GENERAL INFORMATION FOR ELECTRICAL EQUIPMENT DIRECTORY 2005

Use the Index of Product Categories at the back of this Directory.


OFFICES AND TESTING FACILITIES IN THE UNITED STATES

CORPORATE HEADQUARTERS
Underwriters Laboratories Inc.
333 Pfingsten Road
Northbrook, Illinois 60062-2096
Customer Service:
Phone: +1-877-ULHELPS (1-877-854-3577)
Fax: +1 847-407-1395
E-mail: customerservice.nbk@us.ul.com
www.ul.com

Underwriters Laboratories Inc.
1655 Scott Blvd.
Santa Clara,
California 95050-4169
Customer Service:
Phone: +1-877-ULHELPS (1-877-854-3577)
Fax: +1 408-556-6207
E-mail: customerservice.scl@us.ul.com

Underwriters Laboratories Inc.
1285 Walt Whitman Road
Melville, L. I.,
New York 11747-3081
Customer Service:
Phone: +1-877-ULHELPS (1-877-854-3577)
Fax: +1-631-439-6464
E-mail: customerservice.mel@us.ul.com

Underwriters Laboratories Inc.
2600 N.W. Lake Road
Camas WA 98607-8542
Customer Service:
Phone: +1-877-ULHELPS (1-877-854-3577)
Fax: +1 360 817-6137
E-mail: customerservice.cam@us.ul.com

Additional offices are listed in back of Directory.

Web Site: www.ul.com

Founded in 1894, Underwriters Laboratories Inc. (UL) is an independent, not-for-profit organization dedicated to working for a safer world. UL and its subsidiaries operate facilities throughout the world for the testing, certification and quality assessment of products, systems and services. With an unwavering commitment to public safety and societal well-being, UL provides the highest level of conformity assessment services to its global clients.

ISBN-0-7629-1062-3
COPYRIGHT © 2005 UNDERWRITERS LABORATORIES INC.®
General Information for Electrical Equipment Directory

Table of Contents

Introduction

Installation and Use of Products Bearing the UL Mark .......................................................... xxv
Use of this Directory .................................................................................................................. xxv

Look for the UL Mark
Identification of UL Listed and Classified Products .............................................................. xxvi
Identification of UL Listed Products .................................................................................... xxvii
Identification of UL Listed Gas-Fired Products .................................................................... xxvii
Identification of UL Listed Environmental and Public Health (EPH) Products ................... xxvii
Identification of UL Classified Products ................................................................................ xxvii
Identification of UL Classified Environmental and Public Health (EPH) Products .............. xxviii
Identification of UL Listed Products that are Also Classified in Accordance with
International or Regional Standards ....................................................................................... xxviii
Identification of Products Classified in Accordance with
International or Regional Standards Only ........................................................................... xxviii

Specifying UL Listed and Classified Products

Field Engineering Services ..................................................................................................... xxix
Over 600 Volts Rated Equipment and Devices Category List .............................................. xxix
Distributed Power Generation Equipment Category List ..................................................... xxx

General Information from
Electrical Construction Equipment Directory

PART I

Electrical Equipment for Use in Ordinary Locations (AALZ)
Advertising Displays, Nonilluminated (AAVU) ................................................................. 4
Aluminum Sheathed Cable Fittings (ARYV) ....................................................................... 4
Appliance Controls (ATNZ) ................................................................................................. 4
Appliance Controls (ATYZ) ................................................................................................. 4
Appliance Outlet Centers (AUJZ) ....................................................................................... 5
Commercial Appliance Outlet Centers (AUUZ) ............................................................... 5
Residential Appliance Outlet Centers (AVGQ) ................................................................. 5
Arc-fault Circuit Interrupters (AVYI) .................................................................................. 5
Arc-fault Circuit Interrupters, Branch/Feeder Type (AVZQ) ............................................... 5
Arc-fault Circuit Interrupters, Combination Type (AWAH) ............................................. 5
Arc-fault Circuit Interrupters, Cord Type (AWAY) ............................................................ 5
Arc-fault Circuit Interrupters, Outlet Branch Circuit Type (AWBZ) ................................ 6
Arc-fault Circuit Interrupters, Outlet Circuit Type (AWCG) ............................................ 6
Arc-fault Circuit Interrupters, Portable Type (AWDO) ..................................................... 6
Architectural and Floating Fountains (AWEG) ................................................................. 6
Armored Cable (AWEZ) ...................................................................................................... 6
Armored Cable Connectors, Type AC (AWSX) ........................................... 7
Attachment Plugs (AXGV) .............................................................................. 7
Attachment Plugs, Fuseless (AXUT) ................................................................. 8
Attachment Plugs with Switches (AYIR) ............................................................. 9
Attachment Plugs with Overload Protection (AYVZ) ......................................... 9
Boat Cable (BDFX) ........................................................................................... 9
Boxes, Enclosures, Handholes and Vaults, Underground, Utility Specification (BGHL) .................................................................................................................. 9
Boxes, Junction and Pull (BGUZ) ...................................................................... 9
Busways, Metal-enclosed, Over 600 V (CVZW) ................................................... 10
Busways and Associated Fittings (CWFT) .......................................................... 10
Cabinets and Cutout Boxes (CYIV) .................................................................... 11
Cable Assemblies and Fittings for Industrial Control and Signal Distribution (CYJV) ........................................................................................................ 11
Cable Limiters (CYMT) .................................................................................... 11
Cable Trays (CYNW) ........................................................................................ 12
Cable Trays, Nonmetallic (CYOV) ....................................................................... 12
Capacitors (CYWT) .......................................................................................... 12
Circuit Breakers (DHJR) .................................................................................... 12
Adapters, Circuit Breaker (DHWZ) ..................................................................... 12
Adapters, Circuit Breaker, Classified for Use in Specified Equipment (DICQ) .... 13
Circuit Breaker Accessories (DIHS) .................................................................... 13
Circuit Breaker and Secondary Surge Arresters (DIMV) .................................... 13
Circuit Breaker and Transient Voltage Surge Suppressors (DIPJ) ....................... 13
Circuit Breaker Current Limiters (DIRW) ............................................................ 13
Circuit Breakers for Use in Communications Equipment (DITT) ....................... 14
Circuit Breakers, Molded-case and Circuit Breaker Enclosures (DIVQ) ............ 14
Circuit Breakers, Molded-case, Classified for Mitigating the Effects of Arcing Faults (DIWL) .......................................................... 15
Circuit Breakers, Molded-case, Classified for Use in Specified Equipment (DIXF) ........................................................................................................ 15
Circuit Breakers with Equipment Ground-fault Protection (DIYA) ....................... 16
Fused Circuit Breakers (DIYV) ........................................................................... 16
Circuit Breaker and Ground-fault Circuit Interrupters (DKUY) ......................... 16
Circuit Breakers and Metal-clad Switchgear Over 600 V (DLAH) ....................... 16
Circuit Breakers, Medium Voltage Classified for Use in Specified Equipment (DLBC) .................................................................................................... 17
Circuit Breaker Switchgear, Metal-enclosed, Over 600 V (DLBK) ....................... 18
Circuit Protectors (DLBX) .................................................................................. 19
Class 2 and Communication Cable Management Systems (DLPV) ..................... 19
Cold Cathode Transformers and Power Supplies (DUEC) ................................... 19
Communication Cable Assemblies (DUNH) ...................................................... 19
Communications Cable (DUZX) ......................................................................... 20
Communications Cable Verified in Accordance with National or International Specifications (DVBG) .......................................................... 20
Data Transmission Cable Verified in Accordance with National or International Specifications (DVB1) .......................................................... 20
Community Antenna Television Cable (DVCS) ................................................... 21
Computer Interconnection Cable Assemblies (DVPI) ........................................... 21
Conductor Termination Compounds (DVYW) ..................................................... 21
Conduit and Fittings (DWFV) ............................................................................ 21
Conduit and Cable Hardware (DWMU) ............................................................. 21
Conduit Fittings (DWTI) .................................................................................... 22

IMPORTANT INFORMATION FOR USERS OF THIS DIRECTORY
 IMPORTANT INFORMATION FOR USERS OF THIS DIRECTORY

Elevator Control Panels (FQPB) ................................................................. 36
Elevator Door Locking Devices and Contacts (FQXZ) ...................... 36
Elevator Oil Buffers (FQZD) ................................................................. 36
Elevator Switches (FRAH) ................................................................. 36
Passenger Elevator Car Enclosures (FRBK) ........................................ 37
Emergency Lighting and Power Equipment (FTBR) ......................... 37
Engine Generators (FTCA) ................................................................. 37
Engine Generators for Portable Use (FTCN) ....................................... 37
Engine Generators for Recreational Vehicles (FTCZ) ....................... 37
Energy Usage Monitoring Systems (FTRZ) ........................................ 38
Engine Generators (FTSR) ................................................................. 38
Equipment Ground-Fault Protective Devices (FTTE) ....................... 38
Exit Fixtures (FWBO) ........................................................................ 38
Exit Signs, Self-luminous and Photoluminescent (FWBX) ............... 39
Exit Sign Conversion Kits (FWCF) .................................................... 39
Exit Fixture to Exit Light Conversions, Retrofit (FWCN) ................. 39
Exit Sign Retrofit Kits (GGET) ........................................................ 39
Factory Automation Equipment (GPNY) ............................................ 40
Fan Speed Controls (GQHG) ............................................................. 40
FC Cable (GQKT) ............................................................................. 40
FC Cable Fittings (GQRS) ................................................................. 40
Fire Alarm Cable (HNGV) ................................................................. 41
Nonpower-limited Fire Alarm Cable (HNHT) ..................................... 41
Power-limited Fire Alarm Cable (HNIR) ............................................ 41
Luminaires and Fittings (HYXT) .......................................................... 42
Fixtures, Stage Type (IDDX) .............................................................. 42
Fixtures, Submersible (IDRV) .......................................................... 42
Luminaires and Fittings, Special Purpose, Miscellaneous (IETR) .... 42
Luminaires (IETX) ........................................................................... 43
Luminaire Conversions, Retrofit (IEUQ) ........................................... 43
Luminaire Poles (IEUR) ................................................................. 43
Fluorescent Lamp Type Luminaires (IEUT) ........................................ 44
Fluorescent Surface Mounted Luminaires (IEUZ) ......................... 44
Fluorescent Recessed Luminaires (IEWV) ....................................... 44
Light Diffusers and Lenses for Air Handling Luminaires, Fluorescent (IEWR) ................................................................. 45
Incandescent Lamp Type Luminaires (IEYV) .................................... 46
Incandescent Surface-mounted Luminaires (IEZR) ......................... 46
Incandescent Recessed Luminaires (IEZX) ....................................... 46
Incandescent Recessed Luminaires, Convertible, Non-IC/IC (IFAH) .... 47
Special Purpose Luminaires (IFAT) ................................................... 48
Canopy Luminaires (IFAW) ............................................................. 48
Electric Discharge Lighting Systems, Cold Cathode (IFAY) .......... 48
Landscape Lighting Systems, Low Voltage (IFDH) ......................... 48
Luminaires and Luminaire Assemblies Classified for Fire Resistance (IFDL) ... 49
Low Voltage Luminaires for Recreational Vehicle Use (IFDQ) .... 49
Low-voltage Incandescent Luminaires and Fittings (IFDR) .......... 49
Medical-dental Luminaires (IFDT) ................................................... 50
Stage and Studio Luminaires and Connector Strips (IFDZ) .......... 50
Submersible Luminaires (IFEV) ....................................................... 50
<table>
<thead>
<tr>
<th>Category</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Control Equipment (NIMX)</td>
<td>66</td>
</tr>
<tr>
<td>Hydrogen Generators (NCBD)</td>
<td>65</td>
</tr>
<tr>
<td>Grounding Equipment, Neutral Grounding Devices, Over 600 V (KDZC)</td>
<td>65</td>
</tr>
<tr>
<td>Grounding and Bonding Equipment, Communication (KDSH)</td>
<td>64</td>
</tr>
<tr>
<td>Grounding and Bonding Equipment (KDER)</td>
<td>64</td>
</tr>
<tr>
<td>Generators (JZGZ)</td>
<td>62</td>
</tr>
<tr>
<td>Fuel Cell Equipment (IRGN)</td>
<td>53</td>
</tr>
<tr>
<td>Flexible Stage and Lighting Power Cable (ILPH)</td>
<td>53</td>
</tr>
<tr>
<td>Fuse Holders (IYXV)</td>
<td>54</td>
</tr>
<tr>
<td>Fuse Holders, Cartridge Fuse (IZLT)</td>
<td>54</td>
</tr>
<tr>
<td>Fuse Holders, Special Purpose (IZND)</td>
<td>55</td>
</tr>
<tr>
<td>Fittings for Fuse Holders (IZZR)</td>
<td>55</td>
</tr>
<tr>
<td>Fuse Holders, Plug Fuse (JAMZ)</td>
<td>55</td>
</tr>
<tr>
<td>Fuses (JCQR)</td>
<td>55</td>
</tr>
<tr>
<td>Cartridge Fuses, Nonrenewable (JDDZ)</td>
<td>55</td>
</tr>
<tr>
<td>Cartridge Fuses, Renewable (JDRX)</td>
<td>58</td>
</tr>
<tr>
<td>Fuse Accessories (JDVS)</td>
<td>58</td>
</tr>
<tr>
<td>Fuses, Supplemental (JDXY)</td>
<td>59</td>
</tr>
<tr>
<td>Fuses, Over 600 Volts (JEFG)</td>
<td>59</td>
</tr>
<tr>
<td>Low-voltage Fuses Classified in Accordance with IEC Publications (JEFA)</td>
<td>60</td>
</tr>
<tr>
<td>Plug Fuses (JEFV)</td>
<td>61</td>
</tr>
<tr>
<td>Special Purpose Fuses (JFHR)</td>
<td>61</td>
</tr>
<tr>
<td>Universal Modular Fuses (JGFI)</td>
<td>62</td>
</tr>
<tr>
<td>Generators (JZGZ)</td>
<td>62</td>
</tr>
<tr>
<td>Ground-fault Circuit Interrupters (KCXS)</td>
<td>63</td>
</tr>
<tr>
<td>Special Purpose Ground-fault Circuit Interrupters (KCYC)</td>
<td>63</td>
</tr>
<tr>
<td>Ground-Fault Sensing and Relaying Equipment (KDAX)</td>
<td>63</td>
</tr>
<tr>
<td>Grounding and Bonding Equipment (KDER)</td>
<td>64</td>
</tr>
<tr>
<td>Grounding and Bonding Equipment, Communication (KDSH)</td>
<td>64</td>
</tr>
<tr>
<td>Grounding Equipment, Neutral Grounding Devices, Over 600 V (KDZC)</td>
<td>65</td>
</tr>
<tr>
<td>Hoistway Cable (MSZR)</td>
<td>65</td>
</tr>
<tr>
<td>Hydrogen Generators (NCBD)</td>
<td>65</td>
</tr>
<tr>
<td>Hydrogen Generators, Electrolyser Type (NCBH)</td>
<td>65</td>
</tr>
<tr>
<td>Hydrogen Generators, Fuel Processing Type (NCBL)</td>
<td>65</td>
</tr>
<tr>
<td>Hydrogen Generators, Water Reaction Type (NCRB)</td>
<td>66</td>
</tr>
<tr>
<td>Industrial Control Equipment (NIMX)</td>
<td>66</td>
</tr>
<tr>
<td>Electro-sensitive Protective Equipment (NIOZ)</td>
<td>66</td>
</tr>
<tr>
<td>Active Opto-electronic Protective Devices (NIPF)</td>
<td>67</td>
</tr>
<tr>
<td>Active Opto-electronic Protective Devices Responsive to Diffuse Reflection (NIPM)</td>
<td>67</td>
</tr>
<tr>
<td>Elevator Controls and Accessories (NIQK)</td>
<td>67</td>
</tr>
<tr>
<td>Emergency Stop Devices (NISD)</td>
<td>67</td>
</tr>
<tr>
<td>Industrial Control Panels (NITW)</td>
<td>67</td>
</tr>
<tr>
<td>Flame Control Panels (NIVT)</td>
<td>68</td>
</tr>
<tr>
<td>Power Press Control Panels (NIXQ)</td>
<td>68</td>
</tr>
<tr>
<td>Track Lights and Tracks (IFFR)</td>
<td>51</td>
</tr>
<tr>
<td>Luminaire Fittings (IFFX)</td>
<td>51</td>
</tr>
<tr>
<td>Fixture Fittings for Track Lighting (IFGT)</td>
<td>51</td>
</tr>
<tr>
<td>Recessed Luminaire Trims (IFGW)</td>
<td>52</td>
</tr>
<tr>
<td>Flat Conductor Cable, Type FCC (IKKT)</td>
<td>52</td>
</tr>
<tr>
<td>Flat Conductor Cable Fittings (IKMW)</td>
<td>52</td>
</tr>
<tr>
<td>Flexible Metallic Tubing (ILJW)</td>
<td>52</td>
</tr>
<tr>
<td>Flexible Metallic Tubing Assemblies (IHLT)</td>
<td>52</td>
</tr>
<tr>
<td>Fittings, Flexible Metallic Tubing (ILNR)</td>
<td>53</td>
</tr>
<tr>
<td>Flexible Stage and Lighting Power Cable (ILPH)</td>
<td>53</td>
</tr>
<tr>
<td>Fuel Cell Equipment (IRGN)</td>
<td>53</td>
</tr>
<tr>
<td>Hand-held or Hand-transportable Fuel Cell Power Units and Disposable Fuel Cartridges (IRGU)</td>
<td>53</td>
</tr>
<tr>
<td>Stationary Fuel Cell Power Systems (IRGX)</td>
<td>53</td>
</tr>
<tr>
<td>Fuel Gas Booster Compressor Equipment (IUXX)</td>
<td>54</td>
</tr>
<tr>
<td>Fused Power Circuit Devices (IYSR)</td>
<td>54</td>
</tr>
<tr>
<td>Fuse Holders (IYXV)</td>
<td>54</td>
</tr>
<tr>
<td>Fuse Holders, Cartridge Fuse (IZLT)</td>
<td>54</td>
</tr>
<tr>
<td>Fuse Holders, Special Purpose (IZND)</td>
<td>55</td>
</tr>
<tr>
<td>Fittings for Fuse Holders (IZZR)</td>
<td>55</td>
</tr>
<tr>
<td>Fuse Holders, Plug Fuse (JAMZ)</td>
<td>55</td>
</tr>
<tr>
<td>Fuses (JCQR)</td>
<td>55</td>
</tr>
<tr>
<td>Cartridge Fuses, Nonrenewable (JDDZ)</td>
<td>55</td>
</tr>
<tr>
<td>Cartridge Fuses, Renewable (JDRX)</td>
<td>58</td>
</tr>
<tr>
<td>Fuse Accessories (JDVS)</td>
<td>58</td>
</tr>
<tr>
<td>Fuses, Supplemental (JDXY)</td>
<td>59</td>
</tr>
<tr>
<td>Fuses, Over 600 Volts (JEFG)</td>
<td>59</td>
</tr>
<tr>
<td>Low-voltage Fuses Classified in Accordance with IEC Publications (JEFA)</td>
<td>60</td>
</tr>
<tr>
<td>Plug Fuses (JEFV)</td>
<td>61</td>
</tr>
<tr>
<td>Special Purpose Fuses (JFHR)</td>
<td>61</td>
</tr>
<tr>
<td>Universal Modular Fuses (JGFI)</td>
<td>62</td>
</tr>
<tr>
<td>Generators (JZGZ)</td>
<td>62</td>
</tr>
<tr>
<td>Ground-fault Circuit Interrupters (KCXS)</td>
<td>63</td>
</tr>
<tr>
<td>Special Purpose Ground-fault Circuit Interrupters (KCYC)</td>
<td>63</td>
</tr>
<tr>
<td>Ground-Fault Sensing and Relaying Equipment (KDAX)</td>
<td>63</td>
</tr>
<tr>
<td>Grounding and Bonding Equipment (KDER)</td>
<td>64</td>
</tr>
<tr>
<td>Grounding and Bonding Equipment, Communication (KDSH)</td>
<td>64</td>
</tr>
<tr>
<td>Grounding Equipment, Neutral Grounding Devices, Over 600 V (KDZC)</td>
<td>65</td>
</tr>
<tr>
<td>Hoistway Cable (MSZR)</td>
<td>65</td>
</tr>
<tr>
<td>Hydrogen Generators (NCBD)</td>
<td>65</td>
</tr>
<tr>
<td>Hydrogen Generators, Electrolyser Type (NCBH)</td>
<td>65</td>
</tr>
<tr>
<td>Hydrogen Generators, Fuel Processing Type (NCBL)</td>
<td>65</td>
</tr>
<tr>
<td>Hydrogen Generators, Water Reaction Type (NCRB)</td>
<td>66</td>
</tr>
<tr>
<td>Industrial Control Equipment (NIMX)</td>
<td>66</td>
</tr>
<tr>
<td>Electro-sensitive Protective Equipment (NIOZ)</td>
<td>66</td>
</tr>
<tr>
<td>Active Opto-electronic Protective Devices (NIPF)</td>
<td>67</td>
</tr>
<tr>
<td>Active Opto-electronic Protective Devices Responsive to Diffuse Reflection (NIPM)</td>
<td>67</td>
</tr>
<tr>
<td>Elevator Controls and Accessories (NIQK)</td>
<td>67</td>
</tr>
<tr>
<td>Emergency Stop Devices (NISD)</td>
<td>67</td>
</tr>
<tr>
<td>Industrial Control Panels (NITW)</td>
<td>67</td>
</tr>
<tr>
<td>Flame Control Panels (NIVT)</td>
<td>68</td>
</tr>
<tr>
<td>Power Press Control Panels (NIXQ)</td>
<td>68</td>
</tr>
<tr>
<td>Topic</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Motor Control Centers (NJAV)</td>
<td>68</td>
</tr>
<tr>
<td>Motor Controllers Over 1500 V (NJHU)</td>
<td>68</td>
</tr>
<tr>
<td>Power Conversion Equipment, Medium Voltage (NJIC)</td>
<td>69</td>
</tr>
<tr>
<td>Motor Controller Accessories Over 1500 V (NJII)</td>
<td>69</td>
</tr>
<tr>
<td>Motor Controllers (NJOT)</td>
<td>69</td>
</tr>
<tr>
<td>Auxiliary Devices (NKCR)</td>
<td>69</td>
</tr>
<tr>
<td>Combination Motor Controllers (NKJH)</td>
<td>70</td>
</tr>
<tr>
<td>Motor Controllers, Float- and Pressure-operated (NKPZ)</td>
<td>70</td>
</tr>
<tr>
<td>Magnetic (NLDX)</td>
<td>70</td>
</tr>
<tr>
<td>Motor Controllers, Manual (NLRV)</td>
<td>70</td>
</tr>
<tr>
<td>Motor Controllers, Mechanically-operated and Solid-state (NMFT)</td>
<td>70</td>
</tr>
<tr>
<td>Power Conversion Equipment (NMMS)</td>
<td>71</td>
</tr>
<tr>
<td>Power Circuit and Motor-mounted Apparatus (NMTR)</td>
<td>71</td>
</tr>
<tr>
<td>Programmable Controllers (NRAQ)</td>
<td>71</td>
</tr>
<tr>
<td>Programmable Safety Controllers (NRGF)</td>
<td>71</td>
</tr>
<tr>
<td>Protective Relays (NRGU)</td>
<td>72</td>
</tr>
<tr>
<td>Proximity Switches (NRKH)</td>
<td>72</td>
</tr>
<tr>
<td>Switches, Industrial Control (NRNT)</td>
<td>72</td>
</tr>
<tr>
<td>Industrial Control Equipment, Programmable Controllers Classified in Accordance with IEC Publications (NWCS)</td>
<td>72</td>
</tr>
<tr>
<td>Instrumentation Tray Cable (NYTT)</td>
<td>72</td>
</tr>
<tr>
<td>Insulating Devices and Materials (NYYV)</td>
<td>73</td>
</tr>
<tr>
<td>Insulating Bushings (NZMT)</td>
<td>73</td>
</tr>
<tr>
<td>Insulating Tape (OANZ)</td>
<td>73</td>
</tr>
<tr>
<td>Insulating Devices and Materials, Miscellaneous (OCDT)</td>
<td>73</td>
</tr>
<tr>
<td>Irrigation Cable (OFFY)</td>
<td>73</td>
</tr>
<tr>
<td>Irrigation Cable Assemblies (OFJZ)</td>
<td>73</td>
</tr>
<tr>
<td>Lampholders (OIMZ)</td>
<td>73</td>
</tr>
<tr>
<td>Lampholders, Electric Discharge (OJAX)</td>
<td>73</td>
</tr>
<tr>
<td>Lampholders, Electric Discharge, More Than 1000 V (OJOV)</td>
<td>73</td>
</tr>
<tr>
<td>Lampholders, Electric Discharge, 1000 V or Less (OKCT)</td>
<td>73</td>
</tr>
<tr>
<td>Lampholders, Fittings (OKQR)</td>
<td>74</td>
</tr>
<tr>
<td>Lampholders, Incandescent (OLDZ)</td>
<td>74</td>
</tr>
<tr>
<td>Lampholders, Adapters (OLRX)</td>
<td>74</td>
</tr>
<tr>
<td>Lampholders, Candelabra and Miniature (OMFV)</td>
<td>74</td>
</tr>
<tr>
<td>Lampholders, Intermediate Base (OMTT)</td>
<td>74</td>
</tr>
<tr>
<td>Lampholders, Medium Base (ONHR)</td>
<td>74</td>
</tr>
<tr>
<td>Lampholders, Mogul Base (ONUZ)</td>
<td>74</td>
</tr>
<tr>
<td>Lampholders, Miscellaneous (OOIX)</td>
<td>74</td>
</tr>
<tr>
<td>Lighting and Power Equipment, Auxiliary (OUST)</td>
<td>74</td>
</tr>
<tr>
<td>Lightning Protection (OVGR)</td>
<td>75</td>
</tr>
<tr>
<td>Lightning Conductors, Air Terminals and Fittings (OVTZ)</td>
<td>75</td>
</tr>
<tr>
<td>Lightning Protection System Installations (OWAY)</td>
<td>75</td>
</tr>
<tr>
<td>Surge Arresters (OWHX)</td>
<td>75</td>
</tr>
<tr>
<td>Surge Arresters Classified for Use in Specified Equipment (OWIWI)</td>
<td>75</td>
</tr>
<tr>
<td>Limited Combustible Cable (OWKZ)</td>
<td>75</td>
</tr>
<tr>
<td>Low Voltage AC Power Switching Devices (PAPU)</td>
<td>76</td>
</tr>
<tr>
<td>Low Voltage AC Power Switching Devices, Mechanically-operated and Solid-state (NMFT)</td>
<td>70</td>
</tr>
<tr>
<td>Accessories, Low Voltage AC Power Switching Devices (PAQF)</td>
<td>76</td>
</tr>
<tr>
<td>Adapters, Low Voltage AC Power Switching Devices (PAQQ)</td>
<td>76</td>
</tr>
<tr>
<td>Low Voltage AC Fuse Draw Out (PAQT)</td>
<td>76</td>
</tr>
<tr>
<td>Low Voltage AC Power Circuit Breakers (PAQX)</td>
<td>77</td>
</tr>
<tr>
<td>Secondary Network Protectors (PARZ)</td>
<td>77</td>
</tr>
<tr>
<td>Low Voltage AC Integrrally Fused Power Circuit Breakers (PASQ)</td>
<td>77</td>
</tr>
<tr>
<td>IMPORTANT INFORMATION FOR USERS OF THIS DIRECTORY</td>
<td>72</td>
</tr>
<tr>
<td>Topic</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Low Voltage AC Power Circuit Protectors (PATT)</td>
<td>77</td>
</tr>
<tr>
<td>Low Voltage DC Power Circuit Breakers (PAXW)</td>
<td>77</td>
</tr>
<tr>
<td>Trip Devices Classified for Use in Low Voltage AC Power Circuit Breakers (PAYK)</td>
<td>78</td>
</tr>
<tr>
<td>Management Equipment, Energy (PAZX)</td>
<td>78</td>
</tr>
<tr>
<td>Marina and Boatyard Cable (PDYQ)</td>
<td>78</td>
</tr>
<tr>
<td>Medium-voltage Cable (PITY)</td>
<td>78</td>
</tr>
<tr>
<td>Medium-voltage Cable Classified in Accordance with UL 1072, with Metric Conductor Sizes (PIVW)</td>
<td>79</td>
</tr>
<tr>
<td>Metal-clad Cable (PJAZ)</td>
<td>79</td>
</tr>
<tr>
<td>Metal-Clad Cable Classified in Accordance with IEC Publications (PJHY)</td>
<td>79</td>
</tr>
<tr>
<td>Metal-clad Cable Connectors, Type MC (PJOX)</td>
<td>80</td>
</tr>
<tr>
<td>Metal-clad Cable Classified in Accordance with UL 1569, with Metric Conductor Sizes (PJP)</td>
<td>80</td>
</tr>
<tr>
<td>Meter Mounting Equipment (PJSR)</td>
<td>80</td>
</tr>
<tr>
<td>Meter Fittings (PJVV)</td>
<td>81</td>
</tr>
<tr>
<td>Meter Socket Bases (PJWT)</td>
<td>81</td>
</tr>
<tr>
<td>Metering Transformer Cabinets (PJXS)</td>
<td>81</td>
</tr>
<tr>
<td>Meter Sockets (PJY)</td>
<td>81</td>
</tr>
<tr>
<td>Meter Socket Accessories (PKAX)</td>
<td>81</td>
</tr>
<tr>
<td>Mineral Insulated Metal-sheathed Cable (PPKV)</td>
<td>81</td>
</tr>
<tr>
<td>Mineral Insulated Cable Fittings (PPYT)</td>
<td>82</td>
</tr>
<tr>
<td>Motor-Generator Sets (PQYW)</td>
<td>82</td>
</tr>
<tr>
<td>Motors (PRGY)</td>
<td>82</td>
</tr>
<tr>
<td>Mounting Posts and Pedestals for Distribution Equipment (PUPR)</td>
<td>82</td>
</tr>
<tr>
<td>Multioutlet Assemblies (PVGT)</td>
<td>83</td>
</tr>
<tr>
<td>Multioutlet Assembly Fittings (PVUR)</td>
<td>83</td>
</tr>
<tr>
<td>Neon Transformers and Power Supplies (PWIK)</td>
<td>83</td>
</tr>
<tr>
<td>Network-powered Broadband Communications Cable (PWIP)</td>
<td>83</td>
</tr>
<tr>
<td>Nonmetallic-sheathed Cable (PWVX)</td>
<td>84</td>
</tr>
<tr>
<td>Nonmetallic-sheathed Cable Connectors (PXJV)</td>
<td>84</td>
</tr>
<tr>
<td>Nonmetallic Extensions (PXXT)</td>
<td>84</td>
</tr>
<tr>
<td>Nonmetallic Extension Fittings (PYYZ)</td>
<td>84</td>
</tr>
<tr>
<td>Nonmetallic Surface Extensions (PZMX)</td>
<td>85</td>
</tr>
<tr>
<td>Nonmetallic-sheathed Cable Interconnectors (QAAV)</td>
<td>85</td>
</tr>
<tr>
<td>Optical Fiber Cable (QAYK)</td>
<td>85</td>
</tr>
<tr>
<td>Optical Fiber Cable, Field Assembled (QAZD)</td>
<td>85</td>
</tr>
<tr>
<td>Optical Fiber Cable Verified in Accordance with National or International Specifications (QAZI)</td>
<td>86</td>
</tr>
<tr>
<td>Optical Fiber Cable Verified in Accordance with New York City Transit Specification (QAZK)</td>
<td>86</td>
</tr>
<tr>
<td>Optical Fiber/Communications/Signaling/Coaxial Cable Raceways (QAZM)</td>
<td>86</td>
</tr>
<tr>
<td>Optical Fiber Raceway Assemblies (QAZQ)</td>
<td>87</td>
</tr>
<tr>
<td>Optical Fiber/Communications Cable Routing Assemblies for Use in Telecommunication Installations (QBAA)</td>
<td>87</td>
</tr>
<tr>
<td>Optical Fiber Branching Devices (QBEA)</td>
<td>88</td>
</tr>
<tr>
<td>Optical Fiber Branching Devices Verified in Accordance with National or International Specifications (QBEN)</td>
<td>88</td>
</tr>
<tr>
<td>Optical Fiber Cable Assemblies and Connectors (QBFA)</td>
<td>88</td>
</tr>
<tr>
<td>Optical Fiber Cable Assemblies and Connectors Verified in Accordance with National or International Specifications (QBFN)</td>
<td>88</td>
</tr>
<tr>
<td>Outlet Boxes and Fittings (QBPZ)</td>
<td>89</td>
</tr>
<tr>
<td>Outlet Boxes and Fittings Classified for Fire Resistance (QBWY)</td>
<td>89</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Conduit Bodies and Covers Classified for Use with Specified Equipment</td>
<td>90</td>
</tr>
<tr>
<td>Metallic Outlet Boxes (QCIT)</td>
<td>89</td>
</tr>
<tr>
<td>Nonmetallic Outlet Boxes (QCMZ)</td>
<td>90</td>
</tr>
<tr>
<td>Outlet Bushings and Fittings (QCRV)</td>
<td>91</td>
</tr>
<tr>
<td>Wall Opening Protective Materials (QCSN)</td>
<td>91</td>
</tr>
<tr>
<td>Outlet Circuit Testers (QCYU)</td>
<td>91</td>
</tr>
<tr>
<td>Packaged Pumping Systems (QCZI)</td>
<td>92</td>
</tr>
<tr>
<td>Panelboards (QEUY)</td>
<td>92</td>
</tr>
<tr>
<td>Temporary Panelboard Ingress Barriers (QEWI)</td>
<td>93</td>
</tr>
<tr>
<td>Panelboards, Modular (QFOF)</td>
<td>93</td>
</tr>
<tr>
<td>Distributed Generation Power Systems Equipment (QHWJ)</td>
<td>93</td>
</tr>
<tr>
<td>AC Modules (QHYZ)</td>
<td>93</td>
</tr>
<tr>
<td>Photovoltaic Charge Controllers (QIBP)</td>
<td>94</td>
</tr>
<tr>
<td>Photovoltaic Modules and Panels (QIGU)</td>
<td>94</td>
</tr>
<tr>
<td>Distributed Generation Power Systems Accessory Equipment (QIIO)</td>
<td>94</td>
</tr>
<tr>
<td>Photovoltaic Power Units (QIJL)</td>
<td>94</td>
</tr>
<tr>
<td>Static Inverters and Converters for Use in Independent Power Systems</td>
<td>95</td>
</tr>
<tr>
<td>Pin-and-Sleeve Type Plugs, Receptacles and Cable Connectors (QLGD)</td>
<td>96</td>
</tr>
<tr>
<td>Attachment Plugs, Pin-and-Sleeve Type (QLHN)</td>
<td>96</td>
</tr>
<tr>
<td>Receptacles, Pin-and-Sleeve Type (QLIW)</td>
<td>96</td>
</tr>
<tr>
<td>Receptacle-Plug Combinations, Pin-and-Sleeve Type, Classified for Use</td>
<td>96</td>
</tr>
<tr>
<td>in Specific Combinations (QLKH)</td>
<td>96</td>
</tr>
<tr>
<td>Polyvinyl Chloride Solvent Cement (QORV)</td>
<td>97</td>
</tr>
<tr>
<td>Portable Power Cable (QPMU)</td>
<td>97</td>
</tr>
<tr>
<td>Power and Control Tray Cable (QPOR)</td>
<td>97</td>
</tr>
<tr>
<td>Power and Control Tray Cable Connectors (QPOZ)</td>
<td>98</td>
</tr>
<tr>
<td>Power Cable Assemblies (QPPL)</td>
<td>98</td>
</tr>
<tr>
<td>Power Converters/Inverters and Power Converter/Inverter Systems (QPPY)</td>
<td>98</td>
</tr>
<tr>
<td>Power Distribution Blocks (QPQS)</td>
<td>99</td>
</tr>
<tr>
<td>Power Distribution Centers for Communications Equipment (QPQY)</td>
<td>99</td>
</tr>
<tr>
<td>Power Distribution Equipment, Portable (QPRW)</td>
<td>99</td>
</tr>
<tr>
<td>Portable Power Distribution Units and Devices (QPSH)</td>
<td>100</td>
</tr>
<tr>
<td>Portable Power Distribution Panels (QPSM)</td>
<td>100</td>
</tr>
<tr>
<td>Power-limited Circuit Cable (QPTZ)</td>
<td>100</td>
</tr>
<tr>
<td>Power Outlets and Power Outlet Fittings (QPYV)</td>
<td>101</td>
</tr>
<tr>
<td>Power Supplies (QQAQ)</td>
<td>101</td>
</tr>
<tr>
<td>Power Supplies, Gas Tube Sign (QQDZ)</td>
<td>102</td>
</tr>
<tr>
<td>Power Supplies, General Purpose (QQFU)</td>
<td>102</td>
</tr>
<tr>
<td>Power Supplies, Information Technology Equipment Including Electrical</td>
<td>102</td>
</tr>
<tr>
<td>Business Equipment (QQGQ)</td>
<td>102</td>
</tr>
<tr>
<td>Power Supplies, Specialty (QQII)</td>
<td>102</td>
</tr>
<tr>
<td>Power Supplies, Telephone (QQIE)</td>
<td>103</td>
</tr>
<tr>
<td>Power Supplies, Gas Tube Sign (QQQK)</td>
<td>103</td>
</tr>
<tr>
<td>Nonmetallic Underground Conduit with Conductors (QQRK)</td>
<td>103</td>
</tr>
<tr>
<td>Prefabricated Assemblies (QQRX)</td>
<td>103</td>
</tr>
<tr>
<td>Manufactured Wiring Systems (QQVX)</td>
<td>104</td>
</tr>
<tr>
<td>Sections and Units (QQXX)</td>
<td>104</td>
</tr>
<tr>
<td>Wiring Assemblies (QQYZ)</td>
<td>104</td>
</tr>
<tr>
<td>Press and Other Power-operated Machine Controls and Systems (QUEQ)</td>
<td>104</td>
</tr>
<tr>
<td>Presence Sensing Devices (QUHP)</td>
<td>104</td>
</tr>
<tr>
<td>Press Controls (QUKQ)</td>
<td>105</td>
</tr>
<tr>
<td>Process Control Equipment (QUXY)</td>
<td>105</td>
</tr>
</tbody>
</table>
Process Control Equipment, Electrical (QUYX) ......................................................... 105
Quick-connect Terminals (RFWV) ............................................................................. 105
Raceways (RGKT) ........................................................................................................ 106
   Cellular Concrete Floor Raceways (RGYR) .......................................................... 106
   Cellular Concrete Floor Raceway Fittings (RHLZ) ................................................. 106
   Cellular Metal Floor Raceways (RHZX) ................................................................ 106
   Cellular Metal Floor Raceway Fittings (RINV) ..................................................... 106
   Strut-type Channel Raceways (RIUU) ................................................................. 107
   Fittings for Strut-type Channel Raceways (RIYG) ................................................ 107
   Surface Metal Raceways (RJBT) ......................................................................... 107
   Surface Metal Raceway Fittings (RJPR) .............................................................. 107
   Surface Nonmetallic Raceways (RJTX) ............................................................... 107
   Surface Nonmetallic Raceway Fittings (RJYT) ................................................... 107
   Underfloor Raceways (RKCZ) ............................................................................. 107
   Underfloor Raceway Fittings (RKQX) ................................................................ 108
   Raised Floor Wireways (RQFW) ......................................................................... 108
   Receptacles (RTDV) .......................................................................................... 108
      Receptacles for Plugs and Attachment Plugs (RTRT) ..................................... 109
      Receptacles, Stage Type (RURF) ................................................................. 110
      Receptacles with Switches (RUSZ) ............................................................... 110
      Utility Service Receptacles (RVNW) .......................................................... 110
   Repackaged Electrical Construction Equipment (TEOZ) ...................................... 111
   Robots and Robotic Equipment (TETZ) ............................................................ 111
   Semiconductor Manufacturing Equipment (TWKH) ........................................... 111
      Analysis and Measurement Equipment (TWLR) ........................................... 111
      Automation and Wafer Handling Equipment (TWPV) .................................... 111
      Control Panels (TWRF) .............................................................................. 112
      Liquid Chemical Distribution Systems (TWSP) ............................................ 112
      Miscellaneous Equipment (TWTZ) .............................................................. 112
      Power Supplies (TWVJ) .............................................................................. 112
      Process Equipment (TWWT) ....................................................................... 113
      Semiconductor Manufacturing Equipment, Limited Production (TWWU) .... 113
   Service Cable (TXKT) ...................................................................................... 113
   Service Entrance Cable (TYLZ) ........................................................................ 113
      Service Entrance Cable Fittings (TYZX) ....................................................... 113
   Shipboard Cable, Marine (UBVZ) ..................................................................... 114
   Shipboard Cable Fittings, Marine (UBWE) ......................................................... 114
   Shipboard Cable, Marine Classified in Accordance with International
   Specifications (UBWK) ..................................................................................... 114
   Signs (UXYT) ................................................................................................... 114
      Field Installed Neon Outline Lighting Systems (UYAM) ................................ 115
      Signs, Changing Message (UYFS) ............................................................... 115
      Sign Accessories (UYMR) ......................................................................... 116
      Sign Components Classified for Use with Specified Equipment (UYTA) .... 116
      Sign Controllers, Message Centers (UYTQ) ............................................... 116
      Sign Conversions, Retrofit (UYWU) ............................................................ 116
      Sign Flashers (UYZZ) ................................................................................. 116
      Skeletal Neon Sign and Outline Lighting Systems, Field Assembled (UZBL) .... 117
   Soldering Fluxes and Fluxed Solders (VABV) ..................................................... 117
   Surge Arresters, 1000 V and Higher (VZQK) ..................................................... 117
   Structured Cabling Programs (VZYY) ............................................................... 117
      Levels XP Structured Cabling Program (VZZL) ............................................ 118
   IMPORTANT INFORMATION FOR USERS OF THIS DIRECTORY
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMPORTANT INFORMATION FOR USERS OF THIS DIRECTORY</td>
<td></td>
</tr>
<tr>
<td>Proprietary Structured Cabling Programs (VZZX)</td>
<td>118</td>
</tr>
<tr>
<td>Swimming Pool and Spa Equipment (WABX)</td>
<td>119</td>
</tr>
<tr>
<td>Blowers (WAGN)</td>
<td>119</td>
</tr>
<tr>
<td>Chlorinators (WAPV)</td>
<td>119</td>
</tr>
<tr>
<td>Controls (WAWU)</td>
<td>119</td>
</tr>
<tr>
<td>Covers for Swimming Pools and Spas (WBAH)</td>
<td>119</td>
</tr>
<tr>
<td>Luminaires and Forming Shells (WBDT)</td>
<td>119</td>
</tr>
<tr>
<td>Heaters (WBRR)</td>
<td>121</td>
</tr>
<tr>
<td>Heat Pumps (WBVE)</td>
<td>121</td>
</tr>
<tr>
<td>Hot Tub and Spa Equipment Assemblies (WBYQ)</td>
<td>121</td>
</tr>
<tr>
<td>Junction Boxes (WCEZ)</td>
<td>121</td>
</tr>
<tr>
<td>Ozone Generators (WCKA)</td>
<td>121</td>
</tr>
<tr>
<td>Swimming Pool and Spa Equipment Classified in Accordance with NSF Standard Number 50 (WCNZ)</td>
<td>122</td>
</tr>
<tr>
<td>Swimming Pool and Spa Cover Operators, Electric (WDDJ)</td>
<td>123</td>
</tr>
<tr>
<td>Swimming Pool and Spa Transformers (WDGV)</td>
<td>123</td>
</tr>
<tr>
<td>Water Treatment Equipment (WDLC)</td>
<td>123</td>
</tr>
<tr>
<td>Swimming Pool and Spa Equipment, Miscellaneous (WDUT)</td>
<td>123</td>
</tr>
<tr>
<td>Suction Fittings for Swimming Pools and Spas (WEBS)</td>
<td>123</td>
</tr>
<tr>
<td>Pullout Switches, Detachable Type (WGEU)</td>
<td>125</td>
</tr>
<tr>
<td>Switches, Automatic (WGLT)</td>
<td>125</td>
</tr>
<tr>
<td>Switches, Clock Operated (WGZR)</td>
<td>125</td>
</tr>
<tr>
<td>Switches, Open Type (WHTY)</td>
<td>125</td>
</tr>
<tr>
<td>Switches, Dead-front (WHXS)</td>
<td>126</td>
</tr>
<tr>
<td>Switches, Enclosed (WIAX)</td>
<td>126</td>
</tr>
<tr>
<td>Switches, Knife (WIOV)</td>
<td>127</td>
</tr>
<tr>
<td>Switches, Load Interrupter and Isolating, Over 600 V (WIQG)</td>
<td>127</td>
</tr>
<tr>
<td>Switches, Molded Case (WJAZ)</td>
<td>127</td>
</tr>
<tr>
<td>Switches, Photoelectric (WJCT)</td>
<td>128</td>
</tr>
<tr>
<td>Photo Controls, Plug-in, Locking Type (WJFX)</td>
<td>128</td>
</tr>
<tr>
<td>Snap Switches (WJQR)</td>
<td>128</td>
</tr>
<tr>
<td>Switches, Door (WLFV)</td>
<td>129</td>
</tr>
<tr>
<td>Switches, Fixture (WLTT)</td>
<td>129</td>
</tr>
<tr>
<td>Switches, Fixture, Socket and Special Mechanism Type (WMHR)</td>
<td>129</td>
</tr>
<tr>
<td>Switches, Flush (WMUZ)</td>
<td>129</td>
</tr>
<tr>
<td>Switches, Pendant (WNIX)</td>
<td>129</td>
</tr>
<tr>
<td>Switches, Pendant, Socket and Special Mechanism Types (WNWV)</td>
<td>129</td>
</tr>
<tr>
<td>Switches, Surface (WOKT)</td>
<td>129</td>
</tr>
<tr>
<td>Transfer Switches (WPTZ)</td>
<td>130</td>
</tr>
<tr>
<td>Accessories, Transfer Switch (WPVQ)</td>
<td>130</td>
</tr>
<tr>
<td>Automatic Transfer Switches for Use in Emergency Systems (WPWR)</td>
<td>130</td>
</tr>
<tr>
<td>Automatic Transfer Switches for Use in Optional Standby Systems (WPXT)</td>
<td>130</td>
</tr>
<tr>
<td>Automatic Transfer Switches, Over 600 V (WPYC)</td>
<td>130</td>
</tr>
<tr>
<td>Nonautomatic Transfer Switches (WPYY)</td>
<td>131</td>
</tr>
<tr>
<td>Switchgear Assemblies, Metal Enclosed, Low-voltage Power Circuit Breaker Type (WUTZ)</td>
<td>131</td>
</tr>
</tbody>
</table>
Switchgear, Gas Insulated Type, Over 600 V (WVEK) .................................................. 131
Temperature-indicating and Regulating Equipment (XAPX) ........................................ 132
Temperature-indicating and Regulating Equipment, Electrical (XATJ) .................... 132
Temporary Lighting Strings (XBRT) ............................................................................. 133
Relocatable Power Taps (XBYS) .................................................................................. 133
Termination Boxes (XCKT) ......................................................................................... 133
Traffic Signal Cable Classified in Accordance with IMSA Specifications (XNTL) .... 134
Transformers (XNWX) ................................................................................................. 134
  Transformers, Class 2 and Class 3 (XOKV) ................................................................. 134
  Transformers, Dimmers (XOYT) ................................................................................... 135
  Transformers, Distribution, Dry Type, Over 600 V (XPFS) ...................................... 135
  Transformers, Distribution, Liquid-filled Type, Over 600 V (XPLH) ....................... 135
  Transformers, Gas Tube Sign (XPMR) ....................................................................... 135
  Transformers, General Purpose (XPTQ) ..................................................................... 135
  Transformers, Ignition (XPZZ) ................................................................................... 136
  Power and General Purpose Transformers, Dry Type (XQNX) .................................. 136
  Transformers, Toy (XRBV) ......................................................................................... 136
  Transient Voltage Surge Suppressors (XUHT) .......................................................... 137
  Transient Voltage Surge Suppressor/Panelboard Extension Modules, Classified for Use With Specified Equipment (XUPD) ......................................................... 137
  Transit Application Equipment and Systems (XUPY) ................................................. 138
  Switches, Isolating (XUTE) ......................................................................................... 138
  Unit Substations (YEFR) ............................................................................................ 139
  Unit Substations Over 600 V (YEFT) .......................................................................... 139
  Valves, Transformer Relief (YUIK) ............................................................................. 140
  Wind Turbine Generating Systems (ZGXW) ............................................................... 140
  Small Wind Turbine Generating Systems (ZGYW) ..................................................... 141
  Large Wind Turbine Generating Systems (ZGYZ) ...................................................... 141
  Wind Turbine Generating Systems Subassemblies (ZGZJ) ......................................... 141
  Wire (ZGZX) ............................................................................................................. 141
  Festoon Cable (ZIPF) ............................................................................................... 141
  Fixture Wire (ZIPR) .................................................................................................... 141
  Flexible Cord (ZJCZ) .................................................................................................. 142
  Gas-Tube-Sign Cable (ZJQX) ...................................................................................... 142
  Machine-tool Wire (ZKHZ) ....................................................................................... 142
  Processed Wire (ZKLU) ............................................................................................ 143
  Thermoset-insulated Wire (ZKST) ............................................................................. 143
  Thermoplastic-insulated Wire (ZLGR) ...................................................................... 144
  Welding Cable (ZMAY) ............................................................................................. 144
  Wire, Special Purpose (ZMHX) .................................................................................. 145
  Wire Connectors (ZMKQ) .......................................................................................... 145
  Crimp Tools Classified for Use with Specified Wire Connectors (ZMLS) .................. 145
  Wire Connector Adapters (ZMOW) .......................................................................... 145
  Wire Connectors and Soldering Lugs (ZMVV) ............................................................ 146
  Wire Connectors, Insulated for Use with Underground Conductors (ZMWQ) ........... 147
  Wire Connectors and Soldering Lugs Classified in Accordance with IEC Standards (ZMWW) ................................................................. 148
  Publications (ZNKD) ............................................................................................... 147
  Positioning Devices (ZODZ) ..................................................................................... 147
  Wire-pulling Compounds (ZOKZ) .............................................................................. 148
  Wireways, Auxiliary Gutters and Associated Fittings (ZOYX) .................................. 148
General Information from
Hazardous Locations Equipment Directory - Part 1

PART II
Equipment for Use in and Relating to Class I, II and III, Division 1 and 2
Hazardous Locations (AAIZ)

   Access Control System Units for Use in Hazardous Locations (AATF) ...................... 154
   Air Conditioning Equipment for Use in Hazardous Locations (AHSY) .................. 154
       Air Conditioners for Use in Hazardous Locations (AIDR) ................................ 154
   Room Air Conditioners for Use in Hazardous Locations (AINU) ......................... 154
   Air Filtering Appliances for Use in Hazardous Locations (AISX) ......................... 155
   Air Sampling Equipment for Use in Hazardous Locations (ALOA) ................. 155
   Alarm System Units for Use in Hazardous Locations (ALSY) ......................... 155

   Intrusion Detection Units for Use in Hazardous Locations (ARCX) .................... 155
   Alternators, Electric for Use in Hazardous Locations (ARDK) ........................... 155
   Lubricant Dispensing Equipment for Use in Hazardous Locations (BAYZ) ............. 155
   Brakes, Electric for Use in Hazardous Locations (BHIX) .................................... 156
   Cable Sealing Fittings for Use in Hazardous Locations (CYMX) ....................... 156
   Camera Equipment for Use in Hazardous Locations (CYPH) ........................... 156
   Casters, Rubber, Electrically Conductive, Relating to Hazardous Locations (CZXZ) .......... 156

   Centrifuges for Use in Hazardous Locations (DAZV) ........................................ 156
   Circuit Breakers for Use in Hazardous Locations (DKAR) ............................... 156
       Branch Circuit and Service for Use in Hazardous Locations (DKNZ) ............... 157
   Cleaning Machines for Use in Hazardous Locations (DMRR) ......................... 157
   Combustion Detection Equipment for Use in Hazardous Locations (DUFK) ............ 157
   Conductivity Testing Equipment Relating to Hazardous Locations (DVRX) ............... 157
   Conduit Fittings for Use in Hazardous Locations (EBNV) .................................... 157
   Corrosion Measuring Equipment for Use in Hazardous Locations (ELHS) .......... 158
   Data Processing Equipment, Electronic for Use in Hazardous Locations (ENWS) .... 158
   Distributed Generation Power Systems Equipment for Use in Hazardous Locations (FCHD) ............................................................. 158
       Photovoltaic Modules and Panels for Use in Hazardous Locations (FCJU) .......... 158
   Door Operators for Use in Hazardous Locations (FCQU) .................................. 159
   Door Holders for Use in Hazardous Locations (FDGF) ...................................... 159
   Drilling Equipment for Use in Hazardous Locations (FDJZ) ............................ 159
       Drilling Instrumentation for Use in Hazardous Locations (FDKX) .................. 159
   Marine Shipboard Cable Sealing Fittings for Use in Hazardous Locations (FDLW) ........ 159
   Electric Discharge Lamp Control Equipment for Use in Hazardous Locations (FNTR) .......................................................... 159
       Ballasts for Use in Hazardous Locations (FOGZ) ........................................ 159
   Electromagnets for Use in Hazardous Locations (FOOM) ............................... 160
   Elevator Appliances for Use in Hazardous Locations (FRZV) .......................... 160
       Elevator Door Locking Devices and Contacts for Use in Hazardous Locations (FSNT) .......... 160
   Emergency Lighting Equipment for Use in Hazardous Locations (FTEV) ......... 160
       Emergency Lighting Equipment Fittings for Use in Hazardous Locations (FTGT) ........ 160
   Enclosures for Metering Equipment for Use in Hazardous Locations (FTRQ) ........ 160
   Enclosures for Use in Hazardous Locations (FTRV) ....................................... 161
   Enclosure Accessories for Use in Hazardous Locations (FTRX) ....................... 161
   Engine Control Equipment for Use in Hazardous Locations (FTVV) .................. 161
Ignition Controls for Use in Hazardous Locations (FTWL) ........................................... 161
Exit Signs and Exit Appliances for Use in Hazardous Locations (FWBC) .............. 161
Self-luminous Exit Signs and Markers for Use in Hazardous Locations (FWBH) . 161
Fans, Portable Electric for Use in Hazardous Locations (GQJA) .......................... 162
Fans, Portable Pneumatic for Use in Hazardous Locations (GQJX) ...................... 162
Luminaires and Fittings for Use in Hazardous Locations (IFGZ) ......................... 162
Luminaires for Use in Hazardous Locations (IFUX) ............................................. 162
Luminaires, Paint Spray Booth for Use in Hazardous Locations (IFYJ) ............. 162
Luminaires, Recessed Type for Use in Hazardous Locations (IGBW) ............... 163
Luminaire Fittings for Use in Hazardous Locations (IGIV) .................................. 163
Luminaire Fittings for Use with Specified Fittings for Use in Hazardous Locations (IGMX) ................................................................................................................ 164
Lighting Unit Fittings, Auxiliary for Use in Hazardous Locations (IGOY) ........... 164
Flashlights and Lanterns for Use in Hazardous Locations (IKBR) ...................... 164
Floor Cleaners for Use in Hazardous Locations (ILQV) ....................................... 164
Flooring, Electrically Conductive, Relating to Hazardous Locations (INFZ) ........ 164
Flooring, Static Dissipative, Relating to Hazardous Locations (INTX) ............... 165
Fumigant Dispensing Equipment for Use in Hazardous Locations (IYNK) ........ 165
Gas and Vapor Detection Equipment for Use in Hazardous Locations (JTNQ) ..... 165
Gas and Vapor Detection Equipment Enclosures for Use in Hazardous Locations (JTOL) .............................................................................................................. 165
Gas and Vapor Detection Equipment Classified for Use in Hazardous Locations (JTPD) .............................................................................................................. 165
Gas and Vapor Detection Equipment Listed for Use in Hazardous Locations (JTPX) .............................................................................................................. 165
Ground-fault Circuit Interrupters for Use in Hazardous Locations (KCYN) ........ 166
Heaters for Use in Hazardous Locations (KFHT) ............................................... 166
Heaters, Air for Use in Hazardous Locations (KFVR) ....................................... 166
Electrical Resistance Heat Tracing Cable Sets for Use in Hazardous Locations (KGFR) .......................................................................................................... 166
Heaters, Industrial and Laboratory for Use in Hazardous Locations (KGIZ) .... 166
Heaters, Miscellaneous for Use in Hazardous Locations (KGWX) .................... 166
Surface Heaters for Use in Hazardous Locations (KHCM) ................................ 166
Water-driven Ventilators for Use in Hazardous Locations (NCGV) .................... 167
Industrial Control Equipment for Use in Hazardous Locations (NNGZ) .......... 167
Control Panels and Assemblies for Use in Hazardous Locations (NNNY) ...... 167
Control Assembly Covers for Use in Hazardous Locations (NNRL) ............... 167
Flame Control Panels for Use in Hazardous Locations (NNTE) ...................... 168
Enclosed Slip Rings for Use in Hazardous Locations (NNTR) ......................... 168
Motor Controllers for Use in Hazardous Locations (NNUX) .......................... 168
Auxiliary Devices for Use in Hazardous Locations (NOIV) ................................ 168
Combination Motor Controllers for Use in Hazardous Locations (NOTH) ....... 168
Float- and Pressure-operated Motor Controllers for Use in Hazardous Locations (NOWT) .................................................................................................. 169
Magnetic Motor Controllers for Use in Hazardous Locations (NPKR) ............. 169
Manual Motor Controllers for Use in Hazardous Locations (NPXZ) .......... 169
Miscellaneous Motor Controllers for Use in Hazardous Locations (NQLX) ..... 169
Power Conversion Equipment for Use in Hazardous Locations (NQMD) ....... 169
Motor Controllers Over 1500 V for Use in Hazardous Locations (NRAA) .... 170
Programmable Controllers for Use in Hazardous Locations (NRAG) ............. 170
Industrial Control Equipment Relating to Hazardous Locations (NRAW) ...... 170
Industrial Control Panels Relating to Hazardous Locations (NRBX) .............. 170
Motor Controllers Relating to Hazardous Locations (NRCY) .......................... 170
Auxiliary Devices Relating to Hazardous Locations (NRDZ) ......................171
Information Technology Equipment for Use in Hazardous Locations (NWHP) .....171
Intrinsically Safe Equipment and Systems for Use in Hazardous Locations (OERX) ..................................................................................171
Laboratory Equipment for Use in Hazardous Locations (OGNA) ..............171
Leak Detection Equipment for Use in Hazardous Locations (OPDH) ........172
Mattresses and Pads, Electrically Conductive, Relating to Hazardous Locations (PHLV) .................................................................172
Measurement Equipment Classified for Use in Hazardous Locations (PICX) ....172
Medical Equipment for Use in Hazardous Locations (PINR) ......................172
Metal-clad Cable for Use in Hazardous Locations (PJPP) ..........................172
Mineral-insulated Cable Assemblies for Use in Hazardous Locations (POWD) ..173
Mineral-insulated Cable Fittings for Use in Hazardous Locations (POWX) ..........173
Motors and Generators for Use in Hazardous Locations (PSBV) ...............173
Generators for Use in Hazardous Locations (PSPT) .................................173
Motors for Use in Hazardous Locations (PTDR) ......................................173
Motors, Division 2 for Use in Hazardous Locations (PTHE) ......................173
Motors and Generators, Rebuilt for Use in Hazardous Locations (PTKQ) ......174
Motors, Specialty for Use in Hazardous Locations (PUCJ) ..........................174
Office Appliances and Business Equipment for Use in Hazardous Locations (QAVS) ..................................................................................174
Outlet Box Accessories for Use in Hazardous Locations (QAZV) ..............174
Outlet Boxes for Use in Hazardous Locations (QBCR) ..............................174
Painting Equipment for Use in Hazardous Locations (QDIY) ......................175
Paint Spray and Finishing Equipment for Use in Hazardous Locations (QEEA) ...175
Paint Spray Booths Without Fire Protection Systems for Use in Hazardous Locations (QEFA) .................................................................175
Paint Spray Booths with Fire Protection Systems for Use in Hazardous Locations (QEFY) .................................................................175
Panelboards for Use in Hazardous Locations (QFIW) .................................176
Personal Protective Equipment for Use in Hazardous Locations (QGWX) ....176
Occupational Head Protection for Use in Hazardous Locations (QGXT) .......176
Plumbing Accessories for Use in Hazardous Locations (QNHV) .................176
Portable Lighting Units for Use in Hazardous Locations (QPKX) .................176
Process Control Equipment for Use in Hazardous Locations (QUZW) ........177
Purging and Pressurizing Controls and Accessories for Use in Hazardous Locations (RFPW) .................................................................177
Radio Devices for Use in Hazardous Locations (RMGR) .............................177
Radio Devices, Rebuilt for Use in Hazardous Locations (RMGZ) ..............177
Receptacle-Plug Combinations for Use in Hazardous Locations (RRAT) ......178
Receptacle-Enclosure Combinations with Plugs for Use in Hazardous Locations (RREG) .................................................................178
Receptacle-Plug Combination Accessories for Use in Hazardous Locations (RRHS) ..................................................................................178
Receptacles with Plugs for Use in Hazardous Locations (RROR) ...............178
Receptacles with Plugs Interlocked with Circuit Breakers for Use in Hazardous Locations (RSBZ) .................................................................179
Receptacles with Plugs Interlocked with Switches for Use in Hazardous Locations (RSPX) .................................................................179
Reels, Cord for Use in Hazardous Locations (SAOX) .................................179
Refrigeration Equipment for Use in Hazardous Locations (SSCR) ..............179
Accessories for Use in Hazardous Locations (SSPZ) .................................179
Controllers, Refrigeration for Use in Hazardous Locations (STDX) ............179

IMPORTANT INFORMATION FOR USERS OF THIS DIRECTORY xv
<table>
<thead>
<tr>
<th>Category</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Refrigerators and Freezers for Use in Hazardous Locations</td>
<td>179</td>
</tr>
<tr>
<td>Water Coolers for Use in Hazardous Locations</td>
<td>180</td>
</tr>
<tr>
<td>Releasing Device Equipment for Use in Hazardous Locations</td>
<td>180</td>
</tr>
<tr>
<td>Heat Detectors for Releasing Device Service for Use in Hazardous Locations (TBGR)</td>
<td>180</td>
</tr>
<tr>
<td>Releasing Devices for Use in Hazardous Locations (TBJW)</td>
<td>180</td>
</tr>
<tr>
<td>Repackaged Hazardous Locations Equipment (TEPD)</td>
<td>180</td>
</tr>
<tr>
<td>Rotary Automatic Product Filling Equipment for Use in Hazardous Locations (TONI)</td>
<td>181</td>
</tr>
<tr>
<td>Signal Appliances for Use in Hazardous Locations (UXWC)</td>
<td>181</td>
</tr>
<tr>
<td>Audible Signal Appliances for Use in Hazardous Locations (UGKZ)</td>
<td>181</td>
</tr>
<tr>
<td>Extinguishing System Attachments for Use in Hazardous Locations (UGYX)</td>
<td>181</td>
</tr>
<tr>
<td>Fire Alarm Devices for Use in Hazardous Locations (UHMV)</td>
<td>181</td>
</tr>
<tr>
<td>Flame-automatic Fire Detectors for Use in Hazardous Locations (UIAZ)</td>
<td>182</td>
</tr>
<tr>
<td>Ground Indicators for Use in Hazardous Locations (UIOR)</td>
<td>182</td>
</tr>
<tr>
<td>Heat-actuated Devices for Special Application for Use in Hazardous Locations (UIPV)</td>
<td>182</td>
</tr>
<tr>
<td>Heat-automatic Fire Detectors for Use in Hazardous Locations (UIRV)</td>
<td>182</td>
</tr>
<tr>
<td>Signal System Units for Use in Hazardous Locations (UIFT)</td>
<td>183</td>
</tr>
<tr>
<td>Signal Appliances, Miscellaneous for Use in Hazardous Locations (UJPX)</td>
<td>183</td>
</tr>
<tr>
<td>Signaling Equipment Accessories for Use in Hazardous Locations (UJQO)</td>
<td>183</td>
</tr>
<tr>
<td>Visual-Signal Devices for Use in Hazardous Locations (UJTK)</td>
<td>183</td>
</tr>
<tr>
<td>Sprinkler System and Water Spray System Devices for Use in Hazardous Locations (VQNT)</td>
<td>185</td>
</tr>
<tr>
<td>Solenoids for Use in Hazardous Locations (VAPT)</td>
<td>184</td>
</tr>
<tr>
<td>Solenoid Pumps for Use in Hazardous Locations (VAWS)</td>
<td>184</td>
</tr>
<tr>
<td>Solvent Distillation Units for Use in Hazardous Locations (VBFY)</td>
<td>184</td>
</tr>
<tr>
<td>Sound Metering Equipment for Use in Hazardous Locations (VBYC)</td>
<td>185</td>
</tr>
<tr>
<td>Sound Recording and Reproducing Equipment for Use in Hazardous Locations (VCSV)</td>
<td>185</td>
</tr>
<tr>
<td>Switches, Pressure for Use in Hazardous Locations (VRBR)</td>
<td>186</td>
</tr>
<tr>
<td>Static Neutralizing Equipment for Use in Hazardous Locations (VXDY)</td>
<td>186</td>
</tr>
<tr>
<td>Straps, Restraint, Electrically Conductive, Relating to Hazardous Locations (VZAR)</td>
<td>186</td>
</tr>
<tr>
<td>Surge Protectors and Isolators for Use on Cathodically Protected Systems for Use in Hazardous Locations (VQSO)</td>
<td>186</td>
</tr>
<tr>
<td>Switches for Use in Hazardous Locations (WQNV)</td>
<td>186</td>
</tr>
<tr>
<td>Switches, Clock Operated for Use in Hazardous Locations (WRBT)</td>
<td>186</td>
</tr>
<tr>
<td>Enclosed Switches for Use in Hazardous Locations (WRPR)</td>
<td>186</td>
</tr>
<tr>
<td>Snap Switches for Use in Hazardous Locations (WSQX)</td>
<td>187</td>
</tr>
<tr>
<td>Switches, Miscellaneous for Use in Hazardous Locations (WTEV)</td>
<td>187</td>
</tr>
<tr>
<td>Tank Monitoring Equipment for Use in Hazardous Locations (WWQS)</td>
<td>187</td>
</tr>
<tr>
<td>Telemetering Equipment for Use in Hazardous Locations (WYMV)</td>
<td>187</td>
</tr>
<tr>
<td>Telemetering Equipment Accessories for Use in Hazardous Locations (WYOS)</td>
<td>187</td>
</tr>
<tr>
<td>Telephones for Use in Hazardous Locations (WZAT)</td>
<td>188</td>
</tr>
<tr>
<td>Telephone Accessories for Use in Hazardous Locations (WZOR)</td>
<td>188</td>
</tr>
</tbody>
</table>
Temperature-indicating and Regulating Equipment for Use in Hazardous Locations (XBDV) ................................................................. 188
Time-indicating and Recording Appliances for Use in Hazardous Locations (XIAZ) ............................................................................... 188
Tools for Use in Hazardous Locations (XKVL) ................................................................. 189
Portable Electric Tools for Use in Hazardous Locations (XKWH) ......................... 189
Tires, Electrically Conductive Rubber, Industrial, Relating to Hazardous Locations (XJCV) ................................................................................ 188
Transformers for Use in Hazardous Locations (XPAF) ........................................ 189
Transformers, General Purpose for Use in Hazardous Locations (XPJF) .......... 189
Transformers, Distribution, Liquid-filled Type, Over 600 V for Use in Hazardous Locations (XPLP) ................................................................. 189
Trucks, Industrial for Use in Hazardous Locations (XVHY) ................................. 190
Trucks, Industrial, Type EX for Use in Hazardous Locations (XXGV) .......... 190
Storage Batteries, Trucks, Electric for Use in Hazardous Locations (XXIY) .... 190
Tubing and Hose, Electrically Conductive, Relating to Hazardous Locations (YDGZ) .................. 190
Tunnel Drilling Guidance Systems for Use in Hazardous Locations (YDUE) .... 191
Valves, Electric for Use in Hazardous Locations (YTSX) ......................................... 191
Ventilators, Power for Use in Hazardous Locations (ZANE) ................................. 191
Electrical Industrial Vibrators for Use in Hazardous Locations (ZBRX) ............ 191
Viscometers for Use in Hazardous Locations (ZCFV) ........................................... 192

General Information from Hazardous Locations Directory - Part II

PART III
Equipment for Use in and Relating to Class I, Zone 0, 1 and 2, Hazardous Locations (AANZ)
Boxes, Junction and Pull for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (BGYM) ................................................................. 198
Cable Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (CYMJ) ...... 198
Camera Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (CYPB) ................................................................................ 198
Conduit Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (EBMB) . 198
Corrosion Measuring Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (ELHN) ................................................................. 199
Drilling Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FDJJ) ................................................................. 199
Marine Shipboard Cable Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FDJR) ................................................................. 199
Emergency Lighting Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FTHR) ................................................................. 199
Enclosures for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FTQH) ........ 199
Enclosure Accessories for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FTRY) ................................................................. 199
Exit Signs and Exit Appliances for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FWDD) ................................................................. 200
Exit Signs and Markers for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FWDJ) ................................................................. 200
Luminaires and Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (IHRV) ................................................................. 200
Luminaire Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (IHSN) ................................................................. 200
Luminaires for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (IHTF) ........ 200
Flashlights and Lanterns for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (IJRF) ............................................................... 200
Gas and Vapor Detection Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (JLVG) ................................................................. 201
Gas and Vapor Detection Equipment Classified for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (JLVV) ................................. 201
Heaters for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (KHTG) ....... 201
Heaters, Industrial and Laboratory for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (KIQV) ................................................................. 201
Industrial Control Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWEX) ................................................................. 201
Control Panels and Assemblies for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWFA) ................................................................. 201
Motor Controllers for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWFE) ................................................................. 202
Auxiliary Devices for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWFN) ................................................................. 202
Combination Motor Controllers for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWFP) ................................................................. 202
Magnetic Motor Controllers for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWFR) ................................................................. 202
Manual Motor Controllers for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWFU) ................................................................. 203
Programmable Controllers for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWGD) ................................................................. 203
Information Technology Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWHC) ................................................................. 203
Inspection and Measuring Electrical Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NYPA) ................................................................. 203
Intrinsically Safe Equipment and Systems for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (OEVX) ................................................................. 204
Motors and Generators for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (PRSN) ................................................................. 204
Motors for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (PRZA) ................................................................. 204
Motors, Specialty for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (PRZM) ................................................................. 204
Outlet Boxes for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (QBBZ) ................................................................. 204
Panelboards, Light and Power for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (QFAR) ................................................................. 204
Process Control Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (QVAK) ................................................................. 205
Receptacle-Plug Combinations for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (RSUN) ................................................................. 205
Receptacles with Plugs Interlocked with Switches for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (RSZD) ................................................................. 205
Reels, Cord for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (SAOD) ................................................................. 205
Signal Appliances for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (UXUQ) ................................................................. 205
Audible Signal Appliances for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (UXVF) ................................................................................................................ 205
Visual Signal Appliances for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (UXVU) ............................................................................................................... 205
Solenoids for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (VAMH) ................................................................. 206
Sound Metering Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (VBYX) .......................................................... 206
Switches for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (WTSN) .......................................................... 206
Enclosed Switches for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (WUGF) .......................................................... 206
Telemetering Equipment for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (WYMG) .......................................................... 206
Temperature-Indicating and Regulating Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (XBAI) .......................................................... 206

General Information for
Selected Categories from the
Electrical Appliance and Utilization Equipment Directory

PART IV

Electrical Equipment for Use in Ordinary Locations (AALZ) .............................................................................................................................. 212

Air Conditioning Equipment (AAYZ) .............................................................................................................................. 212

Accessories, Air Conditioning Equipment (ABFY) .............................................................................................................................. 212
Accessories, Air Duct Mounted (ABQK) .............................................................................................................................. 212
Air Conditioners, Packaged Terminal (ACKZ) .............................................................................................................................. 212
Air Conditioners, Room (ACOT) .............................................................................................................................. 213
Air Conditioners, Special Purpose (ACVS) .............................................................................................................................. 213
Packaged Terminal, Replacement Air Conditioners (ADAU) .............................................................................................................................. 214
Air Conditioning and Refrigeration Systems Equipment (ADBT) .............................................................................................................................. 214
Air Filtering Appliances (AEDX) ...................................................................................................................................................... 214
Dehumidifiers (AERV) ...................................................................................................................................................... 215
Dehumidifiers, Refrigeration Type (AFFT) ...................................................................................................................................................... 215
Electrostatic Air Cleaners (AGGZ) ...................................................................................................................................................... 215
Evaporative Coolers (AGNY) ...................................................................................................................................................... 215
Humidifiers (AHIV) ...................................................................................................................................................... 215

Antenna Discharge Units (ASWA) ...................................................................................................................................................... 215
Boilers, Electric (BDJS) ...................................................................................................................................................... 216
Seasonal and Holiday Decorative Products (DGVT) ...................................................................................................................................................... 216
Christmas Tree and Decorative Outfit Accessories (DGWU) ...................................................................................................................................................... 216
Electric Ornaments (DGXC) ...................................................................................................................................................... 216
Lamps, Decorative (DGXO) ...................................................................................................................................................... 216
Outfits, Decorative (DGXW) ...................................................................................................................................................... 217
Strings, Decorative Lighting (DGZZ) ...................................................................................................................................................... 217

Cleaning Machines (DMDT) ...................................................................................................................................................... 217
Vacuum Cleaning Machines and Blower Cleaners (DMLW) ...................................................................................................................................................... 217

Custom-built Kiosks (EMHH) ...................................................................................................................................................... 218
Door, Drapery, Gate, Louver, and Window Operators and Systems (FDDR) ...................................................................................................................................................... 218
Door Panel Assemblies (FDIT) ...................................................................................................................................................... 219
Fans, Ceiling Suspended (GPRT) ...................................................................................................................................................... 219
Fans, Electric (GPWV) ...................................................................................................................................................... 219
Flexible Lighting Products (ILGJ) ...................................................................................................................................................... 220
Garage Equipment (JGWV) ...................................................................................................................................................... 220
Gas Detectors, Residential and Recreational Vehicles (JKIS) ...................................................................................................................................................... 220
Health Care Facilities Equipment (KEVQ) ................................................................. 221
Hospital Ground Jacks and Grounding Cord Assemblies (KEVX) ................................. 221
Isolated Power Systems Equipment (KEWV) ............................................................... 221
Isolated Power Wall Modules (KEXS) .......................................................................... 221
Prefabricated Medical Headwalls and Medical Supply Units (KEZR) ......................... 221
Medical and Dental Equipment, Professional (KFBJQ) .............................................. 222
Medical Waste Disposal Systems, Equipment and Accessories (KFCC) .................... 222
Power Supplies for Use in Health Care Facilities (KFCG) ............................................. 222
Television/Video Equipment for Use in Health Care Facilities (KFCV) ....................... 223
Uninterruptible Power Supplies for Use in Health Care Facilities (KFFG) ..................... 223
Heaters and Heating Equipment (KKBV) ................................................................. 223
Air Heaters, Moveable and Wall or Ceiling Hung (KKPT) .............................................. 223
Air Heaters, Room, Fixed and Location Dedicated (KPKS) ............................................ 224
Baseboard Heaters (KLDR) .......................................................................................... 224
Baseboard Heater Accessories (KLQZ) ........................................................................ 224
Clothes Dryers (KMEX) .............................................................................................. 224
Clothes Dryer Transition Ducts (KMKI) ....................................................................... 225
Laundry Equipment Accessories Classified for Use in Specified Equipment (KMKD) ...... 225
Control Panels, Remote, for Electric Duct Heaters (KMLW) ........................................ 225
Heaters, Cooking Appliances (KMSV) ....................................................................... 225
Commercial Cooking Appliances (KNGT) ................................................................. 225
Commercial Cooking Appliances with Integral Recirculating Ventilation Systems (KNGK) ................................................................. 226
Commercial, with Integral Systems for Limiting the Emission of Grease-laden Air (KNLZ) .................................................................................................................. 226
Custom-built Food Service Equipment (KNNS) ......................................................... 227
Filters for Cooking Oil, Commercial (KNRF) ............................................................. 227
Household Cooking Appliances, Classified (KNSY) .................................................... 227
Household Cooking Appliances (KNU) ....................................................................... 228
De-icing and Snow Melting Equipment (KOBQ) ........................................................ 228
Duct Heaters, Electric (KOHZ) ...................................................................................... 228
Heaters, Sauna and Steam Bath (KPJV) ....................................................................... 229
Sauna Heating Equipment (KPSX) .............................................................................. 229
Steam Bath Equipment (KQBX) .................................................................................. 229
Immersion Type Liquid Heaters, Industrial (KQGV) ..................................................... 229
Heaters, Industrial and Laboratory (KQLR) ................................................................. 229
Micro-wave Cooking Appliances (KQSG) ................................................................. 230
Pipe Heating Cable (KQUF) ........................................................................................ 230
Mobile/manufactured Home Pipe Heating Cable (KQTV) .......................................... 230
Pipe Heating Cable, Industrial and Commercial (KQXR) .......................................... 230
Residential Pipe Heating Cable (KQYI) ........................................................................ 231
Heaters, Radiant Heating Equipment (KQYZ) ............................................................. 231
Ranges, Household Electric (KRMX) ......................................................................... 231
Water Heaters (KSAV) ............................................................................................... 232
Commercial Storage Tank and Booster Water Heaters (KSBZ) ................................... 232
Heat Pumps for Special Use (KSCZ) ............................................................................ 232
Water Heaters, Space Heating (KSDR) ........................................................................ 233
Household Water Heaters, Storage Tank (KSDT) ....................................................... 233
Immersion Heaters (KSFX) ........................................................................................ 233
Miscellaneous Water Heaters (KSGR) ........................................................................ 233
Heaters, Waterbeds (KSHU) ....................................................................................... 233
Heaters, Specialty (KSOT) .......................................................................................... 233

IMPORTANT INFORMATION FOR USERS OF THIS DIRECTORY
<table>
<thead>
<tr>
<th>Category</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heaters, Emitter Type, Classified for Use in Specified Equipment (KSSG)</td>
<td>234</td>
</tr>
<tr>
<td>Heating and Cooling Equipment (LZFE)</td>
<td>234</td>
</tr>
<tr>
<td>Heating, Cooling and Ventilating Equipment (LZLZ)</td>
<td>238</td>
</tr>
<tr>
<td>Accessories Classified for Use with Specified Equipment (LZNI)</td>
<td>238</td>
</tr>
<tr>
<td>Blower Assemblies (LZOS)</td>
<td>238</td>
</tr>
<tr>
<td>Electric Heater Assemblies Classified for Use on Specified Equipment (LZPU)</td>
<td>239</td>
</tr>
<tr>
<td>Heat Recovery Ventilators, Ducted (LZTW)</td>
<td>239</td>
</tr>
<tr>
<td>Heat Recovery Ventilators, Non-ducted (LZUU)</td>
<td>239</td>
</tr>
<tr>
<td>Hydromassage Bathtubs (NCHX)</td>
<td>239</td>
</tr>
<tr>
<td>Information Technology Equipment Including Electrical Business Equipment (NWGQ)</td>
<td>240</td>
</tr>
<tr>
<td>Lamps (OOKH)</td>
<td>241</td>
</tr>
<tr>
<td>Lamps, Self-ballasted and Lamp Adapters (OOLR)</td>
<td>241</td>
</tr>
<tr>
<td>Lamps, Specialty (OONB)</td>
<td>241</td>
</tr>
<tr>
<td>Lamps, Tungsten Halogen (OOOJ)</td>
<td>241</td>
</tr>
<tr>
<td>Medical Equipment (PIDF)</td>
<td>242</td>
</tr>
<tr>
<td>Microwave and Cable Communication Equipment (POFV)</td>
<td>243</td>
</tr>
<tr>
<td>Antenna Positioning Equipment (POJQ)</td>
<td>243</td>
</tr>
<tr>
<td>Communication Antennas (POQQ)</td>
<td>243</td>
</tr>
<tr>
<td>Microwave Communication Equipment Classified for Use in Specified Equipment (POVJ)</td>
<td>243</td>
</tr>
<tr>
<td>Office Furnishings (QAWZ)</td>
<td>243</td>
</tr>
<tr>
<td>Office Furnishing Lights (QAXB)</td>
<td>244</td>
</tr>
<tr>
<td>Portable Lighting Products (QOTU)</td>
<td>244</td>
</tr>
<tr>
<td>Portable Cabinet Luminaires (QOVJ)</td>
<td>244</td>
</tr>
<tr>
<td>Luminaires, Portable (QOWZ)</td>
<td>244</td>
</tr>
<tr>
<td>Lampshades (QOXZ)</td>
<td>245</td>
</tr>
<tr>
<td>Nightlights (QOYX)</td>
<td>245</td>
</tr>
<tr>
<td>Portable Luminaire Kits and Subassemblies (QPAU)</td>
<td>245</td>
</tr>
<tr>
<td>Portable Work Lights (QPCI)</td>
<td>245</td>
</tr>
<tr>
<td>Sun and Heat Lamps (QPDY)</td>
<td>246</td>
</tr>
<tr>
<td>Telecommunication Equipment (WYIE)</td>
<td>246</td>
</tr>
<tr>
<td>Custom-built Telecommunication Equipment (WYKM)</td>
<td>246</td>
</tr>
<tr>
<td>Telephones, Cellular (WYLQ)</td>
<td>247</td>
</tr>
<tr>
<td>Telephone Appliances and Equipment (WYQQ)</td>
<td>248</td>
</tr>
<tr>
<td>Telephone Equipment, Legacy Installations (WYXR)</td>
<td>248</td>
</tr>
<tr>
<td>Tools (XJXX)</td>
<td>248</td>
</tr>
<tr>
<td>Tools, Semi-Automatic Woodworking Equipment (XKHS)</td>
<td>248</td>
</tr>
<tr>
<td>Tradeshow Equipment (XNRI)</td>
<td>249</td>
</tr>
<tr>
<td>Exhibition Display Units, Accessories (XNRA)</td>
<td>249</td>
</tr>
<tr>
<td>Exhibition Display Units, Custom (XNSA)</td>
<td>249</td>
</tr>
<tr>
<td>Exhibition Display Units, Portable and Modular (XNSN)</td>
<td>249</td>
</tr>
<tr>
<td>Exhibition Display Units, Rebuilt (XNST)</td>
<td>249</td>
</tr>
<tr>
<td>Ventilators, Power (ZACT)</td>
<td>250</td>
</tr>
<tr>
<td>Industrial Material Handlers (ZAJI)</td>
<td>250</td>
</tr>
<tr>
<td>Wired Cabinets (ZNXR)</td>
<td>250</td>
</tr>
</tbody>
</table>
## General Information for Selected Categories from the Fire Protection Equipment Directory

**PART V**  
Fire Protection Equipment  
- Pumping Equipment for Fire Service (QVUT) ....................................................... 253  
- Battery Chargers for Use with Internal Combustion Engines Driving Centrifugal Pumps (QWIR) ................................................................. 253  
- Fire Pump Motors (QXZF) ...................................................................................... 253  
- Pump Controllers, Fire (QYZS) .............................................................................. 253  
- Pump Controllers, Fire, Over 600 V (QZGR) .......................................................... 253  
- Pump Controllers, Fire, Residential (QZKE) ........................................................... 254  
- Signal and Fire Alarm Equipment and Services (SYKJ) ........................................... 254  
- Control Units, System (UOJZ) .................................................................................. 254  
- Detectors, Automatic Fire (UPLV) .......................................................................... 255  
- Smoke-automatic Fire Detectors (UROX) ................................................................. 255  
- Smoke-automatic Fire Detector Accessories (URRQ) .............................................. 256  
- Smoke Detectors for Special Applications (URXG) ............................................... 256  
- Fire Alarm Devices, Single- and Multiple-Station, and Accessories (UTER) .......... 257  
- Single- and Multiple-station Heat Detectors (UTFS) ................................................. 257  
- Single- and Multiple-station Smoke Alarms (UTGT) ............................................... 257  
- Heat Actuated Devices for Special Application (UTHV) ......................................... 258  
- Household Fire-Warning System Units (UTLQ) ...................................................... 258  
- Control Units and Accessories, Household System Type (UTOU) ......................... 258  

## General Information for Selected Categories from the Fire Resistance Directory

**PART VI**  
Fire Resistance Ratings (BXRH)  
- Luminaires and Luminaire Assemblies Classified for Fire Resistance (CDHW) ...... 260  
- Speaker Assemblies for Fire Resistance (CHML) .................................................... 260  
- Wall Opening Protective Materials (CLIV) ............................................................. 260  
- Electrical Circuit Protective Systems (FHIT) .......................................................... 261  
  - Electrical Circuit Protective Materials (FHIY) ...................................................... 261  
  - Fire Resistive Cable (FHJR) .................................................................................. 262  
- Plastics Used in Semiconductor Tool Construction (QMTW) ................................ 262  
- Thermal Barrier Systems (XCLF) .......................................................................... 263  
  - Batts and Blankets (XCLR) ................................................................................ 263  
  - Packing Materials (XCMD) ................................................................................ 263  
  - Preformed Mineral and Fiber Units (XCMK) ....................................................... 263  
- Through-penetration Firestop Systems (XHEZ) ....................................................... 263  
- Fill, Void or Cavity Materials (XHHW) ................................................................. 265  
- Firestop Devices (XHJI) ........................................................................................ 265  
- Forming Materials (XHKU) ................................................................................... 265  
- Through-penetrating Products (XHLY) .................................................................. 266
General Information for
Selected Categories from the
Building Materials Directory

PART VII
Building Materials (AABM)
Prefabricated Buildings (QRAR) ................................................................. 267
Prefabricated Units (QRHQ) ................................................................. 268
Commercial and Industrial Buildings (QRNZ) ........................................... 268
Composite Panels (QRSY) ................................................................. 268
Residential Buildings (QTDT) ................................................................. 268

General Information for
Selected Categories from the
Heating, Cooling, Ventilating and Cooking Equipment Directory

PART VIII
Heating, Cooling, Ventilating and Cooking Equipment (AAHC)
Heating Appliances (KTCR) ................................................................. 270
Boiler Assemblies (KVFT) ................................................................. 271
Field-erected Boiler Assemblies (KVQE) .............................................. 271
Sanitation, Food Service Equipment (TSQS) ........................................... 272
Vending Machines for Food and Beverages (TSYA) .................................. 272
Ventilating Equipment for Commercial Cooking Appliances (YXLT) .......... 272
Exhaust Hoods with Exhaust Dampers (YXZR) ....................................... 272
Power Ventilators for Restaurant Exhaust Appliances (YZHW) ............... 272

Index:
INDEX OF PRODUCT CATEGORIES .................................................. 273

OVERVIEW OF THE UL FAMILY OF COMPANIES, THE UL MARK AND CONFORMITY ASSESSMENT SERVICES

UL Marks ................................................................................................. 281
Conformity Assessment Services ......................................................... 281
Listing Service
Classification Service
Component Recognition Service
Multiple Product Category Evaluation
Certificate Service
Listing Card Service
Multiple Listing, Recognition or Classification Service

Other UL Services
Field Engineering Services ................................................................. 284
Field Evaluation Service
Field Investigation Service
Field Inspection Service
Electromagnetic Compatibility Testing ................................................. 285
The International “emc-Mark”

Performance Testing ................................................................. 285
LAN Cable Performance Testing
Energy Verification Service
Other Performance Testing

UL’s Services for Registration of Management Systems 286
Multiple Accreditations and Worldwide Recognition
A Well-known Mark

International Certification .............................................. 287

Specialized Services ......................................................... 287
Customer Service Professionals (CSPs)
Regulatory Services
Local Engineering Services
Fact-Finding Investigations
Research Services
Commercial Inspection and Testing Services

UL Information Services

UL’s Technical Information Services ........................................ 289
Product Directories and CDs
UL’s Website on the Internet
Helping Clients Promote Their UL Certification in Advertising Materials
On The Mark -- UL’s Publication on Global Conformity Assessment Issues
UL Standards for Safety
Standards and Standards-on-Diskette Subscription Services
UL Standards Publications
UL StandardsInfoNet

UL University Workshops .................................................. 291

List of Underwriters Laboratories Inc. Locations

United States ................................................................. 293
International ................................................................. 294

Regulatory Services Staff .................................................... 298
Introduction

This Directory contains the General Guide Information for product categories in UL’s Electrical Construction Equipment and Hazardous Locations Equipment Directories. In addition, General Guide Information on selected categories in UL’s Electrical Appliance and Utilization Equipment Directory, Fire Protection Equipment Directory, Building Materials Directory and Heating, Cooling, Ventilating and Cooking Equipment Directory are also included in this Directory. Attention is directed specifically to the General Guide Information following the product category headings which describe limitations of the Listings, such as current, voltage and horsepower and installation provisions. The scope and sizes and ratings specified in the General Guide Information is intended to indicate the current range of Listings, and is not necessarily indicative of the limitations for Listing.


Only those products bearing the appropriate UL Mark and the company’s name, trade name, trademark or other authorized identification should be considered as being covered by UL’s Listing or Classification and Follow-Up Service. The UL Mark provides evidence of listing or labeling which may be required by installation codes or standards.

Many of the products bearing the UL Mark incorporate components that bear the UL Recognized Component Mark ．The Recognized Component Mark is applicable to components that are incomplete in construction features or limited in performance capabilities. The Recognized Component Mark does not provide evidence of listing or labeling which may be required by installation codes or standards.

This Directory contains General Guide Information in effect as of April 15, 2005. Information on new or revised product categories established after the effective date will be found in UL’s Online Certifications Directory at www.ul.com and will appear in the next annual printed Directory.

Note: At the back of this Directory is important information about UL services for manufacturers and other clients, regulatory authorities, and consumers.

Installation and Use of Products Bearing the UL Mark

Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Listed or Classified products, equipment, systems, devices and materials.

Use of this Directory

This Directory includes the following:

■ General Guide Information for each product category that includes references to the requirements used for the investigation of the products and the UL Mark to be used on the product;
■ Information relating to limitations or special conditions applying to the product;
■ The titles and designations of standards or requirements that have been used for the investigation of products in a specific product category

UL Listing and Classification information is arranged alphabetically in this Directory by product category. The four-letter code (shown in parenthesis) following each category title is the product category guide designation.

To assist in the use of the Directory, an Index of Product Categories is provided

UL’s General Guide Information for each product category provides important information regarding the scope and limitation of UL’s certification of the product and a general description of the UL Marks authorized for products in that category.
This information may include the identification of published standards that have been used to investigate products in that category. There may not be a published standard against which a product can be tested and evaluated to determine its acceptability for the UL Mark. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from standards and other sources and will develop requirements to cover uses and conditions for which specific requirements did not previously exist.

The scope of each UL Standard for Safety and Outline of Investigation can be accessed at no cost by setting your browser’s URL to http://ulstandardsinfonet.ul.com.

For some product categories, UL’s Listing Information database may include additional product information that does not appear in the Directory.

UL permits the reproduction of the material contained in the UL Directories subject to the following conditions: 1. The Guide Information must be presented in its entirety and in a non-misleading manner, without any manipulation of the data. 2. The statement “Reprinted from the UL Directory with permission from Underwriters Laboratories Inc.” must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: “Copyright © 2005 Underwriters Laboratories Inc.”

Look for the UL Mark
Identification of UL Listed and Classified Products

The symbol \( \mathcal{U} \) and the name “Underwriters Laboratories Inc.” in various forms and abbreviations are registered with the U.S. Patent and Trademark Office, and in numerous other countries. Subject to the terms of UL’s Follow-Up Service Agreement, companies are permitted to use the symbol \( \mathcal{U} \) or other specified forms of UL’s name as part of the UL Mark on products which are Listed or Classified and which comply with UL’s requirements.

The product name as indicated in the General Guide Information for each product category is generally included as part of the UL Mark, but may be omitted when, in UL’s opinion, the use of the name is unnecessary and the UL Mark is directly and permanently applied to the product by stamping, molding, ink-stamping, silk screening or similar processes.

A separable UL Mark (not part of a nameplate and in the form of decals, stickers or labels) will always include the following four elements: UL’s symbol \( \mathcal{U} \), the word “LISTED” or “CLASSIFIED,” the product or category name, and a control number assigned by UL.

The complete UL Mark will appear on the product unless otherwise indicated in the General Guide Information for a specific product category.

When a UL Listed product is of such a size, shape, material or surface texture that, in UL’s opinion, it is impossible to apply legibly the complete marking to the product, the complete UL Listing Mark will appear on the smallest unit container in which the product is packaged. In these cases UL may authorize the use of the UL symbol \( \mathcal{U} \) on the product in addition to the complete UL Mark on the package.

When a UL Classified product is of such a size, shape, material or surface texture that, in UL’s opinion, it is impossible to apply legibly the complete marking to the product, the complete UL Classification Mark will appear on the smallest unit container in which the product is packaged. In these cases there shall be no reference to UL on the product.

Refer to the General Guide Information for each product category for additional information on the specific UL Mark for the products in the category.
Identification of UL Listed Products

The UL Listing Mark generally includes the UL symbol or it may include other registered forms as authorized by UL. The UL Listing Mark includes: (1) the UL symbol shown below; (2) the word “LISTED”; (3) the product identity; and (4) a control number assigned by UL.

Identification of UL Listed Gas-Fired Products

The UL Listing Mark for gas-fired products certified to UL Standards includes: (1) the UL symbol with the words “GAS-FIRED” above the UL symbol as shown below; (2) the word “LISTED”; (3) the product identity; and (4) a control number assigned by UL.

Identification of UL Listed Environmental and Public Health (EPH) Products

The UL Listing Mark for Environmental and Public Health (EPH) products certified to UL Standards includes: (1) the UL symbol with the letters EPH inside a triangular background as shown below; (2) the word “LISTED” below the UL symbol; (3) the product identity; and (4) a control number assigned by UL.

Identification of UL Classified Products

The UL Classification Mark may appear in various forms as authorized by UL. The UL Classification Mark includes: (1) the UL symbol; (2) the word “CLASSIFIED” above the UL symbol; (3) the product identity; (4) a control number assigned by UL; and (5) indication of the extent of UL’s evaluation of the product, e.g. “AS TO (nature of hazard) ONLY”; rating or classification as specified in the General Guide
Identification of UL Classified Environmental and Public Health (EPH) Products

The UL Classification Mark for Environmental and Public Health (EPH) products certified to Standards of other organizations for EPH evaluations only includes: (1) the UL symbol with the letters EPH inside a triangular background, as shown below; (2) the word “CLASSIFIED” above the UL symbol; (3) the product identity; (4) the Standard designation; and (5) a control number assigned by UL.

Additional information regarding the UL Marks for Environmental and Public Health (EPH) can be found in the back of this directory under Other UL Services and online at www.ul.com/eph.

Identification of UL Listed Products that are Also Classified in Accordance with International or Regional Standards

The UL Listing Mark and Classification Mark shown above can be combined for products that not only meet the applicable UL requirements but also comply with the requirements of the applicable International or Regional standards. For these products the combination UL Listing and Classification Mark is shown below:

UL provides a service for the Classification of products that have been determined to comply with the appropriate requirements of the applicable International or Regional standards only. For these products, the Classification Mark may appear in various forms as authorized by UL. A typical form which may be authorized is shown below. When the complete Classification Mark cannot be applied to the product, no reference to “Underwriters Laboratories Inc.” on the product is permitted.
Products Listed by Report

Certain products are Listed under a special service designated as “Listed by Report.” These are usually products or constructions for which there are no generally recognized installation requirements. The description of this type of product or construction and information concerning proper field assembly and/or installation are contained in a Report identified by the reference and date shown by the Listing. Products Listed by Report are eligible to bear a UL Mark which includes a reference to the Report number and date. Copies of the Report may be obtained upon application to the company whose product is Listed.

Specifying UL Listed and Classified Products

Specifying UL Listed and Classified products up front is one of the best methods used by designers, consultants, insurers and others to help gain jurisdictional acceptance. A typical specification reads: “The (product) must bear the UL Mark.” Or, if the specification cannot be that specific, an alternate wording would read: “The (product) must meet the requirements of Underwriters Laboratories Inc.® The UL Mark on the product will be accepted as evidence of compliance.”

Products, equipment and materials evaluated by UL in accordance with International or Regional standards only are intended for installation and use where the specified standards have been adopted.

Field Engineering Services

The UL Mark applies to the product as it is originally manufactured, when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of an alteration or repair may be on the safety of the product or the continued validity of the UL Certification unless the field alterations or repairs have been specifically evaluated by UL. Unless UL evaluates a modified or rebuilt product, UL cannot indicate whether such changes “void” the UL Mark, or that the product continues to meet UL’s safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the marking on the product have been evaluated for use in that product.

UL evaluates installed equipment in the field that does not bear the UL Mark as well as equipment that has been modified after shipment from the factory. A description of UL’s Field Engineering Services for the evaluation of installed equipment is described in the back of this Directory.

Over 600 Volts Rated Equipment and Devices Category List

Overcurrent Protection and Switchgear
- Fuses, Over 600 Volts (JEEG) ................................................................. 59
- Circuit Breakers and Metal-Clad Switchgear Over 600 Volts (DLAH) ........... 16
- Circuit Breakers, Medium Voltage, Classified for Use in Specified Equipment (DLBC) ................................................................. 17
- Circuit Breaker Switchgear, Metal-Enclosed, Over 600V (DLBK) ................. 18
- Switchgear, Gas Insulated Type - Over 600 Volts (WVEK) .......................... 131
- Switches, Load Interrupter and Isolating Over - 600 Volts (WIQG) ............... 127
- Transfer Switches (WPTZ) ...................................................................... 130
- Transfer Switches, Automatic - Over 600 Volts (WPYC) ............................ 130

Power Distribution Equipment and Devices
### Grounding Equipment, Neutral Grounding Devices Over 600 Volts (KDZC)
- 65

### Surge Arresters, 1000 Volts and Higher (VZQK)
- 117

### Transformers, Distribution Dry Type - Over 600 Volts (XPFS)
- 135

### Transformers, Distribution Liquid Filled Type - Over 600 Volts (XPLH)
- 135

### Unit Substations - Over 600 Volts (YEFV)
- 140

### Wiring Methods and Devices
- **Busways, Metal-Enclosed - Over 600 Volts (CVZW)**
- 10
- **Metal-Clad Cable (PJAZ)**
- 79
- **Metal-Clad Cable Connectors, Type MC (PJOX)**
- 80
- **Metal-Clad Cable for Hazardous Locations (PJPP)**
- 172
- **Metal-Clad Cable, Classified in Accordance with UL 1569, with Metric Conductor Sizes (PJPJ)**
- 80
- **Medium Voltage Cable (PITY)**
- 78
- **Medium Voltage Cable, Classified in Accordance with UL 1072, with Metric Conductor Sizes (PIVW)**
- 79
- **Power and Control Tray Cable (QPOR)**
- 97
- **Wire Connectors (ZMVV)**
- 146
- **Wire, Thermoset-Insulated (ZKST)**
- 143

### Control Equipment
- **Motor Controllers (600 Volts or less and 701-1500 Volts) (NJOT)**
- 69
- **Motor Controllers, Over 1500 Volts (NJHU)**
- 68
- **Motor Controller Accessories, Over 1500 Volts (NJIJ)**
- 69
- **Motor Controllers, Over 1500 Volts, for Use in Hazardous Locations (NRAA)**
- 170
- **Power Conversion Equipment, Medium Voltage (NJIC)**
- 69
- **Pump Controllers, Fire, Over 600 Volts (QZGR)**
- 253

### Distributed Power Generation Equipment Category List

#### Distributed Generation Power Systems Equipment
- **Distributed Generation Power Systems Equipment (QHWJ)**
- 93
- **AC Modules (QHYZ)**
- 93
- **Distributed Generation Power Systems Accessory Equipment (QIIO)**
- 94
- **Static Inverters and Converters for Use in Independent Power Systems (QIKH)**
- 95

#### Gas and Fuel Power Systems
- **Engine Generators (includes microturbines) (FTSR)**
- 38
- **Fuel Gas Booster Compressor Equipment (IUXX)**
- 54
- **Fuel Cell Equipment (IRGN)**
- 53
- **Hand-held or Hand-transportable Fuel Cell Power Units with Fuel Containers (IRGU)**
- 53
- **Stationary Fuel Cell Power Plants (IRGX)**
- 53
- **Hydrogen Generators, Fuel Processing Type (NCBL)**
- 65
- **Hydrogen Generators, Water Reaction Type (NCBR)**
- 66
- **Hydrogen Generators, Electrolyser Type (NCBH)**
- 65

#### Photovoltaic Power Systems
- **Photovoltaic Charge Controllers (QIBP)**
- 94
- **Photovoltaic Modules and Panels (QIGU)**
- 94
- **Photovoltaic Power Units (QIJL)**
- 94

#### Wind Power Systems
- **Wind Turbine Generating Systems (ZGXW)**
- 140
- **Wind Turbine Generating Systems, Small (ZGYW)**
- 141
Wind Turbine Generating Systems, Large (ZGYZ) .......................................................... 141
Wind Turbine Generating Systems Subassemblies (ZGZJ) ............................................. 141
Electrical equipment for use in unclassified (ordinary) locations is intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC). Electrical equipment for use in hazardous (classified) locations, as defined by the NEC, may also be used in ordinary locations.

INVESTIGATION REQUIREMENTS AND STANDARDS

Electrical equipment for use in ordinary locations has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the NEC.

Some products are certified for uses not within the scope of the NEC. Such products are investigated for the specifications or the use conditions indicated in the general Guide Information for each product category.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

The general Guide Information for each product category describes the limitations relative to the products covered, such as current, voltage and horsepower limits, markings, special descriptions and installation provisions.

INSTALLATION REQUIREMENTS

Ordinary locations, as defined in the NEC, include:

**Damp Location** — Partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, barns, and cold-storage warehouses.

**Dry Location** — A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

**Wet Location** — Installations underground or in concrete slabs or masonry in direct contact with the earth, and locations subject to saturation with water or other liquids, such as vehicle washing areas, and locations exposed to weather and unprotected.

**Outdoor Use** — In general, individual appliances and equipment have been investigated only for use indoors, in dry locations. An exception is where outdoor use is specifically permitted by the Article of the NEC concerned with the product installation. See also the general Guide Information for the product category or included in the individual Listing. In some cases the title (e.g., Snow Movers, Swimming Pool Fixtures) indicates the conditions for which the product has been investigated.

Cord- and plug-connected appliances obviously intended for outdoor use, such as gardening appliances, are not intended for use in the rain, and should be stored indoors when not in use.

**Enclosure Types**

Section 110.11 of the NEC specifies that equipment shall be identified for use in certain operating environments. Section 300.6 provides guidance regarding protection against corrosion and Table 430.91 provides the basis for selecting motor controller enclosure types for use in specific locations. To assist inspection authorities, UL requires type designations on power distribution and control equipment enclosures such as cabinets and cutout boxes, enclosed panelboards or switchboards, meter sockets, enclosed circuit breakers or switches, industrial control and other equipment. The following table summarizes the intended uses of the various type enclosures for other than hazardous locations:

<table>
<thead>
<tr>
<th>Enclosure Type Number</th>
<th>Provides a Degree of Protection Against the Following Environmental Conditions*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indoor use</td>
</tr>
<tr>
<td>2</td>
<td>Indoor use, limited amounts of falling water</td>
</tr>
<tr>
<td>3R</td>
<td>Outdoor use, undamaged by the formation of ice on the enclosure**</td>
</tr>
<tr>
<td>3S</td>
<td>Same as 3R plus windblown dust</td>
</tr>
<tr>
<td>4</td>
<td>Same as 3R plus windblown dust, external mechanisms remain operable while ice laden</td>
</tr>
<tr>
<td></td>
<td>Outdoor use, splashing water, windblown dust, undamaged by the formation of ice on the enclosure**</td>
</tr>
</tbody>
</table>
Enclosure Type Number Provides a Degree of Protection Against the Following Environmental Conditions*

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4X</td>
<td>Same as 4 plus resists corrosion</td>
</tr>
<tr>
<td>5</td>
<td>Indoor use to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids</td>
</tr>
<tr>
<td>6</td>
<td>Same as 3R plus entry of water during temporary submersion at a limited depth</td>
</tr>
<tr>
<td>6P</td>
<td>Same as 3R plus entry of water during prolonged submersion at a limited depth</td>
</tr>
<tr>
<td>12, 12K</td>
<td>Indoor use, dust, dripping noncorrosive liquids</td>
</tr>
<tr>
<td>13</td>
<td>Indoor use, dust, spraying water, oil and noncorrosive coolants</td>
</tr>
</tbody>
</table>

*All type enclosures provide a degree of protection against ordinary corrosion and against accidental contact with the enclosed equipment when doors of covers are closed and in place. All type enclosures provide protection against a limited amount of falling dirt.

**All outdoor type enclosures provide a degree of protection against rain, snow and sleet. Outdoor enclosures are also suitable for use indoors if they meet the environmental conditions present.

An enclosure that complies with the requirements for more than one type of enclosure may be marked with multiple designations.

Enclosures marked with a type may also be marked as follows:

A Type 1 enclosure may be marked “Indoor Use Only”
A Type 3, 3S, 4, 4X, 6 or 6P enclosure may be marked “Raintight”
A Type 3R enclosure may be marked “Rainproof”
A Type 4, 4X, 6 or 6P enclosure may be marked “Watertight”
A Type 4X or 6P enclosure may be marked “Corrosion Resistant”
A Type 2, 5, 12, 12K or 13 enclosure may be marked “Driptight”
A Type 3, 3S, 5, 12K or 13 enclosure may be marked “Dusttight”

For equipment designated “Raintight,” testing designed to simulate exposure to a beating rain will not result in entrance of water. For equipment designated “Rainproof,” testing designed to simulate exposure to a beating rain will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure. “Watertight” equipment is so constructed that water does not enter the enclosure when subjected to a stream of water. “Corrosion resistant” equipment is so constructed that it provides degree of protection against exposure to corrosive agents such as salt spray.

“Driptight” equipment is so constructed that falling moisture or dirt does not enter the enclosure. “Dusttight” equipment is so constructed that circulating or airborne dust does not enter the enclosure.

Sizes and Ratings

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

Marked ratings of utilization equipment include ampere, wattage or volt-ampere ratings. Motor-operated utilization equipment may also be marked with a horsepower rating. The actual marked ratings (other than the horsepower rating) and other markings or instructions, if any, are to be used to select branch circuit conductors, branch circuit overcurrent protection, control devices and disconnecting means.

The ampere or wattage marking on power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Appliance and Utilization Equipment Terminations

Except as noted in the general Guide Information for some product categories, most terminals, unless marked otherwise, are for use only with copper wire. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits as specified in Table 310.16 of the NEC. If the termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).
Distribution and Control Equipment Terminations

Most terminals are suitable for use only with copper wire. Where aluminum or copper-clad aluminum wire can or shall be used (some crimp terminals may be Listed only for aluminum wire), there is marking to indicate this. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted in the following paragraphs or in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C ampacities for wire size Nos. 14-1 AWG, and 75°C ampacities for wire size Nos. 1/0 AWG and larger, as specified in Table 310.16 of the NEC.

Some distribution and control equipment is marked to indicate the required temperature rating of each field-installed conductor. If the equipment, normally intended for connection by wire sizes within the range 14-1 AWG, is marked “75C” or “60/75C,” it is intended that 75°C insulated wire may be used at full 75°C ampacity. Where the connection is made to a circuit breaker or switch within the equipment, such a circuit breaker or switch must also be marked for the temperature rating of the conductor.

A 75°C conductor temperature marking on a circuit breaker or switch normally intended for wire sizes 14-1 AWG does not in itself indicate that 75°C insulated wire can be used unless 1) the circuit breaker or switch is used by itself, such as in a separate enclosure, or 2) the equipment in which the circuit breaker or switch is installed is also so marked.

A 75 or 90°C temperature marking on a terminal (e.g., AL7, CU7AL, AL7CU or AL9, CU9AL, AL9CU) does not in itself indicate that 75 or 90°C insulated wire can be used unless the equipment in which the terminals are installed is marked for 75 or 90°C.

Higher temperature rated conductors than specified may be used if the size is based on the above statements.

**Copper-clad Aluminum Conductors** — Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

**Copper Pigtail Leads** — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

**Wiring Devices** — Supply terminals of 15 A and 20 A switches and receptacles not marked “CO/ALR” are for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded, unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked “AL/CU” are for use with copper conductors only. Terminals of switches rated 30 A and above marked “AL/CU” are for use with aluminum, copper and copper-clad aluminum conductors.

**Wire Connectors** — Combinations of dissimilar conductors in terminal or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing. See also the information under Wire Connectors and Soldering Lugs (ZMVV).

**Terminals** — Product terminals, including wire connectors and terminal screws, are acceptable for connection of only one conductor, unless there is marking or a wiring diagram indicating the number of conductors which may be connected.

**Tightening Torque** — Some equipment may be marked to show a tightening torque for wire connectors intended for use with field wiring.

**Supply Cords** — When flexible supply cords or cord sets are replaced on utilization equipment and appliances, the replacement should be of the same type, AWG size, voltage rating and temperature rating as originally used.

**INSTRUCTIONS AND PRODUCT MARKINGS**

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

**FIELD MODIFICATIONS**

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL’s safety requirements.
The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been investigated in accordance with the applicable requirements of UL, the United States Coast Guard (USCG), the American Boat and Yacht Council, Inc. (ABYC), and the National Fire Protection Association (NFPA). For additional information, see the general Guide Information for the specific product category. Equipment bearing UL’s Marine Mark is suitable for use only with stranded copper wire.

ADVERTISING DISPLAYS, NONILLUMINATED (AAVU)

This listing covers electrically operated, nonilluminated, units intended to draw attention to, or to display, demonstrate or advertise products. Advertising displays designed for permanent installation indoors only are so marked. Cord and plug connected advertising displays suitable for outdoor use are marked “Outdoor”.

Advertising displays including illumination, are Listed under Electric Signs (UXY1). Advertising displays that include a changing message sign are covered under the categories of Electric Signs (UXY1) and Signs, changing message (UYFS).

The basic standards used to investigate products in this category are UL 48, “Electric Signs” and UL 73, “Motor-Operated Appliances”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Advertising Display”, “Nonilluminated Advertising Display”, “Animated Display”, or other appropriate product name.

ALUMINUM SHEATHED CABLE FITTINGS (ARYV)

This listing covers fittings for use with aluminum sheathed cable, Type ALS. Nonmetallic parts, such as glands or seals are required to be suitable for an ambient temperature of 90°C in dry locations. The fittings are suitable for use in dry or wet locations except that those fittings suitable for use only in dry locations are so marked on the device or shipping carton.

Aluminum sheathed cable fittings are marked with the type of cable sheath (corrugated or smooth) for which they have been investigated, or this marking may be on the carton.

Aluminum sheathed cable fittings made of aluminum are not considered suitable for use in concrete or cinder fill unless protected with asphalt paint or the equivalent.

The basic standard used to investigate products in this category is UL 514, “Electrical Outlet Boxes and Fittings”.

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Aluminum Sheathed Cable Fitting”, “Aluminum Sheathed Cable Connector”, “Connector”, or other appropriate product name.

APPLIANCE CONTROLS (ATNZ)

GENERAL

This category covers controllers (single device or interconnected series of components) with one or more input power and possibly signal ports. Included are controllers with solid-state circuitry, and one or more output switching components to directly control all or a portion of household type appliances, such as portable luminaires, audio/video equipment, etc. These controllers typically respond directly or indirectly to sensors or remote control signals to affect operation or electronically store or process information by virtue of a memory system.

Appliance controls are rated maximum 16 A, 2000 VA, 300 V. They are not intended for controlling motor-driven appliances unless specifically identified for such use, e.g., appliance controls designated for control of electric fans. They have been investigated for use in nominal 25°C environments, unless otherwise stated in the individual Listings.

PRODUCT MARKINGS

Controls for loads other than resistive or general use (power factor 0.75 – 0.80) are specifically identified for their intended load type, e.g., “Suitable for ___ HP electric fans” or “___ FLA,” where the blank identifies the numerical value of the motor rating.

RELATED PRODUCTS

Devices intended to be part of a building control system are covered under Management Equipment, Energy (FAX2).

Devices that use light and/or motion (passive infrared)-sensitive switches are covered under Switches, Photoelectric (WJCT).

Devices intended for industrial applications are covered under Power Circuit and Motor-mounted Apparatus (NMTR).

Devices such as thermostats are covered under Temperature-indicating and Regulating Equipment (XAPX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, “Industrial Control Equipment,” and UL 244A, “Solid-State Controls for Appliances.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Appliance Control,” or other appropriate product name as shown in the individual Listings.

APPLIANCE CONTROLS (ATNZ)

These products are Appliance Control such as cord connected power factor controllers rated less than 1 hp intended for use with specific types or classes of appliances. The controls have been investigated by UL to determine that when used in accordance with the manufacturer’s instructions they do not adversely affect operation of the appliance. Manufacturer’s claims for energy savings have not been evaluated by UL.

See Industrial Control Equipment for the Listing of Industrial types of power factor controllers.

The basic standards used to investigate the appliance controls in this category are UL 508 “Industrial Control Equipment” and any other UL Electrical Standard applicable to the type products.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product, together with a control number, is the only method provided by Underwriters Laboratories Inc. to identify products under its Classification and Follow-Up Service.

FOR USE WITH A SPECIFIC APPLIANCE:

APPLIANCE CONTROL

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.®

WITH RESPECT TO ELECTRICAL FIRE AND SHOCK HAZARDS ONLY. FOR USE ONLY WITH (PRODUCT CATEGORY) MODEL MANUFACTURED BY

FOR USE WITH A SPECIFIC CLASS OF APPLIANCE:

APPLIANCE CONTROL

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.

WITH RESPECT TO ELECTRICAL, FIRE AND SHOCK HAZARDS ONLY. FOR USE ONLY WITH UL LISTED (SPECIFIC TYPE OF PRODUCT).
### APPLIANCE OUTLET CENTERS (AUUZ)

**USE**

This category covers appliance outlet centers, which consist of a group of outlets with or without suitable branch circuit overcurrent protective devices, branch circuit switching and/or timer provisions.

**ADDITIONAL INFORMATION**

For additional information, see Appliance Outlet Centers (AUUZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**Requirements**

The basic standard used to investigate products in this category is UL 891, “Automatic-Outlet Switchboards.” These products are additionally investigated using ANSI/NFPA 70, “National Electrical Code” (NEC), to ensure compliance with the installation and use provisions of the NEC.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Commercial Appliance Outlet Center.”

### RESIDENTIAL APPLIANCE OUTLET CENTERS (AVGQ)

These products are intended for use in residential dwellings. See general information card for guide AUUZ.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Residential Appliance Outlet Center.”

### ARC-FAULT CIRCUIT INTERRUPTERS (AVYI)

**USE**

This category covers arc fault circuit interrupters intended to mitigate the effects of arcing faults that may pose a risk of fire ignition under certain conditions if the arcing persists.

**Ratings**

These devices are rated 120 or 120/240 V, 20 A maximum.

**Product Markings**

Arc fault circuit interrupters are marked to identify the type of device to aid the user in determining the intended location in a circuit.

### ARC-FAULT CIRCUIT INTERRUPTERS, BRANCH/FEEDER TYPE (AVZQ)

**USE**

This category covers arc fault circuit interrupters intended to be installed at the origin of a branch circuit or feeder, such as at a panelboard, where they can function to de-energize the entire branch circuit when an arc fault is detected.

These devices are intended to provide protection of the branch circuit wiring, feeder wiring, or both, against the unwanted effects of arcing. These devices also provide protection to cord sets and power supply cords connected to receptacles as shown below.

**Protection Provided**

The following branch circuit diagram and arc fault protection table illustrate the protection provided by a branch/feeder AFCI under various arc fault scenarios.

<table>
<thead>
<tr>
<th>Arc Fault Scenario</th>
<th>Protection Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branch Circuit Wiring</td>
<td>Parallel Arcing Detection (With Ground) Y</td>
</tr>
<tr>
<td>Series Arcing Detection (With Ground)</td>
<td>Y</td>
</tr>
<tr>
<td>Series Arcing Detection Without Ground</td>
<td>N</td>
</tr>
<tr>
<td>N</td>
<td>Arc fault protection provided</td>
</tr>
<tr>
<td>Y</td>
<td>Arc fault protection not provided</td>
</tr>
</tbody>
</table>

**Notes**

- Branch circuit wiring systems without ground were permitted prior to the 1962 NEC
  - Parallel arcing detection includes arcing line-to-line and line-to-ground

**Ratings**

These devices are rated 15 or 20 A, 120 or 120/240 V.

**Additional Information**

For additional information, see Arc Fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL Mark**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Branch/Feeder Arc Fault Circuit Interrupter” or “Branch/Feeder AFCI.”

### ARC-FAULT CIRCUIT INTERRUPTERS, COMBINATION TYPE (AWAH)

This category covers arc fault circuit interrupters that have been evaluated to provide protection of the branch circuit wiring, feeder wiring, or both, and cord sets and power-supply cords connected to receptacles against the unwanted effects of arcing.

These devices may be self-contained with an enclosure, separate devices intended to be mounted in an enclosure or outlet box, or integrated as part of another device such as a circuit breaker or outlet receptacle.

These devices are rated 15 or 20 A, 120 V.

For additional information, see Arc Fault Circuit Interrupters (AVYI).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word LISTED, a control number, and one of the following product names as appropriate: “Combination Arc Fault Circuit Interrupter” or “Combination AFCI.”

### ARC-FAULT CIRCUIT INTERRUPTERS, CORD TYPE (AWAY)

**USE**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).
This category covers arc fault circuit interrupters that are intended to be connected to a receptacle outlet. These devices are intended to provide protection to the power supply cord connected to it against the unwanted effects of arcing. The cord may be integral to the device. The device has no additional outlets.

**RATINGS**

These devices are rated 20 A maximum, 120 V.

**ADDITIONAL INFORMATION**

For additional information, see Arc Fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Cord Arc Fault Circuit Interrupter” or “Cord AFCI.”

**ARC-FAULT CIRCUIT INTERRUPTERS, OUTLET BRANCH CIRCUIT TYPE (AWBZ)**

**USE AND INSTALLATION**

This category covers arc fault circuit interrupters that have been evaluated to provide protection of the downstream branch circuit wiring, cord sets and power-supply cords against the unwanted effects of arcing. These devices also provide protection to upstream branch circuit wiring as shown below.

These devices have feed-through connections.

These devices are intended to be installed as the first outlet in a branch circuit.

**PROTECTION PROVIDED**

The following branch circuit diagram and arc fault protection table illustrate the protection provided by an outlet branch circuit AFCI under various arc fault scenarios.

<table>
<thead>
<tr>
<th>Arc Fault Scenario</th>
<th>Protection Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branch Circuit Wiring – First Leg</td>
<td>N (WAWU)</td>
</tr>
<tr>
<td>Parallel Arcing Detection</td>
<td>Y (WAWU)</td>
</tr>
<tr>
<td>Series Arcing Detection (With Ground)</td>
<td>Y (WAWU)</td>
</tr>
<tr>
<td>Series Arcing Detection Without Ground</td>
<td>Y (WAWU)</td>
</tr>
<tr>
<td>(#)</td>
<td>N (WAWU)</td>
</tr>
</tbody>
</table>

**Notes**

Y - Arc fault protection provided

N - Arc fault protection not provided

(1) - Branch circuit wiring systems without ground were permitted prior to the 1962 NEC

**Related Products**

Similar portable equipment is covered under Fountains, Small Decorative (QBW).

Control panels for use with equipment intended for water-play fountains and water playground areas, swimming pools and spas, or fountains with water in common with swimming pools are covered under Controls (WAWU).

**ARCHITECTURAL AND FLOATING FOUNTAINS (AWEG)**

**USE AND INSTALLATION**

This category covers electrical equipment systems intended for installation in accordance with Article 680 (Part V) and Article 682 of ANSI/NFPA 70, “National Electrical Code.” Equipment may consist of pumps (including submersible pumps), lights, control panels, and timers. Equipment may also include wind sensors, light detectors, freeze prevention equipment, and the like. These systems may be submersible or intended for remote installation. Systems suitable for outdoor use are so marked.

**RELATED PRODUCTS**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are ANSI/UL 778, “Motor-Operated Water Pumps,” UL 676, “Underwater Lighting Fixtures,” and UL 508A, “Industrial Control Panels.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Architectural Fountain,” “Floating Fountain” or “Floating Fountain Equipment,” or other appropriate product name as shown in the individual listings.

**ARMORED CABLE (AWEZ)**

**GENERAL**

This category covers arc fault circuit interrupters that are intended to be installed at a branch circuit outlet, such as an outlet box. These devices are intended to provide protection of cord sets and power-supply cords connected to it against the unwanted effects of arcing. These devices may provide feed-through protection of the cord sets and power-supply cords connected to downstream receptacles.

These devices may or may not have feed-through connections.

These devices may or may not have integral receptacles.

**RATINGS**

These devices are rated 15 or 20 A, 120 V.

**ADDITIONAL INFORMATION**

For additional information, see Arc Fault Circuit Interrupters (AVYI) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Outlet Circuit Arc Fault Circuit Interrupter” or “Outlet Circuit AFCI.”
This category covers armored cable in sizes 14–1 AWG copper and 12–1 AWG aluminum or copper-clad aluminum and rated 600 V or less. Armored cable is for use in alternating current circuits only. Armored cable is for use in accordance with Article 320 of ANSI/NFPA 70, “National Electrical Code.”

**ACTH** — Indicates armored cable rated 75°C employing conductors having thermoplastic insulation.

**ACTHH** — Indicates armored cable rated 90°C employing conductors having thermoplastic insulation.

**ACHI** — Indicates armored cable rated 90°C employing conductors having thermosetting insulation.

Armored cable connectors (box connectors) other than the direct bearing setscrew type are suitable for use on cable employing aluminum armor. For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (ALAZ).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (ALAZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1685, “Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables” and may be marked with the suffix “LS” and/or “For Use in Cable Trays.”

Cable with aluminum armor is identified with the words “ALUMINUM ARMOR” on a marker tape and tag on coils.

Cable with copper-clad aluminum conductors is identified with the designation “AL (C-U-CLAD)” or “Cu-Clad AL” on a tag, on the carton or reel. Cable with aluminum conductors is identified with the designation “AL,” “C-U,” or “Cu-Clad” on a tag, on the carton or reel. In addition, cable with compact-stranded copper conductors is identified with the designation “Compact Copper” or “CMPCT CU” following the conductor size and the words “Terminate with connectors identified for use with compact-stranded copper conductors” on a tag, on the carton or reel.

**ARMOURED CABLE CONNECTORS, TYPE AC (AWSX)**

**GENERAL**

This category covers armored cable connectors suitable for use with armored cable (Type AC) for installation in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC).

**ADDITIONAL FITTINGS** — Connectors covered under Metal-clad Cable Connectors, Type MC (PJOX) and Power and Control Tray Cable Connectors (PQOZ) are also suitable for use with armored cable when specifically indicated on the device or carton. Temporary wiring, such as flexible cables or cords, may be secured by the use of a connector suitable for use with flexible cord.

**GROUNDING** — Armored cable connectors (Type AC) are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with the NEC.

**SIZE OF CABLE USED** — Connectors of the 1/2 trade size, unless marked otherwise, are capable of holding a No. 14–2 armored cable and any larger size which it will accommodate.

**USE WITH ALUMINUM CABLE** — Connectors other than direct bearing setscrew type are suitable for use with aluminum armored cable.

**PRODUCT MARKINGS**

Some connectors are also acceptable for use with flexible metal conduit, flexible cord, nonmetallic sheathed cable, metal clad (Type MC), service entrance cable, flexible nonmetallic tubing, or armored optical fiber cable as indicated on the device or carton. Connectors for use with nonmetallic sheathed cable are also suitable for use with multicoupler underground feeder and branch circuit cable where used in dry locations.

**ATTACHMENT PLUGS (AXGV)**

**GENERAL**

This category covers the following types of products:

**Adapter** — A device that adapts one blade or slot configuration to another (including a grounding adapter for a nongrounding receptacle), adapts a receptacle to a lampholder, or adapts a lampholder to a receptacle (also known as a separable attachment plug). (See EMDV for similar products.)

**Appliance Coupler** — A single-outlet female contact device to be wired on flexible cord as part of a detachable power supply cord to be connected to a male inlet of an appliance.

**Appliance or Flatiron Plug** — An appliance coupler type of device having a slot configuration specified for use with heating or cooking appliances.

**Attachment Plug** — A male contact device for the temporary connection of a flexible cord or cable to a receptacle, cord connector, or other female outlet device.

**Cord Connector** — A female contact device to be wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection to an attachment plug or, as an appliance coupler, to an equipment inlet.

**Male Inlet (Equipment Inlet, Motor Attachment Plug)** — A male contact device to be mounted on utilization equipment to provide a detachable electrical connection to an appliance coupler or cord connector.

**Nonseparable Attachment Plug** — An adapter having a male screw shell and a pair of wire leads to be connected to utilization equipment.

**Separable Attachment Plug** — An adapter having a male screw shell and a slot configuration outlet.

**Shore Power Inlet** — A male inlet intended to provide power supply connection to boats moored to a dock. Shore power inlets are also covered under Shore Power Inlets, Marine (UBXK).

**Table Tap** — A cord connector having more than one outlet and intended to rest on a horizontal surface while in use.

** Terminals**

The terminations of devices intended to be wired to flexible cord are based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of ANSI/NFPA 70, “National Electrical Code” (NEC). The ampacity of flexible cord and cable is based on Section 400.5, Tables 400.5(A) and 400.5(B). The conductors are sized as specified on the product or in the manufacturer’s instructions provided with the device. The terminations are based on the use of 60°C insulated cord or cable.

The terminations of devices intended to be wired onto branch circuit conductors are based upon the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in circuits rated more than 100 A, as specified in Table 310.16 of the NEC.

**Grounding**

Devices having a terminal identified by a green-colored finish, the words “green” or “ground,” the letters “G” or “GR,” or the grounding symbol for use with wire and wire and unassembled devices to be factory assembled on flexible cord or wire. Such devices are complete only after installation of the flexible cord or wire and they are judged as part of a complete assembly.

**Ratings**

These devices are rated 600 V or less, ac or dc, and 200 A or less. They may also be rated in horsepower as noted in the individual product categories.

Outlet devices rated 250 V are tested on circuits involving a nominal potential to ground of 125 V. Outlet devices having other voltage ratings are tested on circuits involving full-rated potential to ground, except for multiphase-rated devices, which are tested on circuits consistent with their voltage ratings, i.e., a 120/208 V, 3-phase, device is tested on a circuit involving 120 V to ground.

**ADDITIONAL INFORMATION**

For additional information, see Armored Cable (AWEZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).
ATTACHMENT PLUGS, FUSELESS (AXUT)

GENERAL

This category covers adapters, appliance couplers, appliance and flatiron plugs, attachment plugs, cord connectors, male inlets (equipment inlets, motor attachment plugs), nonseparable attachment plugs, separable attachment plugs, and male inlets in this category have been investigated for compliance with Federal Specification W-C-596, "General Specification for Electrical Power Connectors." Such devices are identified by a Listing Mark augmented by the capital letters "F" and "S," each in a wing on either side of the UL Mark. The manufacturer may also include the Federal Specification number described in the specification) on the device or on the smallest unit container in which the product is packaged is the only number (which consists of the appropriate specification sheet and dash number described in the specification) on the device or on the smallest container in which the device is packaged.

Federal Specification — Some Listed attachment plugs, cord connectors and male inlets in this category have been investigated for compliance with Federal Specification W-C-596, “General Specification for Electrical Power Connectors.” Such devices are identified by a Listing Mark augmented by the capital letters "F" and "S," each in a wing on either side of the UL Mark. The manufacturer may also include the Federal Specification number described in the specification) on the device or on the smallest container in which the device is packaged.

Terminals — Terminals of appliance couplers, appliance and flatiron plugs, attachment plugs, cord connectors and table taps are intended for use with stranded copper conductors of the type used in flexible cord. Terminals of male inlets (motor attachment plugs) and shore-power inlets and table taps are intended for use with stranded copper conductors of the type used in flexible cord. Terminals of male inlets (motor attachment plugs) and shore-power inlets and table taps are intended for use with stranded copper conductors of the type used in flexible cord.

Horsepower Ratings — In addition to ampere and voltage ratings, standard ac horsepower ratings corresponding to the amp and voltage ratings assigned to specific attachment plugs not incorporating overcurrent protection or a switch are given in the table below. For a Design E motor rated more than 2 horsepower, it is necessary to use an attachment plug having a horsepower rating not less than 1.4 times the standard ac horsepower rating. The NEMA configuration designation is included for reference. Devices other than attachment plugs, and attachment plugs of configurations other than those indicated in the table, have horsepower ratings only if such ratings are marked on the device.

Enclosures

In general, devices having integral enclosures or installed as intended have been investigated for use indoors, in dry locations. All such Listed products provide a degree of protection against ordinary corrosion, accidental contact with live parts, and a limited amount of falling dirt. Some devices have been investigated for use in other operating environments when unmounted and when mated with other devices in the same manufacturer’s line of products. They are marked with one of the type designations 2 through 6, 12 and 13 indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). All outdoor types provide a degree of protection against rain, snow, and sleet. Outdoor types are also suitable for use indoors if they meet the environmental conditions present. A device that complies with the requirements for more than one type of enclosure may be marked with multiple designations. Complete use and mating information is provided in the installation instructions provided with each device.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 498, “Attachment Plugs and Receptacles.”

Horsepower Ratings for NEMA Configuration Attachment Plugs

<table>
<thead>
<tr>
<th>Amps</th>
<th>AC V</th>
<th>Rating</th>
<th>No. of Phase</th>
<th>No. of Poles</th>
<th>No. of Wire</th>
<th>NEMA Dsg</th>
<th>HP Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>1-15</td>
<td>L1-15</td>
<td>1/2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td>2-20</td>
<td>L2-20</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td>3-25</td>
<td>L3-25</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td>4-30</td>
<td>L4-30</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td>5-40</td>
<td>L5-40</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td>6-50</td>
<td>L6-50</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td>7-60</td>
<td>L7-60</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
<td>8-75</td>
<td>L8-75</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td>9-100</td>
<td>L9-100</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>125</td>
<td></td>
<td></td>
<td>10-125</td>
<td>L10-125</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td>11-150</td>
<td>L11-150</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
<td></td>
<td>12-200</td>
<td>L12-200</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250</td>
<td></td>
<td></td>
<td>13-250</td>
<td>L13-250</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300</td>
<td></td>
<td></td>
<td>14-300</td>
<td>L14-300</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>350</td>
<td></td>
<td></td>
<td>15-350</td>
<td>L15-350</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td></td>
<td></td>
<td>16-400</td>
<td>L16-400</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>450</td>
<td></td>
<td></td>
<td>17-450</td>
<td>L17-450</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td></td>
<td></td>
<td>18-500</td>
<td>L18-500</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>550</td>
<td></td>
<td></td>
<td>19-550</td>
<td>L19-550</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600</td>
<td></td>
<td></td>
<td>20-600</td>
<td>L20-600</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>650</td>
<td></td>
<td></td>
<td>21-650</td>
<td>L21-650</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>700</td>
<td></td>
<td></td>
<td>22-700</td>
<td>L22-700</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>750</td>
<td></td>
<td></td>
<td>23-750</td>
<td>L23-750</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td></td>
<td></td>
<td>24-800</td>
<td>L24-800</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>850</td>
<td></td>
<td></td>
<td>25-850</td>
<td>L25-850</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>900</td>
<td></td>
<td></td>
<td>26-900</td>
<td>L26-900</td>
<td>26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>950</td>
<td></td>
<td></td>
<td>27-950</td>
<td>L27-950</td>
<td>27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td></td>
<td>28-1000</td>
<td>L28-1000</td>
<td>28</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory)
ATTACHMENT PLUGS WITH SWITCHES (AYIR)

This listing covers appliance couplers, appliance plugs, attachment plugs, male inlets (equipment inlets, motor attachment plugs), and flatiron plugs incorporating switches.

In addition to UL 498, the standard used to investigate products in this category is either UL 20, “General Use Snap Switches”, or UL 1054, “Special Use Switches”. For additional information, see the information under Snap Switches (WJQR).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name of Underwriters Laboratories Inc. (as illustrated in the introduction of this Directory) together with the word “LISTED” (or “LIST”).

ATTACHMENT PLUGS WITH OVERLOAD PROTECTION (AYVZ)

This category covers attachment plugs, separable and nonseparable attachment plugs, cord connectors, and male inlets designed to accommodate standard fuses, or provided with circuit breakers or equivalent overcurrent protection.

ADDITIONAL INFORMATION

For additional information, see Attachment Plugs (AXGV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Attachment Plug with Overload Protection”, “Attachment Plug” or “Cord Connector,” or other appropriate product name as shown in the individual Listings.

BOAT CABLE (BDFX)

This category covers boat cable, which consists of a single insulated conductor without a jacket or two or more insulated conductors with or without an overall nonmetallic jacket, and which is suitable for use in marine pleasure crafts. Boat cable is rated 600 V or less, 60°C (122°F) or 75°C (167°F) when dry, and 60°C (140°F) and lower temperatures where exposed to oil. The cable employs stranded copper conductors in a size range of 18 to 4/0 AWG inclusive for multiple-conductors, 16 to 4/0 AWG inclusive for single conductors.

Additional capacities shall be in accordance with United States Coast Guard Regulations Title 33, Chapter I Parts 183.430 and 183.435 of the CFR.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Marine Products (AAMP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1426, “Electrical Cables for Boats.”

Cable rated 600 V is investigated to UL 1426. Cable rated 50 V is investigated to SAE J1127, J1128, or J379b.

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Boat Cable.”

BOXES, ENCLOSURES, HANDHOLES AND VAULTS, UNDERGROUND, UTILITY SPECIFICATION (BGHL)

This category covers Boxes, Enclosures, Handholes, Vaults, and the associated Covers for underground utility company installations and similar uses. These products are investigated in accordance with the Western Underground Committee Guide 3.6 for Nonconcrete Enclosures, and with additional utility specifications as noted in the individual listings and marked on the products. The products are intended for installation as specified by the Authority Having Jurisdiction. The products provide a level of mechanical protection only. They have not been investigated for protection against environmental conditions.

Boxes, Enclosures, Handholes and Vaults are marked with a Vertical Design Load and a Lateral Design Load. Covers for use with these Boxes, Enclosures, Handholes and Vaults are marked with a Vertical Design Load only. Boxes, Enclosures, Handholes and Vaults are marked to identify Covers which may be used. Covers are also marked to identify the Boxes, Enclosures, Handholes and/or Vaults for which they are suitable. The Vertical Design Load of the system (Box, Enclosure, Handhole or Vault in combination with a Cover) is equal to the lowest Vertical Design Load of either component. The Lateral Design Load is equal to that of the Box, Enclosure, Handhole or Vault.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names: “Underground Box”, “Underground Enclosure”, “Underground Handhole”, “Underground Vault”, or “Cover for Underground Enclosure” (where the blank is filled with Box, Enclosure, Handhole, or Vault, as appropriate) or other appropriate product name as shown in the individual Listing, and “investigated IN ACCORDANCE WITH The Standard Western Underground Committee Guide 3.6 for Non-concrete Enclosures, (+)”. In addition, when investigated to additional specification names, the organization name and specification, such as “YZ Phone Company Specification 123ABC” is also marked on the product.

BOXES, JUNCTION AND PULL (BGUZ)

GENERAL

This category covers sheet-metal boxes, cast-metal boxes, and nonmetallic boxes. These boxes are provided with a cover secured by fasteners other than hinges. All boxes in this category have a volume of more than 100 cu in. (1640 cm3).

ADDITIONAL INFORMATION

Boxes identified with an enclosure type designation are intended for use as specified in Electrical Equipment for Use in Ordinary Locations (AALZ).

ENVIRONMENTAL RATINGS AND CONDITIONS

Boxes identified with an enclosure type designation are intended for use in accordance with Article 314 of ANSI/NFPA 70, “National Electrical Code.”

CONDUIT CONNECTIONS

Cast-metal boxes suitable for field drilling and tapping of holes for conduit connections and mounting are marked to indicate the location and the trade sizes of the openings either on the box or on the packaging carton.

USE IN CONCRETE OR CINDER FILL

Cast-aluminum boxes suitable for use in concrete or cinder fill are marked to indicate this fact either on the box or on the packaging carton. These boxes may not be supplied with mounting means.

CONCENTRIC AND ECCENTRIC KNOCKOUTS

Some boxes are intended for the installation of specific kinds of equipment; however, this category does not cover any electrical material or fittings contained in the box.

RELATED PRODUCTS

Boxes intended to accommodate metering transformers are covered under Metering Transformer Cabinets (PJXS).
Boxes intended for electric meter sockets are covered under Meter Sockets (PJYZ).

Boxes provided with a door are covered under Cabinets and Cutout Boxes (CIVF).

Enclosures intended for use with industrial control panels are covered under Industrial Control Panels (NITW).

Boxes having a volume of 100 cu in. or less are covered under Metallic Outlet Boxes (QC7T) or Nonmetallic Outlet Boxes (QCMZ).

Boxes intended for use with swimming pool luminaires are covered under Junction Boxes (WCEZ).

Boxes intended for use aboard marine vessels are covered under Boxes, Junction and Pull, Marine (QCUP).

Boxes for use in hazardous (classified) locations are covered under Boxes, Junction and Pull for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (BGYM).

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

The basic standard used to investigate products in this category is ANSI/UL 50, "Enclosures for Electrical Equipment."

The Listing Mark on the product or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: "juncture and Pull Box," "Junction Box," "Pull Box," "Metal," or other appropriate product name as shown in the individual Listings.

**BUSWAYS, METAL-ENCLOSED, OVER 600 V (CVZW) **

**GENERAL**

This category covers busways and associated fittings, rated 600 V or less, 6000 A or less. Busways are grounded metal enclosures containing factory-mounted, bare or insulated conductors, which are usually copper or aluminum bars, rods or tubes. These enclosures, and in some cases an additional ground bus, are intended for use as equipment grounding conductors.

Some busways are not intended for use ahead of service equipment and are marked with the maximum rating of overcurrent protection to be used on the supply side of the busway.

Busways may be of one of the following designs:

**Lighting Busway** — Busway intended to supply and support industrial and commercial luminaires. Lighting busway is limited to a maximum current rating of 50 A.

**Trolley Busway** — Busway having provision for continuous contact with a trolley by means of a slot in the enclosure. Trolley busway may be additionally marked “Lighting Busway” if intended to supply and support industrial and commercial luminaires.

**Continuous Plug-in Busway** — Busway provided with provision for the insertion of plug-in devices at any point along the length of the busway. Continuous plug-in busway is intended for general use and may be installed within reach of persons. Busways of this design are limited to a maximum current rating of 225 A.

**Short-run Busway** — Unprotected busway intended for a maximum run of 20 ft horizontally, 10 ft vertically and are primarily used to supply switchboards. Except for transformer stubs, short-run busway is not intended to have intermediate taps.

**USE AND INSTALLATION**

Busways are intended for installation in accordance with Article 368 of ANSI/NFPA 70, "National Electrical Code" (NEC), and the manufacturer’s installation instructions.

Busways investigated to determine their suitability for - installation in a specified position, - for use in a vertical run, or for support at intervals greater than 5 ft, - for outdoor use

are so marked. This marking is on or contiguous with the name plate incorporating the manufacturer’s name and electrical rating.

A busway or fitting containing a vapor seal is so marked, but unless marked otherwise, the busway or fitting has not been investigated for passage through a fire-rated wall.

Busway marked “Lighting Busway” and protected by overcurrent devices rated in excess of 20 A is intended for use only with luminaires employing heavy duty lampholders unless additional overcurrent protection is provided for the luminaire in accordance with the NEC.

Trolley busway should be installed out of the reach of persons or otherwise installed to prevent accidental contact with exposed conductors. Some busways have a number of short stubs and are marked for use with certain compatible equipment.

Busways and fittings covered under this category are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on the terminal connectors and is on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14–1 AWG and 75°C ampacities for wire sizes 1/0 AWG and larger.

Some fittings are suitable for use as service equipment and are so marked.

**PLUG-IN BUSWAY FITTINGS INTENDED FOR USE ON OTHER MANUFACTURERS’ BUSWAYS**

Busway fittings of the plug-in design may be suitable for use on other manufacturers’ continuous plug-in or lighting busways. Busway fittings investigated for use on other manufacturers’ busways are limited to fittings incorporating luminaires. Fittings are marked to indicate with which busways they are intended to be used. Fittings intended for this application are limited to short-circuit current ratings of 10 kA, 600 V or less.

**RATINGS**

Busways and associated fittings marked “Short Circuit Current Rating(s) Maximum RMS Symmetrical Amps ___ Volts ___” have been investigated for the rating indicated.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

The basic standard used to investigate products in this category is UL 857, “Busways.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Busway,” “Short-Run Busway” or “Busway Plug,” or other appropriate product name.
CABINETS AND CUTOUT BOXES (CYIV)

GENERAL
This category covers sheet-metal boxes and nonmetallic boxes. Cutout boxes are provided with a door secured by hinges and one or more fasteners and are intended for surface mounting. A cabinet consists of two parts: a cabinet box and a mating cabinet front that contains a door. A cabinet may be flush mounted or surface mounted. These boxes are intended for installation in accordance with Article 312 of ANSI/NFPA 70, "National Electrical Code."

ENVIRONMENTAL RATINGS AND CONDITIONS
Cabinets and cutout boxes identified with an enclosure type designation are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Concentric or eccentric knockouts suitable for bonding conduits for non-service conductors are marked as such and do not require bonding jumpers to be installed. Boxes with concentric or eccentric knockouts may be marked with the manufacturer's model number and the product name "Cable Assembly" or "Cable Assembly with Knockout." The use of a knockout is optional. The use of a knockout is mandatory for applications where electrical parts are intended to be installed, or both, where necessary to maintain the designated environmental rating.

Cable assemblies and mating fittings are intended to be used as a substitute for the fixed wiring of the building structure. The cable assemblies and mating fittings are not intended to be used as a substitute for the fixed wiring of the building structure. They may also be used in conjunction with other control circuit devices. The cable assemblies and mating fittings are not intended to be used with any other control circuit device. They are not intended to be used as branch circuit or feeder protection and have not been investigated for those purposes. Similarly, they have not been investigated to determine their ability to provide overload protection or protection for cable and equipment connected to the load side of the cable limiters. They are not current limiting and will be marked as such.

Cable Assemblies — Cable assemblies consist of a length of flexible cord with a molded-on or assembled-on male or female connector at least one end of the cable. Cable assemblies with only one end terminated are intended for direct connection to a proximity switch, control panel, or similar device.

Male and Female Cable Fittings — Fittings intended to be field-wired onto flexible cord may have a male or female insert configuration. The diameter and the wire size of the flexible cord to which the fitting is intended to be assembled is indicated on the fitting or the smallest unit shipping container.

Panel-mounted Fittings — These fittings consist of a panel-mounted assembly with either a male or female insert. Each assembly is provided with a means to secure to a panel. These fittings may be provided with leads intended for direct wiring connection to a control panel, proximity switch, or other similar device.

Feeder-tap Fittings — Feeder-tap fittings consist of field-wiring terminals for feed-through connection to power-limited tray cable or other appropriate cable together with a female connector to connect to a cable assembly or field wiring terminals to connect to flexible cord suitable for hard use that is of the same size and ampacity as the feeder cable. Feeder-tap fittings are intended for use within outlet boxes supported by cable trays in Class I power-limited circuits to provide a point of connection to the fixed wiring of the building structure. They may also be installed on Type PLT cable on open wiring in Class 2 circuits in accordance with Exception No. 3 of Section 725-61(d) of the National Electrical Code. They have been evaluated for electrical insulation, mechanical strength, temperature rise, fault current withstand and effectiveness of grounding path to demonstrate equivalency to the wiring system on which they are intended to be installed.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The products covered under this category are investigated to the Outline of Investigation, SUB 2238.

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product or smallest unit shipping container in which the product is placed is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Cable Assembly for Industrial Control and Signal Distribution” or “Cable Assembly Fitting for Industrial Control and Signal Distribution.” The cable assemblies which have terminations on one end only may be bulk labeled with the Listing Mark provided on the smallest unit shipping container. All other Listing Marks are applied to each individual device.

CABLE LIMITERS (CYMT)

GENERAL
This category covers cable limiters of the nonrenewable type, rated 600 V maximum. These cable limiters are intended for use on ac circuits only, unless also marked with a dc voltage rating. They have a current interrupting rating of up to 200,000 rms symmetrical amperes. They are suitable for use with copper or aluminum cable when the wire terminals are so marked.

These cable limiters are intended for supplementary overcurrent protection. They are intended for use, where multiple wires per phase are used, to isolate an individual wire should it become faulted. They are not intended to be used as branch circuit or feeder protection and have not been investigated for those purposes. Similarly, they have not been investigated to determine their ability to provide overload protection or protection for cable and equipment connected to the load side of the cable limiter. They are not current limiting and will be marked as such.

PRODUCT MARKINGS
These devices are marked with the manufacturer’s name or trademark (or both), catalog number, voltage rating, interrupting rating (200,000 or 200 A), and the cable size with “CU”’, “AL” or “CU/AL” (as appropriate) following.

Those devices investigated and intended to be secured to conductors by crimping are additionally marked to identify the required crimp tool, die, and number of crimps.

Unless marked to indicate otherwise, these devices are intended for use only in dry locations.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 248-1, “Low-Voltage Fuses – Part I: General Requirements.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its
CABLE TRAYS (CYNW)

USE
This category covers cable trays intended for assembly in the field and for use in accordance with Article 392 of ANSI/NFPA 70, “National Electrical Code” (NEC). They have been classified as to their suitability for use as equipment grounding conductors in accordance with Sections 392.3(C) and 392.7(B) of the NEC. The cable trays are marked on the outer surface of the sidewall of the tray indicating the cross-sectional area of the grounding metal.

INSTALLATION
Cable tray assemblies have been investigated for bonding between sections using the minimum hardware provided by the manufacturer. The manufacturer may supply cable tray sections and fittings without a positive mechanical means for completing the grounding connection. Assemblies not provided with positive mechanical grounding connections are intended to be bonded with mechanical connectors or bonding jumpers provided by the installer, in accordance with 392.7(B)(4) of the NEC.

RELATED PRODUCTS
For nonmetallic cable trays, see Cable Trays, Nonmetallic (CYOV).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

CABLE TRAY AS TO ITS SUITABILITY AS AN EQUIPMENT GROUNDING CONDUCTOR ONLY
Control No.

CABLE TRAYS, NONMETALLIC (CYOV)

USE
This category covers nonmetallic, including fiberglass (fiberglass reinforced plastic) cable tray systems installed for the support of power and/or control cable. Nonmetallic cable trays are intended for assembly in the field and for use in accordance with Article 392 of ANSI/NFPA 70, “National Electrical Code.”

Cable trays are intended to be installed in accordance with NEMA VE 2, “Cable Tray Installation Guidelines,” or as recommended by the manufacturer. Cable trays are marked with load/span ratings and may additionally be marked with class designations Class A, B, C, D or E. These class designations represent the static weight supportable by cable tray spans.

<table>
<thead>
<tr>
<th>Span (ft)</th>
<th>Class A</th>
<th>Class B</th>
<th>Class C</th>
<th>Class D</th>
<th>Class E</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>50</td>
<td>75</td>
<td>100</td>
<td>45</td>
<td>75</td>
</tr>
<tr>
<td>16</td>
<td>50</td>
<td>75</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>50</td>
<td>75</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>25</td>
<td></td>
<td>65</td>
<td>120</td>
<td>200</td>
</tr>
<tr>
<td>8</td>
<td>50</td>
<td>75</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Listed nonmetallic cable trays are constructed of flame retardant material, provide a degree of voltage isolation, are investigated for the effects of low temperature handling, and are suitable for outdoor use.

Nonmetallic cable trays have not been investigated for use in air-handling spaces.

The investigation of nonmetallic cable trays does not include the support system.

RELATED PRODUCTS
For metallic cable trays, see Cable Trays (CYNW).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is ANSI/UL 568, “Nonmetallic Cable Tray Systems.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Nonmetallic Cable Tray.”

CAPACITORS (CYWT)

GENERAL
This category covers general-use power factor correction units rated 600 V maximum. These assemblies employ integrally protected capacitors investigated under Capacitors (CYWT).

USE AND INSTALLATION
These units are intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code,” and are intended for indoor use, unless otherwise indicated. This information, together with other restrictions of use, such as mounting means and special electrical connections, are detailed in the manufacturer’s installation instructions furnished with the product.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

CIRCUIT BREAKERS (DHJR)

USE
This category covers circuit breakers which, unless otherwise noted, are of the manually operable, air break type, providing automatic overcurrent protection.

PRODUCT MARKINGS AND RATINGS
These circuit breakers and circuit breaker enclosures are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on terminal connectors and are located on a wiring diagram or another readily visible location.

1. Circuit breaker enclosures are marked to indicate the temperature rating of all field installed conductors.

2. Circuit breakers with a current rating of 125 A or less are marked as being suitable for 60°C, 75°C only or 60/75°C rated conductors with a higher insulation rating, if the temperature rating is based on the conductor temperature rating marked on the breaker.

3. Circuit breakers marked 125 A or less and marked suitable for use with 75°C rated conductors are intended for field use with 75°C rated conductors at full 75°C ampacity only when the circuit breaker is installed in a circuit breaker enclosure or individually mounted in an industrial control panel with no other component next to it, unless the end-use equipment (panelboard, switchboard, service equipment, power outlet, etc.) is also marked suitable for use with conductors rated 75°C.

4. A circuit breaker with a current rating of more than 125 A is suitable for use with conductors rated 75°C.

5. Circuit breakers intended for continuous operation at 100 percent of rated current may be marked to be connected with 90°C rated wire with the size based on 75°C ampacity.

A suitable marking is required in a circuit breaker enclosure, whether or not terminals are mounted therein, if it is intended that the breaker to be mounted therein is to be used with aluminum wires.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

ADAPTERS, CIRCUIT BREAKER (DHWZ)

This listing covers equipment designed to adapt circuit breakers to receiving devices such as panelboards, panel base assemblies, etc. and field installation is intended only in those receiving devices which are specifically marked for their use.

For additional information, see Circuit Breakers, Guide DIVQ.

The basic standard used to investigate products in this category is UL 489, “Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures.”
ADAPTERS, CIRCUIT BREAKER, CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (DICQ)

This category covers Classified Circuit Breaker adapter kits designed to adapt circuit breakers to receiving devices such as panelboards. The kits and the Listed Circuit breakers furnished with the kits have been investigated and found suitable for use in place of other Listed circuit breakers in specific equipment such as panel boards identified by type and company name in the installation instructions furnished with each kit. A marker is provided for application to the equipment to indicate that the kit and circuit breaker have been investigated to IEEE C62.1-1989, Standard for Gapped Silicon-metal oxide surge arresters is ANSI/IEEE C62.11, “Standard for Metal and Circuit Breaker Enclosures”. The basic standard used to investigate products in this category is UL 67 “Standard for Panelboards”.

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the smallest unit container in which the product is packed, is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service.

"CIRCUIT BREAKER ADAPTER CLASSIFIED BY UNDERWRITERS LABORATORIES INC® FOR USE IN LISTED (MANUFACTURER) PANELBOARDS AS NOTED IN IL SHEET __________"

CIRCUIT BREAKER AND SECONDARY SURGE ARRESTERS (DIMV)

This listing covers combination circuit breaker and secondary surge arrester devices designed to serve the dual function of providing overcurrent protection, and protection against power-distribution system surge related damage to connected circuits and load connected equipment. They are intended for installation in circuit breaker enclosures, panelboards and the like on grounded 60 Hz alternating current power circuits in accordance with the National Electrical Code.

For additional information see Molded Case Circuit Breakers (DICQ) and Surge Arresters (OWXH). The basic Standard used to investigate the metal oxide surge arresters is ANSI/IEEE C62.11, “Standard for Metal-Oxide Surge Arresters for AC Power Circuits”. All other types of surge arresters are investigated to IEEE C62.1-1989, Standard for Gapped Silicon-Carbide Surge Arresters for AC Power Circuits.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product name: “Circuit Breaker and Secondary Surge Arrester”.

CIRCUIT BREAKER AND TRANSIENT VOLTAGE SURGE SUPPRESSORS (DIPJ)

This Listing covers combination circuit breaker and transient voltage surge suppressor kit designed to serve the dual function of providing overcurrent protection, and are intended to limit the maximum amplitude of transient voltage surges on power lines to specified values. They are not intended to function as Surge Arresters.

The transient voltage surge suppressors have been tested to verify that transient voltage surges are limited to the maximum amplitudes specified by the manufacturer when subjected to a 1.2 by 50 microsecond 6 kV voltage pulse.

The effect of the suppressor on connected loads, the effect of the suppressor on harmonic distortion of the supply voltage and the adequacy of the suppression level to protect connected equipment from damage from transient voltage surges have not been evaluated.

These devices are intended for installation in circuit breaker enclosures, panelboards and the like on grounded 60 Hz alternating current systems in accordance with the National Electrical Code.

For additional information see Molded Case Circuit Breakers (DIPQ) and Transient Voltage Surge Suppressors (AUHT).

The basic Standard used to investigate the circuit breaker portion is UL 489, “Standard for Molded-Case Circuit Breaker, Molded-Case Switches and Circuit Breaker Enclosures”. The basic standard used to investigate the transient voltage surge suppressor is UL 1449, Standard for Transient Voltage Surge Suppressors.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number and the following product name: “Circuit Breaker and Transient Voltage Surge Suppressor”.

CIRCUIT BREAKER CURRENT LIMITERS (DIRW)

Circuit breaker current limiters are designed to be used in conjunction with specific circuit breakers and to be directly connected to the load terminals of the circuit breakers. They contain fusible elements which function only to increase the fault current interrupting ability of the combination which is intended for use in the same manner as circuit breakers when installed at the service and as branch circuit protection. The limiters are rated 600 V or less.

The fusible elements in circuit breaker current limiters are so coordinated that they function at currents below those specified in short circuit tests requirements for circuit breakers. Except for this feature of short circuit operation, combinations of circuit breakers and circuit breaker current limiters meet all requirements applicable to branch circuit and service circuit breakers and, in addition, are required to clear circuits up to and including 25 times their amp rating and, and circuits of 1000 amps or less regardless of amp rating, without causing operation of the fusible elements in the current limiter. For additional information see Circuit Breakers.

Circuit breaker current limiters are marked to indicate the breakers with which they are intended to be used.

Circuit breaker current limiters which are marked “Current Interrupting Rating(s), MAXIMUM RMS SYM. AMPERES ______ VOLTS ______” have been investigated in conjunction with the circuit breaker and found suitable for the marked interrupting rating.

An interrupting rating on a circuit breaker current limiter included in a piece of equipment does not automatically qualify the equipment in which the combination is installed for use on circuits with higher available currents than the rating of the equipment itself.

The combination of circuit breaker and circuit breaker current limiter is intended to be mounted in listed enclosures.

Equipment (such as panelboards, service equipment, and dead front switchboards) which has been investigated and found suitable for use with the combination of circuit breaker current limiter and circuit breaker is marked to indicate that both may be used.

Circuit breaker current limiters as listed herein are for use with copper conductors unless marked “Other than aluminum conductors” which terminals are suitable for use with aluminum conductors. Such markings shall be independent of any marking on terminal connectors and shall be readily visible.

Unless the circuit breaker current limiters is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire in circuit rated 100 amp or less, and the use of 75 C wire for higher amp rated circuits.

The basic standard used to investigate products in this category is UL 489, “Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its
CIRCUIT BREAKERS FOR USE IN COMMUNICATIONS EQUIPMENT (DITT)

These are DC rated circuit breakers intended to provide branch circuit protection in communications circuits.

The acceptability of circuit breakers at 100% of the ampere rating is determined in the end-product.

Circuit breakers that may be used in ambient at temperatures other than 25°C are marked with either a maximum ambient temperature or a range determined in the end-product.

Circuit breakers have not been investigated for use on motor circuits.

The basic standard use to evaluate these circuit breakers is the Standard for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, UL-489, as modified by the Outline of Investigation for Circuit Breakers for Use in Communications Equipment.

For additional information see DHJR.

The Listing Mark for Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Circuit Breaker Current Limiter”.

CIRCUIT BREAKERS, MOLEDED-CASE AND CIRCUIT BREAKER ENCLOSURES (DIVQ)

This category covers circuit breakers and circuit breaker enclosures designed to provide service-entrance, feeder or branch circuit protection in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC).

These circuit breakers are intended for use with Listed enclosures, or as part of other Listed equipment, or without enclosures where acceptable.

Investigation of a Listed “replacement circuit breaker” involves only the circuit breaker and associated parts; the end application or any series combination application has not been investigated.

Some circuit breakers are not provided with a means to prevent their installation in Class CTL assemblies. These circuit breakers are for use in old style, non-Class CTL equipment and are marked “For Replacement Use Only, Not CTL Assemblies.”

Circuit breakers marked “SWD” and rated 347 V or less are suitable for switching fluorescent lighting loads on a regular basis at their rated voltage.

Circuit breakers marked “HID” have been investigated for switching high-intensity discharge lighting loads on a regular basis at their rated voltage.

Some circuit breakers include a pole intended to disconnect the grounded circuit conductor of a branch circuit. All poles of these circuit breakers open simultaneously.

Single-pole circuit breakers rated 120 V ac are suitable for use on circuits rated 120 V to ground.

Single-pole or multi-pole independent trip circuit breakers, with or without handle ties, rated 120/240 V ac, are suitable for use in a single-phase, multi-wire circuit on-line-to-neutral connected loads.

Single-pole or multi-pole independent circuit breakers, with handle ties, rated 120/240 V ac, are suitable for use on multi-wire circuits with line-to-line or line-to-ground connected loads.

2-pole independent trip breakers and single-pole breakers with handle ties, rated 120/240 V ac, are suitable for use in line-to-line single-phase circuits or line-to-line lighting and appliance branch circuits connected to 3-phase, 4-wire systems, provided the systems have a grounded neutral and the voltage to ground does not exceed 120 V.

2-pole independent trip circuit breakers and single-pole breakers with handle ties, rated 125/250 V dc, are suitable for use in line-to-line connected 3-wire dc circuits supplied from a system with a grounded neutral where the voltage to ground does not exceed 125 V.

2-pole independent trip circuit breakers and single-pole breakers with handle ties, rated 125/250 V (both ac and dc), are suitable for use in accordance with either of the above two paragraphs, as applicable.

Some independent trip circuit breakers are marked “independent trip,” “no common trip” or equivalent wording.

3-pole circuit breakers having provision for two poles to be connected to a bus structure and a third isolated pole (commonly referred to as delta breakers) are marked “For Replacement Use Only.”

PRODUCT TYPES

Circuit breakers and circuit breaker enclosures are indicated by the label designations as follows:

CTL Circuit Breaker — without enclosure, and with noninterchangeable trip units.

Replacement Circuit Breaker — a present design with external modifications to permit its mounting in place of obsolete designs of the same manufacturer in previously Listed applications, such as panelboards, switchboards and the like, which are still in service.

INSTALLATION

Some circuit breakers include a ground-fault trip element. These ground-fault trip elements have been investigated in accordance with UL 1053, “Ground-Fault Sensing and Relaying Equipment,” and are suitable for providing ground-fault protection of equipment in accordance with NEC Articles 426 or 427 are covered under Circuit Breakers with Equipment Ground Fault Protection (DIYA).

Some circuit breakers include “independent trip” as marked accordingly.

An interrupting rating on a circuit breaker included in a piece of equipment does not automatically qualify the equipment in which the circuit breaker is installed for use on circuits with higher available currents than the rating of the equipment itself.

Circuit breaker enclosures that have a short-circuit current rating are marked accordingly.

PRODUCT MARKINGS

A circuit breaker that includes an accessory device, whether attached to the circuit breaker by the manufacturer of the circuit breaker, or by others, is marked to indicate the presence of that accessory.
CIRCUIT BREAKERS, MOLDED-CASE, CLASSIFIED FOR MITIGATING THE EFFECTS OF ARcing FAULTS (DIWL)

This category covers Listed molded case circuit breakers which are also Classified in that they have been investigated for the ability to mitigate the effects of arcing faults that may pose risk of fire ignition under certain conditions if the arcing persists.

These devices have been tested using methods that create or simulate arcing conditions to determine their ability to recognize and react to arcing faults. The test methods used to evaluate these devices include the carbonized path arcing and point contact arcing test. Tests have also been conducted to verify that operation is not unduly inhibited by the presence of loads and circuit characteristics that may mask or attenuate unwanted arcing.

These devices have been evaluated to determine resistance to unwanted tripping due to the presence of arcing equipment. These tests included utilizing equipment under normal operating conditions or a loading condition which closely mimics an arc fault, such as the current waveform produced by some solid-state loads.

These circuit breakers are rated 120 or 240 volts, 15 or 20 amperes. These circuit breakers are also Listed and are intended to be used in panelboards or the like marked for their use.

For additional information see the Guide Information for Molded-Case Circuit Breakers and Circuit Breaker Enclosures (DIVQ) and the General Information Section of the Guide for Circuit Breakers (DHJR).

The basic standard used to investigate products in this category is UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

The Classification Marking appears on the device in addition to the Listing Mark. The Classification Marking on the device indicates to the user the circuit breaker is Classified for use only in specified panelboards where the available short-circuit current is 10 kA, 120/240 volts ac.

The Classification Marking identifies circuit breakers investigated for use in a marine environment.

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures."

CIRCUIT BREAKERS, MOLDED-CASE, CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (DIXF)

GENERAL

This category covers Classified molded-case circuit breakers rated 15 to 50 A, 120/240 V maximum that have been investigated and found suitable for classification of other Listed circuit breakers in specific Listed panelboards, with ratings not exceeding 225 A, 120/240 V ac and a short-circuit current of 10 kA. The circuit breakers are Classified for use in specified panelboards in accordance with the details described on the circuit breaker or in the publication provided with the circuit breaker.

In addition, Classified molded-case circuit breakers may also be Listed with additional features such as a ground-fault trip element, ground-fault circuit interrupter, arc-fault circuit interrupter, secondary surge arrester, transient voltage surge suppressor, and the like.

PRODUCT MARKINGS

A circuit breaker that is Classified only is marked on the side with the statement: "This circuit breaker is Classified for use only in specified panelboards where the available short-circuit current is 10 kA, 120/240 volts ac or less. Do not use in equipment connected to circuits having a short-circuit current exceeding 10 kA, 120/240 V ac.

A circuit breaker that is both Classified and Listed is marked on the side with the statement: "This circuit breaker is Listed for use in panelboards in accordance with the details described on the circuit breaker. If additional information is necessary, contact [Classified circuit breaker manufacturer’s name]."

The referenced publication is a compatibility list which tabulates the company name, catalog number, number of poles and electrical ratings of the Classified circuit breaker, in addition to the company name and catalog number of the applicable UL Listed panelboards, and corresponding UL Listed circuit breakers in place of the Classified circuit breaker that has been investigated. The compatibility list also details the maximum permissible voltage and maximum available short-circuit current of the supply system to the panelboard. The Classified circuit breaker is not suitable for the specified application if the system supply characteristics exceed the maximum values indicated in the compatibility list. One copy of the compatibility list is provided with each circuit breaker.

Circuit breakers which are both Classified and Listed have markings as above, with the addition of the Listing Mark, located on the side of the circuit breaker.

RELATED PRODUCTS

For information on markings, see Molded-case Circuit Breakers and Circuit Breaker Enclosures (DIVQ) and Circuit Breakers (DHJR). For those Classified molded-case circuit breakers containing additional features, refer to the following categories: for Arc Fault Circuit Interrupters, Branch/Feeder Type, see AVZQ; for Circuit Breaker and Secondary Surge Arresters, see DMY; for Circuit Breaker and Transient Voltage Surge Suppressors, see DDPF; for Circuit Breakers with Equipment Ground Fault Protection, see DIYA; for Circuit Breaker and Ground-fault Circuit Interrupters, see DKUY.

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHJR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
CIRCUIT BREAKERS WITH EQUIPMENT GROUND-FAULT PROTECTION (DIYA)

USE AND INSTALLATION

This category covers combination circuit breaker and equipment ground fault protective devices designed to serve the dual function of providing overcurrent protection, and protection against shock hazard, as required by Articles 426 and 427 of NFPA 70, “National Electrical Code” (NEC).

A circuit breaker and equipment ground fault device is intended to be installed only on grounded alternating current systems in accordance with the NEC.

1. These devices are intended to be installed in new or existing panelboards or the like.
2. The equipment ground fault protection trip level is marked on the device.
3. These devices are suitable for use on systems where the voltage does not exceed the rating on the device.
4. A two-wire device is not suitable for use in a multwire branch circuit as defined in the NEC.
5. These devices are marked so that they can be distinguished from a circuit breaker and ground fault circuit interrupter.
6. These devices may have any voltage rating that is acceptable for a circuit breaker.

RELATED PRODUCTS

See Circuit Breakers, Molded-case and Circuit Breaker Enclosures (DIVQ).

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers (DHR) and Electrical Equipment for Use in Ordinary Locations (AAZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 489, “Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures” and UL 1053, “Ground-Fault Sensing and Relaying Equipment.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Circuit Breaker With Equipment Ground Fault Protection” or the abbreviation “C.B. W/EQ.GFP.”

FUSED CIRCUIT BREAKERS (DIYV)

Fused circuit breakers include all the mechanical features of molded-case circuit breakers and in addition have one or more replaceable current limiters or fuses which function to increase the fault current interrupting ability. They are intended to be used in the same manner as other circuit breakers when installed at the service and as branch circuit protection and are to be mounted in Listed enclosures. Fused circuit breakers are identified with respect to their performance characteristics as either Type 1 or Type 2. They are rated at 600 volts or less.

Type 1 fused circuit breakers meet all performance requirements of molded-case circuit breakers. The fuse, fuses, or replaceable current limiters function only to extend the fault current interrupting ratings beyond the short circuit test requirement applicable. Type 1 devices are limited to constructions which are designed to accommodate and coordinate with fuses or replaceable current limiters having high interrupting capacity ratings.

Type 2 fused circuit breakers use a fuse, fuses or current limiters so coordinated that they function at currents below those specified in short circuit test requirements. Except for this feature of short circuit operation Type 2 fused circuit breakers meet all requirements applicable to molded-case circuit breakers and, in addition, are required to clear circuits up to and including 25 times their amp rating, and circuits of 1000 amp or less regardless of amp rating, without causing operation of the fuse, fuses or current limiters which are a part of the device. Type 2 devices are limited to constructions which are designed to accommodate and coordinate with fuses having high interrupting capacity ratings.

For additional information see Circuit Breakers.

CIRCUIT BREAKER AND GROUND-FAULT CIRCUIT INTERRUPTERS (DKUY)

This listing covers combination circuit breaker and ground fault circuit interrupter devices designed to serve the dual function of providing overcurrent protection, and protection against shock hazard, as required by the National Electrical Code ANSI/NFPA 70.

A circuit breaker and ground-fault circuit interrupter is intended to be installed only on grounded 60 hertz alternating current systems in accordance with the National Electrical Code.

1. These devices are intended to be installed in new or existing service equipment, panelboards and the like.
2. These devices are categorized by a lettered Class designation such as Class A, to assure proper coordination with certain utilization equipment such as underwater swimming pool equipment.
3. A two-wire device is not suitable for use in a multwire branch circuit as defined in the National Electrical Code.
4. Some devices rated 120/240V do not have a load neutral wire connector and are intended for use with 208 volt or 240 volt loads only.
5. For additional information see Molded-Case Circuit Breakers and Circuit Breaker Enclosures, and Ground-Fault Circuit Interrupters.

The basic standards used to investigate products in this category are UL 489, “Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures” and UL 943, “Ground-Fault Circuit Interrupters”.

The listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name: “Circuit Breaker and Ground-Fault Circuit Interrupter” or “C.B./GFCI”.

CIRCUIT BREAKERS AND METAL-CLAD SWITCHGEAR OVER 600 V (DLAH)

GENERAL

This category covers indoor medium-voltage ac power circuit breakers rated over 600 V and the metal-clad switchgear in which they are intended to be installed. The term “indoor” does not preclude the use of these circuit breakers in outdoor enclosures, but rather defines the class of equipment. These circuit breakers are specifically intended to provide service entrance, feeder or branch circuit overcurrent protection, serve as a disconnecting means, or both. These devices are intended for installation in accordance with the requirements of ANSI/NFPA 70, “National Electrical Code”.

CIRCUIT BREAKERS

The circuit breakers are three-pole devices of the draw-out type, are trip-free and may be air break, vacuum-type or devices employing other insulation medium.

Circuit Breaker Ratings

Each circuit breaker is provided with a marking that indicates the voltage and current ratings for both the close and trip coils. This marking also contains a “close-and-latch” rating in kiloamperes that is equivalent to the momentary rating (maximum asymmetrical current rating) of the circuit breaker. This rating is expressed in rms asymmetrical amps. Circuit breakers have a rated maximum voltage of 4.76, 8.25, 15, 27 or 38 kV with continuous current ratings of 1200, 2000 or 3000 A.

Circuit breakers are marked with an interrupting rating “I” in rms symmetrical amps that is applicable at the maximum rated voltage. Circuit breakers using the rating structure of ANSI C37.06-1987 are also provided with a “K” factor for determining the interrupting rating at a use voltage lower than the maximum rated voltage. The circuit breaker may interrupt
a current greater than "I" by a factor up to the value of "K," at a voltage reduced from the maximum rated voltage, "V max" by the same factor, or at a lower voltage, as depicted in Illustration 1. Circuit breakers using the rating structure of ANSI C37.06-1997 or later do not have a "K" factor, or are marked with a "K" factor of 1.0.

**METAL-CLAD SWITCHGEAR**

Metal-clad switchgear may consist of one or two compartments in a vertical section. A compartment may be intended to house a circuit breaker, or it may be designated an auxiliary compartment. An auxiliary compartment may typically contain potential transformers, control gear, protective relays and the like. Vertical sections may consist of a single freestanding section or they may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus. When provided with a horizontal bus, each section is marked with the ampacity of the horizontal bus in amps. Each vertical section of a line-up of abutting vertical sections is provided with a "_____ of _____" marking where the second blank indicates the total number of vertical sections provided (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

A section, with only horizontal bus or with no installed equipment, may be provided. This section is identified as an enclosure and is numbered as part of a line-up.

Current sensors are factory installed and may be mounted on the circuit breaker or on the line or load bus within the metal-clad switchgear. The output of these current sensors is connected to either protective relays or similar sensing and relaying equipment that is typically located on the door of the circuit breaker compartment or in an auxiliary compartment.

**Metal-clad Switchgear Ratings**

Metal-clad switchgear assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. This marking appears on each vertical section bearing the UL Listing Mark. The Classification Mark consists of the appropriate Listing Mark (noted above) of the manufacturer's name, a type designation, electrical ratings, primary disconnecting devices compartment compatibility and an instruction manual number.

**ENCLOSURES**

An enclosure investigated to determine that it is rainproof is marked "Rainproof," "Outdoor" or "3R." Enclosures may be either nonventilated or ventilated. Enclosures are marked to indicate the exposure Category (A, B or C) for which they are intended. Enclosures marked "Category A" are intended to be installed in areas accessible to the unsupervised general public; enclosures marked "Category B" are intended to be installed in areas accessible to authorized personnel only; enclosures marked "Category C" are intended to be installed in areas accessible to qualified personnel only. The environmental and exposure category marking need only appear on the first (incoming) switchgear vertical section of a line-up.

**ARC-RESISTANT SWITCHGEAR**

Metal-clad switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended may additionally be classified as arc-resistant switchgear.

Arc-resistant switchgear has been evaluated for installation in buildings (for indoor applications) that have sufficient overhead space to permit venting without reflecting arc products, as specified in the installation instructions.

Arc-resistant switchgear is marked with an Accessibility Type designation based upon the construction. The Types may be either A, B or C.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**


**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. In an assembly of products, the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark on the overall enclosure covers only the vertical section to which it is affixed; it does not cover other vertical sections included in the assembly, or the removable circuit breaker.

The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number and one of the following product names as appropriate: "Medium Voltage AC Power Circuit Breaker," "Metal-clad Switchgear," "Metal-clad Switchgear Enclosure" or "Ground and Test Device."

**Classification Mark for Arc-resistant Switchgear**

The Classification Mark of Underwriters Laboratories Inc. on switchgear evaluated as arc resistant is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

The Classification Mark appears on the front of each vertical section eligible for this classification. The Classification Mark consists of the appropriate Listing Mark (noted above) and the following additional information:

**ARC-RESISTANT SWITCHGEAR**

**ALSO CLASSIFIED IN ACCORDANCE WITH**

**(designation of standard and date)**

**CIRCUIT BREAKERS, MEDIUM VOLTAGE CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (DLBC)**

**USE**

This category covers circuit breakers of current design that have been modified to replace obsolete circuit breakers.

These circuit breakers are intended to be installed in switchgear where the exact replacement is no longer available.

The ratings on the circuit breaker apply unless the ratings on the host switchgear case are lower. In either case the lower rating is applicable.

In addition to other required markings, these circuit breakers are marked to indicate the Type of switchgear where they are intended to be used.

---

**2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY**

**PART I**

**LOOK FOR THE UL MARK ON PRODUCT**
CIRCUIT BREAKER SWITCHGEAR, METAL-ENCLOSED, OVER 600 V (DBLK)

GENERAL

This category covers indoor medium-voltage ac power circuit breakers rated over 600 V and the metal-enclosed switchgear in which they are installed. The term “indoor” does not preclude the use of these circuit breakers in outdoor enclosures, but rather defines the class of equipment. These circuit breakers are specifically intended for interrupting current. The circuit breaker is supplemented by a series-connected switch that can ground the load circuit and serves as a disconnecting means.

CIRCUIT BREAKER RATINGS

Each circuit breaker section is provided with a marking that indicates the voltage and current ratings. This marking also contains a “close-and-latch” rating in kiloamperes that is equivalent to the momentary rating (maximum asymmetrical current rating) of the circuit breaker. This rating is expressed in rms asymmetrical amps. Circuit breakers may be rated up to 38 kV and 3150 A.

Circuit breakers are marked with an interrupting rating “I” in rms symmetrical kiloamperes that is applicable at the maximum rated voltage. The symbol “K” is used on circuit breakers using the rating structure of ANSI/IEEE C37.06-1995 or later do not have a “K” factor. The circuit breaker may interrupt a current greater than “I” by a factor up to the maximum rated voltage. When there is a marked “K” factor, the circuit breaker may interrupt a current greater than “I” by a factor up to the value of “K” at a voltage reduced from the maximum rated voltage, “V max,” by the same factor, or at a lower voltage. Circuit breakers using the rating structure of ANSI/IEEE C37.06-1995 or later do not have a “K” factor rating, or are marked with a “K” factor of 1.0. Unless specifically marked otherwise, these circuit breakers are intended for use on three-phase circuits where the nominal voltage-to-ground is 0.58 times the line-to-line voltage.

METAL-ENCLOSED SWITCHGEAR

Metal-enclosed switchgear may consist of one or more vertical sections. Vertical sections may consist of a single freestanding section, or they may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus. A vertical section may be intended to house a circuit breaker and switch or other attendant equipment, or it may be designated an auxiliary section. An auxiliary section may typically contain potential transformers, control gear, protective relays and the like. When provided with a horizontal bus, each section is marked with the ampacity of the horizontal bus in amps. Each vertical section of a line-up of abutting vertical sections is provided with a “” marking where the second blank indicates the total number of vertical sections provided (including sections not bearing the UL Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Mark.

ADDITIONAL INFORMATION

For additional information, see Circuit Breakers and Metal-clad Switchgear Over 600 V (DLAH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS


UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

MEDIUM VOLTAGE CIRCUIT BREAKER FOR USE ONLY IN SWITCHGEAR AS DESIGNATED ON THE NAMEPLATE

Control No.

The nameplate on the circuit breaker shall identify the switchgear for which the circuit breaker is designed, including the switchgear manufacturer and type or model number.

METAL-ENCLOSED SWITCHGEAR

Metal-enclosed switchgear assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. This marking appears on each vertical section bearing the UL Listing Mark.

ENCLOSURES

An enclosure investigated to determine that it is rainproof is marked “Rainproof,” “Outdoor” or “3R.” Enclosures may be either nonventilated or ventilated. Enclosures are marked to indicate the exposure Category (A, B or C) for which they are intended. Enclosures marked “Category A” are intended to be installed in areas accessible to the unsupervised general public; enclosures marked “Category B” are intended to be installed in areas accessible to authorized personnel only; enclosures marked “Category C” are intended to be installed in areas accessible to qualified personnel only. The environmental and exposure category marking need only appear on the first (incoming) switchgear vertical section of a line-up.

ARC-RESISTANT SWITCHGEAR

Metal-enclosed switchgear specially designed to provide some degree of protection to an operator, or other personnel in the vicinity of the equipment, from the effects of an internal arc occurring in atmospheric air within the enclosure when the doors and covers are secured as intended may additionally be classified as arc-resistant switchgear.

Arc-resistant switchgear has been investigated for installation in buildings (for indoor applications) that have sufficient overhead space to permit ventilation without reflecting arc products, as specified in the installation instructions.

Arc-resistant switchgear is marked with an Accessibility Type designation based upon the construction. The Types may be either A, B or C (when investigated to EEMAC G14-I, “Procedure for Testing the Resistance of Metalclad Switchgear Under Condition of Arcing Due to an Internal Fault”), or 1, 1C, 2 or 2C (when investigated to ANSI C37.20.7, “Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear”), based upon the construction and the standard used for the investigation.

Arc-resistant switchgear is marked with an Accessibility Type designation based upon the construction. The Types may be either A, B or C (when investigated to EEMAC G14-I, “Procedure for Testing the Resistance of Metalclad Switchgear Under Condition of Arcing Due to an Internal Fault”), or 1, 1C, 2 or 2C (when investigated to ANSI C37.20.7, “Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear”), based upon the construction and the standard used for the investigation.

Arc-resistant switchgear is marked with an Accessibility Type designation based upon the construction. The Types may be either A, B or C (when investigated to EEMAC G14-I, “Procedure for Testing the Resistance of Metalclad Switchgear Under Condition of Arcing Due to an Internal Fault”), or 1, 1C, 2 or 2C (when investigated to ANSI C37.20.7, “Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear”), based upon the construction and the standard used for the investigation.

ENCLOSURES

For additional information, see Circuit Breakers and Metal-clad Switchgear Over 600 V (DLAH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS


Classification Mark for Arc-resistant Switchgear

The Classification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Metal-enclosed Circuit Breaker Switchgear.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. In an assembly of products the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark identifies only the sections included in the assembly. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Metal-enclosed Circuit Breaker Switchgear.”
COLD CATHODE TRANSFORMERS AND POWER SUPPLIES (DUEC)

USE

This category covers indoor and outdoor use cold cathode transformers and power supplies for use as part of a cold cathode electric discharge lighting system, sign, field-assembled skeletal neon sign and outline lighting system, or field-installed neon outline lighting system. These transformers and power supplies have been evaluated for the secondary-circuit ground fault protection requirements in NFPA 70, “National Electrical Code” (NEC).

PRODUCT MARKINGS

Transformers and power supplies covered under this category are marked “Indoors,” “Outdoors,” “Weatherproof” or “WP.” Products marked “Indoors” are only suitable for use indoors, and products marked “Outdoors” are suitable for use outdoors. These products are not intended for use under carpet.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2161, “Neon Transformers and Power Supplies.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction to this Directory) together with the word “LISTED,” a control number, and the product name “Cold Cathode Transformer” or “Cold Cathode Power Supply.”

COMMUNICATION CABLE ASSEMBLIES (DUNH)

USE AND INSTALLATION

This category covers factory-assembled communication cable assemblies that are comprised of Listed communication cable and communication cable connectors suitable for the application. They are intended for use in residential and/or commercial applications as connected communication premises wiring. These assemblies are intended for installation in accordance with Article 800 of ANSI/NFPA 70, “National Electrical Code” (NEC). Restrictions that apply to the cable used in these assemblies, according to this article, also apply to the complete cable assemblies. The connectors employed in these assemblies have not been investigated for use under carpet.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1863, “Communications Circuit Assemblies.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its...
COMMUNICATIONS CABLE (DUZX)

USE AND INSTALLATION

This category covers communications cable which is a single conductor coaxial cable or a multiple conductor jacketed cable for telephone and other communications circuits as described in Article 800 of ANSI/NFPA 70, “National Electrical Code” (NEC).

This cable is used as wiring from a protector to a telephone or other communications equipment within a building, and for use as interconnecting wiring between parts of a communications circuit.

Except for special locations specifically required by the NEC, communications cable, in general, is not required to be installed in conduit or raceway.

PRODUCT MARKINGS

Communications cable is identified by marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

- **CM** — Indicates cable intended for general use within buildings in accordance with Section 800.53E(1) of the NEC. The cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Flame Test in UL 1685.
- **CMR** — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 800.53(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft, when tested per NFPA 262, “Standard Method of Test for Flame Travel and Smoke of Wire and Cables for Use in Air-Handling Spaces.”
- **CMG** — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 800.53(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, “Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.”
- **CMUC** — Indicates cable for undercarpet use in accordance with Section 800.53E(6) of the NEC. This cable complies with the VW-1 Flame Test requirements in UL 1581, “Reference Standard for Electrical Wires, Cables, and Flexible Cords.”
- **CMX** — Indicates cable intended for use within buildings (1) where the wire or cable is enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of wire or cable does not exceed 10 ft, or (3) in one- or two-family or multifamily dwellings when the cable diameter is less than 0.25 in., in accordance with Section 800.53E of the NEC. Type CMX cable may be marked “Outdoor” to indicate its suitability for installation outdoors on dwellings. This cable complies with the VW-1 Flame Test requirements in UL 1581.
- **MPP** — Indicates cable intended for use within buildings in accordance with Section 800.53E(1) of the NEC. This cable does not exceed the top of the raceway when tested in accordance with the requirements of the Vertical-Flame Test in UL 1685.
- **MPG** — Indicates cable for general use within buildings in accordance with Section 800.53E of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Flame Test in UL 1581.
- **MPP** — Indicates cable that is intended for use within buildings in ducts, plenums or other spaces used for environmental air in accordance with Section 800.53B of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested in accordance with NFPA 262.

MPP* — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 800.53E(1) of the NEC. The flame propagation height of this cable is less than 12 ft when tested in accordance with UL 1666.

Types MP, MPG and MPP cable will no longer be manufactured after July 1, 2003. Cable manufactured before that date continues to be suitable for use in accordance with the NEC Sections shown above.

Listed cable that is additionally marked “Verified (UL) Category 2, 3, 4, 5, 5E or 6 [including latest draft number if applicable]” or “Verified (UL) Category 3, 4, 5, 5E or 6 [including latest draft number if applicable]” complies with the requirements of the UL Data Transmission Performance Category Marking Program and is manufactured under an acceptable quality assurance system.

Listed cable that is additionally marked “Verified (UL) Category 6 or 7” has been investigated in accordance with NEMA WC66-1999, “Performance Standard for Category 6 and 7 100 Ohm Shielded and Unshielded Twisted Pair Cable.” Additionally, this cable has been manufactured under an acceptable quality assurance system.

Listed cable that is additionally marked “Verified In Accordance With [Specification name and/or number]” complies with the requirements of a transmission performance specification referenced and is manufactured under an acceptable quality assurance system.

Communications wire is a single wire or unjacketed multi-conductor assembly of these wires that is intended for use in distributing frames and in cross-connect arrays in accordance with Section 800.53(C) of the NEC. This wire or assembly is marked “cross-connect wire.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 444, “Communications Cable.” In addition, the standards used to investigate cables marked “Verified In Accordance With [Specification]” include the applicable Performance Standards.

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Communications Cable.”

Cable that is also Verified to the UL Data Transmission Performance Category Marking Program has the marking “Verified to UL Performance Category Program,” along with the UL symbol (as illustrated in the Introduction of this Directory) on the product, or the UL Verification Mark along with the words “Performance Category Program,” together with the Listing Mark information on the tag, the reel or the smallest unit container.

Cable that is alsoVerified to another transmission performance specification has the marking “Verified in Accordance With [Specification name and/or number],” along with the UL symbol (as illustrated in the Introduction of this Directory) on the product, or the UL Verification Mark along with the applicable Specification name and/or number together with the Listing Mark information on the tag, the reel or the smallest unit container.

COMMUNICATIONS CABLE VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (DVBG)

DATA TRANSMISSION CABLE VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (DVI)

GENERAL

This category covers data transmission cable whose signal transmission characteristics have been determined to be in accordance with one of the specifications shown below or other national or international data transmission performance specifications. This cable has not been investigated for use in accordance with ANSI/NFPA 70, “National Electrical Code.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Performance Specifications:
COMMUNITY ANTENNA TELEVISION CABLE (DVCS)

USE AND INSTALLATION

This category covers community antenna television cable for use in accordance with Article 820 of ANSI/NFPA 70, “National Electrical Code” (NEC).

PRODUCT MARKINGS

Community antenna television cable is identified by marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

CATVP — Indicates cable intended for use within buildings in ducts or plenums, or other spaces used for environmental air as required by Section 820.51(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame-spread distance of 5 ft when tested per NFPA 262, “Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.”

CATVR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 820.51(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, “Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.”

CATV — Indicates cable intended for general use within buildings in accordance with Section 820.51(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1381, “Reference Standard for Electrical Wires, Cables, and Flexible Cords.”

CATVP — Indicates cable intended for limited use within buildings (1) where the cables are enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, or (3) installed in one- or two-family or multifamily dwellings when the cable diameter is less than 0.375 in. in accordance with Section 820.51(D) of the NEC. This cable complies with the VW-1 Flame Test requirements in UL 1581.

Type CATVX was known as “Community Antenna Television Cable” and the cable was so marked.

Cable marked “sunlight resistant” or “sun res” may be exposed to the direct rays of the sun. A cable marked “-30C,” “-40C,” “-50C,” “-60C” or “-70C” complies with a temperature of -30°C, -40°C, -50°C, -60°C or -70°C respectively.

Cable marked “direct burial,” “for direct burial” or “burial” has been investigated and found suitable for direct burial in the earth.

Cable that complies with the requirements for “Limited Combustible” specified in NFPA 90A, “Installation of Air Conditioning and Ventilating Systems,” is surface marked “Limited Combustible.”

ADDENDUAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (ALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1655, “Community Antenna Television Cables.”

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Community Antenna Television Cable.”

COMPUTER INTERCONNECTION CABLE ASSEMBLIES (DVPI)

USE AND INSTALLATION

This category covers computer interconnection cable assemblies intended for installation between units of electronic equipment where the cable is outside of the equipment enclosure and within the computer room as defined in Article 615 of ANSI/NFPA 70, “National Electrical Code.”

These cable assemblies may also be used in an office environment where the cable is visible after installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (ALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 444, “Communications Cables,” UL 13, “Power-Limited Circuit Cables,” or UL 758, “Appliance Wiring Material,” and UL 60950-21, “Information Technology Equipment Safety – Part 21.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Computer Interconnection Cable Assembly.”

CONDUCTOR TERMINATION COMPOUNDS (DYW)

Conductor termination compounds are for use on splice and termination connections of aluminum, copper-clad aluminum and copper conductors where used to retard oxidation at the conductor/connector interface. These compounds do not have a deleterious effect on the conductor metal, insulation or equipment when used in accordance with the manufacturer’s installation instructions.

Reference should be made to the product label located on the smallest unit container for specific instructions as to the proper use of the compound.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the words “LISTED,” a control number and the following product name: “Conductor Termination Compound.”

CONDUIT AND FITTINGS (DFVF)

CONDUIT AND CABLE HARDWARE (DWMU)

GENERAL

This category covers cable ties, conduit straps, staples, and similar types of hardware for installation in wiring systems in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC).

The mechanical strength of these products is investigated with consideration given to the intended installation. Metallic devices are also investigated for resistance to corrosion, and nonmetallic devices may be for flammability and exposure to elevated or cold temperatures.

CARTON MARKINGS

The product carton for a metallic construction of any conduit and cable hardware that is intended for use in spaces used for environmental air is
CONDUIT FITTINGS (DWTT)

USE

This category covers metallic and nonmetallic conduit fittings, such as couplings, bushings, and hangers, that are suitable for use with threaded or elbow conduit bodies, or as part of a fitting, for grounding for use in circuits over and under 250 V and when used in accordance with the NEC. All conduit fittings and liquid-tight flexible metal conduit fittings. Such fittings are inherently resistant to atmospheres containing industrial corrosive agents and will also withstand vapors or mists of caustic, pickling, acids, plating baths, hydrofluoric, and chromic acids. Fittings that have been investigated for exposure to other reagents may be identified by the designation “Reagent Resistant” printed on the surface of the fittings. Such special uses are described in greater detail in the individual listings.

CARTRON MARKINGS

Fittings for use with electrical metallic tubing (adapters), untreated rigid metal conduit, intermediate metal conduit or threaded couplings which split to fit over the ends of threaded rigid metal or intermediate metal conduit and then are bolted in place have been tested only for use with steel conduit or tubing unless marked on the fitting or carton to indicate suitability for use with aluminum or other material. A fitting that is taped completely (from the raceway to the box or raceway to raceway) is concrete-tight when the product carton is marked with “CONCRETE-TIGHT WHEN TAPED.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2239, “Hardware for the Support of Conduit, Tubing, and Cable.” The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or the Listing Mark on the product is the only method provided by UL to notify you that a manufacturer under its Listings and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Conduit and Cable Hardware” or other appropriate product name as shown in the individual Listings.

2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

2005 GENERAL INFORMATION DIRECTORY

Fittings for use with flexible metal conduit have been tested only for use with the type of conduit marked on the carton. The carton may be marked “FMC” for all types of flexible metal conduit, or may also be marked “FE,” “AL,” “FERW” or “ALRW” in any combination for any combination of the four types of flexible metal conduit.

Threadless conduit fittings suitable for use in concrete or where exposed to the weather are identified by a marking on the carton. Aluminum fittings are not considered suitable for use in concrete or cinder fill unless protected with an asphalt paint or the equivalent. All liquid-tight fittings are identified on the carton as “Liquid-Tight.” The term “Liquid-Tight” on the carton indicates suitability for use where directly exposed to oil spray or to rain.

A metallic fitting that physically cannot be connected to any type of conduit other than liquid-tight flexible metallic or nonmetallic Type B conduit can have the marking on carton in which the fitting is packed. It is marked “Liquid-Tight Flexible Nonmetallic Conduit Type B Only,” “LFNC-B” or “FNMC-B.”

Fittings identified with an enclosure type designation as rain-tight or liquid-tight on the carton are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Connectors that are also suitable for use with power and control tray cable, nonmetallic sheathed cable, service entrance cable, or flexible nonmetallic tubing are identified by the appropriate marking on the carton. Connectors designated “For Use With Nonmetallic Sheathed Cable” are also suitable for use with multicore underground feeder and branch circuit cable where used in dry locations. Unless marked otherwise on the carton, the connectors are suitable for connection of only one cable per cable entry.

GROUNDING

All metal fittings for metal cable, conduit and tubing are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with the NEC, except as noted for flexible metal conduit fittings and liquid-tight flexible metal conduit fittings.
Flexible Conduit, Liquid-tight (DWWY)

Flexible Metal Conduit Assemblies, Liquid-tight (DXAS)

**USE AND INSTALLATION**

This category covers liquid-tight flexible metal conduit, in trade sizes 3/8 to 4 (metric designators 16 to 103) inclusive, for installation in accordance with Article 350 of ANSI/NFPA 70, “National Electrical Code” (NEC), for conductors in circuits of 600 V, nominal, or less. This product may also be used for installation of conductors in motor circuits, and for electric signs and outline lighting in accordance with the NEC.

Flexible metal conduit assemblies are suitable for use in ordinary dry locations temperature.

- 1. The 1-1/2 (41) and larger trade sizes.
- The 3/8 and 1-1/2 (12 and 16) trade sizes where used on circuits rated higher than 20 A or where the total length in the ground return path is greater than 6 ft.
- The 3/4 and 1 and 1-1/4 (21, 27 and 35) are suitable for grounding where used on circuits rated 20 A or less, and the 3/4 and 1 and 1-1/4 (21, 27 and 35) trade sizes are suitable for grounding where used on circuits rated 60 A or less.

**ADDITIONAL INFORMATION**

- The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Conduit Fitting,” “Adapter” or “Coupling,” or other appropriate product name as shown in the individual Listings.

- Liquid-tight flexible metal conduit assemblies suitable for use in ordinary dry locations temperature.

**Flexible Metal Conduit, Liquid-tight (DXHR)**

**USE AND INSTALLATION**

This category covers liquid-tight flexible metal conduit in trade sizes 3/8 to 4 (metric designators 16 to 103) inclusive, for installation in accordance with Article 350 of ANSI/NFPA 70, “National Electrical Code” (NEC), for conductors in circuits of 600 V, nominal, or less. This product may also be used for installation of conductors in motor circuits, and for electric signs and outline lighting in accordance with the NEC.

- Liquid-tight flexible metal conduit is sunlight resistant and suitable for use outdoors.
- Where terminated in fittings investigated for grounding and where used on circuits rated higher than 20 A or where the total length in the ground return path is greater than 6 ft.
- The 3/4 and 1 and 1-1/4 (21, 27 and 35) are suitable for grounding where used on circuits rated 20 A or less, and the 3/4 and 1 and 1-1/4 (21, 27 and 35) trade sizes are suitable for grounding where used on circuits rated 60 A or less.

**ADDITIONAL INFORMATION**

- The basic standards used to investigate products in this category are ANSI/UL 314B, “Conduit, Tubing, and Cable Fittings,” and ANSI/UL 651, “Schedule 40 and 80 Rigid PVC Conduit.”

- Liquid-tight flexible metal conduit assemblies are suitable for use in ordinary dry locations temperature.

**Flexible Nonmetallic Conduit, Liquid-tight (DXOQ)**

**USE AND INSTALLATION**

This category covers liquid-tight flexible nonmetallic conduit, in trade sizes 3/8 in. to 4 (metric designators 16 to 103) inclusive, for installation in accordance with Article 350 of ANSI/NFPA 70, “National Electrical Code” (NEC), for conductors in circuits of 600 V, nominal, or less. This product may also be used for installation of conductors for electric signs and outline lighting in accordance with the NEC.

- Liquid-tight flexible nonmetallic conduit is marked “Direct Burial,” “Burial,” “Dir Burial” or “Dir Buz.”
- Liquid-tight flexible nonmetallic conduit is marked with a temperature designation or marked “60 C” is intended for use at temperatures not in excess of 60°C (140°F).
- Conduit intended for use in dry or oily locations at a temperature higher than 60°C (140°F) is marked “___ C dry, 60 C wet, 70 C oil res” or “___ C dry, 60 C wet, 70 C oil res” with “80” or “105” inserted as the dry-locations temperature.
- Conduit marked “80 C dry, 60 C wet, 60 C oil res” or “80 C dry, 60 C oil res” is intended for use at 80°C (176°F) and lower temperatures in air, and at 60°C (140°F) and lower temperatures where exposed to water, oil or coolants.
- Conduit that has not been investigated for use where exposed to oil is marked “OIL-FREE ENVIRONMENTS ONLY.”

**ADDITIONAL INFORMATION**

- The basic standards used to investigate products in this category is UL 360, “Liquid-Tight Flexible Steel Conduit.”

- The Listing Mark of Underwriters Laboratories Inc. on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Liquid-Tight Flexible Metal Conduit.”

**RELATED PRODUCTS**

- Flexible Conduit, Liquid-tight (DWWY)
- Flexible Metal Conduit, Liquid-tight (DXAS)
- Flexible Metal Conduit, Liquid-tight (DXHR)
- Flexible Nonmetallic Conduit, Liquid-tight (DXOQ)
Fittings for use with liquid-tight nonmetallic conduit are covered under Conduit Fittings (DWTT) and are suitable only for the type of conduit indicated by the marking on the fitting.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 1660, “Flexible-Tight Flexible Nonmetallic Conduit.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Flexible-Tight Flexible Nonmetallic Conduit,” “FNMC-A,” “LFNC-A,” “FNMC-B,” “LFNC-B,” “FNMC-C,” or “LFNC-C.”

**FLEXIBLE METAL CONDUIT (DXUZ)**

**USE**

This category covers flexible aluminum and steel conduit in trade sizes 3/8 to 4 (metric designators 12 to 103) inclusive, flexible aluminum and steel conduit Type RW (reduced wall), flexible aluminum and steel conduit Type XRW (extra reduced wall) in trade sizes from 3/8 to 3 (16 to 78) inclusive, for installation in accordance with Article 348 of ANSI/NFPA 70, “National Electrical Code” (NEC), for conductors in circuits of 600 V, nominal, or less. This product may also be used for installation of conductors in motor circuits, electric signs and outline lighting in accordance with the NEC.

Flexible metal conduit (steel or aluminum) should not be used underground (directly buried or in duct which is buried) or embedded in poured concrete or aggregate, or in direct contact with earth or where subject to corrosive conditions. In addition, flexible aluminum conduit should not be installed in direct contact with masonry in damp locations.

Flexible metal conduit no longer than six ft and containing circuit conductors protected by instantaneous devices rated at 20 A or less is suitable as a grounding means.

Flexible metal conduit longer than six ft has not been judged to be suitable as a grounding means.

To prevent possible damage to flexible aluminum conduit, flexible aluminum and steel conduit Types RW and XRW, care must be exercised when installing connectors employing direct bearing set screws.

**PRODUCT MARKINGS**

- Flexible aluminum conduit is marked at intervals of not more than one ft with the letters “AL.”
- Flexible aluminum conduit Type RW is marked at intervals of not more than one ft with the letters “AL” and “RW.”
- Flexible steel conduit Type RW is marked at intervals of not more than one ft with the letters “RW.”
- Flexible aluminum conduit Type XRW is marked at intervals of not more than one ft with the letters “AL” and “XRW.”
- Flexible steel conduit Type XRW is marked at intervals of not more than one ft with the letters “XRW.”

**RELATED PRODUCTS**

See Conduit Fittings (DWTT) with respect to fittings suitable as a grounding means.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 1242, “Electrical Intermediate Metal Conduit – Steel.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Intermediate Metal Conduit” (or “IMC”).

**RIGID FERROUS METAL CONDUIT (DYBY)**

**USE AND INSTALLATION**

This category covers rigid ferrous metal conduit that includes standard 10 ft. lengths of straight conduit, with a coupling, special lengths either shorter or longer, with or without a coupling for specific applications or uses, elbows, and nipples in trade sizes 1/2 to 4 (metric designators 16 to 103) inclusive, for installation in accordance with Article 342 of ANSI/NFPA 70, “National Electrical Code.”

Galvanized intermediate steel conduit installed in concrete does not require supplementary corrosion protection.

Galvanized intermediate steel conduit installed in contact with soil does not generally require supplementary corrosion protection.

In the absence of specific local experience, soils producing severe corrosive effects are generally characterized by low resistivity less than 2000 ohm-centimeters.

Wherever ferrous metal conduit runs directly from concrete encasement to soil burial, severe corrosive effects are likely to occur on the metal in contact with the soil.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 1661, “Flexible Rigid Metal Conduit.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Flexible Rigid Metal Conduit” (or “FIRM”).

**CONDUIT (DYBY)**

**USE AND INSTALLATION**

This category covers intermediate ferrous metal conduit that includes standard 10 ft. lengths of straight conduit, with a coupling, special lengths either shorter or longer, with or without a coupling for specific applications or uses, elbows, and nipples in trade sizes 1/2 to 4 (metric designators 16 to 103) inclusive, for installation in accordance with Article 342 of ANSI/NFPA 70, “National Electrical Code.”

Galvanized intermediate steel conduit installed in concrete does not require supplementary corrosion protection.

Galvanized intermediate steel conduit installed in contact with soil does not generally require supplementary corrosion protection.

In the absence of specific local experience, soils producing severe corrosive effects are generally characterized by low resistivity less than 2000 ohm-centimeters.

Wherever ferrous metal conduit runs directly from concrete encasement to soil burial, severe corrosive effects are likely to occur on the metal in contact with the soil.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 1661, “Flexible Rigid Metal Conduit.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Flexible Rigid Metal Conduit” (or “FIRM”).
includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rigid Metal Conduit."

As appropriate, a designation such as "Steel" is appended to the product name or is substituted for the word "Metal" in the product name.

RIGID NONFERROUS METALLIC CONDUIT (DYWV)

USE

This category covers rigid nonferrous metal conduit that includes straight conduit, elbows, and nipples in trade sizes 3/8 to 6 (metric designators 16 to 155) inclusive for installation in accordance with Article 344 of ANSI/NFPA 70, "National Electrical Code."

Aluminum conduit used in concrete or in contact with soil requires supplementary corrosion protection.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rigid Metal Conduit."

As appropriate, a designation such as "Stainless Steel," "Red Brass" or "Aluminum" is appended to the product name or is substituted for the word "Metal" in the product name.

REINFORCED THERMOSETTING RESIN CONDUIT (DZKT)

USE AND INSTALLATION

This category covers reinforced thermosetting resin conduit and fittings intended for installation in accordance with Article 352 of ANSI/NFPA 70, "National Electrical Code."

Reinforced thermosetting resin conduit is Listed in trade sizes 1/2 to 6 (metric designators 16 to 155) inclusive, in IPS, ID, RTRC 40 and RTRC 80 dimensions, as marked on the product. Listing includes straight conduit, elbows, bends, and other fittings, unless otherwise noted.

Reinforced thermosetting resin conduit has been investigated for use with conductors rated 90°C or less. Reinforced thermosetting resin conduit is designed for connection to couplings, fittings and boxes by use of a suitable epoxy-type cement or drive-on bell and spigot. Instructions supplied by the epoxy-type cement manufacturer describe the method of assembly and precautions to be followed.

Conduit marked "Below Ground" (or "BG") has been investigated for underground use only — for direct burial, with or without being encased in concrete.

Conduit marked "Above Ground" (or "AG") has been investigated for use aboveground, underground and for direct burial with or without encasement in concrete. This conduit has been investigated for concealed or exposed work where not subject to physical damage.

Reinforced thermosetting resin conduit, elbows, bends and other fittings investigated for direct exposure to reagents are identified by the designation "Reagent Resistant" and are marked to indicate the specific reagents.

RELATED PRODUCTS

For underground conduit other than reinforced thermosetting resin, see Rigid Nonmetallic Underground Conduit, Plastic (EAYZ). For aboveground conduit other than reinforced thermosetting resin, see Rigid Nonmetallic Schedule 40 and Schedule 80 PVC Conduit (DZYR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Reinforced Thermosetting Resin Conduit" (or "RTRC"), "Conduit Fitting," "Adapter," "Coupling," or other appropriate product name.

2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

PART I

Red printing on a yellow background is used as an identifying means for the Listing Mark.

RIGID NONMETALLIC SCHEDULE 40 AND SCHEDULE 80 PVC CONDUIT (DZYR)

USE AND INSTALLATION

This category covers rigid nonmetallic PVC conduit (Schedule 40 and Schedule 80), including straight conduit and elbows in trade sizes 1/2 to 6 (metric designators 16 to 155) inclusive, intended for installation as rigid nonmetallic raceway for wire and cable in accordance with Article 352 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Schedule 40 conduit is suitable for underground use by direct burial or encasement in concrete. Schedule 40 conduit is also suitable for aboveground use indoors or outdoors exposed to sunlight and weather where not subject to physical damage.

Schedule 80 conduit has a reduced cross-sectional area available for wiring space and is suitable for use wherever Schedule 40 conduit may be used. The marking "Schedule 80 PVC" identifies conduit suitable for use where exposed to physical damage and for installation on poles in accordance with the NEC.

Unless marked for higher temperature, rigid nonmetallic conduit is intended for use with wire rated 75°C or less including where it is encased in concrete within buildings and where ambient temperature is 50°C or less. Where encased in concrete in trenches outside of buildings it is suitable for use with wires rated 90°C or less.

Listed PVC conduit is inherently resistant to atmosphere containing common industrial corrosive agents and will also withstand vapors or mist of caustic, pickling acids, plating bath and hydrofluoric and chromic acids.

PVC conduit and elbows (including couplings) that have been investigated for direct exposure to other reagents may be identified by the designation "Reagent Resistant" printed on the surface of the product. Such special uses are described as follows: Where exposed to the following reagents at 60°C or less: Acetic, Nitric (25°C only) acids in concentrations not exceeding 1/2 normal; hydrochloric acid in concentrations not exceeding 30 percent; sulfuric acid in concentrations not exceeding 10 normal; sulfuric acid in concentrations not exceeding 80 percent (25°C only); concentrated or dilute ammonium hydroxide; sodium hydroxide solutions in concentrations not exceeding 50 percent; saturated or dilute sodium chloride solution; cottonseed oil, or ASTM 3 petroleum oil.

PVC conduit is designed for connection to couplings, fittings and boxes by the use of a suitable solvent-type cement. Instructions supplied by the solvent-type cement manufacturer describe the method of assembly and precautions to be followed.

RELATED PRODUCTS

For additional Listings of rigid nonmetallic conduit suitable for underground use, see Reinforced Thermosetting Resin Conduit (DZKT) and Rigid Nonmetallic Underground Conduit, Plastic (EAYZ). Fittings for rigid nonmetallic conduit are covered under Conduit Fittings (DWT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Rigid Nonmetallic Conduit Aboveground and Underground (Schedule 40)" or "Rigid Nonmetallic Conduit Aboveground and Underground Extra Heavy Wall (Schedule 80)."

Conduit, Rigid Underground, Other Than Plastic, Fiber Type (EALZ)

This listing covers impregnated fiber conduit, for use only when installed underground as raceway for the installation of wires and cables in accordance with the National Electrical Code. For plastic types of underground conduit, see Plastic Underground.

The conduit is designed for use in underground work under the following conditions: When laid with its entire length in concrete, identified as "Type I", without being encased in concrete, identified as "Type II". When conduits emerge from underground installation the wiring method should be of a type recognized by the National Electrical Code.

This listing includes straight conduit in lengths up to 10 ft (not for field bends) sizes 1/2- to 6-in. incl., for use with factory made elbows, couplings, reducers and other terminal fittings.

The basic standard used to investigate products in this category is UL 543, "Electrical Impregnated Fiber Conduit".
The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product name: “Rigid Nonmetallic Underground Conduit”.

**RIGID NONMETALLIC UNDERGROUND CONDUIT, PLASTIC (EAZX)**

**USE AND INSTALLATION**

This category covers plastic types of rigid nonmetallic conduit, including straight conduit, elbows and other bends in sizes 1/2 to 6 (metric designators 16 to 155) inclusive, intended for installation underground as raceway for wire and cable in accordance with Articles 352 and 355 of ANSI/NFPA 70, “National Electrical Code” (NEC). This conduit may be: (1) polyvinyl chloride (PVC) Type A, Type EB or Schedule 40, or (2) high density polyethylene (HDPE) Schedule 40, Schedule 80, EPE A, EPE B.

The conduit is intended for underground use under the following conditions, as indicated in the Listing Mark: (1) when laid with its entire length in concrete in any location (Type A), (2) when laid with its entire length in concrete in outdoor trenches (Type EB) and (3) direct burial with or without being encased in concrete (HDPE Schedule 40, Schedule 80, EPE A, EPE B or PVC Schedule 40, Schedule 80). The conduit is intended for use in ambient temperatures of 25°C or less.

Unless marked otherwise, Type A and HDPE Schedule 40, Schedule 80, EPE A, EPE B conduit is intended for use with wire rated 75°C or less. Type EB and Type A conduit, where encased in concrete in trenches outside of buildings, may be used with wire rated 90°C or less. HDPE Schedule 40, Schedule 80, EPE A, EPE B or PVC Schedule 40, conduit, when directly buried or encased in concrete in trenches outside of buildings, may be used with wire rated 90°C or less.

Where conduit emerges from underground installation the wiring method shall be of a type recognized by the NEC for the purpose.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AAZL).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 651A, “Type EB and A Rigid PVC Conduit and HDPE Conduit.”

The basic standard used to investigate PVC Schedule 40 conduit in this category is ANSI/UL 651, “Schedule 40 and 80 Rigid PVC Conduit.”

The basic standard used to investigate continuous lengths of high density polyethylene conduit in this category is ANSI/UL 651B, “Continuous Length HDPE Conduit.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Rigid Nonmetallic Underground Conduit” (High Density Polyethylene, Schedule 40, Schedule 80, EPE A, EPE B), “Rigid Nonmetallic Conduit Underground (Polyvinyl Chloride, Schedule 40),” “Rigid Nonmetallic Conduit Underground for Concrete Encasement Only (Type A)”, “Rigid Nonmetallic Conduit Underground for Concrete Encasement in Outdoor Trenches Only. Not for use in Ceilings, Floors or Walls (Type EB).”

**CONNECTORS, SPECIAL PURPOSE (ECIS)**

**GENERAL**

This category covers connector systems employing nonstandard blade, slot and/or pin configurations that are intended for use in special-purpose applications in wiring systems recognized by ANSI/NFPA 70, “National Electrical Code” (NEC), or in highway lighting, utility company installations, and similar uses not within the scope of the NEC. These devices may incorporate switches or overcurrent protection. The connector systems may include the following types of products:

- **Equipment, Power or Female Outlet** — A female contact device for mounting in or on utilization equipment.
- **Receptacle** — A female contact device intended to be installed in or on a wiring system to supply current to utilization equipment.
- **Plug** — A male contact device for connection and disconnection of a flexible cord or cable to a receptacle, cord connector, or other female outlet device.
- **Cord Connector** — A female contact device to be wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection for an attachment plug or, as an appliance coupler to a male inlet.
- **Equipment, Power or Male Inlet** — A male contact device to be mounted in or on utilization equipment to provide a detachable electrical connection to an appliance coupler or cord connector.
- **Breakaway Connector** — A connector that is not intended for routine disconnection under load, but which is intended to separate from its mating half when subjected to an impact force in an emergency situation.
- **Hybrid Connector** — A connector employing two or more dedicated constructions of blades, pins or contacts that are intended to perform different functions, such as handling power, signal currents, or fiber optic transmissions.

**TERMINALS**

The termination of devices intended to be wired to flexible cord is based on the use of flexible cord or cable having copper conductors, in accordance with Article 408 of the NEC. The ampacity of the flexible cord and cable is based on Section 400.5, Table 400.5(A) (A) or 400.5(B). Product markings or the manufacturer’s instructions provided with the device indicate the conductor size(s) to be used. Unless stated otherwise in the individual Listings, the terminations are based on the use of 60°C flexible cord or cable.

Where stated otherwise in the individual Listings, the termination provisions of all devices for fixed wiring installations are based on use of conductors having temperature ratings marked on the product at their amperages specified in Table 310.16 of the NEC. These temperature ratings may be represented by a 7 or 9 associated with the marking “CU,” “AL” or “AL-CU,” e.g., “AL9,” “AL9CU,” “AL7CU,” “CL3,” “CU9.”

Terminals not marked “AL-CU” are intended for use with copper conductors only. Terminals marked “AL-CU” are intended for use with aluminum, copper and copper-clad aluminum conductors.

**RATINGS**

These devices are rated 600 V or less, ac or dc, and 200 A or less. They may also be rated in wattage or in horsepower as noted in the individual Listings.

The devices are tested on circuits involving full rated potential to ground, except for multi-phase rated devices which are tested on circuits consistent with their voltage ratings, for example, a 120/208 V, 3-phase, device is tested on a circuit involving 120 V to ground.

**GROUNDING**

Devices having a terminal identified by a green colored finish, the words “green” or “ground,” the letters “G” or “GR,” or the “inverted-Christmas-tree” grounding symbol are grounding types. The blade, pin or contact member connected to this terminal is for equipment grounding only.

**APPLICATION**

Each individual connector Listing may contain features that are unique to a system or application. Information concerning special installation procedures, compatibility and other important design features are provided in the individual Listings, on product markings, on product data sheets and/or in installation instructions. The individual Listings contain the following information:

- **Maximum Use Temperature** — Assigned to the connector systems based upon the temperature rating of the insulation of the intended conductors or the insulating materials used in the connectors, whichever is less.

**Installation** — Indicates whether the connector is intended for use on flexible cord or as a part of a fixed wiring system. Specifies whether the connectors are intended for use within an overall enclosure, within locations where they will be concealed (not readily accessible) after on-site interconnection of modules or building components, or where they will be exposed. Connectors intended for exposed or concealed installation are investigated on electrical inspectors, mechanism testing, such as short-circuit, fault-current withstand, and effectiveness of grounding path to demonstrate equivalence to the wiring system on which they are intended to be installed.

**Other Conditions** — Describes other conditions of use for which the connector system has been investigated, including, but not limited to, environmental factors and enclosure type designations.

**RELATED PRODUCTS**

This category does not cover devices to be molded on flexible cord or wire, or unassembled devices to be factory assembled on flexible cord or wire. Such devices are complete only after installation of the flexible cord or wire and are investigated as part of a complete assembly.
This category does not cover general purpose devices. See Attachment Plugs (AXGV) and Receptacles (RTDV).

This category does not cover pin-and-sleeve type devices; refer to Pin-and-Sleeve Type Plugs, Receptacles and Cable Connectors (QLGD).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**


**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Special Purpose Connector,” or other appropriate product name as shown in the individual Listings.

**CORD SETS AND POWER SUPPLY CORDS (ELBZ)**

**GENERAL**

This category covers (1) cord sets and (2) power supply cords for use as supply connections for portable appliances, and (3) shore power cable sets for use as supply connections to boats that are moored to a dock.

Cord sets and power supply cords are not intended to be used as a substitute for the fixed wiring of a structure and, hence, are not intended to be fastened in place. Cord sets and shore power cable sets are rated in volts, amps and watts.

Cord sets, shore power cable sets, and power supply cords are commonly furnished in hanked or coiled form. If used in this condition, excessive heating may occur. Therefore, when placed into service, all wrappings should be removed, and the flexible cord should be extended for its entire length.

For information regarding the flexible cord types and their ratings, see Flexible Cord (ZJCZ).

**CORD SETS**

Cord sets consist of a length of flexible cord assembled (1) to an attachment plug or current tap as a line fitting and a cord connector as a load fitting, and with or without a through-cord switch, or (2) with a series-connected current tap and a pendant switch.

Cord sets are designated as one of the following types and are so identified by the Listing Mark:

- **Cord Set** — This is a cord set intended for general use indoors and assembled with general-use flexible cord and general purpose fittings. These cord sets may be less than 6 feet long but not less than 3 feet long. Cord sets shorter than 6 feet long are marked to indicate their length. Cord sets may also have integral restraint devices to prevent unintentional disconnection of the cord connector from a mating attachment plug of an appliance. Restraint devices that are separate from cord sets are covered under Cord Restraint Devices (ELDW).

- **Outdoor Use Cord Set** — This is a cord set assembled with outdoor type flexible cord without a switch, and which is intended for use outdoor to supply portable electric equipment. It is (1) marked “Suitable For Use With Outdoor Appliances — Store Indoors While Not In Use,” (2) suitable for supplying portable outdoor appliances within their marked voltage, amp and wattage rating, (3) intended for use outdoors only while the equipment supplied is in use, and (4) intended to be stored indoors (i.e., where not exposed to sunlight and/or weather) while not in use. Such a cord set has been investigated to determine (1) that the materials in the flexible cord and in the line and load fittings, and (2) the adhesion between the cord jacket and the bodies of the line and load fittings are suitable for periodic use outdoors.

The connection between the attachment plug cap and the outlet device supplying the cord set, and between the supply cord of any connected appliance and the load end of the cord set, should not be subjected to moisture or dampness. Outdoor use cord sets may also have integral restraint devices to prevent unintentional disconnection of the cord connector from a mating attachment plug of an appliance. Restraint devices that are separate from cord sets are covered under Cord Restraint Devices (ELDW).

- **Adapter Cord Set** — This is an outdoor use cord set, without a switch, consisting of an attachment plug a length of extra-hard-usage outdoor type flexible cord, and one or more load fittings providing a total of not more than three outlets. It is intended for use in areas such as construction sites to provide power to two or three outlets from a single outlet, or to convert from one outlet configuration to another.

**CORD SETS FOR RECREATIONAL VEHICLES**

- **Shore Power Cable Set** — A shore power cable set is an outdoor use cord set that is used in supplying power to boats that are moored to a dock. They are intended to be stored aboard the boat where not exposed to sunlight and/or weather while not in use. The line and load fittings are of the locking type, rated not less than 20 A and not intended to be connected to suitable shore power outlet and hull power inlet devices, respectively. The connection of the attachment plug to a shore-based power outlet and the connection of the cord connector to a shore power inlet, aboard a boat, provides a seal against water. Shore power cable sets are also covered under Shore Power Cable Sets, Marine (UBWW).

- **PSW SUPPLY CORDS**

Power supply cords may be either the non-detachable type or detachable type. Any item attached to the load end of a non-detachable power supply cord is not covered under this category.

Power supply cords are designated as one of the following types and are so identified by the Listing Mark:

- **Non-detachable Types**
  - **Power Supply Cord for General Use** — This is a power supply cord consisting of a length of flexible cord assembled with an attachment plug or current tap as a line fitting but without a cord connector (appliance coupler) at the opposite end. It is intended for direct wiring connection to an appliance and may include a through-cord switch. Non-detachable power supply cords may be one of the following:
    - **Power Supply Cord for General Use** — This is a power supply cord consisting of a suitable fitting for line connection assembled to a length of general purpose flexible cord, and may include a through-cord switch.
    - **Power Supply Cord for Ranges and Dryers** — This is a power supply cord consisting of a general-use non-detachable power supply cord constructed using Type SRD or SRDT flexible cable. The flexible cable may employ a neutral conductor which is two AWG sizes smaller than the other circuit conductors, but not smaller than 10 AWG.
    - **Power Supply Cord for Ranges and Dryers** — This is an outdoor use power supply cord with the outer surface of the flexible cord marked “For Range and Dryer Use.”
    - **Power Supply Cord — Special Use** — A special use power supply cord is intended for restricted use and incorporates special design features (such as special cords and fittings) for a specific application. Each is provided with marking pertinent to its proper use, and/or limitations and electrical rating.

- **Detachable Types**
  - **Detachable Power Supply Cord** — A detachable power supply cord consists of a length of flexible cord assembled with (1) an attachment plug or current tap as a line fitting at one end and (2) a single outlet load fitting (appliance coupler) at the opposite end. It is intended for use with portable appliances. It may be one of the following types:
    - **Detachable Power Supply Cord Having an Appliance Plug** — This is a power supply cord, not less than 2 feet long, with an appliance plug as a load fitting.
    - **Detachable Power Supply Cord Having a Flatiron Plug** — This is a power supply cord, not less than 6 feet long, having a heater cord and a flatiron plug as a load fitting.
    - **Detachable Power Supply Cord for Appliances Rated Not Greater Than 50 W** — A detachable power supply cord for use with hand-held appliances rated 50 W or less and having a load fitting (appliance coupler) for use with electric shavers, electric scissors, electric combs, and the like.
    - **Detachable Power Supply Cord — Special Use** — A special use detachable power supply cord is intended for restricted use and incorporates special design features (such as special cords and fittings) for a specific application. Each is provided with marking pertinent to its proper use, and/or limitations and electrical rating.

**RELATED PRODUCTS**

Cord Restraint Devices (ELDW)

The Listing covers devices provided with retention means intended to reduce the likelihood of an attachment plug of an appliance becoming unintentionally detached from a mating cord connector of a cord set or a fixed receptacle. These devices are constructed such that (1) the plug and mating connector or receptacle are not enclosed so as to permit dissipation of any heat generated at the connection and (2) the plug can be separated from the mating cord connector or receptacle without the use of a tool.

The devices covered in this listing are not an integral or permanently attached component of a cord set or receptacle, but rather are separate add-on devices. Cord restraint devices which are integral or permanently attached to a cord set are covered under the category of Cord Sets and Power Supply Cords (ELBW).

OUTDOOR SEASONAL USE CORD-CONNECTED WIRING DEVICES (ELWI)

This category covers cord-connected wiring devices intended for temporary outdoor use only, for a period not to exceed 90 days. These devices are intended for use with outdoor equipment, Christmas tree and other seasonal decorative lighting outfits. They may be provided with integral overcurrent protection, clock operated and/or photovoltaic switches.

ADDITIONAL INFORMATION

For additional information, see Cord Sets and Power Supply Cords (ELBW) and Electrical Equipment for Use in Ordinary Locations (AAALZ).

CORD SETS WITH LEAKAGE CURRENT DETECTION AND INTERRUPTION (ELGN)

This category covers cord sets intended for indoor use only with Christmas tree and similar seasonal decorative lighting outfits. They are provided with integral overcurrent protection and may incorporate outlet fittings that are factory assembled onto the flexible cord between the end fittings. They are not intended for permanent installation or for use with other than seasonal lighting products.

ADDITIONAL INFORMATION

For additional information, see Cord Sets and Power Supply Cords (ELBW) and Electrical Equipment for Use in Ordinary Locations (AAALZ).

UTILITY SERVICE CORD SETS (ELFT)

The products covered in this category are Utility Service Cord Sets having an attachment plug of a unique, non-standard configuration intended for mating with a Utility Service Receptacle (see Guide RVNW) which utilizes the grounded neutral conductor of the supply as the equipment grounding conductor.

The basic standard used to investigate products in this category is UL 817, “Cord Sets and Power Supply Cords.”

ADDITIONAL INFORMATION

For additional information, see Cord Sets and Power Supply Cords (ELBW) and Electrical Equipment for Use in Ordinary Locations (AAALZ).
CRANE AND HOIST ELECTRIFICATION SYSTEMS (ELPX)

Crane and Hoist Electrification Systems are designed to provide electrical power from a fixed source to moving equipment.

Rigid systems consist of insulated contact conductors, collectors and feed in devices together with supports by which the system may be mounted on tram rails, crane bridges, or hoist runways.

Festoon systems consist of flexible cable secured at both ends, supported by moving carriers which may be mounted on tram rails, crane bridges or hoist runways with sufficient cable slack to allow moving equipment to travel a limited distance. The festoon system flexible cable is separately listed under the classification Wires, Miscellaneous. The maximum voltage rating for both types is 600 v.

Crane and hoist electrification systems have not been investigated by UL for mechanical load carrying ratings. Systems which are marked with a mechanical load carrying rating also bear the following marking: "Mechanical load carrying ratings have not been investigated by Underwriters Laboratories Inc."

Some systems are duty-cycle as well as continuous rated. These systems have been tested for a one minute "on", one minute "off" cycle. The applicable amp ratings are marked on the contact conductor or its sheath. Conductor overcurrent protection should not exceed the duty cycle rating.

Some rigid systems are suitable for outdoor use and are so marked on a main nameplate.

Crane and hoist electrification systems have not been investigated for use in corrosive atmospheres.

Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspection authorities and others concerned with the installation.

The Listing Mark of Underwriters Laboratories Inc. on each part or on the smallest unit container in which the complete system is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and an appropriate product name on each part (Conductor, Collector, Insulator, etc.) or the name "Crane and Hoist Electrification Systems" the smallest complete system container.

CURRENT TAPS AND ADAPTERS (EMDV)

GENERAL

This category covers current taps and adapters for use in accordance with NFPA 70, "National Electrical Code."

This category does not cover current taps or adapters rated at more than 200 A or for more than 4000 V nor does this flexible cable apply to current taps wired to flexible cord or lampholder adapters, but supplements the standards for lampholder adapters covered in UL 498. "Edison-Base Lampholders" and current taps that can be wired to flexible cord covered in UL 498, "Attachment Plugs and Receptacles."

This category does not cover cord-connected, relocatable power taps intended only for indoor use as a temporary extension of a grounding, alternating-current branch circuit for general use, which are covered in UL 1363, "Relocatable Power Taps," nor does this category cover the current or voltage conversion circuitry capable of being used in travel adapters.

For purposes of this category, the following definitions apply:

Adapter — A device that adapts one blade or slot configuration to another (including a grounding adapter for a nongrounding receptacle).

Current Tap — A male and female contact device that, when connected to an outlet receptacle or cord set, provides multiple outlets or outlet configurations. An outlet configuration may consist of a slot configuration, or provision for the connection of flexible cord.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Current Tap," "Tap," "Cube Tap" or "Adapter."

DATA PROCESSING CABLE (EMRB)

GENERAL

This category covers Type DP data processing cable for use in computer rooms and under the raised floors of computer rooms in accordance with Article 645 of ANSI/NFPA 70, "National Electrical Code." The cable consists of one or more insulated conductors that are covered with a nonmetallic jacket. The cable may contain grounding conductors and/or optical fiber members.

PRODUCT MARKINGS

Data processing cable is identified by marking on the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

- **DP-1** — Indicates cable rated 600 V in conductor sizes 18 AWG to 1000 kcmil copper or 12 AWG to 1000 kcmil aluminum or copper-clad aluminum. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

- **DP-1P** — Indicates cable rated 600 V in conductor sizes 18 AWG to 1000 kcmil copper or 12 AWG to 1000 kcmil aluminum or copper-clad aluminum. This cable meets the requirements of NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

- **DP-2** — Indicates cable rated 300 V in conductor sizes 24 to 8 AWG copper or 12 to 8 AWG aluminum or copper-clad aluminum. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581.

- **DP-2P** — Indicates cable rated 300 V in conductor sizes 24 to 8 AWG copper or 12 to 8 AWG aluminum or copper-clad aluminum. This cable meets the requirements of NFPA 262.

- **DP-3** — Indicates cable with no voltage rating in conductor sizes 30 to 10 AWG copper for general use and copper-clad steel for use in coaxial conductors. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581.

- **DP-3P** — Indicates cable with no voltage rating in conductor sizes 30 to 10 AWG copper for general use and copper-clad steel for use in coaxial conductors. This cable meets the requirements of NFPA 262.

Type DP-3 and Type DP-3P cable is for use in circuits having maximum available ac voltage of 30 V, dc voltage of 60 V, peak voltage of 42.2 V, VA of 100 and current of 8 A or in circuits designated DP-3 in UL 60950, "Information Technology Equipment."

Cable with aluminum conductors is surface printed "AL."

Cable with copper-clad aluminum conductors is surface printed "AL (CU-CLAD)" or "Cu-Clad."

Type DP-1, DP-2 and DP-3 cable that complies with the Limited Smoke Test requirements specified in UL 1685, "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables," is surfaced marked with the suffix "—LS."

The temperature rating of the cable is 60°C unless otherwise marked on the cable.

Cable containing optical fiber members is identified with the suffix "OF." Type DP-1, DP-2 and DP-3 cable which has a damage height that does not exceed 4 ft. 11 in. when tested in accordance with the FT-4 Vertical-Tray Flame Test in UL 1581 may have the additional marking, "FT-4" on the surface.

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1690, "Data Processing Cable."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Data Processing Cable, Type DP."

DIELECTRIC MEDIUMS (EOUV)

USE

This category covers liquids intended for use as dielectric and cooling mediums. The liquids are not intended to replace mineral oil unless equipment is also designed for the specific liquid.

These products have been Classified as to their fire hazard only, using Underwriters Laboratories Inc.’s method for Classification of the fire hazard of liquids. They have been rated numerically according to the schedule in which:
2005 GENERAL INFORMATION FROM
ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

Diethyl Ether rates
Gasoline
Alcohol (ethyl)
Kerosene (100 F flash)
Paraffin oil
Water (nonflammable)

0
90-100
60-70
30-40
10-20
0

RELATED PRODUCTS
Liquids intended for use as dielectric and cooling mediums in electrical transformers are covered under Transformer Fluids (EOVK).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Flammable and Combustible Liquids and Gases Equipment (AAPO).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 340, “Tests for Comparative Flammability of Liquids.”

LOOK FOR CLASSIFICATION MARK ON PRODUCT
The Classification Mark of Underwriters Laboratories Inc. on the product container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

AS TO FIRE HAZARD ONLY
(PRODUCT NAME)
CLASSED

[MAY EVOLVE FLAMMABLE GASES WHEN DECOMPOSED BY AN ELECTRIC ARC (if appropriate)]

TRANSFORMER FLUIDS (EOVK)

USE
This category covers liquids intended for use as dielectric and cooling mediums in electrical transformers.

These products have been Classified as to their fire hazard using Underwriters Laboratories Inc.’s method for Classification of the fire hazard of liquids. They have been rated numerically according to the schedule in which:

Diethyl Ether rates
Gasoline
Alcohol (ethyl)
Kerosene (100 F flash)
Paraffin oil
Water (nonflammable)

100
90-100
60-70
30-40
10-20
0

USE RESTRICTIONS
Products Classified as “less-flammable liquid” may have use restrictions on the product container. Certain fluids have fuse use restrictions which require that the fuse must be either a type which does not vent under normal operation, or it shall be installed external to the transformer tank.

ADDITIONAL INFORMATION
For additional information, see Dielectric Mediums (EOUV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Flammable and Combustible Liquids and Gases Equipment (AAPO).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 340, “Tests for Comparative Flammability of Liquids.”

These products are also Classified as a “less-flammable liquid” or “non-flammable fluid” in accordance with Sections 450-23 or 450-24 of the National Electrical Code, NFPA 70.

LOOK FOR CLASSIFICATION MARK ON PRODUCT
The Classification Mark of Underwriters Laboratories Inc. on the product container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

AS TO FIRE HAZARD ONLY
(PRODUCT NAME)
CLASSED

[MAY EVOLVE FLAMMABLE GASES WHEN DECOMPOSED BY AN ELECTRIC ARC (if appropriate)]

2005 GENERAL INFORMATION FROM
ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

ALSO CLASSIFIED AS A “NONFLAMMABLE FLUID” IN COMPLIANCE WITH THE NATIONAL ELECTRICAL CODE WITH THE FOLLOWING “USE RESTRICTIONS” (as appropriate)

DIMMERS (EOVZ)

DIMMERS, COMMERCIAL (EOXT)

This category covers incandescent and fluorescent commercial dimmers.

RELATED PRODUCTS
See Dimmers, Theater (EPAR).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 508, “Industrial Control Equipment.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Commercial Dimmers.”

DIMMERS, GENERAL USE SWITCH (EOYX)

GENERAL
This category covers dimmers for mounting in flush device boxes or on outlet box covers (wall box), unless otherwise stated in the individual Listings. They are intended only for the control of permanently installed luminaires.

RATINGS
Dimmers are rated maximum 600 V ac (120 V ac for touch dimmers) and are intended for installation on a 20 A or less branch circuit. Dimmers are rated for lamp or lamp control loads from 300 W to 300 VA to a maximum of 2000 W or 2000 VA. They have been investigated for use in nominal 25°C environments, unless otherwise stated in the individual Listings.

PRODUCT MARKINGS
Dimmers may include one or more of the following installation-related markings:

On the dimmer:
“Control of Permanently Installed ______ Lamp Fixtures Only,” or the equivalent. The blank identifies the type of lighting (luminaire) load, such as “Incandescent,” “Fluorescent” or “Low Voltage.”
“Use ______ wire only,” where the blank indicates “copper” or “CU,” “aluminum” or “AL,” or both. If symbols are used, they shall be as follows:

On the dimmer, on a separate instruction sheet packaged with the dimmer, or on the smallest unit packaging provided with the dimmer, the word “CAUTION” followed by one of the statements or equivalent as indicated below based upon the intended load:

For dimmers controlling a ballast — “To Reduce the Risk of Overheating and Possible Damage to Other Equipment, Do Not Install to Control a Receptacle, a Motor-operated Appliance, or a Transformer-supplied Appliance,” or
For dimmers controlling a tungsten-filament load — “To Reduce the Risk of Overheating and Possible Damage to Other Equipment, Do Not Install to Control a Receptacle, a Motor-operated Appliance, a Fluorescent Lighting Fixture, or a Transformer-supplied Appliance,” or
For dimmers controlling a low-voltage transformer — “To Reduce the Risk of Overheating and Possible Damage to Other Equipment, Do Not Install to Control a Receptacle, or a Motor-operated Appliance.”

Additionally, one or more of the following markings may appear on the dimmer, on a separate instruction sheet packaged with the dimmer, or on the smallest unit packaging provided with the dimmer:

— “For multiple ganged installations apply derating factor”
— “For use with ______,” where the blank identifies specific manufacturers and models of electronic ballast, electronic power supply or low-voltage supply.
— “For use with magnetic ballast ______,” where the blank identifies specific manufacturers and models. If no specific manufacturer or model is specified, the dimmer is rated for control of any magnetic ballast.
— “For use with Class 2 supply only”
— “For splicing ______ wires, sized ______ AWG, use the provided wire splicing connector. Strip conductors to ______ length” (or equivalent description), where the blanks indicate the number of conductors,
maximum size and length of prepared striped conductor, respectively. “For supply connection, use wires rated minimum 75°C.”

**RELATED PRODUCTS**

Dimmers used for special applications are covered under Dimmers for Commercial Use (EOXT). Dimmers for Theater Use (EPAR) and Controls for Theater Dimming Equipment (EPCT).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1472, “Solid-State Dimming Controls.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Dimmer,” “Outlet Box Lighting Control” or “Wall Box Dimmer,” or other appropriate product name as shown in the individual Listings.

---

**DIMMERS, THEATER (EPAR)**

**USE**

This category covers luminaire dimmers intended for use in motion picture and television studios as well as theater and similar locations. The dimmers may be intended for portable use, rack mounting, or be suitable for permanent installation. This category also covers theater dimming modules intended for mounting in theater switchboards.

**RELATED PRODUCTS**

Dimmers not intended for motion picture and television studio or theater stage use are covered under Dimmers, Commercial (EOXT).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 508, “Industrial Control Equipment.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Theater Dimmer.”

---

**EARTHQUAKE ACTUATED EQUIPMENT (FFPC)**

This category covers products with earthquake sensing means that shut off gas flow or disconnect an electrical load from its source in the event of a seismic disturbance.

**INSTALLATION**

Earthquake actuated gas shutoff valves are intended for stationary installation and marked with the specific fluids, fluid temperature, ambient temperature and operating pressure.

Earthquake actuated electrical switches are intended for installation in accordance with the National Electrical Code, NFPA 70.

---

**EARTHQUAKE ACTUATED SHUTOFF SYSTEMS (FFPH)**

This category covers products with earthquake sensing means that shut off gas flow or disconnect an electrical load from its source in the event of a seismic disturbance.

**INSTALLATION**

Earthquake actuated gas shutoff valves are intended for stationary installation and marked with the specific fluids, fluid temperature, ambient temperature and operating pressure.

Earthquake actuated electrical switches are intended for installation in accordance with the National Electrical Code, NFPA 70.

**RELATED PRODUCTS**

For additional information, see Mechanical Equipment and Associated Products (AAME).

**REQUIREMENTS**

Earthquake actuated gas shutoff valves have been evaluated to ANSI Z21.70-(+), “Earthquake Actuated Automatic Gas Shutoff Systems.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, one of the following product names, as appropriate: “Earthquake Actuated Gas Shutoff System,” “Earthquake Actuated Gas Shutoff Valve,” “Earthquake Actuated Electrical Switch” or other appropriate product name as shown in the individual Listings, and “IN ACCORDANCE WITH ANSI Z21.70-(+), Earthquake Actuated Automatic Gas Shutoff Systems.”

**ELECTRIC VEHICLE SYSTEMS (FFQM)**

**USE**

This category covers products and systems intended for use with or installation on automotive type vehicles for highway use, such as passenger automobiles, buses, trucks, vans, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery. Battery charging equipment can be supplied by a utility source, a fuel cell, photovoltaic array, or other source of power.

**RELATED PRODUCTS**

See Industrial Trucks (XVHZ) and Industrial Trucks for Use in Hazardous Locations (XVHY).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**ELECTRIC VEHICLE BATTERY PACKS (FFRW)**

**USE AND INSTALLATION**
This category covers battery packs investigated in accordance with Article 625 of ANSI/NFPA 70, “National Electrical Code” (NEC), to determine whether or not a forced-air ventilation system is required when a particular electric vehicle battery pack is charged using the specified charging system of the electric vehicle.

**REBUILT PRODUCTS**

This category also covers electric vehicle battery packs that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt electric vehicle battery packs are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt electric vehicle battery packs are subject to the same requirements as new electric vehicle battery packs.

**ADDITIONAL INFORMATION**

For additional information, see Electric Vehicle Systems (FFQM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

Electric vehicle battery packs employing batteries that can emit hydrogen, such as valve regulated or vented lead-acid or nickel-metal hydride batteries, are subject to investigation in accordance with SAE Recommended Practice J1718 (1994), “Measurement of Hydrogen Gas Emission From Battery-Powered Cars and Light Trucks During Battery Charging.” Battery systems which do not produce hydrogen concentrations in excess of 1% (25% of the lower flammability limit) are considered in compliance with the requirements of Article 625 of the NEC.

**UL MARK**

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**ELECTRIC VEHICLE BATTERY PACK**

**FOR CHARGING INDOORS WITHOUT MECHANICAL BUILDING VENTILATION IN [COMPANY NAME] ELECTRIC VEHICLE [MODEL, NAME] Control No.**

For rebuilt products the word “Rebuilt,” “Remanufactured” or “Reconditioned” precedes the product name.

**ELECTRIC VEHICLE CABLE (FFSO)**

**GENERAL**

This category covers electric vehicle cable constructed as described in, and listed for use provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**ELECTRIC VEHICLE CABLE**

**FOR CHARGING INDOORS WITHOUT MECHANICAL BUILDING VENTILATION IN [COMPANY NAME] ELECTRIC VEHICLE [MODEL, NAME] Control No.**

Electric vehicle cable employs flexible stranded copper conductors in a size range of 18 AWG to 500 kcmil. The cable is used to supply power, signal, and control to electric vehicles during the charging process. It is rated 60°C (140°F), 75°C (167°F), or 90°C (194°F) where exposed to oil, and for use where exposed to the direct rays of the sun. For cable so marked, a gasoline immersion rating is also assigned. The term “wet” indicates that the cable is acceptable for immersion in water.

- **Type EVJ** - Rated 300 V, contains two to five 18-12 AWG thermoset-insulated circuit conductors, and may employ one or two insulated grounding conductors. The cable may contain hybrid data, signal, communications, and/or optical fiber cable.
- **Type EVJE** - Rated 300 V, same as Type EVJ except that the cable employs thermoset-insulated conductors.
- **Type EVJT** - Rated 300 V, same as Type EVJ except that the cable employs thermoset-insulated conductors.
- **Type EV** - Rated 600 V, contains two or more 18 AWG to 500 kcmil thermoset-insulated circuit conductors, and may employ one or more insulated grounding conductors. The cable may contain hybrid data, signal, communications and/or optical fiber cable.
- **Type EVE** - Rated 600 V, same as Type EV except that the cable employs thermoset-insulated conductors.
- **Type EVT** - Rated 600 V, same as Type EV except that the cable employs thermoplastic insulated conductors.

For additional information, see Electric Vehicle Systems (FFQM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 2202, “Electric Vehicle (EV) Charging System Equipment.”

**UL MARK**

This category covers charging system equipment, either conductive or inductive, intended for use with electric vehicles. The equipment can be located on or off board the vehicle. Off-board equipment is intended for indoor or outdoor use.

This equipment is rated 600 V or less. The equipment is intended to be connected to the vehicle by means of a flexible cord and an electric vehicle connector, and intended for installation in accordance with ANSI/NFPA 70, “National Electrical Code.”

**PRODUCT MARKINGS**

Portable type equipment with parts that are considered arcing or sparking, such as switches, relays, etc., are marked with the word “WARNING” and the following or equivalent: “This equipment employs parts, such as switches and relays, that tend to produce arcs or sparks and therefore, when used in a garage, locate in a room or enclosure provided for the purpose or not less than 18 inches (457 mm) above the floor.”

**RELATED PRODUCTS**

See Battery Chargers, Automotive Type (BBGC).

**ADDITIONAL INFORMATION**

For additional information, see Electric Vehicle Systems (FFQM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Charging System Equipment,” “Battery Charger,” “Charge Port” or “Charge Controller,” or other appropriate product name as shown in the individual Listings, preceded by “Electric Vehicle” or “EV.”

**ELECTRIC VEHICLE CHARGING SYSTEMS, INDOOR CHARGING WITHOUT VENTILATION (FFTY)**

These electric vehicle charging systems, either inductive or conductive, have been investigated in accordance with the requirements of the National Fire Protection Association Standard NFPA 70, the National Electrical Code (NEC), Article 625, “Electric Vehicle Charging System Equipment,” to determine whether mechanical ventilation is required during charging of the specified electric vehicle battery pack in an enclosed space.

Electric vehicle charging systems employing nonvented batteries or batteries whose chemistry cannot produce hydrogen are investigated by inspection of the manufacturer’s product.

Electric vehicle charging systems employing batteries that can emit hydrogen, such as valve regulated or vented lead-acid or nickel-metal hydride batteries, are subjected to evaluation in accordance with SAE (Society of Automotive Engineers) Recommended Practice J1718 (1994), “Measurement of Hydrogen Gas Emission From Battery-Powered Cars and Light Trucks During Battery Charging.” Battery systems which do not produce hydrogen concentrations in excess of 1% (25% of the lower flammability limit) are considered suitable for charging indoors without mechanical ventilation in accordance with the requirements of NEC Article 625.

**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the vehicle is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

**Electric Vehicle Charging System**

Classified by Underwriters Laboratories Inc®

For indoor charging without mechanical building ventilation in accordance with the National Electric Code, NFPA 70-1996, Article 625 and SAE Recommended Practice J1718 1994 when used with a UL Classified electric vehicle battery pack marked for use with the:
This listing covers ground-fault protective devices for use with electric vehicle charging systems in accordance with the National Electrical Code, NFPA 70.

The products covered under this category include charging circuit interrupting devices and isolation monitor/interrupters.

A charging circuit interrupting device is one whose function is to detect ground fault current or other conditions that may be hazardous and cause interruption of the electric circuit to the charging system or the vehicle when a fault current to ground exceeds some pre-determined value that is less than that required to operate the overcurrent protective device of the circuit or, in some devices, when another hazardous condition, such as an open-circuited grounding conductor, is detected. A charging circuit interrupting device is intended to be used only in a circuit where one of the conductors is solidly grounded.

A Type CCID25 charging circuit interrupting device trips when the current to ground has a value in the range of 4 through 6 MIU. A Type CCID20 charging circuit interrupting device trips when the current to ground has a value of 20 MIU or greater. MIU, Measurement Indication Unit, is a value that corresponds to leadage current but accounts for the waveshape and frequency of the voltage.

A charging circuit interrupting device is marked to identify its suitability for use with a specific electric vehicle charging equipment or with power supplies with certain voltage, frequency and waveshape.

The acceptability of a Type CCID20 charging circuit interrupting device is based upon the voltage of the circuit and the level of insulation provided in the device to which it will be connected.

An isolation monitor/interrupter is a device whose function is to detect a path to ground on an isolated circuit and cause interruption of the electric circuit to the vehicle if a path that would permit 5 MIU or greater current to flow is detected. An isolation monitor/interrupter is intended for use in a separately derived isolated (ungrounded) circuit.

A device of the enclosed type that has been found suitable for use where it will be exposed to rain, is so marked.

The basic standard used to investigate products in this category is Outline of Investigation, Subj: 2231, "Personnel Protection Systems for Electric Vehicle Supply Circuits."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the following product name: Charging Circuit Interrupter Device, "Ground Monitor/Interrupter" or "Isolation Monitor/Interrupter."

**ELECTRIC VEHICLE POWER OUTLETS (FFWA)**

**USE**

This category covers power outlets rated 600 V or less, intended for indoor or outdoor use where power is required for the recharging of electric vehicle storage batteries. These products include receptacles, vehicle inlets and connectors for use with electric vehicles in accordance with Article 625 of ANSI/NFPA 70, "National Electrical Code."

**ADDITIONAL INFORMATION**

For additional information, see Electric Vehicle Systems (FFQM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 2231-1, "Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements," and UL 2231-2, "Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems."

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Vehicle Power Outlet" (or "EV Power Outlet.")
dance with Article 362 of ANSI/NFPA 70, “National Electrical Code” (NEC). This tubing can be installed in residential attics up to 3 feet above the bottom of the ceiling joist.

**Fittings** — The outside diameters of ENT are such that standard connectors, couplings and outlet boxes for rigid PVC conduit can be employed for ENT that is also constructed of PVC. Installation instructions are provided with each bundle or coil of ENT outlining the procedure to be used when employing cemented-on PVC conduit fittings and outlet boxes. These techniques include specific cement to be used as well as the application method. Other fittings are covered under Electrical Nonmetallic Tubing (FKKY).

ENT with mechanical fittings identified for the purpose or with cemented-on fittings is suitable for use with poured concrete. ENT with cemented-on PVC fittings is suitable for use in:

1. Indoor locations where walls are frequently washed, and  
2. Concrete slabs in direct contact with the earth.

**PRODUCT MARKINGS**

The product is provided with marking on the package, in combination with the UL Listing Mark (every 10 ft), specifying the wire temperature rating, minimum installation temperature of -4°F (-20°C), and maximum ambient temperature 122°F (50°C). Products Listed for 90°C wire insulation is suitable for use with 105°C rated GTO cable in accordance with Section 600-32(b) of the 1996 NEC. The product may be provided with a marking on the package and in combination with the UL Listing Mark (every 10 ft) which reads “105 C GTO Cable.” The product may be provided with a marking on the package that reads “For use in residential attics up to 3 feet above the bottom of ceiling joist.”

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1653, “Electrical Nonmetallic Tubing.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electrical Nonmetallic Tubing.”

**FITTINGS (FKKY)**

**GENERAL**

This category covers electrical nonmetallic tubing (ENT) fittings made in trade sizes 1/2 to 2 (metric designators 16 to 53).

**CARTRON MARKINGS**

Unless otherwise marked on the carton, fittings are suitable for use with any listed ENT of the appropriate trade size. If a fitting is suitable for use with only specific manufacturer’s ENT, the smallest unit carton of the fittings identifies the ENT manufacturer(s). Classified ENT (see FKMT) is suitable for use with compatible Listed ENT fittings, as identified on the ENT smallest unit carton. This compatibility marking appends any compatibility marking on the fitting carton.

Fittings suitable for use in concrete are identified by a marking on the carton. A fitting that is taped completely (from the raceway to the box or raceway-to-raceway) is concrete-tight, when the product carton is marked “CONCRETE-TIGHT WHEN TAPPED.”

**ADDITIONAL INFORMATION**

For additional information, see Electrical Nonmetallic Tubing (FKHU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1653, “Electrical Nonmetallic Tubing.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electrical Nonmetallic Tubing Fitting” (or “ENT Fitting”).

**ELECTRIC DISCHARGE LAMP CONTROL EQUIPMENT (FKVS)**

This category covers fluorescent lamp ballasts for both alternating and direct current. The ballasts are high frequency electronic, resistor, choke (reactor) coil, or transformer of the isolating or auto type for controlling the starting and operating voltages and currents of a fluorescent lamp. These ballasts are intended for connection in accordance with the National Electrical Code to branch circuits rated 600 V or less. The output voltages are 2500 V or less.

Class P rated ballasts are provided with integral protection that prevents ballast overheating and are intended for use in lighting fixtures (luminaires) or signs. The protection has been evaluated in accordance with the requirements of Underwriters Laboratories Inc. for Class P fluorescent lamp ballasts. Class P rated ballasts are generally provided with luminaire enclosure but may be an open type construction if the ballast is a simple reactance type.

Some ballasts exhibit an inrush of current at the moment of initial operation, unless internal circuitry is provided to minimize the inrush. The inrush is similar to that exhibited in tungsten-filament, incandescent lighting. Accordingly, it is recommended that lighting controls meet the tungsten-load requirement or be rated for use with the ballast in order to minimize incompatibility. See the guide information for the particular lighting control (such as Snap Switches, WJQR) for more information on how the controls are marked regarding tungsten inrush.

Fluorescent ballasts have the following designations of use as indicated below. The designations of use relate to different levels of corrosion protection provided. Each subsequent designation includes the uses above it in the following descriptions. For example, an outdoor ballast is acceptable wherever an indoor or open type ballast can be used.

**INDOOR BALLASTS**

Indoor ballasts are suitable for use in indoor, dry location only.

**OUTDOOR BALLASTS**

- **Type 1-Outdoor ballasts** are suitable for use in (1) outdoor equipment, (2) fixtures intended for wet or damp locations or (3) an outdoor sign if the ballasts are within an overall electrical enclosure. Ballasts of this type are marked “Type 1 Outdoor” or “Type 1.”

- **Type 2-Outdoor ballasts** are suitable for use in (1) outdoor equipment, (2) fixtures intended for wet or damp locations or (3) an outdoor sign if the ballasts, in addition to their own enclosure, are within an overall enclosure. Ballasts of this type are marked “Type 2 Outdoor” or “Type 2.”

**WEATHERPROOF BALLASTS**

Weatherproof ballasts are suitable for use where completely exposed to the weather without an additional enclosure and are marked “Weatherproof” or “WP.”

Alternating current ballasts marked “high power factor” operate at 90 percent or higher power factor under the intended operating conditions or otherwise indicate those conditions, that result in less than 90 percent power factor. Ballasts marked “power factor corrected” indicate the value of the power factor.

Ballasts marked with an output voltage when the output is over 300 V. The output voltage will be the maximum voltage existing between any two poles, and the current limited to 90 percent of the maximum current to ground when it would aid in selecting lampholders. The voltage to ground will be the maximum voltage existing in any one lampholder and should be less than the rating of the lampholder.

Ballasts marked “For Use in Portable Lamps” have an output voltage of 150 V or less and are intended for use in portable lamps without ground-  

**Ballasts marked “Type CC” are intended for use in commercial cabinets, either refrigerated or non-refrigerated, and where the ballast circuit is designed to minimize arcing within the lampholder in the event lamps become loose in their lampholders.**

**Ballasts marked “Type HH” are intended for use in lighting fixtures in a Class 1, Division 2, Hazardous (Classified) Location - defined in Article 500 of the National Electrical Code.**

**Ballasts with a nonmetallic enclosure and marked “Suitable for Air Handling Spaces” have enclosures that may be used in environmental air spaces as defined in Section 300-22(c) of the National Electrical Code. These products have been evaluated in accordance with UL 2413, “Standard Fire Test for Heat and Visible Smoke Release for Discrete Products and System Components Installed in Air-Handling Spaces.”**

Ballasts suitable for dimming fluorescent lamps are marked to indicate such use and, unless the dimming control leads are marked for connection to a Class 2 limited energy circuit, the ballast is additionally marked with the catalog number of the dimming control to which the ballast is Listed. For dimmable controls to be used with ballasts for dimming fluorescent lamps, see Industrial Control Equipment-Miscellaneous Apparatus and Transformer Dimmers.

**THE LISTING MARK OF UNDERWRITERS LABORATORIES**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its...
HID BALLASTS (FLCR)

This category covers high intensity discharge (HID) lamp ballasts of the following types: mercury vapor, metal halide, high pressure sodium and low pressure sodium. These ballasts are intended for connection in accordance with the National Electrical Code to branch circuits rated 600 v or less. The output voltages are 1000 v or less.

Ballasts intended for remote mounting in recessed installations are: (1) thermally protected, (2) marked “Thermally Protected” or the equivalent, and (3) marked “Suitable for Recessed Use.” These ballasts are intended to be installed in uninsulated or insulated ceilings with all insulation kept a minimum distance of 3 inches from the sides of the ballasts and not placed over the ballasts such that it would entrap the heat produced by the ballasts. The ballasts are provided with thermal protection to deactivate the ballasts should insulation be placed over or in contact with the ballasts.

Ballasts not intended for recessed installations may be provided with thermal protection. If the ballasts are provided with thermal protection, they are marked “Thermally Protected” or the equivalent. The effectiveness of such protection must be evaluated in combination with the specific fixture with which the ballast is used.

High intensity discharge lamp ballasts are restricted in use as indicated below. In regard to the corrosion protection provided, a ballast is acceptable for any use described above in the following descriptions.

INDOOR BALLASTS: Indoor ballasts are suitable for use in indoor, dry locations only.

OUTDOOR BALLASTS:

Type 1-Outdoor ballasts are suitable for use in (1) outdoor equipment, (2) fixtures intended for wet or damp locations or (3) an outdoor sign if the ballasts are within an overall electrical enclosure. Ballasts of this type are marked “Type 1 Outdoor” or “Type 1.”

Type 2-Outdoor ballasts are suitable for use in (1) outdoor equipment, (2) fixtures intended for wet or damp locations or (3) an outdoor sign if the ballasts, in addition to their own enclosure, are within an overall enclosure. Ballasts of this type are marked “Type 2 Outdoor” or “Type 2.”

WEATHERPROOF BALLASTS: Weatherproof ballasts are suitable for use where completely exposed to the weather without an additional enclosure and are marked “Weatherproof” or “WP.”

The basic standard used to investigate products in this category is UL 1029, “High Intensity Discharge Lamp Ballasts.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the specific type of product as shown in the following table.

HOLDERS FOR AUTOMATIC STARTERS (FLPZ)

This listing covers separate holders for automatic starters which are intended for use with electric discharge (fluorescent) lamps. Holders in combination with or designed to be assembled with lampholders are listed under Lampholders, Electric Discharge — 1000 Volts or Less. Unless otherwise noted, they are rated 660 watts, 250 volts.

The basic standard used to investigate products in this category is UL 542, “Lampholders, Starters, and Starter Holders for Fluorescent Lamps.” The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as appropriate: “Automatic Starter”, “Fluorescent Lamp Starter”, or other appropriate product name.

STARTERS, AUTOMATIC (FMDX)

This listing covers automatic starters for electric discharge (fluorescent) lamps.

The basic standard used to investigate products in this category is UL 542, “Lampholders, Starters, and Starter Holders for Fluorescent Lamps.” The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as appropriate: “Automatic Starter”, “Fluorescent Lamp Starter”, or other appropriate product name.

STARTERS, MANUAL (FMV)

This listing covers manual starter switches, and combinations of manual starter switches with line switches, for electric discharge (fluorescent) lamps.

The basic standard used to investigate products in this category is UL 542, “Lampholders, Starters, and Starter Holders for Fluorescent Lamps.” The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as appropriate: “Manual Starter”, “Fluorescent Lamp Starter”, or other appropriate product name.

MISCELLANEOUS (FNFT)

Products in this category include fluorescent ballasts and fluorescent lamp power reducers, fluorescent lamp life extenders, high intensity discharge (HID) lamp high-low dimmers, HID lamp starters, electromagnetic interference filters, related miscellaneous devices. These devices are for field installation, in accordance with their installation instructions, into Listed lighting fixtures employing fluorescent or high intensity discharge lamps.

Fluorescent power reducer devices are limited to installation only in fixtures employing thermally protected ballasts and are marked as such. The devices are designed for either high power factor, rapid start or high power factor, instant start ballasts, and marked as appropriate, unless marked for additional ballast types. These devices have not been evaluated for use on emergency lighting equipment or with dimming ballasts, unless marked otherwise.

HID lamp high-low dimmers are limited to installation only in or with fixtures employing the lamp wattage and type along with the ballast type and capacitor rating agreeing with the installation instructions provided with the dimmer.

The basic standards used to investigate products in this category are UL 1029, the Standard for High Intensity Discharge Lamp Ballasts and UL 935, the Standard for Fluorescent Lamp Ballasts, as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the specific type of product as shown in the individual Listing.

ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT COMPOUNDS (FOIZ)

This category covers electrically conductive corrosion-resistant compounds for use on the threads of rigid metal conduit (RMC) and intermediate metal conduit (IMC). The compounds resist corrosion and provide electrical conductivity in accordance with Section 300.6(A) of ANSI/NFPA 70, “National Electrical Code”, when used in accordance with the manufacturer’s installation instructions.

These compounds are not suitable for use in hazardous (classified) locations.

Reference should be made to the product label located on the smallest unit container for specific instructions as to the proper use of the compound.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2419, “Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its
Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electrically Conductive Corrosion Resistant Compound.”

ELEVATOR EQUIPMENT (FQKR)

Products listed under this category include Elevator Controls and Accessories, Elevator Control Panels, Elevator Relays, Elevator Switches, Elevator Door Locking Devices, Contacts, Passenger Elevator Car Enclosures and Elevator Oil Buffers.

Products covered in this section are for ordinary location use only. For listing covering Elevator Appliances for use in hazardous locations, see Elevator Appliances for Use in Hazardous Locations Directory. Elevator Doors and Door Hardware are covered under Fire Doors in the Building Materials Directory.

ELEVATOR CONTROLS AND ACCESSORIES (FQMW)

This Listing covers accessories and controllers for use in elevator applications and includes elevator accessories such as push buttons, indicator lights, lighting fixtures and elevator controls such as power supplies (motor and door operators).

The basic standard used to investigate products in this category is UL 508 “Industrial Control Equipment.”


Some devices are open type (without enclosures). This means that such devices are for use as parts of Listed equipment where the acceptability of the combination has been determined by Underwriters Laboratories Inc. or where open type devices are acceptable.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word, “LISTED,” a control number, and the following product name: “Elevator Control,” “Elevator Accessory.” Products additionally evaluated ANSI/ ASME A17.1 and ANSI/ASME A17.5 may also be marked: “Also Evaluated In Accordance With ANSI/ASME A17.1.”

ELEVATOR CONTROL PANELS (FQPB)

USE

This category covers elevator control panels consisting of assemblies of equipment intended to control elevators, dumbwaiters, escalators, moving walks, inclined lifts and their associated equipment.

ADDITIONAL INFORMATION

For additional information, see Elevator Equipment (FQKR), Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 508A, “Industrial Control Panels.”

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), a control number, the product name “Open Elevator Control Panel” or “Enclosed Elevator Control Panel,” and Statement No. 1 or No. 2 as applicable.

Statement No. 1: “As to electrical shock and fire hazard only. Classification does not include evaluation with respect to ANSI/ASME A17.1 or A17.5.”

Statement No. 2: “As to electrical shock and fire hazard, and in accordance with ANSI/ASME A17.1 (date) and A17.5 (date).”

ELEVATOR DOOR LOCKING DEVICES AND CONTACTS (FQXZ)

The devices listed in this section are designed for installation and operation in accordance with the requirements of the Safety Code for Elevators, Dumbwaiters, and Escalators and Moving Walks (ANSI/ASME A17.1).

Elevator hoist way door interlocks are intended to prevent the operation of the driving machine by the normal operating device unless the hoist way door is locked in the closed position, and to prevent the opening of the hoist way door from the landing side unless the car is within the landing zone and is either stopped or being stopped.

Retiring cams are not covered by these listings, and their acceptability must be determined at the point of installation by the authority having jurisdiction.

Elevator hoist way door combination mechanical locks and electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the hoist way door is in the closed position, and to lock the hoist way door in the closed position and prevent it from being opened from the landing side unless the car is within the landing zone.

Elevator hoist way door, car door or gate electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the door or gate is in the closed position.

The devices covered by these Listings are investigated for misalignment conditions when properly installed as recommended by the manufacturer. Their acceptability is to be determined at the point of installation by the authority having jurisdiction.

The basic standard used to investigate products in this category is UL 104, “Elevator Door Locking Devices and Contacts.”

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Elevator Interlock,” “Elevator Interlock Retiring Cam Required,” “Elevator Combination Mechanical Lock and Electric Contact,” “Elevator Electric Contact,” or appropriate product names as shown in the individual Listings.

ELEVATOR OIL BUFFERS (FQZD)

These products are intended for installation under elevator cars having a rated speed in excess of 50 ft/min in order to stop a descending car beyond its normal limit of travel. They have been classified in accordance with the American National Safety Code For Elevators, Dumbwaiters, Escalators and Moving Walks (ANSI/ASME A17.1), paragraph for 201.4g.

The basic standard used to investigate products in this category is UL 104, “Elevator Door Locking Devices and Contacts.”

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. (shown below) is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.,© IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARD SAFETY CODE FOR ELEVATORS, DUMBWAITERS, ESCALATORS AND MOVING WALKS, ANSI/ASME A17.1 (DATE OF STANDARD) PARAGRAPH 201.4g. (CONTROL NUMBER)

ELEVATOR SWITCHES (FRAH)

The devices Listed in this section are designed for installation and operation in accordance with the requirements of the Safety Code for Elevators, Dumbwaiters, and Escalators and Moving Walks (ANSI A17.1-1987).

These are elevator switches to be used with the elevator system car or shaft.

Elevator door locking devices and contacts and replacement parts for elevator door locking devices and contacts are covered under separate categories.

The basic standard used to investigate products in this category is UL 104, “Elevator Locking Devices and Contacts.”

The devices covered by these Listings are investigated for proper operation when installed as recommended by the manufacturer. Their acceptability is to be determined at the point of installation by the authority having jurisdiction.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory), together with the word
PASSERGNER ELEVATOR CAR ENCLOSURES (FRBK)

Passenger elevator car enclosures classified under this category are factory-built assemblies of wall and ceiling panels intended to be secured to a car platform in accordance with the requirements of the Safety Code for Elevators and Escalators (ANSI/ASME A17.1). These factory-built enclosures incorporate materials and equipment such as decorative panels, suspended ceilings, and light fixtures which, after installation, may not be accessible for inspection at the installation site. These factory-built enclosures may be shipped disassembled.

This category does not include freight car enclosures, enclosures having glass panels in excess of 1 sq ft in area, enclosures having gates, weights, vertically sliding car doors, or padded linings for temporary use in passenger cars during the handling of freight.

These factory-built enclosures have been investigated in accordance with the applicable paragraphs of Section 204 of ANSI/ASME A17.1.

The Classification Marking for the elevator car enclosure appears on the upper surface of the top of the car enclosure. Each knock down part of the enclosure also bears a supplementary Classification Marking reading: "Knock down Enclosure Part for Classified Elevator Enclosure".

CLASSIFIED BY UNDERWRITERS LABORATORIES INC. IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARD SAFETY CODE FOR ELEVATORS AND ESCALATORS ANSI/ASME A17.1 (DATE OF STANDARD) SECTION 204

EMERGENCY LIGHTING AND POWER EQUIPMENT (FTBR)

USE

This category covers emergency electrical lighting and power equipment for use in accordance with ANSI/NFPA 101, "Life Safety Code," and Article 700 of ANSI/NFPA 70, "National Electrical Code." Emergency lighting and power equipment has been investigated for transferring operation from a normal utility source to an immediately available emergency supply source. Emergency lighting and power equipment is provided with a test switch and visible or audible indicators to report the readiness of the emergency supply.

PRODUCT TYPES

This category covers emergency luminaire, exit signs, unit equipment, inverters, central station battery systems, and related accessories that directly facilitate or supplement the function of these devices. This category also includes inverter/charger packs intended for factory or field installation. Listed luminaire/exit sign packs, inverter/charger packs, and inverter chargers have been investigated by UL to determine that when installed in accordance with the manufacturer’s instructions they do not adversely affect the operation of the installed luminaire. Electrical ratings, lamp compatibility, and wiring diagrams are marked on the packs and/or identified in the instructions provided. Inverter/charger packs are not suitable for installation in sealed or gasketed compartments unless investigated and marked for such applications.

RATINGS

All products have been investigated for use in dry locations only unless marked as suitable for damp or wet locations. Products marked as suitable for indoor damp or wet locations have not been investigated for UV exposure. All products have been investigated for use in ambient temperatures of 20 – 30°C (68 – 86°F) unless otherwise marked with an extended use temperature range.

Emergency lighting and power equipment with batteries has been determined to provide 90 minutes of rated power or light, in accordance with ANSI/NFPA 101, unless specifically marked for a longer period of time. Emergency luminaires have been investigated for their ability to contribute to the required illumination of the path of egress, in accordance with ANSI/NFPA 101. However, compliance with the lighting levels contemplated by ANSI/NFPA 101 must be determined in the actual application.

Exit signs have been investigated for visibility from 100 ft unless marked with a maximum viewing distance of 50 or 75 ft.

RELATED PRODUCTS

Exit signs intended for connection to a single source of power only are covered under Exit Fixtures (FWBO). Exit signs with no connection to a source of electrical power are Listed under Exit Signs, Self-luminous and Photoluminescent (FWBX).

ENGINE GENERATORS (FTCA)

This category covers electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel fueled internal combustion engines, including microturbines. The products are provided as integrated systems rated 10 kW or less, 115 V, 2-wire single phase; 240 V, 2-wire single phase; 115/230 V, 3-wire single phase; 3- or 4-wire, any voltage, three phase.

RELATED PRODUCTS

Engine generators intended for use in recreational vehicles are covered under Engine Generators for Recreational Vehicles (FTCZ). Engine generator sets intended for stationary use are covered under Stationary Engine Generator Sets for Recreational Vehicles (FTDZ). Engine generators are also referred to as generator heads or alternators, intended for use in an engine generator are covered under Generators (JGZ).

ENGINE GENERATORS FOR RECREATIONAL VEHICLES (FTCZ)

GENERAL

This category covers electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel fueled internal combustion engines. The systems are intended for installation in recreational vehicles.

REQUIRED EQUIPMENT FOR PORTABLE USE

This category covers portable electrical generating equipment driven by gasoline, LP-gas, natural gas or diesel fueled internal combustion engines. Listed portable engine generator assemblies are rated 10 kW or less, 115 V, 2-wire single phase; 240 V, 2-wire single phase; 115/230 V, 3-wire single phase; 3- or 4-wire, any voltage, three phase.

RELATED PRODUCTS

Engine generator sets intended for use in stationary installations are covered under Stationary Engine Generator Sets for Recreational Vehicles (FTDZ). Engine generators are also referred to as generator heads or alternators, intended for use in an engine generator are covered under Generators (JGZ).

ENGINE GENERATORS FOR PORTABLE USE (FTCN)

GENERAL

The standard basic used as a guide to investigate products in this category is UL 1248, "Engine-Generator Assemblies for Use in Recreational Vehicles."
portable use are covered under Engine Generators for Portable Use (FTCN). Engine generators for use in marine craft are covered under Generator Sets, Marine (FTSW). Wind-driven generators are covered under Wind Turbine Generating Systems (ZGXW). Motor generator sets and flywheels energized by gas (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Engine Generator for Recreational Vessels.”

ADDITIONAL INFORMATION
For additional information, see Engine Generators (FTCA), Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 1248, “Engine Generator Assemblies for Use in Recreational Vehicles.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Engine Generator for Recreational Vessels.”

ENERGY USAGE MONITORING SYSTEMS (FTRZ)

USE
This category covers products intended for use in metering of utility and non-utility electric power. These devices monitor power consumption on a building main supply or separate branch circuits. These devices may communicate with other devices by means of power line carrier, satellite/radio frequency, telephone, cable or other means. Devices suitable for outdoor use are so marked.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 916, “Energy Management Equipment.”

ADJUNCT SERVICES
Underwriters Laboratories Inc. (UL) provides a service for the Classification of watt-hour meters for use in metering of utilities that not only meet the appropriate requirements of UL but also have been investigated in accordance with standards or parts detailed below from the American National Standards Institute (ANSI):
1. NEMA/ANSI C12.1–++, “Code for Electricity Metering”
2. IEEE/ANSI C12.11–++, “Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)”
5. IEEE/ANSI C12.16–++, Solid-state Electric Meters
6. NEMA/ANSI C12.20–++, “0.2 and 0.5 Accuracy Classes”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Engine Generator for Recreational Vessels.”

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with one or more of the standards or parts detailed below from the American National Standards Institute (ANSI). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following additional information:
“Also Classified IN ACCORDANCE WITH *,” where “*” is one of the texts detailed below:
1. NEMA/ANSI C12.1–++ Code for Electricity Metering
2. IEEE/ANSI C12.11–++, Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)
4. IEEE/ANSI C12.15–++, Solid-state Demand Registers for Electromechanical Watt-hour Meters
5. IEEE/ANSI C12.16–++, Solid-state Electric Meters
6. NEMA/ANSI C12.20–++ 0.2 and 0.5 Accuracy Classes

ENGINE GENERATORS (FTSR)

GENERAL
This category covers electrical generating equipment driven by gasoline, LP gas, natural gas or diesel fueled internal combustion engines.


Listed stationary engine generator assemblies may be used in emergency and standby power systems, provided the installed system complies with applicable codes.

ADDITIONAL INFORMATION
For additional information, see Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is ANSI/UL 2200, “Stationary Engine Generator Assemblies.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Stationary Engine Generator Assembly,” or other appropriate product name as shown in the individual Listings.

EQUIPMENT GROUND-FAULT PROTECTIVE DEVICES (FTFE)

This category covers Equipment Ground-Fault Protective Devices (EGFPD) which operate to disconnect the electric circuit from the source of supply when ground-fault current exceeds the ground-fault pick-up level marked on the device.

To aid the user in making proper selection of this equipment, the EGFPDs are marked with a ground-fault pick-up level in milliamperes and with a voltage and current rating. The ground-fault pick-up level is limited to the range above 6 mA to 50 mA. These devices are intended to operate upon a condition of excessive ground-fault leakage current from equipment, rather than minimize damage due to arcing faults in services. EGFPDs are intended to be installed only on grounded alternating-current systems in accordance with the National Electrical Code ANSI/NFPA 70.

EGFPDs are intended for use in applications where ground-fault protection of equipment is required by the National Electrical Code, specifically Sections 426-28 and 427-22, or where such protection is deemed appropriate.

A two-wire device is not suitable for use in a multivwire branch circuit as defined in the National Electrical Code.

The devices covered by this category have not been evaluated to provide electric shock protection for personnel and they are not intended to be used in place of a ground-fault circuit interrupter (GFCI) where a GFCI is required by the National Electrical Code. See Ground-Fault Circuit Interrupters (KCXS) for further information.

The devices covered by this category are not intended to be used in electrical service entrance equipment where ground-fault sensing and relaying equipment, required by Section 230-95 of the National Electrical Code, is used. See Ground-Fault Sensing and Relaying Equipment (KDAX) for further information.

The basic standard used to investigate products in this category is UL 1053, “Ground-Fault Sensing and Relaying Equipment.” Some requirements are also derived from UL 943, “Ground-Fault Circuit-Interrupters.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Equipment Ground-Fault Protective Device” or “EGFPD.”

EXIT FIXTURES (FWBO)

GENERAL
This category covers fixtures or recessed fixtures intended to be connected to a single source of power and to illuminate an integral legend “EXIT.” They are intended for installation in accordance with NFPA 70, “National Electrical Code” and NFPA 101, “Life Safety Code.”
Exit fixtures have been determined to comply with the applicable NFPA 101 requirements only when all internal lamps are illuminated. Each fixture is marked to indicate the type of lamp(s) or replacement lamp(s) to be used. Fixtures intended for mounting to a ceiling are suitable for use where the ceiling is thermal or acoustically insulated above it.

Exit fixtures are for use in indoor dry locations only, unless marked “Suitable for Damp Locations,” “Suitable for Indoor Wet Locations” or “Suitable for Wet Locations.” Exit fixtures marked for indoor wet locations have not been evaluated by UL with regard to UV (sunlight) exposure.

Exit fixtures containing fluorescent or electroluminescent lamps, and marked as suitable for damp, indoor wet, or wet locations, have been evaluated for use only at or above the marked minimum ambient temperature. Exit fixtures containing electroluminescent lamps are additionally marked with a lamp replacement date, of either 5 or 8 years after the date of manufacture.

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 924, “Emergency Lighting and Power Equipment.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc., on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Exit Fixture.”

### EXIT SIGNS, SELF-LUMINOUS AND PHOTOLUMINESCENT (FWBX)

#### USE AND INSTALLATION

This category covers exit signs that utilize a nonelectrical illumination power source, and includes exit signs containing self-luminous gases or with a photoluminescent surface that relies on external illumination. These signs are intended for installation in accordance with ANSI/NFPA 101, “Life Safety Code” and other codes governing the marking of the means of egress.

These exit signs have been evaluated only for dry, indoor locations unless otherwise marked. They are intended to be installed and operated in accordance with the product markings and installation instructions provided.

#### EXTERNAL ILLUMINATION

Exit signs whose visibility is dependent on external illumination (such as photoluminescent signs) are intended for installation only where such external illumination is deemed reliable and sufficient by the Authority Having Jurisdiction, and where the lighting controls are accessible only to authorized personnel. Where compliance with the visibility requirements requires external illumination greater than 1 ft-c, these signs are marked, where visible after installation, for a minimum 5 ft-c illumination, measured on the face of the sign. If specific type(s) of lighting are needed to achieve the required visibility, the lighting type is also marked on the sign.

#### VIEWING DISTANCE

These exit signs have been evaluated for visibility from 100 feet unless marked with a maximum viewing distance of 50 or 75 feet.

#### REPLACEMENT DATE

Exit signs whose visibility is expected to decline over time (such as those containing self-luminous gases) are marked, where visible after installation, with a replacement date.

### ADDITIONAL INFORMATION

For additional information, see Building Materials (AABM). **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 924, “Emergency Lighting and Power Equipment.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc., on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

- **FOR USE ONLY WITH EXIT++ MODEL**
- **MANUFACTURED BY [Manufacturer’s Name]**
- **Control No.**
- “EFS” or “ELS”
- “FIXTURE” (for Type EFS) or “LIGHT” (for Type ELS)
- *Additional model/manufacturer combinations may be noted*

### EXIT FIXTURE TO EXIT LIGHT CONVERSIONS, RETROFIT (FWCN)

These exit fixture to exit light conversions are parts and/or subassemblies intended for field installation in specific Listed exit fixtures identified by catalog numbers and company name. They are retrofit devices to convert specific exit fixtures to exit lights with integral battery providing emergency power, and may also convert the light source from one type to another (e.g., incandescent to light emitting diodes) when installed in accordance with the manufacturer’s instructions.

These conversions have been investigated by UL to determine that when used in accordance with the manufacturer’s instructions, the converted exit fixture complies with the applicable requirements for exit lights.

The basic standard used to investigate the exit fixture to exit light conversions is UL 924, “Emergency Lighting and Power Equipment.” **LOOK FOR CLASSIFICATION MARK ON PRODUCT**

*The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product, together with a control number, is the only method provided by Underwriters Laboratories Inc. to identify products under its Classification and Follow-Up Service.*

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC.**

**EXIT FIXTURE TO EXIT LIGHT CONVERSIONS, RETROFIT FOR USE ONLY WITH EXIT FIXTURE MODEL**

**MANUFACTURED BY [Manufacturer]***

### EXIT SIGN RETROFIT KITS (GGET)

**USE AND INSTALLATION**

This category covers exit sign retrofit kits, which are parts and/or subassemblies intended for field installation in specific Listed exit fixtures (see Exit Fixtures [FWBO]) or exit lights (see Emergency Lighting and Power Equipment [FTBR]). They convert the light source from one type to another (e.g., incandescent to LED), primarily for energy-saving purposes. They have been investigated to determine that when used in accordance with the manufacturer’s instructions, they do not adversely affect the operation of the complete exit sign. Their use is subject to the conditions indicated on the installation instructions provided with the kit.

*Conversion kits are of one of the following type designations:

Type EFS (Exit Fixture Specific) — A conversion kit intended for use with one or more specific exit fixture(s) identified by manufacturer and catalog number on the kit and in the installation instructions.

Type ELS (Exit Light Specific) — A conversion kit intended for use with one or more specific exit fixture(s) identified by manufacturer and catalog number on the kit and in the installation instructions. These kits are intended for installation into UL Listed products that bear the product identity “Exit Fixture” (for Type EFS) or “Emergency Lighting Equipment” (for Type ELS) as part of the Listing Mark.

Exit sign conversion kits are intended for use in indoor, dry locations unless marked “Suitable for Wet Locations,” “Suitable for Indoor Wet Locations” or “Suitable for Damp Locations.”

Exit sign conversion kits containing fluorescent or electroluminescent lamps and marked as being suitable for damp or wet locations are for use in an ambient temperature not greater than that marked on the product.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ). **REQUIREMENTS**

The basic standard used to investigate products in this category is UL 924, “Emergency Lighting and Power Equipment.”

**UL MARK**

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

- **EXIT SIGN CONVERSION KIT, TYPE +**
- **FOR USE ONLY WITH EXIT ++ MODEL**
- **MANUFACTURED BY [Manufacturer’s Name]**
- **Control No.**
- “EFS” or “ELS”
- “FIXTURE” (for Type EFS) or “LIGHT” (for Type ELS)
- *Additional model/manufacturer combinations may be noted*
Retrofit kits are one of the following type designations:

**Type EFG (Exit Fixture General)** — A retrofit kit intended for use only in single or double faced stencil exit fixtures having a legend not exceeding 6 in. (152 mm) in height. Type EFG kits are suitable for use with UL Listed exit fixtures of the following interior dimensions: 6-1/4 to 8-7/8 in. high, 9-1/2 to 13-7/16 in. wide, and 7/8 to 3-1/4 in. deep.

**Type EFI (Exit Fixture Independent)** — A retrofit kit that includes a light source, light reflecting media enclosure, diffuser, legend, and two directional indicators, intended to retrofit any UL Listed exit fixture having a legend not exceeding 6 in. (152 mm) in height. Type EFI kits are self-contained assemblies that are independent of the original exit fixture except for mechanical support and electrical supply.

**Type ELG (Exit Light General)** — Same as Type EFG except intended for use only in UL Listed exit exit lights, which are energized by an ac power source in the normal mode and by an internal or external dc power source in the emergency mode.

**Type ELI (Exit Light Independent)** — Same as Type EFI except intended for use Listed exit lights energized by an ac power source in the normal mode and by an internal or external dc power source in the emergency mode.

Exit sign retrofit kits are intended for use in indoor, dry locations unless marked "Suitable for Wet Locations," "Suitable for Indoor Wet Locations" or "Suitable for Damp Locations" (see FTBR).

Exit sign retrofit kits containing fluorescent or electroluminescent lamps and marked as being suitable for damp or wet locations are for use in an ambient temperature not less than that marked on the product.

These kits are intended for installation into UL Listed products that bear the product identity of "Exit Fixture" (for Types EFG and EFI) or "Emergency Lighting Equipment" (for Types ELG and ELI) as part of the Listing Mark. These devices have not been investigated as replacement light sources in edge-illuminated exit signs.

### ADDITIONAL INFORMATION

**For additional information, see Building Materials (AABM) and Electrical Equipment for Use in Ordinary Locations (AALZ).**

### REQUIREMENTS

The basic standard used to investigate products in this category is UL 924, "Emergency Lighting and Power Equipment.

### UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product includes the UL symbol, the word "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**EXIT SIGN RETROFIT KIT TYPE + FOR USE ONLY WITH EXIT ++ MODEL * MANUFACTURED BY ____________

Control No.**

* Additional model/manufacturer combinations may be noted.

---

**FACTORY AUTOMATION EQUIPMENT (GPNY)**

### USE AND INSTALLATION

This category covers production equipment for attended and unattended assembly of products and subassemblies. This equipment is designed to be programmed for a specific manufacturing application, such as assembly of components, packaging, sorting, or counting of parts, or hole punching or cutting. The equipment may also incorporate manufacturing processes involving heating or cooling, drawing, or gluing of parts.

This equipment is intended to be installed in accordance with ANSI/NFPA 79, "Electrical Standard for Industrial Machinery," and Article 670 of ANSI/NFPA 70, "National Electrical Code."

### Special Considerations

This equipment is not intended for the handling of hazardous materials in unattended applications, or intended for fire protection service.

### RELATED PRODUCTS

Robots and associated control equipment are covered under Robots and Robotic Equipment (TETZ). Industrial control panels are covered under the category of the same name (NITW).

Equipment intended primarily for measurement of physical or chemical properties of materials, measurement of the functional performance of a piece of equipment, qualitative or quantitative constituent analysis of substances, or preparation of materials for further analysis or measurements is covered under Laboratory Use Electrical Equipment (OGTK).
FIRE ALARM CABLE (HNVT)

Fire Alarm cable is intended for use in accordance with Article 760 of the National Electrical Code.

NONPOWER-LIMITED FIRE ALARM CABLE (HNHT)

Use and Installation

This category covers nonpower-limited fire alarm cable for use in nonpower-limited circuits in accordance with Section 760.30 of ANSI/NFPA 70, “National Electrical Code” (NEC).

Unless a higher temperature rating is marked on the cable, nonpower-limited fire alarm cable is intended for use where the operating temperature does not exceed 60°C. The marked voltage rating is 150 V.

Product Markings

Nonpower-limited fire alarm cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

NPLF — Indicates cable intended for use within buildings in accordance with Section 760.30(B)(2) of the NEC. This cable exhibits a maximum peak optical density of 0.50, a maximum average optical density of 0.15, and a maximum flame spread propagation height of this cable is less than 12 ft when tested per UL 1666, “Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.”

NPLFR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 760.30(B)(3) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, “Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.”

NPL — Indicates cable intended for use within buildings in other spaces for use with Section 760.30(B)(4) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Flame Test in UL 1581, “Reference Standard for Electrical Wires, Cables, and Flexible Cords.”

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol and “Fire Alarm System” together with the word “LISTED,” a control number, and the product name “Fire Alarm Cable.”

POWER-LIMITED FIRE ALARM CABLE (HNIR)

Use and Installation

This category covers power-limited fire alarm cable intended for use in power-limited circuits in accordance with Article 760 of ANSI/NFPA 70, “National Electrical Code” (NEC).

Unless a higher temperature rating is marked on the cable, power-limited fire alarm cable is intended for use where the operating temperature does not exceed 60°C. The voltage rating is 300 V but is not marked.

Product Markings

Power-limited fire alarm cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

FPL — Indicates cable intended for use within buildings in accordance with Section 760.61(C) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Flame Test in UL 1581, “Reference Standard for Electrical Wires, Cables, and Flexible Cords.”

FPLP — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 760.61(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per NFPA 262, “Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.”

FPLR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 760.61(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, “Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.”

Power-limited Fire Alarm Cable — Indicates cable suitable for use within buildings (1) where the cable is enclosed in a raceway, or (2) in nonconcealed spaces where the exposed length of cable does not exceed 10 ft, in accordance with Sections 760.61(C)(2) and (3) of the NEC. This cable complies with the Vertical-Flame Test requirements in UL 1581.

Listed Type FPLP cable that is additionally marked “Also Classified NYC CERT Fire Alarm Cable” has been evaluated in accordance with the requirements of the Fire Alarm Code of the Department of Buildings of the City of New York.

Cable that complies with the requirements for “Limited Combustible” specified in NFPA 90A, “Installation of Air Conditioning and Ventilating Systems,” is surface marked “Limited Combustible.”

Cable marked “direct burial,” “for direct burial” or “dir bur” has been investigated and found suitable for direct burial in the earth.

Cable marked “sunlight resistant” or “sun res” may be exposed to the direct rays of the sun.

Cable marked “CI (max voltage ___)” is suitable for use as circuit integrity cable at the maximum voltage to ground indicated, in accordance with Section 760.71(G) of the NEC.

Additional Information

For additional information, see Fire Alarm Cable (HNVT) and Electrical Equipment for Use in Ordinary Locations (AAZL).

UL MARK

The basic standard used to investigate products in this category is UL 1424, “Cables for Power-Limited Fire Alarm Circuits.”

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Power-limited Fire Alarm Cable.”

In addition, the Listing Mark for cable also classified for use in accordance with the requirements of the Fire Alarm Code of the Department of Buildings of the City of New York includes the statement “Also Classified for Use as Fire Alarm Cable in New York City.”

LUMINAIRES AND FITTINGS (HYXT)

Use

This category covers complete luminaires (lighting fixtures) intended for general and special purpose illumination and component fittings and retrofit intended for field assembly to or into complete units.

SPECIAL USE LUMINAIRES

Cooking Hood Luminaires — Luminaires for use in nonresidential occupancies in exhaust ducts or hoods above cooking equipment are marked “SUITABLE FOR USE WITHIN COMMERCIAL COOKING HOODS” and “MOUNT A MINIMUM OF 1.2 M (4 FT) ABOVE COOKING SURFACE.” Such luminaires are for installation in accordance with NFPA 96, “Standard for Ventilation Control and Fire Protection of Commercial Cooking Equipment,” and Section 410.4(C) of ANSI/NFPA 70, “National Electrical Code” (NEC).

Recessed cooking hood luminaires are additionally marked with a minimum spacing marking “INSTALL WITH MINIMUM SPACINGS”.

2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

LOOK FOR THE UL MARK ON PRODUCT
BETWEEN A) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: ___INCHES; B) TOP OF LUMINAIRE AND AN OVERHEAD BUILDING MEMBER: ___INCHES; AND C) LUMINAIRE CENTER TO SIDE BUILDING MEMBER: ___INCHES.” The recessed cooking hood is to be installed in a hood that maintains these minimum spacings.

Air Handling Luminaires — Luminaires suitable for air handling use are marked “SUITABLE FOR AIR HANDLING USE.” For information on the use of air handling luminaires in fire-rated ceiling constructions, reference should be made to the design information section under Fire Resistance Ratings (BXUV). For applicable requirements covering air handling installations, reference should be made to NFPA 90A, “Standard for the Installation of Air Conditioning and Ventilating Systems.”

Some recessed air handling luminaires are restricted to certain applications because of certain features and are marked as follows: “VENTILATING OR COOLING AIR ONLY,” “ONLY FOR USE IN CEILING PLENUM OF NONCOMBUSTIBLE CONSTRUCTION OR WITH AIR HANDLING PARTS THAT COVER VENT OPENINGS” or “INSTALLATION ONLY IN ENVIRONMENTAL AIR HANDLING SPACES WHERE A COMPLETE METAL ENCLOSED WIRING SYSTEM IS PROVIDED.”

INSTALLATION MARKINGS

Unless otherwise indicated under the category for a specific type of luminaire, all luminaires are marked indicating the location where they can be used:

A luminaire marked “DRY LOCATIONS ONLY” is to be installed in indoor dry locations.

A luminaire marked “SUITABLE FOR DAMP LOCATIONS” may be installed in a damp or dry location.

A luminaire marked “SUITABLE FOR WET LOCATIONS” may be installed in a wet, damp, or dry location.

The locations are defined in Electrical Equipment for Use in Ordinary Locations (AALZ) and the NEC.

Luminaires investigated for or restricted to a particular mounting location for suitability to wet locations are additionally marked “SUITABLE FOR MOUNTING WITHIN 1.2 M (4 FT) OF THE GROUND,” “SUITABLE FOR GROUND-MOUNTED RECESSED,” “LIMIT RANGE OF ADJUSTMENT TO (INSTRUCTION)” or “COVERED CEILING MOUNT ONLY.”

Luminaires investigated for or restricted to a particular mounting location are marked “WALL MOUNT ONLY,” “FOR CEILING MOUNTING ONLY” or “MOUNTING ORIENTATION” (such as “This End Up”).

Luminaires are marked with a supply wire temperature rating “MIN __°C SUPPLY CONDUCTORS,” if intended for greater than 60°C supply wiring. Luminaires rated for over 90°C supply wiring are additionally marked “NOT FOR USE IN DWELLING.”

Luminaires that include an integral raceway intended to comply with Exception No. 1 of Section 410.31 of the NEC are marked “SUITABLE FOR USE AS RACEWAY,” and are additionally marked to include the maximum number, size and type of conductors they are intended to accommodate. See Surface Metal Raceways (RJBT) for raceways that can be assembled and installed as lighting units.

Some luminaires are only suitable for use with specific lamp types and are so marked. However, luminaires are not investigated or intended for use with sun lamps.

Luminaires containing components that require the luminaire to be connected only to an alternating-current circuit are marked “60 Hz,” “AC ONLY.”

Luminaires designed for connection to a proprietary wiring system will specify the name and part number of the proprietary system and all cautionary or other markings required for the system. These systems are covered under Manufactured Wiring Systems (QQVX).

Luminaires designed for connection to other than nominal 120 V supply and/or a 2-wire branch circuit are marked to identify the voltage supply or type of branch circuit or both.

RELATED PRODUCTS

Fire Resistant Luminaires — Luminaires for recessed installation in ceilings that have been shown to provide a degree of fire resistance with the floor or roof assembly with which they have been tested are covered under Luminaires and Luminaire Assemblies Classified for Fire Resistance (CDHW).

Emergency Lighting — Luminaires intended for simultaneous connection to normal and emergency power circuits, as well as luminaires with integral batteries for emergency illumination, are covered under Emergency Lighting and Power Equipment (FTBR).


Electric Signs — Products that illuminate an integral legend other than “Exit” are covered under Signs (UXIT).

Sunlight Lamps — Lighting products that employ sunlight lamps are covered under Sun and Heat Lamps (QPDI) or Personal Sun and Heat Equipment (QGRX).

Submersible Fixtures — Luminaires intended for installation under water in accordance with Article 680 of the NEC are covered under Submersible Luminaires (IFEV) if intended for decorative fountains and similar locations, or Fixtures, Lighting and Fixture Housings (WBDT) if intended for installation in swimming pools and similar locations.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, “Luminaires.”

FIXTURES, STAGE TYPE (IDDX)

The basic standard used to investigate products in this category is UL 1573, “Stage and Studio Lighting Units.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Stage Fixture,” “Stage Border Light,” “Stage Fixture Accessory” or other appropriate product name.

FIXTURES, SUBMERSIBLE (IDRV)

Submersible fixtures are intended for installation in fountains and similar locations below the surface of the water in accordance with Article 680 of the National Electrical Code. For listings of lighting fixtures intended for use in swimming pools see “Swimming Pool Equipment; Fixtures, Lighting, and Fixture Housings.”

Means for grounding are provided on the fixture.

Wet-niche submersible fixtures are intended to be removable for servicing, without lowering the water level.

Dry-niche submersible fixtures are intended to be sealed into underwater walls in such a manner that supply connections can be made in a dry niche behind the fixture.

Special-use submersible fixtures may rest directly on the fountain floor or may be otherwise located under the water level. They are provided with flexible cord or equipped for conduit connections.

Flexible cords for submersible fixtures are of Type ST or SO which have been investigated for water resistance.

The basic standard used to investigate products in this category is UL 676, “Underwater Lighting Fixtures.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Submersible Fixture,” “Submersible Fixture Wet-Niche Type,” “Submersible Fixture Dry-Niche Type” or other appropriate product name.

LUMINAIRES AND FITTINGS, SPECIAL PURPOSE, MISCELLANEOUS (IETR)

USE

This category covers special purpose luminaires and fittings that are parts and/or subassemblies of special purpose luminaires that are intended for final assembly into special purpose luminaires in the field.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

PRODUCT MARKING

All luminaires and fittings are marked in combination with the UL Listing Mark indicating the location where they can be used:

A luminaire or fitting marked “DRY LOCATIONS ONLY” is intended to be installed in indoor, dry locations.

A luminaire or fitting marked “SUITABLE FOR DAMP LOCATIONS” is intended to be installed in a damp or dry location.

A luminaire or fitting marked “SUITABLE FOR WET LOCATIONS” is intended to be installed in a wet, damp or dry location.

Requirements

The basic standard used to investigate products in this category is UL 1598, “Luminaires.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names, as appropriate: “Miscellaneous Luminaire,” “Floodlight,” “Inspection Light” or other appropriate product name.
LUMINAIRE POLES (IEUR)

USE

This category covers poles for support of luminaires in accordance with Article 410 of ANSI/NFPA 70, “National Electrical Code.” Included are poles that exceed 12 feet in length, measured from the bottom of the base, or from the intended grade level of poles for installation partially in ground. These poles are investigated with respect to suitability of the enclosure for supply conductors, provision of equipment grounding and bonding means, and a means of access to wiring. These poles have not been investigated for mechanical strength or wind loading.

POLES

These poles are investigated for use in wet locations.

PRODUCT MARKINGS

Poles that are greater than 10 feet in length and not provided with conductor support are marked “FOR USE ONLY WITH A LUMINAIRE WITH INTEGRAL CONDUCTOR SUPPORT.”

RELATED PRODUCTS

Poles that do not exceed 12 feet in length are covered under Luminaires and Fittings (IFXX).

5.0 ADDITIONAL INFORMATION

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, “Luminaires.”

UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for retrofit devices that are other than reflector kits includes the UL symbol, the word “CLASSIFIED” above the UL symbol as illustrated in the Introduction of this Directory, “Luminaire Conversion, Retrofit FOR USE ONLY WITH + IDENTIFICATION IN MANUFACTURER’S INSTRUCTIONS,” and a control number.

The Classification Mark for retrofit devices that are other than reflector kits includes the UL symbol, the word “CLASSIFIED” above the UL symbol as illustrated in the Introduction of this Directory, “Luminaire Conversion, Retrofit FOR USE ONLY WITH + IDENTIFICATION IN MANUFACTURER’S INSTRUCTIONS,” and a control number.

The Classification Mark for retrofit devices that are other than reflector kits includes the UL symbol, the word “CLASSIFIED” above the UL symbol as illustrated in the Introduction of this Directory, “Luminaire Conversion, Retrofit FOR USE ONLY WITH + IDENTIFICATION IN MANUFACTURER’S INSTRUCTIONS,” and a control number.

The Classification Mark for retrofit devices that are other than reflector kits includes the UL symbol, the word “CLASSIFIED” above the UL symbol as illustrated in the Introduction of this Directory, “Luminaire Conversion, Retrofit FOR USE ONLY WITH + IDENTIFICATION IN MANUFACTURER’S INSTRUCTIONS,” and a control number.
LUMINAIRE POLE
WITH RESPECT TO ELECTRICAL HAZARDS ONLY — NOT FOR MECHANICAL STRENGTH OR WIND LOADING
Control No.

FLUORESCENT LAMP TYPE LUMINAIRES (IEUZ)

This category covers surface and recessed luminaires containing only fluorescent lamps or fluorescent and incandescent lamps. Luminaires that contain HID lamps and fluorescent with luminaire are listed under HID Lamp Type (IEWZ).

All luminaires employ a Class P thermally protected ballast except that luminaires intended for use with straight tubular lamps and/or marked for “OUTDOOR USE ONLY” incorporate a Class P thermally protected or a non-Class P ballast of the simple reactance type.

For additional information see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

SPECIAL USE LUMINAIRES

Luminaires intended for connection only to a 24 V or less input and for use in recreational vehicles are covered under Low Voltage Luminaires for Recreational Vehicle Use (IFDQ).

Luminaires intended for use with germicidal lamps (germicidal lamps should not be used in ordinary luminaires) are marked “THIS LUMINAIRE IS DESIGNED FOR USE WITH GERMICIDAL LAMPS AND MUST BE INSTALLED IN COMPLIANCE WITH COMPETENT TECHNICAL DIRECTIONS SO THAT THE USER’S EYE AND BARE SKIN WILL NOT BE EXPOSED TO INJURIOUS RAYS.”

LUMINAIRE INSTALLATION MARKINGS

All luminaires except those intended for use with a remote ballast are marked with their electrical ratings excluding any convenience receptacle provided, stating the voltage, current or volt-amperes and frequency.

As an alternative to a marked volt-ampere rating, the luminaire line volt-amperes can be determined by the following markings: “FOR LINE VOLT-AMPERES MULTIPLY TOTAL LAMP WATTAGE BY 1.5” for luminaires with higher power factor preheat or rapid start ballasts; “FOR LINE VOLT-AMPERES MULTIPLY TOTAL LAMP WATTAGE BY 2.5” for luminaires with low power factor preheat or rapid start ballasts; or “FOR LINE VOLT-AMPERES MULTIPLY ALL LAMPS IN INCHES BY” for luminaries with instant start ballasts and where the blank corresponds to a multiplying factor based on supply voltage.

Luminaires with a ballast output circuit voltage exceeding 1000 V are marked “NOT FOR USE IN DWELLING.”

Luminaires intended to be field connected to a remote ballast are marked “USE BALLAST FOR” and “TYPE LAMP.”

Luminaires with a thermally protected ballast are marked “USE THERMALLY PROTECTED BALLAST FOR TYPE LAMPS.”

Luminaires are suitable for use with 60C field wiring unless (1) the field wiring is routed within 3 inches of the ballast, in which case 90C rated wire is to be used, or (2) the luminaire is marked with a supply wire rating.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1958, “Luminaires.”

Fluorescent Surface Mounted Luminaires (IEUZ)

This category covers surface mounted luminaires, including floor-, wall-, ceiling-, and pole-mounted luminaires. Ceiling mounted luminaires include cord, stem, chain and cable suspended luminaires in addition to outlet box mounted luminaires.

For additional information, see Fluorescent Lamp Type (IEUZ), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

LUMINAIRE INSTALLATION MARKINGS

All ceiling and wall mounted luminaires are acceptable for mounting on an insulated ceiling or wall. Exceptions: (1) luminaires obviously not designed for ceiling use or if marked “WALL MOUNT ONLY” are not acceptable for mounting on ceilings and (2) luminaires marked “NON COMBUSTIBLE SURFACE ONLY.”

All luminaires provided with a power supply cord are intended for chain, hook, or similar suspension means only and are marked “FOR CHAIN OR HOOK SUSPENSION ONLY.”

Luminaires intended for installation below a combustible surface are marked “SUITE FOR UNDER-CABINET MOUNT.”

Luminaires intended for continuous row mounting are marked “SUITE FOR CONTINUOUS ROW MOUNTING.”

Luminaires weighing more than 50 lbs and intended for outlet box connection are marked “THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX.”

Fluorescent Recessed Luminaires (IEVV)

This category covers luminaires for installation in recessed cavities in walls, ceilings and similar locations in accordance with the National Electrical Code, Section 410-64.

For additional information, see Fluorescent Lamp Type (IEUZ), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

TYPES OF RECESSED LUMINAIRES

TYPE IC LUMINAIRE — Luminaires marked “TYPE IC” may be installed such that insulation and other combustible materials are in contact with, and over the top, of the luminaire.

TYPE NON-IC LUMINAIRE — Recessed luminaires, except those identified as Type IC or for use in concrete only, are intended to be installed in an insulated or insulated ceiling (or wall), with all insulation kept a minimum distance of 3 inches from the sides of the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire. Other combustible materials are spaced, except at the points of support, at least 1/2 inch from adjacent luminaires.

CONCRETE ONLY LUMINAIRE — A recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked “FOR USE IN CONCRETE ONLY.”

A Type IC or Non-IC luminaire that is sealed to prevent the entry of concrete may be installed in concrete providing it is marked “SUITE FOR USE IN Poured CONCRETE.”

SUSPENDED CEILING LUMINAIRE — All recessed luminaires except those marked for use in concrete only are suitable for use in suspended ceilings and may be marked “FOR SUSPENDED CEILING.”

Recessed luminaires intended for use in suspended ceilings and provided with integral clips are marked for use with particular grid systems. When installed in accordance with this marking they comply with 410-16(c) of the NEC. Instructions for using clips to secure the luminaire to the grid are provided with the luminaire. The ability of these clips to withstand seismic disturbances has not been evaluated.

GROUND-MOUNTED RECESSED LUMINAIRE — A ground-mounted recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked “FOR GROUND-MOUNTED RECESSED ONLY.”

A ground-mounted recessed luminaire that is suitable for installation in non-fire resistant mediums such as a wooden deck is marked “SUITE FOR GROUND-MOUNTED RECESSED.”

LUMINAIRE INSTALLATION MARKINGS

A luminaire with an integral junction box or wiring compartment and evaluated for any heat contribution added by branch circuit conductors is marked “MAXIMUM OF ___ NO. ___ AWG BRANCH CIRCUIT CONDUCTORS SUITE ___ C PERMITTED IN BOX.” A luminaire suitable for branch circuit conductors, but not for pulling wires though conduit is additionally marked “FOR CABLE USE ONLY — NOT FOR PULLING WIRING.”

Luminaires which, by their construction, do not permit access to or inspection of field wiring connections from the front of the luminaire, after installation, are marked “ACCESS BEHIND WALL REQUIRED” or “ACCESS NONCOMBUSTIBLE CEILING PLENUM ONLY.”

Luminaires that are provided with polymeric recessed housings are marked “FOR USE IN ONE- AND TWO-FAMILY DWELLINGS ONLY” and “FOR USE IN NON-FIRE RATED INSTALLATIONS ONLY.”

Luminaires that are provided with recessed housings with openings that do not close off the room side to ceiling opening are marked “FOR USE IN NON-FIRE RATED INSTALLATIONS ONLY.”

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.
1) For luminaire housing and trims, the housing is marked “USE WITH (manufacturer’s name) (catalog number) TRIM” and each trim is marked with the manufacturer’s name and catalog number;

2) For rough-in and finishing sections, the rough-in section is marked “ROUGH-IN SECTION FOR USE WITH FINISHING SECTION,” where the blank refers to the type or catalog number. The finishing section is marked in the same manner stating “FINISHING SECTION FOR USE WITH ROUGH-IN SECTION.”

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, the product name “Luminaires,” and one of the following words adjacent to the Listing Mark: “Recessed Fluorescent,” “Recessed Fluorescent Channel,” “Wired Recessed Fluorescent Luminaries Reflector,” “Wired Recessed Fluorescent Channel” or “Wired Fluorescent Recessed Section.”

Light Diffusers and Lenses for Air Handling Luminaires, Fluorescent (IEWR)

This category covers light diffusers consisting of metal frames and panels of nonmetallic light diffusing material, other than glass. They are for use on luminaires that are designed to handle return air in a heating or air conditioning system. The method of mounting in the metal frame, the frame dimensions and the panel material used are so designed that the panel drops out of the frame under most fire conditions and, if the panel material ignites while in the frame, it will not propagate flame to adjacent light diffusers.

For additional information, see Fluorescent Lamp Type Luminaires (IEUT), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AAŁZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Light Diffuser for Air Handling Luminaires.”

High Intensity Discharge Lamp Type Luminaires (IEWX)

This category covers surface and recessed lighting luminaires containing high intensity discharge lamps and may contain fluorescent and incandescent lamps.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AAŁZ).

LUMINAIRE INSTALLATION MARKINGS

All luminaires except those intended for use with a remote ballast are marked with their electrical ratings excluding any convenience receptacle provided, stating the voltage, current or volt-amperes and frequency. Luminaires intended to be field connected to a remote ballast are marked “USE BALLAST FOR WATT TYPE LAMP” and “USE THERMALLY PROTECTED BALLAST FOR TYPE LAMPS.”

Luminaires intended for use with metal halide lamps and not provided with a suitable lamp containment barrier, are marked “CAUTION - RISK OF FIRE, DO NOT USE A LAMP IDENTIFIED FOR USE IN ENCLOSED LUMINAIRE.”

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1998, “Luminaires.”

High Intensity Discharge Surface Mounted Luminaires (IEXT)

This category covers surface mounted luminaires, including floor-, wall-, ceiling-, and pole-mounted luminaires. Ceiling mounted luminaires include cord, stem, chain and cable suspended luminaires in addition to outlet box mounted luminaires.

For additional information, see HID Lamp Type Luminaires (IEWX), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AAŁZ).

SPECIAL USE LUMINAIRE

Luminaires suitable for continuous operation in an elevated ambient such as a boiler room, foundry, etc., are marked “SUITABLE FOR...

OPERATION IN AMBIENTS NOT EXCEEDING __° C,” where the blank is filled in with the intended elevated ambient.

LUMINAIRE INSTALLATION MARKINGS

All ceiling and wall mounted luminaires are acceptable for mounting on an uninsulated ceiling or wall. Exceptions: 1) luminaires obviously not designed for ceiling use or if marked “WALL MOUNT ONLY” are not acceptable for mounting on ceilings and (2) luminaires marked “NON-COMBUSTIBLE SURFACE ONLY.”

Luminaires provided with a power supply cord are intended for chain, hook, or similar suspension means only and are marked “FOR CHAIN OR HOOK SUSPENSION ONLY.”

Luminaires intended for undercabinet mounting are marked “SUITABLE FOR UNDER-CABINET MOUNT.”

Luminaires intended for continuous row mounting are marked “SUITABLE FOR CONINUOUS ROW MOUNTING.”

Luminaires weighing more than 50 lbs and intended for outlet box connection are marked “THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX.”

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, the product name “Luminaires,” and one of the following words adjacent to the Listing Mark: “HID” or “Wired HID Section.”

HIGH INTENSITY DISCHARGE RESERVOED LUMINAIRE (IEXZ)

This category covers luminaires for installation in recessed cavities in walls, ceilings and similar locations in accordance with the National Electrical Code, Section 410-64.

For additional information, see HID Lamp Type Luminaires (IEWX) Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AAŁZ).

TYPES OF RESERVOED LUMINAIRE

TYPE IC LUMINAIRE — Luminaires marked “TYPE IC” may be installed such that insulation and other combustible materials are in contact with, and over the top of, the luminaire. Type Non-IC LUMINAIRE — Luminaires, except those identified as Type IC or for use in concrete only, are intended to be installed in an uninsulated or insulated ceiling (or wall), with all insulation kept a minimum distance of 13 inches from the sides of the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire. Other combustible materials are spaced, except at the points of support, at least 1/2 inch from the luminaire.

Type Non-IC luminaires are provided with thermal protection to deactivate the lamp(s) should insulation be placed over or in contact with the luminaire.

For proper heat dissipation, Type Non-IC luminaires are intended to be installed in a cavity as follows: If not marked with any spacing information, the luminaire is intended to be installed not closer than 1/2 inch from any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 inch from adjacent luminaires.

Luminaires intended for marked spacing installation are marked “INSTALL WITH MINIMUM SPACINGS BETWEEN A) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: __ INCHES; B) TOP OF LUMINAIRE AND AN OVERHEAD BUILDING MEMBER: __ INCHES; AND C) LUMINAIRE CENTER TO SIDE BUILDING MEMBER: __ INCHES.” The marked spacing luminaire is to be installed in a cavity that maintains minimum spacing.

Individual obstructions, such as ceiling joists, barriers to maintain thermal insulation 3 inches from the luminaire and other structural support members may be in the cavity area above the luminaire provided (1) they are not closer than 1/2 inch from any part of the luminaire (except for points used in support of the luminaire), and (2) they do not seal off the luminaire from the remaining portion of the cavity. More than one marked spacing luminaire may be installed in the same cavity provided the marked spacings are maintained from each luminaire to cavity sidewalls and to adjacent luminaires. Spacings between adjacent luminaires are measured center to center, based upon the geometric center of the luminaire at the ceiling line.

CONCRETE ONLY LUMINAIRE — A recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked “FOR USE IN CONCRETE ONLY.”
A Type IC or Non-IC luminaire that is sealed to prevent the entry of concrete may be installed in concrete providing it is marked “SUITABLE FOR USE IN Poured CONCRETE.”

SUSPENDED CEILING LUMINAIRE—All recessed luminaires except those marked for use in concrete only are suitable for use with suspended ceilings and may be marked “SUITABLE FOR SUSPENDED CEILING.”

Recessed luminaires intended for use in suspended ceilings and provided with integral clips are marked for use with particular grid systems. When installed in accordance with this marking they comply with 410-16(c) of the NEC. Instructions for using clips to secure the luminaire to the grid are provided with the luminaire. The ability of these clips to withstand seismic disturbances has not been evaluated.

GROUND-MOUNTED RECESSED LUMINAIRE—A ground-mounted recessed luminaire that is exempted from being thermostatically protected because it is intended for use only in a fire-resistant medium is marked “SUITABLE FOR GROUND-MOUNTED RECESSED.”

A ground-mounted recessed luminaire that is suitable for installation in non-fire-resistant mediums such as a wooden deck is marked “SUITABLE FOR GROUND-MOUNTED RECESSED.”

LUMINAIRE INSTALLATION INSTRUCTIONS

All recessed luminaires except those marked “FOR USE IN Poured CONCRETE ONLY” are marked “BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING.”

Luminaires that produce temperatures in excess of 90C at points of mounting to the building structure are marked “INSTALL IN BUILDINGS OF FIRE-RESISTANT CONSTRUCTION – MOUNT ON NON-COMBUSTIBLE MATERIAL.”

Only those luminaires with an integral junction box or wiring compartment marked in combination with the Listing Mark, “MAXIMUM OF NO. OF ACCESS HOLES IN EACH ENCLOSURE SUITABLE FOR SPUN C WIRE PERMITTED IN BOX,” have been evaluated for any heat contribution added by branch circuit conductors.

Luminaires which, by their construction, do not permit access to or inspection of field wiring connections from the front of the luminaire, after installation, are marked “ACCESS ABOVE CEILING REQUIRED” or “ACCESS BEHIND WALL REQUIRED.”

Luminaires that are provided with polymeric recessed housings are marked “FOR USE IN ONE- AND TWO-FAMILY DWELLINGS ONLY” and “FOR USE IN BUILDINGS WITH NON-FIRE RESISTANT CONSTRUCTION.”

Luminaires that consist of (1) a luminaire housing and trims or (2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

1. For luminaire housing and trims, the housing is marked “USE WITH (manufacturer’s name) (catalog number) TRIMS” and each trim is marked with the manufacturer’s name and catalog number;
2. For rough-in and finishing sections, the rough-in section is marked in combination with the Listing Mark, “ROUGH-IN SECTION FOR USE WITH FINISHING SECTION,” where the blank spaces are filled in with a) type or catalog number or b) refers to the type or catalog number located elsewhere on the label. The finishing section is marked in the same manner stating “FINISHING SECTION FOR USE WITH ROUGH-IN SECTION.”

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, “Luminaires.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, the product name “Luminaire,” and one of the following words adjacent to the Listing Mark: “Recessed HID,” “Recessed HID Type IC,” “Rough-In Section for Recessed HID Type IC,” “Finishing Section for Recessed HID” or “Wired Recessed HID Section.”

INCANDESCENT LAMP TYPE LUMINAIRES (IEYV)

GENERAL

This category covers surface and recessed lighting luminaires containing only incandescent lamps.

Luminaires provided with electrical loads other than lampholders directly connected to a 120 V, 2-wire branch circuit supply are marked with the total current rating for the luminaire excluding any convenience receptacle provided.

Luminaries provided with medium or mogul base lampholders are investigated for use with Types A or PS lamps unless marked otherwise. Also, some luminaires are only suitable for use with specific lamp types and are so marked.

INCANDESCENT LAMP TYPE LUMINAIRES (IEYV)

GENERAL

This category covers surface and recessed lighting luminaires containing only incandescent lamps.

Luminaires provided with electrical loads other than lampholders directly connected to a 120 V, 2-wire branch circuit supply are marked with the total current rating for the luminaire excluding any convenience receptacle provided.

Luminaries provided with medium or mogul base lampholders are investigated for use with Types A or PS lamps unless marked otherwise. Also, some luminaires are only suitable for use with specific lamp types and are so marked.

INCANDESCENT Surface-mounted Luminaires (IEZR)

This category covers surface mounted luminaires, including floor-, wall-, ceiling-, and pole-mounted luminaires.

Ceiling-mounted luminaires include cord, stem, chain and cable suspended luminaires in addition to outlet box mounted luminaires.

For additional information, see Incandescent Lamp Type Luminaires (IEYV), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AAZL).

SPECIAL USE LUMINAIRES

Luminaires suitable for continuous operation in an elevated ambient such as a boiler room, foundry, etc., are marked “SUITABLE FOR OPERATION IN AMBIENTS NOT EXCEEDING __ C,” where the blank is filled in with intended elevated ambient.

LUMINAIRE INSTALLATION MARKINGS

If the required rating of the field wiring supplying the luminaire requires the installer to push the supply conductors from the luminaire into the outlet box, the luminaire is marked “PUSH CONDUCTORS INTO JUNCTION BOX.”

All ceiling and wall mounted luminaires are acceptable for mounting on an insulated ceiling or wall. Exceptions: (1) luminaires obviously not designed for ceiling use or if marked “WALL MOUNT ONLY” are not acceptable for mounting on ceilings and (2) luminaries marked “NON-COMBUSTIBLE SURFACE ONLY” intended for undercabinet mounting are marked “SUITABLE FOR UNDER-CABINET MOUNT.”

Luminaires intended for continuous row mounting are marked “SUITABLE FOR CONTINUOUS ROW MOUNTING.”

Luminaires weighing more than 50 lbs and intended for outlet box connection are marked “THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX.”

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1598, “Luminaires.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, the product name “Luminaire,” and the word “Incandescent” adjacent to the Listing Mark.

INCANDESCENT Recessed Luminaires (IEZX)

This category covers luminaires for installation in recessed cavities in walls, ceilings and similar locations in accordance with the National Electrical Code, Section 410-64. For additional information, see Incandescent Lamp Type Luminaires (IEYV), Incandescent Recessed Luminaires (IFAH), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AAZL).

SPECIAL USE LUMINAIRES

Recessed type luminaires suitable for optional use with infrared heating lamps are marked and rated for 250 watt reflector type lamps. Recessed units suitable only for use with one or more infrared heating lamps are Listed under Air Heaters, Room, Fixed and Location-Dedicated (K▌WS) in the Electrical Appliance and Utilization Equipment Directory. The basic standard used to investigate products that is marked “SUITABLE FOR INFRARED LUMINAIRES” is UL 1598, “Luminaires.”
tact with, and over the top of, the luminaire. Type IC luminaires are provided with thermal protection to deactivate the lamp should the luminaire be mislamped.

**INHERENTLY PROTECTED LUMINAIRE** — A recessed luminaire which does not exceed temperatures greater than 90°C on outside surfaces even when mislamped with a non-fire resistant medium such as paper, or mislamped or overlapped is identified by being marked “INHERENTLY PROTECTED.”

**TYPE NON-IC LUMINAIRE** — Recessed luminaires, except those identified as Type IC or for use in concrete only, are intended to be installed in an uninsulated or insulated ceiling (or wall), with all insulation kept a minimum distance of 3 inches from the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire. Other combustible materials are spaced, except at the points of support, at least 1/2 inch from the luminaire. Type Non-IC luminaires are provided with thermal protection to deactivate the lamp(s) should insulation be placed over or in contact with the luminaire.

For proper heat dissipation, Type Non-IC luminaires are intended to be installed in a cavity as follows: If not marked with any spacing information, the luminaire is intended to be installed not closer than 1/2 inch from any surface forming the cavity behind the recessed portion of the luminaire and not closer than 1 inch from adjacent luminaires. Individual obstructions, such as ceiling joists, barriers to maintain thermal insulation 3 inches from the luminaire and other structural support members may be in the cavity area above the luminaire provided (1) they are not closer than 1/2 inch from any part of the luminaire except points used in support of the luminaire, and (2) they do not seal off the luminaire from the remaining portion of the cavity. More than one marked spacing luminaire may be installed in the same cavity provided the marked spacings are maintained from each luminaire to cavity sidewalls and to adjacent luminaires. Spacings between adjacent luminaires are measured center to center, based upon the geometric center of the luminaire at the ceiling line.

**CONCRETE ONLY LUMINAIRE** — A recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked “FOR USE IN CONCRETE ONLY.”

**SUSPENDED CEILING LUMINAIRE** — All recessed luminaires except those marked for use in concrete only are suitable for use in suspended ceilings. For proper heat dissipation, Type Non-IC luminaires are intended to be installed not closer than 1 inch from any part of the luminaire except for points used in support of the luminaire. For Type IC luminaires, a Type IC recessed luminaire installed in a cavity that maintains these minimum spacings.

**GROUND-MOUNTED RECESSED LUMINAIRE** — A ground-mounted recessed luminaire that is exempted from being thermally protected because it is intended for use only in a fire-resistant medium is marked “SUITABLE FOR GROUND-MOUNTED RECESSED ONLY.”

**LUMINAIRE INSTALLATION MARKINGS**

All recessed luminaires except those marked “FOR USE IN POURED CONCRETE ONLY” are marked “BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING.” Luminaires that produce temperatures in excess of 90°C at points of mounting to the building structure are marked “INSTALL IN BUILDINGS OF FIRE RESISTANT CONSTRUCTION.”

Only those luminaires with an integral junction box or wiring compartment marked in combination with the Listing Mark, “MAXIMUM OF NO._AWG BRANCH CIRCUIT CONDUCTOR SUITABLE FOR ___ PERMITTED IN BOX,” have been evaluated for any heat contribution added by branch circuit conductors.

Luminaires which, by their construction, do not permit access to or inspection of field wiring connections from the front of the luminaire, after installation, are marked “ACCESS ABOVE CEILING REQUIRED” or “ACCESS BEHIND WALL REQUIRED.”

Luminaires that are provided with polymeric recessed housings are marked “FOR USE IN ONE- AND TWO-FAMILY DWELLINGS ONLY” and “FOR USE IN NON-FIRE-RATED INSTALLATIONS.”

Luminaires that consist of (1) a luminaire housing and trims or (2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

1. For luminaire housing and trims, the housing is marked “USE WITH (manufacturer’s name) (catalog number) TRIMS” and each trim is marked with the manufacturer’s name and catalog number.
2. For rough-in and finishing sections, the rough-in section is marked in combination with the Listing Mark, “ROUGH-IN SECTION FOR USE WITH FINISHING SECTION,” where the blank spaces are filled in with (a) type or catalog number or (b) refers to the type or catalog number located elsewhere on the label. The finishing section is marked in the same manner stating “FINISHING SECTION FOR USE WITH ROUGH-IN SECTION.”

Luminaires that consist of separate wired luminaire sections are marked on each separable part with correlation markings.

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1598, “Luminaires.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the following words adjacent to the Listing Mark: “LUMINAIRE,” and one of the following words adjacent to the Listing Mark: “Recessed,” “Rough-In Section for Recessed Incandescent,” “Rough-In Section for Recessed Type IC,” “Rough-In Section for Recessed Incandescent Type IC” or “Rough-In Section for Recessed Fixture.”

**Incandescent Recessed Luminaires, Convertible, Non-IC/IC (IFAH)**

This category covers luminaires for installation in recessed cavities in walls, ceilings and similar locations in accordance with the National Electrical Code, Section 410-64. These products may be installed in either IC or Non-IC applications. The safety instructions, section and markings for use in IC installations also apply to Type Non-IC luminaires.

For additional information, see Incandescent Recessed Luminaires (IEZX), Incandescent Lamp Type Luminaires (IEYV), Luminaires and Fixtures (HYXT) and Electrical Equipment for Use in Ordinary Locations (AAZ).

**TYPE IC INSTALLATIONS** — Refer to Incandescent Recessed Luminaires (IEZX) sections entitled “Type IC Luminaires.”

**TYPE NON-IC INSTALLATIONS** — Refer to Incandescent Recessed Luminaires (IEZX) sections entitled “Type Non-IC Luminaires.”

**LUMINAIRE INSTALLATION MARKINGS**

The rough-in section or the luminaire housing of a convertible recessed luminaire is marked with the following two statements:

A. “BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING” and
B. “DO NOT INSTALL INSULATION WITHIN 76 MM (3 IN.) OF ANY PART OF THE LUMINAIRE”

The marking in ‘B’ shall be on a peel-off label that is removed when the luminaire is installed in a Type IC installation.

Luminaires that consist of (1) a luminaire housing and trims or (2) a rough-in section and finishing sections are marked on each separable part with correlation markings:

1. For luminaire housing and trims, the housing is marked “USE WITH (manufacturer’s name) (catalog number) TRIMS,” and each trim is marked with the manufacturer’s name and catalog number.
2. For rough-in and finishing sections, the rough-in section is marked “ROUGH-IN SECTION FOR USE WITH FINISHING SECTION,” where the blank spaces are filled in with (a) type or catalog number or (b) refers to the type or catalog number located elsewhere on the label. The finishing section is marked in the same manner stating “FINISHING SECTION FOR USE WITH ROUGH-IN SECTION.”

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1598, “Luminaires.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its...
Electric Discharge Lighting Systems, Cold Cathode (IFAY)

**USE**

This category covers lighting systems that incorporate electric discharge tubing with ferrule type end caps, commonly referred to as cold cathode lighting, which is electrically connected to the output of a transformer, power supply or ballast by ferrule type lampholders. Each transformer or power supply in the system is not rated more than 120 mA operating current (150 mA rated output current) when the open circuit voltage is over 7500 V, and not more than 240 mA operating current (300 mA rated output current) when the open circuit voltage is 7500 V or less. These systems are for installation in accordance with Article 410 of NFPA 70, “National Electrical Code” (NEC).

These lighting systems may incorporate transformers, power supplies or ballasts that have a marked output voltage greater than 1000 V. Such systems are not intended for use in dwellings in accordance with Article 410 of the NEC.

**INSTALLATION**

Electric discharge lighting systems are provided as a system of parts that are field installed. These systems are installed using tools and techniques available only to an electrician. The systems are provided with installation instructions which define the scope of the system and method for installation. It is intended that the system installation instructions be retained with the installation to which they apply.

The Listing of a lighting system does not constitute approval of the design which is the responsibility of the manufacturer and the Authority Having Jurisdiction. The final acceptance of the field-installed lighting system is the responsibility of the Authority Having Jurisdiction.

**PRODUCT MARKING**

The Listing Mark of Underwriters Laboratories Inc. on each transformer and transformer enclosure, and on the remaining lighting system parts themselves, referencing a specific field-installed System Number, is the only method provided by UL to identify these lighting systems covered under its Listing and Follow-Up Services. The Listing Mark for these systems includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” an issue number, “Field-Installed Electric Discharge Lighting System Part,” and the words “The Listing of this lighting system is contingent upon installation according to the specifications of (Listee’s Name), System No. ______, and the National Electrical Code.”
applications and are provided with a terminal block or factory-connected length of cord for connecting the low-voltage wiring or cable. Power units marked “Indoor/Outdoor Use” are for use in indoor or outdoor applications and are provided with means for connection of the luminaires (lighting units) to the secondary circuit by a wiring system in accordance with Chapter 3 of the NEC. Power units, if located outdoors, are intended to be connected to a receptacle outlet with a cover assembly marked suitable for wet locations while in use. The luminaires (lighting units) are intended for certain indoor applications, such as atriums or shopping malls, and outdoor wet location installations.

For power units marked “For Use with Submersible Fixtures or Submersible Pumps,” the transformer complies with Section 680.22(A)(2) of the NEC. These power units may be used to energize low-voltage submersible fixtures and pumps identified for use in decorative fountains or ponds not intended for swimming or wading in accordance with Section 680.50, Part V of the NEC.

ADDITIONAL INFORMATION

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the word “LUMINAIRE” or “Fitting,” or other appropriate product name as shown in the individual Listings.

**Luminaires and Luminaire Assemblies Classified for Fire Resistance (IFDL)**

**USE**

This category covers luminaires and luminaire assemblies for recessed installation in ceilings in accordance with the provisions of ANSI/NFPA 70, “National Electrical Code.” They have been shown to provide a degree of fire resistance with the floor or roof assemblies with which they have been tested.

These luminaires and luminaire assemblies have been investigated and found to comply with applicable electrical requirements and are so labeled.

**ADDITIONAL INFORMATION**

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**LUMINAIRE:** 

CLASSIFIED FOR FIRE RESISTANCE

**FIRES RESISTANCE CLASSIFICATION**

SEE UL FIRE RESISTANCE DIRECTORY

* or “LUMINAIRE ASSEMBLY” as appropriate

**Low Voltage Luminaires for Recreational Vehicle Use (IFDQ)**

**USE**

This category covers incandescent and fluorescent lamp type luminaires rated 24 V or less, ac or dc, intended for use in recreational vehicles, supplied by a transformer, battery, converter or similar power supply source and installed in accordance with the National Electrical Code.

**PRODUCT MARKING**

These luminaires are intended for use in dry locations only, unless marked “Suitable for Wet Locations.” These luminaires have been investigated for ceiling mounting as surface or recessed types. Luminaires for either ceiling or wall mounting are marked “Ceiling/Wall Mount.” Luminaires limited to wall mounting are marked “Wall Mount Only,” unless so constructed that they are obviously intended for wall mounting.

These luminaires are marked with the minimum temperature rating for supply conductors, except when integral lead wire is provided for connection to the supply conductors. The integral leads are of sufficient length for field splices to be located behind the ceiling or wall panel. After field splices are completed, it is intended the splices be positioned in a space not affected by the luminaire lamp heat.

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 234, “Low Voltage Lighting Fixtures for Use in Recreational Vehicles.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number and the product name “Low Voltage RV Luminaire” or other appropriate product name as shown in the individual Listings.

**Low-voltage Incandescent Luminaires and Fittings (IFDR)**

**USE**

This category covers low-voltage luminaires and low-voltage luminaire systems. This category also covers luminaire fittings that are parts and/or subassemblies intended for final assembly into low-voltage luminaires in the field.

These luminaires and fittings are rated 30 V (42.4 V peak) or less, for connection to an isolating type power supply Listed for the purpose and installed using fixed wiring in accordance with Article 411 of ANSI/NFPA 70, “National Electrical Code” (NEC). Sets of low-voltage luminaires may include the power supply and interconnecting cabling, to make up a low-voltage luminaire system.

This category also covers low-voltage lighting systems incorporating luminaires which may be repositionable along supply conductors that also support the luminaire. The power supply is provided with integral protection that de-energizes the output upon overloading or inadvertent shorting of live parts of the system that may be uninsulated and exposed.

**PRODUCT MARKINGS**

Luminaires and fittings restricted for connection to a Class 2 power-limited source of supply are identified by product markings or installation instructions, and either provided with a Class 2 power source or correlation markings.

These luminaires and fittings are intended for surface mounting, suspended or recessed installation and are marked for either dry, damp or wet locations. A luminaire or fitting marked for wet locations is rated 15 V (21.2 V peak) maximum unless live parts are made inaccessible to contact during normal use. See Luminaires and Fittings (HYXT) for additional installation marking.

Recessed units (luminaires and power units) marked “Type IC” or “Inherently Protected” in may be installed in accordance with NEC Section 410-66, such that insulation and other combustible materials are in contact with and over the top of the unit.

All recessed units not marked “Type IC” or “Inherently Protected” are intended to be installed so that any insulation that may have been placed over the top or within 3 inches of the sides of the unit, and other combustible materials are spaced, except at the points of support, at least 1/2 inch from the unit.

**INSTALLATION INSTRUCTIONS**

Luminaires intended for recessed or undershelf installation into a cabinet are provided with installation instructions depicting the intended use.

**RELATED PRODUCTS**

Low-voltage landscape lighting systems consisting of a remote power supply source, flexible cord, interconnecting means and relocatable outdoor use lighting assemblies are covered under Landscape Lighting Systems, Low Voltage (IFDH).

Luminaires incorporating an integral transformer or power supply with a low-voltage secondary circuit are covered under Incandescent Surface-mounted Luminaires (IEZR).

Low-voltage luminaires intended for connection only to 24 V or less source of supply in recreational vehicles are covered under Low-voltage Luminaires for Recreational Vehicle Use (IFDQ).

**ADDITIONAL INFORMATION**

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate 1) low-voltage lighting power units, 2) low-voltage exposed conductor lighting systems and low-voltage luminaires incorporating exposed conductors, and 3) Class 2 low-voltage lighting systems in this category is UL 2108, “Low Voltage Lighting Systems, Low Voltage (IFDR).”

The basic standard used to investigate other low-voltage lighting products in this category is UL 1958, “Luminaires.”

**UL MARK**
The listing mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up service. The listing mark for these products includes the UL symbol (as illustrated in the introduction of this directory) together with the word “LISTED,” a control number, and one of the following product names: “Low Voltage Luminaire,” “Low Voltage Recessed Luminaire,” “Low Voltage Cabinet Luminaire,” “Low Voltage Luminaire Power Supply,” “Low Voltage Lighting System,” “Low Voltage Luminaire System,” “Low Voltage Luminaire Fitting,” or other appropriate product name as shown in the individual listings.

The term “Fixture” may be used in lieu of “Luminaire” in the product name.

**Medical-dental luminaires (IFDT)**

**USE**

This category covers task lighting products such as examination room lights, illuminated eye charts and the like, which are intended for installation and use in hospitals, nursing homes, medical care centers, medical and dental offices, and similar health care facilities, but not in patient vicinity. Patient vicinity is defined as areas in which patients are normally cared for, and it is the space with surfaces likely to be contacted by the patient or an attendant who can touch the patient. Patient vicinity includes a space within the room 6 feet (1.83 m) beyond the perimeter of the bed (examination or dental chair, treatment booth, and the like) in its intended location, and extending vertically 1/2 to 1.5 feet (2.29 m) above the floor.

These lighting products have been investigated from the standpoint of electrical, fire, and casualty hazards only. Lighting products that have been evaluated as patient care equipment, with respect to the isolation and leakage current requirements of UL 544, “Medical and Dental Equipment,” appear under Medical and Dental Equipment, Professional (KFBQ) in the Electrical Appliance and Utilization Equipment Directory. Other hazards, including those which may result from use of this equipment in the presence of flammable anesthetics, have not been investigated. The effect on a patient of simultaneous use of this equipment with other electrical apparatus and the physiological effects, beneficial or otherwise, which may be produced by this equipment, has not been investigated.

**ADDITIONAL INFORMATION**

For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

The basic standard used to investigate products in this category is UL 1598, “Luminaires.”

**UL MARK**

The listing mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up service. The listing mark for these products includes the UL symbol (as illustrated in the Introduction of this directory) together with the word “LISTED,” a control number, and one of the following product names, as appropriate: “Medical Examining Room Light,” “Eye Chart” or the name of the specific type of product as shown in the individual listing.

**Stage and Studio Luminaires and Connector Strips (IFDZ)**

**USE**

This category covers stage and studio luminaires (lighting fixtures) and connector strips rated 600 V or less, for use in theaters, studios and similar locations in accordance with Articles 520 and 530 of the National Electrical Code. Stage and studio luminaires and connector strips are not intended for residential use.

**LUMINAIRE INSTALLATION MARKINGS**

Stage and studio luminaires and connector strips are not intended for residential use and are marked “Not For Residential Use.”

Some stage luminaires are marked with a lamp replacement marking stating “CAUTION — Risk of Fire — Use With Max ____ Watt Lamp” where the space is filled in with a number specifying the maximum wattage.

**RELATED PRODUCTS**

For additional information, see Special Purpose Luminaires (IFAT), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1573, “Stage and Studio Lighting Units.”

**UL MARK**

The listing mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up service. The listing mark for these products includes the UL symbol (as illustrated in the Introduction of this directory) together with the word “LISTED,” a control number, and one of the following product names, as appropriate: “Stage Lighting Unit,” “Stage Luminaire,” “Stage Border Lighting Unit,” “Stage Border Luminaire,” “Connector Strip” or other appropriate product name.

**Submersible Luminaires (IFEV)**

**USE**

This category covers submersible luminaires intended for installing in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code,” in vessels intended to accommodate vessels not intended to accommodate the complete or partial immersion of persons. For Listings of luminaires intended for use in swimming pools, spas, hot tubs and other vessels intended to accommodate persons, see Luminaires and Forming Shells (WBDT).

This category also covers submersible junction boxes intended for use with submersible luminaires and other submersible fountain equipment.

Luminaires investigated for operation only while submersed in water are marked “Submerge Before Lighting,” or with equivalent wording, and such marking is visible after installation of the luminaire.

Submersible luminaires have been investigated for both outdoor and indoor use.

**Dry-niche Submersible Luminaire** — These luminaires are intended for permanent installation only in the wall of a fountain unless accompanying installation instructions describe the additional option of installation in the bottom of the fountain. These luminaires are designed for servicing from the rear in a passageway behind the fountain wall or, if mounted in the bottom of the fountain, in a fountain niche. In the case of either access, the luminaires may consist of two separable parts. One part includes a factory-installed length of flexible cord terminating in an attachment plug, and the second part includes a receptacle for the attachment plug and a splice compartment in which the branch circuit conductors are connected.

**Wet-niche Submersible Luminaire** — These luminaires are intended to be installed only in the wall of a fountain unless accompanying installation instructions describe the additional option of installation in the bottom of the fountain. These luminaires are intended for installation in a permanently installed luminaire housing (forming shell) in which the luminaire will be completely surrounded by water. These luminaires are marked to indicate the properties with which they are designed to be used, and the luminaire housings are marked to indicate the luminaires with which the housings are to be used. These luminaires are provided with a factory-installed, permanently attached flexible cord with an exposed length of not less than 12 ft. The flexible cord is confined in the luminaire housing by the luminaire and permits the luminaire to be removed from the luminaire housing and to be lifted to the fountain deck for servicing without lowering the water level or disconnecting the luminaire from the branch circuit conductors. Luminaires with longer cords are available for installation where the junction box or splice enclosure is so located that a 12 ft long cord will not permit luminaire removal from the luminaire housing and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored in the luminaire housing.

**Forming Shell (Housing) for Wet-niche Submersible Luminaries** — These are structures designed to support a mating wet-niche luminaire, for mounting in a fountain structure. Forming shells are designed to receive the supply end of the conduit connected to the forming shell to be directly connected to a Listed swimming pool junction box (see WCEZ). This forming shell-connected conduit may alternatively be connected directly to other equipment (such as Swimming Pool and Spa Transformers (WDGV), Ground-fault Circuit Interrupters (KCXS), Panelboards (QEUY), or pool or spa control equipment) only when such other equipment has been investigated for this use, as indicated by the marking “Suitable for direct conduit connection to a wet-niche or no-niche luminaire,” or the equivalent.

**No-niche Submersible Luminaire** — These luminaires are intended to be installed only on the walls of a fountain unless accompanying installation instructions describe the additional option of installation on the bottom of the fountain. These luminaires are mounted to a bracket permanently secured in or on the wall or bottom of the luminaire completely surrounded by water. These luminaires are provided with a factory-installed, permanently attached flexible cord with an exposed length of not less than 12 ft that is confined by the luminaire and fountain wall or bottom. The flexible cord passes through the mounting bracket and is to be lifted to the fountain deck for servicing without lowering the water level or disconnecting the luminaire from the branch circuit conductors. Luminaires with longer cords are available for installations where the junction box or splice enclosure is so located that a 12 ft long cord will not permit luminaire removal from the mounting bracket and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored between the luminaire and fountain wall.

**Mounting Brackets for No-niche Submersible Luminaires** — These structures are designed to support a mating no-niche luminaire, for mounting...
in or on a fountain structure. Mounting brackets are designed to require the supply end of the conduit connected to the mounting bracket to be directly connected to a Listed swimming pool junction box (see WCEZ). The information provided above about alternate supply-end termination of conduit connected forming shells also applies to supply-end termina-

tion of conduit connected to the mounting brackets of no-niche luminaires.

Special Use Submersible Luminaire — These luminaires are intended to rest directly on the fountain floor or may be otherwise located in the fountain. The luminaires are provided with a permanently attached exposed flexible cord intended to be routed into a submersible junction box, or the luminaires have other means for permanent connection to the supply circuit.

ADDITIONAL INFORMATION
For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AÅLZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 676, “Luminaires and Submersible Junction Boxes.”

UL MARK
The Listing Mark of Underwriters Laboratories Incorporated on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following: a product name and/or description, e.g., “Suitable for Use in Poured Concrete,” or “For use in….” The complete four-element Listing Mark will appear on the smallest unit container in which the product is packaged when the product is of such a size that only the UL logo can be applied to the product.

LUMINAIRE FITTINGS (IFFX)

GENERAL
This category covers luminaire fittings that are complete parts and/or subassemblies of luminaires, assembled into luminaires in the field. Completely assembled luminaires incorporating luminaire fittings may be submittted to Underwriters Laboratories Incorporated as part of the Factory Inspection and Follow-Up Service Program for Fluorescent, Incandescent and High Intensity Discharge Luminaires and, if found suitable, Listed as luminaires to smoothness and thickness of wireways, methods for connection to a recognized wiring system, suitability of splice enclosure and means for inspecting splices are typical considerations given to the completed luminaire which cannot be judged until the fittings are assembled into a complete luminaire.

A complete luminaire assembled from Listed luminaire fittings will bear the luminaire Listing Mark appropriate to the luminaire category if produced under UL’s Factory Inspection and Follow-Up Service Program. The determination of the acceptability of an assembly not so labeled rests with the local Authority Having Jurisdiction.

PRODUCT MARKINGS
All fittings are marked indicating the location where they can be used:
A fitting marked “DRY LOCATIONS ONLY” is intended to be installed in indoor dry locations.

A fitting marked “SUITABLE FOR DAMP LOCATIONS” is intended to be installed in a damp or dry location.
A fitting marked “SUITABLE FOR WET LOCATIONS” is intended to be installed in a wet, damp or dry location.

The locations are defined in Electrical Equipment for Use in Ordinary Locations (AALZ) and in ANSI/NFPA 70, “National Electrical Code.”

RELATED PRODUCTS
Certain devices in the categories of Sign Accessaries (UWMR), Surface Metal Raceways (RJBT), Surface Nonmetallic Raceways (RJTX), Surface Metal Raceway Fittings (RJPR) and Surface Nonmetallic Raceway Fittings (RJYT) are also suitable for use with luminaire fittings.

ADDITIONAL INFORMATION
For additional information, see Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AÅLZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 1598, “Luminaires,” and standards applicable to the device(s) constituting the fitting.

UL MARK
The Listing Mark of Underwriters Laboratories Incorporated on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Track Lighting Fitting.” The complete four-element Listing Mark will appear on the smallest unit container in which the product is packaged when the product is of such a size that only the UL logo can be applied to the product.

Track Fittings for Track Lighting (IFGT)

USE
This category covers fixture fittings that are parts and/or subassemblies intended for field installation in specific track lighting systems, identified by catalog number and company name. They include track lighting fixture units intended for installation in specific existing field-installed tracks of another manufacturer in accordance with the fixture unit manufacturer’s instructions. These fittings have been investigated to determine that, when installed and used in accordance with the manufacturer’s instructions, they do not adversely affect the operation of the complete track lighting system.

For additional information, see Luminaires Fittings (IFFX), Luminaires and Fittings (HYXT) and Electrical Equipment for Use in Ordinary Locations (AÅLZ).
FLAT CONDUCTOR CABLE, TYPE FCC (IKKT)

GENERAL

This category covers flat conductor cable, Type FCC, which is an assembly of three or more solid, flat, parallel, insulated copper conductors. The cable is intended for installation in accordance with Article 324 of ANSI/NFPA 70, "National Electrical Code." The cable is marked for use with specific fittings [see Flat Conductor Cable Fittings (IKMW)] to make up a particular flat conductor cable, Type FCC, wiring system.

The cable is marked on both sides with the manufacturer's identification, wire size in AWG, Type FCC, 300 V, temperature rating and ampacity. Type FCC cable always has one conductor identified as the grounding conductor and one conductor identified as the grounded conductor. The classification marking on the trim identifies the grounding conductor.

Installation instructions are supplied by the manufacturer for use by the general contractor, electrical contractor, electrical inspector and others concerned with the installation.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), "CLASSIFIED" above the UL symbol (as illustrated in the Introduction of this Directory), "RECESSED LUMINAIRE TRIM FOR USE WITH FLAT CONDUCTOR CABLE, TYPE FCC," and a control number.

ADDITIONAL PRODUCTS

See Fittings, Flexible Metallic Tubing (ILNR) with respect to fittings suitable as a grounding means.

FLEXIBLE METALLIC TUBING ASSEMBLIES (ILLT)

Flexible metallic tubing assemblies consist of a length of flexible metallic tubing terminated at each end with a permanently attached connector. They include trade sizes 3/8, 1/2 and 3/4 in. for installation in accordance with Article 349 of the National Electrical Code.

Flexible metallic tubing assemblies, in the 3/4 in. and smaller trade sizes and not more than 6 ft in length and when the circuits therein are protected by overcurrent devices rated 20 A or less are considered suitable as a grounding means.

Flexible metallic tubing assemblies installed in partitions and not subjected to physical damage except where expressly approved by the consumer's authority having jurisdiction.

The basic standards used to investigate products in this category are UL 360, Liquidtight Flexible Steel Conduit, Electrical and UL 514, Outlet Boxes and Fittings, Electrical.
Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Flexible Metallic Tubing Assembly.”

**FITTINGS, FLEXIBLE METALLIC TUBING (ILNR)**

**GENERAL**

This category covers flexible metallic tubing fittings in trade sizes 3/8", 1/2 and 3/4" (metric designators 12, 16 and 21).

**Grounding** — These fittings are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with ANSI/NFPA 70, “National Electrical Code.” The conduit used with the connectors must contain conductors protected by overcurrent devices rated 20 A or less.

**PRODUCT MARKINGS**

Fittings have been tested for use only with steel tubing unless marked on the device or carton to indicate suitability for use with aluminum or other material.

**ADDITIONAL INFORMATION**

For additional information, see Flexible Metallic Tubing (ILJW) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 514B, “Conduit, Tubing, and Cable Fittings.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Flexible Metallic Tubing Fitting,” “Connector,” “Coupling,” or other appropriate product name as shown in the individual Listings.

### FLEXIBLE STAGE AND LIGHTING POWER CABLE (ILPH)

**USE AND INSTALLATION**

This category covers flexible stage and lighting power cable constructed for use in accordance with Article 400 of ANSI/NFPA 70, “National Electrical Code” (NEC). Flexible stage and lighting cable consists of either a single insulated conductor or two or more insulated conductors, with or without fully insulated equipment grounding conductors, with an overall jacket.

**RATINGS**

The cable is rated 600 V, 60°C, 75°C, 90°C or 105°C. The cable is intended for use at amperages in accordance with Table 400(B) of the NEC. Cable rated 105°C has the same amperages assigned to 90°C rated cable in Table 400(B) and is so marked.

Flexible stage and lighting power cable employs flexible stranded copper conductors in a size range of 8 AWG to 250 kcmil and is designated as Type SC (thermost insulation and jacket), Type SCT (thermost insulation and jacket) and Type SCE (thermost elastomer insulation and jacket).

**PRODUCT MARKINGS**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in Subject 1680, “Outline of Investigation for Stage and Lighting Cables.”

**UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit containing in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Flexible Stage and Lighting Power Cable.”

### FUEL CELL EQUIPMENT (IRGN)

**USE AND INSTALLATION**

This category covers fuel cell type power systems with input/output rated 600 V or less and intended for installation in accordance with ANSI/NFPA 70, “National Electrical Code.” These products are marked for indoor or outdoor use. Authorities Having Jurisdiction should be consulted regarding the use of this equipment before installation.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**HAND-HELD OR HAND-TRANSPORTABLE FUEL CELL POWER UNITS AND DISPOSABLE FUEL CARTRIDGES (IRGU)**

**USE AND INSTALLATION**

This category covers hand-held or hand-transportable devices intended to provide a dc electrical power source not exceeding 60 V ac and 240 VA, and accessory removable fuel cartridges. These devices are intended for use in indoor locations only.

Removable fuel cartridges transporting hazardous fuels for use with these products are intended to comply with the requirements of the U.S. Department of Transportation (DOT) in accordance with CFR49, “Research and Special Programs Administration.”

**PRODUCT MARKINGS**

Fuel cell power systems are marked with the manufacturer’s name, model designation and fuel type. These products are also marked with the following (or equivalent wording): “WARNING: This Product Contains Methanol, Which is an Eye, Skin, and Respiratory Tract Irritant. Methanol May Cause Blindness or Death if Swallowed. If Methanol is Exposed, Contain and Dispose of Methanol. Use in Well-Ventilated Areas. Read and Understand Use Before Use. Keep Out of Reach of Children.”

Fuel cell power systems found to provide limited power output in accordance with Subject 2265A are additionally marked “Limited Power Supply” (or “LPS”).

Removable fuel cartridges are marked with the manufacturer’s name, model number, type of fuel and the statement “For Use with ____ Model Fuel Cell Power System” (or equivalent).

Removable fuel cartridges are also marked with the following (or equivalent wording): “WARNING: This Product Contains Methanol, Which is an Eye, Skin, and Respiratory Tract Irritant. Methanol May Cause Blindness or Death if Swallowed. If Methanol is Exposed, Contain and Dispose of Methanol. Keep Out of Reach of Children. Never Expose to Heat Above 140°F (60°C) or to Prolonged Sunlight. Never Puncture or Put in Fire. Do Not Crush, Disassemble or Mutilate. Read and Understand All Instructions Before Use.”

Fuel cartridges for hand-held or hand-transportable fuel are marked with appropriate identifying information for products containing methanol, as outlined in 49CFR180, “Rulemaking Procedures.”

**RELATED PRODUCTS**

Component fuel cell modules intended for use in a portable application, but not intended for use with hand-held or hand-transportable equipment are covered under Fuel Cell Equipment (IRGN).

**ADDITIONAL INFORMATION**

For additional information, see Fuel Cell Equipment (IRGN) and Electrical Equipment for Use in Ordinary Locations (AALZ).

The basic requirements used to investigate products in this category are contained in Subject 2265A, “Outline of Investigation for Hand- Held or Hand-Transportable Fuel Cell Power Units with Disposable Methanol Fuel Cartridges for Use in Original Equipment Manufacturer’s Information Technology Equipment.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Direct Methanol Fuel Cell Power Unit” (or “DM Fuel Cell Power Unit”) or “Methanol Fuel Cell,” or other appropriate product name as shown in the individual Listings.

**STATIONARY FUEL CELL POWER SYSTEMS (IRGX)**

**USE AND INSTALLATION**

This category covers products intended for use in accordance with ANSI/NFPA 70, “National Electrical Code.” These products have an input/output rating of 600 V or less, and are for use as marked with the appropriate fuel. These products are intended for permanent connection to the source of supply and for installation in accordance with the manufacturer’s installation instructions. Products rated more than 50 kW are intended for installation in accordance with Chapters 1 – 8, and products
FUSED POWER CIRCUIT DEVICES

This category covers fuel gas booster compressor equipment designed to increase the pipe line pressure of a fuel gas, such as natural gas, from a low fuel gas pressure (nominally 1/4 to 5 psig) to a higher outlet pressure (such as 30 to 115 psig). This higher-pressure fuel gas is then supplied to an external product, such as a microturbine. The equipment is intended for either indoor or outdoor use.

The equipment consists of a motor compressor or an open type compressor, internal gas piping, wiring and a combination of associated electrical and mechanical assemblies and controls on a common frame in an overall enclosure.

Equipment containing a motor compressor connected to a flammable fuel gas piping system has been investigated to determine that flame will not propagate beyond the fuel gas connection. It does not include a spring charged mechanism.

Some Fused Power Circuit Devices are described as being without enclosures (open type) the Listing Mark is applied to the switching unit.

On Fused Power Circuit Devices with integral enclosures the Listing Mark is applied to the enclosures. These devices have been investigated for use at 100 per cent of their amp rating and are intended for use on circuits having available fault currents of 100,000, 150,000 or 200,000 rms symmetrical amps or 20,000, 50,000 or 100,000 amps DC as indicated on the device.

Fused Power Circuit Devices may be either bolted pressure contact switches or high pressure butt type contact switches. Bolted pressure contact switches have blade jaw type construction where all blade joints and subjected to high clamping pressure when the switch is closed by means of bolted or similar mechanical action.

High-pressure butt type contact switches have butt type contacts and a spring charged mechanism.

Some Fused Power Circuit Devices are described as being without enclosures (open type). This means that such devices are for use only as parts of listed equipment.

Fused Power Circuit Devices which are suitable for use as service switches are marked “Suitable For Use As Service Equipment.”

Some fused power circuit devices incorporate neutrals factory bonded to the frame or enclosure. Such units are marked “Suitable Only For Use As Service Equipment.”

Fused power circuit devices marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system, or for a second building.

Some Fused Power Circuit Devices may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected will be identified by a marking such as on a wiring diagram.

Fused Power Circuit Devices which have been found suitable for ground fault protection are marked “Suitable For Ground Fault Protection When Combined With Class...” (or Manufacturer and Cat. No.) Ground Fault Sensing Element” or the equivalent.

Devices for use with Class I ground fault sensing and relaying equipment include those which are capable of interrupting 12 times their rated current or which have integral means to prevent disconnecting at levels of fault current exceeding their contact interrupting capability.

Devices for use with Class II ground fault sensing and relaying equipment are capable of interrupting 10 times their rated current and are for use in ground fault protection systems where means to prevent disconnecting at levels of fault current exceeding their contact interrupting capability are incorporated within the ground fault sensing and relaying equipment.

Fused Power Circuit Devices as listed herein and for use with copper conductors unless the device is marked to indicate that terminals are also suitable for aluminum conductors.

The basic standard used to investigate products in this category is UL 977, “Fused Power-Circuit Devices.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Fuel Gas Booster” or “Fuel Gas Booster Compressor,” as appropriate.

2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

FUSEHOLDERS (IYXV)

FUSEHOLDERS, CARTRIDGE FUSE (IZLT)

GENERAL

This category covers fuseholders intended for use with Class CC, G, H, J, K, R and T cartridge fuses.

A Class CTL (current-limiting) cartridge fuseholder has the physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, is designed to prevent the installation of more fuseholder poles than the number for which the assembly is designed and rated.

An interrupting rating on a fuseholder included in a piece of equipment does not automatically qualify the equipment in which the fuseholder is installed for use on circuits with higher available currents than the rating of the equipment itself.

PRODUCT MARKINGS

Fuseholders are plainly and legibly marked to indicate:
1. The manufacturer’s name, trademark, or other descriptive marking by which the organization responsible for the product may be identified
2. The current and voltage ratings
3. The withstand rating in rms symmetrical amperes
4. The catalog number (or equivalent)
Fuseholders intended for Class G, J, R, T or CC fuses are marked “Use Class ___ fuses.”

Fuseholders with wiring terminals intended for use with copper and aluminum conductors are marked “USE COPPER OR ALUMINUM WIRE” or with the abbreviations “CU” and “AL.”

Fuseholders with terminals intended for copper wire only are marked “USE COPPER WIRE ONLY” (or “CU ONLY”). If the terminals are intended for aluminum wire only, the fuseholder is marked “USE ALUMINUM WIRE ONLY” (or “AL ONLY”).

Fuseholders rated 100 A having terminals intended to secure a maximum 1 AWG (42.4 mm²) conductor, if marked as being acceptable for aluminum wire, are also marked “FOR ALUMINUM USE NO. 1, 75C WIRE ONLY.”

Fuseholders are marked in a readily visible location to indicate the required temperature rating of all field-installed conductors.

Fuseholders are marked to indicate the specific tightening torque in pound-inches or pound-feet for each wire connector in the fuseholder that is intended for field wiring. If different connectors are used for line or load, the specific torques to be applied to each connector are clearly indicated. The torque marking may be provided in a written format or pictorially.

Class CTL cartridge fuseholders may be identified by the words “Class CTL” or “CTL” on the fuseholder as part of the marking.

RELATE PRODUCTS
For information regarding the use of fuses with interrupting ratings in equipment, see Cartridge Fuses, Nonrenewable (JDDZ).

For combinations of cartridge fuseholders and snap switches, see Snap Switches and Fuseholders, Combination (WKDZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 512, “Fuseholders.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuseholder” or “Cartridge Fuseholder.”

FUSEHOLDERS, SPECIAL PURPOSE (IZND)
USE AND INSTALLATION
This category covers fuseholders intended for use with Listed special purpose fuses. These fuseholders are designed for special purpose applications. They incorporate dimensional or other rejection features to prevent the installation of other Listed classes of renewable and nonrenewable cartridge fuses.

PRODUCT MARKINGS
Special purpose fuseholders are marked with their voltage and current rating. When the fuseholders are investigated for use in circuits capable of delivering in excess of 10,000 rms symmetrical amps, fuseholders are marked with their withstand rating. When not so marked, the withstand rating is 10,000 A. A fuseholder marked for use in circuits capable of delivering in excess of 10,000 rms symmetrical amps does not qualify the equipment in which it is installed for use in circuits with higher available currents than may be indicated by the equipment markings.

Fuseholders in this category are designed for use with specific fuses, and are marked with the manufacturer and catalog number of the fuse it is intended to accommodate.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 512, “Fuseholders.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Special Purpose Fuseholder.”

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

FITTER FOR Fuseholders (IZZR)
GENERAL
This category covers fuse reducers designed for use in cartridge fuse fuseholders to permit the insertion of fuses of smaller rating. Type S fuse adapters designed for use in Edison-base fuseholders to permit the insertion of Type S fuses, and special adapters designed to permit the use of miscellaneous plug fuses in Edison-base fuseholders to provide supplementary overcurrent protection.

Fuse reducers are primarily intended for use with open fuseholders. The use of fuse reducers in enclosed switches, panelboards, or other enclosures may introduce a hazard due to reduced spacings. Consideration should be given to spacings when fuseholders are used within enclosures.

PRODUCT MARKINGS
Fittings for fuseholders are plainly and legibly marked to indicate:
1. The manufacturer’s name, trademark, or other descriptive marking by which the organization responsible for the product may be identified
2. The current and voltage ratings
3. The catalog number (or equivalent)

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 512, “Fuseholders.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuseholder Fitting,” “Fuse Reducer” or “Fuse Adapter,” or other appropriate product name as shown in the individual Listings.

FUSEHOLDERS, PLUG FUSE (JAMZ)
GENERAL
This category covers fuseholders for Edison base and Type S fuses. Some of these fuseholders are intended for use in panelboards and may include separately Listed snap switches.

Fuseholders may be provided on a cover plate for mounting to outlet boxes. These fuseholders are provided with grounding means so that the plate can be grounded when installed on nonmetallic outlet boxes.

Class CTL plug fuseholders may be identified by the words “Class CTL” or “CTL” on the fuseholder as part of the marking.

Class CTL plug fuseholders have physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, are designed to prevent the installation of more fuseholder poles than the number for which the assembly is designed and rated.

RELATED PRODUCTS
Fuseholders that are an integral part of a snap switch are covered under Snap Switches (WJQR).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 512, “Fuseholders.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuseholder” or “Plug Fuse holder” or other appropriate product name as shown in the individual Listings.

FUSES (JCQR)
CARTRIDGE FUSES, NONRENEWABLE (JDDZ)
GENERAL
This category covers nonrenewable cartridge-enclosed fuses, rated as follows:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 V</td>
<td>0 – 600 A</td>
</tr>
<tr>
<td>300 V</td>
<td>0 – 1200 A</td>
</tr>
<tr>
<td>600 V</td>
<td>0 – 6000 A</td>
</tr>
</tbody>
</table>
The fuse classes are further categorized as follows:

<table>
<thead>
<tr>
<th>Class</th>
<th>In (A)</th>
<th>V</th>
<th>DC Rating</th>
<th>Interrupting Rating</th>
<th>Duty</th>
<th>Time Delay</th>
<th>Current-lim</th>
<th>Body Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>0–30</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, 50, 100, 150 or 200</td>
<td>200</td>
<td>No</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>CB</td>
<td>0–60</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, 50, 100, 150 or 200</td>
<td>200</td>
<td>No</td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>CC</td>
<td>0–30</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, 50, 100, 150 or 200</td>
<td>200</td>
<td>Optional</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>CD</td>
<td>0–60</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, 50, 100, 150 or 200</td>
<td>200</td>
<td>Optional</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>G</td>
<td>0–20</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, or 100</td>
<td>200</td>
<td>Optional</td>
<td>Yes</td>
<td>4</td>
</tr>
<tr>
<td>H</td>
<td>0–600</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, 50, 100, 150 or 200</td>
<td>200</td>
<td>Optional</td>
<td>No</td>
<td>6</td>
</tr>
<tr>
<td>J</td>
<td>0–600</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, 50, 100, 150 or 200</td>
<td>200</td>
<td>Optional</td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>K</td>
<td>0–600</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, 50, 100, 150 or 200</td>
<td>200</td>
<td>Optional</td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>L</td>
<td>0–600</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, 50, 100, 150 or 200</td>
<td>200</td>
<td>Optional</td>
<td>Yes</td>
<td>9</td>
</tr>
<tr>
<td>R</td>
<td>0–600</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, 50, 100, 150 or 200</td>
<td>200</td>
<td>Optional</td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>T</td>
<td>0–1200</td>
<td>600</td>
<td>Optional</td>
<td>10, 20, 50, 50, 100, 150 or 200</td>
<td>200</td>
<td>Optional</td>
<td>Yes</td>
<td>8</td>
</tr>
</tbody>
</table>

These fuses are intended for use on ac circuits only, unless also marked with a dc voltage rating. These fuses are suitable for branch circuit, feeder and service overcurrent protection in accordance with ANSI/NFPA 70, “National Electrical Code.”

The term “current-limiting” indicates that a fuse, when tested on a circuit capable of delivering a specific short-circuit current (rms amps symmetrical) at rated voltage, will start to melt within 90 electrical degrees and will clear the circuit within 180 electrical degrees (1/2 cycle).

Because the time required for a fuse to melt is dependent on the available current of the circuit, a fuse that may be current-limiting when subjected to a specific short-circuit current (rms amps symmetrical) may not be current-limiting on a circuit of lower maximum available current. Class K fuses incorporate dimensional features equivalent to, and are thus interchangeable with, Class H fuses.

Class R fuses incorporate features that permit their insertion into Class H and K fuseholders. They are also provided with a feature that allows their insertion into rejection-type fuseholders designed to accept only Class RK1 or RK5 fuses.

All classes covered under this category (with the exception of Class H) are further classified as to their maximum peak let-through current (I_P) and maximum clearing ampere-squared seconds (I^2t) as follows. These tables indicate the maximum permissible let-through values obtained when the fuse is connected to a circuit capable of providing the indicated available current.

**Maximum Peak Let-through Current (I_P amperes) and Clearing I^2t (ampere-squared seconds)**

### Class CA Fuses

<table>
<thead>
<tr>
<th>Rating (A)</th>
<th>I_P x 10^3 (A)</th>
<th>I^2t x 10^3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–30</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>31–60</td>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>

### Class CB Fuses

<table>
<thead>
<tr>
<th>Rating (A)</th>
<th>I_P x 10^3 (A)</th>
<th>I^2t x 10^3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–30</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>31–60</td>
<td>15</td>
<td>60</td>
</tr>
</tbody>
</table>

### Class CC Fuses

<table>
<thead>
<tr>
<th>Rating (A)</th>
<th>I_P x 10^3 (A)</th>
<th>I^2t x 10^3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–30</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>31–60</td>
<td>15</td>
<td>60</td>
</tr>
</tbody>
</table>

### Class CD Fuses

<table>
<thead>
<tr>
<th>Rating (A)</th>
<th>I_P x 10^3 (A)</th>
<th>I^2t x 10^3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–30</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>31–60</td>
<td>15</td>
<td>60</td>
</tr>
</tbody>
</table>

### Class G Fuses

<table>
<thead>
<tr>
<th>Rating (A)</th>
<th>I_P x 10^3 (A)</th>
<th>I^2t x 10^3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–30</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>31–60</td>
<td>15</td>
<td>60</td>
</tr>
</tbody>
</table>

### Class J Fuses

<table>
<thead>
<tr>
<th>Rating (A)</th>
<th>I_P x 10^3 (A)</th>
<th>I^2t x 10^3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–30</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>31–60</td>
<td>15</td>
<td>60</td>
</tr>
</tbody>
</table>

### Class K Fuses

- Maximum permissible values when connected to circuits supplying 50 or 100 kA available current.
### 2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

#### Class K Fuses — Maximum permissible values when connected to circuits supplying 200 kA available current

<table>
<thead>
<tr>
<th>Class</th>
<th>Rating (A)</th>
<th>$I_p \times 10^5$ (A)</th>
<th>$I_t \times 10^6$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>K-1</strong></td>
<td>0 – 30</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>31 – 60</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>61 – 100</td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>101 – 200</td>
<td>22</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>201 – 400</td>
<td>35</td>
<td>1,200</td>
</tr>
<tr>
<td></td>
<td>401 – 600</td>
<td>50</td>
<td>3,000</td>
</tr>
<tr>
<td><strong>K-5</strong></td>
<td>0 – 30</td>
<td>11</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>31 – 60</td>
<td>21</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>61 – 100</td>
<td>25</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>101 – 200</td>
<td>40</td>
<td>1,600</td>
</tr>
<tr>
<td></td>
<td>201 – 400</td>
<td>60</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td>401 – 600</td>
<td>80</td>
<td>10,000</td>
</tr>
<tr>
<td><strong>K-9</strong></td>
<td>0 – 30</td>
<td>14</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>31 – 60</td>
<td>28</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>61 – 100</td>
<td>35</td>
<td>650</td>
</tr>
<tr>
<td></td>
<td>101 – 200</td>
<td>60</td>
<td>3,500</td>
</tr>
<tr>
<td></td>
<td>201 – 400</td>
<td>80</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>401 – 600</td>
<td>130</td>
<td>40,000</td>
</tr>
</tbody>
</table>

#### Class I Fuses

**Rating (A)**

<table>
<thead>
<tr>
<th>Class</th>
<th>Rating (A)</th>
<th>$I_p \times 10^5$ (A)</th>
<th>$I_t \times 10^6$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>K-1</strong></td>
<td>0 – 30</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>31 – 60</td>
<td>16</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>61 – 100</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>101 – 200</td>
<td>30</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>201 – 400</td>
<td>50</td>
<td>1,600</td>
</tr>
<tr>
<td></td>
<td>401 – 600</td>
<td>70</td>
<td>4,000</td>
</tr>
<tr>
<td><strong>K-5</strong></td>
<td>0 – 30</td>
<td>14</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>31 – 60</td>
<td>26</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>61 – 100</td>
<td>32</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>101 – 200</td>
<td>50</td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td>201 – 400</td>
<td>75</td>
<td>6,000</td>
</tr>
<tr>
<td></td>
<td>401 – 600</td>
<td>100</td>
<td>12,000</td>
</tr>
<tr>
<td><strong>K-9</strong></td>
<td>0 – 30</td>
<td>14</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>31 – 60</td>
<td>28</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>61 – 100</td>
<td>35</td>
<td>650</td>
</tr>
<tr>
<td></td>
<td>101 – 200</td>
<td>60</td>
<td>3,500</td>
</tr>
<tr>
<td></td>
<td>201 – 400</td>
<td>80</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>401 – 600</td>
<td>130</td>
<td>40,000</td>
</tr>
</tbody>
</table>

#### Class RK1 Fuses

**Rating (A)**

<table>
<thead>
<tr>
<th>Class</th>
<th>Rating (A)</th>
<th>$I_p \times 10^5$ (A)</th>
<th>$I_t \times 10^6$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>50 kA or</strong></td>
<td><strong>Threshold Current</strong></td>
<td><strong>Whichsoever Is Greater</strong></td>
<td>601 – 1200</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>125</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td><strong>Threshold Current</strong></td>
<td><strong>601 – 1200</strong></td>
<td><strong>100 kA</strong></td>
<td><strong>200 kA</strong></td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>125</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

#### Class RK5 Fuses

**Rating (A)**

<table>
<thead>
<tr>
<th>Class</th>
<th>Rating (A)</th>
<th>$I_p \times 10^5$ (A)</th>
<th>$I_t \times 10^6$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>50 kA or</strong></td>
<td><strong>Threshold Current</strong></td>
<td><strong>Whichsoever Is Greater</strong></td>
<td>0 – 30</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td><strong>Threshold Current</strong></td>
<td><strong>0 – 30</strong></td>
<td><strong>100 kA</strong></td>
<td><strong>200 kA</strong></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

### 2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

#### Class T Fuses – 300 V

<table>
<thead>
<tr>
<th>Rating (A)</th>
<th>Between Threshold &amp; 100 kA</th>
<th>100 kA</th>
<th>200 kA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6 – 10</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>11 – 15</td>
<td>15</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>16 – 20</td>
<td>20</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>21 – 25</td>
<td>25</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>26 – 30</td>
<td>30</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>31 – 35</td>
<td>35</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>36 – 40</td>
<td>40</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

#### Class T Fuses – 600 V

<table>
<thead>
<tr>
<th>Rating (A)</th>
<th>Between Threshold &amp; 50 kA</th>
<th>50 kA</th>
<th>100 kA</th>
<th>200 kA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6 – 10</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>11 – 15</td>
<td>15</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>16 – 20</td>
<td>20</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>21 – 25</td>
<td>25</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>26 – 30</td>
<td>30</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>31 – 35</td>
<td>35</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>36 – 40</td>
<td>40</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

### PRODUCT MARKINGS

All devices covered under this category are marked with:

1. The manufacturer’s name or trademark (or both)
2. The current rating
3. The voltage rating
4. The interrupting rating in rms symmetrical and/or dc amperes
5. The device class or classification
When a fuse has a dc rating, it is marked with the dc voltage and interrupting rating. Class K and R fuses investigated for use in protecting trailing cables for dc circuits in mines are marked “Mine Duty” and have an interrupting rating of 20,000 A, dc. Equipment (a switch, motor starter, panelboard, etc.) investigated for use with these fuses is marked with the class of fuse intended to be used in the equipment, and available current rating applicable to that piece of equipment. The equipment with these fuses installed, is suitable for use on circuits having a maximum available fault current up to the short-circuit rating of the equipment, or the interrupting rating of the fuse, whichever is lower.

An interrupting rating on a fuse included in a piece of equipment does not automatically qualify the equipment in which the fuses are installed for use on circuits with higher available currents than the rating of the equipment itself.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AA2L).

REQUIREMENTS
The basic standards used to investigate products in this category are:

- ANSI/UL 198M, “Mine-Duty Fuses”
- ANSI/UL 248-6, “Low-Voltage Fuses – Part 6: Class H Nonrenewable Fuses”
- ANSI/UL 248-8, “Low-Voltage Fuses – Part 8: Class J Fuses”
- ANSI/UL 248-12, “Low-Voltage Fuses – Part 12: Class R Fuses”

UL Subject 2126, “Outline of Investigation for Low-Voltage Fuses – Class CD Fuses” (dated June 25, 1997)

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuse.”

CARTRIDGE FUSES, RENEWABLE (JDRX)

GENERAL
This category covers renewable, cartridge-enclosed fuses, rated as follows:

<table>
<thead>
<tr>
<th>Class</th>
<th>In (A)</th>
<th>V</th>
<th>DC Rating</th>
<th>Interrupting Rating</th>
<th>Time Delay Limiting</th>
<th>Current Rating</th>
<th>Body Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-400</td>
<td>250</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>600</td>
<td>10</td>
<td>AC</td>
<td>AC</td>
<td>No</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

These fuses are intended for use on ac circuits only unless also marked with a dc voltage rating. These fuses are suitable for branch circuit, feeder and service overcurrent protection in accordance with ANSI/NFPA 70, “National Electrical Code.”

Renewable fuses of a given voltage rating or current rating range are not interchangeable in the same fuseholder with fuses of a different voltage rating or current rating range.

Each line of renewable links has been investigated only with the same line of fuses from the same manufacturer.

PRODUCT MARKINGS

All devices covered under this category are marked with:
1. The manufacturer’s name or trademark (or both)
2. The current rating
3. The voltage rating
4. The interrupting rating in rms symmetrical and/or dc amperes
5. The device class or classification
6. The word “Renewable”

In addition, each renewal element covered under this category is marked with:
1. The manufacturer’s name or trademark (or both)
2. The current rating
3. The voltage rating
4. The interrupting rating

The device classes are:
- Class CA, CB
- Class CC
- Class G, K
- Class H
- Class J
- Class L
- Class R
- Class T

3. The voltage rating
When a fuse has a dc rating, it is marked with the dc voltage and interrupting rating.

These fuses may be marked with the designation “Time Delay,” indicating that the fuse will be investigated in accordance with the time-delay requirements of the Standard.

Equipment (a switch, motor starter, panelboard, etc.) that has been investigated for use with these fuses is marked with the class of fuse intended to be used in the equipment, and available current rating applicable to that piece of equipment. The equipment with these fuses installed, is suitable for use on circuits having a maximum available fault current up to the interrupting rating of the equipment, or the interrupting rating of the fuse, whichever is lower.

An interrupting rating on a fuse included in a piece of equipment does not automatically qualify the equipment in which the fuses are installed for use on circuits with higher available currents than the rating of the equipment itself.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AA2L).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 248-1, “Low-Voltage Fuses – Part 1: General Requirements,” and UL 248-7, “Low-Voltage Fuses – Part 7: Class H Renewable Fuses.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuse” or “Fuse Renewal.”

The Listing Mark for fuses is marked on the product; the Listing Mark for fuse renewals is marked on each carton containing fuse renewals, with or without the UL symbol on the renewal.

FUSE ACCESSORIES (JDVS)

GENERAL
This category covers nonrenewable signal-indicating/alarm-actuating devices and fuse covers that are suitable for use with specific Listed fuses. The combination is used for branch circuit, feeder and service overcurrent protection in accordance with ANSI/NFPA 70, “National Electrical Code.”

These devices have a maximum rating of 600 V ac. They are intended to be used with fuses with an interrupting rating of 10 kA rms or less unless specifically investigated for a higher rating.

Accessories are not intended to be used as branch circuit and service overcurrent protection or supplementary overcurrent protection.

Signal-indicating/Alarm-actuating Devices

These devices are intended to provide actuation of remote Listed or Recognized signaling devices, or to provide a visual indication that a fuse has opened. Their operation is concurrent with that of the fuse, and after operation there is essentially no electrical continuity between the line and load sides of the fuse accessory.

Fuse Covers

These devices are intended to be used with Listed branch circuit fuses. They may be nonindicating, or may be provided with an electrical or electromechanical indicator that operates when a fuse has opened. Fuse covers are intended to provide additional protection against incidental contact with live parts of the fuseholder assembly. The covers are not intended to be used in lieu of spacings in the equipment in which they are used.

PRODUCT MARKINGS

Products covered under this category are marked either on the device or on the smallest unit carton with the class of fuse, fuse amperage rating, and the voltage rating of the fuse with which they are intended to be used.

Fuse covers may be designed so that they snap-fit onto the fuse body when the fuse is already installed, or they may be designed such that the fuse is installed in the cover before being inserted into the fuseholder. When the fuse cover is of the latter design, it is not intended to be used to remove a fuse under load, and it is marked “DO NOT OPERATE UNDER LOAD” or the equivalent.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AA2L).

REQUIREMENTS
The basic standards used to investigate products in this category are:

- UL 248-2, “Low-Voltage Fuses – Part 2: Class C Fuses”
- UL 248-3, “Low-Voltage Fuses – Part 3: Class CA and CB Fuses”
- UL 248-4, “Low-Voltage Fuses – Part 4: Class CC Fuses”
- UL 248-5, “Low-Voltage Fuses – Part 5: Class G Fuses”
- UL 248-6, “Low-Voltage Fuses – Part 6: Class H Nonrenewable Fuses”
2005 GENERAL INFORMATION FROM
ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

**FUSES, SUPPLEMENTAL (JDYX)**

**USE**

This category covers supplemental fuses, which are also described as miscellaneous, miniature, and micro fuses. These fuses provide supplemental protection in end-use equipment to provide protection for components or internal circuits. They are not suitable for branch or feeder circuit use. Physical dimensions are not specified, but dimensional limitations apply to prevent insertion of supplementary protection fuses into branch or feeder circuit fuseholders intended to accommodate branch or feeder circuit fuses of the Class CA, CB, CC, CD, G, H, J, K, L, R or T Type.

Micro fuses are supplemental fuses with no principal dimension (length, width, height or diameter) exceeding 10 mm (excluding leads).

The devices covered under this category are rated as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>(I_d) (A)</th>
<th>(V)</th>
<th>DC Rating</th>
<th>Interrupting Rating</th>
<th>Min Interrupting</th>
<th>Time Delay</th>
<th>Current-limiting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Miniature fuse</strong></td>
<td>0 - 60</td>
<td>&lt;125</td>
<td>Optional</td>
<td>0.02 at 250 V</td>
<td>0.10 at 250 V</td>
<td>Optional</td>
<td>No</td>
</tr>
<tr>
<td><strong>Micro fuse</strong></td>
<td>0 - 60</td>
<td>125</td>
<td>Optional</td>
<td>0.05 at 100 V</td>
<td>0.10 at 100 V</td>
<td>Optional</td>
<td>No</td>
</tr>
<tr>
<td><strong>Miscellaneous or</strong></td>
<td>0 - 1</td>
<td>125/250</td>
<td>Optional</td>
<td>0.05 at 100 V</td>
<td>0.10 at 100 V</td>
<td>Optional</td>
<td>No</td>
</tr>
<tr>
<td><strong>Device current</strong></td>
<td>0 - 60</td>
<td>125/250</td>
<td>Optional</td>
<td>0.20 at 250 V</td>
<td>0.20 at 250 V</td>
<td>Optional</td>
<td>No</td>
</tr>
<tr>
<td><strong>Device voltage</strong></td>
<td>10, 50 or</td>
<td>125/250</td>
<td>Optional</td>
<td>0.75 at 250 V</td>
<td>0.75 at 250 V</td>
<td>Optional</td>
<td>No</td>
</tr>
<tr>
<td><strong>Device</strong></td>
<td>100 or</td>
<td>125/250</td>
<td>Optional</td>
<td>1.5 at 250 V</td>
<td>1.5 at 250 V</td>
<td>Optional</td>
<td>No</td>
</tr>
<tr>
<td><strong>Required</strong></td>
<td>Manufacturer's name or trademark (or both)</td>
<td>Device current rating</td>
<td>Device voltage rating</td>
<td>Device interrupting rating</td>
<td>The words “Time Delay” or the letter “D” if device is a time delay type</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PRODUCT MARKINGS**

If a color code is used to mark a micro fuse to designate voltage, interrupting rating or time delay type, the color code scheme is marked on the smallest package.

Devices covered under this category are not marked “Current-limiting.”

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**


**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fuse Accessory.”

### FUSES, OVER 600 VOLTS (JEEG)

#### GENERAL

This category covers power and distribution fuses with voltage ratings above 600 V.

These fuses are intended to provide overcurrent protection in accordance with ANSI/NFPA 70, “National Electrical Code,” and are intended for installation in specific metal-enclosed switchgear.

These fuses are not intended to be interchanged with other manufacturers’ fuses or with other classes of Listed fuses. Each fuse is intended to only be replaced with a fuse of the same manufacturer, type and ratings.

The melting times at specified overcurrents are shown by each manufacturer’s published time-current curves, which may vary between manufacturers, and between fuse types and/or models.

<table>
<thead>
<tr>
<th>Type</th>
<th>Required</th>
<th>Fuse Markings</th>
<th>Manufacturer’s name or trademark (or both)</th>
<th>Device current rating</th>
<th>Device voltage rating</th>
<th>Device interrupting rating</th>
<th>The words “Time Delay” or the letter “D” if device is a time delay type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Micro fuse</strong></td>
<td>Device current rating</td>
<td>Manufacturer’s name or trademark (or both)</td>
<td>Device current rating</td>
<td>Device voltage rating</td>
<td>Device interrupting rating</td>
<td>The words “Time Delay” or the letter “D” if device is a time delay type</td>
<td></td>
</tr>
</tbody>
</table>
By using the term “current-limiting,” it indicates a relationship between the cutoff (peak let-through) current to prospective available current, within the current-limiting range of the fuse, in accordance with characteristic curves published by the manufacturer. When operated within its current-limiting range, a current-limiting fuse introduces a high resistance to reduce current magnitude and duration, resulting in subsequent current interruption.

This category covers two major classes of fuses: **Power class fuses** are generally used in three-phase applications, in substations, cabinets, or electrical vaults where a large amount of electrical power is being supplied to a distribution system. They are normally used where fault currents are high, X/R ratios are high, and/or severe transient recovery voltages (TRV) are anticipated. **Distribution class fuses** are generally used in single-phase applications on a distribution line on single-phase taps or for protecting single-phase transformers. They are suitable for use in three-phase applications where the high capabilities of the power class fuse are not required.

Each of these classes is further subdivided into three types:

**Back-up current-limiting fuses** provide fault current interrupting duty only between their maximum interrupting rating and their minimum interrupting rating. They must be coordinated with other overcurrent protective device(s) which will interrupt below that level.

**General purpose current-limiting fuses** are not intended to interrupt currents below the current that causes melting of the fuse in not less than 1h. This current is their rated low current, which may be referred to as their rated minimum interrupting rating. They must be coordinated with other overcurrent protective device(s) which will interrupt below that level.

**Full range current-limiting fuses** are intended to interrupt any current between the minimum current that can cause melting of its elements (at the highest ambient specified by the manufacturer) and its maximum interrupting rating.

Specific devices covered under this category are as follows:

**E-rated Fuses**

- **Characteristics** — E-rated fuses are current-limiting power fuses in the voltage range of 2.8 kV through 38 kV, intended for use on ac circuits only. E-rated fuses may have either full range or general-purpose characteristics, as designated in the individual Listings. E-rated fuses have the following melting-time performance characteristics:
  - An E-rated fuse rated 100 A or less will melt in 300 seconds at an rms current within the range of 200 to 240% of its continuous current rating.
  - An E-rated fuse rated greater than 100 A will melt in 600 seconds at an rms current within the range of 220 to 264% of its continuous current rating.

The melting times at higher overcurrents are shown by each manufacturer’s published time-current curves, which may vary between manufacturers and between fuse types and/or models.

**Markings** — Each fuse is marked with the manufacturer’s name or trademark, manufacturer’s type or identification number, rated continuous current, rated maximum voltage, rated frequency, rated maximum interrupting current, and “E” following the continuous current rating (e.g., 100E).

**General Purpose Fuses**

- **Characteristics** — General purpose fuses are current-limiting power fuses in the voltage range of 2.8 kV through 38 kV, intended for use on ac circuits only. General purpose fuses have general purpose characteristics only.

- **Markings** — Each fuse is marked with the manufacturer’s name or trademark, manufacturer’s type or identification number, rated continuous current, rated maximum voltage, rated frequency, rated maximum interrupting current, and rated low current.

**Fuse Links**

- **Characteristics** — Type K and Type T distribution fuse links are for voltages up to 38 kV, intended for use on ac circuits only.

- **Markings** — Each link is marked with the manufacturer’s name or trademark, the manufacturer’s type or identification number, and rated continuous current, followed by the type identification (e.g., 40K).

The smallest shipping container is required to be marked with the manufacturer’s name or trademark, manufacturer’s type or trademark, manufacturer’s identification number, and rated continuous current, followed by the type identification.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**


**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “E-rated Fuse,” “General Purpose Fuse” or “Fuse Link.”

The Listing Mark is marked on the fuse for E-rated and general purpose fuses; the Listing Mark is marked on each package for fuse links, with or without the UL symbol on the fuse link.

**LOW-VOLTAGE FUSES CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (JEFA)**

**USE**

This category covers fuses incorporating enclosed current-limiting fuse links intended for protecting power-frequency ac circuits or dc circuits. These fuses are intended for use by authorized persons as referenced in IEC 60269-2-1, and are intended mainly for industrial applications.

**PRODUCT TYPES**

These fuses are defined by size and operating characteristics. The available sizes are 000, 00, 0, 1, 2, 3, 4, and 4a.

These fuses are also defined by their utilization category as follows:

- gG — indicates fuse links with a full-range breaking capacity for general applications
- gM — indicates fuse links with a range-breaking capacity for the protection of motor circuits
- aM — indicates fuse links with a partial range-breaking capacity for the protection of motor circuits
- gD — indicates time delay fuse links with a full-range breaking capacity
- gN — indicates non-time-delay fuse links with a full-range breaking capacity

**RATINGS**

The standard values of rated ac voltages are 400 V, 500 V, and 690 V. The rated dc voltages are 250 V and 440 V.

Fuses covered under this category have ampere ratings related to size as follows:

<table>
<thead>
<tr>
<th>Fuse Size</th>
<th>Ampere Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>0 to 315</td>
</tr>
<tr>
<td>00</td>
<td>6 to 160</td>
</tr>
<tr>
<td>0</td>
<td>8 to 160</td>
</tr>
<tr>
<td>1</td>
<td>30 to 250</td>
</tr>
<tr>
<td>2</td>
<td>125 to 400</td>
</tr>
<tr>
<td>3</td>
<td>315 to 630</td>
</tr>
<tr>
<td>4</td>
<td>500 to 1000</td>
</tr>
<tr>
<td>4a</td>
<td>500 to 1250</td>
</tr>
</tbody>
</table>

**PRODUCT MARKINGS**

The following information is marked on all fuse-links where practicable: manufacturer’s name or trademark, manufacturer’s identification reference, size, rated voltage, rated current, breaking range, utilization category, kind of current, and rated frequency (if applicable).

When the size of the fuse link makes it impracticable to include all markings on the fuse link, the manufacturer’s name or trademark, manufacturer’s identification reference, size, rated voltage, and rated current will be marked.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to evaluate products in this category is International Electrotechnical Commission (IEC) 60269-2. “Low-voltage fuses, Part 2-1: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)” – Sections 1 to V: Examples of types of standardized fuses.
PLUG FUSES (JEVF)

GENERAL

This category covers nonrenewable, Edison base, Type C and Type S plug fuses. These fuses have the following characteristics:

- Interrupting Rating
- DC Rating
- Voltage Rating
- Time Delay
- Current-limiting
- Body Types

Edison base 0 – 30 125 Optional 10 Optional No 1
Type C 3
Type S 3

PRODUCT MARKINGS

The devices covered under this category, at a minimum, are marked with:
1. The manufacturer’s name or trademark (or both)
2. The device current rating
3. Plug fuses designated as time-delay fuses are identified by the symbol “D” at least 1/8-in. in height, stamped, molded or printed in a location visible after installation of the fuse.

In addition, these devices are not marked “Current-limiting.”

Devices rated 15 A or less have a prominent hexagonal feature.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS


UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

LOW-VOLTAGE FUSE
IN ACCORDANCE WITH IEC 60269-2-1
Control No.

SPECIAL PURPOSE FUSES (JFHR)

GENERAL

This category covers fuses rated 0 – 6,000 A, 0 – 1,000 V with interrupting ratings up to 300,000 A. These fuses are designed for special purpose applications such as in combination with low-voltage power circuit breakers, in combination with TVSS devices or in combination with capacitors. If they do not incorporate dimensional or other rejection features that make them noninterchangeable with Listed classes of renewable and nonrenewable fuses, then they have been investigated and found to comply with all of the performance requirements applicable to Listed classes of renewable and nonrenewable fuses for which they may be substituted.

PRODUCT MARKINGS

All devices covered under this category are marked with:
1. The manufacturer’s name or trademark (or both)
2. The current rating
3. The voltage rating
4. The interrupting rating in rms symmetrical and/or dc amperes (when not so marked, the interrupting rating is 10,000 A (rms symmetrical)
5. The words “Time Delay” (for qualifying fuses only)
6. The words “Current-limiting” (for qualifying fuses only)
7. These devices may also be marked to indicate if their performance is dependent upon the equipment with which they are designed to be used
8. Fuses that comply with all of the dimensional and performance requirements applicable to a Listed class of cartridge fuse may be marked “This fuse may substitute for a Listed Class ___ Fuse,” where the appropriate fuse class is placed in the blank
9. Fuses that comply with all of the performance requirements applicable to a Listed class of cartridge fuse, but do not comply with the dimensional requirements for that fuse may be marked “This fuse meets the performance specifications for a Class ___ Fuse,” or the equivalent

RELATED PRODUCTS

For classes of renewable and nonrenewable fuses, see Cartridge Fuses, Nonrenewable (JDDZ), Cartridge Fuses, Renewable (JDRX) and Plug Fuses (JEVF).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 248-1, “Low-Voltage Fuses – Part 1: General Requirements.” Additional standards may be used as follows:

<table>
<thead>
<tr>
<th>Venue</th>
<th>Mexico</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>(ANCE)</td>
<td></td>
</tr>
<tr>
<td>UL 248-1</td>
<td>NMX-J-009/248/</td>
<td>1-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-2</td>
<td>NMX-J-009/248/</td>
<td>2-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-3</td>
<td>NMX-J-009/248/</td>
<td>3-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-4</td>
<td>NMX-J-009/248/</td>
<td>4-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-5</td>
<td>NMX-J-009/248/</td>
<td>5-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-6</td>
<td>NMX-J-009/248/</td>
<td>6-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-7</td>
<td>NMX-J-009/248/</td>
<td>7-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-8</td>
<td>NMX-J-009/248/</td>
<td>8-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-10</td>
<td>NMX-J-009/248/</td>
<td>10-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-12</td>
<td>NMX-J-009/248/</td>
<td>12-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-14</td>
<td>NMX-J-009/248/</td>
<td>14-2000-ANCE</td>
</tr>
<tr>
<td>UL 248-16</td>
<td>NMX-J-009/248/</td>
<td>16-2000-ANCE</td>
</tr>
<tr>
<td>UL 275</td>
<td>Subject 275A</td>
<td></td>
</tr>
<tr>
<td>UL 347</td>
<td>Subject 2126</td>
<td></td>
</tr>
</tbody>
</table>

UNIVERSAL MODULAR FUSES (JGFI)  
GENERAL
This category covers universal modular fuses (UMFs) that provide supplemental protection in end-use equipment to provide protection for components or internal circuits. They are not suitable for branch or feeder circuit use. 
UMFs have opening characteristics that are different from supplemental fuses (see JDYX). UMFs may or may not be suitable for substitution in applications where supplemental fuses are used. 

CHARACTERISTICS AND RATINGS

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF – Very Quick</td>
<td>Time delay</td>
</tr>
<tr>
<td>F – Quick</td>
<td>Time delay</td>
</tr>
<tr>
<td>T – Time delay</td>
<td>Time delay</td>
</tr>
<tr>
<td>TT – Long time delay</td>
<td></td>
</tr>
</tbody>
</table>

These devices have the following characteristics and ratings:

<table>
<thead>
<tr>
<th>Mounting</th>
<th>Operating Characteristics</th>
<th>AC (V)</th>
<th>DC (V)</th>
<th>Interrupting Rating (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through-hole or surface mount</td>
<td>FF – Very quick acting</td>
<td>0.032 – 6.3</td>
<td>32</td>
<td>The greater of 35 or 10 x I N</td>
</tr>
<tr>
<td>FF – Quick</td>
<td>acting</td>
<td>63</td>
<td>63</td>
<td>The greater of 35 or 10 x I N</td>
</tr>
<tr>
<td>T – Time delay</td>
<td>125</td>
<td>125</td>
<td>(optional)</td>
<td>The greater of 50 or 10 x I N</td>
</tr>
<tr>
<td>TT – Long time delay</td>
<td>250</td>
<td>250</td>
<td>L – 100</td>
<td>(optional)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>H – 1500</td>
<td></td>
</tr>
</tbody>
</table>

PRODUCT MARKINGS

Devices rated 250 V are marked on the device itself and on the smallest package with the following information:

1. The manufacturer's name or trademark (or both)
2. The rated current
3. The rated voltage

Note: When the voltage rating is followed by “ac,” the UMF is suitable for alternating current circuits only.
4. One of the following operating characteristic symbols: “FF,” “F,” “T,” “TT”
5. Devices rated 250 V are marked with one of the following symbols denoting breaking capacity: “L,” “I,” “H”
6. The UMF symbol
7. The statement “IN ACCORDANCE WITH IEC 60127-1 (issue date) and IEC 60127-4 (issue date)” on the product package only

Additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are International Electrotechnical Commission (IEC) 60121-1, “Miniature Fuses,” and IEC 60127-4, “Universal Modular Fuse-links.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Universal Modular Fuse” (or “UMF”) or the UMF symbol.

GENERATORS (JZGZ)  
GENERAL
This category covers generators, also referred to as generator heads. They are intended for installation in accordance with ANSI/NFPA 70, “National Electrical Code.”

PRODUCT MARKINGS/INSTALLATION INSTRUCTIONS

An enclosed type generator has the enclosure type designation marked on the generator for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). The generator may also be marked “Rain-tight” or “Rainproof.”

An enclosed type generator is not intended to be installed in an enclosure unless a marking on the generator, the installation instructions, or a stuffer sheet provided with the generator states that the generator may be enclosed. Specifications for the enclosure are included with the instructions or marking.

An open type generator is intended to be installed in an enclosure suitable for the end use. The minimum size of the enclosure is marked on the generator, provided in the installation instructions, or as a stuffer sheet provided with the generator.

A generator that has running heating and locked-rotor protection is marked “Thermally Protected.”

Generators are marked for use in a 40°C (104°F) or higher ambient. All generators are provided with installation instruction information, which indicate the proper methods to secure the generator, electrically connect the generator to the prime mover, and connect it to the generator drive. The instructions also provide information concerning the load rating at which the generator can operate.

FIELD EVALUATED PROVISIONS

Suitability of guards for the shaft or other moving parts must be determined in the end-use application.

If a generator does not have thermal protection as described above, protection needs to be provided in the end-use application such as an over-
load relay. The generator has a marking indicating that the generator is not provided with thermal protection.

RELATED PRODUCTS
Electric generators for use in marine applications are covered under Alternators, Generators and Motors, Electric Marine (ARDY).
Electric generators for use in hazardous (classified) locations are covered under Generators for use in Hazardous Locations (PSPT).
Electric generators used in combination with an engine for use with recreational vehicles are covered under Engine Generators (TSSR).
Motor generator sets and frequency converters intended for use in unclassified (ordinary) locations are covered under Motor Generator Sets (PQQW).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 1004, “Electric Motors” and UL 2111, “Overheating Protection for Motors.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Generator” or “Electric Generator Head.”

GROUND-FAULT CIRCUIT INTERRUPTERS (KCXS)

GENERAL
This category covers ground-fault circuit interrupters (GFCI) for use in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC). A GFCI is a device whose function is to interrupt the electric circuit to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the circuit.

A GFCI is intended to be used only in a circuit where one of the conductors is solidly grounded. Class A GFCIs trip when the current to ground has a value in the range of 4 through 6 mA. Class A GFCIs are suitable for use in branch and feeder circuits, including swimming pool circuits. However, swimming pool circuits installed before the adoption of the 1965 NEC may include sufficient leakage current to cause a Class A GFCI to trip.

Class B GFCIs trip when the current to ground exceeds 20 mA. These devices are suitable for use with underwater swimming pool luminaires installed before the adoption of the 1965 NEC.

A GFCI of the enclosed type that has not been found suitable for use where it will be exposed to rain is so marked.

A receptacle type GFCI installed in wet locations is intended to be installed with an enclosure that is weatherproof, whether or not the attachment plug cap is inserted.

The “TEST” and “RESET” buttons on the GFCIs are only intended to check for the proper functioning of the GFCI. They are not intended to be used as “ON/OFF” controls of motors or other loads unless the buttons are specifically marked “ON” and “OFF.” Products with “ON” and “OFF” markings have been additionally Listed under Motor Controllers, Mechanically-operated and Solid-state (NMFT).

Some GFCIs include receptacles, and are intended to be installed in an enclosure similar to a conventional receptacle. Receptacle type GFCIs may have been additionally found to meet appropriate requirements and are marked “hospital grade” and/or “CO/ALR.” See Receptacles for Plugs and Attachment Plugs (RTRT) for further information.

REBUILT PRODUCTS
This category also covers rebuilt or refurbished portable GFCIs. These are factory rebuilt to the extent necessary to replace components such as cords, plugs or cord connectors. Rebuilt GFCIs are subject to the same requirements as new GFCIs.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is ANSI/UL 943, “Ground-Fault Circuit-Interrupters.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Ground-Fault Circuit Interrupter.”

For rebuilt products the word “Rebuilt” or “Refurbished” precedes the product name.

SPECIAL PURPOSE GROUND-FAULT CIRCUIT INTERRUPTERS (KCYC)

USE
This category covers ground-fault circuit interrupters for use in applications where equipment grounding is provided or is required by the National Electrical Code, NFPA 70, or where the voltage to ground is greater than 150 V.

PRODUCT CHARACTERISTICS
These ground-fault circuit interrupters trip when the current to ground has a value in the range of 15 through 20 mA. Let-go protection is not provided by the ground-fault circuit interrupter; however, a person touching the protected equipment would earth the electrical equipment grounding path in parallel with the person’s body.

These ground-fault circuit interrupters rely upon equipment grounding for let-go protection. The reliability of the grounding circuit may be demonstrated by a system that monitors the grounding path to the service and to the load, such that an unacceptable increase in the resistance of the grounding path will cause the circuit to be opened, or by some other method that demonstrates, by investigation, that the grounding circuit is reliable or that faults are unlikely because of the level of insulation that is provided (double insulation).

CLASSES
These ground-fault circuit interrupters are divided into classes based upon voltage rating and the quality of the grounding circuit. Some may be used in circuits where grounding is not provided to the load but double insulation is provided.

A Class C ground-fault circuit interrupter (GFCI) is intended to be used in circuits with voltage not exceeding 300 V AC to ground on any conductor. Class C GFCIs are intended to be used in circuits where reliable equipment grounding or double insulation is provided or is required by the National Electrical Code.

A Class D GFCI is intended to be used in circuits with one or more conductors over 300 V to ground, with conventional equipment grounding, to provide a low impedance path so that the voltage across the body during a fault does not exceed 150 V, is provided for the protected equipment in the system.

A Class E GFCI is intended to be used in circuits with one or more conductors over 300 V to ground but with conventional equipment grounding or double insulation provided for the protected equipment in the system. These GFCIs respond rapidly to open the circuit before the magnitude and duration for the current flowing through a person’s body exceeds the limits for ventilator fibrillation.

RELATED PRODUCTS
For additional information, see Ground-Fault Circuit Interrupters (KCXS) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 943, “Ground-Fault Circuit Interrupters” as modified by the “Outline of Investigation for Special Purpose Ground-Fault Circuit Interrupters.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the name “Class ___ Ground-Fault Circuit Interrupter, Special Purpose.”

GROUND-FAULT SENSING AND RELAYING EQUIPMENT (KDAY)

This category covers ground fault current sensing devices, relaying equipment, or combinations of ground fault current sensing devices and relaying equipment, rated 600 volts maximum, which will operate to cause a disconnecting means to function at predetermined values of ground fault current in accordance with the National Electrical Code, ANSI/NFPA 70.

This equipment is intended to provide ground-fault protection of equipment at services and feeders.

This equipment is intended to operate devices with shunt trip coils such as fused power circuit devices, molded case circuit breakers, molded case switches and the like which constitute the disconnecting means. It is necessary that ground fault sensing and relaying equipment be coordinated with a disconnecting device to prevent the disconnecting device from interrupting a fault current that exceeds the interrupting capability of the disconnecting means.

To aid the user in making the proper selection of disconnecting means and sensing and relaying equipment, the sensing and relaying devices are designated as Class I or Class II, a control number, and the name “Ground-Fault Sensing and Relaying Equipment.”

Class I ground fault sensing and relaying equipment does not incorporate means to prevent opening of a disconnecting device at any level of
fault current. This Class is suitable for use with a disconnecting device that is capable of interrupting the maximum available fault current of the system on which it is used. Examples of such disconnecting devices are (1) circuit breakers or fused circuit breakers used within their interrupting ratings, (2) fuses having integral means to prevent the switch from opening at levels of fault current exceeding the interrupting capability of the switch and thus permitting the fuses to clear the circuit, (3) fused switches having an interrupting capability not less than 12 times their amp rating and which are capable of interrupting the levels of fault current that may exist before the fuses open.

Class II ground fault sensing and relaying equipment incorporates means to prevent initiation of opening of the disconnecting device if the fault current exceeds the contact interrupting capability of the disconnecting device with which it is intended to be used, such as in the case of a fused switch that does not have an interrupting capability of at least 12 times its amp rating.

Ground fault sensing and relaying equipment is marked to indicate the maximum available fault currents it is capable of withstand ing without damage.

This listing covers enclosed equipment and also open type equipment which is intended for use in Listed equipment such as panelboards, switchboards, and where the suitability of the combination has been determined by Underwriters Laboratories Inc. The basic standard used to investigate products in this category is UL 1053, "Ground-Fault Sensing and Relaying Equipment." The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the following product name: "Ground Fault Sensing and Relaying Equipment."
Some of the required marking may be on a tag attached to the product.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 467, “Grounding and Bonding Equipment.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged, on a tag securely attached to the product or container, or on the product, when size or shape permits, is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Ground Clamp – Communication.”

GROUNDING EQUIPMENT, NEUTRAL GROUNDING DEVICES, OVER 600 V (KDZC)

This category covers neutral grounding devices for use on systems having AC voltage ratings from 603 volts to 38kV. Neutral grounding devices are used for the purpose of controlling the ground current or the potential to ground of an alternating current system.

These devices are: grounding transformers, ground fault neutralizers, resistors, reactors, capacitors, or combination of these. In addition, these devices may include current sensors, relays, audible and visual signaling and similar accessories.

Devices that have been investigated for use outdoors are marked “Outdoor.”

Enclosures are marked to indicate the exposure category (A, B or C) for which they are intended. Enclosures marked “Category A” are intended to be installed in areas accessible to the unsupervised general public; enclosures marked “Category B” are intended to be installed in areas accessible to authorized personnel only; enclosures marked “Category C” are intended for use in areas accessible to qualified personnel only.

Devices covered under this category are marked with the following information: Name of manufacturer, serial number, name of device, type designation, impedance (except resistors), number of phases as applicable, rated current, rated frequency, rated time, rated voltage, BIL of line, indoor or outdoor service, weight, volume of oil (as applicable), instruction book number or equivalent.


The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names or other appropriate product name: “Neutral Grounding Resistor”, “Neutral Grounding Reactor”.

HOISTWAY CABLE (MSZR)

GENERAL

This category covers hoistway cable which is a single and multiple conductor cable for use in raceways in accordance with Article 620 of ANSI/NFPA 70, “National Electrical Code.” Insulated conductors are 20 to 14 AWG inclusive. Multiple-conductor cable consists of insulated conductors cables together with a suitable binder or sheath. The cable is rated 300 V or 600 V. The temperature rating, if so marked, is 90°C, otherwise it is 60°C. All cable complies with a vertical flame test.

PRODUCT MARKINGS

Hoistway cable is identified by the words “Hoistway Cable” printed on each insulated conductor and on the sheath, if provided.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 62, “Flexible Cord and Fixture Wire.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Hoistway Cable.”

HYDROGEN GENERATORS (NCBD)

HYDROGEN GENERATORS, ELECTROLYSER TYPE (NCBH)

USE AND INSTALLATION

This category covers products that generate hydrogen for use as a fuel (with oxygen as a by-product) by electrolysis of water. These products are intended for use in accordance with ANSI/NFPA 70, “National Electrical Code.” These products have an input rating of 600 V or less, and are intended for either portable or permanent connection to the source of supply and for installation in accordance with the manufacturer’s installation instructions. Products are intended to be installed in accordance with NFPA 50A, “Standard for Gaseous Hydrogen Systems at Consumer Sites,” NFPA 52, “Compressed Natural Gas (CNG) Vehicular Fuel Systems Code,” or the “International Fuel Gas Code,” as applicable.

Types of Electrolytes:

- PEM — Acidic electrolyte, proton exchange membrane
- Alkaline — Base electrolyte, designated by chemical formula (i.e., KOH for potassium hydroxide)

PRODUCT MARKINGS

These products are marked to indicate the manufacturer’s name; model number; electrical input rating; IP rating; hydrogen output purity, capacity and pressure rating; type of electrolyte and input water quality; oxygen purity and output rating (if employed as an oxygen source). Units are marked for residential or nonresidential use as intended:

- Residential — Use in occupancies in which sleeping accommodations are provided for normal residential purposes and include all buildings designed to provide sleeping accommodations.
- Nonresidential — Use in locations other than residential, such as mercantile business, industrial and storage.

RELATED PRODUCTS

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Flammable and Combustible Liquids and Gases Equipment (AAPQ).

REQUIREMENTS

The basic standard used to investigate products in this category is proposed ANSI/UL 2264A, “Hydrogen Generators, Electrolyser Type.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Hydrogen Generator, Electrolyser Type.”

HYDROGEN GENERATORS, FUEL PROCESSING TYPE (NCBL)

USE AND INSTALLATION

This category covers products that generate hydrogen for use as a fuel by processing of hydrocarbon fuels. These products are intended for use in accordance with ANSI/NFPA 70, “National Electrical Code.” These products have an input rating of 600 V or less, and are intended for either portable or permanent connection to the source of supply and for installation in accordance with the manufacturer’s installation instructions. Products are intended to be installed in accordance with NFPA 50A, “Standard for Gaseous Hydrogen Systems at Consumer Sites,” NFPA 52, “Compressed Natural Gas (CNG) Vehicular Fuel Systems Code,” or the “International Fuel Gas Code,” as applicable.

PRODUCT MARKINGS

These products are marked to indicate the manufacturer’s name; model number; electrical input rating; IP rating; hydrogen output purity, capacity and pressure rating; type of supply fuel and input water quality. Units are marked for residential or nonresidential use as intended:

- Residential — Use in occupancies in which sleeping accommodations are provided for normal residential purposes and include all buildings designed to provide sleeping accommodations.
- Nonresidential — Use in locations other than residential, such as mercantile business, industrial and storage.
RELATED PRODUCTS
This category does not cover fuel cell systems or reversible fuel cell sys-
tems; such products are covered under Stationary Fuel Cell Power Sys-
tems (IRGX) or Fuel Cell Modules (IRGR2).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary
Locations (AALZ) and Flammable and Combustible Liquids and Gases
Equipment (AAPO).

REQUIREMENTS
The basic standard used to investigate products in this category is
ANSI/UL 2264, “Hydrogen Generators, Fuel Processing Type.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the
only method provided by UL to identify products manufactured under its
Listing and Follow-Up Service. The Listing Mark for these products includes
the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the prod-
cut name “Hydrogen Generator, Fuel Processing Type.”

HYDROGEN GENERATORS, WATER
REACTION TYPE (NCBR)
USE AND INSTALLATION
This category covers products that generate hydrogen for use as a fuel
by chemical reactions with water and other chemical substances (i.e.,
sodium borohydride and sodium hydride). These products are intended
for use in accordance with ANSI/NFPA 20, “National Electrical Code.”
These products have an input rating of 600 V or less, and are intended for
either portable or permanent connection to the source of supply and for
installation in accordance with the manufacturer’s installation instructions.
Products are intended to be installed in accordance with NFPA 50A,
“Standard for Gaseous Hydrogen Systems at Consumer Sites,” NFPA 52,
“Compressed Natural Gas (CNG) Vehicle Fuel Systems Code,” or the
“International Fuel Gas Code,” as applicable.

PRODUCT MARKINGS
These products are marked to indicate the manufacturer’s name; model
number; electrical input rating; IP rating; hydrogen output purity, tem-
perature, capacity and pressure; and input fuel. Units are marked for resi-
dential use or nonresidential use as intended.

Residential — Use in occupancies in which sleeping accommodations
are provided for normal residential purposes and include all buildings
designed to provide sleeping accommodations.

Nonresidential — Use in locations other than residential, such as mer-
cantile business, industrial and storage.

RELATED PRODUCTS
This category does not cover fuel cell systems or reversible fuel cell sys-
tems; such products are covered under Stationary Fuel Cell Power Sys-
tems (IRGX) or Fuel Cell Modules (IRGR2).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary
Locations (AALZ) and Flammable and Combustible Liquids and Gases
Equipment (AAPO).

REQUIREMENTS
The basic standard used to investigate products in this category is
ANSI/UL 2264B, “Hydrogen Generators, Water Reaction Type.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the
only method provided by UL to identify products manufactured under its
Listing and Follow-Up Service. The Listing Mark for these products includes
the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the prod-
cut name “Hydrogen Generator, Water Reaction Type.”

INDUSTRIAL CONTROL EQUIPMENT
(NIMX)
The listing covers the following products:
Industrial Control Panels
Motor Control Centers
Motor Controllers
Motor Controller Switches
Miscellaneous Apparatus
Programmable Controllers
Industrial Control Switches
Enclosed industrial control equipment identified with an enclosure type
designation is intended for use as indicated in the guide information at
the front of this directory (AALZ).

Industrial Control Equipment, is for use with copper conductors unless
marked to indicate which terminals are suitable for use with aluminum
conductors. Such marking is independent of any marking on terminal con-
nectors and is on a wiring diagram or other readily visible location.

Industrial Control Equipment, for which accessory kits are available for
the field or distributor modification of the basic product or which may be
assembled in many forms from separate components are marked to indi-
cate the suitable accessories or separate components which may be used.

CONTROL PANELS
If the sealed rating of the operating coil circuit of a magnetically oper-
ated industrial control device exceeds 125 volt-amperes, the coil circuit
rating is marked on the device.

Overload relays or industrial control equipment incorporating overload
relays are identified as to their maximum tripping time at 600 per cent of
the overload relay current element trip rating. The designations “Class 10,
Class 20, and Class 30” are used to identify the maximum tripping times,
with the Class number indicating the maximum tripping time in seconds.
Overload relays with maximum tripping times of 10 to 30 seconds are
marked Class 10 or Class 30 respectively. Overload relays with a maxi-
um tripping time of 20 seconds may be marked Class 20. Overload
relays with tripping times in excess of 30 seconds are marked with their
maximum tripping times. All unmarked overload relays have a maximum
 tripping time of 20 seconds.

There are open, across-the-line starters intended for bolt on mounting to
panelboards and dead front switchboards and are so restricted by the List-
ing Mark. They are provided with a cover or door and the remaining por-
tions of the enclosure are provided by the panel or switchboard enclosure.

Some industrial control equipment is suitable for use as service equip-
ment and may be so marked. Such marking is part of the Listing Mark or is
an integral part of other required markings.

Some of the equipment listed in this category has also been investigated
for use aboard marine vessels over 65 ft. in length as covered by the Elec-
trical Engineering Regulations of the United States Coast Guard, Subchap-

The Electrical Engineering Regulations of the United States Coast Guard
classify marine type equipment as “Non-Watertight,” “Drip-proof,” or
“Watertight.”

Some industrial control equipment incorporates neutrals factory bonded
to the frame or enclosure. Such units are marked “Suitable Only For Use
As Service Equipment.”

Open type across-the-line starters designed only for use in panelboards
or dead front switchboards employ Listing Marks with the product iden-
 tifier “INDUSTRIAL CONTROL EQUIPMENT FOR USE IN PANEL-
BOARDS AND DEAD FRONT SWITCHBOARDS” or “IND. CONT. EQ.
FOR USE IN PANELBOARDS AND DEAD FRONT SWITCHBOARDS.”

For other than industrial control panels, and unless indicated otherwise in
the general information for the following subcategories, enclosed type
product Listing Marks contain the product identity “INDUSTRIAL CON-
 TROL EQUIPMENT” or the abbreviation “IND. CONT. EQ.” on the enclo-
 sure, or the product identity “INDUSTRIAL CONTROL EQUIPMENT
ENCLOSED” on the mechanism mounted within the enclosure. In either
case, the Listing Mark indicates that the overall product with its enclosure
is Listed.

Enclosures for use with open type products employ Listing Marks with the
product identification “Enclosure For Industrial Control Equipment” or
“Enclosure For Ind. Cont. Eq.” and are marked to specify the Listed
open type products to be installed within. Look for a Listing Mark on both
the enclosure and the open mechanism.

For industrial control panels, one of the following product identities
appears on the Listing Mark, “Industrial Control Panel Enclosure,” “Open
Industrial Control Panel Enclosure,” “Enclosed Industrial Control Panel,”
“Enclosed Industrial Control Panel Enclosure.”

The “Enclosed Industrial Control Panel” Listing Mark covers both the
enclosure and the panel provided with it. Open panels employ the “Open
Industrial Control Panel” Listing Mark. The “Industrial Control Panel
Enclosure” Listing Mark covers only the enclosure; the compatibility of
the enclosure and the installed equipment and associated wiring has not
been investigated unless an “Enclosed Industrial Control Panel” Listing
Mark is also present.

The Listing Mark of Underwriters Laboratories Inc. on the product is the
only method provided by UL to identify products manufactured under its
Listing and Follow-Up Service. The Listing Mark for these products includes
the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the
following product names as appropriate: “Industrial Control Equipment”
(or “Ind. Cont. Eq.”); “Marine Industrial Control Equipment For Use
Only On Vessels Over 65 Feet.”

ELECTRO-SENSITIVE PROTECTIVE
EQUIPMENT (NIOZ)
GENERAL
This category covers electro-sensitive protective equipment (ESPE) for
the safeguarding of machinery. ESPE is applied to machinery that presents
a risk of personal injury. It provides protection by causing the machine to
revert to a safe condition before a person can be placed in a hazardous
situation. In addition to fire and electric shock hazards, these devices have
been investigated for their safety-related performance features.
ESPE is designated as a certain “Type” as shown in the individual Listings and as defined in UL 61496-1, “Electro-Sensitive Protective Equipment Part 1: General Requirements and Tests.” In addition, the individual Listings identify products that also have been investigated to UL 1986, “Software in Programmable Controllers.”

This category does not specify the dimensions or configuration of the sensing zone and its disposition in relation to hazardous parts for any particular application, nor what constitutes a hazardous state of any machine. It is restricted to the functioning of the ESPE, that is, the means by which it monitors the condition of the machine, and how it interfaces with the machine controls.

Products covered in this category may be relevant to applications other than those for the protection of persons, for example for the protection of machinery or products from mechanical damage. In those applications, additional requirements may be necessary, for example when the materials have to be recognized by the sensing function have different properties than those for persons.

### ADDITIONAL INFORMATION
For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**Active Opto-electronic Protective Devices (NIPF)**

**GENERAL**

This category covers electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing active opto-electronic protective devices (AOPD) for the sensing function.

The sensing function is performed by opto-electronic emitting and receiving elements detecting the interruption of optical radiation generated, within the device, by an opaque object present in the specified detection zone.

Excluded from this category are AOPDs employing radiation at wavelengths outside the range 400 nm to 1,500 nm.

### ADDITIONAL INFORMATION
For additional information, see Electro-sensitive Protective Equipment (NIOZ), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

### REQUIREMENTS


**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction to this Directory) together with the word “LISTED,” a control number, and the product name “ESPE,” “Active Opto-Electronic Protective Device” or “AOPD,” or other appropriate product name as shown in the individual Listings.

**Active Opto-electronic Protective Devices Responsive to Diffuse Reflection (NIPF)**

This category covers electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing active opto-electronic protective devices responsive to diffuse reflection (AOPDDR) for the sensing function.

The sensing function is performed by opto-electronic devices which respond to the diffused reflection from an opaque object present in the specified detection zone of their incident light.

### REQUIREMENTS


**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction to this Directory) together with the word “LISTED,” a control number, and the following product names or abbreviations, as appropriate: “Electro-Sensitive Protective Equipment” or “ESPE,” “Active Opto-Electronic Protective Device” or “AOPD,” or other appropriate product name as shown in the individual Listings.

**ELEVATOR CONTROLS AND ACCESSORIES (NIQK)**

This category covers accessories and controllers for use in elevator applications and it includes elevators and accessories such as pushbuttons, indicator lights, lighting fixtures and elevator controls such as power supplies (motor and door operators).

### EMERGENCY STOP DEVICES (NSID)

This Listing covers emergency stop devices including emergency stop units and emergency stop buttons. These devices are intended to be installed in a machine covered to perform a Category 0 or Category 1 stop function as defined in the Electrical Standard for Industrial Machinery, NFPA 79. The emergency stop actuator provided in these devices is either a momentary or self-latching type. These devices have been investigated for their functionality in addition to fire and electric shock safety.

The basic standards used to investigate products in this category are: UL 508, The Standard for Industrial Control Equipment UL 991, The Standard for Tests for Safety-Related Controls Employing Solid-State Devices.


The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction to this Directory) together with the word “LISTED,” a control number and one of the following product names as appropriate: “Emergency Stop Device”, “Emergency Stop Unit”, “Emergency Stop Button”, or other appropriate product names as shown in the individual Listings.

**INDUSTRIAL CONTROL PANELS (NITW)**

This category covers industrial control panels which are factory-wired assemblies of industrial control equipment such as motor controllers, switches, relays and auxiliary devices. The panels may include disconnect means and motor branch circuit protective devices.

This category also covers enclosures which are intended to house open type industrial control panels or individual items of industrial control equipment as noted above.

The investigation of industrial control panels does not include investigation of the adequacy of the control and protective devices to supervise the functioning of the controlled equipment. Special relationships and evaluations may be necessary for the proper operation of certain equipment, such as air conditioning or refrigeration equipment. For Listings of such equipment incorporating industrial control panels and where such evaluations have been made, see Air Conditioning Equipment (AAYZ) or Refrigeration Equipment (SCER).

Industrial control panels designated for control of metal-working machine tools and/or plastics machinery have been investigated to determine whether they meet the requirements of NFPA 79, “Electrical Standard for Industrial Machinery,” in addition to Article 670 of ANSI/NFPA 70, “National Electrical Code.” Industrial control panels designated for control of metal-working machine tools may not be suitable for use with equipment other than metal-working machine tools.

**CONTROL PANELS**

Control panels intended for industrial application on power-operated machines intended for such uses as pressing, punching, shearing or braking operations and additionally judged in accordance with the Occupational Safety and Health Administration Standard Section 1910.217 are covered under Press and Other Power-operated Machine Controls and Systems (QUEQ).
Control panels intended for industrial application on power-operated machines intended for such uses as pressing, punching, shearing or braking operations, and evaluated as to fire and electrical shock hazard only are covered under Power Press Control Panels (NIXQ).

Control panels intended for industrial applications in the control of fossil fuel-burning equipment such as incinerators, kilns and drying ovens, and evaluated as to electrical fire and shock hazard only are covered under Flame Control Panels (NIVT).

Controllers for electric fire pumps are covered under Pump Controllers, Fire (QYZS).

Control panels provided with intrinsically safe circuits for extension into a hazardous (classified) location are covered under Industrial Control Panels Relating to Hazardous locations (NIRX). Control panels intended for access control systems which provide a means of regulating or controlling entry into an area are covered under Access Control System Units (ALYV).

ADDITIONAL INFORMATION
For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 508A, “Industrial Control Panels.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Open Industrial Control Panel,” “Industrial Control Panel Enclosure,” “Enclosed Industrial Control Panel,” “Metalworking Machine Tool Control Panel” or “Protective Machinery Control Panel.”

Flame Control Panels (NIVT)

USE
This category covers flame control panels intended for application in the control of fossil fuel burning equipment such as incinerators, kilns and drying ovens. Flame control panels have been classified only as to electrical fire and shock hazards incident to their use in ordinary locations. The compatibility of the panel with the controlled equipment from the standpoint of programming the burner(s) and preventing hazardous conditions due to firing of fuel has not been determined.

ADDITIONAL INFORMATION
For additional information, see Industrial Control Panels (NITW), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic requirements used to investigate products in this category are contained in Subject 508A, “Outline of Investigation for Industrial Control Panels”.

LOOK FOR CLASSIFICATION MARK ON PRODUCT
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product name “Open Flame Control Panel” or “Enclosed Flame Control Panel,” “AS TO ELECTRICAL SHOCK AND FIRE HAZARDS ONLY,” and a control number.

Power Press Control Panels (NIXQ)

USE
This category covers power press control panels intended for industrial application on power-operated machines intended for such uses as pressing, punching, shearing or braking operations. Power press control panels have been classified only as to fire and electrical shock hazards incident to their use in ordinary locations. Power press control panels have been investigated to determine that they meet the requirements of NFPA 79, “Electrical Standard for Metal Working Machine Tools,” in addition to Article 670 of the National Electrical Code, NFPA 70.

ADDITIONAL INFORMATION
For additional information, see Industrial Control Panels (NITW), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic requirements used to investigate products in this category are contained in Subject 508A, “Outline of Investigation for Industrial Control Panels”.

LOOK FOR CLASSIFICATION MARK ON PRODUCT
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product name “Open Power Press Control Panel” or “Enclosed Power Press Control Panel,” “AS TO ELECTRICAL SHOCK AND FIRE HAZARDS ONLY,” and a control number.

MOTOR CONTROL CENTERS (NJAV)

GENERAL
This category covers motor control centers, which are floor-mounted assemblies of one or more enclosed vertical sections having a common horizontal power bus and primarily containing combination motor control units. In addition, motor control centers may contain other types of units, such as relay units, circuit breaker units, disconnect switch units, or panelboard units. Units are mounted one above the other in the vertical sections. Power may be supplied to the individual units by vertical power bus or, if the bus is omitted, by suitable wiring to the horizontal bus. A combination motor control unit includes an externally operable circuit disconnecting means, branch circuit overcurrent protection, and a motor controller. Motor control centers are intended for installation in accordance with Article 430 of ANSI/NFPA 70, “National Electrical Code.”

Motor control center sections and units are rated 600 V maximum. Motor control center sections are rated for the maximum current for horizontal and vertical buses. A motor control center section is marked “Short-circuit current rating amps – RMS symmetrical volts – maximum. Do not install on circuits with available short-circuit currents greater than the lowest short-circuit rating of any installed unit,” or the equivalent. Combination motor control units are rated in horsepower. A motor control center unit is marked “Unit short-circuit current rating – RMS symmetrical amps – volts maximum, when equipped with fuse or circuit breaker,” or the equivalent.

A motor control center section or enclosure investigated for outdoor use is marked “Rainproof.” A motor control center enclosure is intended to enclose one or more motor control center sections.

USE AS SERVICE EQUIPMENT
The marking “Suitable For Use As Service Equipment” appears on each motor control center section optionally intended for use at a service.

Some motor control center sections incorporate neutrals factory bonded to the enclosure. Such sections are marked “Suitable Only For Use As Service Equipment.”

A section marked for use at services may also be used to provide the main control and disconnecting means for a separately derived system.

RELATED PRODUCTS
For information concerning overcurrent protective devices for motor controllers, see Motor Controllers (NITJ).

ADDITIONAL INFORMATION
For additional information, see Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is ANSI/UL 845, “Motor Control Centers.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Motor Control Center Unit,” “Motor Control Center Section” or “Motor Control Center Rainproof Enclosure.”

The Listing Mark for motor control center sections also includes the marking “_ or _.” The first space is stamped with a number indicating the position that the section occupies in the series of sections constituting the motor control center. The latter space is stamped with the total number of sections in the motor control center. The Listing Mark on the motor control center section does not cover the individual units that are installed in the section.

The splice bus for interconnecting horizontal bus of abutting vertical sections in the series is also covered by the section Listing Mark. Each Listed motor control center unit is identified by its own Listing Mark. Only those sections and units that bear the Listing Mark are covered under UL’s Follow-Up Service.

MOTOR CONTROLLERS OVER 1500 V (NJHU)

This listing covers enclosed motor controllers having AC voltage ratings in the range of 2.2 kV to 2.5 kV, 3.8 kV to 5.0 kV or 6.2 kV to 7.2 kV, intended for starting, stopping, regulating, controlling, or protecting electric motors or other electrical loads, including refrigeration equipment.

Equipment covered by this category has been investigated for use on three phase circuits having available fault levels not exceeding the MVA.
rater appearing on the nameplate. The three phase available symmetrical MVA is equal to the product of the available symmetrical rms short-circuit current, the line to line open circuit voltage, and a phase factor of 1.73 X 10-sup(6).

Motor controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, accordingly they are tested at six times the continuous current rating of the controller at rated voltage.

Some motor controllers are provided with an integrally mounted surge arrester to meet the required impulse withstand.

These motor controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

These motor controllers may consist of a single vertical section housing one or more individual controllers or may consist of several abutting vertical sections intended for interconnection by means of a suitable horizontal bus. These vertical sections are normally free standing, however, a single motor controller may be provided in a construction intended for wall mounting.

The basic standard used to investigate products in this category is UL 347, “High Voltage Industrial Control Equipment”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product name: “High Voltage Industrial Control Equipment Accessory”.

### Power Conversion Equipment, Medium Voltage (NJIC)

This Listing covers enclosed power conversion equipment with primary voltage ratings of 1501-7200 volts. Equipment covered by this category supplies power to control a motor or motors operating at a frequency or voltage different than the input supply voltage.

This category also includes power-supply modules, input and output modules, SCR or Transistor output modules, dynamic braking modules, and input/output accessory kits for medium voltage power conversion equipment. This equipment is intended for use in ordinary locations in accordance with the National Electrical Code.

Medium voltage power conversion equipment incorporating overload protection for motor controller is marked to indicate the level of protection provided, i.e., ten times motor full load running current for d-c ratings.

Medium voltage power conversion equipment incorporating overload protection for motor controller is marked to indicate the level of protection provided, i.e., ten times motor full load running current for d-c ratings.

### MOTOR CONTROLLER ACCESSORIES OVER 1500 V (NJI)

This listing covers accessories for field installation in motor controllers having AC voltage ratings in the range of 2.2kV to 2.5kV, 3.8kV to 5.0kV or 6.2kV to 7.2kV. The motor controllers are intended for starting, stopping, regulating, controlling, or protecting electric motors or other electrical loads, including refrigeration equipment.
### Motor Controllers, Float- and Pressure-operated (NKPD)

This listing covers the following devices:

- Float operated switches, including weight-operated switches
- Pressure-operated switches, including vacuum-operated switches

Devices listed in this section are for direct control of motors; for use in control circuits of magnetic motor controllers and the like; and for control of other types of loads.

Unless otherwise marked, these devices are intended for use only with air, water, or other nonhazardous fluids.

### Magnetic (NLDX)

This listing covers the following devices:

- Across-the-line starters
- Reactance type starters
- Resistance type starters
- Solid-state starters

### Motor Controllers, Mechanically-operated and Solid-state (NMFT)

This category covers flow-operated switches, machine-operated switches, soft starters, solid-state starters, solid-state reduced voltage starters, starters, soft starters, and solid-state relays and solid-state speed controls.

These devices are intended for use in control circuits of magnetic motor controllers and the like are covered under Auxiliary Devices (NKCR).

### REBUILT PRODUCTS

This category also covers mechanically-operated and solid-state motor controllers that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt mechanically-operated and solid-state motor controllers are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt mechanically-operated and solid-state

---

**Combination Motor Controllers (NKJH)**

Combination motor controllers provide the motor branch circuit functions of motor controller, disconnect means, short-circuit and ground-fault protection and overload protection. The functions may be provided by individual discrete components or be combined in a single controller unit.

The product is marked “Combination Motor Controller” to signify that all of the motor branch circuit functions indicated above have been evaluated and are included in the Listing of the controller.

An open type combination motor controller is intended for factory installation in a switchboard, motor control center, industrial control panel or the like, or for field installation in an enclosure for industrial control equipment, a cabinet or a cutout box.

Combination motor controllers are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating.

The basic standard used to investigate products in this category is UL 508, “Industrial Control Equipment”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Industrical Control Equipment” or “Ind. Cont. Eq.”.

### ADDITIONAL INFORMATION

- For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NIMX) and Electrical Equipment for Use in Ordinary Locations (AAZ).
- The basic standard used to investigate products in this category is UL 508, “Industrial Control Equipment.”
- UL MARK

**RATING CODES FOR DC CONTROL-CIRCUIT CONTACTS**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Contact Test Current</th>
<th>Max Make or Break</th>
<th>Max Make or Break V Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>125 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N150</td>
<td>10</td>
<td>2.2</td>
<td>—</td>
</tr>
<tr>
<td>N300</td>
<td>10</td>
<td>2.2</td>
<td>1.1</td>
</tr>
<tr>
<td>N600</td>
<td>10</td>
<td>2.2</td>
<td>1.1</td>
</tr>
<tr>
<td>P150</td>
<td>5.0</td>
<td>1.1</td>
<td>—</td>
</tr>
<tr>
<td>P300</td>
<td>5.0</td>
<td>1.1</td>
<td>0.55</td>
</tr>
<tr>
<td>P600</td>
<td>5.0</td>
<td>1.1</td>
<td>0.55</td>
</tr>
</tbody>
</table>

**RATING CODES FOR AC CONTROL-CIRCUIT CONTACTS AT 50 AND 60 Hz**

<table>
<thead>
<tr>
<th>Rating Code</th>
<th>Thermal Continuous Test Current</th>
<th>Max Break</th>
<th>Max Make or Break</th>
<th>Max Make or Break V Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>120 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A150</td>
<td>10</td>
<td>60</td>
<td>60.0</td>
<td>120</td>
</tr>
<tr>
<td>A300</td>
<td>10</td>
<td>60</td>
<td>60.0</td>
<td>120</td>
</tr>
<tr>
<td>A600</td>
<td>10</td>
<td>60</td>
<td>60.0</td>
<td>120</td>
</tr>
<tr>
<td>B150</td>
<td>30</td>
<td>30</td>
<td>30.0</td>
<td>30.0</td>
</tr>
<tr>
<td>B300</td>
<td>30</td>
<td>30</td>
<td>30.0</td>
<td>30.0</td>
</tr>
<tr>
<td>B600</td>
<td>30</td>
<td>30</td>
<td>30.0</td>
<td>30.0</td>
</tr>
<tr>
<td>C500</td>
<td>1.5</td>
<td>300</td>
<td>135</td>
<td>135</td>
</tr>
<tr>
<td>C300</td>
<td>1.5</td>
<td>300</td>
<td>135</td>
<td>135</td>
</tr>
<tr>
<td>C300</td>
<td>60</td>
<td>60</td>
<td>60.0</td>
<td>60.0</td>
</tr>
<tr>
<td>D300</td>
<td>1.0</td>
<td>300</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>E150</td>
<td>0.5</td>
<td>150</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>

Note: The numerical suffix designates the maximum voltage design values which are to be 600 V, 300 V and 150 V for suffixes 600, 300 and 150, respectively.

Note: For maximum ratings at 300 V or less, the maximum make and break ratings are to be obtained by dividing the volt-ampere rating by the application voltage, but are not to exceed the thermal continuous test current.
motor controllers are subject to the same requirements as new mechanically-operated and solid-state motor controllers.

**ADDITIONAL INFORMATION**

For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NMIX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 508, “Industrial Control Equipment.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Industrial Control Equipment” (or “Ind. Cont. Eq.”). For rebuilt products the word “Rebuilt,” “Remanufactured” or “Reconditioned” precedes the product name.

---

### Power Conversion Equipment (NMMS)

**GENERAL**

This category covers equipment that supplies power to control a motor or motors operating at a frequency or voltage different than the input supply voltage. This category also includes power-supply modules, input and output modules, SCR or transistor output modules, dynamic braking modules, and input/output accessory kits for power conversion equipment. Power conversion equipment may be of the open or enclosed type. This equipment is intended for use in unclassified (ordinary) locations in accordance with Articles 430 and 440 of ANSI/NFPA 70, “National Electrical Code.”

Power conversion equipment incorporating overload protection for motors and not intended for remote or external motor overload protection is marked to indicate the level of protection provided in percent of full load current. Where such protection is adjustable, a marking with instructions for adjustment is provided. Equipment not providing motor overload protection is marked to indicate motor protection such as thermal overload relays, or a thermally protected motor must be otherwise provided.

Power conversion equipment is marked with input and output electrical ratings.

**ADDITIONAL INFORMATION**

For additional information, see Motor Controllers (NJOT), Industrial Control Equipment (NMIX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 508C, “Power Conversion Equipment.” Equipment intended to provide a primary, secondary, or primary and secondary power source to nonspecific loads in parallel or separate from the utility is investigated in accordance with UL 1741, “Inverters, Converters, and Controllers for Use in Independent Power Systems,” and covered under Static Inverters and Converters for Use in Independent Power Systems (QKH). Examples of this equipment are Utility Interactive, Standby Static Inverters and Converters for Use in Independent Power Systems. This category also includes power supplies, central processing units, input and output modules, SCR or transistor output modules, dynamic braking modules, and input/output accessory kits for power conversion equipment. Power conversion equipment may be of the open or enclosed type. This equipment is intended for use in unclassified (ordinary) locations in accordance with Articles 430 and 440 of ANSI/NFPA 70, “National Electrical Code.”

Power conversion equipment incorporating overload protection for motors and not intended for remote or external motor overload protection is marked to indicate the level of protection provided in percent of full load current. Where such protection is adjustable, a marking with instructions for adjustment is provided. Equipment not providing motor overload protection is marked to indicate motor protection such as thermal overload relays, or a thermally protected motor must be otherwise provided.

Power conversion equipment is marked with input and output electrical ratings.

### PROGRAMMABLE SAFETY CONTROLLERS (NRGF)

**USE**

This category covers control equipment incorporating software for use in safety-related functions. These devices are primarily intended to detect unsafe conditions, to alert operators, and/or take action based on out-of-specification parameters to place the equipment-under-control or system into a safe configuration. These devices may additionally have facilities for performing functions such as logic, sequencing, counting, and controlling various industrial equipment through digital or analog inputs or outputs. These devices may also include power supplies, central processing units, input and output accessories, computer interfaces and programming or program diagnostic units associated with programmable control systems.

**INSTALLATION INSTRUCTIONS**

These products fulfill their safety-related function only when used in accordance with the manufacturer’s instructions. The equipment covered under this category has been found suitable for the implementation of safety-related control functions with a safety integrity level as stated in the manufacturer’s documentation and as defined in International Electrotechnical Commission Standard IEC 61508, “Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems.”

**RATINGS**

All products covered in this category are marked with their electrical ratings. Output devices may have more than one rating. At least one rating is marked on the output device and additional ratings may be marked on an instruction sheet referenced on the output device.

**RELATED PRODUCTS**

This category does not cover programmable devices whose primary function is the control of industrial equipment. For those controls, see Programmable Controllers (NRAQ).

**ADDITIONAL INFORMATION**

For additional information, see Industrial Control Equipment (NMIX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 508, “Industrial Control Equipment.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Industrial Control Equipment” (or “Ind. Cont. Eq.”).
INDUSTRIAL CONTROL EQUIPMENT, PROGRAMMABLE CONTROLLERS CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (NWCS)

This category covers products that have been investigated in accordance with IEC 204-1, Electrical Equipment of Industrial Machines. These products may also be provided with a Listing Mark of Industrial Control Equipment, Programmable Controllers. For additional information, see the Electrical Construction Equipment Directory.

INDUSTRIAL CONTROL EQUIPMENT

This category covers products which are also Listed, the Classification Marking includes the appropriate Listing Mark and the statement: “Also Classified by Underwriters Laboratories Inc. in accordance with IEC Publication 204-1.”

For those products which are not also Listed, the Classification Marking consists of the statement: “Classified by Underwriters Laboratories Inc. in accordance with IEC Publication 204-1 and a control number. Additionally, the Classification Marking may include the symbol UL in a circle in conjunction with the word "CLASSIFIED".

INSTRUMENTATION TRAY CABLE (NYTT)

GENERAL

This category covers Type ITC instrumentation tray cable for use only in industrial establishments in accordance with Article 727 of ANSI/NFPA 70, “National Electrical Code” (NEC). The cable consists of two or more insulated copper or thermocouple alloy conductors enclosed within a nonmetallic jacket. The cable may have a metal sheath or armor over the nonmetallic jacket, and may contain grounding conductors and/or optical fiber members.

The cable is rated 300 V and is intended for use on circuits rated 150 V or less and 5 A or less. The cable is Listed in conductor sizes 22 AWG to 12 AWG. Conductor sizes within a cable may be mixed.

Regarding cable seals outlined in Article 501 of the NEC, Type ITC cable has a sheath which is considered to be gas/vapor tight but the cable has not been investigated for inability to transmit gases through its core.

PRODUCT MARKINGS

The cable identification “TYPE ITC” and other markings are visible on the surface of the nonmetallic jacket.

Cable with thermocouple alloy conductors is intended for thermocouple extension use only and is so marked or has the marking “THCPL EXTN.”

The temperature rating of the cable is 60°C unless otherwise marked on the cable.

Cable containing optical fiber members is identified with the suffix “OF.”

Cable that has been evaluated in accordance with the Limited Smoke Test requirements specified in UL 1685, “Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables” is marked with the suffix “LS.”

Cable investigated for direct burial in the earth is marked “DIRECT BURIAL.” or “DIR BUR.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AAALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2250, “Instrumentation Tray Cable.”

The basic standard used to investigate products in this category is UL 2250, “Electric Industrial Control Equipment”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Industrial Control Equipment” (or “Ind. Cont. Eq.”).


The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Programmable Safety Controller” or “Safety Related Control Device” (or “SRCD”).

SWITCHES, INDUSTRIAL CONTROL (NRNT)

This listing cover the following products:

Magnetically operated switches
Manually operated switches
Meter switches
Photoelectric switches
Solid state switches
Switches rated in horsepower and with or without pilot duty ratings for use in control circuits are listed under “Motor Controllers.”

Open type switches are listed for use as parts of equipment where the acceptability of the combination has been determined by Underwriters Laboratories Inc. or where open type switches may be employed.

Switches have been tested to determine their acceptability for continuous operation at their marked rated load.
This category covers irrigation cable for use with electrically driven or controlled irrigation machines in accordance with Article 675 of ANSI/NFPA 70, “National Electrical Code.”

Irrigation cable used to interconnect enclosures on the structure of an irrigation machine or assembly of stranded, insulated conductors with nonhygroscopic fillers in a core of moisture and flame resistant, nonmetallic material overlaid with a metallic covering and jacketed with a moisture, corrosion and sunlight-resistant nonmetallic material. Irrigation cable is suitable for direct burial in the earth and may, optionally, be marked.

This cable may consist of a composite of power, control and grounding conductors in sizes 18 AWG and larger, stranded copper, and is rated 75°C and 600 V.

**RELATED PRODUCTS**

Fittings for use with this cable are covered under Outlet Bushings and Fittings (QCRV).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in Subject 1263, “Outline of Investigation for Irrigation Cables.”

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel, or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Irrigation Cables.”

**IRRIGATION CABLE ASSEMBLIES (OFJZ)**

This listing covers Irrigation Cable Assemblies consisting of Listed Irrigation Cable terminated at each end in special purpose fittings, for use with Irrigation Equipment in accordance with Article 675 of the National Electrical Code. These assemblies are connecting devices used to interconnect multiple parts of irrigation equipment as permitted by the National Electrical Code.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Irrigation Cable Assembly.”

**LAMPHOLDERS (OIMZ)**

**LAMPHOLDERS, ELECTRIC DISCHARGE (OJAX)**

Lampholders, Electric Discharge, More Than 1000 V (OJOV)

**USE**

This category covers lampholders and electrode receptacles for use with electric discharge lamps and tubes.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 542, “Lampholders, Starters, and Starter Holders for Fluorescent Lamps” and UL 879, “Electrode Receptacles for Gas-Tube Signs.”

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Lampholder” or other appropriate product name as shown in the individual Listings.

**Lampholders, Electric Discharge, 1000 V or Less (OKCT)**

This listing covers lampholders and combination lampholders with starter holders for use with electric discharge or fluorescent lamps. Separate starter holders are Listed under Electric Discharge Lamp Control Equipment — Holders for Automatic Starters.
The basic standard used to investigate products in this category is UL 542, “Lampholders, Starters, and Starter Holders for Fluorescent Lamps.”

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Lampholder,” “Electric Discharge Lampholder,” or other appropriate product name.

**LAMPHOLDERS, FITTINGS (OKQR)**

This listing covers attachments and parts for use with screw-shell lampholders to modify the lampholders for certain conditions of usage.

**LAMPHOLDERS, INCANDESCENT (OLDZ)**

**Lampholders, Adapters (OLRX)**

**GENERAL**

This category covers screw-shell lamp adapters. Included are male-to-female screw-shell adapters and screw-shaft adapters provided with attachment plug blades or receptacles.

**RELATED PRODUCTS**

For plug-in devices with a lampholder intended to be used as a night-light, see Nightlights (OQY).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AAZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 496, “Edison-Base Lampholders.”

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Lampholder Fitting,” “Shadeholder,” or other appropriate product name.

**LAMPHOLDERS, CANDELABRA AND MINIATURE (OMFV)**

**GENERAL**

This category covers screw-shell lampholders of the candelabra and miniature base sizes. Candle lampholders are those having exposed wiring terminals or other live parts intended for use with a close fitting, nonmetallic outer decorative casing, which is used in addition to the paper covering on the screw-shell and terminals, to enclose the entire lampholder and provide the required depth of lamp cavity.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AAZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 496, “Edison-Base Lampholders.”

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Adapter,” “Lampholder Adapter” or “Incandescent Lampholder Adapter,” or other appropriate product name as shown in the individual Listings.

**Lampholders, Intermediate Base (OMT)**

This listing covers screw-shell lampholders of the intermediate base size.

Lampholders, Medium Base (ONHR)

This listing covers screw-shell lampholders of the medium and intermediate base sizes.

**ADDITIONAL INFORMATION**

The basic standard used to investigate products in this category is UL 496, “Edison-Base Lampholders.”

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Lampholder,” “Intermediate Lampholder,” “Incandescent Lampholder.”

**Lampholders, Mogul Base (OUNU)**

This listing covers screw-shell lampholders of the mogul base size.

Switched lampholders are tested on circuits involving a potential to ground of 125 volts.

The basic standard used to investigate products in this category is UL 496, “Edison-Base Lampholders.”

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Lampholder,” “Mogul Lampholder,” “Incandescent Lampholder.”

**Lampholders, Miscellaneous (OOUX)**

This listing covers lampholders for lamps which employ other than the usual screw-shell bases or are designed for specialized uses.

The basic standard used to investigate products in this category is UL 496, “Edison-Base Lampholders.”

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Lampholder,” “Miscellaneous Lampholder,” “Incandescent Lampholder.”

**LIGHTING AND POWER EQUIPMENT, AUXILIARY (OUST)**

**USE AND INSTALLATION**

This category covers equipment to be used in conjunction with a facility emergency lighting and power system. This equipment has not been evaluated for compliance with the performance criteria of Article 700 of the National Electrical Code (ANSI/NFPA 70), the Life Safety Code.
LIMITED COMBUSTIBLE CABLE (OWKZ)

This category covers electrical and optical fiber cable that meets the limited combustible and smoke developed requirements for cable in ceiling cavity and raised floor plenums in accordance with NFPA 90A, “Standard for the Installation of Air Conditioning and Ventilating Systems.” This cable also meets the requirements for cable used in ducts, plenums and other spaces used for environmental air in accordance with Articles 725, 760, 770, 800, 820 and 830 of ANSI/NFPA 70, “National Electrical Code.”
This listing covers low voltage power switching devices which are sub-classified into low voltage AC power circuit breakers, low voltage DC power circuit breakers, low voltage AC power circuit protectors, low voltage AC integrally fused power circuit breakers and low voltage power switching device adapters.

The low voltage power switching devices have been investigated for continuous duty at 100 per cent of their current ratings and are designed to provide service entrance, feeder, or branch circuit protection. They may be manually and/or electrically operable.

Low voltage power switching devices, enclosures, and adapters as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings may be independent of any marking for current-carrying conductors and are on a wiring diagram or other readily visible location.

Stationary equipment is normally bus connected. However, terminal pads are provided which can accommodate field installed pressure wire connectors.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60°C wire in circuits rated 100 amp or less and on the use of 75°C wire for higher amp rated circuits. Low voltage power switching devices that have been found to be suitable for use with an accessory are marked to indicate the accessory(s), the electrical rating and proper connections (if not obvious).
LOW VOLTAGE AC POWER CIRCUIT BREAKERS (PAQX)

This category covers low voltage power circuit breakers specifically designed to provide service-entrance, feeder, or branch circuit protection or serve as a disconnecting means and also covers power circuit breaker enclosures. They are covered by the classifications indicated by the label designation as follows:

- "Low voltage AC power circuit breaker" — without enclosure, and with or without non-interchangeable trip devices.
- "Low voltage AC power breaker frame" — frame only of power circuit breaker with provision for interchangeable trip devices. A Listed "Low voltage AC power breaker frame" is Listed for use only with Listed "Low Voltage AC power circuit breaker trip device'.
- "Low voltage AC power circuit breaker trip device" — trip device only of power circuit breaker having provisions for interchangeable trip devices.
- "Low voltage AC power switching device enclosure" — enclosure only for individual 1-, 2- or 3-pole power circuit breaker.

Low voltage AC power circuit breakers are marked with maximum voltage, frequency, continuous current, short-time current, short circuit current (interrupting rating) and control voltage ratings. The short-time current rating is the designated limit of fault current that the low voltage AC power circuit breaker can successfully carry for a short interval. Other rating information such as the nominal design voltage, and time-delay overcurrent trip setting may be provided.

The short-circuit current rating of a low voltage ac power circuit breaker may be extended by connecting a low voltage ac fuse draw out in series. When such connection is used, the circuit breaker is provided with means for tripping by way of a signal from an open fuse trip device. The open fuse trip device may be either on the fuse draw out or on the circuit breaker. Circuit breakers are marked with the catalog or type designation of the fuse draw out with which they are intended to be used.

The frame size determines the maximum continuous current rating for all parts of a low voltage AC power circuit breaker except the coils of the direct acting trip device. The rating of the trip device determines the actual continuous current rating.

The trip devices may contain ground-fault current, long time delay overcurrent, short-time delay overcurrent and instantaneous overcurrent trip elements which may be adjustable. The tolerance of the marked position of the long time delay overcurrent trip setting is plus or minus ten percent. A ground fault current trip element is one that functions at all values of current at or above a predetermined value of fault current to ground.

An instantaneous overcurrent trip element is one that functions with a purposely delayed action at all values of current at or above a predetermined value of overcurrent.

A long time overcurrent trip element is one that functions with a purposely delayed action at all values of current between a predetermined value of overcurrent and the short time or instantaneous pick-up settings of the circuit breaker.

A short time overcurrent trip element is one that functions with a purposely delayed action at all values of current between a predetermined value of overcurrent and the short time current rating of the circuit breaker.

Circuit breakers without trip devices cannot of themselves respond to overcurrent, short circuit or ground faults and are marked: "No Over-Current Protection Provided" or "If Over-Current Protection is Required, Use With Type Protective Relays". Circuit breakers without trip devices can respond to overcurrent when properly connected to protective relays.

For additional information, see Low Voltage Power AC Switching Devices.

The basic standards used to investigate products in this category are UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used In Enclosures", ANSI C37.13, and ANSI C37.50.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Low-Voltage AC Power Circuit Breaker", "Low Voltage AC Power Breaker Frame", "Low Voltage AC Power Circuit Breaker Trip Unit", "Low Voltage AC Power Switching Device Enclosure".

Secondary Network Protectors (PARZ)

USE

This category covers secondary network protectors for use in spot or grid networks rated 600 V or less. These protectors consist of a circuit breaker and its control equipment. They are used for automatically disconnecting a transformer from a secondary network in response to predetermined electrical conditions on the primary feeder or transformer. They are also used for connecting a transformer to a secondary network either through manual control or automatic control responsive to predetermined electrical conditions on the feeder and the secondary network.

PRODUCT MARKINGS

Each secondary network protector is marked with the company name, model number and its electrical ratings, which includes the maximum short circuit rating of the device.

ADDITIONAL INFORMATION

For additional information, see Low Voltage AC Power Circuit Breakers (PAQX), Low Voltage AC Power Switching Devices (PAPU) and Electrical Equipment for Use in Ordinary Locations (ALAZ).

REQUIREMENTS

The basic standard used to investigate products in this category is IEEE C37.12-44, “IEEE Standard Requirements for Secondary Network Protectors.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED,” a control number, and the product name “Secondary Network Protector.”

LOW VOLTAGE AC INTEGRALLY FUSED POWER CIRCUIT BREAKERS (PASQ)

This listing covers low voltage AC integrally fused power circuit breakers rated 600 volts maximum. Low voltage AC integrally fused power circuit breakers include all the mechanical features of low voltage AC power circuit breakers and in addition have current limiters or current limiting fuses which function to increase the fault current interrupting rating of the low voltage AC integrally fused power circuit breakers.

These devices have been investigated for use on circuits having available fault currents of 200,000 rms symmetrical amps, maximum, three-phase. Low voltage AC integrally fused circuit breakers are marked with maximum voltage, frequency, continuous current, short-circuit current (interrupting rating) and control voltage ratings. Other rating information such as the nominal design voltage and time-delay overcurrent tripping setting may be provided.

In addition to overcurrent trip elements of the low voltage AC power circuit breaker, these are provided with anti-single phase tripping device which automatically opens the circuit breaker contacts in response to circuit interruption by the current limiter or the current limiting fuse.

The basic standards used to investigate products in this category are UL 1066, "Low-Voltage AC and DC Power Circuit Breakers Used In Enclosures", ANSI C37.13, and ANSI C37.50.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED,” a control number, and the product name “Low Voltage AC Integrally Fused Power Circuit Breaker.”

LOW VOLTAGE AC POWER CIRCUIT PROTECTORS (PATT)

This listing covers low voltage AC power circuit protectors rated 240 volts or 480 volts, and have been investigated for use on circuits having available fault currents of 200,000 rms symmetrical amps maximum, three-phase.

The low voltage AC power circuit protector consists of a low voltage AC power circuit breaker that has been modified to omit the direct acting tripping devices and to include a Class I current limiting fuse in series with the load terminals of each pole.

The low voltage AC power circuit protectors are marked with maximum voltage, frequency, continuous current, short-circuit current and control voltage(s) ratings. Other rating information such as switching current rating may be provided.

The basic standards used to investigate products in this category are ANSI C37.29 and ANSI C37.52.

For additional information, see Low Voltage AC Power Switching Devices.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED,” a control number, and the product name “Low Voltage AC Power Circuit Protector.”

LOW VOLTAGE DC POWER CIRCUIT BREAKERS (PAWX)

This listing covers low voltage DC power circuit breakers specifically designed to provide service-entrance, feeder or branch circuit protection.
Low voltage DC power circuit breakers are separated into three types: general purpose, high speed and semi-high speed. These products are marked with rated maximum voltage, rated continuous current, rated momentary current (when applicable), rated peak current (when applicable), rated short-time current, rated short-circuit current and rated control voltage. These products are intended to be used in Listed enclosures or switchboards with Recognized or Listed adapters.

**TRIP DEVICES CLASSIFIED FOR USE IN LOW VOLTAGE DC POWER CIRCUIT BREAKERS (PAYK) USE**

This category covers trip devices suitable for use in place of the original trip device of a Low Voltage AC Power Circuit Breaker. This category covers only the trip device in its ability to sense and respond to overcurrent and fault current conditions. It does not cover the circuit breaker on which the trip device is mounted. For additional information see the Electrical Equipment for Use in Ordinary Locations (AAZL) and Low Voltage AC Power Circuit Breakers (PAQX).

**REQUIREMENTS**


**LOOK FOR CLASSIFICATION MARKING ON PRODUCT**

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Inc. to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Low Voltage DC Power Circuit Breaker”.

**MANAGEMENT EQUIPMENT, ENERGY (PAZX)**

**USE**

This category covers energy management equipment that energizes or de-energizes electrical loads to achieve the desired use of electrical power. This equipment normally controls electrical loads by responding to sensors or transducers monitoring power consumption, by sequencing, by cycling the loads through the use of preprogrammed data logic circuits, or any combination thereof. Devices responding to signals from a utility company may receive the signals over the power lines or as radio signals.

**UNEVALUATED FACTORS**

The effects of the controls on the performance ratings of the connected loads have not been evaluated.

**PRODUCT MARKINGS**

“Energy Management Equipment Enclosure,” “Energy Management Equipment Subassembly” and “Energy Management Equipment Accessory” require modular labeling. The marking on the individual subassembly, or smallest combination of subassemblies that may be employed to comprise the system unit.

**RELATED PRODUCTS**

Signal system units incorporating energy management systems are covered under Signal System Units (UDTZ) in the Electrical Appliance and Utilization Equipment Directory. Switching devices operated by a clock mechanism and other similar type products used to energize or de-energize loads are covered under Switches, Clock-operated (WZGR).

**MARINA AND BOATYARD CABLE (PDYQ)**

**USE**

This category covers cable intended for use as flexible branch circuit and feeder wiring in marinas and boatyards in accordance with Article 555 of ANSI/NFPA 70, “National Electrical Code.” The cable is rated 600 V, 75°C and is suitable for exposure to sunlight, fresh water, salt water, gasoline, diesel fuel and lubricating oil.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AAZL) and Marine Products (AAMP).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 83, “Thermoplastic Insulated Wire.”

**UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Marina and Boatyard Cable.”

**MEDIUM-VOLTAGE CABLE (PITY)**

**GENERAL**

This category covers medium-voltage cable rated 5000 to 35,000 V intended for use and installation in accordance with Article 328 of ANSI/NFPA 70, “National Electrical Code” (NEC).

The cable is single or multiconductor, aluminum or copper, with solid extruded dielectric insulation and may have an extruded jacket, metallic covering or combination of both over the single conductors or over the assembled conductors in a multiconductor power cable.

All insulated conductors rated higher than 8000 V have electrostatic shielding. Cable rated 5000 or 8000 V may be shielded or nonshielded.

Nonshielded cable is intended for use where conditions of maintenance and supervision ensure that only competent individuals service and have access to the installation.

**PRODUCT MARKINGS**

Shielded cable is marked “MV-90” or “MV-105” and is suitable for use in wet or dry locations at 90 or 105°C.

Nonshielded cable is marked either “MV-90” indicating suitability for use in wet or dry locations at 90°C maximum, or “MV-90 Dry Locations Only” indicating suitability for use only in dry locations at 90°C maximum.

Cable marked “oil resistant I” or “oil resistant II” is suitable for exposure to mineral oil at 60°C or 75°C, respectively.

Cable marked “sunlight resistant” may be exposed to the direct rays of the sun.

Cable intended for installation in cable trays in accordance with Article 392 of the NEC is marked “for CT Use” or “for use in cable trays.”

Cable with aluminum conductors is marked with the word “aluminum” or the letters “AL.”

The cable is marked with the conductor size, voltage rating and insulation level (100 percent or 133 percent).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AAZL).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1072, “Medium-Voltage Power Cables.”
### MEDIUM-VOLTAGE CABLE CLASSIFIED IN ACCORDANCE WITH UL 1072, WITH METRIC CONDUCTOR SIZES (PIVW)

#### GENERAL

This category covers medium-voltage cable rated 2001 to 35,000 V and in conductor sizes 10 through 500 sq mm. The cable complies with all requirements specified in UL 1072. “Medium-Voltage Power Cables,” except that metric conductor sizes are used instead of AWG sizes. The cable is for use in jurisdictions where metric conductor sizes are required or permitted. The cable is single or multi-conductor, aluminum or copper, with solid extruded dielectric insulation. An extruded jacket, metallic covering, or combination of both may be provided over single conductors or over the assembled conductors in a multi-conductor power cable.

All insulated conductors rated 8001 V and higher have electrostatic shielding. Cable rated 1000 to 8000 V may be shielded or nonshielded. Nonshielded cable is intended for use where conditions of maintenance and supervision ensure that only competent individuals service and have access to the installation.

#### PRODUCT MARKINGS

Shielded cable is marked “MV-90” or “MV-105” and is suitable for use in wet or dry locations at 90°C or 105°C. Nonshielded cable is marked either “MV-90” indicating suitability for use in wet or dry locations at 90°C maximum, or “MV-90 Dry Locations Only.”

Cable marked “oil resistant I” or “oil resistant II” is suitable for exposure to mineral oil at 60°C or 75°C, respectively. Cable marked “sunlight resistant” may be exposed to the direct rays of the sun.

Cable intended for installation in cable trays is marked “For CT Use” or “For Use In Cable Trays.”

Cable with aluminum conductors is marked with the word “Aluminum” or the letters “AL.” Cable is marked with conductor size in sq mm, voltage rating and insulation level (100 percent or 133 percent).

#### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### REQUIREMENTS

The basic standard used to investigate products in this category is UL 1072, “Medium-Voltage Power Cables.”

#### UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product, the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products shall only be as illustrated below:

#### MEDIUM VOLTAGE CABLE CLASSIFIED BY UNDERWRITERS LABORATORIES INC. IN ACCORDANCE WITH UL 1072, WITH METRIC CONDUCTOR SIZES

**Control No.**

---

### METAL-CLAD CABLE (PJAZ)

#### GENERAL

This category covers Type MC metal-clad cable. It is rated for use up to 2000 V, and Listed in sizes 18 AWG through 3000 kcmil for copper, 12 AWG through 2000 kcmil for aluminum, or copper-clad aluminum, and employs thermoset or thermoplastic insulated conductors. It is intended for installation in accordance with Article 330 of ANSI/NFPA 70, “National Electrical Code” (NEC). The cable consists of one or more insulated conductors; one or more grounding conductors (required for interlocked armor, as needed for smooth or corrugated tube); one or more optional optical fiber members; and an overall metal sheath. The metal sheath is an interlocked metal tape, a corrugated metal tube, or a smooth metal tube. The metal sheath of single-conductor cable is nonferrous. A nonmetallic jacket may be provided under and/or over the metal sheath. Cable with metal armor, rated 5000 to 35,000 V is covered under Medium-voltage Cable (PITT) and is marked “Type MV or MC.”

Cable with interlocked armor that has been determined to be suitable for use as a grounding means, for interlocked armor in direct contact with a single, fully-sizes, bare aluminum grounding/bonding conductor. This cable is marked to indicate that the armor/grounding conductor combination is suitable for ground. The equipment grounding conductor required within all other cable with interlocked armor may be insulated or bare, may be sectioned, and is located in the cable core but not in contact with the armoring. Any additional grounding conductors of either design have green insulation. One insulated grounding conductor may be unmarked, one other may have only a yellow stripe and the balance have surface markings that indicate they are additional equipment grounding conductors or isolated grounding conductors.

The sheath of the smooth or corrugated tube Type MC cable or a combination of the sheath and a supplemental bare or unstripped green insulated conductor is suitable for ground as the ground path required for equipment grounding. The supplemental grounding conductor may be sectioned. When sectioned, all sections are identical. Each additional green insulated conductor has either a yellow stripe or a surface marking or both to indicate that it is an additional equipment or isolated grounding conductor. Additional grounding conductors, however marked, are not smaller than the required grounding conductor.

#### PRODUCT MARKINGS

Information regarding temperature rating, voltage rating, cable and conductor Type and AWG size is shown either on a marker tape under the armor or on the surface of a nonmetallic jacket, if used.

Copper-clad aluminum conductors are surface printed “AL (CU-CLAD)” or “Cu-clad Al.” Aluminum conductors are surface printed “Al.” Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by “compact copper.” The abbreviations “CMPT” and “Cu” may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: “terminate with connectors identified for use with compact-stranded copper conductors.”

For termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### REQUIREMENTS

Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked. Cable marked for direct burial is also considered acceptable for encasement in concrete.

Cable marked “Oil Resistant I” or “Oil Res I” is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked “Oil Resistant II” or “Oil Res II.”

Cable containing one or more optical fiber members is marked “MC-O.”

Cable with a nonmetallic outer jacket that complies with the Limited Smoke Test requirements specified in UL 1685, “Vertical-Flat Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables,” and all unjacketed metal-clad cable may be marked with the suffix “LS.”

Cable with an interlocked armor that is intended as a ground path is marked “armor is ground path component,” and is provided with installation instructions.

#### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name as appropriate: Metal-clad cable that contains copper or copper-clad aluminum conductors has the product name “Metal-clad Cable”; metal-clad cable that contains aluminum conductor has the product name “Metal-clad Aluminum Cable.”

### METAL-CLAD CABLE CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (PJHY)

This category covers Listed products that have also been investigated in accordance with IEC 332-3, Tests on Electric Cables Under Fire Conditions;
METAL-CLAD CABLE CONNECTORS, TYPE MC (PJOX)

GENERAL

This category covers fittings for use with metal-clad cable, Type MC, employing (a) interlocking aluminum or steel tape, (b) smooth aluminum tube or (c) corrugated aluminum or copper tube. This product is intended for installation and use in accordance with the following information and the limitations specified in Metal-clad Cable (PZAZ).

Connector Selection — Connectors are intended to be selected in accordance with the size and type of cable for which they are designated. Bronze connectors are intended for use only with cable employing corrugated aluminum connectors for use with cable employing corrugated aluminum, interlocking aluminum or smooth aluminum tube, unless marked otherwise on the product (see PRODUCT MARKINGS below).

Use in Concrete — Fittings made of aluminum are not considered suitable for use in concrete or cinder fill unless protected with asphalt paint or the equivalent. Fittings suitable for use in concrete are identified by a marking on the carton.

Grounding — Metal-clad cable connectors for use with corrugated aluminum or copper tube, or smooth aluminum tube, are considered suitable for grounding for use in circuits over 250 V and under 1000 V where installed in accordance with ANSI/NFPA 70, “National Electrical Code.”

Dry and Wet Locations — Nonmetallic parts, such as glands or seals, are suitable for use at a temperature of 90°C in dry and wet locations. The fittings are suitable for use in dry or wet locations unless marked otherwise (see PRODUCT MARKINGS below).

Use with Armored Cable — Metal-clad cable connectors also suitable for use with armored cable, Type AC, are so marked on the device or carton.

Listed armored cables, Type AC, are covered under Armored Cable Connectors, Type AC (AWSX).

PRODUCT MARKINGS

Metal-clad cable fittings or the smallest unit shipping cartons are marked with (1) the range of cable diameters and the type of cable sheath (corrugated, interlocking or smooth), (2) the material of the sheath (aluminum, copper or steel) for which they have been investigated, (3) “Concrete-tight” if suitable for use in poured concrete, and (4) “For Type AC Cable” (or equivalent wording) if suitable for that use. Metal-clad cable fittings suitable for use only in dry locations are marked “Dry Locations” on the device and smallest unit carton.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, "Conduit, Tubing, and Cable Fittings.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Metal-clad (Type MC) Cable Connector.”

METAL-CLAD CABLE CLASSIFIED IN ACCORDANCE WITH UL 1569, WITH METRIC CONDUCTOR SIZES (PJPJ)

GENERAL

This category covers Type MC metal-clad cable. It is rated for use up to 2000 V, 60 Hz. Clad conductors in sizes 1.5 through 35 sq mm aluminum or copper-clad aluminum and employs thermoset or thermoplastic insulated conductors.

The cable complies with all the requirements specified in UL 1569, “Metal-Clad Cables,” except that metric conductor sizes are used instead of AWG/kcmil sizes. This cable is for use in jurisdictions where metric conductor sizes are required or permitted.

Type MC cable is of three types: (a) interlocked metal tape, (b) corrugated tube and (c) smooth tube, and all are intended for aboveground use except when marked for direct burial.

The armor of the interlocked metal tape type may or may not be used for grounding. Interlocked armor constructions that may be used as a ground path have a grounding/bonding conductor outside the cable core and in direct contact with the armor. Interlocked armor constructions that are not intended as a ground path have a grounding conductor inside the cable core and not in contact with the armor.

The tube of corrugated or smooth tube Type MC cable in combination with the equipment grounding conductor, when provided, is suitable for grounding; otherwise the tube by itself is suitable for grounding.

PRODUCT MARKINGS

Information regarding temperature rating, voltage rating, cable and conductor Type and sq mm size is shown either on a marker tape under the armor or on the surface of a nonmetallic jacket, if used.

Copper-clad aluminum conductors are surface printed “AL (CU-CLAD)” or “Cu-Clad AL.” Aluminum conductors are surface printed “AL.”

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by “compact copper.” The abbreviations “CMFT” and “CMF” may be used for compact copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: “Terminate with connectors identified for use with compact-stranded copper conductors.”

Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked.

Cable marked “Oil Resistant I” or “Oil Res I” is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked “Oil Resistant II” or “Oil Res II.”

Cable with an interlocked armor that is intended as a ground path is marked “armor is grounding path component,” and is provided with installation instructions.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1569, “Metal-Clad Cable.”

UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product, the attached tag, the reel, or the smallest unit container in which the product is packaged in the cartons, is so marked on the device or cartons provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products shall only be as illustrated below using the appropriate product name: Metal-clad cable that contains copper or copper-clad aluminum conductors has the product name “Metal-Clad Cable” metal-clad cable that contains aluminum conductors has the product name “Metal-Clad Aluminum Cable.”

PRODUCT NAME

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.

IN ACCORDANCE WITH UL 1569, WITH METRIC CONDUCTOR SIZES

Control No.

METER MOUNTING EQUIPMENT (PJSR)

Meter mounting equipment consists of an enclosure, wiring terminals and provision for fastening of the meter to the equipment. Meter mounting equipment does not include overcurrent devices, normally arcing parts, or the like. It may include provisions for current transformers but not the transformers.

Meter mounting equipment having provision for current transformers is marked to indicate the maximum transformer current rating.

Meter mounting equipment accommodating two or more meters is marked with an overall amp rating.

Meter mounting equipment Listed herein is for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking will be on a wiring diagram or in another readily visible location, and will be independent of any marking on a terminal connector unless the terminal connector is an integral, non-removable part of the meter socket jaw.

Wire connectors in Listed meter mounting equipment are intended to accommodate one conductor only unless use with more than one conductor is clearly indicated on the wiring diagram or other readily visible location.
Unless the equipment is marked with both the size and temperature rating of wire to be used the termination provisions are based on the use of 75°C ampcapities for wire.

Meter mounting equipment is marked with the enclosure type described in guide AALZ installation.

Meter mounting equipment with a mounting post is intended to be mounted in concrete at grade level or below, or is intended to be secured to some other mounting support. The mounting post is marked to indicate the proper ground location.

Meter mounting equipment with a mounting pedestal is intended to be mounted on a concrete slab.

Meter mounting equipment with a mounting post or pedestal either has ventilation to inhibit condensation or is provided with instructions for the use of sealing facilities.

Unless marked otherwise, meter mounting equipment with a post or pedestal is not intended to serve as the sole support of a mast for overhead wiring.

**METER FITTINGS (PJVV)**

Meter fittings are designed to accommodate bolt in type watt-hour meters and similar meters.

Ratings of Listed meter fittings are limited to 600 V, ac, maximum and to 400 amp maximum.

Meter fittings are marked with their short circuit withstand RMS symmetrical current rating in amps. For short circuit ratings exceeding 10kA, the marking will include the type and rating of overcurrent protection to be used with the meter fitting.

For additional information, see Meter Mounting Equipment.

The basic standard used to investigate products in this category is UL 414, “Meter Sockets”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Meter Fitting”.

**METER SOCKET BASES (PJW7)**

Meter socket bases are bases intended to accommodate plug-in type watt-hour and similar meters rated for use with current transformers. They are designed to be installed, with the meter, inside enclosures to allow for connection in accordance with the National Electrical Code.

Meter socket bases are rated 600 V, AC max. Meter socket bases rated over 30 A are marked with their short circuit withstand RMS symmetrical current ratings in amps. For short circuit current ratings exceeding 10 kA, the marking includes the type and rating of overcurrent protection to be used with the meter socket.

Meter socket bases are marked with a continuous amp rating and may, in addition, have a maximum use (intermittent) rating of not more than 125 percent of the continuous amp rating.

Meter sockets with meters protruding through the enclosure are Listed under the category of “Meter Sockets” (PJZZ).

The basic standard used to investigate products in this category is UL 414, “Meter Sockets”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Unenclosed Meter Socket”.

**METERING TRANSFORMER CABINETS (PJXS)**

Metering transformer cabinets consist of an enclosure and provisions for accommodating current Transformers. They do not include the current transformers. They may have provision for the mounting of plug-in type watt-hour meters. They may also include wiring terminals and buses to accommodate bus type current transformers.

Metering transformer cabinet interiors are intended for field installation into enclosures. Unmarked for use in a specific enclosure, wiring space has not been investigated.

Ratings of Listed metering transformer cabinets and interiors are limited to 600 V AC maximum and to 6000 A maximum.

Metering transformer cabinets intended for use with specific metering transformer cabinet interiors and the interiors themselves are marked with their short circuit withstand RMS symmetrical current rating in amperes.

For additional information, see Meter Mounting Equipment (PJSR).

The basic standard used to investigate products in this category is UL 414, “Meter Sockets”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names: “Metering Transformer Cabinet” or “Metering Transformer Cabinet Interior”.

**METER SOCKETS (PJYZ)**

Meter sockets comprise complete enclosures accommodating plug-in type watt-hour and similar meters. They provide terminating facilities for conductors of wiring systems recognized by the National Electrical Code.

The tightening torque required for terminal screws is specified by a marking.

Terminal wire connectors may be omitted and, if omitted a marking shall specify which connectors shall be used. Instructions for the field installation of connectors are provided with the connectors.

Except when marked “Top feed only” or “Bottom feed only” meter sockets are suitable for supply from either the upper or lower end of the enclosure.

Ratings of Listed meter sockets are limited to 600 V, ac, maximum and to 400 amp maximum through any meter.

Meter sockets rated over 30 amps are marked with their short circuit withstand RMS symmetrical current rating in amps. For short circuit ratings exceeding 10kA, the marking will include the type and rating of overcurrent protection to be used with the meter socket.

Meter sockets are marked with a continuous amp rating and may in addition have a maximum use (intermittent) amp rating of not more than 125 percent of the continuous amp rating.

For additional information, see Meter Mounting Equipment.

The basic standard used to investigate products in this category is UL 414, “Meter Sockets”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Meter Socket”.

**METER SOCKET ACCESSORIES (PKAX)**

The category of meter socket accessories covers devices intended for use with a meter socket, such as jumper covers, meter socket extenders or other equipment.

Ratings of Listed meter socket accessories are limited to 600 VAC, 400 Amps maximum.

Meter socket accessories are only considered suitable for use in a meter socket with a short circuit current rating not exceeding 10,000 Amps, unless the accessory is otherwise marked.

For additional information see Meter Mounting Equipment (PJSR) and Meter Sockets (PJYZ).

The basic standard used to investigate products in this category is UL 414, “Meter Sockets”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this directory) together with the word “LISTED”, control number and one of the following products members names as appropriate “Meter Socket Accessory”, “Temporary Jumper Cover Accessory”, “Meter Socket Extender”, or other appropriate product name.

**MINERAL INSULATED METAL-SHEATHED CABLE (PPKV)**

**GENERAL**

This category covers Type MI mineral insulated metal-sheathed cable which consists of one or more solid copper conductors insulated with highly compressed magnesium oxide and enclosed in a continuous copper or alloy steel sheath. A nonmetallic jacket is permitted for use in accordance with Article 332 of NFPA 70, “National Electrical Code.” Cable rated 600 V is labeled in sizes 16 AWG to 500 kcmil single conductor, 16 to 4 AWG two and three conductor, 16 to 6 AWG four conductor, and 16 to 10 AWG seven conductor constructions. Cable rated 300 V is labeled in two, three, four and seven conductor, sizes 18 to 16 AWG, for use on signaling circuits.

The copper sheath is suitable as an equipment grounding conductor. For cable with alloy steel outer sheath one of the conductors is to be used for equipment grounding. Nonmetallic jackets or coatings have not been investigated for resistance to corrosion.
PRODUCT MARKINGS

Information regarding voltage rating, cable Type, and conductor size is shown either on a tag affixed to the reel or carton, or on the surface of the metal sheath. If a nonmetallic jacket is used, the information is printed on the surface of the jacket.

Cable with nonmetallic jackets has the following marking on a tag affixed to the reel or carton: “Not suitable for use in Ducts, Plenums or Other Spaces used for environmental air.”

Cable with nonmetallic jackets marked “Not suitable for use on or in buildings” has not been investigated for fire retardance but are sunlight resistant.

Cable with nonmetallic jackets that has been investigated for use in cable trays is surface marked “CT Use” or “Cable Tray Use” and may additionally be marked “sunlight Resistant” if applicable.

RELATED PRODUCTS

Terminations especially investigated for use with this cable are covered under Mineral Insulated Cable Fittings (PPYT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. affixed to the reel supporting the cable or tag attached to the cable is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Mineral Insulated Metal-Sheathed Cable.”

MINERAL INSULATED CABLE FITTINGS (PPYT)

GENERAL

This category covers fittings for use on mineral insulated cable (Type MI) and small diameter mineral insulated cable. These fittings are suitable for use at a maximum operating temperature of 90°C in dry locations and 60°C in wet locations. A complete box connector consists of a connector body and a screw-on potting fitting.

Screw-on Potting Fitting — The screw-on potting fitting to be used with the connector may be used separately as an end fitting for change to open wiring. The screw-on potting fitting is to be assembled with a special tool and consists of a screw-on pot, insulating cap, insulating sleeving, anchoring bead, and sealing compound.

Grounding — These fittings are considered suitable for grounding for use in circuits over and under 250 V and where installed in accordance with ANSI/NFPA 70, “National Electrical Code.”

ADDITIONAL INFORMATION

For additional information, see Mineral Insulated Metal-Sheathed Cable (PPKV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 514B, “Conduit, Tubing, and Cable Fittings.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Mineral Insulated Metal-Sheathed Cable,” “Connector,” or “Box Connector,” or other appropriate product name as shown in the individual Listings.

MOTOR-GENERATOR SETS (PQYW)

USE

This category covers indoor use motor generator sets and frequency converters intended for use in accordance with ANSI/NFPA 70, “National Electrical Code.”

RELATED PRODUCTS

This category does not cover electrical generating equipment driven by gasoline, LP-gas, or diesel fueled internal combustion engines. These products are covered under Engine Generators (FITS).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are ANSI/UL 508, “Industrial Control Equipment,” UL 1004, “Electric Motors,” and UL 1248, “Engine-Generator Assemblies for Use in Recreational Vehicles.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Motor-Generator Set” or “Flywheel Energy Storage System,” or other appropriate product name as shown in the individual Listings.

MOTORS (PRGY)

USE

This category covers motors intended for use in unclassified (ordinary) locations. The product name is used to identify the product.

PRODUCT MARKINGS/INSTALLATION INSTRUCTIONS

An enclosed type motor has the enclosure type designation marked on the motor for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ). The motor may also be marked “Rainproof” or “Rainproof—”. An enclosed type motor is not intended to be installed in an enclosure unless a marking on the motor, the installation instructions or a stuffer sheet provided with the motor states that the motor may be enclosed. Specifications for the enclosure are included with the instructions or marking.

FIELD PROVISIONS

If a motor does not have thermal or impedance protection as described above, protection should be provided in the end-use application. The motor has a marking indicating that the motor is not provided with protection.

MOTOR-GENERATOR SETS (PQYW)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 1004B, “Outline of Investigation for Electric Motors and Generators.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Motor.”

MOUNTING POSTS AND PEDESTALS FOR DISTRIBUTION EQUIPMENT (PUPR)

This listing covers mounting posts and pedestals rated 600 v, ac or less. They are intended to serve as a raceway for underground wiring which is being brought to above the surface of the earth to feed an outdoor electrical distribution device such as a power outlet, panelboard, service equipment unit, meter socket or circuit breaker enclosure. They are intended to support the distribution unit which is installed either in the factory or in the field.
the field. They may contain electrical termination points for underground wiring and for wiring to the distribution unit.

A mounting post is intended to be mounted in concrete at grade level or below, or is intended to be secured to some other mounting support. A mounting post is marked to indicate the proper ground level.

A mounting pedestal is intended to be mounted on a concrete slab.

A mounting post or pedestal either has ventilation to inhibit condensation or is provided with instructions for the use of sealing facilities. Landing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Multi-Outlet Assembly Fitting,” “Elbow,” “End Fitting,” or other appropriate product name.

MULTIOUTLET ASSEMBLIES (PVGT)

USE AND INSTALLATION

This category covers metal raceways with factory-installed conductors and attachment plug receptacles without provision for field installation of additional conductors except where the product is marked to indicate the number, type and size of additional conductors which may be field installed. Also covered are nonmetallic raceways with factory-installed conductors and attachment plug receptacles either factory installed or separately Listed as Multioutlet Assembly Fittings (PVUR) for field installation.

Separation of communication, signal and data circuits from branch circuit wiring is provided in the assembly where the conductors are installed at the factory. Separate channels are provided in assemblies intended to be field wired with circuits requiring separation.

Multioutlet assemblies are for installation in accordance with Article 380 of NFPA 70, “National Electrical Code.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 5, “Surface Metal Raceways and Fittings” and UL 5A, “Nonmetallic Surface Raceways and Fittings.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Multi-Outlet Assembly.”

MULTIOUTLET ASSEMBLY FITTINGS (PVUR)

Multi-outlet assembly fittings, consisting of flexible metal conduit or armored cable to be connected to multioutlet assemblies by means of a nonmetallic flexible plug-in fitting at one end and to electric fixtures at the other end, are suitable for use in air handling plenums when marked to indicate this use.

The basic standards used to investigate products in this category are UL 5, “Surface Metal Raceways and Fitting,” and UL 5A, “Nonmetallic Surface Raceways and Fittings.”

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Multi-Outlet Assembly Fitting,” “Elbow,” “End Fitting,” or other appropriate product name.

NEON TRANSFORMERS AND POWER SUPPLIES (PWIK)

USE

This category covers indoor and outdoor use neon transformers and power supplies for use with display signs, outline lighting and luminaires employing gas-filled glass tubing identified as neon or electric discharge tubing.

These transformers and power supplies have been evaluated for the secondary-circuit ground fault protection requirements in NFPA 70, “National Electrical Code” (NEC).

PRODUCT MARKINGS

Transformers and power supplies covered under this category are marked “Indoors,” “Outdoors,” or “Weatherproof” or “WP.” Products marked “Indoors” are only suitable for use indoors, and products marked “Outdoors” are suitable for use indoors or outdoors sheltered from rain, snow and the like by being located within a sign body, enclosure and the like. Products marked “Weatherproof” or “WP” do not need to be additionally sheltered from rain, snow and the like.

Transformers and power supplies covered under this category are marked with a Type number from 2 to 8 in association with the location designation “Indoors,” “Outdoors,” “Weatherproof” or “WP.” These Type numbers identify particular construction features associated with a particular transformer or power supply as identified below:

Type 2 – Neon supply with input and output terminals or leads that should be enclosed in accordance with the NEC.

Type 3 – Neon supply with input terminals or leads enclosed and intended for connection to a permanent wiring system, and with output terminals or leads that should be enclosed in accordance with the NEC.

Type 4 – Neon supply with input and output terminals or leads enclosed and intended for connection to a permanent wiring system.

Type 5 – Neon supply with input terminals or leads enclosed and intended for connection to a permanent wiring system and provided with integral receptacles for output connection.

Type 6 – Cord-connected neon supply provided with integral receptacles for output connection.

Type 7 – Cord-connected neon supply with output terminals or leads that should be enclosed in accordance with the NEC.

Type 8 – Cord-connected neon supply with enclosed output terminals or leads.

These Type designations do not relate in any way to general enclosure designations as noted in Electrical Equipment for Use in Ordinary Locations (AALZ).

Transformers and power supplies are also marked with a model designation and may be marked with an optional designation 2161HX, 2161KX, 2161MH or 2161WX. The optional designations provide information on the construction of the transformer and power supply for sign manufacturers and installers to use for ordering and replacement purposes.

Transformers and power supplies marked “For Moving Vehicle Use Only” are intended for use only in moving vehicles and not for use in a freestanding sign, or building-mounted sign or outline lighting product.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 2161, “Neon Transformers and Power Supplies.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Neon Transformer” or “Neon Power Supply.”

NETWORK-POWERED BROADBAND COMMUNICATIONS CABLE (PWIP)

USE

This category covers network-powered broadband communications cable, which is a jacketed single-conductor coaxial cable or a multiple-
Cable jacketed cable, consisting of a combination of coaxial members, insulated conductors and/or optic fiber members. The cable is intended for use in low-power and medium-power circuits in accordance with Article 380 of ANSI/NFPA 70, “National Electrical Code” (NEC). All types with the exception of Type BLF are suitable for installation outdoors on dwellings.

**PRODUCT MARKINGS**

Network-powered broadband communications cable is identified by markings on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

- **BMU** — Indicates medium-power cable intended for outdoor underground use in accordance with Section 380.54(C) of the NEC. This cable complies with the Cable Flame Test requirements in UL 1581, “Reference Standard for Electrical Wires, Cables, and Flexible Cords.”

- **BLX** — Indicates low-power cable intended for outdoor underground use in accordance with Section 380.55(D)(3) of the NEC. The cable complies with the UL Flame Test requirements in UL 1581.

- **BPL** — Indicates low-power cable intended for use only within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 380.55(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame-propagation distance of 5 ft. When tested in accordance with the NEMA Standards, the cable is marked as “WS.”

**APPLICATIONS**

- **UL** — Indicates small-power cable intended for use with compact-stranded copper conductors. The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Network-powered Broadband Communications Cable.”

**ADDITONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**NONMETALLIC-SHEATHED CABLE CONNECTORS (PXJV)**

**GENERAL**

Connectors for use with nonmetallic-sheathed cable are also suitable for use with multi-conductor underground feeder and branch circuit cable where used in dry locations unless otherwise indicated on the carton.

**Single Cable** — If single conductor Type UF cable is terminated with a fitting not specifically recognized for use with single conductor cable, special care should be taken to assure it is properly secured and not subject to change.

**MARKINGS**

Connectors which are also suitable for use with service entrance cable, flexible nonmetallic tubing, or flexible cord are so indicated on the device or carton.

**RELATED PRODUCTS**

Connectors covered under Armored Cable Connectors (AWSX), Conduit Fittings (DWTT) and Power and Control Tray Cable Connectors (PQOZ) are also suitable for use with nonmetallic-sheathed cable when specifically indicated on the device or carton.

**ADDITIONAL INFORMATION**

For additional information, see Nonmetallic-sheathed Cable (PWV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Network-powered Broadband Communications Cable.”

**NONMETALLIC EXTENSIONS (PXT)**

**NONMETALLIC EXTENSION FITTINGS (PYYZ)**
This category covers attachment plug caps, receptacles for attachment plugs, and end caps for nonmetallic surface extensions, and wiring compartment, entrance bushings, bonding connectors, hangers, terminal fittings, support fittings, receptacles and lampholders for aerial cable.

### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

### REQUIREMENTS

The basic standards used to investigate products in this category are UL 5A, “Nonmetallic Surface Raceways and Fittings,” UL 183, “Manufactured Wiring Systems,” and UL 498, “Attachment Plugs and Receptacles.”

#### UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Nonmetallic Extension Fitting,” “NM Extension Ftg.” or “End Cap,” or other appropriate product name as shown in the individual Listings.

### NONMETALLIC SURFACE EXTENSIONS (PZMX)

#### USE AND INSTALLATION

This category covers assemblies of two insulated circuit conductors with or without a grounding conductor within a nonmetallic jacket or extruded thermoplastic covering, intended for installation in accordance with Article 382 of ANSI/NFPA 70, “National Electrical Code.” Assemblies without a grounding conductor are marked “Intended for replacement use only.”

#### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### REQUIREMENTS


#### UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Nonmetallic Surface Extension.”

### NONMETALLIC-SHEATHED CABLE INTERCONNECTORS (QAAV)

#### GENERAL

This category covers self-contained interconnectors employing pressure cable connectors, insulation displacement or insulation piercing connectors for splicing or tapping nonmetallic (NM) sheathed cable. These interconnectors are intended for installation in accordance with ANSI/NFPA 70, “National Electrical Code.”

These devices have been investigated for equivalency to Type NM cable in insulation and temperature rise, and for capability to withstand fault currents, vibration and mechanical shock that may occur during transport of the units in which they are used.

#### PRODUCT MARKINGS

The devices are marked with the Listee's name or identification, the catalog number or equivalent, and complete electrical ratings.

#### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2256, “Outline of Investigation for Nonmetallic Sheathed Cable Interconnectors.”

#### UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Nonmetallic Sheathed Cable Interconnector” or “NM Cable Interconnector” or other appropriate product name as shown in the individual Listings.

### OPTICAL FIBER CABLE (QAYK)

#### USE AND INSTALLATION

This category covers optical fiber cable which is a jacketed cable for use within buildings in accordance with Article 770 of ANSI/NFPA 70, “National Electrical Code” (NEC). Where optical fiber is installed in a laser system, the system shall comply with the ANSI Z136 laser system safety standards.

#### PRODUCT MARKINGS

Optical fiber cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

- **OFC** — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in accordance with Section 770.154(C) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested as described under FT4/IEEE 1202, “Type of Flame Exposure” (smoke measurements are not applicable) in UL 1685.

- **OFNG** — This cable is the same as Type OFC except it contains no metallic members and no other electrically conductive materials.

- **OFCR** — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in vertical runs in a shaft in accordance with Section 770.154(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested as described under FT4/IEEE 1202, “Type of Flame Exposure” (smoke measurements are not applicable) in UL 1685.

- **OFN** — This cable is the same as Type OFCR except it contains no metallic members and no other electrically conductive materials.

- **OFN** — Indicates cable containing noncurrent-carrying conductive members such as metallic strength members and metallic vapor barriers for use in vertical runs in a shaft in accordance with Section 770.154(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested as described under FT4/IEEE 1202, “Type of Flame Exposure” (smoke measurements are not applicable) in UL 1685.

- **OFNP** — This cable is the same as Type OFC except it contains no metallic members and no other electrically conductive materials.


Cable that complies with the Limited Smoke Requirements specified in UL 1685 is surface marked with the suffix “LS.”

Cable marked “sunlight resistant” or “sun res. may be exposed to the direct rays of the sun.

#### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1651, “Optical Fiber Cable.”

#### UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Optical Fiber Cable.”

Cable also verified to a performance specification under Optical Fiber Cables. Verified in accordance with National or International Specifications (QAZ) the marking “Also Verified Specification name and / or number” together with the Listing Mark information on the tag, reel or smallest unit container.

### OPTICAL FIBER CABLE, FIELD ASSEMBLED (QAZD)

#### USE AND INSTALLATION

This category covers field-assembled optical fiber cable which is an on-site assembly of one or more optical fiber units and an optical fiber jacket. Field-assembled optical fiber cable is intended for installation in buildings in accordance with Article 770 of ANSI/NFPA 70, “National Electrical Code” (NEC). The optical fiber jacket is installed in a manner similar to conduit or raceway. Once the jacket is installed, the optical fiber units are inserted into the jacket, completing the assembly.
Listed field-assembled optical fiber cable is for use with Class I laser products, in accordance with applicable provisions of 21 CFR Part 1040, or with light emitting diodes with power levels that do not exceed the limits for Class I lasers.

**PRODUCT MARKINGS**

Optical fiber cable is identified by a marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following:

- **OFN** — Indicating cable containing only optical fiber units for use in accordance with Section 770.53(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per UL 1665, "Vertical-Ray Flame Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

- **OFNR** — Indicates cable containing only optical fiber units, for use in vertical runs in a shaft in accordance with Section 770.53(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1666, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shaf.

- **OFNP** — Indicates cable containing only optical fiber units, for use in conditions specified in Section 770.53(C) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

- **OFNFR** — Indicates cable containing only optical fiber units, for use in accordance with Section 770.53(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

- **OFNFR** — Indicates cable containing only optical fiber units, for use in accordance with Section 770.53(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft when tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The UL symbol and the word "LISTED" along with the word "OPTICAL FIBER CABLE," the marking includes the appropriate Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the optical fiber units are packaged includes the following: "[Company name] Optical Fiber Unit, For Use Only With Optical Fiber Jacket Cat. No. ___ manufactured by [company name]."

For optical fiber cable which is also Listed under Optical Fiber Cable (QAYK), the marking includes the appropriate Listing Mark along with either the Verification Mark and "NYC Transit Specification TO" or the text "Also Verified to NYC Transit Specification TO."
“OFNP,” “OFPC,” “OFNR” or “OFCR,” communications cable marked “CMP,” “CMP-OF,” “CMR” or “CMR-OF,” signaling cable marked “CL2P,” “CL3P,” “CL2R” or “CL3R,” and coaxial cable marked “CATVP” or “CATVR.” This raceway has fire resistant characteristics capable of preventing the carrying of fire from floor to floor. This raceway is identified by a marking on the surface of the raceway or on a marker tape indicating “Riser.” A raceway marked “Riser” is also suitable for general purpose use when used to enclose optical fiber cable marked “OFNP,” “OFNR,” “OFNG” or “OFPH,” communications cable marked “CMP,” “CMP-OF,” “CMR,” “CMR-OF,” “CMG,” “CMG-OF,” “CM” or “CM-OF,” signaling cable marked “CL2P,” “CL2P,” “CL2R,” “CL2,” “CL2,” “CL2X” or “CL2X,” and coaxial cable marked “CATVP,” “CATVR,” “CATVX.”

A raceway with neither the marking “Plenum” nor “Riser” is suitable for general purpose use, with the exception of risers, plenums, and other spaces used for environmental air when used to enclose optical fiber cable marked “OFNP,” “OFPC,” “OFNR,” “OFNG” or “OFPH,” communications cable marked “CMP,” “CMP-OF,” “CMR,” “CMR-OF,” “CMG,” “CMG-OF,” “CM” or “CM-OF,” signaling cable marked “CL2P,” “CL2P,” “CL2R,” “CL2,” “CL2,” “CL2X” or “CL2X,” and coaxial cable marked “CATVP,” “CATVR,” “CATVX.” This raceway is resistant to the spread of fire when tested in accordance with the Vertical-Tray Flame Test (General Use) in ANSI/UL 2024.

Pliable raceway is a raceway that can be bent by hand without the use of tools. The smallest radius of the curve of the inner edge of any bend to which the raceway may be bent without cracking either on the outer surface or internally is not less than 2-1/2 times the outside diameter of the raceway.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The UL symbol and the product name “Optical Fiber Raceway,” “Communications Cable Raceway,” “Signaling Cable Raceway,” “Coaxial Cable Raceway” or “Optical Fiber/Communications/Signaling/Coaxial Cable Raceway” on the raceway, and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Optical Fiber Raceway Assemblies, Underground,” “Optical Fiber Raceway Assemblies, Underground for Concrete Encasement Only,” “Optical Fiber Raceway Assemblies, Underground Direct Burial and Concrete Encasement” or “Optical Fiber Raceway Assemblies, Aboveground, Underground Direct Burial and Concrete Encasement.”

OPTICAL FIBER/RACEWAY ASSEMBLIES

This category covers raceway assemblies intended for the installation of optical fiber cable in accordance with the Optical Fiber/Communications Cable Raceways section of the National Electrical Code. The raceway may be provided with multiple inner ducts that are assembled before shipment. Raceway systems differ in their inside and outside diameters and, therefore, are not interchangeable with other conduit or raceway systems. This category includes straight sections, elbows, and fittings intended to be secured together by cement.

The raceway assemblies are designed for use under the following conditions, as indicated in the Listing Mark: (1) direct burial with or without being encased in concrete, (2) aboveground, or both (1) and (2). The transition from an optical fiber raceway system to another conduit or raceway system has not been investigated.

The raceway system components have not been investigated for their ability to withstand exposure to reagents, unless specifically marked. Aboveground raceway assemblies are suitable for exposed work where not subjected to physical damage and where expansion fittings are not necessary.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Optical Fiber Raceway Assemblies, Underground,” “Optical Fiber Raceway Assemblies, Underground for Concrete Encasement Only,” “Optical Fiber Raceway Assemblies, Underground Direct Burial and Concrete Encasement” or “Optical Fiber Raceway Assemblies, Aboveground, Underground Direct Burial and Concrete Encasement.”
OPTICAL FIBER BRANCHING DEVICES (QBEA)

GENERAL
This category covers optical fiber branching devices. These devices are intended for residential and/or commercial applications as part of an optical fiber wiring system.

Optical fiber branching devices include optical flexible circuits, fan-out devices, wavelength division multiplexers (WDM and DWDM) and other similar passive devices.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 746C, “Polymeric Materials – Use in Electrical Equipment Evaluations.” Additionally, branching devices employing optical fiber connectors have been evaluated to EIA/TIA Standard FOTP-6, “Cable Retention Test Procedure for Fibre Optic Cable Interconnecting Devices.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the attached tag or the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Optical Fiber Branching Device.”

For optical fiber branching devices which are also Verified to a performance specification under Optical Fiber Branching Devices Verified in Accordance with National or International Specifications (QBEN), the marking includes the appropriate Listing Mark and either the text “Also Verified [Specification name and/or number]” or the UL Verification Mark along with [Specification name and/or number].

OPTICAL FIBER CABLE ASSEMBLIES AND CONNECTORS (QBFA)

GENERAL
This category covers optical fiber cable assemblies whose signal transmission, environmental and/or mechanical performance characteristics have been determined by Underwriters Laboratories Inc. to be in accordance with a published specification.

Optical fiber cable assemblies include optical flexible circuits, fan-out devices, wavelength division multiplexers (WDM and DWDM) and other similar passive devices. These devices are intended for residential and/or commercial applications as part of an optical fiber wiring system.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standards used to investigate optical fiber cable assemblies are UL 746C and EIA/TIA Standard FOTP-6, “Cable Retention Test Procedure for Fiber Optic Cable Interconnecting Devices.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the attached tag or the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Optical Fiber Cable Assembly” or “Optical Fiber Branching Device.”

For optical fiber cable assemblies and optical fiber connectors which are also Verified to a performance specification under Optical Fiber Cable Assemblies and Connectors Verified in Accordance with National or International Specifications (QBFN), the marking includes the appropriate Listing Mark and either the text “Also Verified [Specification name and/or number]” or the UL Verification Mark along with [Specification name and/or number].

OPTICAL FIBER CABLE ASSEMBLIES AND CONNECTORS VERIFIED IN ACCORDANCE WITH NATIONAL OR INTERNATIONAL SPECIFICATIONS (QBFN)

GENERAL
This category covers optical fiber cable assemblies and connector products whose signal transmission, environmental and/or mechanical performance characteristics have been investigated in accordance with one or more of the applicable US national standards, published international standards, regional standards, miscellaneous standards, or regulations of other organizations, as indicated in the individual Verifications.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The performance specifications used to investigate products in this category are contained in Telecordia GR-326-CORE (Issue 3 September 1999), “Generic Requirements for Singlemode Optical Connectors and Jumper Assemblies.” Other performance specifications, applicable to optical fiber cable assemblies and connector products, may also be used by UL in Verification investigations.

UL MARK
The Verification Mark of Underwriters Laboratories Inc. on the attached tag or the smallest unit container in which the product is packaged or on the product when size or shape permits is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “VERIFIED,” a control number, the product name “Optical Cable Assembly” or “Optical Fiber Connector,” the Specification name(s) and/or number(s), and the date of the Specification(s).

For optical fiber cable assemblies and optical fiber connectors which are also Listed under Optical Fiber Cable Assemblies and Connectors (QBFA), the marking includes the appropriate Listing Mark and either the text “Also Verified [Specification name(s) and/or number(s)]” or the UL Verification Mark together with [Specification name(s) and/or number(s), date of Specification(s)].
OUTLET BOXES AND FITTINGS

OUTLET BOXES AND FITTINGS
CLASSIFIED FOR FIRE RESISTANCE

QUALIFIED BOXES (QBZ)

GENERAL

This category covers special purpose boxes for installation in floors and nonmetallic outlet boxes for installation in walls and partitions and ceilings in accordance with the provisions of NFPA 70, “National Electrical Code” (NEC). They have shown a degree of fire resistance when installed in the particular floor assembly or wall assembly classified. The boxes of the type listed in UL’s Electrical Construction Materials Directory have been investigated and found to comply with established electrical requirements and are so listed. This category includes classifications for nonmetallic outlet and switch boxes for use in fire resistive rated wall or partition assemblies. The information provided for each Classification includes the model numbers for the Classified products, a description of the rated assemblies, the spacing limitations for the boxes and the installation details. Nonmetallic boxes should not be installed on opposite sides of walls or partitions of staggered stud construction unless Classified for use in such constructions.

Where indicated in the individual Classifications, products have also been investigated for heat and smoke release characteristics in accordance with UL 2043, “Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.” Such products may be installed in air-handling spaces in accordance with Sec. 300.22(C) of the NEC. Authorities Having Jurisdiction should be consulted before installation.

FLOOR BOXES

Boxes for use with floors have been investigated for use with electrical receptacles fabricated of melamine, phenolic or urea materials, unless specified otherwise in the installation instructions and Classification information. Floor boxes and fittings are intended to be installed in accordance with installation instructions provided with the product.

Boxes with integral connectors for electric metallic tubing or for unthreaded rigid metallic conduit are provided with a marking on the carton to indicate the specific type or types of wiring system for which the box has been tested.

Floor boxes designated for floor installation as covered in the NEC are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor cleaning operations. These boxes, intended for installation in concrete floors, are frequently provided with leveling screws, threaded hubs, or both and are provided with a marking on the carton to identify boxes of this type such as “Floor Box” or “Floor Box, Concrete Tight” as appropriate.

WALL AND PARTITION AND CEILING BOXES

Nonmetallic outlet boxes evaluated for installation in fire resistive assemblies are provided with the appropriate Listing Mark for electrical products and other markings as described in Nonmetallic Outlet Boxes (QCZM). Nonmetallic outlet boxes Classified for use in fire resistive designs may have the following marking in the base of the box:

\[
\text{Class } * \text{ hr, F, W and/or C}
\]

where * indicates hourly rating such as 1 hr or 2 hr and F = Floor, W = Wall and C = Ceiling.

The boxes are Classified for use in certain fire resistive designs when installed in accordance with the details described for each Classified company. Any Listed metallic or nonmetallic cover is suitable for use with these nonmetallic boxes.

For information on the installation of Listed metallic outlet and switch boxes in fire resistive rated wall or partition assemblies, see Metallic Outlet Boxes (QCIT).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 263, “Fire Tests of Building Construction and Materials”.

LOOK FOR CLASSIFICATION MARK

The Classification Mark of Underwriters Laboratories Inc. on the product or on each UL Classified Steel Floor and Form Unit with factory-installed floor boxes or the UL symbol on the product and the Classification Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

OUTLET BOXES AND FITTINGS

CLASSIFIED FOR FIRE RESISTANCE

See product category in UL Fire Resistance Directory (Control No.)

WHERE INDICATED IN THE INDIVIDUAL CLASSIFICATIONS, PRODUCTS MAY BE MARKED “SUITABLE FOR USE IN AIR-HANDLING SPACES IN ACCORDANCE WITH Sec. 300.22(C) OF THE NATIONAL ELECTRICAL CODE” WHEN INVESTIGATED TO DETERMINE SUITABILITY FOR SUCH USE.

METALLIC OUTLET BOXES (QCIT)

GENERAL

This category covers metallic flush device boxes, conduit bodies, conduit boxes, floor boxes, outlet boxes, special purpose boxes, extension rings, covers, and flush-device cover plates.

BOX EXTENSIONS

Box extensions are suitable for extending properly secured flush or surface mounted boxes. One or more extensions may be used.

USE IN FIRE RATED ASSEMBLIES

Listed single and double gang metallic outlet and switch boxes with metallic or nonmetallic cover plates may be used in bearing and nonbearing wood stud and steel walls with ratings not exceeding 2 h. These walls have gypsum wallboard facings similar to those shown in Design Nos. U301, U411 and U425, as shown in UL’s Fire Resistance Directory. The boxes are intended to be fastened to the studs with the openings in the wallboard facing cut so that the clearance between the boxes and the wallboard do not exceed 1/8 in. The boxes are intended to be fastened so that the surface area of individual boxes do not exceed 16 sq in, and the aggregate surface area of the boxes do not exceed 100 sq in per 100 sq ft of wall surface.

Boxes located on opposite sides of walls or partitions are intended to be separated by a minimum horizontal distance of 24 in. This minimum separation distance between the boxes may be reduced when Wall Opening Protective Materials (QCZN) are installed according to the requirements of their Classification.

The boxes are not intended to be installed on opposite sides of walls or partitions of staggered stud construction unless Wall Opening Protective Materials (QCZN) are installed with the boxes in accordance with Classification requirements for the protective materials.

Listed metallic outlet and switch boxes with metallic or nonmetallic cover plates may be used in floor-ceiling and roof-ceiling assemblies with ratings not exceeding 2 h when these assemblies have gypsum wallboard membranes. The boxes are intended to be fastened to the joints with the openings in the wallboard facing cut so that the clearance between the boxes and the gypsum wallboard do not exceed 1/8 in. The boxes are intended to be installed so that the surface area of individual boxes do not exceed 16 sq in and the aggregate surface area of the boxes do not exceed 100 sq in per 100 sq ft of ceiling surface.

CONDUIT BODIES

Conduit bodies that are provided with a volume marking can enclose splices, taps or devices. Conduit bodies that are not provided with a volume marking are covered under Conduit Fittings (DWTT). Conduit bodies Classified for use with specific conduit body covers and conduit body covers Classified for use with specific conduit bodies are covered under Conduit Bodies and Covers Classified for Use with Specified Equipment (QCKW).

CONCENTRIC OR ECCENTRIC KNOCKOUTS

All boxes with concentric or eccentric knockouts have been investigated for bonding and are suitable for bonding without any additional bonding means around concentric (or eccentric) knockouts where used in circuits above or below 250 V, and may be marked as such.

CLAMPS

Boxes may or may not be provided with clamps. When clamps are provided, the carton is marked to indicate the type of wiring system or combination of systems for which they have been tested. The clamps are marked with the following letters or combinations thereof to indicate that they are suitable for use with armored cable: “A,” flexible metal conduit “F,” nonmetallic sheathed cable “N” or flexible tubing (loom) “T.” Clamps that are suitable for type MC metal clad cable are marked “MCI” for metal clad interlocking armored cables, “MCS” for metal clad continuous smooth sheath cable, and “MCC” for metal clad continuous corrugated sheath cable. If suitable for all seven types, the clamp is marked “ALL.” Clamps suitable for nonmetallic sheathed cable are also suitable for multicarrier underground feeder and branch circuit cable where used in dry locations.
Conduit Bodies and Covers Classified for Use with Specified Equipment (QCKW)

This category covers Listed conduit body covers Classified for use with specified Listed conduit bodies, and Listed Conduit Bodies Classified for use with specified Listed Conduit Body Covers, in accordance with the details described in the Classification Marking. These products have been evaluated for use in wet locations.

The basic standard used to investigate products in this category is UL 514A, "Metallic Outlet Boxes".

Products Classified under this category are also Listed under the category "Metallic Outlet Boxes".

The Classification Marking of Underwriters Laboratories Inc. on the product or smallest unit container in which the product is packaged, when size or shape permits, is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking includes the complete Listing Mark for Metallic Outlet Boxes (QCT) and the statement "Also Classified by Underwriters Laboratories Inc. For Use With UL Listed (Conduit Body) (Conduit Body Cover), Catalog No______, (Listees name)."

Nonmetallic Outlet Boxes (QCMZ)

**GENERAL**

This category covers nonmetallic flush device boxes, conduit bodies, conduit boxes, outlet boxes, special purpose boxes, extension rings, covers, and flush device cover plates.

**CONDUIT BODIES**

Conduit bodies that are provided with a volume marking can enclose splices, taps or devices. Conduit bodies that are not provided with a volume marking are covered under Conduit Fittings (DWTT). Conduit bodies Classified for use with specific conduit body covers and conduit body covers Classified for use with specific conduit body spacers are covered under Conduit Bodies and Covers Classified for Use with Specified Equipment (QCKW).

**CLAMPS**

Boxes may or may not be provided with clamps. When clamps are provided, the carton is marked to indicate the type of wiring system or combination of systems for which they have been tested. The clamps are marked with the following letters or combinations thereof to indicate that they are suitable for use with nonmetallic sheathed cable "N" or flexible tubing (loom) "T." Clamps suitable for nonmetallic sheathed cable are also suitable for multiconductor underground feeder and branch circuit cable where used in dry locations unless the box or smallest unit carton is marked "Nonmetallic Sheathed Cable Only." Clamps have been tested for securing only one cable per clamp, except multiple section clamps are considered suitable for securing one cable under each section of the clamp, each cable entering a separate knockout.

Boxes intended for use with nonmetallic sheathed cable or open wiring are suitable for use with wire rated 90°C or less, unless marked for a higher rated wire in degrees centigrade.

**SINGLE-GANG BOX**

A box nominally 2-1/4 in. or smaller is intended for one or more nonmetallic sheathed cables to enter through a single or multiple stage knockout opening.

**FOR USE WITH RIGID NONMETALLIC CONDUIT**

Nonmetallic boxes suitable for use with rigid nonmetallic conduit are provided with a marking on the carton to indicate the intended use, such as "For [Specific Type] Conduit." Such boxes, when so marked on the box or carton and provided with installation instructions, are intended for support by the specified conduit. Such boxes are inherently resistant to atmosphere containing common industrial corrosive agents and will withstand vapors or mists of caustic pickling acids, plating baths, and hydrofluoric and chronic acids. Nonmetallic boxes for use with rigid PVC conduit are suitable for use with wire rated 90°C or less.

Nonmetallic boxes suitable for use with rigid nonmetallic conduit are not intended to support equipment or to accommodate heat producing equipment.

**FIXTURE SUPPORT**

A nonmetallic box, with or without bracket or bar hanger, intended for support of a fixture weighing 50 lbs or less, or provided with a marking "FOR FIXTURE SUPPORT" on the carton. A nonmetallic box, with or without bracket or bar hanger, intended for support of a fixture weighing more than 50 lbs, is marked with the weight of the fixture to be supported. Nonmetallic boxes and device plaster rings have not been investigated for support of a ceiling fixture unless marked for use in ceilings, walls, and with the weight of the product to be supported. Nonmetallic device boxes or nonmetallic device boxes intended to be installed in an existing structure have been investigated for the support of fixtures, smoke detectors and carbon monoxide detectors weighing not more than 6 lbs.

**CEILING SUSPENDED FAN SUPPORT**

Clamps have been tested for securing only one cable per clamp, except multiple section clamps are considered suitable for securing one cable under each section of the clamp, each cable entering a separate knockout.

**GROUNDING**

Clamps for armored cable, flexible metal conduit, metal clad continuous smooth sheath cable, or metal clad continuous corrugated sheath cable are considered suitable for grounding where installed in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC).

**FIXTURE SUPPORT**

A box, with or without bracket or bar hanger, intended for support of a fixture weighing 50 lbs or less, is provided with a marking "FOR FIXTURE SUPPORT" on the carton to indicate that the box is for fixture support. A box, with or without bracket or bar hanger, intended for support of a fixture weighing more than 50 lbs, is marked with the weight of the fixture to be supported. Metallic device boxes and device plaster rings have not been investigated for support of a ceiling fixture unless marked for use in ceilings, walls, and with the weight of the product to be supported. Metallic device boxes or metallic device boxes intended to be installed in an existing structure have been investigated for the support of fixtures, smoke detectors and carbon monoxide detectors weighing not more than 6 lbs.

**INTEGRAL CONNECTORS**

Boxes with integral connectors for electrical metallic tubing or for unthreaded rigid metallic conduit are provided with a marking on the carton to indicate the specific type or types of wiring system for which the boxes have been tested, as illustrated in the Introduction of this Directory.

**CEILING SUSPENDED FAN SUPPORT**

A box, a box with bracket, or bar hanger intended for support of a ceiling suspended (paddle) fan weighing 35 lbs or less is provided with a marking on the product "ACCEPTABLE FOR FAN SUPPORT." A box, a box with bracket, or bar hanger for support of a ceiling suspended (paddle) fan weighing more than 35 lbs but not more than 70 lbs is provided with a marking on the product "ACCEPTABLE FOR FAN SUPPORT up to 70 lbs."

**CONCRETE TIGHT**

All metal boxes, except aluminum alloy boxes, are provided with corrosion protection suitable for installation in concrete. Aluminum alloy boxes listed here are not considered acceptable for installation in concrete or under fill unless protected by asphalt paint or the equivalent. Boxes designated as "concrete tight" may have no means of support other than the concrete and often accommodate covers at top and bottom.

**FLOOR BOXES**

Floor boxes designed for floor installation as covered in the NEC are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor cleaning operations. Covers with gaskets may be shipped separately from the boxes. Both products are provided with installation instructions. These boxes intended for installation in concrete floors are frequently provided with leveling screws, threaded hubs or both, and are provided with a marking on the carton to indicate boxes of this type such as "Floor Box Cover," "Floor Box" or "Floor Box, Concrete Tight" as appropriate.

**WET AND DAMP LOCATIONS**

Boxes and covers intended for use in wet locations as defined by the NEC are marked "Wet Location." Damp location boxes and covers are intended to be so located or equipped as to prevent water from entering or accumulating in the box and are marked "Damp Location." Boxes with threaded conduit hubs will normally prevent water from entering except for condensation within the box or connected conduit. Box and device cover combinations, and flush device covers that provide protection from the weather only when the cover is closed, are marked "Wet Location Only When Cover Closed" and may be marked "Damp Location."

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 514A, "Metallic Outlet Boxes" and UL 514D, "Cover Plates for Flush-Mounted Wiring Devices."

**UL MARK**

The Listing Mark on the product or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Outlet Box," "Outlet Box and Cover," "Extension Ring," "Flash Device Box," or other appropriate product name as shown in the individual Listings.
A box, a box with bracket or bar hanger intended for support of a ceiling suspended (paddle) fan is provided with a marking on the product “ACCEPTABLE FOR FAN SUPPORT.” A box, a box with bracket or bar hanger intended for support of a ceiling suspended (paddle) fan weighing more than 75 lbs., is provided with a marking on the product “ACCEPTABLE FOR FAN SUPPORT up to 75 lbs.”

**CONCRETE TIGHT**

Boxes designated as “concrete tight” may have no means of support other than the concrete and often accommodate covers at top and bottom.

**FLOOR BOXES**

Floor boxes designed for floor installation as covered in ANSI/NFPA 70, “National Electrical Code” (NEC) are provided with covers and gaskets to exclude surface water and sweeping compounds that might be present in floor cleaning operations. Covers with gaskets may be shipped separately from the boxes. Both products are provided with installation instructions. Those boxes intended for installation in concrete floors are frequently provided with leveling screws, threaded hubs, or both and are provided with a marking on the carton to identify boxes of this type such as, “Floor Box Cover” or “Floor Box, Concrete Tight” as appropriate.

**WET AND DAMP LOCATIONS**

Boxes and covers intended for use in wet locations as defined by the NEC are marked “Wet Location.” Damper location boxes and covers are intended to be so located or equipped as to prevent water from entering or accumulating in the box and are marked “Damp Location.” Boxes with threaded conduit hubs will normally prevent water from entering except for condensation within the box or connected conduit. Box and device cover combinations, and flush device covers that provide protection from the weather only when the cover is closed, are marked “Wet Location Only When Cover Closed” and may be marked “Damp Location.”

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 514C, “Nonmetallic Outlet Boxes, Flush Device Boxes, and Covers” and UL 514D, “Cover Plates for Flush-Mounting Devices.”

**UL MARK**

The Listing Mark on the product or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Outlet Bushing,” “Outlet Fitting,” “Offset Adapter,” “Bar Hanger,” or other appropriate product name as shown in the individual Listings.

**OUTLET BUSHINGS AND FITTINGS (QCRU)**

**GENERAL**

This category covers supports for outlet and flush device boxes; fittings for use with outlet and flush device boxes, such as knockout reducers, seals and insulating inserts, and cord grip attachments; service entrance heads for rigid conduit or electrical metallic tubing; cable riser supports; and bushings for use on the ends of rigid or flexible conduit, or electrical metallic tubing, where a change to an open wiring is made.

**Armored Cable Bushings** — These bushings are used on armored cable between the conductors and the outer armor. They are a readily distinguishable bright color such as red, orange or yellow.

**Bushings** — These bushings are suitable for temperatures of 150°C if they are black or brown in color, 90°C if they are any other color unless specifically marked for a higher temperature. Other bushings are covered under Insulating Bushings (NZMT) and Conduit Fittings (DWT). Service entrance heads for use with service entrance cable are covered under Service Entrance Cable Fittings (TYZX). Temporary wiring, such as round flexible cords or cables may be secured by the use of a connector suitable for use with flexible cord.

**Floor Outlet Fittings** — Floor outlet fittings are for use in concrete floors for coupling short lengths of exposed conduit to concealed systems when so installed that floor couplings do not come below surface of floor in which they are embedded and subject to the following restrictions: Elbow to be used only when conduit wires pass through fitting without splice, joint, or tap within fitting and only where no more than one elbow is used in any conduit run. Tees to be used only where conductors are not drawn in until after main conduit installation is complete. If splices, joints, or taps are used in tees, conductors are intended to be looped that upon removing exposed conduit at floor coupling, splices, joints, or taps can readily be disconnected without interfering with other wiring within fitting.

**CARTON MARKINGS**

**OUTLET CIRCUIT TESTERS (QCYU)**

**GENERAL**

This category covers portable devices with fixed attachment plug blades, or probes attached to flexible leads, used to indicate various wiring conditions in 15 or 20 A branch circuits by a pattern of lights or other similar means along with markings or instructions to identify the probable wiring conditions which cannot be determined by the tester.

The devices may include provisions for checking the functions of a ground-fault circuit interrupter (GFCI) connected to the branch circuit, or for indicating that a branch circuit is connected to an arc-fault circuit interrupter (AFCI).

AFCI indicators operate by producing a waveform similar to an arc fault. Since these devices cannot produce an actual arc fault, an AFCI indicator may not trip every AFCI. AFCI indicators are provided with markings or instructions that state the following or equivalent: “CAUTION: AFCIs recognize characteristics unique to arcing, and AFCI indicators produce characteristics that mimic some forms of arcing. Therefore the indicator may provide a false indication that the AFCI is not functioning properly. If this occurs, recheck the operation of the AFCI using the test and reset buttons. The AFCI button test function will demonstrate proper operation.” These devices are not intended for use as comprehensive diagnostic instruments.

**RELATED PRODUCTS**

Ground-continuity-indicating devices constructed integral with cord-connector bodies for use on construction sites are covered under Attachment Plugs, Fuseless (AXUT) as “cord-connector bodies.”

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).
REQUIREMENTS

The basic standard used to investigate products in this category is UL 1436, “Outlet Circuit Testers.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Circuit Tester.”

PACKAGED PUMPING SYSTEMS (QCZJ)

This category covers fluid handling systems consisting of pumps, electric motors, frequency drives, control valves, gauges and piping mounted on a structural steel base. They are used for plumbing boosters, heat transfer, hot water heating, HVAC chilled and hot water packages, irrigation, boiler feed and condensate packages, and similar applications. The system and components of the system are to be used within rated working pressure and used with appropriate liquids in accordance with system markings.

Systems included in this category have not been evaluated for the handling of hazardous materials.

Systems included in this category have not been evaluated for use as package pumps for fire protection services.

The basic standards used to investigate products in this category are UL 508, “Industrial Control Equipment”, UL 778, “Motor-Operated Water Pumps”, and UL 308A, the Outline of Investigation for “Industrial Control Panels”. Packaged pumping systems for heating and cooling equipment are evaluated in accordance with UL 1995, “Heating and Cooling Equipment”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Packaged Pumping System”.

PANELBOARDS (QEUY)

GENERAL

This category covers lighting and power panelboards rated 600 V or less. Panelboards are intended for mounting in cabinets or cutout boxes which may be provided with the panel or provided separately. Only panelboards marked to indicate that they are for use in a specific box and panelboards labeled as “Enclosed Panelboards” have been investigated to determine that box wiring space is adequate.

USE, INSTALLATION AND MARKINGS

Enclosed panelboards identified with an enclosure type designation are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Some enclosed panelboards have one or more openings for plug-in watt hour or similar meters. Such panelboards which are marked for outdoor use have, except for the joint between the plug-in meter and opening, been investigated for rain tightness.

Some panelboards are suitable for use as service equipment and may be so marked. Such marking is part of the Listing Mark as noted below or is an integral part of other required markings. Panelboards marked to indicate that they are suitable for use as service equipment and which can be removed from the enclosure are marked to identify the specific box or boxes in which they are intended to be installed. If the acceptability of such a panelboard for use as service equipment depends upon the condition of installation or use, the panelboard is marked to indicate those conditions.

Some panelboards incorporate neutrals factory bonded to the frame or enclosure. Such units are marked “Suitable Only For Use As Service Equipment.”

Panelboards marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system.

Panelboards are marked with their short-circuit current rating in RMS symmetrical amps. The marking states that short-circuit ratings are limited to the lowest interrupting rating of (1) any device installed or intended to be installed therein, or (2) any device installed or intended to be installed in the panelboard. However, for combination series-connected devices, the short-circuit current rating marked on the panelboard may be higher than the short-circuit current rating of a specific circuit breaker installed or to be installed in the panelboard. This higher rating is valid only if the specific overcurrent devices identified in the marking are used within or ahead of the panelboard in accordance with the marked instructions.

Panelboards to which units (circuit breakers, switches, etc.) may be added in the field are marked with the name or trademark of the manufacturer and the catalog number or equivalent of those units that are intended to be installed in the field. Individual Circuit Breakers and Ground-fault Circuit Interrupters (GFI) may also be classified and marked as being suitable for use in certain panelboards in place of specific units marked on the panelboard.

Where in normal operation the load will continue for 3 hours or more, molded-case circuit breakers and fused switches other than fused power circuit devices should not be loaded to exceed 80 percent of their current rating, unless the device is otherwise marked. Low-voltage AC Power Switching Devices (PAPU) and Fused Power Circuit Devices (IYUS) used in panelboards are suitable for continuous use at 100 percent of their rating.

Some panelboards may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected will be identified by a marking such as on a wiring diagram.

Panelboards as Listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location. If all terminals are suitable for use with aluminum conductors as well as with copper conductors the panelboard will be marked “Use Copper Wire Only.” A panelboard employing terminals or main switch branch circuits units, individually marked “CU” will be marked as noted above or “Use Copper Wire Only.” The latter statement indicates that wiring space or other factors make the panel unsuitable for aluminum conductors.

Unless the panelboard is marked to indicate otherwise, the termination provisions are based on the use of 60°C amperages for wire sizes 14–1 AWG, and 75°C amperages for wire sizes 1/0 AWG and larger. However, 3-wire, single-phase service entrance or feeder conductors for dwelling units may be as covered in Section 310.15(B)(6) of ANSI/NFPA 70, “National Electrical Code” (NEC).

Some panelboards, constructed with interlocked main switching and overcurrent protective devices, have been investigated for use in optional standby systems in accordance with Article 702 of the NEC. Such panelboards are marked “Suitable for use in accordance with Article 702 of the National Electrical Code ANSI/NFPA 70,” or, if provided within kit form, “Suitable for use in accordance with Article 702 of the National Electrical Code ANSI/NFPA 70 when provided with interlock kit Cat No. __.”

CLASS CTL PANELBOARDS

Class CTL panelboards are identified by the words “Class CTL” on the Underwriters Laboratories Inc. Follow-Up Service Listing Mark.

Class CTL panelboards incorporate physical features which, in conjunction with the physical, electrical, or other characteristics provided in Class CTL circuit breakers, fuse holders, or fusible switches, are designed to prevent the installation of more overcurrent protective poles than that number for which the device is designed and rated.

MARINE PANELBOARDS

Some Listed enclosed panelboards in this category have been investigated for use aboard marine vessels over 65 ft in length in accordance with the Electrical Engineering Regulations of the United States Coast Guard Subchapter J CG-259 (46 CFR Parts 110-113). Such enclosed panelboards are identified by a Listing Mark for marine vessels over 65 ft in length.

The Electrical Engineering Regulations of the United States Coast Guard classifies marine enclosed panelboards as “Non-watertight,” “Drip-proof” or “Watertight.”

A “Drip-proof” marine enclosed panelboard is so constructed that falling moisture or dirt does not interfere with the successful operation of the equipment.

A “Watertight” marine enclosed panelboard is so constructed that water does not enter the enclosure when subjected to a stream of water.

External means are provided for the operation of switches or circuit breakers in “Watertight” marine enclosed panelboards.

Marine enclosed panelboards classified “Drip-proof” or “Watertight” are marked to indicate this fact.

A marine enclosed panelboard for use in corrosive locations is marked “Suitable For Use In Corrosive Locations.”

RECREATION VEHICLE (RV) PANELBOARDS

Some Listed enclosed panelboards in this category have been investigated for RV use only. These panelboards generally consist of a line voltage/branch circuit section that complies with ANSI/UL 67, “Panelboards.” The low-voltage compartment complies with ANSI/UL 48 “Power Converters/Inverters and Power Converter/Inverter Systems for Land Vehicles and Marine Crafts,” and is intended to be installed in accordance with Article 351 of the NEC. Such enclosed panelboards are identified by a Listing Mark for RV’s. RV panelboards do not have inverter functions. Devices having combination panelboard/inverter capability are covered under Power Converters/Inverters and Power Converter/Inverter Systems (QPPY).
TEMPORARY PANELBOARD INGRESS BARRIER (QEWI)

USE
This category covers polymeric temporary panelboard ingress barriers intended to be field installed over the electrical access opening of an indoor electrical lighting and/or appliance branch and power circuit enclosed panelboard. These barriers are intended for temporary use only, during intermissions in the process of wiring the internal components of the aforementioned devices by qualified persons. These barriers provide protection against inadvertent contact with live parts only. These barriers are not intended for temporary electrical power and lighting installations as covered in Article 590 of ANSI/NFPA 70, “National Electrical Code.”

The barriers covered by these requirements are intended for use in indoor locations, where temperatures are not expected to exceed 50°C and not expected to be below 0°C. Barriers may additionally be investigated and marked for use in locations where temperatures exceed 50°C (122°F). These barriers are not intended to be subjected to direct sunlight, rain, snow, or the like.

PRODUCT MARKINGS
Temporary panelboard ingress barriers include markings to indicate (1) the manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product may be identified, and (2) the size of the enclosure to which the barrier is intended to be attached.

ADDITIONAL INFORMATION
For additional information, see Panelboards (QEUY) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), the product name “UTILITY INTEGRATED PANELBOARD,” and one of the following designations: (1) “Enclosed Panelboard,” (2) “Marine, Enclosed Panelboard for Use on Vessels Over 65 Feet,” (3) “Enclosed RV Panelboard.” The product name may include the wording “Class CTI” or “Suitable For Use As Service Equipment” where appropriate. The product name “Enclosed Panelboard” covers both the panel and enclosure provided with it.

RELATED PRODUCTS
PHOTOVOLTAIC CHARGE CONTROLLERS (QIBP)

This category covers permanently connected photovoltaic charge controllers that control the state of charge of storage batteries used in photovoltaic power systems.

Photovoltaic charge controllers covered by this Listing are rated 600 V dc or less and are intended to be installed in accordance with the National Electric Code, including Article 690.

Products covered by this category include photovoltaic charge controller subassemblies for field installation in a specific terminal compartment in accordance with the instructions supplied with the subassembly. The markings identify the modules in which the subassemblies may be installed or the electrical rating parameters (i.e., Voc and Isc) of the modules to which it is to be used with. The terminal compartments, modules and subassemblies are products of the same manufacturer.

Controllers having an enclosure or an enclosure that is identified with an enclosure type designation or as “Rain tight” or “Rainproof” are intended for use as indicated in the guide information at the front of this Directory (AALZ).

The basic standard used to investigate products in this category is UL 1741, the proposed standard for “Static Inverters and Charge Controllers for Use in Photovoltaic Power Systems”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/(or) symbol of Underwriters Laboratories Inc. together with the word “LISTED”, a control number and one of the following product names: “Photovoltaic Charge Controller”; “Photovoltaic Charge Controller Subassembly” or other appropriate product name as shown in the individual Listings.

PHOTOVOLTAIC MODULES AND PANELS (QIGU)

USE AND INSTALLATION

This category covers flat-plate photovoltaic modules and panels intended for mounting on buildings or on ground-supported frames. Roof-mounted modules or panels are evaluated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building’s roof, or (3) on a rack with a space above the roof surface.

When mounted integral to a building’s roof the module serves as the waterproof membrane. Direct-mounted panels are placed upon the building’s waterproof membrane (shingles or the like). Rack-mounted styles are spaced away from the building’s roof member. Rack-mounted styles may also be installed separate from buildings.

Installation of modules on or integral to a building’s roof system may adversely affect the roof covering materials’ resistance to external fire exposure if the module has a lesser or no fire resistance rating. Roof covering materials will not be adversely affected when the modules have an equal or greater fire resistance rating than the roof covering material.

Photovoltaic modules or panels are intended to be connected to electrical loads, controllers, or to static inverters that convert the dc power the modules or panels generate to other types of power compatible with the intended loads. This category does not include AC modules; see AC Modules (QIGU) for additional details. In addition to their voltage, current and power ratings, modules and panels are marked to indicate terminal polarity, maximum series overcurrent device rating, and minimum acceptable diode bypassing (if needed). Installation of the modules and panels, including connection between the modules and the panels and the load, static inverters or controller is intended to be in accordance with the provisions of ANSI/NFPA 70, “National Electrical Code.” Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes including the class of roof covering.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

Underwriters Laboratories Inc. (UL) provides a service for the Classification of photovoltaic modules and panels that not only meet the appropriate requirements of UL but also have been investigated in accordance with one or more of the following design qualification standards:

1. IEEE 1262-(issue date), “IEEE Recommended practice for qualification of photovoltaic (PV) modules”

PHOTOVOLTAIC POWER UNITS (QIJL)

Photovoltaic power units are factory wired assemblies consisting of photovoltaic modules or panels and other components such as charge controllers, inverters and batteries or other power storage systems.

These units are intended to provide power to utilization equipment. They are not intended to be connected to another electric power production source or system.

Photovoltaic power units covered in this category are rated 600 V ac or dc or less, 10kW or less. Fixed-mounted units are intended to be installed in accordance with the National Electrical Code, including Article 690.

Photovoltaic power units may be constructed as integral units, or as multiple sections for field assembly in accordance with the manufacturer’s installation instructions.

The Standard for Flat-Plate Photovoltaic Modules and Panels, UL 1703, is used as a guide to investigate the photovoltaic modules or panels used with these products and the proposed Standard “Static Inverters and Charge Controllers for use in Photovoltaic Power Systems”, UL 1741 is used as a guide to investigate inverters and charge controllers.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories, Inc. together with the word “LISTED”; a control number and one of the following names: “Photovoltaic Power Unit”, “Photovoltaic Power System” or other appropriate product name as shown in the individual Listings.

DISTRIBUTED GENERATION POWER SYSTEMS ACCESSORY EQUIPMENT (QIIO)

GENERAL

This category covers actuators, blocking diodes, conduit boxes, connectors, controllers (control boxes), communication modules, disconnects, distribution panels and transition boxes.

This accessory equipment is rated 600 V or less and is intended to be installed in accordance with NFPA 70, “National Electrical Code,” including Articles 690 and 692.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1741, “Inverters, Converters, and Controllers for Use in Independent Power Systems.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Distributed Generation Utility Interconnection Controller,” “Photovoltaic System Ground Fault Detector Interrupter,” “Photovoltaic System Transition Box,” “Photovoltaic Disconnect,” “Photovoltaic System Control Box,” “Photovoltaic System Connector,” “Distributed Generation System Distribution Panel,” “Distributed Generation Interface Module,” “Distributed Generation Communications Module,” or other appropriate product name as shown in the individual Listings.
2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

STATIC INVERTERS AND CONVERTERS FOR USE IN INDEPENDENT POWER SYSTEMS (QIKH)

USE AND INSTALLATION

This category covers permanently connected inverters and converters for use in electric power systems. Inverters are devices that change DC power to AC power. Converters are devices that accept AC or DC power input and convert it to another form of AC or DC power for direct utilization by a load or accumulation in an energy storage system (batteries, capacitors, etc.). Electric power systems are defined as facilities that deliver electric power to a load. Devices covered in this category are classed as Utility Interactive, Stand-alone or Multimode. Utility Interactive devices operate in parallel with the utility grid. Stand-alone devices are intended to operate independent of the utility grid. Multimode devices can operate as both or either Stand-alone (utility independent) or Utility Interactive devices.

These products may contain energy storage devices and associated charge controllers.

These devices are intended for installation in accordance with ANSI/NFPA 70, “National Electrical Code.”

The devices may be connected to different types and combinations of distributed generation (DG) sources: generator sets, photovoltaic cells, fuel cells, wind and microturbines or other sources as specified in the manufacturer’s installation instructions.

Some devices in this category must be installed and operated with an external transformer. Such devices are provided with markings and instructions to indicate the type of transformer required.

These products may require external output overcurrent protection, which will be specified in product markings and installation instructions. The products require external overcurrent protection to be sized at 125 percent of the product output current rating unless otherwise specified.

These products may require that overcurrent protection be provided in the source circuits. These protection ratings will be specified in the product installation instructions.

Devices containing charge controllers are provided with instructions to indicate the type of battery for which they are intended.

ADJUNCT SURGE TESTING

At the manufacturer’s request some devices in this category are subjected to Ring Wave and Combination Wave Surge Tests in IEEE C62.41-1991, “Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.” These particular surge waveforms that are applied to the DG equipment are based upon distance between the DG equipment and the service entrance equipment. These location categories have associated peak values of voltage and current for the standard surge-testing waveforms as noted below:

<table>
<thead>
<tr>
<th>Location Category</th>
<th>Ring Wave</th>
<th>Combination Wave</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>N/A</td>
<td>6 kV/3 ka</td>
</tr>
<tr>
<td>C2</td>
<td>N/A</td>
<td>10 kV/5 ka</td>
</tr>
<tr>
<td>C3</td>
<td>N/A</td>
<td>20 kV/10 ka</td>
</tr>
<tr>
<td>A1</td>
<td>2 kV/0.07 ka</td>
<td>N/A</td>
</tr>
<tr>
<td>A2</td>
<td>4 kV/0.13 ka</td>
<td>N/A</td>
</tr>
<tr>
<td>A3</td>
<td>6 kV/0.20 ka</td>
<td>3 kV/ka</td>
</tr>
<tr>
<td>B1</td>
<td>2 kV/0.17 ka</td>
<td>2 kV/1 ka</td>
</tr>
<tr>
<td>B2</td>
<td>4 kV/0.33 ka</td>
<td>4 kV/2 ka</td>
</tr>
<tr>
<td>B3</td>
<td>6 kV/0.50 ka</td>
<td>6 kV/3 ka</td>
</tr>
<tr>
<td>C1</td>
<td>N/A</td>
<td>6 kV/3 ka</td>
</tr>
<tr>
<td>C2</td>
<td>N/A</td>
<td>10 kV/5 ka</td>
</tr>
<tr>
<td>C3</td>
<td>N/A</td>
<td>20 kV/10 ka</td>
</tr>
</tbody>
</table>

The standard surge-testing waveforms are as follows:

“Standard 1.2/50 us – 8/20 us Combination Wave”

“Standard 0.5 us – 100 kHz Ring Wave”

Refer to IEEE C62.41-1991 for additional details on standard wave parameters and tolerances.

CODES

The following summarizes and defines the codes shown in the individual Listings.

- **Source Type**
  - Fuel Cell (FC)
  - Photovoltaic (PV)
  - Microturbine (MT)
  - Wind Turbine (WT)
  - Battery (B)
  - Gen Set (GS)
- **Output Type**
  - Stand-alone (SA)
  - Utility Interactive (UI)

FIRMWARE VERSION AND CHECKSUM

Version Number – Identification number of the software elements that specifies the evaluated software version and current release.

Checksum or Unique Identifier – A unique identifier stored in nonvolatile memory computed as a function of the critical and supervisory sections of the software.

RELATED PRODUCTS


ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).
PIN-AND-SLEEVE TYPE PLUGS, RECEPTACLES AND CABLE CONNECTORS (QLGD)

RATINGS

Pin-and-sleeve type plugs, receptacles and cable connectors are rated in 600 V or less, or ac or dc, and in amps. Devices intended for use with motor loads are identified by a horsepower rating. Devices not intended for current interruption are marked “Do Not Disconnect Under Load,” or with an equivalent statement.

Devices rated 250 V are tested on circuits involving a nominal potential to ground of 125 V. Devices having other voltage ratings are tested on circuits involving full-rated potential to ground, except for multiphase-rated devices, which are tested on circuits consistent with their voltage ratings, i.e., a 120/208 V, 3-phase device is tested on a circuit involving a potential to ground of 120 V.

Devices identified as “switch-rated plugs and receptacles suitable as branch circuit disconnect switches” incorporate a “switch” mechanism that has been additionally investigated for making and breaking a motor load. They have provision to open the electrical circuit without uncoupling the mated plug and receptacle housings (device enclosures). Such devices are investigated at six times the full load motor continuous current at rated voltage and are also identified by a horsepower rating. These devices have also been investigated for a minimum 10,000 A short-circuit make and withstand rating.

Devices identified as “switch-rated plugs and receptacles suitable as branch circuit disconnect switches” incorporate an integrated function switching for use in branch circuit switching applications. They have provision to open the electrical circuit without uncoupling the mated plug and receptacle housings. These devices have also been investigated for a minimum 10,000 A short-circuit make and withstand rating.

GROUNDING

Devices having a terminal identified by a green-colored finish or by the word “green” are grounding types. The pin or contact member connected to this terminal is for equipment grounding only.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1682, “Plugs, Receptacles, and Cable Connectors, of the Pin-and-Sleeve Type.

Devices identified as switch-rated plugs/receptacles are additionally investigated to Subject 2682, “Outline of Investigation for Switch-Rated Plugs and Receptacles.”

ATTACHMENT PLUGS, PIN-AND-SLEEVE TYPE (QLHN)

GENERAL

This category covers pin-and-sleeve type attachment plug bodies, attachment plugs with and without fuses, cord connectors and adapters. These devices are intended for use with the same line of products covered under Receptacles, Pin-and-Sleeve Type (QLHW). Devices for use in specific combinations with other manufacturers’ products are covered under Receptacle-Plug Combinations, Pin-and-Sleeve Type (QLHN). The termination provisions of these devices are based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of ANSI/NFPA 70, “National Electrical Code.” The ampacity of the flexible cord and cable is based on Section 400.5 and Tables 400.5(A) and 400.5(B). The conductors are sized as specified on the product or in the manufacturer’s instructions provided with the device. Unless the product

RECEPTACLES, PIN-AND-SLEEVE TYPE (QLIW)

GENERAL

This category covers pin-and-sleeve type receptacles and other outlet devices intended for direct connection to wiring systems recognized by ANSI/NFPA 70, “National Electrical Code” (NEC). It also covers other pin-and-sleeve type receptacles, outlet devices and power inlets intended for use in appliances and other equipment.

These devices are intended for use with the same line of products covered under Attachment Plugs and Pin-and-Sleeve Type (QLHN). Devices for use in specific combinations with other manufacturers’ products are covered under Receptacle-Plug Combinations, Pin-and-Sleeve Type, Classified for Use in Specific Combinations (QLKH).

The terminations of these devices are intended for use with copper conductors and are marked to indicate the conductor size and temperature rating of all field-installed conductors. Such markings are located where readily visible on the device or in a wiring diagram provided with the device. If marking is provided, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in circuits rated more than 100 A as specified in Table 310.16 of the NEC.

Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (devices rated 100 A or less) or 75°C ampacity (devices rated over 100 A).

ADDITIONAL INFORMATION

For additional information, see Pin-and-Sleeve Type Plugs, Receptacles and Cable Connectors (QLGW) and Electrical Equipment for Use in Ordinary Locations (AALZ).

RECEPTACLE-PLUG COMBINATIONS, PIN-AND-SLEEVE TYPE, CLASSIFIED FOR USE IN SPECIFIC COMBINATIONS (QLKH)

GENERAL

This category covers combinations of pin-and-sleeve type plugs, receptacles, power inlets and connectors that have been investigated for use in specific combinations as indicated in the individual classifications.

These combination devices have been investigated for use with other manufacturers’ listed plugs, receptacles, connectors or power inlets. Basic Listings are covered under Attachment Plugs, Pin-and-Sleeve Type (QLHN) and Receptacles, Pin-and-Sleeve Type (QLIW), with additional Listings under Attachment Plugs, Fuseless (AXUT) and Receptacles for Plugs and Attachment Plugs (RTK).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).
POLYVINYL CHLORIDE SOLVENT CEMENT (QORV)

Polyvinyl chloride solvent cements are classified in accordance with the materials and applicable performance requirements in the American Society for Testing and Materials Standard “Specification for Solvent Cements For Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.” ASTM D2564.

The classification Mark for these products includes the appropriate Listing Mark, the statement “Also Classified by Underwriters Laboratories Inc. for use in specific combinations,” and one of the following statements as appropriate: “For use with UL Listed,” “Catalog No.,” or “For catalog numbers of compatible devices, refer to Publication No. ___. provided with this device. If additional information is necessary contact the factory.”

“Receptacle,” “Plug” or “Connector”.

The referenced publication is a compatibility list, which tabulates the company name, catalog number and electrical ratings of the classified device and the company name and catalog number of the applicable UL Listed product with which it has been investigated. One copy of the compatibility list is provided with each device.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify Polyvinyl Chloride Solvent Cement produced under its Classification and Follow-Up Service. The Classification Mark for these products includes the appropriate Listing Mark, the statement “Also Classified by Underwriters Laboratories Inc. for use in specific combinations,” and one of the following statements as appropriate: “For use with UL Listed,” “Catalog No.,” or “For catalog numbers of compatible devices, refer to Publication No. ___. provided with this device. If additional information is necessary contact the factory.”

“Receptacle,” “Plug” or “Connector”.

The referenced publication is a compatibility list, which tabulates the company name, catalog number and electrical ratings of the classified device and the company name and catalog number of the applicable UL Listed product with which it has been investigated. One copy of the compatibility list is provided with each device.

PORTABLE POWER CABLE (QPMU)

GENERAL

This category covers portable power cable constructed and Listed for use in accordance with Article 400 of ANSI/NFPA 70, “National Electrical Code” (NEC). Portable power cable consists of either a single insulated conductor or two or more insulated conductors, with or without grounding conductors, with an overall fiber reinforced jacket. The insulation and jacket are thermoset on Types G, G-GC and W, and thermoplastic elastomer on Type PPE.

This cable is used to supply power to mobile equipment and machinery and is rated 2000 V, 90°C (194°F) dry, and 60°C (140°F) wet where exposed to oil. For cable so marked, ratings of 60°C (140°F), 75°C (167°F), or 90°C (194°F) “wet” are also assigned. The term “wet” indicates that the cable is acceptable for immersion in water. Cable that has been investigated for use where exposed to the direct rays of the sun is marked “Sunlight Resistant” or “Sun Res.”

Portable power cable employs flexible stranded copper conductors in a size range of 12 AWG to 500 kcmil, except for single conductor Type W and single conductor Type PPE which employs flexible stranded copper conductors in sizes 12 AWG to 1000 kcmil. Ampacities for portable power cable can be found in Table 400.5(B) of the NEC.

Type G — Contains 2 – 6 circuit conductors and a grounding conductor. The grounding conductor is either bare or covered with a green-colored braid or tape, and may either be a single conductor or be sectioned into two or more parts.

Type G-GC — Same as Type G except that the cable also contains one, 10 AWG or larger, yellow insulated conductor which is used as a ground check.

Type W — Contains 1 – 6 circuit conductors and may or may not contain a grounding conductor. If included, the grounding conductor is fully insulated.

Type PPE — Contains 1 – 6 circuit conductors and may or may not contain a grounding conductor. If included, the grounding conductor is fully insulated.

POWER AND CONTROL TRAY CABLE (QPOR)

GENERAL

This category covers Type TC power and control tray cable intended for use in accordance with Article 336 of ANSI/NFPA 70, “National Electrical Code” (NEC). The cable consists of one or more pairs of thermocouple extension wires or two or more insulated conductors, with or without one or more grounding conductors, with or without one or more optical fiber members and covered with a nonmetallic jacket. A single grounding conductor may be insulated or bare and may be sectioned. Any additional grounding conductor is fully insulated and has a distinctive surface marking. The cable is rated 600 or 1000 V.

The cable is Listed in conductor sizes 18 AWG to 1000 kcmil aluminum or copper-clad aluminum. Conductor sizes within a cable may be mixed. Thermocouple extension conductors are Listed in sizes 24 to 12 AWG.

PRODUCT MARKINGS

Cable with copper-clad aluminum conductors is surfaced printed “AL (CU-CLAD)” or “Cu-clad AL.”

Cable with aluminum conductors is surface printed “AL.”

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by “compact copper.” The abbreviations “CMPCT” and “CU” may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking: “Terminate with connectors identified for use with compact-stranded copper conductors.” For termination information, see Electrical Equipment for Use in Ordinary Locations (AAZ).

If the type designation of the conductors is marked on the outside surface of the cable, the temperature rating of the cable corresponds to the rating of the individual conductors. When this marking does not appear, the temperature rating of the cable is 60°C unless otherwise marked on the surface of the cable.

Cable investigated for use where exposed to direct rays of the sun is marked “sunlight resistant.”

Cable investigated for use in direct burial in the earth is so identified.

Cable suitable for use between cable trays and utilization equipment in accordance with NEC 336.10(6) is surface marked with the suffix “-ER.”

Cable consisting of thermocouple extension wires is surface marked “THCPL EXTN.” For thermocouple extension use only.”

Cable surface marked “Oil Resistant I” or “Oil Res I” is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is surface marked “Oil Resistant II” or “Oil Res II.”

Cable that complies with the Limited Smoke Test requirements specified in UL 1685, “Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables,” is surface marked with the suffix “LS.”

Cable containing optical fiber members is identified with the suffix “OF.”

Regarding cable seals outlined in Article 501 of the NEC, Type TC cable has a sheath which is considered to be gas/vapor tight but the cable has not been investigated for transmission of gases or vapors through its core.

RELATED PRODUCTS

Fittings for use with this cable are covered under Outlet Bushings and Fittings (QCRV), Nonmetallic-sheeted Cable Connectors (PXJV) or Service Entrance Cable Fittings (TVZN).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AAZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 62, “Flexible Cord and Fixture Wire,” UL 44, “Thermoset-Insulated Wires and Cables” and UL 1581, “Reference Standard for Electrical Wires, Cables, and Flexible Cords.”

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, reel, coil or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The UL symbol Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Portable Power Cable.”
POWER AND CONTROL TRAY CABLE CONNECTORS (QPOZ)

USE
This category covers power and control tray cable connectors for use with Type TC cable installed in accordance with ANSI/NFPA 70, "National Electrical Code." Power cable assemblies are rated in volts and amps denoting the maximum permissible load current through the assembly in free air at nominal 30°C (86°F). The ampacity of the flexible cord or cable may need to be derated in accordance with Section 400.5 of the NEC.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

POWER CABLE ASSEMBLIES (QPL)

USE AND INSTALLATION
This category covers power cable assemblies and pendant power cable assemblies intended for installation between individual units of a communications or similar system where the cables are outside the equipment enclosure. These cable assemblies are intended for use on circuits not exceeding 600 V or less, and only in areas where access is restricted to qualified persons. They are not intended to be disconnected under load and are so marked.

Power cable assemblies employ listed multiconductor power and control tray cable and male or female connectors, wire connectors, or other means to connect the cable to appropriate terminations in the individual units of the system. These assemblies are intended to be installed in cable trays in accordance with Article 392 of ANSI/NFPA 70, "National Electrical Code" (NEC). Up to 7 ft of the cable assembly may be exposed between the cable tray and the equipment in locations where the cable assembly is protected from physical damage. These assemblies are intended to be connected on the load side of Listed overcurrent devices in accordance with Section 240.21(A) of the NEC. Motor cables and trunk cables are rated in volts and amps denoting the maximum permissible load current through the assembly in free air at nominal 30°C (86°F). The ampacity of the cable may need to be derated in accordance with Section 368.56(B) of the NEC. Pendant power cable assemblies are rated in volts and amps denoting the maximum permissible load current through the assembly in free air at nominal 30°C (86°F). The ampacity of the flexible cord or cable may need to be derated in accordance with Section 400.5 of the NEC.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

POWER CONVERTERS/INVERTERS AND POWER CONVERTER/INVERTER SYSTEMS (QPPY)

USE AND INSTALLATION
This category covers (1) fixed and stationary power converters, power inverters, power converter systems, and power inverter systems for use in recreational vehicles in accordance with National Electrical Code, NFPA 70, (2) portable, stationary and fixed power converters, power inverters, power converter systems and power inverter systems for use in land vehicles and (3) accessories for power converters and power inverters.

Power converters are primarily rectifying units intended for connection to a 120 V or 120/240 V, 15 or 20 A branch circuit supplied from the recreational vehicle panelboard and designed to provide low direct voltage for equipment in the recreational vehicle. A power converter may also include a battery charging feature.

Power converters are intended for connection to a battery source within a land vehicle. They are designed to supply ac voltage for equipment in a land vehicle. A power inverter may be provided with an ac transfer option to supply the output from an ac distribution system when the inverter is connected to such a system. A power inverter may also include a battery charger feature.

Power converter systems consist of a power converter and not more than three integral line voltage branch circuit protective devices. Power inverter systems consist of a power inverter and not more than three integral line voltage branch circuit protective devices. A main disconnecting means is provided if more than two branch circuit protective devices are incorporated.

A power converter system or power inverter system may serve the function of a distribution panelboard in a land vehicle. They are intended to be connected directly to an ac distribution system by means of a power supply cord.

REBUILT PRODUCTS
This category also covers units that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt units are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt units are subject to the same requirements as new products.

RELATED PRODUCTS
A land vehicle main distribution center incorporating more than three branch circuit protective devices used in conjunction with a power converter or power inverter are covered under Panelboards (QELY).

Power converters, power inverters, power converter systems and power inverter systems for use on a marine craft are covered under Power Converters/Inverters and Power Converter/Inverter Systems, Marine (QPOL) and Power Inverters, Marine (QPSY).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 458, "Power Converters/Inverters and Power Converter/Inverter Systems for Land Vehicles and Marine Crafts."

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power Cable Assembly" or "Pendant Power Cable Assembly."
Inverter,” “Power Converter System,” “Power Inverter System,” or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word “Rebuilt,” “Remanufactured” or “Reconditioned” precedes the product name.

POWER DISTRIBUTION BLOCKS (QPQS)

This category covers power distribution blocks rated 600 volts or less and intended to be used on the load side of service equipment in accordance with the National Electrical Code, NFPA 70. These blocks are used for splicing and tapping conductors in metallic wayways, auxiliary gutters, junction boxes, termination boxes and the like in order to distribute power to separate circuits or loads.

A power distribution block consists of a connector(s) mounted on an insulating base. Each individual connector has provisions for connection of one or more conductors and multiple smaller tap-off conductors.

Power distribution blocks are considered suitable for use on circuits having available fault current not greater than 10,000 RMS symmetrical amps, unless marked with a larger value.

Installation instructions are provided for proper mounting and use.

These instructions include minimum enclosure dimensions.

The power distribution block is marked with the letters “AL” to indicate use with aluminum conductors only; “CU” to indicate for use with copper conductors only; or “AL-CU” and “AL” to indicate for use with either type of conductor.

The power distribution block is marked with:

a) a “7” or “9” in conjunction with the “AL” or “AL-CU” marking. This marking corresponds with the marking on the individual connector, i.e. AL7CU, AL9, etc.

b) a torque associated with each conductor tightening means.

c) an amp rating that signifies the maximum current per pole and d) a voltage rating.

The basic requirements used to investigate products in this category are contained in Subject 933, “Outline of Investigation For Power Distribution Blocks”.

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), together with the word “LISTED”, a control number, and the following product name: “Power Distribution Block”.

POWER DISTRIBUTION CENTERS FOR COMMUNICATIONS EQUIPMENT (QPQY)

GENERAL

This category covers power distribution centers for communications equipment rated 600 V or less.

Power distribution centers contain equipment such as circuit breakers, suitable investigated supplementary protectors, contactors, fuses, switches, including pull-out types and related accessory equipment.

Some centers incorporate constructions designed to provide safety for the operator. These centers are dead front but may be open at the back, bottom, top or sides. Other centers may employ special alarm indicating devices or warning devices, and supervisory controls to provide protection for the operator. These centers are dead front but may be open at the back, bottom, top or sides. Other centers may employ special alarm indicating devices or warning devices, and supervisory controls to provide protection for the operator.

INSTALLATION

Some equipment has been evaluated for installation in a restricted access location, such as a dedicated equipment room or telecommunication equipment closet, where access is limited to trained service personnel.

Such equipment is provided with a marking or installation instructions which state “To be installed only in a Restricted Access Location” or similar wording. Equipment installed in a restricted access location generally receives power from a centralized d.c. power source. If field wiring terminals are not contained in an internal compartment, both protection of exposed wiring terminals and wiring methods used for such equipment are intended to be provided in accordance with (1) markings on or instructions with the equipment, and (2) the provisions of Sections 110.26 and 110.27 of ANSI/NFPA 70, “National Electrical Code” (NEC).

A Listed subassembly such as a fuse panel, circuit breaker panel or the like has been investigated for use in a power distribution center or cabinet and is suitable for field installation. The subassembly is installed in accordance with the manufacturer’s installation instructions, and the catalog number or equivalent of the subassembly and power distribution center or cabinet is referenced in the instructions.

PRODUCT MARKINGS

Power distribution centers are marked with their short circuit current rating. This marking may be presented as a d.c. rating in amps, a description of the battery power supply such as “Suitable For Use In Circuits Powered By Up To Five Banks Of 48 V, 200 A-Hr. Batteries” or a combination of both. A battery “bank” consists of a sufficient number of series-connected batteries to obtain the required system voltage. A number of “banks” are then wired in parallel to obtain the desired system A-Hr. capacity.

A distribution center having provision for the field installation of additional equipment such as circuit breakers, contactors, switches or the like is marked with the name or trademark of the manufacturer and the catalog number or equivalent of these devices that are intended to be installed in the field.

Power distribution centers are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60°C amperies for wire sizes 14-1 AWG and on the use of 75°C amperies for wire sizes 1/0 AWG and larger as specified in Table 310-16 of the NEC.

RELATED EQUIPMENT

Power supplies for information technology and telecommunications equipment are covered under Power Supplies, Information Technology Equipment Including Electrical Business Equipment (QPQQ) and Power Supplies, Telephone (QPQ).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

POWER DISTRIBUTION EQUIPMENT, PORTABLE (QPQW)

USE

This category covers portable power distribution units and devices, and portable power distribution panels intended for use in the following locations:

Carnivals, circuses, fairs and similar locations in accordance with Article 525 of ANSI/NFPA 70, “National Electrical Code” (NEC)

Exhibition halls or similar locations in accordance with Article 518 of the NEC

Theaters, audience areas of motion picture and television studios and similar locations in accordance with Article 520 of the NEC

Motion picture and television studios and similar locations in accordance with Article 530 of the NEC

Construction sites in accordance with Article 305 of the NEC

RATINGS

This category covers units rated 600 V or less, single- or multi-phase.

Units are rated maximum 1200 A.

Supply Neutral Termination — Units rated for use on either 208Y/120 V 3-phase, 4-wire with ground supplies and marked “200 Percent Neutral” are suitable for use at full rating when connected to a 120/240 V single-phase, 3-wire supply. They are provided with supply neutral receptacles and wiring having an ampacity of twice the ampacity of the largest supply terminal. Units specifically rated for both 208Y/120 V 3-phase, 4-wire and 120/240 V single phase, 3-wire supplies are suitable only at the rating specified for the type of supply being used.

Units employing single conductor supply cables and rated for use on 208Y/120 V 3-phase, 4-wire supplies that are also suitable for use with
### ADDITIONAL INFORMATION

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1440, “Portable Power Distribution Units.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Portable Power Distribution Unit,” “Fort Pwr Dist Unit,” “Construction Site Portable Power Distribution Unit,” or “Construction Site Port Pwr Dist Unit.”

The Listing Mark of partially enclosed, plastic framed cable splicing blocks is the same as that specified above except the product name is “Open Frame Cable Splicing Block.”

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which busbar clamps are packaged and additionally provided with the UL symbol on the busbar clamp is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Busbar Clamp.”

### PORTABLE POWER DISTRIBUTION UNITS AND DEVICES (QPSH)

**GENERAL**

This category covers portable power distribution equipment of standardized size and configuration. Each unit has a marked model, type or catalog number.

Portable power distribution units are assemblies of Listed products, Recognized components, or both, contained in complete electrical enclosures. They may incorporate disconnecting means, overcurrent devices, control components, receptacles for attachment plugs, stage and studio type inlets and connectors, and the like.

**PRODUCT MARKINGS**

**Accessiblity** — Units intended for use in areas not accessible by the general public are marked “TO BE USED WHERE NOT READILY ACCESSIBLE BY THE GENERAL PUBLIC.”

**Conductors in Parallel** — Units intended for parallel connection of feeder or output conductors are marked accordingly.

**Duty Rating** — Outputs are not suitable for continuous use unless marked otherwise.

**Ground Fault Protection** — Only those receptacles so marked are provided with ground fault circuit protection for personnel.

**Indoor/Outdoor Use** — Units are marked with either enclosure type numbers 1 or 3R, or “Suitable For Use In Damp Locations.” Units marked “Type I” may additionally be marked “Indoor Use Only.” Those marked “Type 3R” may additionally be marked “Rainproof.” Units marked “Suitable For Use In Damp Locations” are for indoor or outdoor use in areas subject to moderate degrees of moisture as specified in Article 100 of the NEC. This would also include areas where artificial rain is being produced, or when effect machines that utilize water vapor to generate fog or mist effects are being used. In such environments these units are intended to be provided with temporary shelters for protection from falling or blowing water. Unless a unit is marked for use with a specific shelter, the suitability of the temporary shelter is to be determined by the Authority Having Jurisdiction.

**Qualified Personnel** — Units intended for use by qualified personnel are marked “FOR USE BY QUALIFIED PERSONNEL ONLY.”

**RELATED PRODUCTS**

Units for use in theater or studio rigging immediately adjacent to stage lighting fixtures are covered under Stage and Studio Luminaires and Connector Strips (IPFDZ). Portable cord-connected units rated 250 V ac or less, 20 A or less, intended for indoor use as multiple outlet extensions of a branch circuit to a central location to supply laboratory equipment, a home workshop, home movie lighting control, etc. are covered under Relocatable Power Taps (XBYS). Connector assemblies consisting of only factory-assembled plugs and cord connectors attached to extra-hard service cords or cables are covered under Cord Sets and Power Supply Cords (ELBZ).

Connector assemblies consisting of only factory-assembled plugs and cord connectors attached to extra-hard service cords or cables that are intended specifically and solely for undercarpet use at theaters as covered under undercarpet cord sets in Tradeshows Equipment – Exhibition Display Units, Accessories (XNRU).

**POWER-LIMITED CIRCUIT CABLE (QPTZ)**

**USE**

This category covers cable-mounted busbar clamps for use with portable power distribution units as well as partially enclosed, plastic framed cable splicing blocks.

**Busbar Clamps (Sister Lugs)**

Busbar clamps are intended for use by qualified personnel only. Cable terminating to busbar clamps should be tied or otherwise supported so that flexing or strain on the conductors is not transmitted to the conductor termination at the busbar clamp. Solder lug-type units are not suitable to terminate the equipment grounding conductor. Busbar clamps are marked with their range of intended wire sizes and their maximum current rating.

**Cable Splicing Blocks (Spiders)**

Partially enclosed, plastic framed cable splicing blocks are suitable for outdoor use, damp locations. They are suitable to be exposed to rain or water spray when not energized. Following such an exposure they are intended to be dried and inspected prior to energization. They are intended for use by qualified personnel in areas not readily accessible by the general public. They are intended for installations covered by Articles 520 and 530 of ANSI/NFPA 70, “National Electrical Code.”

**Construction Site Units**

Units identified as “Construction Site Portable Power Distribution Units” or with similar identifiers that are marked as providing fault-protection for personnel protect the output circuits in the presence of one or more of the following conditions:

1. Any two power supply conductors are reversed
2. There is an open circuit in either the grounded supply conductor or any of the ungrounded supply conductors

Protection is provided by exhibiting the performance characteristics of a Class A ground-fault circuit-interrupter or by de-energizing the protected output circuits.

**ADDITIONAL INFORMATION**

For additional information, see Power Distribution Equipment, Portable (QPRW) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify portable power distribution units manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number and the product name “Portable Power Distribution Unit” (or “Port Pwr Dist Unit”) or “Construction Site Portable Power Distribution Unit” (or “Construction Site Port Pwr Dist Unit”). The word “Equipment” may be substituted for “Unit.”

The Listing Mark for partially enclosed, plastic framed cable splicing blocks is the same as that specified above except the product name is “Open Frame Cable Splicing Block.”

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which busbar clamps are packaged and additionally provided with the UL symbol on the busbar clamp is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Busbar Clamp.”

### PORTABLE POWER DISTRIBUTION PANELS (QPSM)

**USE**

This category covers portable power distribution panels built for specific applications. These products are assemblies of Listed products, Recognized components, or both, contained in complete electrical enclosures. They may incorporate disconnecting means, overcurrent devices, receptacles for attachment plugs, stage and studio type inlets and connectors, and the like.

These panels are intended for use in applications specified for portable power distribution units in ANSI/NFPA 70, “National Electrical Code.”

**ADDITIONAL INFORMATION**

For additional information, see Power Distribution Equipment, Portable (QPRW) and Electrical Equipment for Use in Ordinary Locations (AALZ).
This category covers power-limited circuit cable intended for use in Class 2 or Class 3 circuits as described in Article 725 of ANSI/NFPA 70, "National Electrical Code" (NEC).

**PRODUCT MARKINGS**

Cable with a nonmetallic jacket is identified by a marking on the surface of the jacket or on a marker tape under the jacket. Cable with an outer metal sheath is identified by a marking on a tag attached to the reel or coil. This marking includes one of the following Type designations:

- **CL2P or CL3P** — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 725.61(A) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581, "Reference Standard for Electrical Wires, Cables, and Flexible Cords."
- **CL2 or CL3** — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings in accordance with Section 725.61(E) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581.
- **PLTC** — Indicates cable suitable for use in Class 3 circuits within buildings that is suitable for use in cable trays, in accordance with Sections 725.61(C) and (D) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in UL 1581.
- **Safety tested per NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."**
- **CL2R or CL3R** — Indicates cable intended for use in Class 2 or Class 3 circuits within buildings in vertical shafts in accordance with Section 725.61(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per UL 1696, "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."
- **Type PLTC cable suitable for use as open wiring between cable trays and utilization equipment in accordance with Section 725.61(E) of the NEC.**
- **Type PLTC cable suitable for use as open wiring between cable trays and utilization equipment in accordance with Section 725.61(E) of the NEC.**
- **Cable marked "direct burial," "for direct burial" or "dir bur" has been investigated and found suitable for direct burial in the earth.**
- **Cable marked "-30C," "-40C," "-50C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.**
- **Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems." For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).**
- **Cable marked "direct burial," "for direct burial" or "dir bur" has been investigated and found suitable for direct burial in the earth.**
- **Cable marked "-30C," "-40C," "-50C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.**
- **Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems." For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).**
- **Cable marked "direct burial," "for direct burial" or "dir bur" has been investigated and found suitable for direct burial in the earth.**
- **Cable marked "-30C," "-40C," "-50C," "-60C" or "-70C" complies with a cold bend test conducted at that temperature.**
- **Cable that complies with the requirements for "Limited Combustible" specified in NFPA 90A, "Installation of Air Conditioning and Ventilating Systems." For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).**

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 13, "Power-Limited Circuit Cables."

**UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Power-limited Circuit Cable."

**Power outlets**

Power outlets are intended for use with copper conductors unless marked to indicate which wire is allowed to serve as the neutral conductor. Such markings are independent of any marking on terminal connectors. Only As Service Equipment. Power outlets are not intended for use in recreational vehicle parks or in marinas unless so marked. Where intended for use as service equipment for mobile homes, temporary sites, marinas and boatyards, or any combination of these, the appropriate wording appears in the marking "Suitable For Use As Service Equipment For ____." Power outlets so marked for use as service equipment are provided with factory installed or field installable overcurrent protection and disconnecting means for service conductors, as well as means for grounding the service neutral conductor.

Power outlets containing overcurrent protection are marked with their short-circuit current ratings in RMS symmetrical amps. Where in normal operation the load will continue for three hours or more, molded-case circuit breakers and fuses should not be loaded to exceed 80% of their current rating.

Investigation of a power outlet includes a test designed to simulate exposure to beating rain to determine that such exposure will not interfere with successful operation of the apparatus within the enclosure nor result in wetting of the exposed faces of receptacles and associated attachment plugs. Power outlets are intended for use with copper conductors unless marked to indicate which wire is allowed to serve as the neutral conductor. Such markings are independent of any marking on terminal connectors and on a wiring diagram or other readily visible location. Unless the equipment is marked to indicate otherwise, the termination provisions are based on the use of 60°C ampacities for wire sizes 14–1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger.

**RELATED PRODUCTS**

Portable power distribution equipment is covered under Portable Power Distribution Units and Devices (QPSH) and Portable Power Distribution Panels (QPSM).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The basic standard used to investigate products in this category is ANSI/UL 231, "Power Outlets."

**Power outlets**

Power outlets are intended for use in ordinary locations in accordance with the National Electrical Code. General Purpose Power Supplies Specialty Power Supplies

**POWER SUPPLIES (QQAQ)**

These categories cover the following types of power supplies intended for use in ordinary locations in accordance with the National Electrical Code.
Telephone Power Supplies
Gas Tube Sign Power Supplies
Information Technology Equipment Power Supplies
The investigation of a device covered in these categories does not include the effects it may have on the system or equipment connected thereto.

Power supplies intended as components of fire protective signaling systems and burglary protective signaling systems equipment are covered under the respective categories.

Power supplies for use in health care facilities are listed in the Electrical Appliance and Utilization Equipment Directory under Power Supplies for use in Health Care Facilities, Guide KFCG.

Power supplies classified in accordance with IEC publications are listed in this directory under Power Supplies Classified In Accordance With IEC Publications, Guide QKPV.

Power supplies for use in recreational vehicles are listed in this directory under Power Converters and Power Converter Systems, Guide QPPY.

A power supply not covered under one of the above mentioned categories and for use with only a specific product may be covered under the category of the specific product.

The Listing Mark of Underwriters Laboratories Inc. on products covered under these categories does not extend to connected equipment.

POWER SUPPLIES, GAS TUBE SIGN (QQDZ)

This listing covers indoor and outdoor use power supplies for use with display signs employing glass tubes containing gases as the illuminant.

This category also covers Listed power supplies which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new products.

Power supplies provided with power supply cords are not suitable for use outdoors. Power supplies suitable for indoor use only are so marked. Power supplies for use in wet locations as defined in the National Electrical Code are so marked. Unmarked designs are intended for outdoor use within a sign body or equivalent enclosure, and damp locations as defined in the National Electrical Code.

The basic standards used to investigate products in this category are UL 1012, “Power Units Other Than Class 2”, and UL 506, “Specialty Transformers”.

See also “Transformers, Gas Tube Sign”, Guide XPMR.

For additional information, see Power Supplies Guide QQAQ.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product name: “Gas Tube Sign Power Supply”.

The Listing Mark for rebuilt power supplies additionally includes the word “Rebuilt”, “Remanufactured” or “Reconditioned” preceding the above product name.

POWER SUPPLIES, GENERAL PURPOSE (QQFU)

This listing covers indoor and outdoor use power supplies having input ratings of not more than 600 volts, direct and alternating current.

Power supplies identified with an enclosure type designation as or as “Rain Tight” or “Rainproof” are intended for use as indicated in the information at the front of this directory under Equipment for use in Ordinary Locations, Guide AALZ.

Power supplies which are marked “Intended for installation in a protected environment” or the equivalent are intended to be used in a temperature and humidity - controlled indoor area that is relatively free of conductive contamination.

This category also covers Listed power supplies which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new products.

The basic standard used to investigate products in this category is UL 1012, Fifth Edition, “Power Units Other Than Class 2”.

Telephone Power Supplies covered under this category were investigated to the telephone power supply requirements present in UL 1012, “Power Supplies”, (Fourth Edition). Telephone Power Supplies investigated to UL 1459, “Telephone Equipment”, are listed under Guide QQJE in this directory.

Other power supplies under this category with a specific use application indicated are being transferred to the Specialty Power Supplies subcat-
These power supplies are intended for, but not necessarily limited to, specific uses such as to supply some household appliances, electroplating equipment, school laboratory equipment, pipe organs, cathodic protection equipment, power supply-battery charger combinations, and industrial equipment, including inverters and converters. This category also covers permanently connected Class 2 power units. Other types of Class 2 power units are covered under Transformers, Class 2, Class 3 (KOKV) or Direct Plug-in and Cord-connected Class 2 Power Units (EPBU).

Power supplies identified with an enclosure type designation or as "Rain tight" or "Rainproof" are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

PRODUCT MARKINGS

Power supplies marked "Intended for installation in a protected environment" or the equivalent are intended to be used in a temperature- and humidity-controlled indoor area that is relatively free of conductive contamination.

REBUILT PRODUCTS

This category also covers power supplies that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new power supplies.

RELATED PRODUCTS

See Power Supplies, General Purpose (QOQF)

ADDITIONAL INFORMATION

For additional information, see Power Supplies (QQAQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1012, "Power Units Other Than Class 2." Products with a marked Class 2 output are also investigated to UL 1310, "Class 2 Power Units."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the appropriate product name as shown in the individual Listings. For rebuilt products the word "Rebuilt," "Remanufactured" or "Reconditioned" precedes the product name.

POWER SUPPLIES, TELEPHONE (QQJE)

This listing covers telephone power supplies having input ratings of not more than 600 volts, direct and alternating current, intended for use with telephone exchange equipment, telephone appliances, and telephone accessories. This category also covers Listed power supplies which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new products.

The basic standard used to investigate products in this category is UL 1459, "Telephone Equipment."

For additional information, see Power Supplies Guide QQAP and Power Supplies, General Purpose Guide QQFU.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the following product name: "Telephone Power Supply."

The Listing Mark for rebuilt power supplies additionally includes the word "Rebuilt," "Remanufactured" or "Reconditioned" preceding the above product name.

POWER SUPPLIES, GAS TUBE SIGN (QQK)

This Listing covers indoor and outdoor use power supplies for use with display signs employing glass tubes containing gases as the illuminant. Power supplies provided with power supply cords are not suitable for use outdoors. Power supplies if suitable for indoor use only are so marked; power supplies for use in wet locations as defined in the National Electrical Code are so marked; unmarked designs are intended for outdoor use within a sign body or equivalent enclosure, and damp locations as defined in the National Electrical Code.

The effects on the sign to which these devices may be connected have not been investigated. Gas Tube Sign Power Supplies intended for use with a specific gas tube length, diameter, and gas type are so tested and marked; the use of greater lengths or other diameters or types of gases may result in overheating of the power supply.

The basic standards used to investigate products in this category are UL 1012, "Power Supplies" and UL 506, "Specialty Transformers."

See also, "Transformers, Gas Tube Sign", Guide XPMR.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Gas Tube Sign Power Supply."

NONMETALLIC UNDERGROUND CONDUIT WITH CONDUCTORS (QQRK)

USE AND INSTALLATION

This category covers cable, which is a factory assembly of one or more Listed insulated wires or cables, and may include one or more insulated or bare equipment grounding conductor(s), all enclosed in a high-density polyethylene tube, intended for underground installation in accordance with Article 334 of ANSI/NFPA 70, "National Electrical Code" (NEC), or for highway lighting, utility company installations and similar uses not within the scope of the NEC.

The product is intended for embedment in concrete and/or for direct burial in the earth to a depth specified in the NEC, or by the acceptance authority.

The product is provided in a continuous length on a reel and intended to be installed without splices underground. The ends of cable runs are intended to be stubbed-up through concrete or directly from earth into equipment enclosures, cabinets or lighting pole bases.

Conductors in the cable are rated 600 V or higher and are suitable for use in wet and dry locations. The conductors fill the internal cross section of the tube in accordance with Chapter 9 of the NEC.

For cable rated 600 V through 35 kV, the voltage ratings of all conductors in a construction are the same. The ampacity of the conductors is to be determined on the basis of the AWG size, the temperature ratings of the conductors, and the number of current-carrying conductors in the cable, in accordance with the NEC.

The smallest radius to which the cable may be bent in the installation is:

The range of trade sizes is from 1/2 in. to 4 (metric designators 16 to 103) inclusive.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1990, "Nonmetallic Underground Conduit with Conductors."

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Preassembled Cable in Nonmetallic Conduit" or "Nonmetallic Underground Conduit With Conductors," or other appropriate product name.

PREFabricATED ASSEMBLies (QQRX)

Prefabricated assemblies are factory-built assemblies incorporating pre-installed materials and equipment which after installation are usually concealed and may not be accessible for inspection at the installation site.
2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

Materials, including the methods used for the installation of electrical, mechanical, heating and plumbing equipment incorporated in these assemblies by their manufacturer have been judged under the requirements of the Laboratories which are based on the National Electrical Code, National Fire Code and Model Building, Plumbing and Mechanical Codes.

These prefabricated assemblies are intended for installation subject to approval by the authority having jurisdiction.

For factory-built buildings see "Prefabricated Buildings" in the Building Materials Directory.

MANUFACTURED WIRING SYSTEMS (QQVX)

These are factory-built modules and cable sets incorporating fixtures, switches, connectors and receptacles. These prefabricated modules and assemblies are intended for installation rearrangement and inspection in accessible locations in accordance with Article 604 of the National Electrical Code and are subject to approval by the authority having jurisdiction.

Components of manufactured wiring systems may be marked: “Acceptable for use in ducts or plenums” or equivalent wording, or may be marked: “Acceptable for use in air-handling spaces other than ducts or plenums” or equivalent wording.

Assemblies of manufactured wiring systems suitable for use in outdoor locations are marked “Outdoor”.

The basic standard used to investigate products in this category is UL 183, “Manufactured Wiring Systems”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Distribution Box,” “Tap Box,” or other appropriate product name as shown in the individual Listing.

SECTIONS AND UNITS (QQXX)

USE

Prefabricated sections or units are factory-built assemblies for use in, within, or as part of the structure of buildings for commercial, industrial, and residential use. These assemblies may incorporate pre-installed materials and equipment which are usually concealed and may not be accessible for inspection at the installation site.

These assemblies are intended for installation subject to approval by the Authority Having Jurisdiction.

INSTALLATION CODES

Materials, including the methods used for the installation of electrical, mechanical, heating, and plumbing equipment included in these assemblies by the manufacturer of the assembly, have been judged under UL requirements which are based on the National Electrical Code, National Fire Code, and Model Building, Plumbing and Mechanical Codes.

RATINGS

The fire hazard of building materials employed in the assemblies is judged to be no greater than that of ordinary lumber used in site-constructed buildings. Finish surfaces are of materials having flame spread and smoke developed rating of 200 or less. Products with a rating less than 200 as indicated in the individual listings may be included as part of the product marking.

Structural requirements vary with type of building construction and occupancy, and stability is to a large measure dependent upon the attachment of the assemblies to field-erected or existing structures. Therefore, local inspection authorities should be consulted with respect to local requirements and the method to be employed to effect and determine compliance therewith.

REQUIREMENTS

The basic requirements used to investigate products in this category is the National Electrical Code, NFPA 70.

For additional information, see Electrical Equipment for use in Ordinary Locations (AALZ) and Prefabricated Assemblies (QQRX).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product names “Prefabricated.”

The Listing Mark will indicate the specific type of assembly, such as “Dental Unit” with further description where necessary.

One Listing Mark is applied to each section or unit.

WIRING ASSEMBLIES (QQYZ)

GENERAL

This category covers fabricated wiring assemblies, wiring assembly kits, conduit kits, and surface raceway kits.

Factory-assembled wiring assemblies incorporate Listed conduit, tubing, or cable, conductors and fittings intended for field installation in accordance with the National Electrical Code (NEC). They may be factory assembled to outlet or junction boxes, box mounting brackets, and wiring devices.

Factory-assembled wiring assemblies are marked with the conduit, tubing or cable type, and the conductor size and type to permit determination of their suitability for a specific application and Ampacity in accordance with the NEC. A parts list is provided with each assembly to identify the extent of the product.

Wiring Assembly Kits

Wiring assembly kits for final assembly in the field consist of a package that contains some or all: length(s) of Listed conduit, tubing, or cable, Listed fittings, appropriate for the type of conduit, tubing, or cable, outlet or junction boxes, conductors, or other devices.

The packaging for wiring assembly kits is marked with the conduit, tubing, or cable size and type, and the conductor size and type, if provided, to permit determination of their suitability for a specific application and ampacity in accordance with the NEC. Installation instructions and a parts list are provided on or in each package. Acceptability of the field assembly is to be determined by the Authority Having Jurisdiction.

Conduit Kits

Conduit kits for final assembly in the field consist of a package that contains some or all: length(s) of Listed conduit or tubing, Listed fittings appropriate for the type of conduit or tubing, outlet or junction boxes, or other devices.

The packaging for conduit kits is marked with the conduit or tubing size and type to permit determination of their suitability for a specific application in accordance with the NEC. Installation instructions and a parts list are provided on or in each package. Acceptability of the field assembly is to be determined by the Authority Having Jurisdiction.

Surface Raceway Kits

Surface raceway kits for final assembly in the field consist of a package that contains some or all: length(s) of Listed surface metal or nonmetallic surface raceway, Listed fittings appropriate for the surface raceway, or other devices.

The packaging for surface raceway kits is marked with the raceway size and the number, type and size of conductors which may be installed in the Listed raceway, to permit determination of its suitability for a specific application in accordance with the NEC. Installation instructions and a parts list are provided on or in each package. Acceptability of the field assembly is to be determined by the Authority Having Jurisdiction.

RELATED PRODUCTS

For products covered by Article 604 of the NEC, see Manufactured Wiring Systems (QQVX).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the factory-assembled wiring assembly or the packaging of a wiring assembly kit is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Wiring Assembly,” “Wiring Assembly Kit,” “Conduit Kit” or “Surface Raceway Kit.”

PRESS AND OTHER POWER-OPERATED MACHINE CONTROLS AND SYSTEMS (QUEQ)

These Controls and systems are intended for industrial or commercial application on power operated machines intended for such uses as pressing, punching, shearing or breaking operations. They may be designed for use on particular types of equipment such as pneumatic or hydraulic powered devices or mechanically operated part or full revolution types of machines. The control or system is intended to reduce the risk of bodily injury resulting from machine operation. The intended use of the control is noted in the individual listings.

The controls or systems have been investigated in accordance with the requirements of the National Fire Protection Association Electrical Standard for Industrial Machinery NFPA 79, and Article 670 of the National Electrical Code.

PRESENCE SENSING DEVICES (QUHP)

A presence sensing device is intended for use in a machine control system where it can be interconnected to the control system. The presence
sensing device detects the presence of an object or body part and is used as a guard to prevent bodily injury from moving machine parts. The prod-
uct is limited to use on part revolution types of machines or machines where operation can be interrupted and motion stopped at any point in the machine operation cycle.

Presence sensing devices evaluated for press initiation are noted in the individual Listings. Presence sensing devices evaluated for press initiation are intended to be in accordance with the Occupational Safety and Health Administration Standard Section 1910.217 (1)(A).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction to this Directory) together with the word “LISTED”, a control number and the Product name “Presence Sensing Device”.

PRESS CONTROLS (QUKQ)

A press control is a device intended for use in a press control system where it would be interconnected with other components such as push button hand controls, valves, air cylinders, etc. When the press control or system is applied as intended, it is judged to be in accordance with the Occupational Safety and Health Administration Standard Section 1910.217.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction to this Directory) together with the word “LISTED”, a control number and the Product name “Press Control”.

PROCESS CONTROL EQUIPMENT (QUXY)

This category covers process control equipment rated 600 V maximum for use in accordance with NFPA 70, “National Electrical Code.” This equipment includes instruments for measurement, recording and/or control of process variables (such as temperature, pressure, flow, etc.) and auxiliary devices used therewith such as sensors, transducers and valve operations.

The investigation of process control equipment does not include investigation of the function of the controlled equipment.

Equipment intended to be installed only in process control panels is so identified.

Process control equipment may be shipped completely assembled or in modular form. Modular assemblies are intended to be field assembled to form a complete system in accordance with provided installation instructions.

Open-type process control equipment is not provided with a complete enclosure and is intended to be placed in a industrial control panel or similar type of enclosure.

RELATED PRODUCTS

Process control equipment intended to be mounted in hazardous (classified) locations or that have circuits which extend into hazardous (classified) locations is covered under Process Control Equipment for Use in Hazardous Locations (QUZV) and Process Control Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (QUVA).

Requirements

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The basic standard used to investigate products in this category is ANSI/UL 61010-1, “Electrical Equipment for Measurement, Control, and Laboratory Equipment – Part 1: General Requirements.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as appropriate: “Process Control Equipment,” “Open-Type Process Control Equipment,” “Process Control Enclosure,” “Process Control Subassembly” or “Process Control Accessory.”

Quick-Connect Terminals

This category covers quick connect tabs and quick connect connectors constructed from plain or plated copper alloy or of nickel or nickel alloy, herein referred to as quick connect terminals. They are additionally defined as follows:

Quick Connect Wiring Termination — An electrical connection consisting of a male tab and a female connector (receptor) that can be readily engaged or disengaged without the use of a tool.

Terminal — An electrical connecting device consisting of either a connector or tab.

Tab — A terminal that is inserted in a connector, manufactured to specified tolerances, and intended to mate with a connector to establish a connection in an electrical circuit.

Connector — A terminal that is pushed onto a tab.

Quick connect terminals are intended for use with one or two copper conductors, 22 – 10 AWG. Amperage for a two-wire combination is limited to the current associated with the largest of the two conductors.

Quick connect terminals are not intended for disconnecting under load.

Cartons containing quick connect terminals are marked to indicate whether the tab or connector is suitable for the internal wiring of appliances, for field termination of conductors to electrical equipment, or for both.

Cartons containing quick connect terminals are marked to indicate their suitability for termination of copper wire only.

Cartons containing quick connect terminals designed for the field termination of conductors to electrical equipment are marked to indicate that such electrical equipment is to be provided with strain relief and is to be marked with instructions for effecting the strain relief and also reference the specific mating part (tab, terminal, connector) to be used.

Cartons containing insulated quick connect terminals are marked with a voltage rating and the maximum operating temperature for which they have been found acceptable. The marked voltage rating may be 300 V maximum; 600 V maximum; or 600 V maximum building wire, 1000 V maximum signs or luminaires. An insulated terminal is additionally marked with the maximum operating temperature.
Quick connect terminals to be assembled to wire using a special tool are intended to be assembled using the tool specified by the manufacturer on or in the shipping carton. Such tools are identified by appropriate marking.

**RELATED PRODUCTS**
Quick connect tabs or connectors constructed from plated steel, or unplated steel of a corrosion-resistant alloy are covered under Quick Connect Terminals (RFWV2).

**ADDITIONAL INFORMATION**
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**
The basic standard used to investigate products in this category is UL 310, "Electrical Quick-Connect Terminals." End Clips

**UL MARK**
The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Quick Connect Tab" or "Quick Connect Connector" or other appropriate product name as shown in the individual Listings.

### CELLULAR CONCRETE FLOOR RACEWAYS (RGYR)

#### USE AND INSTALLATION
This category covers cellular concrete floor raceways designed for the installation of electrical conductors in accordance with Article 372 of ANSI/NFPA 70, "National Electrical Code."

 Listed cellular concrete floor raceways have fire resistance ratings, as used in building construction, only when assembled in the manner described in the designs covered under Precast Concrete Units (CFTV). Where header ducts and junction boxes are involved, these items must be shown in the design drawing in order that the associated fire resistance rating can be considered appropriate.

 Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector and others concerned with the installation.

#### ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cellular Concrete Floor Raceway."

### Cellular Concrete Floor Raceway Fittings (RHLZ)

#### USE AND INSTALLATION
This category covers cellular concrete floor raceway fittings designed for the installation of electrical conductors in accordance with Article 372 of ANSI/NFPA 70, "National Electrical Code."

 Listed cellular concrete floor raceways fittings have fire resistance ratings, as used in building construction, only when assembled in the manner described in the designs covered under Precast Concrete Units (CFTV). Where fittings are involved, these items must be shown in the design drawing in order that the associated fire resistance rating can be considered appropriate.

 Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector and others concerned with the installation.

### CELLULAR METAL FLOOR RACEWAYS (RHZX)

#### USE AND INSTALLATION
This category covers cellular metal floor raceways designed for the installation of electrical conductors in accordance with Article 374 of ANSI/NFPA 70, "National Electrical Code."

 Raceways may be factory constructed or consist of field-assembled components. Each component of a field-assembled raceway is marked to identify its relation to the other components of the raceway.

 Listed cellular metal floor raceways have fire resistance ratings, as used in building construction, only when assembled in the manner described in the designs covered under Steel Floor and Form Units (CHWX). Where header ducts and junction boxes are involved, these items must be shown in the design drawing in order that the associated fire resistance rating can be considered appropriate.

 Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector, and others concerned with the installation.

#### ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cellular Metal Floor Raceway."

### Cellular Metal Floor Raceway Fittings (RINV)

#### USE AND INSTALLATION
This category covers cellular metal floor raceway fittings designed for the installation of electrical conductors in accordance with ANSI/NFPA 70, "National Electrical Code."

 Raceways fittings may be factory constructed or consist of field-assembled components. Each component of a field-assembled raceway is marked to identify its relation to the other components of the raceway.

 Listed cellular metal floor raceways fittings have fire resistance ratings, as used in building construction, only when assembled in the manner described in the designs covered under Steel Floor and Form Units (CHWX). Where fittings are involved, these items must be shown in the design drawing in order that the associated fire resistance rating can be considered appropriate.

 Installation instructions are supplied by the manufacturer for the use of the general contractor, erector, electrical contractor, inspector, and others concerned with the installation.

#### ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

#### UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Cellular Metal Floor Raceway."

**LOOK FOR THE UL MARK ON PRODUCT**
name “Cellular Metal Floor Raceway Fitting,” “End Closure” or “Grommet,” or other appropriate product name as shown in the individual Listings.

**STRUT-TYPE CHANNEL RACEWAYS (RIUU)**

**USE**

This category covers strut-type channel raceways for installation in dry locations only in accordance with Article 384 of ANSI/NFPA 70, “National Electrical Code.”

**PRODUCT MARKINGS**

The number, type and size of conductors which may be installed in the Listed raceway is marked on the raceway, on the Installation instruction sheet or on the package in which it is shipped.

Raceways for use with lighting fixtures and/or other devices are marked to this effect on the raceway or on the package in which it is shipped.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 5B, “Strut-Type Channel Raceways and Fittings.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Strut-Type Channel Raceway,” “Strut-Type Channel Raceway Base” or “Strut-Type Channel Raceway Closure Strip.”

The Listing Mark is applied to each length or package of complete raceway, raceway closure strip (cover) or raceway base.

**Fittings for Strut-type Channel Raceways (RIYG)**

**USE**

This category covers fittings, such as adapters, boxes, elbows and tees, for use with the same manufacturer’s strut-type channel raceways.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 5B, “Strut-Type Channel Raceways and Fittings”.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Strut-Type Channel Raceway Fitting,” “Elbow” or “Tee,” or other appropriate product name as shown in the individual Listings.

**SURFACE METAL RACEWAYS (RJBT)**

**USE**

This category covers surface metal raceways intended for installation in accordance with Article 386 of ANSI/NFPA 70, “National Electrical Code.”

**PRODUCT MARKINGS**

The number, type and size of conductors which may be installed in the Listed raceway is marked on the raceway, on the installation instruction sheet or on the package in which it is shipped.

Raceways for use with lighting fixtures and/or other devices are marked to this effect on the raceway or on the package in which it is shipped.

**RELATED PRODUCTS**

Some luminaires covered under Fluorescent Surface Mounted Luminaires (IEUZ) are suitable for use as raceways.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 5, “Surface Metal Raceways and Fittings.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Surface Metal Raceway,” “Surface Metal Raceway Base for Use with Labeled Raceway Cover” or “Surface Metal Raceway Cover for Use with Labeled Raceway Base.”

**Surface Metal Raceway Fittings (RJPR)**

The basic standard used to investigate products in this category is UL 5, “Surface Metal Electrical Raceways and Fittings.”

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product, when size or shape permits is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Surface Metal Raceways Fitting,” “Hanger,” “Side-Face,” or other appropriate product name.

**SURFACE NONMETALLIC RACEWAYS (RJTX)**

**USE**

This category covers surface nonmetallic raceways intended for installation in accordance with Article 388 of ANSI/NFPA 70, “National Electrical Code.”

**PRODUCT MARKINGS**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The number, type and size of conductors which may be installed in the Listed raceway is marked on the raceway, on the Installation instruction sheet or on the package in which it is shipped.

**RELATED PRODUCTS**

Some luminaires covered under Fluorescent Surface Mounted Luminaires (IEUZ) are suitable for use as raceways.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**SURFACE NONMETALLIC RACEWAYS (RJTYT)**

**USE**

This category covers surface nonmetallic raceways for installation in accordance with ANSI/NFPA 70, “National Electrical Code.”

**PRODUCT MARKINGS**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 5A, “Nonmetallic Surface Raceways and Fittings.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Surface Nonmetallic Raceway,” “Surface Nonmetallic Raceway Base for Use with Labeled Raceway Cover,” or “Surface Nonmetallic Raceway Cover for Use with Labeled Raceway Base.”

The Listing Mark is applied to each length or package of complete raceway, raceway cover or raceway base.

**UNDERFLOOR RACEWAYS (RKCZ)**

**USE**

This category covers metal underfloor duct systems designed for use as raceways for the installation of wire and cable in accordance with Article 390 of ANSI/NFPA 70, “National Electrical Code,” and the manufacturer’s installation instructions.

The raceway may consist of factory constructed raceways or field assembled components forming a raceway. Each component is provided with installation instructions to identify its relation to the other components of the raceway.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).
UNDERGROUND WIREWAYS (RQFW)

**USE**

This category covers underfloor raceways for installation in underfloor raceway systems in accordance with Article 376 of ANSI/NFPA 70, “National Electrical Code,” and the manufacturer’s installation instructions. Each component is provided with installation instructions to identify its relation to the other components of the raceway system.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/NEMA WD6-1997 configurations 1-15R and 5-15R. Receptacle closures that are intended to reduce drafts through a receptacle to be wired on flexible cord or wire and they are judged as part of a complete assembly.

These listings may also cover the following types of products:

- **Appliance, Equipment or Fixture Outlet** — A female contact device for mounting on utilization equipment.
- **Receptacle** — A female contact device intended to be installed on a wiring system to supply current to utilization equipment. These devices are tested on circuits involving a nominal potential to ground except for multiphase devices which are tested on circuits consistent with their voltage ratings, i.e., a 120/208 volts, 3-phase, devices is tested on a circuit involving 120 volts to ground.
- **Male Inlet (Equipment Inlet, Motor Attachment Plug)** — A male contact device to be mounted on utilization equipment to provide a detachable electrical connection to an attachment plug or, as an appliance coupler, to a male inlet.

**PRODUCT MARKINGS**

Markings are provided to clearly indicate the parts that combine to form the complete assembly.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

RECEPTACLE CLOSURES (RQYF)

**GENERAL**

This category covers receptacle closures for use with receptacles of ANSI/NEMA WD6-1997 configurations 1-15R and 5-15R. Receptacle closures are products molded of insulating material that are intended to be used with a receptacle to cover the outlet slots a) to reduce drafts through a receptacle on an outside wall of a dwelling or b) to restrict a child’s access to energized contacts.

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 2255, “Receptacle Closures.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product when shape or size permits or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Underfloor Raceway.”

**Underfloor Raceway Fittings (RKQX)**

**USE**

This category covers underfloor raceway fittings for installation in underfloor raceway systems in accordance with Article 376 of ANSI/NFPA 70, “National Electrical Code,” and the manufacturer’s installation instructions.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/NEMA WD6-1997 configurations 1-15R and 5-15R. Receptacle closures that are intended to restrict a child’s access to energized contacts are packaged together with an insulating gasket to be fitted behind the receptacle cover plate. The packaging of such closures contains a cautionary marking to this effect.

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**RECEPTACLES (RTDV)**

**GENERAL**

The three sub categories below cover the following attachment plug products:

- Receptacles for Attachment Plugs and plugs
- Receptacles, Stage Type
- Receptacles with Switch

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product when shape or size permits or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Closure” or “Receptacle Closure” or other appropriate product name as shown in the individual Listings.

**RATING**

- These devices are rated 600 volts or less, ac or dc; and 200 amps or less. They may also be rated in horsepower as noted in the individual sub categories.
- Devices rated 250 volts are tested on circuits involving a nominal potential to ground of 125 volts. Devices having other voltage ratings are tested on circuits involving full rated potential to ground except for multiphase devices which are tested on circuits consistent with their voltage ratings, i.e., a 120/208 volts, 3-phase, devices is tested on a circuit involving 120 volts to ground.
- Devices marked “Not for current interruption” are not intended to be disconnected while under load. They are to be installed in series with switches or other appropriate disconnecting means.

**TERMINALS**

- The terminations of devices intended to be wired to flexible cord are based on the use of flexible cord or cable having copper conductors, in accordance with Article 400 of the National Electrical Code. The ampacity of the flexible cords and cables is based on Section 400-5(A) and 400-5(B). The conductors are sized as specified on the product or in the manufacturer’s instructions provided with the device. The terminations are based on the use of 60°C flexible cord or cable.

- Unless state otherwise in the sub categories below, the termination provisions of all other devices are based upon the use of 60°C insulated con-
Receptacles for in use in Hospitals — Receptacles for hospital use in other than hazardous (classified) locations in accordance with Article 517 of the NEC are identified (1) by the marking “Hospital Only” (used to identify a specific grounding locking configuration rated 20 A, 125 V used for the connection of mobile x-ray and similar equipment) or (2) by the marking “Hospital Grade” and a green dot on the face of the receptacle. The identification is visible during installation on the wiring system or, in the case of the appliance outlet, after installation on the utilization equipment.

Tamper Resistant Receptacles — Receptacles for use in pediatric patient care areas in accordance with Article 517 of the NEC are identified by the words “Tamper Resistant” or the letters “TR” where they will be visible after installation with the cover plate removed. Tamper-resistant receptacles may be of the general grade, hospital grade or isolated ground type.

Self-contained Receptacles — Self-contained receptacles include an enclosure and mounting means intended for flush mounting without the use of a separate flush device or other outlet box. They are intended for use with Types NM and NMC cable in accordance with the NEC, specifically Sections 300.15(E), 334.40(C), 545.10, 550.15(I), 551.47(E) Exception No. 1 and 552.48(E) Exception No. 1 and are so identified by specific marking on the carton in which they are packed. Devices employing insulation displacement terminals are intended for assembly with specific installation tools only. Reference must be made to the installation instructions regarding the proper tool and the number of cables (per entry) with which the devices are intended to be used.

Surface Receptacles — Surface receptacles include an enclosure and mounting means for surface mounting without the use of a separate outlet box. They are intended for use in show window floors and similar locations where the device is likely to be subject to severe mechanical abuse. They are not intended to be used as substitutes for floor boxes, which are covered under Metallic Outlet Boxes (QCTI) and Nonmetallic Outlet Boxes (QMIZ).

Display Receptacles — Display receptacles are provided with a flush device cover plate or outlet box cover and closure plug or plugs. They are intended for use in window floor windows and similar locations where the device is not likely to be subjected to scrub water. They are not intended to be used as substitues for floor boxes, which are covered under Metallic Outlet Boxes (QCTI) and Nonmetallic Outlet Boxes (QMIZ).

Interchangeable (Modular) Receptacles — Interchangeable receptacles are flush receptacles that are assembled as single, duplex or triplex outlets in the field from a system of individual outlet modules, mounting yokes, and/or flush device cover plates.

Appliance, Equipment and Fixture Outlets — When an outlet is installed in equipment with a conductive mounting surface, the face of the receptacle shall project a minimum of 3/32 in. and a maximum of 3/16 in. from the mounting surface.

Federal Specification — Some receptacles in this category have been investigated for compliance with Federal Specification W-C-596, “General Specification for Electrical Power Connectors.” Such devices are identified by a Listing Mark augmented by the capital letters “F” and “S” each in a wing on either side of the UL Mark. The manufacturer may also include the Federal Specification number, W-C-596, on the device. The wording on an outlet box, an outlet box cover or a flush device cover plate for Federal Specification part number (which consists of the appropriate specification sheet and dash number described in the specification) on the device or on the smallest container in which the device is packaged.

Terminals — Terminals of 15 and 20 A receptacles not marked “CO/ALR” are for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Terminals of receptacles rated 30 A and above not marked “AL-CU” are for use with copper conductors only. Terminals of receptacles rated 30 A and above marked “AL-CU” are for use with aluminum, copper and copper-clad aluminum conductors.

Terminals marked “75°C” may be wired using the amperages for conductors rated 75°C as well as conductors rated 80°C in Table 310.16 of the NEC.

Terminals of the wire-binding screw, setscrew, or screw-actuated back wire-clamping types are suitable for use with both solid and stranded building wires.

Screwless terminal connectors of the conductor push-in type (also known as “push-in-terminals”) are restricted to 15 A branch circuits and are not connection with 14 AWG or 10 AWG solid copper wire only. They are not intended for use with aluminum or copper-clad aluminum wire, 14 AWG stranded copper wire, or 12 AWG solid or stranded copper wire.

Single and duplex receptacles rated 15 and 20 A that are provided with more than one set of terminals for the connection of line and neutral conductors have been investigated to feed branch circuits connected to other outlets on a multi-outlet branch circuit, as follows:

Back wire (screw actuated clamp type) terminations with multiple wire access holes used concurrently to terminate more than one conductor.
Side wire (binding screw) terminals used concurrently with their respective push-in (screwless) terminations to terminate more than one conductor

Single and duplex receptacles rated 15 and 20 A that are provided with more than one set of terminals for the connection of line and neutral conductors have not been investigated to feed branch circuit conductors connected to other outlets on a multi-outlet branch circuit, as follows:

Side wire (binding screw) terminal with its associated back wire (screw actuated clamp type) terminal

Multiple conductors under a single binding screw

Multiple conductors in a single back wire hole

Duplex receptacles rated 15 and 20 A that are provided with break off tabs may have those tabs removed so that the two receptacles may be wired in a multi-wire branch circuit.

**HORSEPOWER RATINGS**

In addition to ampere and voltage ratings, standard AC horsepower ratings corresponding to the ampere and voltage ratings for specific general-use receptacles not incorporating overcurrent protection or a switch are given in the table below. For a Design E motor rated more than 2 horsepower, it is necessary to use a receptacle having a horsepower rating not less than 1.4 times the standard AC horsepower rating. The NEMA configuration designation is included for reference. Devices of configurations other than those indicated in the table have horsepower ratings only if such ratings are marked on the device.

**HORSEPOWER RATINGS FOR NEMA CONFIGURATION RECEPACTLES**

<table>
<thead>
<tr>
<th>Amps Rating</th>
<th>AC V Rating</th>
<th>No. of Phase</th>
<th>No. of Poles</th>
<th>No. of Wire</th>
<th>NEMA Dsg</th>
<th>HP Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>125</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1-15, L1-15</td>
<td>1/2</td>
</tr>
<tr>
<td></td>
<td>125</td>
<td>2</td>
<td>3</td>
<td>5-15, L5-15</td>
<td>1/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2-15, 1-1/2, %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>2</td>
<td>3</td>
<td>6-15, L6-15</td>
<td>1-1/2, %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>3</td>
<td>3</td>
<td>7-15, L7-15</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>125/250</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>15-14, 1-1/2, 1-1/4, %</td>
<td>1/2 L-N</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>11-15, L1-15</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>120/208</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>16-15, L1-15</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>125</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2-20, L2-20</td>
<td>2, %</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>6-20, L6-20</td>
<td>2, %</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>2</td>
<td>3</td>
<td>7-20, L7-20</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>490</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>L8-20</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>125/250</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>10-20, 2 L-20, %</td>
<td>L10-20, L1-15, L1-N</td>
</tr>
<tr>
<td></td>
<td>125/250</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>14-20, 2 L-20, %</td>
<td>L14-20, L1-N</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>11-20</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>125/250</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>15-20</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>120/208</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>16-20, L1-15, L1-N</td>
<td></td>
</tr>
<tr>
<td></td>
<td>125</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2-30, L2-30</td>
<td>2, %</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>6-30, L6-30</td>
<td>2, %</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>2</td>
<td>3</td>
<td>7-30, L7-30</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>490</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>L8-30</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>125/250</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>10-30, 2 L-30, 2 L-20, %</td>
<td>L10-30, L20-30</td>
</tr>
<tr>
<td></td>
<td>125/250</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>14-30, 2 L-30, 2 L-20, %</td>
<td>L14-30, L20-30</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>11-30, L1-15, L1-N</td>
<td></td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>15-30</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>120/208</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>12-30</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>490</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>L8-30</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>120/208</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>18-30</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>120/208</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>19-30</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>277/490</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>L19-30</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>277/490</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>L22-30</td>
<td>10</td>
</tr>
</tbody>
</table>

%: Also suitable for 208 V motor applications at the indicated horsepower rating

For three-phase devices, the horsepower ratings indicated are for three-phase motor loads.

Refer to ANSI/NEMA WDE-2002 for configurations of the NEMA designations.

**ADDITIONAL INFORMATION**

For additional information, see Receptacles (RTDV) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**RECEPTACLES, STAGE TYPE (RUFR)**

This listing covers attachment plugs, cord connectors, equipment outlets, male inlets and receptacles intended for use in theater and stage applications in accordance with Articles 520 and 530 of the National Electrical Code.

The Listing Mark of Underwriters Laboratories Inc. on the product when shape or size permits, or on the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Attachment Plug,” “Plug,” “Receptacle,” “Recept,” “Attachment Plug With Overload Protection,” “Attachment Plug Fuselless” or other appropriate product name as shown in the individual Listings.

**RECEPTACLES WITH SWITCHES (RUSZ)**

This listing covers receptacles and appliance outlets incorporating switches.

In addition to UL 498, the standard used to investigate products in this category is UL 20, “General Use Snap Switches”. For additional information, see the general guide information under Snap Switches (WJQR).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Plug,” “Connector,” “Stage Type Plug,” “Stage Type Connector” or other appropriate product name.

**UTILITY SERVICE RECEPACTLES (RVNW)**

The products covered in this category are Utility Service Receptacles having a unique, non-standard contact configuration and utilizing the grounded neutral conductor of the supply as the equipment grounding conductor.

These receptacles are intended for mounting in a utility pole and for use in conjunction with a Utility Service Cord Set (see Guide ELFT) only by authorized utility company personnel in obtaining temporary power from utility poles. They are rated as marked, for example 125 volts, 15 amperes.

These receptacles were investigated in accordance with the requirements for Attachment Plugs and Receptacles (UL 498) with regard to protection from the risk of electrical shock and the ability to function without overheating.

LOOK FOR CLASSIFICATION MARK ON PRODUCT
COMMENTS

ROBOTS AND ROBOTIC EQUIPMENT (TETZ)

This category covers robots, integrated work cells, programmable production equipment, remote sensing equipment, robotic servo power supplies, and similar equipment. This equipment has been investigated with respect to risks of electric shock, fire and injury to persons.

The basic standard used to investigate products in this category is UL 1740, “Robots and Robotic Equipment”. The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the symbol and/or word “UL” as illustrated in the Introduction of this Directory. The product name “Robot” or the appropriate product name as shown in the individual Listings.

SEMICONDUCTOR MANUFACTURING EQUIPMENT (TWKH)

USE

This category covers equipment and accessories used in the manufacturing, metrology, assembly and testing of semiconductor products. Equipment intended for both semiconductor product-related use and non-semiconductor product-related use may be covered under this category, as well as in the applicable non-semiconductor categories. These products do not include equipment intended only for non-semiconductor product-related use.

UNEVALUATED FACTORS

The accuracy or quality characteristics of any measured, analyzed or prepared quantities have not been investigated. The sound pressure levels and physiological effects of the RF have not been investigated.

REPACKAGED ELECTRICAL CONSTRUCTION EQUIPMENT (TEOZ)

Products covered under this category are re-packaged Listed or Classified products of the type contained in the Electrical Construction Equipment Directory. Required user instructions and ratings are marked or packaged with the smallest unit container in which the product is packaged. Listed wire or cable that has been subjected to processing or respooling subsequent to its manufacture is covered under “Wire, Processed” (ZKLU).

Lightning Protection Installation (OWAY) are covered by UL’s Master Label service and are not eligible for Re-packaging. Lightning Conductor, Air Terminals and Fittings (OVTZ) are intended for installation in a Listed Lightning Protection Installation and are not eligible for Re-packaging. Products that are covered by “Listing by Report” may require special descriptions and recommended methods of installation and are not covered under this category. The Listing Mark of Classification Marking of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing or Classification and Follow-Up Service.

The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. as illustrated in the Introduction of this Directory. Together with the word “LISTED”, a control number and the appropriate product name. The Classification Marking for these products consists of the Classification Marking (and any rating or design information required as part of the Classification Marking) provided by the original manufacturer of the Classified product and a control number. The Classification Marking may include the symbol UL in a circle in conjunction with the word “CLASSIFIED”.

ANALYSIS AND MEASUREMENT EQUIPMENT (TWLR)

For additional information, see Semiconductor Manufacturing Equipment (TWLR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2011, “Outline of Investigation for Factory Automation Equipment” or UL 3111-1, “Electrical Measuring and Test Equipment; Part I: General Requirements.” Requirements used are indicated in the individual Listings.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the category identifier “Semiconductor Manufacturing Equip” or “TWLR,” and may also include the appropriate product name as shown in the individual Listings.

AUTOMATION AND WAVER HANDLING EQUIPMENT (TWPV)

For apparatus designated as robotic equipment, see Robots and Robotic Equipment (TETZ).

ADDITIONAL INFORMATION

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2011, “Outline of Investigation for Factory Automation Equipment” or UL 3121-1, “Process Control Equipment.” Requirements used are indicated in the individual Listings.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Direc-
CONTROL PANELS (TWRF)

USE
The category covers control panels and equipment used to provide power and control to semiconductor process equipment. The Classification Mark for these products covers both the enclosure and the panel provided with it. The panels may be provided with RF power supplies, DC power supplies, control transformers, motor controllers, overload devices, contactors, a main disconnect device and emergency power off (EPO). Semiconductor manufacturing equipment control panels have been classified only as to electrical fire and shock hazards incident to their use in ordinary locations. The compatibility of the panel with the controlled equipment from the standpoint of other potential hazards has not been investigated. Control panels are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

RELATED PRODUCTS
For industrial control panels for general use, see Industrial Control Panels (NITW) and Industrial Control Equipment (NIMX).

ADDITIONAL INFORMATION
For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic requirements used to investigate products in this category are contained in Subject 508A, “Outline of Investigation for Industrial Control Panels.” In addition, the following applicable requirements from SEMI S2-XX are applied, where XX is the issue date of SEMI S2: Safety-related Interlocks, Electrical, Emergency Shutdown, Hazard Warnings, Ergonomics, Seismic, and Documentation.

LOOK FOR CLASSIFICATION MARK ON PRODUCT
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product identity “Control Panel for Semiconductor Manufacturing Equipment” or “Control Panel for Semiconductor Equipment Control Panel,” “AS TO FIRE AND ELECTRIC SHOCK ONLY,” and a control number.

LIQUID CHEMICAL DISTRIBUTION SYSTEMS (TWSP)

This category covers equipment designed for activities involving control of liquid chemicals used in water processing, such as mixing, dispensing, and waste management.

These units may include a complete distribution system consisting of pumps, liquid chemical containing components (tubing, etc.), and associated electrical controls, or modules of such a system.

This equipment is limited to use with non-flammable liquids. Semiconductor process chemicals present certain inherent hazards. Such inherent hazards such as toxicity have not been investigated. The instructions and warnings supplied with and applicable to each piece of equipment should be carefully observed.

The liquid chemical pumps used in the equipment in this category may be individually covered under the product category Power-Operated Chemical Pumps, RBOG. Listings under (RBOG) cover power-operated pumps intended for liquid transfer or loop systems. Limitations of use, including chemical service and pressure and temperature ratings, are indicated in the individual listings and are marked on the pump.

This equipment is marked with the following information: “For ”, followed by chemical name, “psi max,” “degree F,” where ° is the name of the chemical.

See Semiconductor Manufacturing Equipment (TWKH) for additional information.

The basic standard used to investigate products in this category is UL 3121-1, Standard for Process Control Equipment.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following category identifiers: “Semiconductor Manufacturing Equip” or “TWSP,” and may also include the appropriate product name as shown in the individual listings.

MISCELLANEOUS EQUIPMENT (TWTZ)

GENERAL

This category covers miscellaneous semiconductor manufacturing equipment including, but not limited to, equipment involving commercial processing water chillers, cryogenic refrigeration systems, cryopumps and compressors, heat exchangers, recirculators, turbo molecular pumps, and water heaters.

USE
Water chillers, heaters, heat exchangers and recirculators are intended for cooling and tempering water used in semiconductor processing system (PVD, CVD, Etcher, etc.). These units may be provided with a complete refrigeration system (consisting of a hermetic motor-compressor, condenser, evaporator, refrigerant, electrical controls, wiring and associated refrigerant-containing components including tubing) and associated electrical controls, and may also incorporate means for heating and circulating water.

Vacuum pumps/accessories, turbo molecular pumps, cryopumps and compressors are intended for use on nominal system voltages of 600 V or less, except for equipment driven by an electromagnetic mechanism, which is for use on nominal system voltages of 250 V or less.

SUPPLY CONNECTIONS
These appliances are cord-connected or provided with means for field wiring connections.

ADDITIONAL INFORMATION
For equipment with refrigeration systems, documentation (instructions and warnings) supplied with the equipment identifies the investigated refrigerants.

The basic standards used to investigate products in this category are as follows:

- Heat exchangers and water heaters are investigated to UL 61010A-1 and UL 1995.
- Equipment containing air compressors or vacuum pumps are investigated to UL 61010A-1 and UL 1480, “Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment.”
- Other miscellaneous equipment is investigated to the standards indicated in the individual Listings covering the equipment.

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the category identifier “Semiconductor Manufacturing Equipment” or “TWZ.” The Listing Mark may also include the appropriate product name as shown in the individual Listings.

POWER SUPPLIES (TWVJ)

USE
This category covers radio frequency and DC power supplies used to support semiconductor processing. These power supplies may be water cooled.

ADDITIONAL INFORMATION
For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 60950, “Information Technology Equipment,” UL 3101-1, “Electrical Equipment for Laboratory Use,” UL 1012, “Power Units Other Than Class 2 Power Supplies” and UL 73, “Motor Operated Appliances.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the category identifier “Semiconductor Manufacturing Equipment” or “TWVJ,” and may also include the appropriate product name as shown in the individual Listings.
PROCESS EQUIPMENT (TWWT)

This category covers semiconductor process equipment, process management equipment, and process signaling equipment. Equipment covered by this category includes, but is not limited to equipment involving:

- Chemical Mechanical Planarization (CMP)
- Chemical Vapor Deposition (CVD)
- Dry Etching
- Epitaxy
- Ion Implantation
- Liquid Heating
- Lithography
- Photomasking
- Physical Vapor Deposition (PVD)
- Spin/Rinse Drying
- Vacuum Deposition (Evaporation/Sputtering)
- Wet Etching
- Scrubbers

Equipment covered by this category may use liquid chemicals to complete a process. Equipment that does not utilize liquid chemicals for a process (i.e. serves only to distribute, store, or prepare the liquid chemicals) is covered in the category Liquid Chemical Distribution System Equipment (TWSW). Process Equipment has been classified as only to fire and electric shock hazards incident to their use. The chemical hazards associated with this equipment (i.e. compatibility, inhalation, ingestion, or contact) have not been evaluated. See Semiconductor Manufacturing Equipment (TWKH) for additional information.

The basic standard used to investigate products in this category is UL 3121-1, Standard for Process Control Equipment.

**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking for these products includes:

- (1) the UL symbol;
- the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory);
- (3) one of the following category identifiers: “Semiconductor Manufacturing Equip” or “TWWT”, and may also include the abbreviated product name as shown in the individual listings;
- (4) “AS TO FIRE AND ELECTRIC SHOCK ONLY;” and
- (5) a control number.

SEMI-CONDUCTOR MANUFACTURING EQUIPMENT, LIMITED PRODUCTION (TWWW)

**USE**

This category covers equipment and accessories that are of limited production. Equipment bearing the limited production Classification is not under routine Follow-Up Service. Limited production equipment bearing the Classification Marking has been classified only as to electrical fire and shock hazards incident to its use in ordinary locations.

**RELATED PRODUCTS**

For additional information, see Semiconductor Manufacturing Equipment (TWKH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in Subject 2011, “Outline of Investigation for Factory Automation Equipment”, NFPA 79, “Electrical Standard for Industrial Machinery”, and UL 680, “Industrial Control Equipment”.

**LOOK FOR CLASSIFICATION MARKING ON PRODUCT**

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification Service. The Classification Marking includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), “AS TO ELECTRICAL FIRE AND SHOCK ONLY,” a control number, and the product identifier “Semiconductor Manufacturing Equipment, Limited Production.”

SERVICE CABLE (TXKT)

SERVICE ENTRANCE CABLE (TYLZ)

**GENERAL**

This category covers service entrance cable designated Type SE and Type USE for use in accordance with Article 338 of ANSI/NFPA 70, “National Electrical Code” (NEC).

Service entrance cable, rated 600 V, is Listed in sizes 14 AWG and larger for copper, and 12 AWG and larger for aluminum or copper-clad aluminum. Type SE cable contains Type RHW, RHW-2, XHHW, XHHW-2, THWN or THWN-2 conductors. Type USE cable contains conductors with insulation equivalent to RHW or XHHW. Type USE-2 contains insulation equivalent to RHW-2 or XHHW-2 and is rated 90°C wet or dry.

The cable is designated as follows:

**Type SE** — Indicates cable for aboveground installation. Both the individual insulated conductors and the outer jacket or finish of Type SE are suitable for use where exposed to sun.

**Types USE and USE-2** — Indicates cable for underground installation including direct burial in the earth. Cable in sizes 4/0 AWG and smaller and having all conductors insulated is suitable for all of the underground uses for which Type UF cable is permitted by the NEC. Types USE and USE-2 are not suitable for use in premises or aboveground except to terminate at the service equipment or metering equipment. Both the insulation and the outer covering, when used, on single and multicore Type USE and USE-2, are suitable for use where exposed to sun.

**Submersible Water Pump Cable** — Indicates a multicore cable in which 2, 3 or 4 single-conductor Type USE or USE-2 cables are provided in a flat or twisted assembly. The cable is Listed in sizes 14 AWG to 4/0 AWG inclusive, copper, and 12 AWG to 4/0 AWG inclusive, aluminum or copper-clad aluminum. The cable is tag marked “For use within the well casing for wiring deep well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units.” The insulation may also be surface marked “Pump Cable.” The cable may be directly buried in the earth in conjunction with this use.

For termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**MARKINGS**

The basic standard used to investigate products in this category is UL 854, “Service-Entrance Cables.”

**UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the electrical equipment, carton, or reel contain the product number and the product name as appropriate: Service entrance cable that contains copper or copper-clad aluminum conductor(s) has the product name “Service-Entrance Cable”; service-entrance cable that contains aluminum conductors has the product name “Aluminum Service-Entrance Cable.”

**Service Entrance Cable Fittings (TYXK)**

**GENERAL**

This category covers service entrance cable connectors and service entrance heads or hoods suitable for use with service entrance cable.

**Rainlight Fittings** — Rubber and neoprene gland type fittings which are suitable for being raintight are identified by a marking on the carton.

**Cable Size** — Fittings are marked on the carton with the cable range sizes for which the fitting is intended to be used.

**MARKINGS**

Some connectors are also acceptable for use with flexible cord, flexible nonmetallic tubing or nonmetallic-sheathed cable as indicated on the device or carton. Connectors for use with nonmetallic-sheathed cable are also suitable for use with multicore underground feeder and branch circuit cable where used in dry locations.

**RELATED PRODUCTS**

Fittings covered under Power and Control Tray Cable Connectors (QPOZ), Nonmetallic-sheathed Cable Connectors (PXJV), Conduit Fittings
SHIPBOARD CABLE, MARINE (UBVZ)

USE AND INSTALLATION

This category covers cable for installation and use aboard marine vessels, fixed and floating offshore petroleum facilities and mobile offshore drilling units (MODUs) in accordance with Section 111.60 of the United States Coast Guard Electrical Engineering Regulations, Sub Chapter J (Title 46 CFR, Parts 110 to 113 inclusive). This cable has not been investigated for use in accordance with ANSI/NFPA 70, “National Electrical Code.” The cable covered under this category is distribution cable rated 600 V, 1 kV, 2 kV or 5 kV, 5–35 kV shielded, control cable rated 600 V, 1 kV, and signal and instrumentation cable rated 300 V.

PRODUCT MARKINGS

Cable is surface marked with temperature and voltage rating and the cable Type designation.

ADDITIONAL INFORMATION

For additional information, consult Marine Products (AAMP) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Service Entrance Cable Fitting,” “Connector” or “Service Entrance Head,” or other appropriate product name as shown in the individual Listings.

SHIPBOARD CABLE FITTINGS, MARINE (UBWE)

USE AND INSTALLATION

This category covers fittings for use with marine shipboard cable with and without metal wire armor and with and without nonmetallic jacket over the metal wire armor. No splices of conductors are intended to be made in the fittings. Restrictions on application, position, and/or location of the fittings are indicated in the manufacturer’s instructions.

2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

These fittings are intended for use on mobile offshore oil rigs and drilling platforms. Investigations of these fittings included an evaluation for conformity to the installation and use provisions of Sub-part 111.60 of the United States Coast Guard Electrical Engineering Regulations, Subchapter J (Title 46 CFR, Parts 110 to 113 inclusive) as applied by the Authority Having Jurisdiction.

ADDITIONAL INFORMATION

For additional information, see Shipboard Cable, Marine (UBVZ), Marine Products (AAMP) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The basic standard used to investigate products in this category is UL 514B, “Fittings for Cable and Conduit.”

The listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Marine Shipboard Cable Fitting” or other appropriate product name as shown in the individual Listings.

SHIPBOARD CABLE, MARINE CLASSIFIED IN ACCORDANCE WITH INTERNATIONAL SPECIFICATIONS (UBWK)

GENERAL

This category covers marine shipboard cable whose construction and performance characteristics have been determined by Underwriters Laboratories Inc. to be in accordance with one or more of the following standards:

- IEEE 1580-2001, “IEEE Recommended Practice for Marine Cable for Use on Shipboard and Fixed or Floating Platforms”
- IEC 60092-353, “Electrical Installations in Ships - Part 353: Single and Multicore Non-Radial Field Power Cables with Extruded Solid Insulation for Rated Voltages 1 kV and 3 kV”
- IEC 60092-373, “Shipboard Telecommunication Cables and Radio-Frequency Cables Shipboard Flexible Coaxial Cables”
- IEC 60092-374, “Shipboard Telecommunication Cables and Radio-Frequency Cables Telephone Cables for Non-Essential Communications Services”
- IEC 60092-375, “Shipboard Telecommunication Cables and Radio-Frequency Cables General Instrumentation, Control and Communications Cables”

This cable has not been investigated for use in accordance with ANSI/NFPA 70, “National Electrical Code.”

UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

MARINE SHIPBOARD CABLE IN ACCORDANCE WITH [appropriate Specification name and number as noted above]
Control No.

SIGNS (UXYT)

USE AND INSTALLATION

This category covers electric signs employing incandescent lamps, LEDs (light emitting diodes), electro-luminescent panels, neon tubing, fluorescent lamps, high intensity discharge lamps or combinations thereof for installation in accordance with Article 600 of NFPA 70, “National Electrical Code.”

Cord and plug-connected signs do not have provision for permanent mounting to a building or structure. Due to servicing considerations, spe-
cific types of cord and plug-connected signs are intended and have provision for installation on end-use equipment.

Signs or sections of a sign forming a complete enclosure intended for permanent connection to a source of supply are provided with permanent means of attachment to a building. The mounting hardware, poles and other structural components of a sign have not been evaluated with respect to local variable conditions such as local wind and snow loading or soil conditions.

Electric signs, of such size that shipment in one carton or fully assembled is impractical, may be divided into sections. Each major subassembly bears an “Electric Sign Section” Listing Mark. Sign faces, trim and mounting hardware are not considered major subassemblies. Each sign has installation instructions describing or illustrating the proper assembly, mounting and connection of the sign sections. The acceptability of the assembled sections in the field rests with the Authority Having Jurisdiction.

**PRODUCT MARKINGS**

Signs intended for permanent installation and which have been investigated for indoor use only are so marked. Cord-connected signs investigated for outdoor use are marked “Outdoor.” Signs for outdoor lighting are marked “Outdoor Sign for Outline Lighting.”

Signs, sign sections or outline lighting marked “The neon supply(ies) complies(y) with the secondary ground-fault protection requirements of UL 2161” are provided with neon transformers and power supplies that comply with the secondary fault protection requirements specified in UL 2161, “Neon Transformers and Power Supplies.”

**REBUILD PRODUCTS**

This category also covers signs that are rebuilt by the original manufacturer or another party having the necessaryfacilities, technical knowledge and manufacturing skills. Rebuilt signs are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt signs are subject to the same requirements as new signs.

**RELATED PRODUCTS**

Accessories intended for use in Listed signs are covered under Sign Accessories (UYMR). Retrofit conversions intended to be field installed in Listed electric signs are covered under Sign Conversions, Retrofit (UYWU).

Changing message center signs may contain integral controllers or may be intended for use with externally connected controllers. Generally connected controllers are covered under Sign Controllers, Message Centers (UYTQ). This category does not cover billboard illumination, exit lights, skeletal neon tubing for show windows, or illuminated clock faces rated 600 V or less. Field-assembled neon systems used in display windows, outline lighting, or skeletal neon signs are covered under Skeletal Neon Sign and Outline Lighting Systems, Field Assembled (UZBL).

Field-assembled cold cathode electric discharge lighting systems that provide general illumination are covered under Electric Discharge Lighting Systems, Cold Cathode (IFAY).

Field-installed neon outline lighting systems that outline or call attention to architectural details of a room or building are covered under Field Installed Neon Outline Lighting Systems (UL).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 48, “Electric Signs.” Electric signs that comply with the requirements in UL 153, “Portable Electric Lamps” may also be Listed as Portable Lamps (QOWZ) in the Electrical Appliance and Utilization Equipment Directory.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Indoor Electric Sign,” “Electric Sign” or “Electric Sign Section.” For rebuilt signs the word “Rebuilt” precedes the product name.

**FIELD INSTALLED NEON OUTLINE LIGHTING SYSTEMS (UYAM)**

This category covers neon outline lighting systems that incorporate neon tubing with ferrule type end caps which are electrically connected to the output of a transformer, power supply or ballast by ferrule type lamphead connections. Such transformers or power supplies in the system have a minimum output current rating of 300 mA. These systems are for installation in accordance with Article 600 of the National Electrical Code. These lighting systems outline or call attention to architectural details of a room or building.

Neon outline lighting systems are provided as a system of parts that are field installed. These systems are installed using tools and techniques available only to an electrician. The systems are provided with installation instructions which define the scope of the system and method for installation. It is intended that the system installation instructions be retained with the installation to which they apply.

The Listing of a neon outline lighting system does not constitute approval of the design which is the responsibility of the manufacturer and the Authority Having Jurisdiction nor approval of the installation. The final acceptance of the field installed neon outline lighting system is the responsibility of the Authority Having Jurisdiction.

These systems are intended for permanent installation indoors unless marked as “Suitable for Outdoor Locations.”

Neon outline lighting systems marked “The neon supply(ies) complies(y) with the secondary ground-fault protection requirements of UL 2161” are provided with neon transformers and power supplies that comply with the secondary ground-fault protection requirements specified in the Standard for “Neon Transformers and Power Supplies,” UL 2161. The basic standard used to investigate products in this category is UL 48, “Electric Signs.”

This category does not cover neon tubing for display windows or signs which are covered under category Signs (UXYT).

This category does not cover field assembled neon systems in display windows, outline lighting, or skeletal neon signs which are covered under the category of “Field Assembled Skeletal Neon Signs and Outline Lighting Systems,” (UZBL).

This category does not cover cold cathode electric discharge lighting systems for general illumination which are covered under the category “Electric Discharge Lighting Systems, Cold Cathode,” (IFAY).

Outline lighting of the incandescent, HID or fluorescent type fabricated in factory-built sections is covered under the category Signs (UXYT).

Lighting systems operating at 1000V or less are covered under categories Fluorescent Fixtures (IEUZ), HID Fixtures (IEXT), and Incandescent Fixtures (IEZR).

The Listing Mark of Underwriters Laboratories Inc. on each transformer and transformer enclosure, and the containers in which the remaining neon outline lighting system parts are packaged, or on the remaining neon outline lighting system parts themselves, referencing a specific field-installed neon outline system number is the only method provided by UL to identify neon outline lighting systems manufactured under its Listing and Follow-Up Services. The Listing mark for these systems includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, the product name, “Field Installed Neon Outline Lighting System Part,” and the words “The Listing of this neon outline lighting system is contingent upon installation according to the specifications of (Listee’s Name), System No. and the National Electrical Code”.

**SIGNS, CHANGING MESSAGE (UYFS)**

**GENERAL**

This Listing covers illuminated and nonilluminated changing message signs intended to be installed and connected to an electrical supply source in accordance with the National Electrical Code, ANSI/NFPA 70. Illuminated changing message signs include neon, incandescent, HID (high intensity discharge), electric discharge tubing (including neon) LED (light emitting diode), and other sources of illumination.

Non-illuminated changing message signs include scrolling, flipper, LCD (liquid crystal display), and similar types that are generally motor operated or electronically controlled.

**Sign Section** — The changing message signs may be divided into sections. Each section of the sign bears a “Changing Message Sign Section” Listing Mark that states in combination with the Listing Mark “Section of the” and identifies the number of the section, and the second blank space identifies the total number of sections required to constitute a complete changing message sign. Suitable installation instructions describing or illustrating the proper assembly, mounting, and connection of the numbered sign sections are provided. This Listing also covers rebuilt changing message signs which have been reconditioned or rebuilt. Such changing message signs have been factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Before use, such rebuilt changing message signs are subject to the same requirements as new changing message signs.

Components and parts intended for use on or with changing message signs are Listed or Classified under the separate categories of Sign Accessories (UYMR), Sign Conversions, Retrofit (UYWU), and Sign Controllers - Message Centers (UYTQ).

Changing message signs may also be Listed under category Signs (UXYT).

**SIGN INSTALLATION MARKINGS**

**Indoor/Outdoor Use** — Permanently connected changing message signs are investigated and intended for use outdoors unless marked “For Indoor
SIGN ACCESSORIES (UYMR)

This category covers sign components such as combinations of frame plastic panels with metal or plastic chord, sign-rotating equipment for use in electric signs where weather protection and electrical enclosure are provided by the sign, ballast lead covers or enclosures intended to provide weather and mechanical protection to leads of outdoor ballasts, fluorescent U-tube and lampholder assemblies consisting of lampholders in sheet metal brackets with spring and loaded rod and hook assemblies with or without ballast, insulating caps for use on electrode receptacles to provide electrical insulation, low voltage power supplies consisting of assemblies of Class 2 transformers, an enclosure and a power supply cord, and kickback barriers intended for indoor use and provided with a receptacle for connection of a related display and provided with a power supply cord.

RELATED PRODUCTS

Lampholders and electrode receptacles are covered under Lampholders, Electric Discharge, More than 1000 Volts (OJOV).

ADDITIONAL INFORMATION

For additional information, see Signs (UXYT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

SIGN COMPONENTS CLASSIFIED FOR USE WITH SPECIFIED EQUIPMENT (UYTA)

USE AND INSTALLATION

This category covers specific components that are Classified for use with components manufactured by others, such as:

- Listed GTO cable surface marked “Integral Sleeve” that is also Classified for use with specific Listed or Recognized Component neon electrode boots, and Listed or Recognized Component neon electrode boots that are also Classified for use with specific Listed GTO cable surface marked “Integral Sleeve.”

- The combination of the GTO cable with integral sleeve and neon electrode boot has been evaluated and found to comply with the enclosure requirements for:
  a) the splice between neon tubing electrode leads and GTO cable, and
  b) the GTO cable leading to the splice.

These products are provided with installation instructions that define the scope of the system and method of installation.

ADDITIONAL INFORMATION

For additional information, see Signs (UXYT) and Electrical Equipment for Use in Ordinary Locations (AALZ)

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 879B, “Outline of Investigation for Polymeric Enclo-

looking for the UL mark on product

SIGN CONTROLLERS, MESSAGE CENTERS (UYTQ)

This category covers control panels or units for changing message signs.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1433, “Control Centers for Changing Message Type Electric Signs.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. A Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this directory) together with the word “LISTED,” a control number, and the product name “Sign Controller” or other appropriate product name.

SIGN CONVERSIONS, RETROFIT (UYWU)

USE AND INSTALLATION

This category covers retrofit sign conversions consisting of subassemblies or kits intended for field installation in Listed signs. There are several types of sign conversions as specified below.

- Scrolling units (motor-operated message assemblies), devices to change the type of illumination (from incandescent to fluorescent), or combinations thereof that consist of subassemblies intended for field installation in specific Listed, permanently connected electric signs. The conversion identifies the catalog number (or other description) and company name of the sign in which it is to be used.

- The LED (Light Emitting Diode) kits consist of the power source, the LED and the LED mounting means necessary to change the type of illumination originally contained in the sign to LED illumination. The kit installation instructions specify the type of sign in which the kits is intended to be installed.

- These retrofit sign conversions have been investigated by UL to determine that, when used in accordance with the manufacturer’s instructions provided with the retrofit device, they do not adversely affect the operation of the complete electric sign.

ADDITIONAL INFORMATION

For additional information, see Signs (UXYT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate retrofit sign conversions is UL 48, “Electric Signs.” The basic requirements used to investigate retrofit sign conversion LED kits are contained in Subject 879A, “Outline of Investigation for LED Kits.”

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the following statement as appropriate:

- GTO Cable with Integral Sleeve (or Neon Electrode Boot, as appropriate) Cat. No. _______ for use only with the specified Neon Electrode Boot (or GTO Cable with Integral Sleeve, as appropriate) in _______ (blank to be completed with “dry and damp” or “dry, damp and wet” as appropriate) locations. See installation instructions.

- GTO Cable with Integral Sleeve (or Neon Electrode Boot, as appropriate) Cat. No. _______ for use only with ______ (blank to be completed with the manufacturer’s name and catalog number, or, equivalent, of the Neon Electrode Boot or GTO Cable with Integral Sleeve, as appropriate) in _______ (blank to be completed with “dry and damp” or “dry, damp and wet” as appropriate) locations.

SIGN FLASHERS (UYZZ)

This listing covers flashing devices intended to control incandescent lamps or gas tube sign transformers.
The installation of open type flashing devices in electric signs shall be in accordance with the National Electrical Code as follows: (a) within a standard cutout box or cabinet, or (b) within an enclosed compartment, accessible and weatherproof, of metal at least as thick as that of the sign itself and located in an area so that the sign is protected from the elements. Flashing devices of the thermostatic type are intended to control incandescent lamps and are for indoor use only.

The basic standards used to investigate products in this category are UL 48, "Electric Signs," UL 433, "Control Centers for Changing Message Type Electric Signs," and UL 508, "Electric Industrial Control Equipment".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Sign Flasher," "Blinker," "Winker," "Flasher," or other appropriate product name.

**SKELETAL NEON SIGN AND OUTLINE LIGHTING SYSTEMS, FIELD ASSEMBLED (UZBL)**

The presence of the Listing Mark ("Field Assembled Skeletal Neon Sign System" or "Field Assembled Skeletal Neon Outline Lighting System") is evidenced by the installation of the skeletal neon sign or outline lighting system (1) has been assembled and installed by an installer who is authorized by UL to apply UL Listing Marks described below and who subscribes to UL Follow-Up Service; (2) employs materials and components subject to a factory inspection service bearing the UL Mark; and (3) is subject to a field inspection program covering proper installation of the system. These systems are field assembled for permanent installation in accordance with Article 600 of the National Electric Code.

The basic standard used to investigate a system in this category is the Standard for "Electric Signs," UL 48.

Skeletal neon signs and outline lighting systems marked "The neon supply(ies) complete(s) with the secondary ground-fault protection requirements specified in the Standard for "Neon Transformers and Power Supplies", UL 2161" are provided with transformers and power supplies that comply with the secondary ground-fault protection requirements specified in the Standard for "Neon Transformers and Power Supplies", UL 2161.

The Listing of a system does not constitute approval of the completed assembly and installation which is the responsibility of the installer and the Authority Having Jurisdiction.

This category does not cover field assembled cold cathode electric discharge lighting systems that provide general illumination. Those products are covered by the category "Electric Discharge Lighting Systems, Cold Cathode, (IPAY)."

This category does not cover field installed neon outline lighting systems that depend on architectural details of a room or building. Those products are covered by the category "Field Installed Neon Outline Lighting Systems", (UYAM).

This category does not cover factory assembled neon signs and outline lighting systems whose entire construction is within a new or existing building. Those products are covered under the category Signs, UXYT.

These systems are intended for outdoor use unless marked for indoor use.

The Listing Mark on the transformer or power supply enclosure is the only method provided by UL to identify that a Field Assembled Skeletal Neon Sign or Outline Lighting System is covered under its Listing and Follow-Up Service. The Listing Mark for these systems includes the name and symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this directory) together with the word "LISTED," a control number, the installing company name or logo, date of installation, location and the following words as appropriate "Field Assembled Skeletal Neon Sign System" or "Field Assembled Skeletal Neon Outline Lighting System".

**SOLDERING FLUXES AND FLUXED SOLDERSC (VABV)**

The soldering fluxes, including those incorporated in finely divided solders, and in cored solders, listed on the following cards are for ordinary use in soldering electrical conductors to copper, brass, tinplate, galvanized iron, etc. The fluxes facilitate the making of secure mechanical and electrical bonds between the solder and the metal to which it is applied. These fluxes are not likely to cause corrosion of soldered parts, but excess flux should be removed. The use of these fluxes for soldering electronic devices, or for other application where the conductivity of residual flux must be taken into consideration, has not been investigated.

**SURGE ARRESTERS, 1000 V AND HIGHER (VZOK)**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Soldering Flux", "Fluxed Solder".

This category covers surge arresters rated 1000 Vac and higher intended to repeatedly limit the voltage surges on 48-62 hz power circuits and to afford protection against surge related damage to wiring systems and/or to downstream equipment.

Surge arresters are categorized by their intended application and prescribed test requirements. These categories are: station, intermediate, distribution heavy duty, distribution normal duty, and distribution light duty.

The basic standard used to investigate metal-oxide surge arresters is ANSI/IEEE C62.11. "Standard for Metal-Oxide Surge Arresters for AC Power Circuits". All other types of surge arresters are investigated to IEEE C62.1, Standard for Gapped Silicon-Carbide Surge Arresters for AC Power Circuits.

Surge arresters less than 1000Vac are Listed under the category Lighting Protection Surge Arresters, OWKH.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Surge Arrester", "Distribution Normal Duty Surge Arrester", "Station Class Surge Arrester", or other appropriate product name.

**STRUCTURED CABLING PROGRAMS (VZYY)**

A structured cabling system is a field-assembled set of cabling and connectivity products that integrates the data, voice, video, and various management systems of a building (such as building automation systems, safety alarms, security access, energy systems, etc.).

Structured cabling systems are investigated under UL's Performance Verification and/or Follow-Up Service, and the performance standards used in the investigation can be proprietary manufacturer standards, industry standards, or the UL Levels XP Structured Cabling Program (VZZL).

Performance Verification testing includes passive and/or active testing of the current Link, Basic Link or Channel (system). Passive testing employs a reference signal that is transmitted through the system under test. Transmission performance of the system is investigated against the applicable performance standard. Active testing employs packets of 8-bit serial or binary formatted data, which is transmitted through the system under test, in order to detect the presence of bit errors in the data packet.

These systems may be tested in a laboratory environment or in the field as installed cabling as described in the individual Structured Cabling Program categories.

Cabling and connectivity products contained in a structured cabling system may be supplied by one or more manufacturers.

Structured cabling systems are commonly referred to as “Solutions,” and this terminology is used to identify systems that have been Verified for performance under the individual Structured Cabling Programs. Typical Solution configurations are defined as follows:

- **Permanent Link** — A 90-meter horizontal run of cable terminating in a telecommunications outlet connector or either a transition point (TP) connector or consolidation point (CP) connector at one end and in a telecommunications cross connection at the other end. The total Solution length is 90 meters.

- **Basic Link** — A 90-meter horizontal run of cable terminating in a telecommunications outlet connector or either a transition point (TP) connector or consolidation point (CP) connector at one end and in a telecommunications cross connection at the other end with 2-meter patch cords at each end. The total Solution length is 94 meters.

- **Active Channel** — A 90-meter horizontal run of cable terminating in a telecommunications outlet connector or either a transition point (TP) connector or consolidation point (CP) connector plus a 5-meter patch cord or consolidation point (CP) connector plus a 5-meter patch cord at one end and in a telecommunications cross connection plus a 5-meter patch cord at the other end with 2-meter patch cords at each end. The total Solution length is 100 meters.
LEVELS XP STRUCTURED CABLE PROGRAM (VZZL)

GENERAL
This category covers field-assembled structured cabling systems (referred to as “Solutions”) whose signal transmission characteristics have been investigated in accordance with UL’s Levels XP Structured Cabling Program.

The Levels XP Program investigates how a Solution’s transmission performance affects live data as it interacts with active network components. Solutions investigated for performance under the Levels XP Program have been investigated for the expanded performance properties necessary to maintain true data throughput and component interoperability.

The Levels XP Test Program requires testing of the Solution’s horizontal cable, patch cords and connecting hardware, as well as passive channel, active channel and expanded active channel testing.

ADDITIONAL INFORMATION
For additional information, see Structured Cabling Programs (VZYY) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is the UL Levels XP Specification. Components used in the Solution are also required to be UL Listed for Safety and UL Verified for Performance in accordance with the Standards shown below:

<table>
<thead>
<tr>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>Cable</td>
</tr>
<tr>
<td>Connecting Hardware</td>
</tr>
<tr>
<td>Patch Cords</td>
</tr>
</tbody>
</table>

Performance Verification

<table>
<thead>
<tr>
<th>Category 5e Cable</th>
<th>Standard</th>
<th>Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIA/EIA 568 B.2, “Commercial Building”</td>
<td>DUXR</td>
<td></td>
</tr>
<tr>
<td>Telecommunications Cabling Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part 2: Balanced Twisted-Pair Cabling Components</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revision of TIA / EIA-568-A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category 6 Cable</td>
<td>TIA/EIA 568 B.2-1, “Commercial Building”</td>
<td>DUXR</td>
</tr>
<tr>
<td>Telecommunications Cabling Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part 2: Balanced Twisted-Pair Cabling Components Addendum 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmission Performance Specifications for 4-Pair 100 Category 6 Cabling Addendum No. 1 to TIA/EIA-568-B.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

UL MARK
The Verification Mark of Underwriters Laboratories Inc. on the Bill of Lading, the Bulk Shipment Certificate, or on UL’s Certificate of Conformity Assessment is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “VERIFIED,” the term “Levels XP Program,” a control number, and the Solution name and part number. The Verification Mark (label) is not applied directly to Solutions that have been investigated for performance under the Levels XP Program, since these products are field assembled.

PROPRIETARY STRUCTURED CABLE PROGRAMS (VZZX)

GENERAL
This category covers field-assembled structured cabling systems (referred to as “Solutions”) whose signal transmission characteristics have been investigated in accordance with proprietary manufacturer network cabling standards or industry standards.

Performance Verification testing includes passive and/or active testing of the Permanent Link, Basic Link or Channel. If the performance standard specifies active testing, the investigation will review how a Solution’s transmission performance affects live data as it interacts with active network components. Solutions subjected to active testing have been investigated for the performance properties necessary to maintain true data throughput and component interoperability.

ADDITIONAL INFORMATION
For additional information, see Structured Cabling Programs (VZYY) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
Components used in the Solution are also required to be UL Listed for Safety and UL Verified for Performance in accordance with the Standards shown below:

<table>
<thead>
<tr>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>Cable</td>
</tr>
<tr>
<td>Connecting Hardware</td>
</tr>
<tr>
<td>Patch Cords</td>
</tr>
</tbody>
</table>

Performance Verification

<table>
<thead>
<tr>
<th>Category 5e Cable</th>
<th>Standard</th>
<th>Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIA/EIA 568 B.2, “Commercial Building”</td>
<td>DUXR</td>
<td></td>
</tr>
<tr>
<td>Telecommunications Cabling Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part 2: Balanced Twisted-Pair Cabling Components</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revision of TIA / EIA-568-A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category 6 Cable</td>
<td>TIA/EIA 568 B.2-1, “Commercial Building”</td>
<td>DUXR</td>
</tr>
<tr>
<td>Telecommunications Cabling Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part 2: Balanced Twisted-Pair Cabling Components Addendum 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmission Performance Specifications for 4-Pair 100 Category 6 Cabling Addendum No. 1 to TIA/EIA-568-B.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

UL MARK
The Verification Mark of Underwriters Laboratories Inc. on the Bill of Lading, the Bulk Shipment Certificate, or on UL’s Certificate of Conformity Assessment is the only method provided by UL to identify products manufactured under its Verification and Follow-Up Service. The Verification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “VERIFIED,” the name of the Performance Standard, a control number, and the Solution name and part number. The Verification Mark (label) is not applied directly to Solutions that have been investigated for performance under the Levels XP Program, since these products are field assembled.
directly to Solutions that have been investigated for performance under this category, since these products are field assembled.

SWIMMING POOL AND SPA EQUIPMENT (WABX)

USE
This category covers equipment for use with swimming pools, decorative pools, wading pools, therapeutic pools, and hot tubs and spas in accordance with Article 680 of NFPA 70, "National Electrical Code" (NEC).

This category also covers self-contained hot tubs and spas as well as cord-connected portable appliances for use with aboveground storable swimming pools, hot tubs and spas.

Information concerning the suitability of the equipment for use indoors or outdoors is given in the General Information Section for each individual category.

RELATED PRODUCTS
Ground fault circuit interrupters intended for use with swimming pool equipment are covered under Ground Fault Circuit Interrupters (KCXS).


Fountains covered by Article 680, Part E, of the NEC are covered under Architectural and Floating Fountains (AWEG).

BLOWERS (WAGN)

USE AND INSTALLATION
This category covers equipment intended to introduce pressurized air into spas and hot tubs to create a hydrotherapy effect. They are intended for installation in accordance with Article 680 of the National Electrical Code, NFPA 70.

Products Listed in this category are acceptable for both indoor and outdoor use unless marked otherwise. They are provided with an accessible pressure wire connector for equipotential bonding during installation.

To avoid water contacting live electrical parts, these products are to be installed in accordance with the manufacturer's instructions and permanently mounted at least 12 inches above the overflow level of the spa or hot tub.

REQUIREMENTS
The basic standard used to investigate products in this category is UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment."

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Spa Blower," "Hot Tub Blower," or "Spa/Hot Tub Blower."

CHLORINATORS (WAPV)

This listing covers chlorinators and similar equipment intended for use in the treatment of the water in swimming pools, hot tubs and spas.

Products Listed under this category have been found acceptable for both outdoor and indoor use, unless they are marked "For Indoor Use Only."

The basic standard used to investigate products in this category is UL 1081, "Swimming Pool Pumps, Filters and Chlorinators."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Swimming Pool Chlorinator", "Spa Chlorinator", "Swimming Pool or Spa Chlorinator."

CONTROLS (WAWU)

USE
This category covers controllers, timers, temperature-regulating equipment, etc., for control of equipment intended for use with swimming pools, hot tubs and spas. This category also covers control panels for use with equipment intended for water-play fountains and water playground areas, swimming pools and spas, or fountains with water in common with swimming pools.

These products are acceptable for both indoor and outdoor use unless marked "For Indoor Use Only."

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

REQUIREMENTS
The basic standard used to investigate products in this category is UL 1563, "Electric Spas, Equipment Assemblies, and Associated Equipment."

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Spa Controller" or "Swimming Pool Controller," or other appropriate product name as shown in the individual Listings.

COVERS FOR SWIMMING POOLS AND SPAS (WBAH)

This category includes covers for use with swimming pools, spas and hot tubs. These covers have been evaluated in accordance with the American Society for Testing and Materials Standard ASTM F1346, "Standard Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs."

This category includes manual safety covers and power safety covers, as well as covers of other than the safety type, as defined in the ASTM F1346 Standard.

INSTALLATION
The ability of the manual or power safety cover to perform its intended function is dependent upon proper installation. Therefore, Authorities Having Jurisdiction should be consulted. Installation should be performed by a qualified installer using the manufacturer's instructions.

MANUAL SAFETY COVERS
A manual safety cover is a barrier that is manually placed over the water. It is intended to impede access to the contained body of water. It is provided with a means for removing significant levels of collected surface water.

POWER SAFETY COVERS
A power safety cover is a barrier that can be placed over the water area and removed with a motorized mechanism. It is intended to impede access to the contained body of water. Such covers are marked "This Is Not A Safety Cover."

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking for these products (shown below) includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "CLASSIFIED," a control number, and one of the following product names as appropriate: "Manual Safety Cover", "Power Safety Cover", or "Pool Cover."

(Product Identity) CLASSIFIED BY UNDERWRITERS LABORATORIES INC. In Accordance With ASTM F 1346-(Issue Date) (control number)

LOOK FOR THE CLASSIFICATION MARKING

LUMINAIRES AND FORMING SHELLS (WBDF)

USE
This category covers luminaires and forming shells for installation in accordance with Article 680 of ANSI/NFPA 70, "National Electrical Code" (NEC).

PRODUCT MARKINGS
Luminaires suitable for use only in fresh water are marked "Fresh Water Only." Luminaires suitable for use in either fresh or salt water are marked "Salt Water or Fresh Water." Luminaires investigated for operation only in contact with water are marked "CAUTION To reduce the risk of electric shock immerse before lighting" or the equivalent, and such marking is visible after installation. Additional markings for specific types of luminaires are described below.

PRODUCT TYPES AND INSTALLATION
Dry-niche Underwater Luminaires for Swimming Pools and Spas — These luminaires have been investigated for permanent installation only in the wall of a swimming pool or field-fabricated spa unless accompanying
installation instructions indicate suitability for installation in the bottom of a pool or spa. These luminaires have been investigated for installation with the top of the lens not less than 450 mm (18 in.) below the normal water level unless otherwise marked. These luminaires are designed for servicing from the rear in a passageway behind the pool or spa wall or, if mounted in the bottom of the pool or spa, to be lifted to the pool or spa deck for servicing without lowering the water level. The information provided above for wet-niche luminaires includes provisions for the one-time field conversion of the luminaire design to a non-niche luminaire in which the lens is marked to indicate the proper forming shells with which they have been investigated for use. Mismatching a wet-niche luminaire and forming shell can increase the risk of electric shock or injury to users. These luminaires are provided with a factory-installed, permanently attached flexible cord with an exposed length of not less than 3.6 m (12 ft). The flexible cord is confined in the forming shell by the luminaire and permits the luminaire to be removed from the forming shell and to be lifted to the pool or spa deck for servicing without lowering the water level or disconnecting the luminaire from the branch circuit conductors. Luminaries with longer cords are available for installations where the junction box or splicer enclosure is so located that a 3.6 m (12 ft) long cord will not permit luminaire removal from the forming shell and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored in the forming shell.

Forming Shell (Housing) for Wet-niche Underwater Luminaires for Swimming Pools and Spas — These are structures designed to support a mating underwater luminaire for mounting a pool or spa. These forming shells are marked to indicate the luminaires with which the forming shells have been investigated for use. Mismatching a wet-niche luminaire and forming shell can increase the risk of electric shock or injury to users. Mismatching a wet-niche luminaire and forming shell can increase the risk of electric shock or injury to users. These luminaires are provided with a factory-installed length of flexible cord terminated in an attachment plug and an attachment plug receptacle for connection of the branch circuit conductors.

Wet-niche Underwater Luminaires for Swimming Pools and Spas — These luminaires, with mating forming shell, have been investigated for installation only in the wall of a swimming pool or field-fabricated spa unless accompanying installation instructions indicate suitability for installation in the bottom of a pool or spa. These luminaires have been investigated for installation with the top of the lens not less than 450 mm (18 in.) below the normal water level unless otherwise marked. These luminaires have been investigated for installation in a permanently installed forming shell (luminaire housing) in which the luminaire will be completely surrounded by water. These luminaires are marked to indicate the proper forming shells with which they have been investigated for use. Mismatching a wet-niche luminaire and forming shell can increase the risk of electric shock or injury to users. These luminaires are provided with a factory-installed flexible cord with an exposed length of not less than 3.6 m (12 ft). The flexible cord is confined in the forming shell by the luminaire and permits the luminaire to be removed from the forming shell and to be lifted to the pool or spa deck for servicing without lowering the water level or disconnecting the luminaire from the branch circuit conductors. Luminaries with longer cords are available for installations where the junction box or splicer enclosure is so located that a 3.6 m (12 ft) long cord will not permit luminaire removal from the forming shell and placement on the deck for servicing. To reduce the risk of product damage, any cord length in excess of that necessary for servicing should be trimmed from the supply end rather than stored in the forming shell.

Forming Brackets for No-niche Underwater Luminaires for Swimming Pools and Spas — These are structures designed to support a mating no-niche luminaire, for mounting in a pool or spa. Forming brackets are marked to indicate the luminaires with which the forming brackets have been investigated for use. Mismatching a no-niche luminaire and mounting bracket can increase the risk of electric shock or injury to users. Mounting brackets are designed to require the supply end of the conduit connected to the mounting bracket to be directly connected to a Listed swimming pool junction box (see WCEZ). The information provided above alternate supply-end termination of conduit connected to forming shells also applies for supply-end termination of conduit connected to the mounting brackets of no-niche luminaires.

Underwater Luminaires for Aboveground Storable Swimming Pools — These luminaires are a type of through-wall lighting assembly as described in Article 680 of the NEC. They have been investigated for use with an aboveground storable pool (a pool that is constructed on or above the ground and is capable of holding water to a maximum depth of 1.0 m (42 in.), or a pool with nonmetallic, molded polymeric walls regardless of dimension). They include all three of the following factory-provided parts:

1. Lamp assembly for temporary installation on or through the wall of the pool.
2. Transformer or ground-fault circuit interrupter assembly provided with a 0.9 m – 1.8 m (3 – 6 ft) power supply cord for connection to a source of supply and for temporary mounting away from the pool (the remote assembly)
3. Jacketed flexible cord terminated in a plug not less than 7.6 m (25 ft) in length connecting the lamp assembly and the remote assembly

These luminaires have been investigated for installation with the top of the lens not less than 200 mm (8 in.) below the top of the pool. A hole through the pool wall may be required for luminaire installation. Unless otherwise indicated in the installation instructions, the luminaire design has been investigated for the lower edge of any hole that a luminaire installer must cut in the pool wall to be no more than 360 mm (14 in.) below the top of the pool wall. The pool wall manufacturer may provide, at a greater depth, a properly sized hole or a reinforced wall section designed for field-cutting a properly sized hole for a luminaire or plumbing fitting. Unless otherwise marked for a maximum installation depth, these luminaires have been investigated for installation in such a hole at a greater depth where the pool installation instructions provide for the hole placement and usage.

Underwater Luminaires for Aboveground Nonstorable Swimming Pools — These luminaires are a type of through-wall lighting assembly as described in Article 680 of the NEC. They have been investigated for permanent installation through or on the wall of an aboveground nonstorable pool. The information provided above for underwater luminaires for aboveground storable swimming pools regarding installation depth and using an existing hole or cutting a new hole for installation also applies to underwater luminaires for aboveground nonstorable swimming pools.

Convertible Underwater Luminaires for Aboveground Swimming Pools — These luminaires are initially configured as an underwater luminaire for aboveground storable swimming pool for use as described above. They include provisions for the one-time field conversion of the luminaire to an underwater luminaire for aboveground nonstorable swimming pool for use as described above. Once converted, these luminaires are not suitable for being modified back to their original configuration.

Fiber Optic Luminaires for Swimming Pools and Spas — These luminaires consist of a lamp/electrical enclosure that has been investigated for permanent mounting not less than 1.5 m (5 ft) from the pool or spa wall and a fiber optic element and associated fittings to transmit the light to the pool or spa. The lamp/electrical enclosure has been investigated for installation above the level at which water splashes from the pool or spa or from another source may wet.

SUPPLY CIRCUIT CURRENT RATING
An underwater luminaire for aboveground storable swimming pools has been investigated for connection to the branch circuit specified in the NEC for receptacles having a blade configuration corresponding to the blade configuration of the luminaire attachment plug. For other luminaires, unless otherwise marked for maximum supply circuit current rating, a luminaire with a voltage and current rating shown in the table below has been investigated for installation on a supply circuit rated not more than as specified in the table. A luminaire with a voltage or current rating not covered by the table is marked to identify the maximum supply circuit current rating for its installation.

<table>
<thead>
<tr>
<th>Luminaire Voltage</th>
<th>Luminaire Voltage</th>
<th>Luminaire Supply Current Rating</th>
<th>Luminaire Current Rating</th>
<th>Luminaire Max Current Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 V ac or less</td>
<td>25 A or less</td>
<td>25 A</td>
<td>25 A or less</td>
<td></td>
</tr>
<tr>
<td>110 V ac – 120 V ac</td>
<td>16 A or less</td>
<td>20 A</td>
<td>20 A or less</td>
<td></td>
</tr>
<tr>
<td>110 V ac – 120 V ac</td>
<td>More than 16 A, not</td>
<td>30 A</td>
<td>more than 24 A</td>
<td></td>
</tr>
</tbody>
</table>

RELATED PRODUCTS
See Submersible Luminaires (IFFE) for underwater luminaires intended for use in fountains and similar water-containing vessels not intended to accommodate the complete or partial immersion of persons.

Junction Boxes (WCEZ) for junction boxes intended for use with wet-niche luminaires and their forming shells. See Swimming Pool and Spa Transformers (WDVG) for transformers for use with supply swimming pool and spa luminaires. See Potting Compounds (WCRT) for compounds for the user to encapsulate grounding and bonding conductor splices in swimming pool, spa or fountain equipment, including luminaires, forming shells and junction boxes.

ADDITIONAL INFORMATION
For additional information, see Swimming Pool and Spa Equipment (WABX) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 676, “Underwater Luminaires and Submersible Junction Boxes.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate:

- Dry-niche Underwater Luminare for Swimming Pool
- Wet-niche Underwater Luminare for Swimming Pool
- Forming Shell (or Housing) for Wet-niche Luminare
- No-niche Underwater Luminare for Swimming Pool
- Mounting Bracket for No-niche Luminare
- Underwater Luminare for Aboveground Storable Swimming Pool
- Underwater Luminare for Aboveground Nonstorable Swimming Pool
- Convertible Underwater Luminare for Aboveground Swimming Pool
- Fiber Optic Luminare for Swimming Pool

HEAT PUMPS (WBVE)
This listing covers pumps intended to be used with swimming pool pumps. To calculate the heat from rejection of a mechanical refrigeration system, and optional accessories for these products. This equipment is rated 600 v or less and is intended for permanent installation at or near swimming pools and spas in accordance with Article 680 of the National Electrical Code. These products are designed to restrict the outlet water temperature to a maximum of 50°C (122°F) under normal operating conditions and to a maximum of 70°C (158°F) under abnormal conditions. These products have been found suitable for both outdoor and indoor use. In heat pumps employing two or more motors operating from a single supply circuit, the motor overload protective devices (including thermal protection for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch-circuit short-circuit and ground-fault protection requirements of Sec. 430-53(c) of the National Electrical Code. Such multilayer equipment is to be connected only to a circuit protected by fuses or a circuit breaker with a rating which does not exceed the value marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or "H.A.C.R." circuit breakers, the circuit is to be protected only by the type of protective device specified.

The basic standard used to investigate products in this category are UL 1261, “Electric Water Heaters for Pools and Tubs”, and UL 1985, “Heating and Cooling Units.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Swimming Pool Heater,” “Spa Heater”. This listing also covers Equipment Assemblies which do not contain a water heater and do not contain a water temperature regulating control or a temperature limiting control. A water heater, a temperature regulating control and a temperature limiting control should be provided in the final installation and their adequacy determined by the local inspection authority.

The basic standard used to investigate products in this category is UL 1563, “Electric Spas, Equipment Assemblies, and Associated Equipment.”

The basic standard used to investigate products in this category is UL 1261, “Electric Water Heaters for Pools and Tubs”. The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Equipment Assembly For Spa / Hot Tub”, “Hot Tub Equipment Assembly” or “Spa Equipment Assembly”.

JUNCTION BOXES (WCEZ)
This listing covers junction boxes intended for use with underground pool lights.

The basic standard used to investigate products in this category is UL 1261, “Junction Boxes for Use in Ordinary Locations”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Swimming Pool Junction Box.”

OZONE GENERATORS (WCKA)
These products are ozone generators rated 600 volts or less intended for use in the treatment of nonpotable water in swimming pools, and in spas and hot tubs of other than the self-contained type.

The basic standard used to investigate products in this category is UL 1261, “Junction Boxes for Use in Ordinary Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Swimming Pool Equipment Assembly”.

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by Underwriters Laboratories Inc. to identify products under its Classification and Follow-Up Service.
This category covers pool and spa equipment evaluated in accordance with the National Sanitation Foundation (NSF) Standard No. 50, “Circulation System Components for Swimming Pools, Spas, or Hot Tubs.” These products include filters, centrifugal pumps, surface skimmers, ozone generators, chemical feeding equipment, chlorinators and other units installed in water circulation and filtration systems of pools, spas, and hot tubs. Some products classified under this category may also be Listed under the categories of Water Treatment Equipment (WDLC), Miscellaneous Swimming Pool and Spa Equipment (WDTU) or Pumps (WCSX).

**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. together with the word “CLASSED” or “LISTED,” a control number, and one of the following product names as appropriate: “Swimming Pool Filter,” “Ozone Generator,” “Spa Chlorinator,” or other appropriate product name.

**Potting Compounds (WCRI)**

This category covers compounds intended to be used to encapsulate grounding and bonding conductor splices or terminations in swimming pool, spa or fountain equipment such as fixtures, fixture housings, and junction boxes where the splices or terminations may be exposed to salt-free swimming pool or fountain water and sunlight for varying lengths of time, including continuous exposure. This category also covers potting compounds used to fill underwater junction boxes.

These compounds have been evaluated by Underwriters Laboratories Inc. for their resistance to the deteriorating effects of salt-free swimming pool and fountain water and ultraviolet light. They have also been evaluated for their ability to adhere to typical metals such as copper alloy, stainless steel and to plastic. The container or package is marked to identify the materials to which the compound has been determined to suitably adhere.

The basic requirements used to investigate products in this category are “Outline of Investigation For Potting Compounds For Swimming Pool, Fountain and Spa Equipment”, Subject 676A.

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Listing and Follow-Up Service. The Listing Mark for these products includes the symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number and the following product name: “Swimming Pool, Fountain and Spa Equipment Conductor Splice Potting Compound” (any of the locations may be omitted).

**Pumps (WCSX)**

This listing covers pumps for circulating the water in swimming pools, hot tubs and spas. These products are intended for installation in accordance with Article 680 of the National Electrical Code, NFPA 70. Products listed under this category are acceptable for both outdoor and indoor use, unless marked otherwise. They have been investigated for use with either permanently installed pools or storable pools.

Pumps investigated for permanently installed pools are so identified and are additionally marked “Do Not Use With Storable Pools.” Permanently installed pool pumps are intended to be permanently connected to the water circulation system and they may be permanently wired or provided with a 3 ft nondetachable power supply cord terminating in a grounding type attachment plug. The attachment plug may be of the locking or non-locking type. Units provided with locking type attachment plugs are intended to be installed at least 5 ft from the inside walls of the pool and are marked accordingly. Units provided with a nonlocking type attachment plug are intended to be installed at least 10 ft from the inside walls of the pool and are marked accordingly. Permanently installed pool pumps are provided with an accessible pressure wire connector for equipotential bonding.

Pumps investigated for storable pools are so identified and are additionally marked “Do Not Use With Permanently Installed Pools.” Storable pool pumps are intended to be connected to a water circulation system constructed so that the pump may be readily disassembled from the system for storage and future reassembly to its original integrity. Storable pool pumps are provided with a minimum of 15 ft then detachable power supply cord terminating in a grounding type attachment plug, are double insulated, have no accessible grounded metal parts, have inaccessible non current-carrying metal parts connected to the ground conductor of the supply cord and do not have an equipotential bonding connector.

These pumps may be provided with integral filters. The suitability of the filters to clean water has not been determined. Filters that have been evaluated in accordance with requirements of the National Sanitary Foundation (NSF) Standard No. 50 are contained in the product category “Pools and Spa Equipment Classified In Accordance With NSF Standard No. 50” (WCNZ).

The basic standard used to investigate products in this category is UL 1081, “Swimming Pool Pumps”, Filters and Chlorinators, second edition.

This Listing also covers pumps which are rebuilt using new or reconditioned parts by the original manufacturer or another party having the necessary facilities, technical knowledge, and manufacturing skills. Rebuilt pumps are subjected to the same requirements as new pumps.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Swimming Pool Pump”, “Spa Pump”, “Swimming Pool or Spa Pump”, or other appropriate product name. For rebuilt products, the product name includes the word “Rebuilt”, “Remanufactured”, or “Reconditioned” as part of the Listing Mark.

**Self-Contained Spas (WCNZ)**

This listing covers self-contained Spas for aboveground use, for household or commercial use, and for both indoor and outdoor use, unless marked otherwise. These spas are not designed or intended to have the water drained after each use. They are intended for installation in accordance with Article 680 of the National Electrical Code, NFPA 70.

A self-contained spa is a continuous duty appliance in which all control, water-heating and water-circulating equipment is an integral part of the product, located entirely under the spa skirt.

Self-contained spas may be cord connected, convertible, or permanently wired. A convertible spa is shipped from the factory with a power supply cord but is designed for field-conversion to a permanently wired configuration, either 120 volt, 240 volt, or both. Once a convertible spa is converted to permanently wired, it is not intended to be returned to a cord connected configuration.

Self-contained spas may be provided with electric or gas heaters. Spas with gas heaters are intended for permanent wiring and permanent installation, and are intended for outdoor use only.

Each spa is provided with a marking on the wiring diagram in the field wiring compartment or in the installation instructions or on a separate configuration sheet, to identify the major components of the spa when manufactured. The configuration sheet and the installation instructions are intended to be available during installation and inspection.

Self-contained spas may be shipped completely assembled or in knockdown form.

Knockdown spas are packaged by major component in multiple cartons to aid in shipping. They consist of a completely assembled and plumbed tub and an equipment package. The skirt may be attached to the tub or it may be provided in prefabricated sections for assembly in the field. The equipment package is completely assembled, pre-wired, and pre-plumbed. Connections are made by union fittings or similar quick-disconnect plumbing which does not require tools or special materials. All cartons used to ship a knockdown spa are marked to indicate the contents, the spa model, and the total number of required cartons.

Spas are listed under Hydromassage Bathtubs (NCHX); hydrotherapy equipment for professional treatment of athletes or patients is listed under Medical and Dental Equipment, Professional (KFBQ) — both categories are located in the Electrical Appliance and Utilization Equipment Directory. Factory made assemblies of pumps, heaters, blowers, lights and controls for use with field supplied hot tubs and spas are Listed under Hot Tub and Spa Equipment Assemblies (WBYQ).
SWIMMING POOL AND SPA COVER OPERATORS, ELECTRIC (WDDJ)

This Listing covers electrically driven cover operators for use with swimming pools and spas together with controls for use with such operators. The cover operators generally consist of a motor driven apparatus used to move the covering material. These operators are intended to be installed in accordance with Article 680 of the National Electrical Code. Products Listed under this category have been found suitable for both indoor and outdoor use.

The basic standards used to evaluate the operators are UL 1081, “Swimming Pool Pumps, Filters, and Chlorinators”, and UL 1563, “Electric Spas, Equipment Assemblies, and Associated Equipment”.

Some products Listed under this category may incorporate pool covers that may be Classified under the category “Covers For Swimming Pools and Spas” (WBAH). A power safety cover and the category of “Covers For Swimming Pools and Spas” (WBAH), is a cover provided with the operator has not been evaluated as a safety cover.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Self Contained Spa”.

SWIMMING POOL AND SPA TRANSFORMERS (WDGV)

USE

This category covers swimming pool and spa transformers of the two-winding type having a grounded metal barrier between the primary and secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary windings, and intended to supply swimming pool, spa or submersible (fountain) luminaires in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” The primary rating is 120 V and the secondary

ADDITIONAL INFORMATION

For additional information, see Swimming Pool and Spa Equipment (WABX), Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAP).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Swimming Pool Transformer,” “Spa Transformer” or “Fountain, Swimming Pool or Spa Transformer.”
Definite front switchboard sections are designed particularly to provide safety for the operator, but they are not necessarily dead back boards. The basic standard used to investigate products in this category is UL 891, “Dead-Front Switchboards”.

DEFINITIONS:
A switchboard section is that portion of a switchboard which is prevented from the structural framework from being physically separated into smaller units. Framework that is welded or joined with steel rivets over 1/4 in. in diameter is considered to constitute a single section.

A "switchboard enclosure" is intended to enclose one or more "switchboard sections" or "switchboard interiors", or is intended to provide auxiliary wiring space for an adjacent switchboard section.

A "switchboard interior" is intended to be field-installed in a "switchboard enclosure" to become the equivalent of a "dead front switchboard section".

ELECTRICAL RATINGS:
Dead front switchboards are rated 600 volts or less. Each switchboard section is marked with the current rating of the supply bus. Within a group of sections, a through or splice bus is not required to be marked with its rating. The ampacity of the through bus and supply bus supplying the next section may be reduced but is not less than the supply rating of the next section. The current rating of the through and splice bus in the last section of a group (which might be used in the future to supply an additional section) is shown in the switchboard section marking if the through or splice bus rating is less than the supply rating of that section. The current rating of the bus section is also included in the marking. The adequacy of the supply, through, splice, or section bus current rating with respect to the calculated load current using the appropriate diversity factors, in Section 230-42 and Article 220 of the National Electrical Code, can only be determined by the local inspection authorities at the final installation.

SHORT CIRCUIT RATINGS:
A switchboard section or interior may have provision for the field installation of additional suitable equipment such as branch, splice or through busses, meter socket bases, circuit breakers, switches, panelboards, and terminal connectors. The switchboard section or interior is marked with the name or trade-mark of the manufacturer and the catalog number or equivalent of such equipment that is intended to be installed in the field. A switchboard section or interior also may have provision for utility installed current transformers and metering equipment.

INSTALLATION:
A switchboard section or enclosure which has been investigated to determine that it is rainproof is marked “Type 3R” and may also be marked “Rainproof”.

FIELD TERMINATIONS:
Dead front switchboard sections Listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Aluminum conductors may be used if such marking is independent of any marking on terminal connectors and if it appears on a wiring diagram or other readily visible location.

SWITCHBOARDS, SPECIAL PURPOSE (WFJX)
This listing covers theater switchboards, incandescent lighting switchboards with dimmers, and laboratory switchboards rated at 600 volts or less.

Switchboards listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

SHORT CIRCUIT RATING:
Special purpose switchboards are marked with their DC or RMS symmetrical short-circuit current rating in amps. The marking states that short-circuit ratings are limited to the lowest short-circuit rating of any device installed or intended to be installed therein. However, for combination series-connected devices, the short-circuit current rating marked on the switchboard may be higher than the short-circuit current rating of a specific circuit breaker installed or to be installed in the switchboard. This higher rating is valid only if the specific overcurrent devices identified in the marking are used within or ahead of the switchboard in accordance with the marked instructions. In many cases the short-circuit ratings are associated with instructions for securing supply wiring within the switchboard.

SERVICE EQUIPMENT:
Some dead front switchboard sections or interiors incorporate neutrals factory bonded to the enclosure. Such units are marked “Suitable only for use as Service Equipment”. Some switchboards may have terminals or provisions for terminals, marked as taps, located on the supply side of the service disconnecting means. The suitability of these terminals as taps connected on the supply side of the service disconnect is intended to be determined in accordance with the National Electrical Code.

FIELD-INSTALLED EQUIPMENT:
Where in normal operation the load will continue for 3 hours or more, molded case circuit breakers and fuses switches other than fused power circuit devices should not be loaded to exceed 80 percent of their current rating unless the device or otherwise marked using Devices and Fused Power Circuit Devices used in Dead Front Switchboards are suitable for continuous use at 100 percent of their rating.

OVERCURRENT PROTECTION:
A switchboard section or interior may have provision for the field installation of additional suitable equipment such as branch, splice or through busses, meter socket bases, circuit breakers, switches, panelboards, and terminal connectors. The switchboard section or interior is marked with the name or trade-mark of the manufacturer and the catalog number or equivalent of such equipment that is intended to be installed in the field. A switchboard section or interior also may have provision for utility installed current transformers and metering equipment.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. as illustrated in the Introduction of this Directory together with the word “LISTED”, a control number and one of the following product names as appropriate: “Dead Front Switchboard Section”, “Switchboard Interior”, “Switchboard Enclosure”. The Listing Marks for Dead Front Switchboard Sections contain “*". The latter space is stamped with a number indicating the position that the section occupies in the series of sections constituting the switchboard. The latter space is stamped with the total number of sections in the switchboard (including sections not bearing a UL Listing Mark).

A Listing Mark covering only the section so marked; it does not cover other sections included in the complete switchboard.

DUTY RATING:
Theater dimming switchboards have been evaluated to operate continuously at 100 percent of their marked input rating.

The basic standard used to investigate products in this category is UL 891, “Dead-Front Switchboards”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. as illustrated in the Introduction of this Directory together with the word “LISTED”, a control number, and one of the following product names as appropriate. “Laboratory Switchboard”, “Theater Switchboard”, “Incandescent Lighting Switchboard” or other appropriate product name.
SWITCHES (WFXV)

PULLOUT SWITCHES, DETACHABLE TYPE (WGEU)

USE AND INSTALLATION

This category covers switches having detachable pullout heads, with or without fuseholders, for cartridge fuses. These switches may be enclosed or nonenclosed.

Nonenclosed switches are intended for use in other assemblies, such as panelboards, service equipment, or the like.

Enclosed pullout switches may contain meter sockets and/or neutral assemblies and contain more than one independent switch without connection between switches.

Some enclosed pullout switches incorporate neutrals that are factory bonded to the enclosure. Such switches are marked “Suitable Only For Use As Service Equipment.”

Enclosed pullout switches marked for use as service equipment may also be used to provide the main control and means of cutoff for a separately derived system or for a second building.

Class CTL pullout switches have the physical size, configuration or other means which, in conjunction with the physical means provided in a Class CTL assembly, are designed to prevent the installation of more switch poles than that number for which the assembly is designed and rated.

Class CTL pullout switches may be identified by the words “Class CTL” or “CTL” on the switch as part of the marking.

Enclosed pullout switches that are rain-tight or rainproof are marked accordingly.

These pullout switches are intended for use with copper conductors unless marked to indicate that certain terminals are suitable for use with aluminum conductors. Such markings are independent of any marking on the terminal connectors and appear on a wiring diagram or other readily visible location.

Unless a switch is marked to indicate otherwise, the wire space and current-carrying capacity are based on the use of 60°C wire, where wire sizes 14-1 AWG are used, and 75°C where wire sizes 1/0 AWG and larger are used.

RATINGS

Ratings of enclosed or nonenclosed pullout switches are limited to 600 V or less, 400 A or less.

Switches without fuseholders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load. Fused pullout switches are marked “Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits."

Pullout switches with horsepower ratings in addition to amp ratings are suitable for use in motor circuits as well as for general use. Pullout switches with amp ratings only are suitable for general use only.

Pullout switches rated higher than 100 hp are restricted to use as motor disconnecting means and are not intended for use as motor controllers.

Motor-circuit pullout switches are intended for use only in motor circuits and are marked “Motor-Circuit Pullout Switch.”

Horsepower ratings are associated with particular voltages and number of phases. A horsepower-rated switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some pullout switches have dual horsepower ratings, the larger of which is based on the use of fuses with time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Switches marked “Suitable For Use On A Circuit Capable of Delivering Not More Than __ Amps, RMS, Symmetrical, Volts Maximum: Use Class __. Fuses Having An Interrupting Rating Of No Less Than The Maximum Available Short-Circuit Current Of The Circuit,” have been investigated for the additional rating indicated.

Some enclosed pullout switches are suitable for use as service switches. Such switches are marked “Suitable For Use As Service Equipment.”

RELATED PRODUCTS

Products with similar uses are covered under Switches, Enclosed (WGAH); Motor Controllers, Manual (NLRV); Switches, Dead-front (WHSX) and Switches, Open Type (WHTY).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1429, “Pullout Switch.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Pullout Switch,” “Enclosed Pullout Switch,” “Motor Circuit Pullout Switch” or “Enclosed Motor Circuit Pullout Switch.”

SWITCHES, AUTOMATIC (WGZR)

Clock-operated switches Listed with horsepower ratings are tested at rated voltage and at six times motor full load running current for ac ratings and at ten times motor full load running current for dc ratings.

Clock-operated switches have been tested to determine their acceptability for continuous operation at their marked rated load.

Clock-operated switches Listed for control of electric or other heating appliance loads are tested at rated voltage with noninductive resistance loads.

The basic standard used to investigate products in this category is UL 917, “Clock-Operated Switches.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Clock Operated Switch,” “Timer Switch”.

SWITCHES, OPEN TYPE (WHTY)

USE AND INSTALLATION

This category covers open type switches without an enclosure that are provided with a handle operator. These switches are intended for installation in a panelboard, switchboard, motor control center, industrial control panel or the like, or for installation in a Listed cabinet or a cutout box in accordance with the switch installation instructions, or without an enclosure where acceptable.

This category also covers switches, with or without fuseholders, for plug fuses or cartridge fuses.

These switches are intended to be mounted in enclosures such that they are manually operable by means of an external handle without opening the enclosure. Externally operated handles mounted to the sidewall of an enclosure or through the cover of an enclosure are intended to be installed in accordance with the switch installation instructions.

These switches are intended for use with copper conductors unless marked to indicate those terminals which are suitable for use with aluminum conductors. Such a marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the current-carrying capacity is based on the use of 60°C wire where wire sizes 14-1 AWG are used, and 75°C where wire sizes 1/0 AWG and larger are used.

RATINGS

Switches without fuseholders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load. Fused switches are marked “Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits.”

Ratings of Listed open type switches are limited to 4000 A, 500 hp, 600 V. Open type switches rated more than 1200 A are intended for isolating use only. Open type switches rated 800 or 1200 A at more than 250 V are available in two classes, one intended for general use and the other intended for isolating use only. Switches intended for isolating use only are marked “For Isolating Use Only – Do Not Open Under Load.”

Open type switches with horsepower ratings in addition to ampere ratings are suitable for use in motor circuits as well as for general use. Open type switches with ampere ratings only are intended for general use only. Open type motor circuit switches are intended for use only in motor circuits and are marked “Motor-Circuit Switch.”

Open type switches rated higher than 100 hp are restricted to use as motor disconnecting means and are not for use as motor controllers.

Ratings of Listed open type motor circuit switches are limited to 500 hp, 600 V.

Horsepower ratings are associated with particular voltages and number of phases: a switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some open type switches have dual horsepower ratings, the larger of which is based on the use of fuses with time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Switches marked “Suitable For Use On A Circuit Capable Of Delivering Not More Than __ Amperes, RMS Symmetrical, Volts Maximum: Use Class __. Fuses Having An Interrupting Rating Of No Less Than The Maximum Available Short-Circuit Current Of The Circuit,” have been investigated for the additional rating indicated.
SWITCHES, DEAD-FRONT (WHXS)

USE AND INSTALLATION

This category covers dead-front switches having all current-carrying parts enclosed when mounted in an enclosed panelboard, dead-front switchboard or the like. These switches are manually operable by means of external handles without opening the enclosure or are hinged pullout switches.

This category covers switches either with or without fuseholders for plug fuses or for cartridge fuses.

Switches without fuseholders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Fused switches are marked “Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits.”

These dead-front switches are for use with copper conductors unless marked to indicate those terminals which are suitable for use with aluminum conductors. Such a marking is independent of any marking on terminal connections and is on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60°C wire where wire sizes 14-1 AWG are used, and 75°C wire where wire sizes 1/0 AWG and larger are used.

RATINGS

Ratings of Listed dead-front switches are limited to 4,000 A, 500 hp, 600 V. Dead-front switches rated more than 1,200 A are intended for isolating use only. Dead-front switches rated 800 or 1,200 A at more than 250 V are available in two classes, one intended for general use and the other intended for isolating use only. Switches intended for isolating use only are marked “For Isolating Use Only — Do Not Open Under Load.”

Dead-front switches with horsepower ratings in addition to amperage ratings are suitable for use in motor circuits as well as for general use. Dead-front switches with amperage ratings only are intended for general use only. Some hinged pullout switches achieve an “off” position only by leaving the door open. These switches are restricted to use only as a single main in a panel board or the like and are rated not higher than 200 A and 250 V.

Dead-front switches rated higher than 100 hp are restricted to use as motor disconnecting means and are not for use as motor controllers.

Enclosed motor-circuit switches are intended for use only in motor circuits and are marked “Motor-circuit Switch.”

Ratings of Listed dead-front motor-circuit switches are limited to 500 hp, 600 V. Horsepower ratings are associated with particular voltages and number of phases; a switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some dead-front switches have dual horsepower ratings, the larger of which is based on the use of fuses with time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Dead-front motor-circuit switches and dead-front switches with horsepower ratings are tested for interrupting capacity at rated voltage and six times motor full load running current for alternating current ratings, and at four times motor full load running current for direct-current ratings.

Switches with direct-current horsepower ratings are intended for use with reduced voltage starting.

Switches marked “Suitable For Use On A Circuit Capable Of Delivering Not More Than ____ Amperes, RMS Symmetrical, Volts Maximum; Use, Class ____ Fuses” have been investigated for the additional rating indicated.

MARINE USE

Some Listed dead-front switches in this category have been investigated for use aboard marine vessels over 65 feet in length in accordance with the Electrical Engineering Regulations of the United States Coast Guard Subchapter J CG-259 (46 CFR Parts 110-113). Such dead-front switches are identified by a Listing Mark for marine vessels over 65 feet in length.

SWITCHES, ENCLOSED (WIAX)

Enclosed switches and enclosed motor circuit switches are externally operable without opening the enclosure.

This listing covers switches either with or without fuse holders for plug fuses or for cartridge fuses.

Switches without fuse holders (unfused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Fused switches are marked “Continuous load current not to exceed 80 percent of the rating of fuses employed in other than motor circuits.”

These dead-front switches are for use with copper conductors unless marked to indicate those terminals which are suitable for use with aluminum conductors. Such a marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60°C wire where wire sizes 14-1 AWG are used, and 75°C wire where wire sizes 1/0 AWG and larger are used.

RATINGS

Ratings of Listed enclosed switches are limited to 4,000 amp, 500 hp, 600 v. Enclosed switches rated more than 1,200 amp are intended for isolating use only. Enclosed switches rated 800 or 1,200 amp at more than 250 v are available in two classes, one intended for general use and the other intended for isolating use only. Switches intended for isolating use only are marked “For Isolating Use Only — Do Not Open Under Load.”

Enclosed switches with horsepower ratings in addition to amp ratings are suitable for use in motor circuits as well as for general use. Enclosed switches with amp rating are intended for general use only. Some Listed dead-front switches in this category have been investigated for switching a common load from a normal supply to an optional standby system and are marked “Suitable For Use In Accordance With Article 702 of the National Electrical Code”.

Safety Switches

Enclosed switches rated higher than 100 horsepower are restricted to use as motor disconnecting means and are not for use as motor controllers.

Enclosed motor circuit switches are intended for use only in motor circuits and are marked “Motor Circuit Switch.”

Ratings of Listed enclosed motor circuit switches are limited to 500 hp, 600 v. Horsepower ratings are associated with particular voltages and number of phases; a switch is not intended for use with motors on circuits having voltages or number of phases different from that shown on the marking.

Some enclosed switches have dual horsepower ratings, the larger of which is based on the use of fuses with time delay appropriate for the starting characteristics of the motor. Switches with such horsepower ratings are marked to indicate this limitation and are tested at the larger of the two ratings.

Enclosed motor circuit switches and enclosed switches with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full load running current for alternating current ratings and at four times motor full load running current for direct current ratings.

Switches with direct current horsepower ratings are intended for use with reduced voltage starting.

Switches which are marked “Suitable For Use On A Circuit Capable Of Delivering Not More Than ____ Volts Maximum; Use, Class ____ Fuses Having An Interrupting Rating Of No Less Than The Maximum Available Short Circuit Current Of The Circuit” have been investigated for the additional rating indicated.

Most enclosed switches are also suitable for use as service switches. Such switches are marked “Suitable For Use As Service Equipment.”

Some enclosed switches incorporate neutrals factory bonded to the enclosure. Such switches are marked, “Suitable Only For Use As Service Equipment.”
Enclosed switches marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system, or for a second building.

Some Enclosed Switches are listed as service switches under “Service Equipment.”

Some Enclosed Switches may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected will be identified by a marking such as on a wiring diagram.

3-pole enclosed switches rated 1200 amps and not provided with automatic tripping means for use with ground-fault protection and marked for use as service equipment are intended for continuous industrial processes if used on 3-phase, 4-wire delta systems having more than 150 v to ground.

Enclosed switches that are rain tight or rainproof are marked accordingly. Enclosed switches as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location. Controllers, Manual

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire where wire size Nos. 14-1 AWG are used and 75 C wire where wire size Nos. 1/0 AWG and larger are used.

Enclosed bolted where contact switches are listed under the category of “Fused Power Circuit Devices.”

Some Listed enclosed switches in this category have been investigated for use aboard marine vessels over 65 ft in length in accordance with the Electrical Engineering Regulations of the United States Coast Guard Subchapter J (CG-259 (46 CFR, Parts 110-113). Some enclosed switches are identified by a Listing Mark for marine vessels over 65 ft. in length.

Enclosed switches marked for marine use and also suitable for general service.

The Electrical Engineering Regulations of the United States Coast Guard classify marine enclosed switches as “Non-watertight,” “Drip-proof,” or “Watertight.” A “Drip-proof” marine enclosed switch is so constructed that falling moisture or dirt does not interfere with the successful operation of the equipment.

A “Watertight” marine enclosed switch is so constructed that water does not enter the enclosure when subjected to a stream of water.

Marine enclosed switches which are classed “Drip-proof” or “Watertight” are marked to indicate this fact.

Marine enclosed switch for use in corrosive locations is marked “Suitable For Use in Corrosive Locations.”

The basic standard used to investigate products in this category is UL 98, “Enclosed Switches.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Enclosed Switch,” “Enclosed Motor-Circuit Switch,” “Marine, Enclosed Switch For Use On Vessels Over 65 Ft.”

Enclosed switches, Knife (WIOV)

This listing covers open type knife switches either with or without fuse holders for plug fuses or for 0-600 amp cartridge fuses having no current interrupting rating included in their marking: switches having individual bases designed for either front or rear wiring connection; and switch parts without bases designed for mounting on switchboards and panelboards. Switches may be single- or multiple-pole, and with or without quick-break or auxiliary contacts, except where such contacts are specifically required.

Knife switches without fuse holders (unused) have been tested to determine their acceptability for continuous operation at their marked rated load.

Knife switches are provided with studs or terminal pads to which listed pressure wire connectors can be factory or field installed to accommodate field wiring.

“Knife switches are marked with a short-circuit current withstand rating.”

Standard voltage ratings for knife switches are: 125, 250, 250 dc-500 ac, 600. Unless otherwise indicated, the rating includes both alternating and direct current.

Standard current ratings for knife switches are: 30, 60, 100, 200, 400, 600, 800, 1200, 1600, 2000, 2500, 3000, 4000, 5000, 6000.

“Switches with knife blade action but with external operating handles are covered as enclosed switches, dead front switches, service equipment or fused power circuit devices.”

The basic standard used to investigate products in this category is UL 363, “Knife Switches.”

The Listing Mark on the product, or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit containing the product is packaged in the installable unit method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products include the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Knife Switch”.

SWITCHES, LOAD INTERRUPTER AND ISOLATING, OVER 600 V (WIOG)

This Listing covers enclosed medium voltage load interrupter and isolating switches having AC voltage ratings from 4.76 kV through 38 kV, with continuous current ratings up to 3000 amps. These switches are intended for installation in accordance with the requirements of the National Electrical Code. Load interrupter switches are rated 200 through 1200 amps and may be provided with or without fuses. Switches rated more than 1200 amps at any voltage and those rated more than 600 amps at 27 kV or greater are isolating only. These switches are available in either stationary or draw out versions.

These switches are generally three pole devices, however some switches may be one- or two-pole. Enclosures may be either ventilated or nonventilated.

An enclosure which has been investigated to determine that it is rainproof is marked “Rainproof” or “Outdoor” or “3R.”

Enclosures are marked to indicate the exposure category (A, B or C) for which they are intended. Enclosures marked “Category A” are intended to be installed in areas accessible to the unsupervised general public; enclosures marked “Category B” may be installed for use in areas accessible to authorized personnel only; enclosures marked “Category C” are intended for use in areas accessible to qualified personnel only.

Unless specifically marked otherwise, these switches are intended for use on three phase circuits where the nominal voltage to ground is 0.58 times the line to line voltage.

Switches may or may not be provided with magnetizing current interrupting ratings.

Switches may or may not be provided with cable charging ratings.

Load interrupter switches are marked with a fault close rating. They should not be used on circuits having available fault currents in excess of the fault close rating. When provided with some fuses it may be necessary for the supply circuit to have an available fault current that is less than the fault close rating of the switch due to the limited interrupting ability of the fuses. Switches are marked as follows on the outside of the enclosure “Suitable for use in a circuit capable of delivering no more than RMS Symmetrical Amps.”

These switches may consist of a single free standing vertical section or they may consist of several abutting vertical sections intended for interconnection by a horizontal bus. When provided with a horizontal bus each vertical section is marked with the ampacity of the horizontal bus in amps. Switches that are intended to be part of such a line up are provided with a “Mark of a Line-up” number, which is a line-up number, and the following number designates the total number of vertical sections provided (including sections not bearing a UL Listing Mark) and the first blank indicates the position (reading from left to right) of the vertical section bearing the marking.

A section, with only horizontal bus or with no installed equipment may be provided. This section is identified as an enclosure and is numbered as part of a line-up.

The basic standards used to evaluate these products are ANSI C37.5-1990 (Indoor AC Medium Voltage Switches for Use in Metal-Enclosed Switchgear), ANSI/C80.203-1987 (American National Standard Metal-Enclosed Interrupter Switchgear) and ANSI C37.57-1990 (Metal-Enclosed Interrupter Switchgear Conformance Testing).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. In an assembly of products the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark covers only the sections included in the assembly. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Isolating Switch”, “Metal-Enclosed Interrupter Switchgear”, “Metal Enclosed Switchgear, Interrupter Switchgear”, “Load Interrupter Switchgear” or “Load Interrupter Switchgear”.

SWITCHES, MODIFIED CASE (WJAZ)

This listing covers both fused and unfused molded case switches. No overcurrent protection is provided by the unfused switches and they are MARKED with a SHORT-CIRCUIT CURRENT WITHSTAND RATING.
The fused switches have one or more replaceable fuses to provide overcurrent protection and they are marked with a SHORT-CIRCUIT CURRENT INTERRUPTING RATING. The maximum voltage rating of a molded case switch is 600 volts. The unfused switches are tested to determine their acceptability for continuous operation at their marked rated load.

Unfused switches are marked, “Continuous load current not to exceed 80 percent of the rating of fuses employed.”

Unfused switches are tested under overload conditions at six times amp rating cover motor circuit applications and are suitable for use as motor circuit disconnects per Article 430-109 of the National Electrical Code.

Fused switches are tested for interrupting capacity at rated voltage and at six times motor full load running current for alternating current ratings and at four times motor full load running current for direct current ratings.

Unfused two-pole molded case switches which are marked to indicate suitability for use on 3-phase circuits have been investigated and found suitable for controlling 3-phase, corner grounded delta circuits.

The switches listed herein are for use with copper conductors, unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings are independent of any markings on terminal connectors and are readily visible.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire where wire size Nos. 14-1 AWG are used and 75 C wire where wire size Nos. 1/0 AWG and larger are used.

Molded case switches without enclosures are intended for use in Listed circuit breaker enclosures, or as a part of other Listed equipment or where open type molded case switches are acceptable.

Some unfused switches have a release mechanism that causes the switch to open automatically to protect itself in the event of a short circuit current fault. Such switches are marked to indicate that they may open.

Some enclosed molded case switches may be provided with ground fault protection for services or major feeders. The circuit(s) so protected will be identified by a marking such as on a wiring diagram.

Some enclosed molded case switches are marked as suitable for use as service equipment.

Listed molded case switches may be mounted in any position. Line and load markings on a molded case switch are intended to limit connections there-to as marked.

Molded case switches may be equipped with factory installed accessories such as alarm and auxiliary switches, remotely energized electrically operated trip mechanisms, and electrical operators.

The basic standard used to investigate products in this category is UL 489, Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

The listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Molded Case Switch” or “Molded Case Switch”.

Snap Switches, Photoelectric (WJCT)

This listing covers photoelectric switches and motion detectors for use in nonindustrial locations, rated 250 V, 2000 VA, maximum. Switches which have been investigated for the control of tungsten filament lamp loads are marked “Tungsten”. Switches which have been investigated for the control of fluorescent lamp ballast loads are marked “Ballast”.

Investigation of devices listed as “Rain tight” includes a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

Photoelectric switches and motion detectors designed to provide protection for mercantile premises, stock rooms, safes, vaults, etc. are covered under Intrusion Detection Units (ANSR).

See Industrial Control Equipment for the Listing of industrial types of photoelectric switches and motion detectors.

These switches have been tested to determine their acceptability for continuous operation at their marked load rating.

The basic standard used to investigate products in this category is UL 773A, “Nonindustrial Photoelectric Switches for Lighting Control”.

The listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Photoelectric Switch” or “Motion Detector Switch”.

Snap Switches (WJQR)

The standard amp and voltage ratings for an AC-DC general-use snap switch for controlling direct- or alternating-current circuits are given in Table I. While many of these snap switches will operate successfully on circuits that have some reactance, in general, an inductive load should not exceed one-half the amp rating of the switch at the voltage involved.

However, some of these snap switches are marked with additional horse-power ratings at one or more voltages, which indicate that a switch so marked has been tested for the control of a motor of the horsepower and voltage rating indicated. Such a snap switch has been tested for the control of tungsten-filament lamp loads and is marked with the letter “T” as part of the suitable tungsten-filament lamp load rating at 125 V.

** A panelboard switch may be rated at 30 A, 125 V, without the corresponding 250 V rating

| Snaps Switch Ratings in Amperes Corresponding to Direct-Current Potentials |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| 125 V | 250 V | 600 V | 125 V | 250 V | 600 V |
| — | — | — | — | — | — |
| 3 | 20 | — | 10 | — | — |
| 5 | 40 | — | 20 | — | — |
| 5 or 6 | 3 | — | 30** | 20 | — |
| — | 5 | — | — | 20 | — |
| — | — | — | 30 | — | — |
| 10 | 5 | — | 30 | — | — |
| 15 | 10 | 50 | 60 | — | — |
| 10 | 5 | 60 | 60 | — | — |

Note: The above ratings apply equally when these switches are used on alternating-current circuits.

* These dual ratings may be assigned only to a three-way, four-way, two-circuit, three-circuit, or a fixture switch

** A panelboard switch may be rated at 30 A, 125 V, without the corresponding 250 V rating

AC General-use Snap Switches

An AC general-use snap switch has a marked current and voltage rating only for alternating-current, which is one of the ratings given in Table II.

Photo Controls, Plug-in, Locking Type (WJFX)

This listing covers plug-in locking type photo controls for use on outdoor type electric lighting fixtures which are used for both street lighting and area lighting (lighting of parking lots and similar applications).

Unless marked specifically “Tungsten” or “Ballast” these products are suitable for use with either type of fixture, rated not more than the rating of the photo control. Voltage rating is 480 v, ac, maximum.

The basic standard used to investigate products in this category is UL 773, “Plug-In Locking-Type Photocontrols for Use with Area and Roadway Lighting”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Photocontroller”, “Photocontroller Shorting Plug”, “Photocontroller Open Circuit Plug”.

SNAP SWITCHES (WJQR)
and is intended for installation in a flush device box (flush switch), mounting on an outlet box cover, or surface mounting (surface snap switch).

AC general-use snap switches are tested for the control of resistive, inductive (including electric discharge lamp) and tungsten-filament lamp loads at 120 V up to the full current rating of the switch, and for motor loads up to 80% of the amp rating of the switch, but not exceeding 2 hp.

### Table II

<table>
<thead>
<tr>
<th>120 V AC</th>
<th>120-277 V AC</th>
<th>277 V AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>20</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>30</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>15</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>20</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>—</td>
<td>15</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>30</td>
<td>—</td>
<td>20</td>
</tr>
</tbody>
</table>

Snap switches rated 240 or 250 V that are intended for use on circuits involving a nominal potential to ground of 120 or 125 V, respectively, are tested on such circuits and are marked with the voltage rating “240” or “250” (no underlining). Snap switches rated 240 or 250 V that are suitable for use at full potential to ground are marked with the voltage rating 240 or 250 (double underlining). Snap switches having voltage ratings other than 240 or 250 V are tested on circuits involving full rated potential to ground.

Terminals of 15 A and 20 A switches not marked “CO/ALR” are intended for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are intended for use only with copper and copper-clad aluminum conductors.

Terminals of switches rated 30 A and above not marked “AL-CU” are intended for use with copper conductors only. Terminals of switches rated 30 A and above marked “AL-CU” are for use with aluminum, copper and copper-clad aluminum conductors.

### ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

### Switches, Door (WLFT)

**USE**

This category covers snap switches for use in door jambs.

This category covers an assembly consisting of a switch, special switch box and cover. The special switch box is not an outlet box. It is only intended to terminate the switch leads. It is not intended for any other type of field wiring.

### PRODUCT MARKINGS

Listed door switches are marked with the_Liste’s name or trademark and electrical rating in a location where readily visible after installation. An AC only door switch, if rated in wattage, is marked “For use with incandescent lighting only” where visible after installation. The catalog designation is marked on the assembly, on the package, or on a stuffer sheet packaged with each assembly.

### ADDITIONAL INFORMATION

For additional information, see Snap Switches (WJQR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

### REQUIREMENTS

The basic standard used to investigate products in this category is UL 20, “General Use Snap Switches.”

The Listing Mark of Underwriters Laboratories Inc. on the assembly is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED.”

### Switches, Fixture (WLTT)

This listing covers switches for use in electric fixtures, fixture canopies and portable lamps.

For additional information see Snap Switches, Guide WJQR.

The basic standard used to investigate products in this category is UL 20, “General-Use Snap Switches.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” (or “List.”).

### Switches, Fixture, Socket and Special Mechanism Type (WMHR)

This category covers fixture, socket and special mechanism type switches intended for use in appliances, electric fixtures and portable lamps.

### PRODUCT MARKINGS

The devices are marked as follows:

Liste’s name or identification on device.

Catalog number or equivalent on device or carton.

Complete electrical rating on device.

Switches intended for control of tungsten filament lamps on both direct and alternating current are marked with the letter “T,” located to indicate that it applies only to the rating at 125 V. AC/DC switches intended for the control of electric discharge lamps are marked with the letter “E.” A switch may be marked with both letters to indicate both uses.

A switch intended for appliance use is marked “FOR APPLIANCE USE.”

### ADDITIONAL INFORMATION

For additional information, see Snap Switches (WJQR) and Electrical Equipment for Use in Ordinary Locations (AALZ).

### REQUIREMENTS

The basic standard used to investigate products in this category is UL 20, “General Use Snap Switches.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL Mark for Canada symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” (or “List.”).

### Switches, Flush (WMUZ)

This listing covers snap switches for mounting in flush device boxes and also switches that have been investigated for use without separate outlet boxes with Types NM and NMC cable. For additional information see Snap Switches, Guide WJQR.

The basic standard used to investigate products in this category is UL 20, “General Use Snap Switches.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” (or “List.”).

### Switches, Pendant, Socket and Special Mechanism Types (WNWV)

The basic standard used to investigate products in this category is UL 20, “General-Use Snap Switches.”

The Listing Mark on the product, or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number and the following product name: “Pendant Switch.”

### Switches, Surface (WOKT)

This listing covers snap switches, for surface mounting, unless otherwise stated in the individual listing.

For additional information see Snap Switches, Guide WJQR.

The basic standard used to investigate products in this category is UL 20, “General Use Snap Switches.”
TRANSFER SWITCHES (WPTZ)

This category covers automatic and non-automatic transfer switches, including associated control devices, with maximum ratings of 600 volts AC and transfer switch current over 600 volts AC but not more than 5000 volts AC. Transfer switches and by-pass switches which have been investigated without regard to the enclosure in which they are mounted have the Listing Mark applied to the switch panel. When the Listing Mark is applied to the enclosure of an enclosed transfer switch or by-pass switch it indicates the Listing of the complete enclosed assembly.

Transfer switches rated 600 volts and less which have been investigated for their suitability for use as service equipment are marked, “SUITABLE FOR USE AS SERVICE EQUIPMENT.”

Transfer switches are required to be designed so that the load cannot remain simultaneously disconnected from both the normal and alternative sources when either or both sources are available, except that transfer switches marked, “SUITABLE FOR USE AS SERVICE EQUIPMENT” are provided with accessible means to independently disconnect both the normal and alternate sources.

Automatic transfer switches transfer a common load from a normal supply to an alternate supply in the event of failure of the normal supply, and automatically return the load to the normal supply when the normal supply is reestablished.

Additional sensing devices which may initiate or delay transfer have been evaluated in accordance with the manufacturer's marked operating values.

Automatic Transfer Switches may have a switching contact to initiate the starting of an engine generator set.

Transfer Switches have been investigated for load switching and inrush capability and for suitability for cycles of operation based on their intended use which in the case of an automatic transfer switch is expected to include scheduled test operations switching full load.

Listed transfer switches without enclosures are for use as part of other equipment or where open type devices are acceptable.

Transfer Switches without integral overcurrent protective devices are suitable for continuous use at 100 percent of rated current. Transfer switches incorporating integral overcurrent devices are suitable for continuous use at 100 percent of rated current unless restricted to use at 80 percent of rated current as indicated by the marking, “CONTINUOUS LOAD CURRENT NOT TO EXCEED 80 PERCENT OF SWITCH RATING,” on the switch.

Transfer switches are rated in amps and are generally considered to be suitable for total system transfer, which includes control of motors, electric-discharge lamps, electric-heating loads, and tungsten-filament lamps within the amp rating marked on the nameplate.

Unmarked switches also marked to indicate rated current and or maximum available fault currents not greater than 5000 amps rms symmetrical. Transfer Switches rated more than 100 amps are suitable for use on circuits having an available fault current of 10,000 amps rms symmetrical or 20 times the transfer switch rating whichever is greater.

Transfer switches marked with a short circuit rating without reference to an overcurrent device by manufacturer and catalog number has been tested for a minimum of 3 electrical cycles and is intended for use with a Listed molded case circuit breaker without a short-time function.

Transfer Switches having manual operators accessible only by opening the enclosure, are not intended to be manually operated under load.

Some transfer switches may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected are identified by a marking such as on a wiring diagram.

Transfer switches without integral overcurrent protection, are marked to indicate the maximum rating of overcurrent protection to be provided ahead of the transfer switch.

Transfer switches as Listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is indicated on a wiring diagram or other readily visible location.

Unless the device rated 600 volts and less is marked otherwise, the wiring space and terminations are based on 60 C wire for switches rated 100 amps or less and 75 C for switches rated more than 100 amps.

Unless the transfer switch rated over 600 volts is marked otherwise, the wiring space and terminations are based on the use of Type MV90 conductors. The ampacity of Type MV90 conductors is specified in Tables 310-75 and 310-76 of the National Electrical Code.

The basic standard used to investigate products in this category is UL 1008, “Transfer Switch Equipment.”

ACCESSORIES, TRANSFER SWITCH (WPVQ)

This category covers bypass switches which permit testing and maintenance of emergency system components that could not be otherwise maintained without disruption of important functions. The bypass switching sequence is manually initiated.

The transfer and bypass/isolation switch for use in emergency systems consists of a transfer switch suitable for emergency systems, and with the transfer switch isolated or disconnected the bypass/isolation switch functions as an independent nonautomatic transfer switch and allows the load to be connected to either power source.

ADDITIONAL INFORMATION

For additional information, see Transfer Switches (WPTZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Transfer Switch Accessories, “Transfer and Bypass/Isolation Switch,” “Bypass/Isolation Switch,” “Transfer Switch” or “Transfer and Bypass/Isolation Switch for Emergency Systems.”

AUTOMATIC TRANSFER SWITCHES FOR USE IN EMERGENCY SYSTEMS (WPWR)

This listing covers automatic transfer switches intended for use in Emergency Systems as contemplated by Articles 517 and 700 of the National Electrical Code. These transfer switches are also suitable for use in Standby Systems in accordance with Articles 701 and 702 of the National Electrical Code.

See additional information under “Transfer Switches”, Guide WPWZ.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Automatic Transfer Switch For Emergency Systems.”

AUTOMATIC TRANSFER SWITCHES FOR USE IN OPTIONAL STANDBY SYSTEMS (WPXT)

This listing covers automatic transfer switches intended for use in Optional Standby Systems in accordance with Article 702 of the National Electric Code.

See additional information under “Transfer Switches”, Guide WPWZ.

These products have been investigated with overload protection for the control circuits provided within the controller enclosure or by the installer as specified by the wiring diagram.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Automatic Transfer Switch For Use in Optional Standby Systems.”

AUTOMATIC TRANSFER SWITCHES, OVER 600 V (WPYC)

This category covers automatic transfer switches intended for use in systems rated more than 600 V ac. An automatic transfer switch automatically transfers a load to another source of power when the original source fails and will automatically retransfer the load to the original source under desired conditions.

SWITCH TYPES

These switches may be of the fixed preferential, nonpreferential or selective-preferential type. A fixed-preferential type switch automatically transfers to the original source when it is available. A nonpreferential type switch retransfers the load to the original source only when the second or emergency source fails. A selective-preferential type switch is a type in which either source may be selected as the preferred source and which will retransfer the load to the preferred source upon its reenergization.
2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

RATINGS
These switches are rated up to 1200 A at over 600 V, up to 38 kV.

ADDITIONAL INFORMATION
For additional information, see Transfer Switches (WPTZ) and Electrical Equipment for Use in Ordinary Locations (AAL).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 1088, "Transfer Switch Equipment," ANSI C37.20.1, draft 21 dated 6-1-94, "Proposed Standard for Indoor AC Medium-voltage Switches for Use in Metal-enclosed Switchgear" and/or ANSI C37.54, "Conformance Test Procedures for Indoor Alternating Current Medium-voltage Circuit Breakers Applied as Removable elements in Metal-enclosed Switchgear."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Automatic Transfer Switch."

Nonautomatic Transfer Switches (WPYV)
This listing covers nonautomatic transfer switches intended to transfer a common load from a normal supply to an alternate supply of an equipment system in accordance with Sections 517-34 and 517-43 or an optional stand-by system in accordance with Article 702 of the National Electrical Code.

See additional information under "Transfer Switches", Guide WPTZ.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Non-Automatic Transfer Switch.

SWITCHGEAR ASSEMBLIES, METAL ENCLOSED, LOW-VOLTAGE POWER CIRCUIT BREAKER TYPE (WUTZ)

GENERAL
This category covers metal-enclosed, low-voltage power circuit breaker switchgear rated up to 600 V, AC, 2000 A.

These switchgear assemblies are completely enclosed on all sides and top with sheet metal (except for ventilation openings and inspection windows) and may contain the following: (1) low-voltage power circuit breakers, either fused or unfused, (2) bare and/or insulated buses and connections, (3) instrument and control power transformers, (4) instruments, meters and relays, and (5) control wiring and accessory devices.

The low-voltage power circuit breakers are contained in individual grounded metal compartments and are controlled either remotely or from the front of the enclosure. The circuit breakers may be stationary or of the draw-out type.

These switchgear assemblies may consist of a single vertical section housing one or more individual low-voltage power circuit breaker compartments or auxiliary compartments, along with the associated busbar structure, or may consist of several abutting sections interconnected by horizontal buses.

The auxiliary compartments may house such auxiliary equipment as potential transformers, control power transformers, or other miscellaneous devices.

These switchgear assemblies are marked with the following ratings or with a reference to a drawing which is included with the product and marked with the following ratings: (1) rated maximum voltage, (2) rated frequency, (3) rated insulation level, (4) rated continuous current, (5) rated short-time current, and (6) rated short circuit current.

Low-voltage power switching devices used in these switchgear assemblies are suitable for continuous use at 100 percent of their continuous current rating.

The marking “Suitable for Use as Service Equipment” appears on each switchgear section or assembly optionally intended for use at a service. A switchgear section marked for use at services may also be used to provide the main control and means of cutoff for a separately derived system.

Generally this switchgear is shipped without wire connectors and the busbar terminations are provided with standard bolt hole patterns. The suitability of the wire connectors installed must be determined by Authorities Having Jurisdiction at the time of final inspection.

A switchgear section investigated to determine if it is rainproof is marked “Rainproof.”

The individual power circuit breaker compartments or adapters are intended to accommodate a low-voltage power circuit breaker and are marked to indicate the type(s) of circuit breaker that may be installed.

Individual auxiliary compartments are intended to house control components such as meters, instrument and/or control power transformers, and the like.

Low-voltage power circuit breaker switchgear assemblies are generally provided with shore-side critical circuit diagrams of the assembly, continuous current ratings of the main and section buses, details of control and ground-fault protection (if provided) circuits, etc.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AAL).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Low-Voltage Power Circuit Breaker Switchgear Type." The Listing Mark for these products also includes the marking "WUTZ". The first blank is stamped with a number indicating the position that the section occupies in the series of sections constituting the switchgear assembly. The second space is stamped with the total number of sections in the switchgear assembly. Only those sections and compartments that bear the Listing Mark are covered under UL’s Follow-Up Service.

SWITCHGEAR, GAS INSULATED, TYPE, OVER 600 V (WVEK)

GENERAL
This category covers indoor medium-voltage switchgear where gas, typically sulfur hexafluoride (SF-6), is used as the insulating medium. The term “indoor” does not preclude the use of this equipment in outdoor enclosures, but rather defines the class of equipment. This equipment includes circuit breakers that are specifically intended to provide feeder or branch-circuit overcurrent protection. This equipment is not intended for use as service entrance equipment. These devices are intended for installation in accordance with ANSI/NFPA 70, National Electrical Code.

CIRCUIT BREAKERS
This switchgear is three-pole devices, fixed, trip-free. Interruption may take place in a gas-filled chamber or in a vacuum interrupter that is in a gas-filled chamber. Each circuit breaker pole may be housed separately.

Each circuit breaker is connected to an isolating/grounding switch that can connect the circuit breaker to the circuit, disconnect the circuit breaker, or ground the load circuit at the input of the circuit breaker.

Circuit Breaker Ratings
Each circuit breaker is provided with a marking that indicates the voltage and current ratings for both the close and trip coils. This marking also contains a “close-and-latch” rating in kiloamperes that is equivalent to the interrupting rating (maximum asymmetrical current rating) of the circuit breaker. This rating is expressed in rms symmetrical amperes. Circuit breakers have a rated maximum voltage of 4.76, 8.25, 15, 27 or 38 kV with continuous current ratings of 1200, 2000 or 3000 A.

Circuit breakers are marked with an interrupting rating “I” in rms symmetrical amperes that is applicable at the maximum rated voltage. Circuit breakers using the rating structure of ANSI/IEEE C37.06-1987, “AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis Preferred Ratings and Related Required Capabilities,” are also provided with a “K” factor for determining the interrupting rating at a use voltage lower than the maximum rated voltage. The circuit breaker may interrupt a current greater than “I” by a factor up to the value of “K,” at a voltage reduced from the maximum rating by the same factor, or at a lower voltage, as depicted in Illustration 1 of Circuit Breakers and Metal-clad Switchgear Over 600 V (DLAH). Circuit breakers using the rating structure of ANSI/IEEE C37.06-1997 or later do not have a “K” factor, or are marked with a “K” factor of 1.0.

Unless specifically marked otherwise, these circuit breakers are intended for use on three-phase circuits where the nominal voltage-to-ground is 0.58 times the line-to-line voltage.

GAS-INSULATED SWITCHGEAR
This switchgear may consist of several gas-filled compartments connected together. Gas-filled compartments are isolated from each other by gas seals. The compartments are electrically connected together and
grounded. A compartment may house a circuit breaker, a length of bus, or a switch. A dual bus system, with isolating switches, may be provided.

A vertical section may consist of a circuit breaker, a switch, a bus compartment and a control compartment. A vertical section may be a single freestanding section or may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus.

Each vertical section of a line-up of abutting vertical sections is provided with a "UL" marking where the second blank indicates the total number of vertical sections provided (including sections not bearing the UL Listing Mark) and the first blank indicates the position (from left to right) of the vertical section bearing the UL Listing Mark.

Auxiliary equipment such as potential transformers and current transformers are factory installed. Other auxiliary equipment such as protective relays and the like are usually enclosed within the switchgear. They are not typically in gas-insulated compartments.

The output of these current sensors is connected to either protective relays or similar sensing and relaying equipment that is typically panel mounted or located behind a dead front.

**Gas-insulated Switchgear Ratings**

Switchgear assemblies are marked with the following ratings: maximum voltage, frequency, insulating level, continuous current, short-time current and momentary current. Relative power factor and momentary current are marked with the ampacity of the horizontal bus in amperes. This marking shall appear on each vertical section bearing the UL Listing Mark.

**ENCLOSURES**

The standard enclosure for the parts operating at medium voltage consists of the metal housing that contains the gas-insulating medium. The enclosures are intended for indoor applications.

An additional enclosure is investigated to determine that it is rainproof. The enclosure is marked "Rainproof," "Outdoor" or "3R." These enclosures may be either freestanding or they may consist of a number of abutting vertical sections intended for interconnection by a horizontal bus. Each section is marked with the ampacity of the horizontal bus in amperes. This marking shall appear on each vertical section bearing the UL Listing Mark.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**


**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. In an assembly of products, the Listing Mark is applied to each vertical section eligible for Listing. The Listing Mark on the overall enclosure covers only the vertical section to which it is affixed and any installed fixed circuit breakers; it does not cover other vertical sections included in the assembly, or removable circuit breakers.

The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Gas Insulated Switchgear."

---

**TEMPERATURE-INDICATING AND REGULATING EQUIPMENT (XATJ)**

**GENERAL**

This category covers electrical controls designed for heating and cooling equipment, room temperature or humidity regulation, and industrial uses. They are intended for household, commercial or industrial use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). These devices respond directly or indirectly to changes in temperature, relative humidity, or pressure to effect temperature control or equipment operation, etc. These devices may be investigated for functioning during the normal operation (regulating) of the controlled appliance or for functioning in the event of an abnormal condition (limiting) of the controlled appliance.

**Ratings**

- Temperature-indicating and regulating equipment is Listed with a maximum rating of 600 V. A control rated in amps is tested with an inductive (75-80 percent power factor) load for alternating current ratings unless a direct current (noninductive) rating is specified.
- Manual reset controls — An "M1" or "M2" marking indicates the following manual reset functions are provided:
  - M1 – Controls that automatically reset to the "closed" position after nonnormal operating conditions have been restored if the reset means is held in the "reset" position.
  - M2 – Controls that do not automatically reset to the "closed" position if the reset means is held in the "reset" position.

**Room thermostats** — Room thermostats intended for the direct control of electric space heating equipment that are to be permanently connected electrically and are provided with a marked or implied "off" position, disconnect all ungrounded poles of the supply circuit when adjusted to the "off" position.

**Equipment suitable for outdoor use** — Equipment identified with an enclosure type designation or as "Rain tight" or "Rainproof" is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

**Class 2 output circuits** — A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked with the permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

**Equipment intended for agricultural use** — A control marked to indicate use in agricultural buildings in accordance with Article 547 of the NEC has been tested in the environmental conditions of Paragraph 547.1(A) and 547.1(B) of the NEC.

**Motor operators** — The Listings of motor operators do not include valves or other connected mechanical loads.

**PRODUCT MARKINGS**

Temperature-indicating and regulating equipment is marked with the company’s name or trademark, a distinctive catalog number, and the electrical ratings. Additional markings may be required based on the individual Listing reports.

**RELATED PRODUCTS**

Safety controls for gas- and oil-fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Limit (MBPR), Controls, Primary Safety (MCCZ) or Switches (MFHX).

Controls for refrigeration and air conditioning (except remote, wall-mounted room thermostats) are covered under Controllers, Refrigeration (SDFY).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Temperature Indicating Equipment" or "Temperature Regulating Equipment" or other appropriate product name as shown in the individual Listings.

**TEMPERATURE-INDICATING AND REGULATING EQUIPMENT, ELECTRICAL (XATJ)**

**GENERAL**

This category covers electrical controls designed for heating and cooling equipment, room temperature or humidity regulation, and industrial uses. They are intended for household, commercial or industrial use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). These devices respond directly or indirectly to changes in temperature, relative humidity, or pressure to effect temperature control or equipment operation, etc. These devices may be investigated for functioning during the normal operation (regulating) of the controlled appliance or for functioning in the event of an abnormal condition (limiting) of the controlled appliance.

**Ratings**

Temperature-indicating and regulating equipment is Listed with a maximum rating of 600 V. A control rated in amps is tested with an inductive (75-80 percent power factor) load for alternating current ratings unless a direct current (noninductive) rating is specified.

**Manual reset controls** — An "M1" or "M2" marking indicates the following manual reset functions are provided:
TEMPORARY LIGHTING STRINGS (XBRT)

USE AND INSTALLATION
This category covers temporary lighting strings rated 20 A, 125 V, intended for use indoors and outdoors to provide temporary illumination in accordance with Article 527 of ANSI/NFPA 70, “National Electrical Code.”

Temporary lighting strings consist of a factory assembly of flexible cord, cable or insulated open conductors incorporating a series of Edison-base lampholders with lamp guards. The flexible cord may be terminated at one end with an attachment plug, for connection to the source of supply, and with a cord connector at the opposite end. If an attachment plug is not provided, the temporary lighting string is provided with instructions for proper connection to the source of supply.

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

M1 – Controls that automatically reset to the “closed” position after normal operating conditions have been restored, if the reset means is held in the “reset” position.

M2 – Controls that do not automatically reset to the “closed” position if the reset means is held in the “reset” position.

Room thermostats — Room thermostats intended for the direct control of electric space heating equipment that are to be permanently connected electrically and are provided with a marked or implied “off” position, disconnect all ungrounded poles of the supply circuit when adjusted to the “off” position.

Equipment suitable for outdoor use — Equipment identified with an enclosure type designation or as “Rain tight” or “Rainproof” is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Class 2 output circuits — A device that incorporates a Class 2 transformer or a Class 2 power source with provision for field wiring of the output circuit is marked to permit wiring as specified in Article 725 of the NEC for the Class 2 circuit.

Equipment intended for agricultural use — A control marked to indicate use in agricultural buildings in accordance with Article 547 of the NEC has been tested in the environmental conditions of 547.1(A) and 547.1(B) of the NEC.

Motor operators — The Listings of motor operators do not include valves or other connected mechanical loads.

PRODUCT MARKINGS
Temperature-indicating and regulating equipment is marked with the company’s name or trademark, a distinctive catalog number, and the electric ratings. Additional markings may be required based on the individual Listing reports.

RELATED PRODUCTS
Safety controls for gas- and oil-fired appliances, electric central furnaces, boilers and duct heaters are covered under Controls, Limit (MBPR), Controls, Primary Safety (MCC/2) or Switches (MBX).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products consists of the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Temporary Lighting String.”

RELOCATABLE POWER TAPS (XBYS)

USE AND INSTALLATION
This category covers relocatable power taps rated 250 V ac or less, 20 A or less. They are intended for indoor use as relocatable multiple outlet extensions of a single branch circuit to supply laboratory equipment, home workshops, home movie lighting controls, musical instrumentation, and to provide outlet receptacles for computers, audio and video equipment, and other equipment. They consist of one attachment plug and a single length of flexible cord terminated in a single enclosure in which one or more receptacles are mounted. They may, in addition, be provided with fuses or other supplementary overcurrent protection, switches, suppression components and/or indicator lights in any combination, or connections for cable, communications, telephone and/or antenna.

Relocatable power taps are intended to be directly connected to a permanently installed branch circuit receptacle. Relocatable power taps are not intended to be series connected (daisy chained) to other relocatable power taps or to extension cords.

Relocatable power taps are not intended for use at construction sites and similar locations.

Relocatable power taps have not been investigated and are not intended for use with general patient care areas or critical patient care areas of health care facilities as defined in Article 517 of ANSI/NFPA 70, “National Electrical Code” (NEC).

Component power taps may be factory installed on relocatable equipment intended for use in general patient care areas or critical patient care areas as defined in the NEC. They are intended to comply with 60601-1, “Medical Electrical Equipment, Part 1: General Requirements,” and 60601-1-1, “Safety Requirements for Medical Electrical Systems.” Refer to Medical Equipment (PIDP).

RELATED PRODUCTS
For relocatable power taps employing cord sets provided with leakage current detection and interruption, see Cord Sets with Leakage Current Detection and Interruption (ELGN). For portable ground-fault circuit interrupters, see Ground-fault Circuit Interrupters (KCS).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Relocatable Power Tap,” “Power Tap” or “Outlet Strip.”

TERMINATION BOXES (XCKT)

GENERAL
This category covers termination boxes rated 600 V or less that (1) consist of lengths of busbars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors or both, and (2) are intended to be used in accordance with ANSI/NFPA 70, “National Electric Code.”

This category also covers termination bases to be field installed in termination boxes, and termination boxes in which termination bases are to be field installed.

USE AND INSTALLATION
Termination boxes are investigated for use on the line or load side of service equipment.
Termination boxes may have knockouts or openings for the connection of cable fittings, conduit or electrical metallic tubing. They may also have openings for connection with other equipment, such as meter sockets, panelboards, switch or circuit breaker enclosures, wireways, raceways and the like.

Termination boxes are intended for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Termination boxes intended for use with field-installed wire connectors are marked stating which pressure terminal connectors, component terminal assemblies or termination bases are to be used.

Factory-installed field wiring connectors requiring the use of a special tool (such as crimp connectors) are provided with instructions concerning the proper tool to be used for termination of conductors.

Termination boxes are marked with their short circuit current ratings in RMS symmetrical amps.

Termination boxes are marked with an enclosure type as described in Electrical Equipment for Use in Ordinary Locations (AALZ).

A termination box in the form of a mounting post is intended to be mounted in concrete at grade level or below or is intended to be secured to some other mounting support. A mounting post is marked with a grade level line to which the post should be encased.

A mounting pedestal is intended to be mounted on a concrete slab. A mounting post or pedestal either has ventilation to inhibit condensation or is provided with instructions for the use of sealing facilities. Unless marked otherwise, a mounting post or pedestal is intended to be self-supporting, and is not intended to serve as the support of a mast for overhead wiring.

RELATED PRODUCTS

Equipment connected only by busbars to both input and output circuits and equipment known as “end cable tap boxes” are covered under Busways and Associated Fittings (CWFT). Equipment containing switching devices, relays or overcurrent devices is covered under the appropriate category; see Switchboards (WEIR), Industrial Control Equipment (NIMX) or Panelboards (QEUY).

Posts or pedestals intended to support and feed distribution equipment such as a power outlet, panelboard, or circuit breaker enclosure are covered under Mounting Posts and Pedestals for Distribution Equipment (PUPR).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Termination Box,” or the name of the specific type of product as shown in the individual Listings.

TRAFFIC SIGNAL CABLE CLASSIFIED IN ACCORDANCE WITH IMSA SPECIFICATIONS (XNTL)

GENERAL

This category covers cable investigated in accordance with International Municipal Signal Association Inc. specifications. The cable is intended for installation as aerial cable or in underground conduit as part of a traffic signal system. This cable employs a color-code scheme that permits a conductor with green insulation to be used for other than grounding purposes. This cable has not been investigated for flammability. This cable is not suitable for use as a substitute for cable or wiring systems covered in ANSI/NFPA 70, “National Electrical Code.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products is as illustrated below:

TRAFFIC SIGNAL CABLE CLASSIFIED BY UNDERWRITERS LABORATORIES INC.® IN ACCORDANCE WITH IMSA SPECIFICATIONS XX-X

Control No.

In addition, the Classification Mark may include the UL symbol (as illustrated in the Introduction of this Directory).

TRANSFORMERS (XNWX)

TRANSFORMERS, CLASS 2 AND CLASS 3 (XOKV)

GENERAL

This category covers transformers with secondary voltage limits of 30 V rms for Class 2 and 150 V rms for Class 3 in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC), and intended for connection to essentially sinusoidal supply sources.

These transformers are intended for use in Class 2 or Class 3 remote control and signal circuits in accordance with Article 725 of the NEC.

A Class 2 or Class 3 transformer that is inherently limited has an impedance in the transformer that limits the current output to a particular maximum value. It may or may not be provided with a thermostat or other temperature-sensitive device to limit its maximum temperature. A Class 2 or Class 3 transformer that is not inherently limited does not have an impedance to limit the maximum current output to a specified value. The maximum power is limited by an overcurrent-protective device.

A Class 2 or Class 3 transformer that includes a separate current-limited impedance, such as a resistor or positive temperature coefficient device (PTC), is covered by these requirements.

PRODUCT MARKINGS

A Class 2 or Class 3 transformer is marked “Class 2” or “Class 3,” respectively.

Class 2 transformers with open circuit secondary voltages in excess of 15 V rms or 21.2 V peak but not in excess of 30 V rms or 42.4 V peak are marked “Class 2 Not Wet, Class 3 Wet,” to indicate that wet contact is likely. Class 3 wiring methods are intended to be used, in accordance with Article 725 of the NEC.

These transformers are legibly and permanently marked with the manufacturer’s name, trade name or trademark; the date or other dating period of manufacture not exceeding three consecutive months; a distinctive catalog number or the equivalent; and the electrical rating.

The electrical rating includes:

The primary voltage

Frequency

The voltage and volt-ampere or amperes for each secondary winding

Transformers are marked to indicate which terminals or leads are for primary and which are for secondary windings. Secondary winding connections are identified one from another.

A transformer with multiple secondary windings having an output exceeding 21.2 or 42.4 V peak is marked, where readily visible after installation, with the word “WARNING,” and the following or equivalent:

“Risk of electric shock or fire. Do not interconnect secondary windings.”

A transformer is marked to indicate the proper replacement part and procedure for a required replaceable protective device.

A transformer rated less than 110 V and not intended for use on a 110-120 V circuit is marked “For use only on (intended voltage) circuits.”

Where higher temperature-rated field wiring is required, the transformer is marked “Use wire rated for at least [75 or 90].”

Transformers intended for installation with open wiring or concealed knob and tube wiring in accordance with Articles 320 and 324 of the NEC, are marked “Suitable for use in accordance with Articles 320 and 324 of the NEC.”

Transformers intended for mounting in a conduit knockout and that have no means for maintaining a bonding path between the transformer and the equipment grounding conductor when the transformer is installed in a nonmetallic box are marked “Install in Metal Box Only.”

Unless marked, the fire resistance of secondary circuit wiring provided as part of the transformer has not been investigated for compliance with Section 725.8(B) of the NEC.

RELATED PRODUCTS

Direct plug-in Class 2 transformers are covered under Direct Plug-in and Cord-connected Class 2 Power Units (EPBU).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1585, “Class 2 and Class 3 Transformers.”

UL MARK
TRANSFORMERS, DIMMERS (XOTY)

This covering dimmer type, air cooled, variable voltage autotransformers and reactors, intended for dimming portable electric lamps and electric lighting fixtures used in nonindustrial branch lighting circuits of not more than 120 v. and having overcurrent protection of not more than 20 amp. They are furnished in enclosures having means for conduit connection and may be provided with a control switch.

See Industrial Control Equipment, Miscellaneous Apparatus for listing of industrial type dimmers.

The basic standards used to investigate products in this category are UL 506, “Specialty Transformers”, and UL 508, “Electric Industrial Control Equipment.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as applicable: “Dimmer Transformer”, “Tungsten Lamp Dimmer”, “Fluorescent Lamp Dimmer”, or other appropriate product name. The word “Transformer” may be replaced by the abbreviation “XFMR”, “XFRMR” or “XFORMER.”

TRANSFORMERS, DISTRIBUTION, DRY TYPE, OVER 600 V (XPFS)

USE AND INSTALLATION

This category covers dry-type distribution transformers, including solid cast and resin encapsulated transformers rated 69 kV class or less, single- and three-phase.

Both the primary and secondary voltage ratings may be greater than 600 V. The transformers may be provided with surge arresters.

Transformers provided with forced-air (fan-cooled) ratings are provided with alarm contacts for remote indication of overtemperature. These transformers are intended for installation in accordance with the requirements of NFPA 70, “National Electrical Code” (NEC).

Transformers having exposed live parts, such as at high voltage bushings, are intended for installation in places accessible only to qualified persons, as defined in the NEC.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1562, “Transformers, Distribution, Dry-Type — Over 600 Volts.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Distribution Transformer.” The word “Transformer” may be abbreviated “XFMR,” “XFRMR” or “XFORMER.”

The “Distribution Transformer” Listing Mark covers both the transformer and the enclosure.

TRANSFORMERS, DISTRIBUTION, LIQUID-FILLED TYPE, OVER 600 V (XPLH)

USE AND INSTALLATION

This category covers liquid-filled, distribution type, pad-mounted and substation type transformers, rated 69 kV class or less, single- and three-phase.

Both the primary and secondary voltage ratings may be greater than 600 V. The transformers may be provided with surge arresters.

Transformers provided with forced-air (fan-cooled) ratings are provided with alarm contacts for remote indication of overtemperature.

The transformers are intended for installation in accordance with the requirements of NFPA 70, “National Electrical Code” (NEC).

Transformers having exposed live parts, such as at high voltage bushings, are intended for installation in places accessible only to qualified persons, as defined in the NEC.

The type of liquid used is identified on the transformer nameplate. Additional information on the fluid used is provided in Material Safety Data Sheets (MSDS Sheets) available from the transformer manufacturer.

Transformers identified “FOR USE AS LESS-FLAMMABLE LIQUID-INSULATED TRANSFORMER IN ACCORDANCE WITH SEC. 450-23 OF THE NATIONAL ELECTRICAL CODE (NEC)” are provided with a UL Classified “Less-Flammable Liquid” that has a fire point not less than 300°F. The tube transformer is also marked with the product name and flammability rating of the liquid which is provided, whether the liquid may evolve flammable gases when decomposed by an electric arc (as applicable), and are marked with all use restrictions provided for in the Classification of the liquid. See Transformer Fluids (EOUV) and Dielectric Mediums (EOUV) for additional information. Use restrictions may include information such as limits on the overcurrent protection to be used in the transformer primary.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS


UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Liquid-Filled Distribution Transformer.” The word “Transformer” may be abbreviated “XFMR,” “XFRMR” or “XFORMER.”

The “Liquid-Filled Distribution Transformer” Listing Mark covers both the transformer and the enclosure.

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated in accordance with standards or parts detailed below from standards of the National Fire Protection Association (NFPA). The combined Listing/Classification Mark consists of the Listing Mark elements detailed above and the following marking:

ALSO CLASSIFIED FOR USE AS LESS-FLAMMABLE LIQUID-INSULATED TRANSFORMER

IN ACCORDANCE WITH SEC. 450-23 OF THE NATIONAL ELECTRICAL CODE (NEC)

AND MARKED USE RESTRICTIONS ON THE TRANSFORMER

TRANSFORMERS, GAS TUBE SIGN (XPMR)

This listing covers air cooled transformers for use with display signs employing glass tubes containing inert gases as the illuminant. A weatherproof transformer is marked with the word “Weatherproof” or the designation “W.”

Open core and coil transformers are intended for use only within metal enclosures of portable, indoor signs. Transformers provided with power supply cords are not suitable for use outdoors. Other transformers if suitable for indoor use only are so marked; unmarked designs are intended for outdoor use within a sign body or equivalent enclosure.

The basic standard used to investigate products in this category is UL 506, “Specialty Transformers.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Gas-Tube-Sign Transformer.”

TRANSFORMERS, GENERAL PURPOSE (XPTQ)

The transformers covered by this listing are of the compound filled, exposed core or open core and coil construction, (industrial control type), rated 600 v or less. Step-up, step-down, insulated, and autotransformer types as well as air cooled reactors are included. Autotransformers are so marked.
Transformers of the air cooled, dry, ventilated or nonventilated types are listed under Power And General Purpose Transformers, Dry-Type (XQNX). Reactors used for dimming, and variable voltage autotransformers are listed under Industrial Control Equipment-Miscellaneous Apparatus (NFMT) or (for industrial types rated 500 kVA or less) under Miscellaneous Apparatus (NON). Transformers covered under this category have been evaluated for use on sinusoidal supply circuits only. They have not been investigated for use where a significant nonsinusoidal content is present such as that which may occur with uninterruptible power supplies, data processing equipment and solid state motor speed controllers.

The transformer rating is based on installation in a maximum 25C ambient unless otherwise marked. A transformer intended for elevated voltage use is marked to indicate that one or more windings may be operated at an elevated voltage, in either an isolated or autotransformer mode. Such marking includes the limit of the elevated voltage, the current (amp) limits, and references to where further detail may be found. Such further detail includes typical connection diagrams and methods of relating winding current to number of turns. Transformer nameplate data is the voltage of the winding in which a voltage between a winding (including its subordinate parts such as terminals) and other conductive parts of the transformer exceeds the voltage of the winding. Special Transformers are marked to specify a minimum distance to a wall. General Purpose Transformers are provided with leads, or with studs or terminal pads to which listed pressure wire connectors can be factory or field installed to accommodate field wiring. Wire binding screws or studs with cupped washers may be used for copper wire 10 AWG max. Unless the equipment is marked otherwise, termination provisions are based on the use of 60C wire for size Nos. 14-1 AWG and 75C wire for size Nos. 1/0 AWG and larger.

In cases where the nature of the construction of the transformer is such that special precautions beyond the requirements of the National Electrical Code must be observed in installations or use, suitable special instructions are marked on the transformer. The basic standard used to investigate products in this category is UL 506, "Specialty Transformers".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL name (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name. The word "Transformer" may be abbreviated "XFMR", "XFRMR", or "XFORMER".

TRANSFORMERS, IGNITION (XPPZ)

This listing covers ignition transformers designed for use on gas or oil burning equipment where the acceptability of the combination has been determined by Underwriters Laboratories Inc. The transformers are designed for connection to supply circuits operating at not over 600 V, and unless otherwise indicated in the individual listings are of the air cooled, step-up type.

Interchangeable transformers Listed as Class 6, 10, 42, or 14 have been investigated to determine that their ignition characteristics are such that they may be interchanged with other Listed transformers of like class and secondary grounding on Listed oil or gas burners employing single spark gaps without further ignition performance test.

Noninterchangeable transformers are for specific applications or include ignition characteristics which preclude their interchangeability and their application to gas or oil burning equipment shall be the subject of special study for each case. The basic standard used to investigate products in this category is UL 506. "Specialty Transformers".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Interchangeable Ignition Transformer", "Non-Interchangeable Ignition Transformer", A green background identifies the Listing Mark for interchangeable transformers; a red background identifies the Listing Mark for non-interchangeable transformers. The word "Transformer" may be abbreviated "XFMR", "XFRMR", or "XFORMER".

POWER AND GENERAL PURPOSE TRANSFORMERS, DRY TYPE (XQNX)

This category covers transformers of the air cooled dry, ventilated or nonventilated types rated 500 kVA or less, 1500 kVA or less, 3000 kVA or less, and 5000 kVA or less. Transformers covered under this category have not been investigated for use where a significant nonsinusoidal current is present. Examples of equipment which may draw nonsinusoidal currents are uninterruptible power supplies, electronic ballasts, data processing equipment and solid state motor speed controllers.

Transformers that have been evaluated for use where significant nonsinusoidal current is present are marked, "Suitable for nonsinusoidal current load with K factor not to exceed ...", where the blank is filled in with one of the standard factor ratings of 4, 9, 13, 20, 30, 40 or 50. (The K factor specified is the summation of the per unit rms current at harmonic h squared times the harmonic order squared). K factor rated transformers have not been evaluated for use with harmonic loads where the current of any single harmonic higher than the tenth is greater than 1/2 of the fundamental rms current.

The transformer ratings are based on installation in a maximum 40C ambient unless otherwise marked. Transformers used for dimming, and variable voltage autotransformers are listed under Industrial Control Equipment-Miscellaneous Apparatus, or (for nonindustrial types) under Dimmers (Transformer). Voltage regulators are listed under Power Supplies. Swimming pool transformers are listed under Swimming Pool Equipment. Ballasts for mercury lamps and for fluorescent lamps are listed under Electric Discharge Lamp Control Equipment.

Transformers with ventilating openings should be installed so that the ventilating openings are not blocked. Some transformers are marked to specify a minimum distance to a wall. The suitability of the transformer circuit grounding, grounding electrode connections, and equipment grounding connections in accordance with Article 250 of the National Electrical Code is to be determined by the local authority having jurisdiction.

In cases where the nature or construction of the transformer is such that special precautions beyond the requirements of the National Electrical Code must be observed in installations or use, suitable special instructions are marked on the transformer.

The basic standard used to investigate products in this category is UL 1561, "Dry-Type General Purpose and Power Transformers". The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Power Transformer", "Air-Cooled Power Transformer", "Dry Type General Purpose and Power Transformer", or other appropriate product name. The word "Transformer" may be abbreviated "XFMR", "XFRMR", or "XFORMER".

TRANSFORMERS, TOY (XRBV)

General

This category covers direct plug-in or cord-connected portable, step-down transformers of the single-phase-voltage type suitable for supplying current to electrically-operated toys or hobby sets.

Accessories

An accessory to a Listed toy or hobby transformer is provided with suitable markings and/or instructions detailing proper installation or assembly of the accessory with either a specific or generic Listed toy or hobby transformer specified in the markings or instructions. Such accessories serve to provide conditioning or control of the transformer output voltage, current or power.

Additional Information

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

Requirements

The basic standard used to investigate products in this category is UL 697, "Toy Transformers".

UL Mark

Look for the UL Mark on Product.
The standard surge-testing waveforms are as follows:

- **Standard 1.2/50 us - 8/20 us Combination Wave**
- **Standard 0.5 us - 100 kHz Ring Wave**

Refer to IEEE C62.41-1991 for additional details on standard wave parameters and tolerances.

**SVR** — Under the “Adjunct Classification” heading, SVR refers to the Suppressed Voltage Rating for the associated surge-testing waveform.

**Endurance** — Where the number of surges is indicated, an energized sample was subjected to the specified number of surges of the specified waveform, with a minimum of 30 seconds between surges. The suppressed voltage measured following the final surge is required not to deviate from the “as-received” value by more than 10%. Endurance testing is performed in increments of 1000 applications.

**UNEVALUATED FACTORS**

Surge arresters intended to afford protection against surge related damage to secondary distribution wiring systems and/or to equipment connected thereto and installed in accordance with Article 280 of ANSI/NFPA 70, “National Electrical Code,” are covered under Surge Arresters, Lightning Protection (OWHX).

For cord-connected transient voltage surge suppressors employing cord sets provided with leakage current detection and interruption, see Ground-fault Circuit Interrupters (KCXS).

**ADDITIONAL INFORMATION**

For electrical equipment for use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 1449, “Transient Voltage Surge Suppressors.”

The rating for this product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Toy Transformer,” “Hobby Transformer,” “Toy Transformer Accessory” or “Hobby Transformer Accessory.”

### TRANSIENT VOLTAGE SURGE SUPPRESSORS (XUHT)

#### GENERAL

This category covers transient voltage surge suppressors intended to limit the maximum amplitude of transient voltage surges on power lines to specified values. They are not intended to function as surge arresters. All transient voltage surge suppressors including those subjected to type C1, C2, and C3 surge-testing waveforms are intended to be installed on the load side of the main service disconnect, in circuits not exceeding 600 V rms.

Listed suppressors have been tested to verify that the average of the transient voltage surges is limited to the suppressed voltage rating (SVR) marked on the product when subjected to a 1.2 by 50 microsecond 6 kV surge.

Cord-connected and direct plug-in transient voltage surge suppressors are not intended for use with medical, dental, or health care facilities equipment.

Listed suppressors that are additionally marked “Certified in Accordance with IEEE C62.41-1991, Recommended Practice” have been adjacent tested to verify that transient voltage surges do not exceed suppressed voltage ratings specified by the manufacturer when subjected to the “Standard Surge-Testing Waveforms” in ANSI/IEEE C62.41-1991, “IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits”, using the test procedures specified in UL 1449 except as follows:

- a. The duty cycle portion of the testing is conducted at the full peak voltage and current values.
- b. The suppressed voltage rating (SVR) is equal to or greater than the highest suppressed voltage measured.
- c. The tests are conducted with minimum 6 in. of leads exiting from the enclosure, in accordance with the manufacturer’s instructions, for all “hard wired” permanently connected devices.
- d. The suppressed voltage rating table, as determined in the Classification Information, is marked on or provided with the product.

The following information appears on individual Listing Information Pages available from the manufacturer:

**Product Type** — Identified as follows:

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanently Connected</td>
<td>PC</td>
</tr>
<tr>
<td>Cord-Connected</td>
<td>CC</td>
</tr>
<tr>
<td>Direct Plug-In</td>
<td>DPI</td>
</tr>
</tbody>
</table>

**Voltage Rating** — Refers to the system operating power frequency voltage and number of phases.

**Mode(s)** — Refers to the pair of electrical connections where the SVR applies. The term “ALL” indicates that the SVR applies to all combinations of pairs of electrical connections.

**SVR** — Refers to the suppressed voltage rating of the device evaluated in accordance with UL 1449.

The following information appears on or is provided with products that have been additionally classified in accordance with IEEE C62.41-1991 as indicated on the individual Listing/Classification Information Pages:

**Surge Testing Waveforms** — For products which are “Certified in Accordance with IEEE C62.41-1991 Recommended Practice” the waveforms that are applied in testing, indicated in the table below, are in terms of “Location Categories” described in IEEE C62.41-1991.

The peak values of voltage and current for the standard surge-testing waveforms are as follows:

<table>
<thead>
<tr>
<th>Location Category</th>
<th>Ring Wave</th>
<th>Combination Wave</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>2 kV/0.07 kA</td>
<td>N/A</td>
</tr>
<tr>
<td>A2</td>
<td>4 kV/0.13 kA</td>
<td>N/A</td>
</tr>
<tr>
<td>A3</td>
<td>6 kV/0.20 kA</td>
<td>N/A</td>
</tr>
<tr>
<td>B1</td>
<td>2 kV/0.17 kA</td>
<td>2 kV/1 kA</td>
</tr>
<tr>
<td>B2</td>
<td>4 kV/0.33 kA</td>
<td>4 kV/2 kA</td>
</tr>
<tr>
<td>B3</td>
<td>6 kV/0.50 kA</td>
<td>6 kV/3 kA</td>
</tr>
<tr>
<td>C1</td>
<td>N/A</td>
<td>6 kV/3 kA</td>
</tr>
<tr>
<td>C2</td>
<td>N/A</td>
<td>10 kV/5 kA</td>
</tr>
</tbody>
</table>

**2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY**

**EQUIPMENT (XUPD)**

This category includes transient voltage surge suppressors contained within panelboard extension enclosures. They have been investigated and found suitable for use with specific Listed panelboards in accordance with the details described on the Transient Voltage Surge Suppressor/Panelboard Extension Modules or as provided in the publication provided therewith.

For additional information on markings, see the Guide Information for Transient Voltage Surge Suppressors (XUHT) and Panelboards (QEUY).

The standards used to investigate products in this category are UL 1449, “Standard For Transient Voltage Surge Suppressors”, and UL 67, “Standard for Panelboards”.

A Transient Voltage Surge Suppressor/Panelboard Extension Modules that is Classified is marked where visible after installation with the statement: “ALSO CLASSIFIED IN ACCORDANCE WITH IEEE C62.41-1991 RECOMMENDED PRACTICE.”
The referenced publication is a chart which tabulates the company name, catalog number, number of poles and electrical ratings of the applicable UL listed circuit breakers. In the data table, the following information appears on individual Listing/Classification Information Pages available from the manufacturer:

- **Product Type-Identified as follows:**
  - Permanently Connected
  - Cord-Connected
  - Direct Plug-In

- **Mode(s) - refers to the pair of electrical connections where the SVR applies.**
  - The term “ALL” indicates that the SVR applies to all combinations of pairs of electrical connections.
  - SVR - refers to the suppressed voltage rating of the device evaluated in accordance with UL 1449.

- **Standard Waveform Peak Values:**
  - Location Category
  - Ring Wave
  - Combination Wave
  - Standard 3.2/50 us - 8/20 us Combination Wave
  - Standard 0.5 us - 100 kHz Ring Wave

The standard surge-testing waveforms are as follows:
- **Standard 3.2/50 us - 8/20 us Combination Wave**
- **Standard 0.5 us - 100 kHz Ring Wave**

Refer to IEEE C62.41-1991 for additional details on standard wave parameters and tolerances.

SVR-Under the “Adjacent Classification” heading, SVR refers to the suppressed voltage rating for the associated surge-testing waveform.

Endurance-Where the number of surges is indicated, an energized sample was subjected to the specified number of surges of the specified waveform, with a minimum of 30 seconds between surges. The suppressed voltage measured following the final surge is required not to deviate from the “as-received” value by more than 10%. Endurance testing is performed in increments of 1000 applications. (e.g. 1000, 2000, 3000, 4000, etc.)

**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

The Classification Marking of Underwriters Laboratories Inc. as appropriate (shown below) on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Marking includes the UL symbol and the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory) on the front, visible surface of the Transient Voltage Surge Suppressor/Panelboard Extension Modules. In addition, the Classification Marking text for these products includes “Transient Voltage Surge Suppressor/Panelboard Extension Modules”, together with a control number, on the side of the Transient Voltage Surge Suppressor/Panelboard Extension Modules.

For products that are also classified in Accordance with IEEE C62.41-1991, Recommended Practices, the Marking consists of the Classification Mark described above and the following statement:

**“ALSO CLASSIFIED IN ACCORDANCE WITH IEEE C62.41-1991 RECOMMENDED PRACTICE.”**

**TRANSIT APPLICATION EQUIPMENT AND SYSTEMS (XUPY)**

This category covers switches, controllers and other equipment that is intended to be applied in transit systems.

**SWITCHES, ISOLATING (XUTE)**

This category covers single pole switches that are intended to isolate sections of track as needed for maintenance or similar functions.
- These switches may be open types or enclosed and may be either manually or motor-operated.
- Open type switches are intended for installation in electrical enclosures in accordance with product markings and any accompanying instructions. These switches are rated 6000A and 1000 VDC maximum.
- The basic standard used to evaluate switches in this category is UL-98, Enclosed and Deadfront Switches, with the requirements adjusted for ratings covered in the standard.
- The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Transit System Isolating Switch” or “Transit System Sectionalizing Switch.”

**UNDERGROUND FEEDER AND BRANCH CIRCUIT CABLE (YDUX)**

**GENERAL**

This category covers underground feeder and branch circuit cable, rated 600 V, in sizes 14 to 4/0 AWG inclusive, copper, and 12 to 4/0 AWG inclusive, aluminum or copper-clad aluminum, for single and multiple conductor cables. It is designated as Type UF cable and is intended for use in accordance with Article 340 of ANSI/NFPA 70, “National Electrical Code” (NEC).

Some multi-conductor cable is surface marked with the suffix “B” immediately following the type letters to indicate the usage of conductors employing 90°C rated insulation.

Such cable may also be installed as Nonmetallic-sheathed Cable, per Section 340.10(A) of the NEC. The ampacities of Type UF cable, with or without the suffix “B,” are those of 60°C rated conductors as specified in the latest edition of the NEC.

**Submersible Water Pump Cable** — Indicates multi-conductor cable in which 2, 3 or 4 single-conductor Type UF cables (provided in a flat or twisted assembly. The cable is Listed in sizes from 14 AWG to 4/0 AWG inclusive, copper, and from 12 AWG to 4/0 AWG inclusive, aluminum or copper-clad aluminum. The cable is tag marked “For use within the well casing for wiring deep well water pumps where the cable is not subject to repetitive handling caused by frequent servicing of the pump units.” The insulation may also be surface marked “Pump Cable.” The cable may be directly buried in the earth in conjunction with this use.

This cable may employ copper, aluminum, or copper-clad aluminum conductors. Cable with copper-clad aluminum conductors is surface printed “AL (CU-CLAD)” or “Cu-Clad AL.” Cable with aluminum conductors is surface printed “AL.”
Cable employing compact-stranded copper conductors is so identified directly following the conductor size wherever it appears (surface, tag, carton or reel) by “compact copper.” The abbreviations “CMPT” and “CU” may be used for compact and copper, respectively.

Tags, reels, cartons for products employing compact-stranded copper conductors have the marking: “Terminate with connectors identified for use with compact-stranded copper conductors.” For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

This cable may be terminated at boxes and other enclosures by using nonmetallic-sheathed cable connectors [see Nonmetallic-sheathed Cable Connectors (PJIV)].

Cable suitable for exposure to direct rays of the sun is indicated by tag marking and marking on the surface of the cable with the designation “Sunlight Resistant.”

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 493, “Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name as appropriate: Underground feeder cable that contains copper or compact stranded aluminum conductors has the product name “Underground Feeder Cable”; underground feeder cable that contains aluminum conductors has the product name “Aluminum Underground Feeder Cable.”

UNINTERRUPTIBLE POWER SUPPLY EQUIPMENT (YEDU)

USE AND INSTALLATION

This category covers indoor and outdoor use uninterruptible power supply (UPS) equipment that may be stationary or fixed. This equipment is rated 600 V or less and is intended for use in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC).

This category also covers large UPS equipment requiring field assembly of modules or subassemblies, which are appropriately marked as indicated below.

A UPS is used to provide alternating current power to a load for some period of time in the event of a utility power failure. In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of utility voltage and frequency variations.

These products include the following equipment intended for use with a UPS: (1) battery supply modules with or without batteries, (2) remote status panels, (3) bypass switches, (4) maintenance bypass switches, (5) battery circuit disconnect switches, (6) rectifier and power conversion units, and (7) power distribution panels.

The investigation of UPS equipment does not include the effects on the load that may be caused by momentary disruption of alternating current power.

A UPS identified with an enclosure type designation or as “Rain tight” or “Rainproof” is intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AALZ).

Products suitable for use in computer rooms in accordance with ANSI/NFPA 70, “National Standard for the Protection of Information Technology Equipment” (NFPA 75), include computer rooms, computer cabinets, computer enclosures, computer room enclosures, computer enclosures located in computer rooms, and UPS systems rated 600 V or less and is intended for use in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC).

This category also covers large UPS equipment requiring field assembly of modules or subassemblies, which are appropriately marked as indicated below.

REBUILT PRODUCTS

This category also covers UPS equipment that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt UPS equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt UPS equipment is subject to the same requirements as new UPS equipment.

RELATED PRODUCTS

UPS systems for use with professional medical and dental equipment are covered under Uninterruptible Power Supplies for Use in Health Care Facilities (KFGC).

Battery-powered emergency equipment for controlling lighting and/or power in accordance with Article 700 of the NEC is covered under Emergency Lighting and Power Equipment (FTER).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1778, “Uninterruptible Power Supply Equipment” (Second Edition), or UL 1778, “Uninterruptible Power Systems” (Third Edition).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Uninterruptible Power Supply,” “UPS Battery Supply,” “UPS Status Panel,” “UPS Transfer Switch,” “UPS Inverter,” “UPS Rectifier/Charger,” “UPS Equipment Enclosure,” “UPS Equipment Part,” “UPS Equipment Accessory,” “UPS Equipment Subassembly,” “UPS Equipment Component,” “UPS Power Distribution Panel,” or other appropriate product name as shown in the individual Listings.

For rebuilt products, the word “Rebuilt,” “Remanufactured” or “Reconditioned” precedes the product name.

MAINTENANCE SERVICE FOR UNINTERRUPTIBLE POWER SUPPLY SYSTEMS (YEET)

This category covers service companies Certificated as maintenance service providers for uninterruptible power supply (UPS) equipment in the field.

Service companies that are covered in the directory have demonstrated their capability for maintaining field installed UPS equipment in accordance with the requirements established by their internal maintenance documentation.

Each UPS system covered by a Certificate is required to be maintained by the service company responsible for issuing the Certificate. A UPS system is considered to be included in this program only if it is covered by a current Certificate.

The Certificate serves as evidence that the service company (1) is certified as a Maintenance Service Company for UPS Equipment; (2) is authorized to issue the Certificate for the serviced equipment as representation that the equipment is in compliance with requirements established by their internal documentation that has been reviewed by UL; and (3) is subject to UL’s periodic countercheck program whereby periodic inspections are made of representative serviced equipment in the field and at the maintenance service company to verify correctness of the certificated practices.

The maintenance service Certificate indicates identification and location (address) of the serviced equipment, and the service center from which it was issued. Each Certificate also bears a unique serial number and the period of time covered by the Certificate.

Periodic quality audits at the central maintenance service company’s location are conducted by UL to verify that the necessary documentation and records are in place for each service location. The Certificate of Underwriters Laboratories Inc. is the only method provided by UL to identify field installed equipment under its Certificated Maintenance and Follow-Up Service.

Appearance of a company’s name in the Directory does not mean that all UPS systems serviced by that company are covered under UL’s Certificated Maintenance Service.

Underwriters Laboratories Inc. makes no representations or warranties, expressed or implied, that the UPS system will prevent any loss, or that the system will in all cases provide the protection for which it is installed or intended. The Certificate only evidences that UL conducts countercheck field inspections of representative serviced equipment. UL does not assume or undertake to discharge any liability of the maintenance service company or any other party. UL is not an insurer and assumes no liability for any loss which may result from failure of the equipment, incorrect certification, non-conformance with requirements, cancellation of the Certificate, or withdrawal of the company from UL’s Directory prior to the expiration appearing on the Certificate. If servicing is found not in conformity with requirements, it shall be corrected or the Certificate is subject to cancellation.

LOOK FOR THE CERTIFICATE

UNIT SUBSTATIONS (YEFR)

GENERAL

This category covers unit substations rated 600 V or less intended to be installed in accordance with the requirements of the National Electrical Code and in accordance with the installation instructions provided on the unit substation.

A unit substation consists of a transformer in combination with primary and/or secondary overcurrent protective devices or switching devices housed in a single enclosure.
UNIT SUBSTATIONS OVER 600 V (YEFV)

USE AND INSTALLATION

This category covers three-phase articulated and integral unit substations for step-down operation. Articulated substations are rated through 10,000 kVA, at primary volatages of 601 V through 38 kV (nominal 35 kV). Integral substations are rated through 2500 kVA at primary voltages of 601 V through 38 kV.

Articulated unit substations consist of a transformer section(s) together with an input section(s), an output section(s), or both. Transition sections may also be provided. These unit substations are designed, coordinated and assembled as multiple self-enclosed pieces of equipment intended for connection in the field.

Integral unit substations consist of a transformer section(s) together with an input section(s), an output section(s), or both. Transition sections may also be provided. These unit substations are designed, coordinated and assembled as multiple self-enclosed pieces of equipment intended for connection in the field.

A unit substation marked “Type 3R” may also be marked “Rainproof.”

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Unit Substation.”

WIND TURBINE GENERATING SYSTEMS (ZGXW)

This category covers wind turbine generating systems (WTGS) that produce AC or DC electric power from a wind driven generator.

WTGS consist of one or more turbines (blades, hub, generator, drive train, support structure), control, power collection, power distribution and output sections. Transition sections may be integral parts of two adjacent sections, an integral part of one of the sections, or a separate section.

The transformer ratings determine the kVA and voltage capabilities of the overall integral unit substation. These unit substations are intended for installation in accordance with the requirements of NFPA 70, “National Electrical Code” and in accordance with the installation instructions provided on the equipment.

PRODUCT MARKINGS

A master nameplate is mounted on an external surface of the enclosure and visible after normal installation of the equipment. This master nameplate includes the following information as a minimum: manufacturer’s name and equipment identification number, kVA rating or ratings if force cooled, primary and secondary lightning impulse withstand voltage (BIL) ratings, primary and secondary continuous current ratings, transformer design impedance, and total weight. If metal-clad switchgear or metal-enclosed interrupter switchgear is connected to the transformer primary, the nameplate also includes a short-time current carrying rating and momentary current rating.

Each section of the unit substation also has its own rating based on the requirements in standards applicable for that section of the equipment. These individual section ratings are coordinated to be equal to or greater than the rating of the section.

The enclosure of the integral unit substation or the several enclosures of an articulated unit substation are marked to indicate the exposure category (A, B or C) for which it is intended. Enclosures marked “Category A” are intended to be used in areas accessible to the unsupervised general public; enclosures marked “Category B” are intended to be installed in areas accessible to authorized personnel only; and enclosures marked “Category C” are intended to be installed in areas accessible to qualified personnel only.

An enclosure which has been investigated to determine it is rainproof is marked “Rainproof,” “Outdoor” or “3R.” The enclosure may be either nonventilated or ventilated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The basic standard used to investigate articulated unit substations is ANSI/IEEE C37.121-1989, “Unit Substation – Requirements.”

The basic standard used to investigate integral unit substations is ANSI C37.120-19XX (17th draft - 7/12/79), “Proposed American National Standard for Integral Three-Phase Unit Substations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Unit Substation Section” and “_____ of _____,” where the first space is stamped with a number indicating the position (reading from left to right) that the section occupies in the series of sections constituting the unit substation, and the second space indicates the total number of sections which are provided as part of the unit substation.
SMALL WIND TURBINE GENERATING SYSTEMS (ZGYW)

INSTALLATION AND USE

This category covers small wind turbine generating systems (SWTGS) that have swept areas of less than 40 m² and generate at a voltage below 1000 V ac or 1500 V dc. The system classes are “Normal” and “Special” based on their anticipated site parameters. “Normal” class turbines have been evaluated for the following parameters:

- Extreme Wind Speed — 35 m/s (78.3 mph)
- Normal Operating Temperature — -10°C to 40°C
- Extreme Operating Temperature — -20°C to 50°C
- Maximum Relative Humidity — 95%
- Sea Level Air Density of — 1.225 kg/m³

External conditions for “Special” class turbines are defined by the manufacturer.

REQUIREMENTS

The basic standard used to investigate products in this category is IEC 61400-2, “Wind Turbine Generating Systems - Part 2: Safety of Small Wind Turbines.”

For additional information, see Wind Turbine Generating Systems (ZGXW).

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on these products is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The UL Classification Marking includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), “IN ACCORDANCE WITH IEC STANDARD 61400-2, Issued (date of publication),” a control number and the product identity: “Small Wind Turbine Generating System.”

LARGE WIND TURBINE GENERATING SYSTEMS (ZGYZ)

USE AND INSTALLATION

This category covers large wind turbine generating systems (LWTGS) that have swept areas of 40 m² or larger. The system classes, which are based on their anticipated site parameters as are as follows:

<table>
<thead>
<tr>
<th>LWTGS Class</th>
<th>Annual Average Wind Speed</th>
<th>Characteristic Turbulence Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA</td>
<td>10 m/s (22.4 mph)</td>
<td>0.18</td>
</tr>
<tr>
<td>IB</td>
<td>10 m/s (22.4 mph)</td>
<td>0.16</td>
</tr>
<tr>
<td>IIA</td>
<td>8.5 m/s (19.0 mph)</td>
<td>0.18</td>
</tr>
<tr>
<td>III</td>
<td>8.5 m/s (19.0 mph)</td>
<td>0.16</td>
</tr>
<tr>
<td>IIIA</td>
<td>7.5 m/s (16.8 mph)</td>
<td>0.18</td>
</tr>
<tr>
<td>IIIIB</td>
<td>7.5 m/s (16.8 mph)</td>
<td>0.16</td>
</tr>
<tr>
<td>IV</td>
<td>6 m/s (13.4 mph)</td>
<td>0.18</td>
</tr>
<tr>
<td>IVB</td>
<td>6 m/s (13.4 mph)</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Values as specified by the turbine manufacturer

ADDITIONAL INFORMATION

For additional information, see Wind Turbine Generating Systems (ZGXW).

UL MARK

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification and Follow-Up Service. The Classification Marking includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), “IN ACCORDANCE WITH IEC STANDARD 61400-1, Issued (date of publication),” and a control number.

WIND TURBINE GENERATING SYSTEMS SUBASSEMBLIES (ZGZJ)

USE

2005 GENERAL INFORMATION DIRECTORY

This category covers subassemblies such as blades, towers, generators, gear boxes, control panels, yaw drives, and utility grid interconnect equipment which are intended for field installation for use only with specific wind turbine generating systems.

PRODUCT MARKING

Correct combination of wind turbine generating systems and subassemblies are indicated by markings on or with the subassembly and/or the wind turbine generating system.

REQUIREMENTS

The basic standards used to evaluate wind turbine generating system subassemblies are IEC 61400-1, Wind Turbine Generating Systems - Part 1: Safety Requirements and IEC 61400-2, Wind Turbine Generating Systems - Part 2: Safety of Small Wind Turbines.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification and Follow-Up Service. The UL Classification Marking includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), “IN ACCORDANCE WITH IEC STANDARD 61400-1, Issued (date of publication),” a control number and one of the following product names: “Wind Turbine Generator,” “Wind Turbine Blade” or appropriate product name as shown in the individual Classification.

WIRE (ZGZX)

This category covers insulated wire intended for installation and use in accordance with NFPA 70, “National Electrical Code.” Construction details are contained in the individual General Information sections under the various wire categories.

FESTOON CABLE (ZIPF)

GENERAL

This category covers single- and multiple-conductor festoon cable intended for use and installation in accordance with Article 610 of ANSI/NFPA 70, “National Electrical Code.” The cable consists of one or more insulated conductors cabled together with an overall jacket. The cable is rated 60°C, 75°C, 90°C or 105°C and 600 V.

PRODUCT MARKINGS

Cable marked “Oil Resistant 60°C” is suitable for exposure to oil at 60°C. Cable marked “Oil Resistant 75°C” is suitable for exposure to oil at 75°C. Cable marked “outdoor” or “outdoor use” is suitable for installation outdoors.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Festoon Cable.”

FIXTURE WIRE (ZIPR)

GENERAL

This category covers fixture wire for use in accordance with Article 402 of ANSI/NFPA 70, “National Electrical Code.”

All conductors are copper; however, fixture wire having a temperature rating higher than 90°C may employ nickel.

Thermoplastic compounds tend to stiffen at temperatures below -10°C (14°F) and care should be taken in handling at such temperatures.

Gasoline-resistant wire has been tested at 25°C when immersed in gasoline. It is considered inherently resistant to gasoline vapors within the limits of the temperature rating of the wire type.

Gasoline-resistant TFN or TFFN — Indicates a TFN and TFFN conductor with a jacket of extruded nylon suitable for exposure to mineral oil, and to liquid gasoline and gasoline vapors at ordinary ambient temperature. It is identified by tag marking and by printing on the insulation or nylon jacket with the designation “Type TFN (TFFN) Gasoline and Oil Resistant I” if suitable for exposure to mineral oil at 60°C, “Type TFN (TFFN) Gasoline and Oil Resistant II” if suitable for exposure to mineral oil at 75°C.

Wire that complies with a special Vertical Flame Test is marked “VW-1.”
### Electrical Construction Equipment Directory

**Temperature Ratings**

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Wire Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>60°C maximum</td>
<td>Thermoplastic-insulated wire: 60 V, 18-16 AWG: Types TE, TFF</td>
</tr>
<tr>
<td>75°C maximum</td>
<td>Thermostet-insulated, heat-resistant wire: 600 V, 18-16 AWG: Types RHF-2, FHF-2</td>
</tr>
<tr>
<td>90°C maximum</td>
<td>Thermoplastic-insulated wire: 600 V, 18-16 AWG: Types RHF-2, FHF-2</td>
</tr>
<tr>
<td>100°C maximum</td>
<td>Silicone rubber-insulated wire: 300 V, 18 AWG: Type SFF</td>
</tr>
<tr>
<td>200°C maximum</td>
<td>Polytetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Type TFF</td>
</tr>
<tr>
<td>200°C maximum</td>
<td>Polyethylene terephthalate-insulated wire: 600 V, 18-14 AWG: Type ZH</td>
</tr>
<tr>
<td>250°C maximum</td>
<td>Polytetrafluoroethylene-insulated wire: 600 V, 18-14 AWG: Type ZF</td>
</tr>
</tbody>
</table>

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

### UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, reel, or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fixture Wire.”

### FLEXIBLE CORD (ZJHZ)

**GENERAL**

This category covers flexible cord constructed and Listed for use in accordance with Article 400 of ANSI/NFPA 70, “National Electrical Code” (NEC). All conductors are stranded copper.

**Voltage Ratings**

“Clock Cord” is rated 125 V.

Types C (14-10 AWG), PD (14-10 AWG), SF, SO, SOO, SOW, SOWST, ST, STO, STO, STW, STW, STOW, SE, SEE, SEO, SEE, SOW, SEOW and SEOW are rated 600 V.

Types C (18-16 AWG), PD (18-16 AWG) and all other types are rated 300 V.

**Conductor Sizes**

The conductor size ranges are as specified in the NEC with the following exceptions:

Types XTW, 20-18 AWG; CXTW, 22-18 AWG; “Clock Cord,” 20 AWG; and “Shaver Cord,” 27 and 20 AWG.

**Temperature Ratings**

Types C, PD, SP-1, SP-2, SP-3, NSP-1, NSP-2, SRD, E, EN, ETP, ETT, TP, TS, TST and “Shaver Cord” are rated 60°C.

Type SRDT is rated 60 or 90°C.

Types XTW and CXTW are rated 105°C.

Types SPE-1, SPE-2, SPE-3, SYE, SVEO, SXE, SXE, SXEO, SJ, SJEO, SJW, SJEOW, SJEOOW, SE, SOO, SEE, SEO, SOW, SEOW, SHEW, HDN, HSJ, HSJO, HSJO, HS, HS, HSO and HSO are rated 90 or 105°C. "Clock Cord” is rated 60 or 105°C. Cord having a temperature rating higher than 60°C has the rating printed on the outer surface of the cord. If the cord is rated 60°C, no temperature rating appears.

**Cord Types or Characteristics Not Covered by the NEC**

Types NISP-1, NISP-2, NISP-3, NISP-2, NISP-1 and NISP-2 are parallel constructions, similar to SPT-1, etc., except that the conductors are individually insulated, laid parallel, with a non-integral, overall jacket. Type XTW is a parallel assembly of two conductors intended for use in decorative lighting equipment.

Type CXTW is a single conductor or twisted assembly of two conductors intended for use in decorative lighting equipment.

“Clock Cord,” which has no Type designation, is similar to Type XTW except for conductor size.

**PRODUCT MARKINGS**

“Water Resistant” indicates that the cord is suitable for use in water.

“W-1” indicates that the cord complies with a Vertical Flame Test. Cord that has been evaluated for leakage currents between the circuit conductor and the grounding conductor, and between the circuit conductor and the outer surface of the jacket, may have the values so marked on the cable jacket.

### MACHINE-TOOL WIRE (ZKHZ)

**GENERAL**

This category covers machine-tool wire and cable, which is all-thermoplastic Type MTW 600 V wire and cable for use as specified in ANSI/NFPA 70, “National Electrical Code,” and NFPA 79. "Electrical Standard for Industrial Machinewr.” The finished wire or cable is flame retardant and suitable for use at 90°C (194°F) and lower temperatures in dry locations, and at 60°C (140°F) and lower temperatures where exposed to moisture, oil or coolants, that is, to cutting oils and the like.

The single-conductor constructions are:

Construction A — All PVC-insulated

Construction B — PVC-insulated with a nylon jacket

Both constructions are labeled in sizes 22 AWG to 1000 kcmil inclusive, stranded copper.
The multiple-conductor constructions consist of assemblies of these single-conductor constructions encased by a PVC jacket. Single- and multiple-conductor wire and cable employing 16-10 AWG conductors have the stranding for flexing service surface marked “flexing” or “Class K.” This marking is optional for smaller conductors intended for flexing service.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel or smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Machine Tool Wire.”

**PROCESSED WIRE (ZKLU)**

**GENERAL**

This category covers Listed wire, flexible cord and cable, and Classified wire and cable that has been subjected to processing subsequent to Labeling and identified as either processed wire or processed wire – respooled.

Processed wire, flexible cord or cable identified as “Listed Processed Wire” has been cut into certain lengths from which the insulation may be stripped from either one or both ends. The stripped ends may be sanded or tinned and may have simple terminals of the eyelet, ring, open spade or quick-connect type attached by crimping, soldering or welding.

These lengths may be packaged for further processing. Single lengths of Listed processed wire and cable may be paralleled with other insulated wire and cable and may be held together by an open binder.

Products identified as “Classified Processed Wire – Respooled” are single, continuous lengths of Classified cable cut from a long length and coiled or placed on a spool or reel. Products identified as “Classified Processed Wire” are Classified cable that has been cut into certain lengths from which the insulation may be stripped from one or both ends. These lengths may be packaged for further processing. Single lengths of Classified processed wire may be paralleled with other insulated cable and may be held together by an open binder.

Products identified as “Classified Processed Wire – Respooled” are single, continuous lengths of Classified cable cut from a long length and coiled or placed on a spool or reel. The tag markings from the wire spooler reel (e.g., voltage, temperature, insulation thickness, usage) are provided on the processed wire tag attached to the product.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**UH MARK**

The Listing or Classification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Classified Wire – Respooled.”

**THERMOSET-INSULATED WIRE (ZKST)**

**GENERAL**

This category covers thermoset-insulated wire and cable (tabulated below) which is flame retardant and rated 600 V, except for Types RHH, RHW and RHW-2 which may be rated 2000 V. The voltage rating is marked on the outer surface of the wire or cable.

**PRODUCT MARKINGS**

**RHW** — Indicates a single conductor having a thermoset insulation, with or without a nonmetallic covering, rated 75°C dry, 75°C wet.

**RHW-2** — Indicates a single conductor with the same description as Type RHW, except that it is rated 90°C dry, 90°C wet.

**RHH** — Indicates a single conductor with the same description as Type RHW, except that it is rated 90°C dry, 90°C wet.

**XHH** — Indicates a single conductor having a cross-linked synthetic polymer insulation with no overall covering provided, rated 90°C dry.

**XHHW** — Indicates a single conductor with the same description as Type XHH, except that it is rated 90°C dry, 75°C wet.

**XHHW-2** — Indicates a single conductor with the same description as Type XHH, except that it is rated 90°C dry, 90°C wet.

**SA** — Indicates a single conductor having thermosetting silicone rubber insulation and a nonmetallic covering rated 90°C dry, general use, 200°C dry, special applications.

**SIS** — Indicates a single conductor having thermosetting insulation with no overall covering provided, rated 90°C dry, for switchboard wiring only.

**D** — Used as a suffix indicating a twin wire having two insulated conductors laid parallel under an outer nonmetallic covering.

**M** — Used as a suffix indicating a cable having two or more insulated single conductors twisted together under an outer nonmetallic covering.

**W** — Indicates a single conductor having thermosetting silicone rubber insulation or a nonmetallic covering rated 90°C dry, general use, 200°C dry, special applications.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The Listings Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Machine Tool Wire.”
vided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name as appropri- ate: Thermoplastic-insulated wire that contains copper or copper-clad aluminum conductors has the product name “Insulated Wire”; thermoset-insulated wire that contains aluminum conductors has the product name “Insulated Aluminum Wire.”

**THERMOPLASTIC-INSULATED WIRE**

**USE**

This category covers thermoplastic-insulated wire for use in accordance with Article 310 of ANSI/NFPA 70, “National Electrical Code.”

**PRODUCT TYPES**

Thermoplastic-insulated wire is rated 600 V and is designated as fol- lows:

**TW** — Indicates a single conductor having flame-retardant, moisture-resistant thermoplastic insulation. The wire is rated 60°C wet or dry.

**THHN** — Indicates a single conductor having flame-retardant and heat-resistant thermoplastic insulation with a jacket of extruded nylon or equivalent material. The wire is rated 90°C dry only.

**THW** — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation. The wire is rated 75°C dry or wet.

**THWN-2** — Same as THWN except that the wire is rated 90°C wet or dry.

**THWN** — Indicates a single conductor having flame-retardant, moisture- and heat-resistant thermoplastic insulation with a jacket of extruded nylon or equivalent material. The wire is rated 75°C wet or dry, 90°C dry and 75°C wet.

**FEP** — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (fluorinated ethylene propylene) insulation.

**FEPB** — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (perfluoralkoxy) insulation. Type FEPB wire is suitable for general use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 200°C and lower temperatures for special applications.

**Z** — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (ethylene tetrafluoroethylene) insulation. Type Z wire is suitable for use at 90°C and lower temperatures in dry locations. It is also suitable for use in dry locations at 150°C and lower temperatures for special applications.

**ZW** — Indicates a single copper conductor having flame-retardant and heat-resistant thermoplastic (ethylene tetrafluoroethylene) insulation. Type ZW wire is suitable for use at 90°C and lower temperatures in dry locations at 150°C and lower temperatures for special applications.

**ZW-2** — Same as ZW except that the wire is rated 90°C wet or dry.

**TBS** — Indicates a single conductor switchboard wire having thermo- plastic insulation and a flame-retardant nonmetallic covering. Type TBS is suitable for use at 90°C and lower temperatures in dry locations.

**PRODUCT MARKINGS**

Types TW, THW, THW-2, THHN, THHW, THW-2, Z, ZW, ZW-2, FPA, PFA, and Z in sizes 4 to 1 AWG for grounding conductors only and in sizes 1/0 AWG and larger for circuit and grounding conductors that are marked “Cable Tray Use” or “CT” comply with a vertical-tray cable flame test. Wire so marked may be identified as “Sunlight Resistant” indicating compliance with an artificial weathering test.

Types THW, THW-2, THHN, THW-2, FPA, PFAH and ZW-2 in sizes that are marked “Sunlight Resistant” comply with a mechanical weathering test. Wire so marked may be identified as “Sunlight Resistant” for 60°C oil resistance, or “Oil Resistant II” for 75°C oil resistance, on the surface of the wire. An Oil Resistant marking, by itself, does not include resistance to gasoline or similar light petroleum solvents.

Wire that complies with a special vertical flame test is surface marked “SVW-1.”

Constructions in this category that comply with a flame and smoke test (as described in UL 1685, “Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables”) may have the additional marking “ST” indicating “Limited Smoke.” (Note: The suffix “-LS,” added to the Type letters, has also been used to indicate Limited Smoke. Effective November 15, 2004, only “ST1” may be used.)

In place of three of the markings described above, the following multi- national markings may be used:

**“SR”** in place of “Sunlight Resistant”

**“PR”** in place of “Oil Resistant”

**“GR”** in place of “Gasoline and Oil Resistant”

**SUBMERSIBLE PUMP CABLE** indicates a multifilament conductor cable consisting of two or three flat or two to six twisted insulated conductors with or without an overall jacket. The cable is labeled in size 14 AWG to 500 kcmil copper, and 12 AWG to 500 kcmil aluminum or copper-clad aluminum. In the case of Type THHN, THW-2, THWN, THWN-2, THW and THW-2, the wire is marked “For Wiring Only between Equipment Located at Water Well Heads and Motors of Installed Deep-Well Submersible Water Pumps.” The insulation is surface marked “Submersible Pump Cable.” The cable has not been investigated for direct burial in the earth.

Wire, in sizes mentioned below, may employ copper or aluminum, or copper-clad aluminum conductors. Wire with copper-clad aluminum conduc- tors is surface printed “AL (CU-CLAD)” or “Cu-Clad AL.” Wire with aluminum conductors is surface printed “AL.” Wire and cable employing compact-stranded copper conductors is so identified directly following the conductor size, and is marked with an appended suffix (surface, tag, carton or reel), by “compact copper.” The abbreviations “CMPCT” and “CU” may be used for compact and copper, respectively.

Tags, reels and cartons for product employing compact-stranded copper conductors have the marking “Terminate with connectors identified for use with compact-stranded copper conductors.”

**SIZE AND CONDUCTOR INFORMATION**

Types THW, THW-2 and THHN are Listed in sizes 14 AWG to 2000 kcmil copper and 12 AWG to 2000 kcmil aluminum or copper-clad aluminum.

Types THHN, THW, THWN-2 and THW-2 are Listed in sizes 14 AWG to 1000 kcmil copper and 12 AWG to 1000 kcmil aluminum or copper-clad aluminum.

Types TA, TBS, PFA, PFAH and Z are Listed in sizes 14 to 4/0 AWG copper and 12 to 4/0 AWG aluminum or copper-clad aluminum.

Types TW, ZW-2, FEP and FEPB are Listed in sizes 14 to 2 AWG copper and 12 to 2 AWG aluminum or copper-clad aluminum.

**ADDITIONAL INFORMATION**

For conductor termination information, see Electrical Equipment for Use in Ordinary Locations (AA1Z).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 83, “Thermoplastic-insulated Wires and Cables.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method pro- vided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name as appropri- ate: Thermoplastic-insulated wire that contains copper or copper-clad alu- minum conductors has the product name “Insulated Wire”; thermoplastic-insulated wire that contains aluminum conductors has the product name “Insulated Aluminum Wire.”

**WELDING CABLE (ZMAY)**

**USE**

This category covers welding cable, which is a single-conductor cable intended for use in the secondary circuit of electric welders in accordance with Article 630, Part IV of ANSI/NFPA 70, “National Electrical Code.” The conductors are flexible-stranded copper, 8 AWG through 250 kcmil, the individual strands of which are 34 through 30 AWG.

**RATINGS**

Welding cable is rated 60, 75 or 90°C and 100 or 600 V.
PRODUCT MARKINGS
The voltage and temperature ratings, if higher than 100 V and 60°C, respectively, are identified by printing on the surface of the insulation.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK
The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the attached tag, coil, reel, or smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Welding Cable.”

WIRE, SPECIAL PURPOSE (ZMHX)

GENERAL
This category covers different wire and cable products, each intended for the particular application marked on the product, tag, carton or reel.

Included in this category are:
- Aircraft Ground Support Cable
- Battery Lead Wire
- Brake Control Cable
- Burglar Alarm Cable
- Bus Drop Cable
- Cathodic Protection Cable
- DLO Cable
- Flexible Power Feed Cable
- Golf Course Sprinkler Wire
- Heat Resistant Wire
- Induction Heating Cable
- Inductive Detector Lead-in Cable
- Insulated Grounding Conductors
- Irrigation Machine Feeder Cable
- Low-ohmic Distribution Cable
- Litz Wire
- Marine Cable
- Mine Power Feeder Cable
- Mineral-insulated Metal-sheathed Control Cable
- Pendant Cable
- PVC-jacketed, Thermoplastic Polyolefin-jacketed and Thermoplastic CPE-jacketed Thermoset-insulated Wire
- Railroad Underground Power Cable
- Recreational Vehicle Cable (low voltage)
- RF Coaxial Cable
- SAE Wire Types TWP, GPT, HDT, TXL, GXL and SXL
- Satellite Antenna-Cable
- Shore Power Cable
- Slotted Coaxial Cable
- Solar Panel Wire
- Strobe Flash-head Cable
- Submersible Pump Cable (TPE or PE insulation)
- Surge Protection Cable
- Telephone Central Office Power Cable
- Telephone Drop Wire
- Tower and Case Wire
- Tracer Wire
- Track Wire
- Traction Power Cable
- Undercarpet Data Cable
- Underground Low-energy Circuit Cable
- Underground Signal Cable
- Vault Lacing Cable
- Wireless Antenna Interface Cable

PRODUCT MARKINGS
Information regarding installation, ampacity, etc., where appropriate, is included in the marking found on the tag, reel or carton.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

UL MARK

WIRE CONNECTORS (ZMKQ)

CRIMP TOOLS CLASSIFIED FOR USE WITH SPECIFIED WIRE CONNECTORS (ZMLS)

USE
This category covers crimp tools that have been investigated and found suitable for use with specified wire connector adaptors (ZDER), Quick Connect Terminals (RFW), Wire Connectors and Soldering Lugs (ZMIV) and Wire Connector Adaptors (ZMOW) in accordance with the Classification Mark and a compatibility list provided with the tool.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic requirements used to investigate products in this category are contained in Subject 1776, “Outline of Investigation for Crimp Tools for Use with Wire Connectors.”

LOOK FOR CLASSIFICATION MARK ON PRODUCT
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product identity “Crimp Tool for Use with UL Listed Grounding and Bonding Connectors, Quick Connect Terminals, Wire Connector Adaptors and/or Wire Connector Adaptors Identified in the Instructions Provided,” and a control number.

WIRE CONNECTOR ADAPTORS (ZMOW)

GENERAL
This category covers both insulated and uninsulated adapters that are intended to be installed on the end of wire prior to its connection to Listed wire connectors, or to connectors used in Listed equipment, following the instructions provided with the adapter by the manufacturer.

Adapters are for use in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC).

The marking “AL” or “AL-CU” on an adapter indicates the type of conductor(s) for which the adapter has been evaluated. These adapters have been investigated for attachment to Listed wire connectors or connectors in Listed equipment that are identified as suitable for aluminum and/or copper conductors.

Adapters are suitable for use at not greater than 75°C (167°F) amperages as specified in Table 310-16 of the NEC.

A 75 or 90°C temperature rating is marked on the adapter. The rating may be represented by a 7 or 9 associated with the marking “AL” or “AL-CU,” e.g., AL7, AL9, AL7CU, AL9CU.

For an insulated adapter this temperature rating does not exceed the temperature rating of the insulation.

Insulated adapters have insulation suitable for a voltage rating of 600 V or less as indicated by marking on or in the unit container.

Insulated adapters are marked on or in the unit container to indicate the maximum operating temperature for which the insulating cover is suitable.

Adapters to be assembled to wire using a special tool are intended to be assembled using the tool specified by the manufacturer in the instructions which are provided in the unit container in which the adapters are packaged. Such tools are identified by appropriate marking.

Adapters accommodate a single conductor of stranded wire, unless otherwise noted in the installation instructions.

REQUIREMENTS
The basic standard used to investigate products in this category is UL 486B, “Wire Connectors for Use with Aluminum Conductors.”

2005 GENERAL INFORMATION FROM ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY

PART I
WIRE CONNECTORS AND SOLDERING LUGS (ZM/VV)

USE
This category covers wire connectors for use with all alloys of copper or aluminum conductors, or both, for the purpose of providing contact between current carrying parts. Wire connectors may be uninsulated, supplied with integral insulation, or separable insulation in the form of insulating caps or covers.

Terminal connectors establish a connection between one or more conductors to a terminal plate or stud, or to any similar device by means of mechanical pressure. They are fixed in position.

Splicing wire connectors establish a connection between two or more conductors by means of mechanical pressure and are not intended to be permanently mounted. They are floating, such as a twist-on connector in an outlet box.

Insulating caps or covers are for general use when installed on specific connectors. Information covering use of the caps or cover on specific connectors appears on the unit containers in which the caps or covers are packaged.

Soldering lugs are terminal connectors designed for attachment to a conductor by means of solder (non-pressure).

Reusability — Wire connectors have not been investigated for reusability. Reusability should be determined by the installer and the Authority Having Jurisdiction (AHJ).

Use in service equipment — Where wire connectors are used as a part of service equipment, dead-front switchboards, panelboards, meter sockets, enclosed switches, circuit breakers, etc., reference should be made to the General Information for those categories concerning the use of the wire connectors.

Wire connectors suitable for use with aluminum conductors are employed in such equipment, the suitability for wiring with aluminum conductors of such equipment will be indicated by a marking on the equipment and is independent of any marking on the wire connector.

INSTALLATION

MARKINGS AND RATINGS

Wire size and wire combinations — Wire connectors are rated for 30 AWG or larger copper conductors and/or 12 AWG or larger aluminum conductors. The wire size, wire range or wire combinations are marked on the connector, or on or within the unit container. Wire connectors additionally rated for metric size conductors are marked with the metric wire sizes expressed in mm².

Multiple conductors — Connectors generally accommodate a single conductor under a clamping mechanism unless otherwise identified, such as with the connectors or their unit containers are marked “Division 2” with a strip length for the conductor before assembly to the wire connector.

Wire stranding — Unless clearly marked “Solid,” “SOL,” “Stranded” or “STR” for a given wire size, wire range or wire combination, conductors in the range 30-10 AWG are both solid and stranded, and 8 AWG and larger are for stranded wire only. Connectors additionally rated for metric conductor sizes are marked with the letter “r” for rigid solid and rigid stranded conductors, or the letter “i” for flexible conductors.

Stranded conductor Class — Connectors rated for use with stranded conductors are for the following strand configurations:

- **Aluminum — Class B concentric, compressed, and unidirectional lay compact**
- **Copper — Class B concentric, Class B compressed, Class C concentric**

Wire connectors additionally rated for use with compact copper conductors are additionally marked “For compact-stranded copper conductors” or equivalent on the connector, or on or within the unit container.

Wire connectors additionally rated for use with other Class conductors, such as Class M, are marked with the additional class designation and number of strands.

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Wire Connector Adaptor.”

Strip length — Some connectors or their unit containers are marked with a strip length for the conductor before assembly to the wire connector.

Conductor material — Wire connectors or the unit containers are marked with the type of conductor material(s) as follows:

<table>
<thead>
<tr>
<th>Marking (for equivalent)</th>
<th>For Use With</th>
</tr>
</thead>
<tbody>
<tr>
<td>“CU”</td>
<td>Copper wire only</td>
</tr>
<tr>
<td>“AL”</td>
<td>Aluminum wire only</td>
</tr>
<tr>
<td>“AL-CU” or “CU-AL”</td>
<td>Copper to copper, aluminum to aluminum, and copper to aluminum but not intermixed or in direct physical contact</td>
</tr>
</tbody>
</table>

“AL-CU” (intermixed – dry locations)

Except as otherwise noted on or in the shipping carton, copper and aluminum conductors are not intended to be used in direct physical contact in the same connector. A wire connector for securing an aluminum wire in combination with a copper conductor, where physical contact occurs between the wires of different metals, is limited to dry locations only and is marked “AL-CU (intermixed – dry locations).”

Amperage level rating:

A. Equipment use — Equipment wiring requirements may restrict the size, amperage and temperature ratings of connected conductors. Equipment requirements may limit 90°C or higher rated connectors to 60 or 75°C ampacity in accordance with Electrical Equipment for Use in Ordinary Locations (AALZ).

B. General use — Connectors rated 75°C are intended for use at amperages not greater than those for 75°C rated connectors, and connectors rated 90°C are for use at amperages not greater than those for 90°C rated connectors. Connectors may be marked with “90°C” or “90°C” to represent these levels. Alternatively, these rating levels may be represented by a 7 or 9 associated with the marking “CU,” “AL,” or “AL-CU,” e.g., “AL9,” “AL9CU,” “AL7CU,” “CU9.” Connectors not marked with an ampacity number 7 or 9 have an assumed level per the following table. Use of higher temperature-rated conductors is not prohibited, provided the ampacity levels continue to be based on the 75 or 90°C ratings.

Connectors are rated and marked as follows:

<table>
<thead>
<tr>
<th>Type of Connector</th>
<th>Rated For</th>
<th>Wire Range</th>
<th>Temp Marking</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal (CU body)</td>
<td>CU only</td>
<td>All</td>
<td>Not marked</td>
<td>90</td>
</tr>
<tr>
<td>Terminal (AL body)</td>
<td>AL only</td>
<td>All</td>
<td>75 or 90</td>
<td>As marked</td>
</tr>
<tr>
<td>Terminal (AL-CU)</td>
<td>AL-CU</td>
<td>All</td>
<td>75 or 90</td>
<td>As marked</td>
</tr>
<tr>
<td>Splicing wire (CU body)</td>
<td>CU only</td>
<td>30-6</td>
<td>Not marked</td>
<td>90</td>
</tr>
<tr>
<td>Splicing wire (AL body)</td>
<td>AL only</td>
<td>30-6</td>
<td>Not marked</td>
<td>90</td>
</tr>
<tr>
<td>Splicing wire (AL-CU)</td>
<td>AL-CU</td>
<td>30-6</td>
<td>Not marked</td>
<td>90</td>
</tr>
<tr>
<td>Splicing wire (AL-CU)</td>
<td>4 and larger</td>
<td>Not marked</td>
<td>75 or 90</td>
<td>As marked</td>
</tr>
<tr>
<td>Splicing wire (AL-CU)</td>
<td>AL-CU</td>
<td>4 and larger</td>
<td>Not marked</td>
<td>As marked</td>
</tr>
</tbody>
</table>

Terminal connectors rated for 6 AWG or smaller conductors may have the markings on the connectors, the unit container, or on an information sheet packed in the unit container.

Insulation temperature rating (maximum operating temperature) — Insulated connectors, insulating caps and insulating covers have an insulation temperature rating marked on the device or the unit container. Insulated connectors, insulating caps and insulating covers that have an insulation temperature greater than the connector ampacity level rating are marked “Temperature Rating of Insulating Material ___°C.”

Voltage rating — Uninsulated wire connectors are rated for general use in circuits up through 2000 V. Uninsulated wire connectors may be used in circuits over 2000 V up through 35,000 V where the effects of corona have been investigated in the end-use application. Uninsulated wire connectors are not marked with a voltage rating.

Insulated wire connectors, insulating caps and insulating covers have voltage ratings for which they have been found acceptable. The voltage rating is marked on the device or the unit container and may be stated as “300 volts maximum,” “600 volts maximum,” or “600 volts maximum,” “1000 volts maximum, in signs or luminaires,” or equivalent wording.

Flammability rating — Insulated connectors and insulating caps and covers may be additionally marked with a flammability rating of V-2 or V-1 or M-2 or better.

Assigned torque rating — A connector or its unit container may be marked with an assigned torque value for which the connector was investigated.

INSTALLATION INSTRUCTIONS
Use of specific tools — A specific tool and die used to assemble a wire connector to a conductor is identified on the connector, or on or within the unit container of the connector. The identification consists of a catalog or...
WIRE CONNECTORS, INSULATED FOR USE WITH UNDERGROUND CONDUCTORS (ZMWQ)

USE

This category covers insulated pressure wire connector systems intended for direct burial, below grade use, or similar damp or wet locations. These requirements cover a complete system or insulating caps, covers, resins, tubing and tapes that are part of the system for use with specific wire connectors. Pressure wire connectors may or may not be provided with the system.

CONDUCTOR TYPES

Insulated wire connector systems are intended for use with Type USE, RHW, or XHHW, No. 30 AWG through 2000 MCM copper or aluminum conductors with currents not exceeding the ampacity of insulated conductors rated either 75°C or 90°C and intended for use at 600 V or less.

Insulated wire connector systems may also be intended for use with conductors of single or multiple conductor underground feeder service (Type UF), golf course sprinkler cable, underground low energy cable, irrigation cable, or other cable with insulation acceptable for direct burial, below grade use, or wet locations.

PRODUCT MARKINGS

An insulating system or parts of a system not provided in the same unit container with a pressure wire connector are marked with (1) the manufacturer’s name and (2) the catalog number or equivalent description of the connector intended to be used. Alternatively, the information may be marked on the unit container or on an information sheet provided in each unit container.

An insulating system not intended for direct burial is marked “Not for Direct Burial Use” or the equivalent.

An insulating system may additionally be marked “Raintight,” “Water-tight,” or “Submersible,” as applicable.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category are ANSI/UL 486A-486B, “Wire Connectors,” and ANSI/UL 486C, “Splicing Wire Connectors.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Wire Connector system for use with underground conductors.”

WIRE CONNECTORS AND SOLDERING LUGS CLASSIFIED IN ACCORDANCE WITH IEC PUBLICATIONS (ZKND)

This category covers products that have been investigated in accordance with IEC 60998-1 and IEC 60998-2-4, “Connecting Devices For Low Voltage Circuits Household and Similar Purposes, Particular Requirements for Twist-On Connecting Devices.” These products may also be evaluated for and provided with the Listing Mark for Wire Connectors and Soldering Lugs (ZMVW). For additional information see Wire Connector and Soldering Lugs (ZMVW) in the Electrical Construction Equipment Directory.

LOOK FOR THE UL MARK ON PRODUCT

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Wire Connector system for use with underground conductors.”

POSITIONING DEVICES (ZODZ)

GENERAL

This category covers cable ties, cable tie mounts, and similar types of related hardware for field installation in accordance with NPPA 70, “National Electrical Code.” The investigation of these products includes consideration of the rated mechanical strength, maximum operating temperature, smoke and heat generation, corrosion resistance and weatherability characteristics as appropriate for the product.

MARKINGS

The product or the smallest unit package in which the product is shipped is marked with the product’s maximum load and thermal ratings along with the company name and catalog designation.

For those products which have been investigated to determine their suitability for use in air handling areas are marked either “Suitable for use in air handling spaces in accordance with Sec 300.22(C) and (D) of the National Electrical Code” or “Suitable for use in air handling spaces in accordance with Sec 300.22(B), (C) and (D) of the National Electrical Code,” as appropriate.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1565, “Positioning Devices.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit package in which the product is shipped with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Positioning Device” or other appropriate product name as shown in the individual Listings.
WIRE-PULLING COMPOUNDS (ZOKZ)

USE
This category covers wire-pulling compounds intended for use as lubricants in installing electrical conductors in raceways. These compounds have been investigated to determine their compatibility with conductor insulation and coverings.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Wire Pulling Compound.”

WIREWAYS, AUXILIARY GUTTERS AND ASSOCIATED FITTINGS (ZOYX)

USE AND INSTALLATION
This category covers metallic and nonmetallic wireways, auxiliary gutters, and associated fittings for installation in accordance with Articles 366, 376, 378 and 645 of ANSI/NFPA 70, “National Electrical Code” (NEC).

Metallic wireways installed in accordance with the product markings and manufacturer’s instructions are suitable for use as equipment grounding conductors, and are Listed for grounding.

PRODUCT MARKINGS
Products investigated to determine that they are rain tight are marked “Raintight.”
Nonmetallic products investigated to determine their suitability for exposure to sunlight are marked “Sunlight Resistant.”
Nonmetallic products investigated to determine their suitability for use in an air-handling space in a location subject to Article 645 of the NEC are so rated.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate metallic products in this category is ANSI/UL 870, “Wireways, Auxiliary Gutters and Associated Fittings.”
The basic standards used to investigate nonmetallic products in this category are ANSI/UL 870 and ANSI/UL 5A, “Nonmetallic Surface Raceways and Fittings.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Wireway or Auxiliary Gutter,” “Wireway,” “Auxiliary Gutter,” “Wireway or Auxiliary Gutter Fittings,” “Wireway Fittings” or “Auxiliary Gutter Fittings.”
Electrical equipment for use in and relating to Class I, II and III, Division 1 and 2 hazardous locations has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of ANSI/NFPA 70, “National Electrical Code” (NEC), or United States Coast Guard (USCG) Electrical Engineering Regulations, Subchapter J (Title 46 CFR Parts 110 to 113 inclusive). Those products investigated for conformity to the installation and use provisions of the United States Coast Guard Regulations are identified in the general Guide Information for each product category or the individual Listings for the product. Attention is called to the limitations of the Listings and Classifications specified in the general Guide Information for each product category, such as current, voltage, horsepower limits, markings, special descriptions and installation provisions.

Unless equipment is identified in 1) the product category title as relating to hazardous (classified) locations or 2) the individual Listing as apparatus for use in unclassified (ordinary) locations, all product categories contain electrical equipment for use in Class I, II and III hazardous locations.

**Hazardous Locations — General Information**

Hazardous locations, as defined in the NEC, are locations where fire or explosion hazards may exist due to the presence of flammable gases, vapors, or flammable liquids (Class I), combustible dusts (Class II), or ignitable fibers or flyings (Class III).

There are two independent classification systems. One system, found in Article 500 of the NEC, divides all hazardous locations into Classes, Divisions and Groups. Division 1 is a location where a flammable or combustible atmosphere is present under normal operating conditions. Division 2 is a location where a combustible atmosphere is present only under abnormal conditions.

The other classification system, found in Article 505 of the NEC, divides only Class I hazardous locations into Zones and Gas Groups. Zone 0 is a location where an explosive or flammable atmosphere is present continuously or for long period of time. Zone 1 is a location where the explosive or flammable atmosphere is likely to occur during normal operation. Zone 2 is a location where the explosive or flammable atmosphere is not likely to occur in normal operation and, if it occurs, will exist for only a short time.

Protection against explosion in hazardous locations requires that all equipment that could be exposed to the flammable or combustible atmospheres be of a type suitable for installation in such locations. The Classes and Groups for which equipment has been Listed or Classified are shown in the individual Listings and Classifications under the respective categories and are marked on the equipment itself. In addition, intrinsically safe circuit wiring terminals and intrinsically safe equipment is marked “Intrinsically Safe.”

**Suitability of Listed or Classified Equipment**

Equipment intended for use in a hazardous location Class and Group and marked “Division 1” or “Div. 1” or without any Division indication is suitable for use in both Division 1 and 2 locations as defined in the NEC, and in unclassified locations. Equipment marked “Division 2” or “Div. 2” is suitable only for Division 2 and ordinary locations. In addition, the NEC permits equipment Listed for Class I, Division 1 to be used in a Class I, Zone 1 or 2 location of the same gas group and with a suitable temperature class. Equipment Listed for Class I, Division 2 is permitted to be used in a Class I, Zone 2 location of the same gas group and with a suitable temperature class. Zone equipment is only permitted in Division classified areas if it is properly marked. Equipment marked for use in or relating to Class I, Zone 0 area is also suitable for use in or relating to Zones 1 and 2 areas of the same gas group and with suitable temperature class. Equipment marked for use in or relating to Class I, Zone 1 areas is also suitable for use in or relating to Class I, Zone 2 areas of the same gas group with suitable temperature class. Equipment marked for use in or relating to Class I, Zone 2 areas is suitable only for use in or relating to those areas classified as Class I, Zone 2, and in unclassified locations.

**Environmental Considerations**

Unless the equipment is marked otherwise, it is to be used indoors where severe corrosive conditions are not likely to be present. Equipment investigated for severe environmental conditions will be marked with an enclosure type designation or other designation indicating the suitability of the equipment in different environments. See Enclosure Considerations for All Equipment below for more information.

**Ambient Temperatures**

Unless the equipment is marked otherwise, it has been investigated only for use under normal atmospheric conditions in an ambient temperature within the range of -25°C (-13°F) to +40°C (+104°F). Use of equipment under conditions of higher than normal atmospheric pressure or oxygen partial pressure, use in artificial atmospheres, and use under conditions of excessively high ambient temperatures can increase the likelihood of ignition of flammable atmospheres. In addition, low ambient temperatures may increase explosion pressures developed within explosion-proof equipment.
Overload Protection

Equipment should be installed in circuits with overload and short-circuit protection for established ratings. The ampere or wattage marking on power consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Enclosure Modification and Maintenance

The integrity of an enclosure for explosion-proof or dust-ignition-proof equipment must be maintained. Making holes (other than conduit openings specified in the instructions) or alterations in the enclosure during installation may compromise the ability of the enclosure to contain the explosion or to exclude dust. Holding bolts and threaded parts must be screwed tight. The continued acceptability of the equipment will depend upon proper maintenance.

Gas, Vapor and Dust Groups

The following paragraphs group flammable and explosive mixtures of specific gases, vapors and dusts in accordance with the NEC classifications noted in Article 500. For a complete list of group classifications for Class I and II materials where used within Divisions 1 or 2, see ANSI/NFPA 497, “Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas,” and ANSI/NFPA 499, “Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.”

Class I Equipment

Equipment for use in Class I hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. For purposes of area classification for Divisions 1 and 2, such mixtures have been grouped on the basis of their characteristics, as follows:

Class I, Group A — Atmospheres containing acetylene.

Class I, Group B — Atmospheres containing acrolein, butadiene, ethylene oxide, propylene oxide, hydrogen, or fuel and combustible process gases containing more than 30% hydrogen by volume.

Class I, Group C — Atmospheres containing ethyl ether, ethylene, or gases or vapors of equivalent hazard.

Class I, Group D — Atmospheres containing acetone, ammonia, benzene, butane, cyclopropane, ethanol, gasoline, hexane, methane, methanol, naphtha, propane, or gases or vapors of equivalent hazard.

Class I, Zone 0, 1, 2 Gas Groups

For purposes of area classifications for Zones, such mixtures have been grouped on the basis of their characteristics, as follows:

Class I, Group IIA — Atmospheres containing acetone, ammonia, benzene, butane, ethanol, gasoline, hexane, methane, methanol, naphtha, propane, or gases or vapors of equivalent hazard.

Class I, Group IIB — Atmospheres containing ethyl ether, ethylene, or gases or vapors of equivalent hazard.

Class I, Group IIC — Atmospheres containing hydrogen, acetylene, ethyl nitrate, or gases or vapors of equivalent hazard.

The following table compares Class I, Division 1 and 2 Gas Groups with Class I, Zone 0, 1, and 2 Gas Groups. The gases shown are representative of others in the Group.

<table>
<thead>
<tr>
<th>Division 1 &amp; 2</th>
<th>Zone 0, 1 &amp; 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (acetylene)</td>
<td>IIC (acetylene and hydrogen)</td>
</tr>
<tr>
<td>B (hydrogen)</td>
<td>IIC (acetylene and nitrogen)</td>
</tr>
<tr>
<td>C (ethylene)</td>
<td>IIB (ethylene)</td>
</tr>
<tr>
<td>D (propane)</td>
<td>IIA (propane)</td>
</tr>
</tbody>
</table>

Class I Temperature Considerations

The marked temperature class (T-code) of the equipment is based on either the maximum external temperature or internal temperature of the equipment, depending on the protection method used.

For Class I, Division 1 and Zone 1 equipment, in general, the operating temperature is the maximum temperature of external surfaces of the equipment. For Class I, Division 2 and Zone 0 or 2 equipment, in general, the operating temperature is the maximum temperature of all parts of the equipment, including internal parts, that may be exposed to the flammable material.

Equipment is required to be marked with the operating temperature or temperature class (T-code) if the maximum operating temperature is more than 100°C (212°F).

This temperature marking shall not exceed the ignition temperature of the specific gas or vapor to be encountered.

Class I Equipment in Class II Locations
Equipment Listed or Classified for use in Class I locations is not necessarily acceptable for Class II locations as it may not be dusttight or operate at a safe temperature when blanketed with dust.

**Class II Equipment**

Dust-ignition-proof equipment for use in Class II hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of combustible dusts in air. For purposes of area classification, the NEC groups combustible dust-air mixtures as follows:

**Class II, Group E** — Atmospheres containing combustible metal dusts, including aluminum, magnesium, and their commercial alloys, or other combustible dusts whose particle size, abrasiveness, and conductivity present an equivalent hazard.

**Class II, Group F** — Atmospheres containing carbon black, charcoal, coal or coke dusts which have more than 8% total volatile material (carbon black per ASTM D1620, charcoal, coal and coke dusts per ASTM D271), or atmospheres containing these dusts sensitized by other materials so that they present an explosion hazard.

**Class II, Group G** — Atmospheres containing combustible dusts not included in Group E or F, including flour, grain, wood, plastic and chemicals.

**Class II Equipment in Class III Locations**

Equipment Listed or Classified for Class II, Group G hazardous locations is also suitable for use in Class III locations, except for 1) those products marked for Division 2 only, and 2) fan-cooled type motors where there is a very large amount of lint or combustible flyings which are likely to choke or clog the air passages of the motor.

**Class III Equipment**

Equipment for use in Class III hazardous (classified) locations, as defined in the NEC, is tested with respect to acceptability of operation in the presence of easily ignitable fibers or flyings. These fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

**Intrinsically Safe Circuits and Apparatus, and Associated Apparatus**

Intrinsically safe circuits and apparatus may be investigated for any or all of the Classes and Groups as defined in the NEC. In an intrinsically safe circuit, the energy level available in the hazardous location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. To maintain the low energy levels, it is necessary that the intrinsically safe and associated apparatus be installed and interconnected in accordance with Article 504 of the NEC and the instructions provided with the equipment.

Associated apparatus is apparatus in which the circuits are not necessarily intrinsically safe, but which affect the energy in the intrinsically safe circuits and which are relied upon to maintain intrinsic safety. Associated apparatus is not intended for use in hazardous locations unless use in hazardous locations is specifically indicated.

When interconnecting associated apparatus with equipment for use in the hazardous location, special attention should be paid to installation instructions, control drawings, or product markings which may limit the types of connections that are acceptable.

**Equipment Relating to Hazardous Locations**

Equipment relating to hazardous locations includes 1) devices, products, and materials for use in locations where it is necessary for safety to avoid the accumulation of static electricity on personnel or equipment, 2) anesthesia equipment, 3) devices not intended for operation in hazardous locations, but which are designed to indicate certain potentially dangerous conditions with respect to such locations, 4) electrical equipment not intended for installation in hazardous locations except for provision of certain intrinsically safe (low energy) circuit extensions as indicated in the Listings and Classifications, and 5) paint spray booths.

**Enclosure Considerations for All Equipment**

Section 110.11 of the NEC directs that equipment shall not be used in damp or wet locations; locations where exposed to gases, fumes, vapors, liquids or other agents having a deteriorating effect on the equipment; or locations where exposed to excessive temperatures unless the equipment is identified for use in such environments. Section 300.6 of the NEC provides guidance regarding protection against corrosion. To assist inspection authorities, electrical equipment Listed or Classified for use in and relating to hazardous locations may be investigated for use in certain operating environments and marked with an enclosure type number or numbers. The following table summarizes the intended uses of the various enclosure types:

<table>
<thead>
<tr>
<th>Enclosure Type Number</th>
<th>Provides a Degree of Protection Against the Following Environmental Conditions*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indoor use, limited amounts of falling water</td>
</tr>
<tr>
<td>3R</td>
<td>Outdoor use, undamaged by the formation of ice on the enclosure**</td>
</tr>
<tr>
<td>3S</td>
<td>Same as 3R plus windblown dust, external mechanisms remain operable while ice laden</td>
</tr>
<tr>
<td>4</td>
<td>Outdoor use, splashing water, windblown dust, hose-directed water, undamaged by the formation of ice on the enclosure**</td>
</tr>
<tr>
<td>4X</td>
<td>Same as 4 plus resists corrosion</td>
</tr>
</tbody>
</table>

*Table continues...
Enclosure Type Number | Provides a Degree of Protection Against the Following Environmental Conditions*
---|---
5 | Indoor use to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids
6 | Same as 3R plus entry of water during temporary submersion at a limited depth
6P | Same as 3R plus entry of water during prolonged submersion at a limited depth
7 | Indoor use in locations classified as Class I, Division 1, Groups A, B, C, or D — air-break equipment
8 | Indoor use in locations classified as Class I, Division 1, Groups A, B, C, or D — oil immersed equipment
9 | Indoor use in locations classified as Class II, Division 1, Groups E, F, or G — air-break equipment
12, 12K | Indoor use, dust, dripping noncorrosive liquids
13 | Indoor use, dust, spraying water, oil and noncorrosive coolants

*All types of enclosures provide a degree of protection against ordinary corrosion and against accidental contact with the enclosed equipment when doors or covers are closed and in place. All types of enclosures provide protection against a limited amount of falling dirt.

**All outdoor type enclosures provide a degree of protection against rain, snow and sleet. Outdoor enclosures are also suitable for use indoors if they meet the environmental conditions present.

The marking of enclosure type numbers 7, 8 and 9 is optional as the marking of Class and Group is required. The marking of Division 1 is optional for equipment suitable for Divisions 1 and 2.

In some cases, individual appliances and equipment may be marked “Raintight” or “Rainproof” indicating that they have been subjected to a test designed to simulate exposure to beating rain. For equipment designated as “Raintight” such exposure will not result in entrance of water. For equipment designated as “Rainproof” such exposure will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure.

Additionally or alternatively, IEC 60529, “Classification of Degrees of Protection Provided by Enclosures,” provides a system for specifying the enclosures of electrical equipment on the basis of the degree of protection provided by the enclosure (or IP rating) as follows:

<table>
<thead>
<tr>
<th>First Characteristics Numeral</th>
<th>Protection Against Ingress of Solid Foreign Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP0X</td>
<td>Not investigated</td>
</tr>
<tr>
<td>IP1X</td>
<td>50 mm diameter or larger</td>
</tr>
<tr>
<td>IP2X</td>
<td>12.5 mm diameter or larger</td>
</tr>
<tr>
<td>IP3X</td>
<td>2.5 mm diameter or larger</td>
</tr>
<tr>
<td>IP4X</td>
<td>1.0 mm diameter or larger</td>
</tr>
<tr>
<td>IP5X</td>
<td>Dust protected</td>
</tr>
<tr>
<td>IP6X</td>
<td>Dusttight</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Characteristics Numeral</th>
<th>Protection Against Ingress of Water with Harmful Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPX0</td>
<td>Not investigated</td>
</tr>
<tr>
<td>IPX1</td>
<td>Vertically dripping</td>
</tr>
<tr>
<td>IPX2</td>
<td>Dripping (15 degree tilted)</td>
</tr>
<tr>
<td>IPX3</td>
<td>Spraying</td>
</tr>
<tr>
<td>IPX4</td>
<td>Splashing</td>
</tr>
<tr>
<td>IPX5</td>
<td>Jetting</td>
</tr>
<tr>
<td>IPX6</td>
<td>Powerful jetting</td>
</tr>
<tr>
<td>IPX7</td>
<td>Temporary immersion</td>
</tr>
<tr>
<td>IPX8</td>
<td>Continuous immersion</td>
</tr>
</tbody>
</table>

Fittings at Supply Entries

Consideration should be given to the Type or IP rating of fittings used at supply entries. When the manufacturer supplies a fitting with the enclosure, enclosures are to be connected to the wiring system using the fitting provided. If no fitting is provided by the manufacturer, the fitting employed must meet or exceed the Type or IP rating of the enclosure, so that the assembly maintains its protection against contaminants.

Wiring Considerations for All Equipment

Appliances and Utilization Equipment Terminations — Except as noted in the general Guide Information for some product categories, most terminals, unless marked otherwise, are for use only with copper wire. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits as specified in Table 310.16 of the NEC. If the termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) should
be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

**Distribution and Control Equipment Terminations** — Most terminals are suitable for use only with copper wire. Where aluminum or copper-clad aluminum wire can or shall be used (some crimp terminals may be Listed only for aluminum wire), there is marking to indicate this. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted in the following paragraphs or in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C ampacities for wire sizes 14-1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger, as specified in Table 310.16 of the NEC.

Some distribution and control equipment is marked to indicate the required temperature rating of each field-installed conductor. If the equipment, normally intended for connection by wire sizes within the range 14-1 AWG, is marked “75°C” or “60/75°C,” it is intended that 75°C insulated wire may be used at full 75°C ampacity. Where the connection is made to a circuit breaker or switch within the equipment, such a circuit breaker or switch must also be marked for the temperature rating of the conductor.

A 75°C conductor temperature marking on a circuit breaker or switch normally intended for wire sizes 14-1 AWG does not in itself indicate that 75°C insulated wire can be used unless 1) the circuit breaker or switch is used by itself, such as in a separate enclosure, or 2) the equipment in which the circuit breaker or switch is installed is also so marked.

A 75 or 90°C temperature marking on a terminal (e.g., AL7, CU7AL, AL7CU or AL9, CU9AL, AL9CU) does not in itself indicate that 75 or 90°C insulated wire can be used unless the equipment in which the terminals are installed is marked for 75 or 90°C.

Higher temperature rated conductors than specified may be used if the size is based on the above statements.

**Copper-clad Aluminum Conductors** — Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

**Copper Pigtail Leads** — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

**Wiring Devices** — Supply terminals of 15 A and 20 A switches and receptacles not marked “CO/ALR” are for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked “AL/CU” are for use with copper conductors only. Terminals of switches rated 30 A and above marked “AL/CU” are for use with aluminum, copper, and copper-clad aluminum conductors.

**Wire Connectors** — Combinations of dissimilar conductors in terminals or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing. See also the information under Wiring Connectors and Soldering Lugs (ZMVV).

**Terminals** — Product terminals, including wire connectors and terminal screws, are acceptable for connection of only one conductor, unless there is marking or a wiring diagram indicating the number of conductors which may be connected.

**Tightening Torque** — Some equipment may be marked to show a tightening torque for wire connectors intended for use with field wiring.

**Supply Cords** — When flexible supply cords or cord sets are replaced on utilization equipment, the replacement should be of the same type, AWG size, voltage rating and temperature rating as originally used.

**Seals in Conduit and Cable Systems** — Equipment with a factory-installed conduit seal is marked “Leads factory sealed” or equivalent wording. The absence of this marking indicates that the need for a field-installed seal in accordance with Section 501.5 of the NEC should be determined.

---

**REQUIREMENTS**

The standards used to investigate these products address the risk of explosion associated with installation in a classified area, as well as the risk of fire and electric shock associated with any electrical equipment. Unless indicated otherwise in the Guide Information for the product category, the basic hazardous locations standards used to investigate these products with respect to risk of explosion are referenced below for the protection methods shown.

<table>
<thead>
<tr>
<th>Protection Method</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosion-proof and dust-ignition-proof</td>
<td>ANSI/UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations”</td>
</tr>
</tbody>
</table>
INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL’s safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been investigated in accordance with the applicable requirements of UL, the United States Coast Guard (USCG), the American Boat and Yacht Council, Inc. (ABYC), and the National Fire Protection Association (NFPA). For additional information, see the general Guide Information for the specific product category. Equipment bearing UL’s Marine Mark is suitable for use only with stranded copper wire.

ACCESS CONTROL SYSTEM UNITS FOR USE IN HAZARDOUS LOCATIONS (AATF)

USE AND INSTALLATION

This category covers units for access control systems, providing a means of regulating or controlling entry into an area, or access to or the use of a device by electrical, electronic and/or mechanical means.

Intrinsically safe systems covered under this category have been investigated on the basis that all equipment connected to the system is Listed as part of the system unless otherwise indicated and is used as intended.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

The basic nonhazardous (ordinary) locations standard used to investigate products in this category is UL 294, “Access Control System Units.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names, as appropriate: “Access Control System Unit for Hazardous Locations,” “Access Control System (Associated Apparatus),” “Access Control System Unit (Associated Apparatus)” or other appropriate product name as shown in the individual Listings.

AIR CONDITIONING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (AHSY)

AIR CONDITIONERS FOR USE IN HAZARDOUS LOCATIONS (AIDR)

Products covered in this section include central cooling air conditioners and room air conditioners.

Room Air Conditioners for Use in Hazardous Locations (AINU)

USE AND INSTALLATION

This category covers room air conditioners for use in hazardous locations. They are encased assemblies designed as a unit and intended as the prime source of refrigeration and dehumidification, basically intended to serve a single room, zone or space. They are intended for installation in windows or through walls. These units employ alternating current, hermetic refrigerant motor compressors with factory charged refrigeration systems and include a means for circulating air. The effect of in-wall units on the fire resistance rating of the wall has not been investigated.

Permanently connected units are to be connected only to a branch circuit protected by overcurrent devices which do not exceed the value marked on the data plate or attached wiring diagram. The marked branch circuit overcurrent device protection is the maximum for which the unit has been investigated and found acceptable. If time delay fuses are required for starting, the unit is marked to this effect.

Cord-connected units which require a time delay fuse or circuit breaker to permit motor restarting are marked to this effect.

Some room air conditioners may be designed for installation with the indoor side being located in a room purged and pressurized in accordance with NFPA 496, “Standard for Purged and Pressurized Enclosures for Electrical Equipment,” to become an unclassified (ordinary) location, and the outdoor side in a Division 2 hazardous (classified) location. Marking on the product and in the installation instructions identify units intended for this use.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).
AIR FILTERING APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (AISX)

This listing covers portable or stationary, air filtering appliances intended for window, floor table and similar mounting. The appliances consist primarily of air circulating fans and mechanical filters. The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the work “LISTED,” a control number, and the product name “Air Filtering Appliance for Use in Hazardous Locations,” or other appropriate product name.

AIR SAMPLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (ALOA)

This category covers air sampling pumps, sample draw pumps and similar equipment.

RELATED PRODUCTS

Equipment that has been investigated for use only in the classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Air Sampling Equipment for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

ALARM SYSTEM UNITS FOR USE IN HAZARDOUS LOCATIONS (ALSY)

This category includes various electronic devices which may be used to form a complete protective system.

Electronic units include those which utilize rays (photo-electric), electromagnetic waves, ultrasonic radiation or other electronic principles to signal intrusion or movement within mercantile premises or approaches to safes, stockrooms, etc.

The electronic units listed herein have been examined for fire and electrical shock, for reliability of operation and for use in hazardous locations. The effect of radiation on radio communication or radio navigation has not been investigated. The Federal Communications Commission should be consulted for regulations governing the use and operation of radiation devices.

The basic standards used to investigate products in this category are UL 639, “Intrusion Detection Units,” UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Intrusion Detection Unit.”

LUBRICANT DISPENSING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (BAYZ)

This category includes equipment for dispensing lubricants such as lubricating oils and greases.

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate:“Lubricant Dispenser for Hazardous Locations,” “Lubricant Dispensing Equipment for Hazardous Locations,” or “Lubricant Dispensing Equipment for Use in Hazardous Locations.”
CABLE SEALING FITTINGS FOR USE IN HAZARDOUS LOCATIONS (CYMX)

This category covers combination termination and sealing fittings for threaded connection of cables to equipment in Class I, Division 1 and Division 2, and/or Class II, Division 1 and 2 hazardous locations, as indicated in the individual Listings. They are for use only with sealing compounds as specified by the manufacturer in instructions furnished with the fitting.

These devices are intended for use in sealing the conductors and outer jackets of Listed cables of the type indicated in the individual Listings. No splices or terminations are to be made in the fitting. Restrictions on position and/or location of the sealing fitting are indicated in the manufacturer’s instructions.

The basic standard used to investigate products in this category is UL 2225, Standard for “Metal-Clad Cables and Cable-Sealing Fittings For Use in Hazardous (Classified) Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Electric Brake For Hazardous Locations.”

CENTRIFUGES FOR USE IN HAZARDOUS LOCATIONS (DAZV)

GENERAL

This category covers centrifuges designed for use in hazardous (classified) locations. They have been investigated with respect to risk of explosion, fire, electric shock, and injury to persons.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II, and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations,” and UL 674, “Electric Motors and Generators for Use in Hazardous (Classified) Locations.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Centrifuge for Use in Hazardous Locations.”

CIRCUIT BREAKERS FOR USE IN HAZARDOUS LOCATIONS (DKAR)

This listing covers circuit breakers which, unless otherwise noted, are of the manually operable, air break type, providing automatic overcurrent protection.

BRAKES, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (BHIX)

The brakes covered by this category are intended primarily for holding purposes, but may be used for stopping light inertia loads.

This category includes two types of electric brakes. One type is intended to be attached directly to a Listed motor at the factory of the motor manufacturer in accordance with instructions provided by the brake manufacturer. The other type is provided with a mounting bracket and is coupled to the motor.

The Listing Mark on a brake applies to the brake only, not to driving equipment such as a motor.

Electric Brakes for Class I, Division 1, Division 2, and/or Class II, Division 1 and 2 Locations.

The basic standard used to investigate Division 1 products in this category is UL 674, “Standard for Electric Motors and Generators for Use in Hazardous (Classified) Locations.”

Electric Brakes for Class I, Division 2, and Class II, Division 2 Locations.

For Class I, Division 2 locations, the enclosure may be of the open or totally-enclosed type. The Group designation is marked unless the brake is acceptable for Groups A, B, C and D. The brake is also marked with the operating temperature code designating the maximum internal or external surface temperature determined at rated full-load torque marked on the brake, if the brake temperature is greater than 100 degree C. If the enclosure incorporates one or more arcing or sparking parts, the part is housed in a Class I, Division 1 enclosure or the part is within a hermetically-sealed enclosure, constructed with current-interrupting contacts immersed in oil, located in a nonincendive circuit or located in a purged and pressurized enclosure. If the brake is provided with an internal space heater, the space heater is intended to be wired in the control circuit such that the space heater is energized when the motor to which the brake is coupled is deenergized, and vice-versa.

For Class II, Division 2 Locations, the enclosure is of the totally enclosed type. The brake is marked with the operating temperature or operating temperature code designating the maximum full load external temperature determined at rated full-load torque (as marked on the brake), when operating in free air (not dust blanketed), if the external temperature is greater than 100 degrees C.

The basic Standards used to investigate brakes for Division 2 locations in this category are UL Subject 1836, Outline of Investigation For Electric Motors and Generators For Use in Class I, Division 2, and Class II, Division 2 Hazardous (Classified) Locations, and UL 1604, “Electrical Equipment For Use in Class I and II, Division 2, and Class III Hazardous Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Electric Brake For Hazardous Locations.”

CAMERA EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (CYPH)

This category includes camera equipment such as cameras and pan and tilt drives.

The basic standards used to investigate products in this category are UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations,” and UL 580, “Industrial Control Equipment.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), together with the word “LISTED,” a control number and the following product name: “Camera for Use in Hazardous Locations”, “Pan and Tilt Drive for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listing.

CASTERS, RUBBER, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (CZXZ)

These products are electrically conductive rubber casters which have metal shafts and forks, and are provided with conductive rubber composition wheels or with metal wheels having conductive rubber tires. The casters are intended for use on portable equipment in hospital operating rooms.

Tests indicate that static electrical charges are discharged through these casters when in contact with ground or suitable electrically conductive floor, and that the electrical resistance conforms to the requirements of the Standard of The National Fire Protection Association for Health Care Facilities, NFPA 99.

Oil is injurious to rubber compounds and impairs the electrically conductive properties of these casters. The use of floor oils and oily sweeping compounds should therefore be avoided. Insulating floor waxes should not be used.

Conductive floors are required for the proper dissipation of static electrical charges by these casters. Please refer to listings of Electrically Conductive Floorings.

The basic standard used to investigate products in this category is UL 1067, “Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electrically Conductive Rubber Caster Relating to Hazardous Locations.”
Circuit breakers and circuit breaker enclosures as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such markings shall be independent of any marking on terminal conductors and shall be on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of Type R, or other 60 C wire, in circuits rated 100 amp or less, and the use of Type RH, or other 75 C wire, for higher amp rated circuits.

A suitable marking is required in a circuit breaker enclosure, whether or not terminals are mounted therein, if it is intended that the breaker to be mounted therein is to be used with aluminum wire.

**BRANCH CIRCUIT AND SERVICE FOR USE IN HAZARDOUS LOCATIONS (DKNZ)**

This category covers thermostatically responsive circuit breakers designed to carry rated current at ambient temperatures of 40°C or less and marked “40C.”

Circuit breaker enclosures are for use only with Listed mechanisms specified in the enclosure marking.

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 877, “Circuit Breakers and Circuit Breaker Enclosures for Use in Hazardous (Classified) Locations.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Circuit Breaker for Hazardous Locations” or “Circuit Breaker Enclosure for Hazardous Locations.”

**CLEANING MACHINES FOR USE IN HAZARDOUS LOCATIONS (DMRR)**

This category includes portable vacuum cleaners provided with special suction attachments intended to facilitate cleaning operations, such as crevice tools, brushes, and so forth. These attachments are covered in the listings.

Some vacuum cleaners are designed specifically to pick up water in connection with floor scrubbing operations; such cleaners are so indicated in the individual listings.

Connections to supply lines require the use of receptacles with plugs, or receptacles with plugs interlocked with snap switches or their equivalent. Listed for the specified hazardous locations. The flexible cord connected to the units should be frequently inspected and replaced when necessary.

Terminal connections should be properly made and maintained.

**COMBUSTION DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (DUFK)**

These devices are electrically operated combustion detectors intended to be used on gas or oil-burning equipment. The basic standards used to investigate products in this category are UL 1604, “Electrical Equipment for Use in Class I and Class II, Division 2 and Class III Hazardous (Classified) Locations” and UL 1203, “Explosion-proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations” as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Combustion Detection Equipment for Use in Hazardous Locations,” or other appropriate product name as shown in the individual listing.

**CONDUCTIVITY TESTING EQUIPMENT RELATING TO HAZARDOUS LOCATIONS (DVRX)**

**GENERAL**

This category covers equipment intended for use in unclassified (ordinary) locations to measure the electrical resistance (conductivity) of floors, equipment and personnel before use in hazardous locations where reduction of electrostatic hazards is advisable. The measurements are made immediately before entry of the personnel or use of the floors and equipment in the hazardous locations.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Conductivity Testing Equipment Relating to Hazardous Locations.”

**CONDUIT FITTINGS FOR USE IN HAZARDOUS LOCATIONS (EBNV)**

**GENERAL**

This category covers the following types of fittings:

- Conduit fittings for draining or venting are for mounting in existing conduit openings on outlet boxes and electrical equipment. Fittings for draining or venting which do not mount in existing conduit openings, such as those with threads smaller than 1/2 in. trade size, are covered under UL’s Component Recognition Program. Only drain fittings with shut-off valves should be installed in oil immersion devices and only where there is close supervision so that the fittings will not be left open to permit loss of oil.

- Conduit fittings for sealing are for use with sealing compounds specified by the manufacturer in instructions furnished with the fitting. These devices are intended for use in sealing conductors in conduit lines. No splices of conductors should be made in the fittings. Instructions with the fitting indicate any restriction on position or location of the sealing fittings. The maximum number and size of conductors that may be installed within the sealing fittings are stated in the manufacturer’s installation instructions provided with each fitting.

- Conduit unions are for use in threaded rigid conduit wire raceways. 90-degree box connector type conduit unions are for use at threaded openings of devices in accordance with requirements of NFPA 70, “National Electrical Code” (NEC).

Universal type box connector conduit unions are for use at threaded openings of devices in accordance with requirements of the NEC and may be assembled at angle greater than 90 degrees.

- Flexible connection fittings are substantial fittings having insulated inner and flexible metal outer wall encased in metal braid. They are intended for use where it is necessary to employ flexible connections in threaded rigid conduit systems. Information on the minimum inside radius of bend for which these fittings have been investigated is provided with the fitting.

- Prospective users should first ascertain from Authorities Having Jurisdiction under what conditions these flexible connection fittings will be accepted. The use of flexible fittings should be avoided whenever possible. They should be used only when conditions are such that threaded rigid conduit cannot be used.

Conduit elbows and short radius capped elbows are intended for use where it is desirable to have a 90 degree bend and where wires may be guided when being pulled through the conduit line.

- Cord connectors are intended for use in making connections between threaded rigid metal conduit systems or hazardous location devices and existing service type or flexible cord, having a grounding conductor, for portable equipment.

- Fittings which are rain tight or concrete tight are so marked, and this information is provided with the fitting.

- Cast-aluminum alloy conduit fittings covered under this category are not considered acceptable for installation in concrete or cinder fill, unless protected with asphalt base paint or the equivalent.

**RELATED PRODUCTS**

See Outlet Boxes for Use in Hazardous Locations (QBCR). For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).
CORROSION MEASURING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (ELHS)

This category covers corrosion measuring equipment, including control units, indicators, sensors, probes and auxiliary devices used as part of corrosion measuring systems.

Certain products in this category are associated apparatus and are intended for installation in unclassified (ordinary) locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous location.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II, III, Division 1 and 2 Hazardous Locations (AAIZ). The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations," UL 913, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations" and UL 1684, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations," as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Conduit Fitting for Hazardous Locations" or other appropriate product name as shown in the individual Listings.

DATA PROCESSING EQUIPMENT, ELECTRONIC FOR USE IN HAZARDOUS LOCATIONS (ENWS)

This category covers individual units and systems primarily electronic in function and design, which are intended to accumulate, process, or store data and which are intended for use in or have circuits or system units intended for use in areas classified as hazardous locations.

Many of these units and systems require special installation such as separate transformer and branch circuit breaker, power supplies, special grounding methods, high frequency motor generator equipment, etc. Such features are covered in the manufacturer’s installation instructions.

Intrinsically safe equipment is so marked on the product. To maintain the intrinsically safe features of battery operated appliances, only batteries of the type and size indicated on the product should be used.

The basic standards used to investigate products in this category are UL 508, "Industrial Control Equipment - LISTED," a control number, and the product name "Corrosion Measuring Equipment for Use in Hazardous Locations" or "Corrosion Measuring Equipment (Associated Apparatus)" or other appropriate product name as shown in the individual Listings.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Data Processing Equipment for Use in Hazardous Locations," "Electronic Data Processing Equipment for Use in Hazardous Locations," "E.D.P. Equipment for Use in Hazardous Locations," "Data Processing Equipment with Circuits for Use in Hazardous Locations," "Electronic Data Processing Equipment with Circuits for Use in Hazardous Locations," "Electronic Data Processing Equipment for Use in Hazardous Locations," "E.D.P. Equipment with Circuits for Use in Hazardous Locations," "Data Processing Equipment (Associated Apparatus)," "Electronic Data Processing Equipment (Associated Apparatus)," "E.D.P. Equipment (Associated Apparatus)," or the name of the specific type of product as shown in the individual Listing.

DISTRIBUTED GENERATION POWER SYSTEMS EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FCHJ)

PHOTOVOLTAIC MODULES AND PANELS FOR USE IN HAZARDOUS LOCATIONS (FCJU)

USE AND INSTALLATION

This category covers flat-plate photovoltaic modules and panels intended for mounting on buildings or on ground-supported frames. Roof-mounted modules or panels are evaluated for one of three mounting methods: (1) integral to the roof of a building, (2) directly on a building’s roof, or (3) on a rack with a space above the roof surface. When mounted integral to a building’s roof the module serves as the waterproof membrane. Direct-mounted panels are placed upon the building’s waterproof membrane (shingles or tiles). Rack-mounted styles are spaced away from the building’s roof member. Rack-mounted styles may also be installed separate from buildings.

Installation of modules or on integral to a building’s roof system may adversely affect the roof covering materials’ resistance to external fire exposure if the module has a lesser or no fire resistance rating. Roof covering materials will not be adversely affected when the modules have an equal or greater fire resistance rating than the roof covering material.

Photovoltaic modules and panels are intended to be connected to electrical loads, controllers, or to static inverters that convert the dc power the modules or panels generate to other types of power compatible with the intended loads. In addition to their voltage, current and power ratings, modules and panels are marked to indicate terminal polarity, maximum series overcurrent device rating, and minimum acceptable diode bypassing (if needed). Installation of the modules and panels, including connection between the modules and the panels and the load, static inverters or controller is intended to be in accordance with the provisions of ANSI/NFPA 70, "National Electrical Code," Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes including the class of roof covering.

When applicable, modules or panels are identified as Class A, B or C to denote their Classification for resistance to external fire exposure. Modules or panels that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." For significance of external fire exposure classes, see UL’s Roofing Materials and Systems Directory.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II, III, Division 1 and 2 Hazardous Locations (AAIZ). The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 1703, "Flat-Plate Photovoltaic Modules and Panels." The basic hazardous (classified) locations standard used to investigate products in this category is UL 1649, "Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations." 

ADJUNCT SERVICES

Underwriters Laboratories Inc. (UL) provides a service for the Classification of photovoltaic (PV) modules.

REQUIREMENTS

Underwriters Laboratories Inc. (UL) provides a service for the Classification of photovoltaic (PV) modules.

For additional information, see Equipment for Use in and Relating to Class I, II, III, Division 1 and 2 Hazardous Locations (AAIZ).
DOOR OPERATORS FOR USE IN HAZARDOUS LOCATIONS (FCQU)

This category covers door operators for fire doors intended for installation in accordance with the recommendations contained in the National Fire Protection Association Standard for Fire Doors and Windows, NFPA 80.

They are intended for use with swinging, sliding or rolling fire doors, as indicated in the individual listings, and are designed to hold doors in the open position under normal usage and release the doors under fire conditions. They are intended to be used with a suitable door closer and automatic operating devices or systems.

Automatic operating devices or systems consist of Releasing Devices of Heat Detectors For Releasing Device Service, as listed in the Hazardous Location Equipment Directory. For information on door closers, see Fire Door Accessory (GTBT) in the Fire Resistance Directory, Volume 3.

It will be necessary for prospective users of these holders to first ascertain from the Authorities Having Jurisdiction that the door, door holders, door closer and automatic operating device or other combination of system units are acceptable for any given location.

REQUIREMENTS

The basic standards used to investigate products in this category are UL 228, “Door Closers, Holders, and Integral Smoke Detectors” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 1 and 2, Class III, Division 1 and 2”.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Door Operator for Use in Hazardous Locations.”

DOOR HOLDERS FOR USE IN HAZARDOUS LOCATIONS (FGD)

This category covers door holders for fire doors intended for installation in accordance with the recommendations contained in NFPA 80, “Standard for Fire Doors and Windows.”

They are intended for use with swinging, sliding or rolling fire doors, as indicated in the individual listings, and are designed to hold doors in the open position under normal usage and release the doors under fire conditions. They are intended to be used with a suitable door closer and automatic operating devices or systems.

The basic standards used to investigate products in this category are UL 325, “Door, Drapery, Gate, Louver, and Window Operators and Systems”; UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations”; UL 1604, “Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 2, Class III, Division 1 and 2”; UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations”, as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Door Holder for Use in Hazardous Locations.”

DRILLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FDK)

This category includes drilling equipment consisting of instruments, sensors and transducers intended to measure and monitor drilling variables and to control the drilling process. Investigations of these products included an evaluation for potential conformity to the installation and use provisions of the National Electrical Code (NEC) or United States Coast Guard Electrical Regulations, Subchapter J (Title 46 CFR Parts 110 to 113 inclusive).

Intrinsically safe drilling equipment and interconnect equipment shall be installed in accordance with the instructions provided. For additional information, see Equipment for Hazardous Locations, Guide A119.

The basic standards used to investigate products in this category are UL 1092, “Process Control Equipment”; UL 913, “Intrinsically Safe Apparatus and Associated Apparatus” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations”; and UL 1604, “Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 1, Class III, Division 1, and 2”, as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product names as appropriate: “Drilling Instrumentation for Hazardous Locations”, “Drilling Instrumentation (Associated Apparatus)” or other appropriate product name as shown in the individual listings.

MARINE SHIPBOARD CABLE SEALING FITTINGS FOR USE IN HAZARDOUS LOCATIONS (FDL)

This category covers combination termination and sealing fittings for threaded connection of marine shipboard cable to equipment in hazardous locations. They are for use only with sealing compound as specified by the manufacturer in instructions furnished with the fittings. No splices of conductors are to be made in the fitting. Restrictions on application, position, and/or location of the sealing fitting are indicated in the manufacturer’s instructions.

These fittings are intended for use on mobile offshore oil rigs and drilling platforms. Investigations of these fittings included an evaluation for conformity to the installation and use provisions of Sub-part 111.60 of the United States Coast Guard Electrical Regulations, Subchapter J (Title 46 CFR Parts 110 to 113 inclusive) as applied by the authority having jurisdiction.

The basic standard used to investigate products in this category is UL 2225, “Metal-Clad Cables and Cable Sealing Fittings For Use in Hazardous (Classified) Locations”.

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Marine Shipboard Cable Sealing Fitting For Use In Hazardous Locations.”

ELECTRIC DISCHARGE LAMP CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FEG)

This category covers alternating current ballasts for high intensity discharge lamps. The power factor indicated can be considered as the approximate power factor under normal operating conditions.
ELEVATOR APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (FRZV)

Devices listed under this category include Hoist way Door Interlocks, Hoistway-Door Combination Mechanical Locks and Electric Contacts, and Hoistway-Door or Car door or Gate Electric Contacts, and Miscellaneous Elevator Appliances, including Hoist way Limit Switches.

ELEVATOR DOOR LOCKING DEVICES AND CONTACTS FOR USE IN HAZARDOUS LOCATIONS (FSNT)

The devices listed under this category are designed for installation and operation in accordance with the requirements of the Safety Code for Elevators, and Escalators, ANSI/ASME A17.1.

Elevator hoist way door interlocks are intended to prevent the operation of the driving machine by the normal operating device unless the hoist way door is locked in the closed position, and to prevent the opening of the hoist way door from the landing side unless the car is within the landing zone and is either stopped or being stopped.

For interlocks that do not require the use of a retiring cam, see Listing Mark A.

For interlocks that require the use of a retiring cam, see Listing Mark B. Retiring cams are not covered by these listings, and their acceptability must be determined at the point of installation by the authority having jurisdiction.

Elevator hoist way door combination mechanical locks and electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the hoist way door is in the closed position, and to lock the hoist way door in the closed position and prevent it from being opened from the landing side unless the car is within the landing zone. See Listing Mark C.

Elevator hoist way door, car door or gate electric contacts are intended to prevent operation of the driving machine by the normal operating device unless the door or gate is in the closed position. See Listing Mark D.

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

The devices covered by these listings are investigated for misalignment conditions when properly installed as recommended by the manufacturer.

The acceptability is to be determined at the point of installation by the authority having jurisdiction.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: (A) “Elevator Interlock For Hazardous Locations”, (B) “Elevator Interlock For Hazardous Locations - Retiring Cam Required”, (C) “Elevator Combination Mechanical Lock and Electric Contact For Hazardous Locations”, (D) “Elevator Electric Contact For Hazardous Locations”.

EMERGENCY LIGHTING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FTEV)

USE

This category covers automatic transfer switches designed for control of emergency lighting and power systems in hazardous locations certified by Articles 500 – 503 and 700 of NFPA 70, “National Electrical Code.” The lighting circuit ratings do not exceed 250 V for tungsten lamps. The investigation of automatic transfer switches includes the determination of their suitability for transferring the load from a normal supply circuit to an immediately available emergency supply circuit.

This category also covers unit equipment, but not separate lamp heads or lighting fixtures.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

The basic standards used to investigate products in this category are UL 924, “Emergency Lighting and Power Equipment” and UL 844, “Electric Lighting Fixtures for Use in Hazardous (Classified) Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Emergency Lighting Equipment for Use in Hazardous Locations.”

EMERGENCY LIGHTING EQUIPMENT FITTINGS FOR USE IN HAZARDOUS LOCATIONS (FTGT)

Subassemblies of emergency lighting equipment fittings intended for final assembly into a unit in the field in accordance with the manufacturer’s installation instructions are included under this category.

Information restricting the use of these fittings is marked on the fitting or provided with the fitting.

The basic standard used to investigate products in this category is UL 844, “Electric Lighting Fixtures for Use in Hazardous (Classified) Locations” and Articles 500-503 and 700 of the National Electrical Code.

The lighting circuit ratings do not exceed 250 volts for tungsten lamps. The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Emergency Lighting Equipment, Fittings, for use in Hazardous Locations”, or other appropriate product name as shown in the individual Listing.

ENCLOSURES FOR METERING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (FTRQ)

These enclosures are intended to house low temperature metering equipment with no normally arcing or sparking parts in the hazardous location classes and groups indicated on the product, and defined in the National Electrical Code.

The basic standard used to investigate products in this category is UL 886, “Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations”.

LOOK FOR THE UL MARK ON PRODUCT
ENCLOSURES FOR USE IN HAZARDOUS LOCATIONS (FTRV)

GENERAL

This category covers enclosures for use in one or more of the following hazardous locations, as indicated on the individual product, in accordance with NFPA 70, "National Electrical Code": Class I, Groups A, B, C and D; Class II, Groups E, F and G; and Class III, Groups F and G, Division 2 hazardous locations. Classification and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in this Directory) and the product name “Enclosure for Metering Equipment For Use In Hazardous Locations”.

RELATED PRODUCTS

Certain enclosures classified under this category have also been investigated for use aboard marine vessels in accordance with the Electrical Engineering Regulations of the United States Coast Guard, Subchapter J, CG-259 (46 CFR Parts 110-113). Such enclosures are identified by a Marine Listing Mark. Enclosures marked “For Use On Vessels Over 65 Feet” have not been subjected to shock and vibration tests. Enclosures that have been subjected to shock and vibration tests are not marked with a vessel length limitation and may be used on any size vessel.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

Electrical products manufactured under its Classification and Follow-Up Service. The Listing Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory) and the following additional information:

ENCLOSURE FOR USE IN HAZARDOUS LOCATIONS AS TO EXPLOSION AND FIRE HAZARD ONLY

(Control No.).

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory) and the following additional information:

ENCLOSURE FOR USE IN HAZARDOUS LOCATIONS

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

SELF-LUMINOUS EXIT SIGNS AND MARKERS FOR USE IN HAZARDOUS LOCATIONS (FWBH)

This category covers exit signs and markers that are continuously illuminated internally by self-contained energy sources and operate independent of external power supplies. They are intended for installation in accordance with ANSI/NFPA 101, “Life Safety Code”, and other codes governing the marking of the means of egress. Signs and markers that operate using a radioactive source comply with the requirements of the United States Nuclear Regulatory Commission for Generally Licensed Devices.

Exit signs that do not comply with the visibility requirements from 100 ft are marked with a maximum viewing distance of 50 or 75 ft, and are intended only for installation in corridors or rooms where the distance to the exit sign cannot exceed the marked maximum distance.

LOOK FOR THE UL MARK ON PRODUCT
FANS, PORTABLE ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (GQJA)

This category covers portable electric fans for use in Groups C and/or D under Class I hazardous locations as indicated in the respective Listings. Motors are sealed from terminal compartments which have provision for connection of three-conductor, flexible, extra-hard-usage cord having a grounding conductor. Connections to supply lines require the use of receptacles with plugs or receptacles with plugs interlocked with snap switches, or their equivalent. Terminal connections should be properly made and maintained. Authorities having jurisdiction should be consulted with regard to conditions under which this portable equipment will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The basic standard used to investigate products in this category is UL 674, “Electric Motors and Generators for Use In Hazardous Locations”. The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product name: “Portable Electric Fan For Hazardous Locations”.

FANS, PORTABLE PNEUMATIC FOR USE IN HAZARDOUS LOCATIONS (GQJX)

This category covers portable pneumatic fans for use in Class I, Groups A, B, C, and D; Class II, Groups E, F, and G; and Class III hazardous locations as indicated in the respective Listings. The basic standard used to investigate products in this category is UL 674, “Electric Motors and Generators for Use in Hazardous Locations”. Airsupply lines shall be made of electrically conductive material in accordance with the Recommended Practice on Static Electricity, NFPA 77, and/or any other applicable code. Ground terminal connections need to be properly made and maintained. Authorities having jurisdiction should be consulted with regard to conditions under which this portable equipment will be permitted for use. Portable equipment should be used only where necessary.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product name: “Portable Pneumatic Fan For Hazardous Locations” or other appropriate product name as shown in the individual Listings.

LUMINAIRES AND FITTINGS FOR USE IN HAZARDOUS LOCATIONS (IFGZ)

LUMINAIRES FOR USE IN HAZARDOUS LOCATIONS (IFUX)

USE AND INSTALLATION

This category covers incandescent lamp, fluorescent lamp, high intensity discharge lamp, or surgical type luminaires for use in hospital operating rooms, and luminaires for use with germicidal lamps. Seals are provided in the luminaires for Class I, Division 1 hazardous locations between lamp chambers and wiring chambers for supply line connections. The luminaires have been tested with respect to safe maximum external temperatures. Luminaires Listed for use in any of the groups under Class II, Division 1 and 2 hazardous locations have been tested for dusttightness and safe operation in the presence of the specific combustible dusts. The equipment should be kept clean and should be carefully maintained so as not to allow combustible dust to accumulate on equipment or in buildings. The operating temperature of any parts which may be in contact with the combustible dust is marked on the luminaire if this temperature exceeds 100°C.

Luminaires for Class I, Division 2 only, of no specific hazardous location groups or one or more of the hazardous location groups are included below. Such Listings are under hazardous location group headings with the suffix “Division 2 only” or under the heading “Class I, Division 2 only.” Luminaires without guards should be used only where not subject to breakage.

Luminaires intended for use with germicidal lamps are marked with a caution notice regarding their installation so that users will not be subjected to injurious radiations. Luminaires suitable for locations having deposits of readily combustible paint residue are so marked.

Luminaires requiring supply wiring with certain temperature ratings are so marked.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Related to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 844, “Electric Lighting Fixtures for Use in Hazardous (Classified) Locations.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as appropriate: “Electric Lighting Fixture for Hazardous Locations,” “Electric Fixture for Hazardous Locations,” “Electric Luminaire for Hazardous Locations” or “Luminaire for Hazardous Locations.”

LUMINAIRES, PAINT SPRAY BOOTH FOR USE IN HAZARDOUS LOCATIONS (IFYJ)

USE AND INSTALLATION

This category covers incandescent lamp and electric discharge lamp type luminaires intended for flush-mounted installation in the ceiling or wall of a down draft paint spray booth using liquid coating systems as defined in NFPA 33, “Standard for Spray Application Using Flammable or Combustible Materials.” When the luminaire is limited to a specific mounting location, the luminaire is marked with the intended mounting location, such as “For Wall Mounting Only” or “For Ceiling Mounting Only.” When the luminaire is intended for wall and ceiling mounting, the luminaire is not marked with its intended mounting location. These luminaires have been evaluated for deposits of readily combustible paint residues only on the side of the luminaire that forms the interior ceiling or wall surface of the spray booth.

These luminaires have been evaluated for Class I, Division 2 areas since they may be located within 3 ft of an opening in the paint spray booth and are so marked.

These luminaires are intended to be installed in uninsulated or insulated single or double skin sheet metal ceilings or walls with all insulation kept...
a minimum distance of 3 in. from the sides of the luminaire and not placed over the luminaire such that it would entrap the heat produced by the luminaire.

The minimum spacings between adjacent luminaires, to wall, to ceiling above the luminaire, and to the floor below the luminaire are outlined in the installation instructions provided with each luminaire. The space between the flush-mounted luminaire and the adjacent ceiling, floor or walls of the building which are located behind the luminaire must contain relatively unobstructed air space around the luminaire equal to the marked spacings. No allowance has been made for any heat contributed by external heat sources such as steam pipes, heating ducts, and the like.

These luminaires may be accessible for relamping and servicing from either the interior or the exterior of the paint spray booth. If the luminaire is intended to be accessed from the interior of the spray booth and is wall mounted, a door or frame interlock switch is provided. This switch is intended to be connected to the control circuit of the spray booth so that if the luminaire door or frame is not closed properly, painting operations cannot be conducted. A ceiling-mounted luminaire that is intended to be accessed from the interior of the spray booth is also provided with a door or frame interlock switch or is marked “Caution — Do Not Operate Paint Spray Booth When Luminaire Frames Are Open. Keep Luminaire Frame Tightly Closed While Paint Spray Booth Is Operating.”

Each luminaire is marked with the rated ambient temperature. A luminaire may be marked with two ambient temperatures, indicating that the luminaire has been evaluated for a higher ambient temperature, such as "Ambient 60°C Front, 25°C Rear." If the marked ambient for the luminaire is less than the ambient temperature within the spray booth during the baking mode, the luminaire shall be connected to the control circuit of the spray booth and be considered de-energized during the baking mode. Independent of the marked ambient temperature, installation instructions provided with each luminaire specify the maximum ambient temperature for the luminaire. For example, the luminaire may be marked "25°C Ambient" and the installation instructions specify maximum installation ambient of 60°C. Consequently, (1) the luminaire is to be de-energized during the baking mode and (2) the maximum ambient temperature within the spray booth during the baking mode is 60°C.

Unless the luminaire is marked "Maximum of ___ AWG branch circuit conductors (for at least ___ C (____ F) permitted in junction box)," no allowance has been made for any heat contributed by branch circuit conductors which pass through, or supply and pass through, an outlet box or other splice compartment which is part of the luminaires' wiring system.

Luminaires that include raceways are marked, in combination with the Listing Mark, "Suitable for use as Raceways" and are marked to indicate the maximum number, size and type conductors they intend to accommodate.

Each luminaire is provided with installation and maintenance instructions. The maintenance instructions outline procedures to be followed for lens cleaning and gasket replacement. Cleaning and servicing of the luminaires must be performed only when the interior of the spray booth is nonhazardous and only when the ventilation system is operating.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ). The basic standard used to investigate products in this category is UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Paint Spray Booth Lighting Fixture for Hazardous Locations" or "Paint Spray Booth Luminaire for Hazardous Locations.

LUMINAIRE FITTINGS FOR USE IN HAZARDOUS LOCATIONS (IGIV)

USE AND INSTALLATION

This category covers incandescent lamp and electric discharge lamp type luminaires intended for recessed installation in walls and ceilings of hazardous locations in accordance with the provisions of NFPA 70, “National Electrical Code." Unless marked "Suitable for damp locations" or "Suitable for wet locations," recessed luminaires are only suitable for dry locations.

Recessed luminaires are marked with the required minimum temperature rating of wiring supplying the luminaire. Unless marked "maximum of ___ No. ___ AWG branch circuit conductors suitable for at least ___ C (____ F) permitted in junction box," no allowance has been made for any heat contributed by branch circuit conductors which pass through, or supply and pass through, an outlet box or other splice compartment which is part of the luminaire such as the field wiring system.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Paint Spray Booth Lighting Fixture for Hazardous Locations" or "Paint Spray Booth Luminaire for Hazardous Locations.

REQUIREMENTS

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ). The basic standard used to investigate products in this category are UL 844, "Electric Lighting Fixtures for Use in Hazardous (Classified) Locations."
LUMINAIRE FITTINGS FOR USE WITH SPECIFIED FITTINGS FOR USE IN HAZARDOUS LOCATIONS (IGMX)

This category covers luminaire fittings intended for field installation only with specified compatible Listed luminaire fittings (see IGIV) to form complete luminaires as identified on the product.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

Requirements
The basic standard used to investigate products in this category is UL 844, “Electric Lighting Fixtures for Use in Hazardous (Classified) Locations.”

LOOK FOR CLASSIFICATION MARK ON PRODUCT
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the following additional information: “LUMINAIRE (OR FIXTURE) FITTING FOR HAZARDOUS LOCATIONS FOR USE WITH LISTED LUMINAIRE (OR FIXTURE) FITTINGS SPECIFIED IN MARKINGS IN OR ON THE PRODUCT.”

LIGHTING UNIT FITTINGS, AUXILIARY FOR USE IN HAZARDOUS LOCATIONS (IGOY)

USE AND INSTALLATION
This category covers subassemblies of lighting units, battery packs, charging sections and control devices intended for final assembly into battery powered auxiliary lighting units in the field.

This unit equipment is intended to provide auxiliary light from included light sources only. The normal power supply to the equipment is disconnected or otherwise interrupted.

The lighting circuit ratings do not exceed 250 V for tungsten lamps. The investigation of automatic transfer devices includes the determination of their suitability for the auxiliary supply circuit. Information or instructions are provided specifying the subassemblies that may be used to assemble an auxiliary lighting unit in the field.

The unit equipment has not been investigated to determine its conformity with Article 700 of NFPA 70, “National Electrical Code” covering emergency lighting.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

Requirements
The basic standards used to investigate products in this category are UL 844, “Electric Lighting Fixtures for Use in Hazardous (Classified) Locations” and applicable sections of UL 924, “Emergency Lighting and Power Equipment.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Auxiliary Lighting Unit (FLG) for Use in Hazardous Locations,” “Auxiliary Lighting Unit (FLG) for Use in Hazardous Locations” or “Auxiliary Lighting Unit (FLG) for Use in Hazardous Locations.”

FLASHLIGHTS AND LANTERNS FOR USE IN HAZARDOUS LOCATIONS (IKBR)

Flashlights and lanterns Listed for any of the groups under Class I hazardous locations have been tested with respect to use in the presence of specific flammable gas or vapor-air atmospheres. Those Listed for any of the groups under Class II hazardous locations have been tested with respect to use in the presence of specific combustible dusts. The tests have been conducted using specific lamp and battery combinations. The lamp designation and the number, type, size and voltage of the batteries to be used are marked on the product.

2005 GENERAL INFORMATION FROM HAZARDOUS LOCATIONS EQUIPMENT DIRECTORY - PART I

FLOOR CLEANERS FOR USE IN HAZARDOUS LOCATIONS (ILQV)

The products covered in the following section are floor cleaners consisting of an aqueous solution of detergents and certain other materials. They have been classified as to use on electrically conductive floorings under conditions met with in practice.

Look for Classification Mark on Product
The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

Classified by Underwriters Laboratories Inc.® as to electrical conductivity when used on conductive floors and spontaneous heating.

FLOOR, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (INFZ)

The products covered in the following listings are electrically conductive floorings intended for use in industrial plants, arsenals, hospital operating rooms, and similar locations where it is necessary for safety to avoid the accumulation of static electricity.

Tests indicate that these floorings, when installed and maintained in accordance with the manufacturers’ instructions, are moderately electrically conductive and dissipate electrostatic charges on persons and conductive equipment making electrical contact with the floorings, and that the electrical resistance conforms to the requirements of the Standard of The National Fire Protection Association for Health Care Facilities, NFPA 99.

Conductive footwear on personnel, and conductive equipment fitted with conductive bases, leg tips, or casters making electrical contact with the flooring are required in order to make conductivity of the flooring effective in equalizing electrostatic charges. A grounding connection to the flooring may be provided.

To dissipate static electrical charges which may be present on persons or movable equipment before entering the hazardous area, these floorings should extend into rooms and corridors immediately serving or communicating with the hazardous area.

Insulating floor waxes should not be used on these floorings. When flammable solvents or adhesives are used during application of the flooring, precaution should be taken to obtain adequate ventilation and to avoid sources of ignition.
The basic standard used to investigate products in this category is UL 779, “Electrically Conductive Floorings”.

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged or on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product names as appropriate: “Electrically Conductive Flooring Relating to Hazardous Locations”, “Electrically Conductive Floor Material Relating to Hazardous Locations” or “Floor Tile Relating to Hazardous Locations”.

FLOORING, STATIC DISSIPATIVE, RELATING TO HAZARDOUS LOCATIONS (INTX)

The products covered in the following Classification are static dissipative flooring intended for use where it is necessary for safety to avoid the accumulation of static electricity. Tests indicate that these floorings, when installed and maintained in accordance with the manufacturer’s instructions dissipate electrostatic charges and the surface resistivity conforms to the requirements of the Department of Defense Military Handbook No. 263A, Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assembly and Equipment, Dated February 22, 1991. Insulating floor waxes should not be used on these floorings. When flammable solvents or adhesives are used during application of the flooring, precaution should be taken to obtain adequate ventilation and to avoid sources of ignition.

The basic document used to investigate products in this category is the Department of Defense Military Handbook No. 263A. Look for Classification Mark on Product.

GAS AND VAPOR DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (JYNK)

This category includes equipment for dispensing fumigant pellets. Equipment in this category consists of an assembly of UL Listed, Classified and Recognized parts. The basic standards used to investigate products in this category are the applicable standards for the parts of the assembly.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service. Static Dissipative Flooring Classified by Underwriters Laboratories Inc., DOD MIL-HDBK-263A. See instructions.

GAS AND VAPOR DETECTION EQUIPMENT ENCLOSED FOR USE IN HAZARDOUS LOCATIONS (JTOL)

These enclosures are for use in one or more of the following hazardous locations, as indicated on the individual product, in accordance with the National Electrical Code: Class I, Groups A, B, C and D; Class II, Groups E, F and G; Classification covers the enclosure only.

The basic standard used to investigate products in this category is UL 1203, Explosion-Proof and Dust-Ignition-Proof Electrical Equipment For Use in Hazardous Locations.
unit are replaced. Certain gases or vapors may adversely affect (poison) the sensors, and the use of the instruments in sampling atmospheres con-
taining gases or vapors for which they have not been previously cali-
brated should, therefore, be avoided.

Minor variations in the flow of sample aspirated to the detecting unit do
not affect the operation of these instruments to any great extent. However,
as the instruments become inoperative in the event of clogging of sam-
pling lines, flame arresters, or filters, precautions should be taken to keep
these components clean and free from obstructions. Where condensation
of vapors occurs in the detecting unit, or in the sampling lines and fit-
tings, erroneously low indications by the instrument may result. Absorp-
tion of appreciable amounts of certain gases or vapors by nonmetallic tubing
used as sampling lines may also result in incorrect indications by the
instrument.

The basic standards used to investigate products in this category are UL
508, “Industrial Control Equipment”, UL 913, “Intrinsically Safe Apparatus
and Associated Apparatus for Use in Class I, II and III, Division 1, Haz-
ardous Locations”, UL 1203, “Explosion-Proof and Dust-Explosion-Proof
Electrical Equipment for Use in Hazardous (Classified) Locations”, UL
1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class
III Hazardous (Classified) Locations”, and ISA S12.13, “Performance
Requirements for Control and Instrumentation Gas Detectors”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the
only method provided by UL to identify products manufactured under its
Listing and Follow-Up Service. The Listing Mark for these products
includes the UL symbol (as illustrated in the Introduction of this Direc-
tory) together with the word “LISTED”, a control number, and one of the
following product names as appropriate: “(Combustible) Gas Detector for
Hazardous Locations” or “(Combustible) Vapor Detector for Hazardous
Locations”, or other appropriate product name as shown in the individual
listing. The word “Combustible” in the product name is optional.

GROUND-FAULT CIRCUIT INTERRUPTIONS FOR USE IN
HAZARDOUS LOCATIONS (KCYN)

This category covers ground-fault circuit interrupters for use in accor-
dance with the National Electrical Code, ANSI 1/NFPA 70. These devices
are mounted in explosion-proof and/or dust-explosion-proof enclosures.
A ground-fault circuit interrupter is a device whose function is to inter-
rupt the electric circuit to the load when a fault current to ground exceeds
some pre-determined value that is less than that required to operate the
overcurrent protective device of the circuit.

A ground-fault circuit interrupter is intended to be used only in a circuit
where one of the conductors is solidly grounded. A Class A ground-fault circuit interrupter trips when the current to
ground has a value in the range of 4 through 6 milliamperes. A Class A
ground-fault circuit interrupter is suitable for use in branch and feeder
circuits.

The “TEST” and “RESET” buttons on the GFCIs are only intended to
check for the proper functioning of the GFCI. They are not intended to be
used as “ON” and “OFF” controls of motors or other loads unless the but-
tons are specifically marked “ON” and “OFF”.

The basic standards used to investigate products in this category are UL
943, “Ground-Fault Circuit Interrupters”, and UL 1203, “Explosion-Proof
and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Cla-
sified) Locations”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the
only method provided by UL to identify products manufactured under its
Listing and Follow-Up Service. The Listing Mark for these products
includes the UL symbol (as illustrated in the Introduction of this Direc-
tory) together with the word “LISTED”, a control number, and one of the
following product names: “Ground Fault Circuit Interrupter for Use in
Hazardous Locations”, or other appropriate product name as indicated in the
indiv-
dual listing.

HEATERS FOR USE IN HAZARDOUS
LOCATIONS (KFHT)

HEATERS, AIR FOR USE IN HAZARDOUS
LOCATIONS (KFVR)

These listings include air heaters of the natural convection, radiant heat-
ing, and fan assisted types. Heaters for surface mounting should be
installed in a horizontal position and should not be recessed, obstructed,
or placed on or under shelves. Installation should be in accordance with instructions furnished with the heater.
2005 GENERAL INFORMATION FROM HAZARDOUS LOCATIONS EQUIPMENT DIRECTORY - PART I

REQUIREMENTS
The basic standard used to investigate products in this category is UL 515, “Electrical Resistance Heat Testing for Commercial and Industrial Applications.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Surface Heater for Use in Hazardous Locations.”

WATER-DRIVEN VENTILATORS FOR USE IN HAZARDOUS LOCATIONS (NCGV)
This category covers water turbine powered, positive pressure ventilators intended for use in hazardous locations.

The basic standards used to investigate products in this category are UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word LISTED, a control number, and one of the following product names as appropriate: “Positive Pressure Ventilation Fan for Use in Hazardous Locations,” “Water Driven Ventilators for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listing.

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (NNGZ)
Industrial control equipment marked “Rain tight” is subjected to a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

If the sealed rating of the operating coil circuit of a magnetically operated industrial control device exceeds 125 volt-amperes, the coil circuit rating is marked on the device.

CONTROL PANELS AND ASSEMBLIES FOR USE IN HAZARDOUS LOCATIONS (NNNY)

USE AND INSTALLATION
This category covers control panels and assemblies consisting of enclosures and electrical components such as push button stations, pilot lights, motor controllers, and receptacles with plugs.

A single enclosure or a group of interconnected (modular) enclosures may be used for mounting the electrical components.

The enclosures making up a modular assembly are intended to be interconnected either at the factory or in the field by the user. Limitations on the interconnection of the enclosures are given on or with the product.

The electrical components are provided as part of the product and are intended to be installed either at the factory or in the field by the user. It is intended that wiring between the electrical components of modular assemblies be field installed.

Lead wire seals are not required between the modular enclosures. However, conduit runs entering an assembly should be sealed in accordance with the requirements of NFPA 70, “National Electrical Code,” unless factory made seals are provided and the product is marked to so indicate.

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Overload units of motor controllers are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other listed ratings in order that proper overload units may be furnished. Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for a-c horsepower ratings, and at ten times motor full load running current for d-c horsepower ratings.

2005 GENERAL INFORMATION FROM HAZARDOUS LOCATIONS EQUIPMENT DIRECTORY - PART II

PART II

ADDITIONAL INFORMATION
For additional information, see Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 698, “Industrial Control Equipment for Use in Hazardous (Classified) Locations,” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word LISTED, a control number, and one of the following product names as appropriate: “Control Assembly for Hazardous Locations,” “Control Panel Cover for Hazardous Locations” or “Control Panel for Hazardous Locations.”

Control Assembly Covers for Use in Hazardous Locations (NNRL)

USE AND INSTALLATION
This category covers control assembly covers consisting of devices such as push button stations, pilot lights, snap switches, motor controllers or receptacles Classified for use with specific models of Listed control assembly bodies or plugs for hazardous locations as specified in the installation instructions provided with the cover.

The electrical components are provided as part of the product and are intended to be installed either at the factory or in the field by the user. Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Overload units of motor controllers are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other listed ratings in order that proper overload units may be furnished. Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for a-c horsepower ratings, and at ten times motor full load running current for d-c horsepower ratings.

Pilot lights without guards should be used only where not subject to breakage.

Covers are for use with Type S, SO, ST or STO flexible cord having a grounding conductor. The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt, or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which plugs and receptacles will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION
For additional information, see Control Panels and Assemblies for Use in Hazardous Locations (NNRL), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).
REQUIREMENTS
The basic standards used to investigate products in this category are UL 698, “Industrial Control Equipment For Use In Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I, II, Division 2, and Class III Hazardous (Classified) Locations.” as appropriate.

LOOK FOR CLASSIFICATION MARK
The Classification Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

FOR USE WITH LISTED *
FOR HAZARDOUS LOCATIONS
SPECIFIED IN THE INSTALLATION INSTRUCTIONS
PROVIDED WITH THE PRODUCT

* - “Control Assembly Bodies” or “Plugs” as appropriate

Flame Control Panels for Use in Hazardous Locations (NNTE)

GENERAL
This category covers flame control panels intended for application in the control of fossil fuel burning equipment such as incinerators, kilns and dryers. Flame control panels have been classified only as to electrical fire and shock hazards. The compatibility of the panel with the controlled equipment from the standpoint of programming the burner(s) and preventing hazardous conditions due to firing of fuel has not been determined.

ADDITIONAL INFORMATION
For additional information, see Control Panels and Assemblies for Use in Hazardous Locations (NNNY), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ). The Classification Mark on the product will include the UL symbol, the word “LISTED” above the UL symbol (as illustrated in the Introduction of this Directory), and the control number, the product name, and the statement: “AS TO FIRE, ELECTRICAL SHOCK AND EXPLOSION HAZARDS ONLY.”

ENCLOSED SLIP RINGS FOR USE IN HAZARDOUS LOCATIONS (NNTR)

USE AND INSTALLATION
This category covers enclosed slip rings intended to transfer power to industrial equipment. A terminal compartment is provided for connection to threaded rigid conduit systems.

ADDITIONAL INFORMATION
For additional information, see Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Enclosed Slip Ring For Use in Hazardous Locations.”

MOTOR CONTROLLERS FOR USE IN HAZARDOUS LOCATIONS (NNUX)

Motor controllers are Listed under the following categories with maximum ratings of 200 hp and/or 300 amp and 600 V.

Auxiliary Devices
Combination Motor Controllers

Float- and Pressure-Operated Motor Controllers
Magnetic Motor Controllers
Manual Motor Controllers
Miscellaneous Motor Controllers

They are intended for use in control circuits of motor controllers and the like, and consist of the following devices: machine operated switches, push button stations (including pilot lights and selector switches), miscellaneous manually operated switches, magnet operated switches and magnetically operated switches.

Auxiliary devices provided with a factory seal of conductors entering the pilot light or switch enclosure are so identified by a marking on the product.

Pilot lights without guards should be used only where not subject to breakage.

Enclosures furnished without mechanisms are marked to identify the mechanisms that are to be used.

RECONDITIONED PRODUCTS
This category also covers auxiliary devices that have been reconditioned. Reconditioned auxiliary devices may also be referred to as rebuilt. Reconditioned auxiliary devices are factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. The reconditioned auxiliary devices are subject to the same requirements as new auxiliary devices.

ADDITIONAL INFORMATION
For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX), Industrial Control Equipment for Use in Hazardous Locations (NNGZ) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations,” “Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations,” “Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations” or “Industrial Control Equipment Enclosure (or Ind. Cont. Eq.) for Use in Hazardous Locations.” For rebuilt products, the product name is preceded by either “Reconditioned” or “Rebuilt.”

Combination Motor Controllers for Use in Hazardous Locations (NNOV)

This Listing covers combination motor controllers. Combination motor controllers provide the motor branch circuit functions of motor controller, disconnect means, short-circuit and ground-fault protection and overload protection. The functions may be provided by individual discrete components or be combined in a single controller unit. Combination motor controllers are marked “Combination Motor Controller” to signify that all of the motor branch circuit functions indicated above have been evaluated and are included in the Listing of the controller.

Combination motor controllers are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating.

Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

The basic standard used to investigate products in this category is UL 698, “Industrial Control Equipment For Use In Hazardous (Classified) Locations.”
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations,” “Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations,” “Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations (NPNZ)”, “Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations (NNZX)”, or “Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Use in Hazardous Locations”.

**Float- and Pressure-operated Motor Controllers for Use in Hazardous Locations (NOWT)**

This category covers float-operated switches and pressure-operated switches, including vacuum-operated switches. These devices are for direct control of motors, for use in control circuits of magnetic motor controllers and the like, and for control of other types of loads.

Unless otherwise indicated on the individual products, these devices are intended for use only with air, water, or other nonhazardous fluids.

Unless otherwise indicated on the individual products, these devices are for use in an ambient temperature normally prevailing in habitable spaces, and for use with fluids at such a temperature.

These devices have not been investigated for use in connection with automatic sprinkler or similar protective equipment.

**ADDITIONAL INFORMATION**

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX), Industrial Control Equipment for Use in Hazardous Locations (NNZC) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 698, “Industrial Control Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations” or “Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations.”

**Magnetic Motor Controllers for Use in Hazardous Locations (NPKR)**

Magnetic Across-The-Line Starters are listed under this category. Safety of operation of oil immersed type starters will be endangered should the oil level be below the minimum shown by indicator. These devices should be installed with a Listed sealing fitting adjacent to each opening where threaded rigid conduit is connected.

Magnetic switches for controlling other than motor loads are Listed under Auxiliary Devices. Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

The basic standard used to investigate products in this category is UL 698, “Electric Industrial Control Equipment for Use in Hazardous (Classified) Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names:

- “Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations”
- “Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations”
- “Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Use in Hazardous Locations”

**Manual Motor Controllers for Use in Hazardous Locations (NPXZ)**

Manual Across-The-Line Starters are covered in this category. Overload units are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other Listed ratings in order that proper overload units may be furnished.

Miscellaneous Motor Controllers for Use in Hazardous Locations (NQLX)

This category covers devices intended for direct control of motors. Unless otherwise indicated on the individual products, these devices are for use in an ambient temperature normally prevailing in habitable spaces, and for use with fluids at such a temperature.

These devices have not been investigated for use in locations having automatic fire sprinklers.

**RELATED PRODUCTS**

Devices for use in control circuits of magnetic motor controllers and the like are covered under Auxiliary Devices (NOIV).

**ADDITIONAL INFORMATION**

For additional information, see Motor Controllers for Use in Hazardous Locations (NNUX), Industrial Control Equipment for Use in Hazardous Locations (NNZC) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 698, “Industrial Control Equipment for Use in Hazardous (Classified) Locations,” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Industrial Control Equipment for Hazardous Locations” or “Industrial Control Equipment (or Ind. Cont. Eq.) for Use in Hazardous Locations.”

Power Conversion Equipment for Use in Hazardous Locations (NQMD)

**GENERAL**

This category covers equipment that supplies power to control a motor or motors operating at a frequency or voltage different than the input supply voltage. This category also includes power-supply modules, input and output modules, SCR or Transistor output modules, dynamic braking modules, and input/output accessory Kits for power conversion equipment. Power Conversion Equipment may be of the open or enclosed type. This equipment is intended for use in Hazardous (Classified) Locations in accordance with Article 500 of ANSI/NFPA 70, “National Electrical Code.” Power conversion equipment incorporating overload protection for motors and not intended for remote or external motor overload protection are marked to indicate the level of protection provided in percent of full load current. Where such protection is adjustable, a marking with instructions for adjustment is provided. Equipment not providing motor overload protection, is marked to indicate motor protection such as thermal overload relays or a thermally protected motor must be otherwise provided.

Power conversion equipment is marked with input and output electrical ratings.

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 508C, “Power Conversion Equipment” and UL 1604, “Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Industrial Control Equipment for Use in Hazardous Locations” (or “Ind. Cont. Eq. for Use in Haz. Loc.”), or “Power Conversion Equipment for Use in Hazardous Locations” or other appropriate product identity as indicated in the individual Listings.
MOTOR CONTROLLERS OVER 1500 V FOR USE IN HAZARDOUS LOCATIONS (NRAA)

This category covers enclosed motor controllers having AC voltage ratings in the ranges of 2.2 kV to 2.5 kV or 3.8 kV to 5.0 kV, intended for starting, stopping, regulating, controlling, or protecting electric motors or other electrical loads, including refrigeration equipment.

Equipment covered by this category has been investigated for use on three phase circuits having available fault levels not exceeding the MVA rating appearing on the nameplate. The three-phase available symmetrical MVA is equal to the product of the available symmetrical rms short-circuit current, the line-to-line open-circuit voltage, and a phase factor of 1.73 X 10^6.

Motor controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, accordingly they are tested at six times the continuous current rating of the controller at rated voltage.

Some motor controllers are provided with an integrally mounted surge arrestor to meet the required impulse withstand.

These motor controllers are substantially complete when shipped from the factory and final responsibility for service does not depend upon assembly of parts in the field.

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations", UL 1640, "Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 2, and Class III, Division 1 and 2", and UL 347 "High Voltage Industrial Control Equipment", as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and /or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "High Voltage Industrial Control Equipment for use in Hazardous Locations".

PROGRAMMABLE CONTROLLERS FOR USE IN HAZARDOUS LOCATIONS (NRAG)

This category covers programmable industrial control systems for use in Division 2 hazardous locations utilizing a programmable memory for internal storage of user oriented instructions for specific functions such as logic, sequencing, counting, and controlling various industrial equipment through digital or analog inputs or outputs. This category also includes power supplies, central processing units, input and output accessories, computer interfaces and programming or program diagnostic units associated with programmable control systems.

This Listing also includes programmable controllers and their accessories which have been reconditioned. Reconditioned programmable controllers and their accessories are factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. The reconditioned programmable controllers and their accessories are subject to the same requirements as new programmable controllers and their accessories.

These products are marked with their electrical ratings. Output devices may have more than one rating. At least one rating is marked on the output device and additional ratings may be marked on an instruction sheet referenced on the output device.

This category does not cover primary safety controls intended for programming and monitoring the operation of the burner on gas, gas-oil, or oil fired appliances.

The basic standards used to investigate products in this category are UL 508, "Industrial Control Equipment" and UL 1640, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III, Hazardous (Classified) Locations."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Industrial Control Equipment for Use in Hazardous Locations".

For additional information, see Equipment for Use in and Relating to Classes I, II, and III, Division 1 and 2, Hazardous Locations (AAIZ).
Auxiliary Devices Relating to Hazardous Locations (NRDZ)

Devices covered in this section are for use in control circuits of magnetic motor controllers and the like.

The basic standards used to investigate products in this category are UL 508, “Industrial Control Equipment”, and UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Industrial Control Equipment Relating to Hazardous Locations.”

INFORMATION TECHNOLOGY EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (NWHP)

GENERAL

This category covers information technology equipment for use in hazardous (classified) locations such as, but not limited to, personal computers, card readers and printers, rated 600 V or less, normally used in business establishments and other similar environments.

The equipment and appliances may be electromechanical and/or electronic.

SPECIAL CONSIDERATIONS

Card readers, badge readers and similar identification equipment covered under this category have not been investigated with respect to security.

PHYSIOLOGICAL EFFECTS

The physiological effects of chemical substances used in or with this equipment have not been investigated.

The basic unclassified (ordinary) locations standards used to investigate products in this category are UL 60950 and UL 1950, “Safety of Information Technology Equipment,” in conjunction with the basic hazardous (classified) locations standards UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations,” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

The ability or reliability of these products to perform their intended function in a particular application has not been investigated.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Information Technology Equipment for Use in Hazardous Locations,” “T.T.E. for Use in Hazardous Locations” or “Info. Tech. Equip. for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

LABORATORY EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (OGNA)

This category covers laboratory equipment and accessories designed for technological activities involving:

(a) The measurement of physical or chemical properties of materials.

(b) The measurement, control, and/or display of the functional performance of a piece of equipment.

(c) Qualitative or quantitative constituent analysis of substances.

(d) Preparation of materials for further analysis or measurements.

These products have been investigated with respect to risk of fire, shock, and injury to persons. The accuracy of measured, analyzed, or prepared quantities has not been evaluated.

This category does not include laboratory equipment intended for patient contact.

INSTALLATION INSTRUCTIONS

In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, the necessary instructions are marked on the equipment or provided in the instructions.

RELATED PRODUCTS

Other equipment that may be used in laboratories is covered under Heaters, Industrial and Laboratory for Use in Hazardous Locations (KGIZ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified (ordinary) locations standards used to investigate products in this category are UL 60950 and UL 1950, “Safety of Information Technology Equipment,” in conjunction with the basic hazardous (classified) locations standards UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division I, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations,” and UL 1604, “Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

The basic hazardous locations standards used to investigate products in this category are UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations,” and UL 1604, “Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory), together with the word “LISTED,” a control number, and the product name “Motor-Operated Laboratory Equipment for Use in Hazardous Locations” or “Laboratory Equipment for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.
LEAK DETECTION EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (OPDH)

This category covers leak detection equipment, including control units, indicators, sensors, probes and auxiliary devices used as part of leak detection systems.

Certain products in this category are associated apparatus and are intended for installation in nonhazardous locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous location.

The basic standards used to investigate products in this category are UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations”, UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations”, and UL 1604, “Electrical Equipment for Use in Class I, II, Division 2 and Class III Hazardous (Classified) Locations”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names: “Leak Detection Equipment for Use in Hazardous Locations”, “Leak Detection Equipment (Associated Apparatus)”, or other appropriate product name as shown in the individual Listing.

MATTRESSES AND PADS, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (PHLV)

These mattresses and pads are provided with a sheet covering made of cotton material coated with an electrically conductive natural or synthetic rubber, and are intended for use in flammable anesthetizing locations where it is necessary for safety to avoid the accumulation of static electricity.

Tests indicate that the electrical resistance conforms to the requirements of the Standard of The National Fire Protection Association for Health Care Facilities, NFPA 99 and that the mattresses and pads, when in contact with grounded objects, will prevent accumulation of dangerous amounts of static electrical charges.

As oil is injurious to rubber compounds and impairs the electrical conductive properties of these materials, contact with oil should be avoided.

The basic standard used to investigate products in this category is UL 1067, “Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names: “Electrically Conductive Mattress Relating to Hazardous Locations” or “Electrically Conductive Pad Relating to Hazardous Locations”.

MEASUREMENT EQUIPMENT CLASSIFIED FOR USE IN HAZARDOUS LOCATIONS (PICX)

This category includes equipment intended for measuring physical properties, such as thickness and density, on a production line.

Measuring equipment in this category have been evaluated for risk of explosion, fire and electric shock only.

The basic standards used to investigate products in this category are UL 508, “Industrial Control Equipment”, UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations”, UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations”, and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations”, as appropriate.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. as appropriate (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

The Classification Marking consists of the UL Mark together with the word “CLASSIFIED” (as illustrated in the Introduction of this Directory), the following statement and a control number.

AS TO FIRE, ELECTRICAL SHOCK AND EXPLOSION HAZARDS ONLY

The listings include portable suction, pressure, and anesthesia units, portable baby incubators, surgical devices, and similar equipment designed for professional use by attendants in hospitals. This equipment has been investigated solely from the standpoint of electrical, fire, explosion, and accident hazards. Other hazards, such as physiological effects have not been investigated.

Except for low voltage battery powered devices, connections to supply lines require the use of receptacles with plugs or receptacles with plugs interlocked with snap switches, or their equivalent, Listed for the specified hazardous locations. The flexible cord connected to the units should be frequently inspected and replaced when necessary. Terminal connections should be properly made and maintained.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

These devices should be used in accordance with the Standard of the National Fire Protection Association for Health Care Facilities, NFPA 99.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product name: “Medical Equipment for Hazardous Locations” or other appropriate product name as shown in the individual listing.

METAL-CLAD CABLE FOR USE IN HAZARDOUS LOCATIONS (PJPP)

GENERAL

This category covers Type MC metal-clad cable for use in Class I and II, Division 1 hazardous (classified) locations. It is rated for use up to 35,000 V, and Listed in sizes 18 AWG through 2000 kcmil for copper, 12 AWG through 2000 kcmil for aluminum, or copper-clad aluminum, and employs thermoset- or thermoplastic-insulated conductors. It is intended for installation in accordance with Articles 334, 501 and 502 of ANSI/NFPA 70, “National Electrical Code” (NEC). Cable containing conductors rated 2.5 kV may be used in circuits operating at 2 kV, nominal or less, in accordance with Articles 600 and 710 of the NEC. Cable containing conductors rated 5,000 to 35,000 V is intended for installation and use in accordance with Articles 326, 501 and 502 of the NEC.

The cable consists of two or more insulated conductors, one or more grounding conductors, and an overall gas/vapor tight continuous corrugated aluminum sheath. A nonmetallic jacket is provided over the metal sheath.

The equipment grounding conductor required within a cable may be insulated or bare and may be sectioned. Any additional grounding conductors have green insulation. One insulated grounding conductor may be unmarked, one other may have only a yellow stripe and the balance have surface markings that indicate they are additional equipment grounding conductors or isolated grounding conductors. Additional grounding conductors, however marked, are not smaller than the required grounding conductor.

PRODUCT MARKINGS

Information regarding temperature rating, voltage rating, cable and conductor Type and AWG size is shown on the surface of a nonmetallic jacket. The cable is identified as “Type MC-HL.” Cable rated 5,000 to 35,000 V is marked “Type MV or MC-HL.”

Copper-clad aluminum conductors are surface printed “AL (CU-CLAD)” or “Cu-clad AL.” Aluminum conductors are surface printed “AL.”

Cable employing compact-stranded copper conductors is so identified directly following the conductor size, wherever it appears (surface, tag, carton or reel), by “copper-clad.” The abbreviations “CMPCT” and “Cu” may be used for compact and copper, respectively.

Tags, reels and cartons for products employing compact-stranded copper conductors have the marking “Terminate with connectors identified for use with compact-stranded copper conductors.”

For termination information see Cable Sealing Fittings for Use in Hazardous Locations (CYMX).
Cable suitable for use in cable trays, direct sunlight or direct burial application is so marked. Cable marked for direct burial is also considered acceptable for encasement in concrete.

Cable marked “Oil Resistant I” or “Oil Res II” is suitable for exposure to mineral oil at 60°C. Cable suitable for exposure to mineral oil at 75°C is marked “Oil Resistant II” or “Oil Res II.”

Cable investigated in accordance with the Limited Smoke Test requirements specified in UL 1685, “Vertical-Tray Fire Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables” may be marked with the suffix “LS.”

### ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

#### REQUIREMENTS

The basic standards used to investigate products in this category are UL 1569, “Metal-Clad Cables” and UL 2225, “Metal-Clad Cables and Cable Sealing Fittings for Use in Hazardous (Classified) Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the attached tag, the reel, or the smallest unit container in which the product is packaged, with or without the UL symbol on the product, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name as appropriate. A metal-clad cable that contains one or both ends factory terminated with a Listed mineral insulated cable fitting for hazardous locations and a connector having conduit threads for attachment to hazardous location equipment. The basic standard used to investigate products in this category is UL 886, “Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number and the following product name: “Mineral Insulated Cable Assembly for Hazardous Locations” or other appropriate product name as indicated in the individual Listing.

### MINERAL-INSULATED CABLE ASSEMBLIES FOR USE IN HAZARDOUS LOCATIONS (POWD)

This category covers termination fittings for providing threaded connection of mineral insulated cable to hazardous location equipment. These fittings are provided with a screw-on pot for sealing ends of cable with special compound supplied by the manufacturer of fittings and a connector having conduit threads for attachment to hazardous location equipment.

The basic standard used to investigate products in this category is UL 886, “Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Mineral Insulated Cable Fitting for Hazardous Locations.”

### MINERAL-INSULATED CABLE FITTINGS FOR USE IN HAZARDOUS LOCATIONS (POWX)

This category covers termination fittings for providing threaded connection of mineral insulated cable to hazardous location equipment.

The basic standard used to investigate products in this category is UL 886, “Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Mineral Insulated Cable Fitting for Hazardous Locations.”
external surface temperature determined at rated full load steady state conditions, if the temperature is greater than 100°C. If the enclosure incorporates one or more arcing or sparking parts, the part is housed in a Class I, Division 1 enclosure or the part is within a hermetically sealed enclosure, constructed with non-magnetic interlocking contacts immersed in oil, located in a nonincendive circuit, or located in a purged and pressurized enclosure. If the motor is provided with an internal space heater, the space heater is intended to be wired in the control circuit such that the space heater is energized when the motor is de-energized, and vice versa. The maximum surface temperature of the space heater is marked on the motor, if the temperature exceeds 80 percent of the operating temperature of the motor.

For Class II, Division 2 locations, the enclosure is of the totally enclosed type. The motor is marked with the operating temperature or operating temperature code designating the maximum full load external temperature determined at rated full load steady state conditions when operating in free air (not dust blanketed), if the external temperature is greater than 100°C.

RELATED PRODUCTS
For Division 1 motors, see Motors for Use in Hazardous Locations (PTDK).

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic requirements used to investigate products in this category are contained in Subject 1836, “Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2 and Class II, Division 2 Hazardous (Classified) Locations.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Motor for Division 2 Hazardous Locations.”

MOTORS AND GENERATORS, REBUILT FOR USE IN HAZARDOUS LOCATIONS (PTKQ)

USE
This category covers rebuilt motors and generators for use in Class I, Groups C and D, and Class II, Groups E, F and G hazardous locations. Unless otherwise marked, rebuilt motors and generators for use in Class I and II hazardous location are intended for use in ambient temperatures within the range of -25°C (-13°F) to +40°C (+104°F).

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 674, “Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Motor for Division 2 Hazardous Locations.”

MOTORS, SPECIALTY FOR USE IN HAZARDOUS LOCATIONS (PUCJ)

USE AND INSTALLATION
This category covers specialty motors for use in Class I, Groups C and D; Class II, Groups E, F and G hazardous (classified) locations. These motors are intended for installation and operation in accordance with the instructions provided for each motor by the manufacturer. These motors may require any or all of the following for proper operation: (1) special controllers, (2) special control circuitry, (3) atypical input or voltage waveform, (4) atypical input current waveform. Refer to the operating instructions. These motors are not intended for across-the-line operation.

Unless otherwise marked, these motors are intended for use in ambient temperatures within the range of -25°C (-13°F) to +40°C (+104°F).

The Listing Mark on a rebuilt motor or generator applies to the motor or generator, but not to any equipment driven by or driving the motor or generator. In the case of a rebuilt motor or generator set provided with a common base the motor and generator will each bear its respective Listing Mark.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 674, “Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Specially Motor for Use in Hazardous Locations.”

OFFICE APPLIANCES AND BUSINESS EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QAVS)

GENERAL
This category covers equipment and appliances normally used in business establishments classified as hazardous locations. The equipment and appliances may be electromechanical and/or electronic.

Intrinsically safe equipment is so marked on the product. To maintain the intrinsically safe features of battery operated appliances, only batteries of the type and size indicated on the product should be used.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Office Appliance for Use in Hazardous Locations” or “Business Equipment for Use in Hazardous Locations.”

OUTLET BOXES ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (QAZV)

See also outlet boxes, conduit fittings, and fixture fittings. Conduit box bodies, flat or domed covers, fixture hanger covers, threaded extensions, sealing hub covers and similar subassemblies of outlet boxes, fixture fittings, and conduit fittings are included in this category. They are intended to be assembled at the factory or in the field by the user to form a complete explosion-proof or dust-ignition proof enclosure. Information on restrictions in the use and assembly of these devices are marked on each part.

The basic standard used to investigate products in this category is UL 886, “Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name “Outlet Box Accessory for use in Hazardous Locations” or other appropriate product name as shown in the individual listing.

OUTLET BOXES FOR USE IN HAZARDOUS LOCATIONS (QBCR)

GENERAL
This category covers equipment and appliances normally used in business establishments classified as hazardous locations.
This category covers conduit boxes for use in threaded rigid conduit or steel intermediate metal conduit wire raceways. They provide for splicing of conductors, but conductors should not be sealed in conduit boxes. The boxes are marked to indicate when accessories such as unions and sealing fittings are furnished with the box.

Boxes marked “rain tight” have been subjected to tests designed to simulate exposure to beating rain to determine that such exposure will not result in entrance of water.

Cast-aluminum alloy outlet boxes are not considered acceptable for installation in concrete or cinder fill unless protected with asphalt base paint or the equivalent.

**RELATED PRODUCTS**

See Conduit Fittings for Use in Hazardous Locations (EBNV).  
**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).  
**REQUIREMENTS**

The basic standard used to investigate explosion-proof and dust-ignition-proof products in this category is UL 898, “Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.” The basic standard used to investigate dusttight products in this category is UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Outlet Box for Hazardous Locations.”

**PAINT SPRAY AND FINISHING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QDHY)**

This category covers electrostatic hand spray apparatus and associated equipment such as high voltage power supplies and power cable.

The spray gun and power cable have been investigated for use in the spray area. The high voltage power supply is to be located outside of the spray area in a nonhazardous location.

Electrostatic hand spray equipment is intended to be installed and used in accordance with the Standard of the National Fire Protection Association for Spray Application Using Flammable and Combustible Liquids, NFPA 33. Instructions furnished with the equipment by the manufacturer should be carefully observed. The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Painting Equipment for Use in Hazardous Locations.”

**PAINT SPRAY BOOTHS WITHOUT FIRE PROTECTION SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (QEQF)**

This category covers paint spray booths for liquid and powder coating finishing processes as defined in Article 516 of NFPA 70, “National Electrical Code” (NEC) and in NFPA 33, “Spray Application Using Flammable and Combustible Materials.” Some of the booths may alternatively be used for drying, and may utilize electric heating, gas, gas-oil, or an oil-fired heating system. The type of heating employed is indicated in the individual Listings.

These paint spray booths are intended for field erection indoors in accordance with instructions furnished by the manufacturer and the information marked on the equipment. They are intended to be installed and used in accordance with applicable requirements in NFPA 33 and Article 516 of the NEC. Paint spray booths located within a commercial garage are to be installed as defined in Article 511 of the NEC.

**FIRE PROTECTION**

Paint spray booths in this category are not provided with a factory installed automatic fire protection system. A UL Listed fire protection system is intended to be provided by the installer and approved by the Authority Having Jurisdiction prior to operation of the booth.

**COATING MATERIALS**

These paint spray booths are intended for spray operations using a single type of coating material. Due to the possibility of spontaneous ignition, different types of coating materials should not be alternately used unless all deposits of the first used material are removed from the booth and ducts, and all paint contaminated filters are replaced or cleaned prior to spraying with the second type of coating material.

The toxicity of coating materials that may be used and the ability of the spray booth to provide protection for the painter and/or booth operator from coating material fumes have not been evaluated. Proper precautions as recommended by the paint manufacturer should be followed.

**PRODUCT MARKINGS**

The main product nameplate for products in this category includes the statement: “UL Listed (A) Automatic Sprinkler System or other Listed Automatic Extinguishing System shall be provided by the installer and approved by the Authority Having Jurisdiction.”

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in NFPA 33, “Spray Application Using Flammable and Combustible Materials.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names and information, as appropriate: (A) “Paint Spray Booth Without Fire Protection System for Automobile Refinishing,” (B) “Paint Spray Booth Without Fire Protection System for Use Only with (Company Name) Labeled (Gas) (Gas-Oil) (Oil) Burner Model(s). Maximum Input (BTU Per Hour) (Gals Per Hour). Refer to Burner Nameplate for Control and Fuel Specifications.”

A paint spray booth that includes a burner as part of the factory-furnished assembly bears a Listing Mark with the product name and information as outlined in (A) or (B).

A paint spray booth assembly intended for installation of the burner in the field bears a Listing Mark with the product name and information similar to the text in (C). The burner bears a separate Listing Mark.
from coating material fumes have not been evaluated. Proper precautions as recommended by the paint manufacturer should be followed.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in NFPA 33, “Spray Application Using Flammable and Combustible Materials.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names and information, as appropriate: (A) “Paint Spray Booth for Automobile Refinishing,” (B) “Paint Spray Booth” or (C) “Paint Spray Booth for Use Only with (Company Name) Labeled (Gas) (Gas-Oil) (Oil) Burner Model(s).” Maximum Input (BTU Per Hour) (Gals Per Hour). Refer to Burner Nameplate for Control and Fuel Specifications.

A paint spray booth that includes the burner as part of the factory-furnished assembly bears a Listing Mark with the product name and information as outlined in (A) or (B). A paint spray booth assembly intended for installation of the burner in the field bears a Listing Mark with the product name and information similar to the text in (C). The burner bears a separate Listing Mark.

**PERSONAL PROTECTIVE EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QGWX)**

These products are intended for use by individuals to provide a degree of protection against personal injury. They have been Classified in accordance with specific nationally recognized standards or Federal specifications as noted under the specific sub-guides.

The basic standard used to investigate products in this category is UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.”

**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Classification and Follow-Up Service. The Standards referenced in the Classification Marking vary to conform with those shown in the individual Classifications.

**CLASSIFIED BY UNDERWRITERS LABORATORIES INC.® IN ACCORDANCE WITH THE AMERICAN NATIONAL STANDARD SAFETY REQUIREMENTS FOR INDUSTRIAL PROTECTIVE HELMETS FOR ELECTRICAL WORKERS, CLASS B (ANSI Z89.2). FOR USE IN HAZARDOUS LOCATIONS.**

**PLUMBING ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (QNHV)**

This category covers pump assemblies and controls for use in pumping sewage. Assemblies exposed to sewage have constructions intended to reduce corrosion of enclosure parts and explosion-proof joints. They have not been investigated for use where severe corrosive conditions are likely to be present.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 674, “Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Control Unit for Use in Hazardous Locations” or “Submersible Sump Pump for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

**PORTABLE LIGHTING UNITS FOR USE IN HAZARDOUS LOCATIONS (QPKX)**

Portable lighting units listed for use in any of the groups under Class I hazardous locations have been tested in respect to safety of operation in the presence of flammable and explosive mixtures of specific gases and vapors with air as indicated in the respective listings. Lamp compartments are sealed from terminal compartments which have provision for connection of three-conductor, flexible, extra-hard-usage cord having grounding conductor. Portable lighting units for any of the groups under Class II hazardous locations have been tested for dust tightness and safe external temperatures in the presence of the specific combustible dust. Inasmuch as it is not good practice to allow combustible dust to accumulate on equipment or in buildings, the equipment should be kept clean and carefully maintained. Lamp compartments are sealed from terminal compartments which have provision for connection of three-conductor, flexible, extra-hard-usage cord having grounding conductor.

Portables having jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only where necessary. Authorities having jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only where necessary. The basic standard used to investigate products in this category is UL 781, “Portable Electric Lighting Units for Use in Hazardous (Classified) Locations”.

**ADDITIONAL INFORMATION**

For Industrial Protective Helmets for Electrical Workers, Class B (ANSI Z89.2) or the Safety Requirements for Industrial Head Protection (ANSI Z89.1), or both. They may include reference to specific Federal specifications as noted under individual classifications.

The basic standard used to investigate products in this category is UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.”
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Portable Lighting Unit For Hazardous Locations.”

**PROCESS CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (QUZW)**

**USE AND INSTALLATION**

This category covers process control equipment consisting of instruments for measurement, recording and/or control of process variables, and auxiliary devices used with these instruments, such as sensors, transducers and valve operators.

Intrinsically safe systems have been investigated on the basis that all equipment connected to the system is Listed as part of the system unless otherwise indicated and is used as intended.

Equipment intended to be installed only in process control panels is so identified in the individual Listings. Such equipment is not intended for field installation.

Safety may be affected if the manufacturer’s installation instructions are not followed.

**RELATED PRODUCTS**

Equipment investigated for use only in the hazardous (classified) locations of automotive and marine service stations is covered under Control, Monitoring and Auxiliary Equipment (EOXX).

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations,” and UL 1604, “Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations,” as applicable.

The basic unclassified (ordinary) locations standard used to investigate products in this category is ANSI/UL 508, “Industrial Control Equipment.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Process Control Equipment for Hazardous Locations,” “Process Control System for Hazardous Locations,” “Process Control Unit for Hazardous Locations,” “Process Control Equipment (Associated Apparatus),” “Process Control Unit (Associated Apparatus),” or other appropriate product name as shown in the individual Listings.

**PURGING AND PRESSURIZING CONTROLS AND ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (RFPW)**

**GENERAL**

This category covers purging and pressurizing controls and accessory parts intended to be connected to electrical equipment enclosures that are to be purged and pressurized with clean air or nonflammable gas in accordance with NFPA 496, “Purged and Pressurized Enclosures for Electrical Equipment.” This category does not cover the purged or pressurized electrical equipment. Purged or pressurized electrical equipment is covered under the individual product category for the particular type of equipment.

**TYPES**

NFPA 496 specifies the following pressurization types:

- **Type X** — Reduces the classification within an enclosure from Division 1 to nonhazardous.
- **Type Y** — Reduces the classification within an enclosure from Division 1 to Division 2.
- **Type Z** — Reduces the classification within an enclosure from Division 2 to nonhazardous.

**ADDITIONAL INFORMATION FOR USE IN HAZARDOUS LOCATIONS (RMGR)**

**GENERAL**

This category covers portable signal receivers, portable signal and voice receivers, and portable voice transceivers. These products are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt products are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt products are subject to the same requirements as new products.

**PRODUCT MARKINGS**

These products are marked with the following:
- The month and year that the product was repaired or rebuilt
- The standard number and the product name

**RELATED PRODUCTS**

See Radio Devices for Use in Hazardous Locations (RMGR).

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations (Classified) Locations,” as applicable.

**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product name “Purge Control for Use in Hazardous Locations” or “Purge Control Accessory for Use in Hazardous Locations” or other appropriate product name as shown in the individual Classifications, and the following additional information:

**IN ACCORDANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION STANDARD FOR PURGED AND PRESSURIZED ENCLOSURES FOR ELECTRICAL EQUIPMENT NFPA 496**

**RADIO DEVICES, REBUILT FOR USE IN HAZARDOUS LOCATIONS (RMEZ)**

**GENERAL**

This category covers rebuilt portable signal receivers, portable signal and voice receivers and portable voice transceivers. These products are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt products are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt products are subject to the same requirements as new products.

**PRODUCT MARKINGS**

These products are marked with the following:
- The month and year that the product was repaired or rebuilt
- The standard number and the product name

**RELATED PRODUCTS**

See Radio Devices for Use in Hazardous Locations (RMGR).

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations,” UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as applicable.

**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product name “Purge Control for Use in Hazardous Locations” or “Purge Control Accessory for Use in Hazardous Locations” or other appropriate product name as shown in the individual Classifications, and the following additional information:

**IN ACCORDANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION STANDARD FOR PURGED AND PRESSURIZED ENCLOSURES FOR ELECTRICAL EQUIPMENT NFPA 496**
RECEPTACLE-PLUG COMBINATIONS FOR USE IN HAZARDOUS LOCATIONS (RRAT)

Receptacles with plugs, receptacles with plugs interlocked with circuit breakers, and receptacles with plugs interlocked with switches are included under this category.

RECEPTACLE-ENCLOSURE COMBINATIONS WITH PLUGS FOR USE IN HAZARDOUS LOCATIONS (RREG)

Receptacle-Enclosure Combinations With Plugs are intended for use in one or more of the following hazardous locations, as indicated on the product, in accordance with the National Electrical Code: Class I, Groups A, B, C, and D; Class II, Groups E, F, and G.

Receptacle-Enclosure Combinations With Plugs covered under this category are (1) completely assembled at the factory or (2) intended for final assembly in the field using components specified in the product classification. Assembly of the Receptacle-Enclosure Combinations With Plugs in the field is to be in accordance with the instructions provided with the product by the manufacturer.

Enclosures under this category are for threaded rigid conduit connection, and the conductors between the receptacle and the enclosure are factory sealed. The plugs are for use with Type SO ST or STO flexible cord having a grounding conductor.

The flexible cord connecting to the plugs should be frequently inspected and replaced when necessary. Terminal connection to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at the current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where insulation may be impaired by moisture, dirt or other foreign material.

The basic standard used to investigate products in this category is UL 1010, "Receptacle-Plugs Combination for Use in Hazardous (Classified) Locations".

RECEPTACLE-PLUG COMBINATION ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (RRHS)

This category covers receptacles classified for use only with Listed plugs, and plugs classified for use only with Listed receptacles, as specified in the instructions provided with the product. The plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

Receptacles and plugs Listed for use in Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of the National Electrical Code.

The basic standard used to investigate products in this category is UL 1010, "Receptacle-Plugs Combination for Use in Hazardous (Classified) Locations".

RECEPTACLES WITH PLUGS FOR USE IN HAZARDOUS LOCATIONS (RROR)

Receptacles with plugs Listed under Class I and Class II groups for Division 1 locations are provided with receptacle conduit boxes for threaded rigid conduit connection, and the conductors between receptacles and conduit boxes are factory sealed. The plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

Receptacles Listed for Class I, Division 2 locations only are intended for use with general purpose enclosures for supply connections. The supply conductors are factory sealed in the receptacles. The plugs for use with such receptacles are suitable for Class I, Division 1 locations.

Receptacles with plugs for groups under Class I hazardous locations have been subjected to endurance tests and overload operation tests in the presence of the specific flammable vapor-air atmospheres.

Receptacles with plugs for any of the groups under Class II hazardous locations have dust tight terminal boxes and have been subjected to endurance tests and overload operation tests while heavily blanketed with combustible dust. Receptacles with plugs Listed for Class II, Groups F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of the National Electrical Code.

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Some receptacles and plugs are Listed for "Reverse Service" applications on marine vessels, for conformity to the installation and use provisions of the United States Coast Guard Electrical Engineering Regulations, Sub-chapter J (Title 46 CFR, Parts 110 to 113 inclusive), as identified by the individual Listing and marked on the products. Reverse service plugs and receptacles are not suitable for applications other than those governed by the above Coast Guard Regulations.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The basic standard used to investigate products in this category is UL 1010, "Receptacle-Plugs Combination for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by Underwriters Laboratories Inc. to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Plug for Hazardous Locations", "Receptacle Assembly for Hazardous Locations", "Reverse Service Plug for Hazardous Locations" or "Reverse Service Receptacle for Hazardous Locations".
## RECEPTACLES WITH PLUGS INTERLOCKED WITH CIRCUIT BREAKERS FOR USE IN HAZARDOUS LOCATIONS (RSBZ)

Receptacles with plugs interlocked with circuit breakers Listed under Class I and Class II groups are constructed with interlocked circuit breaker and plug so that the plug cannot be withdrawn or inserted when the circuit breaker is closed. These devices have provision for connection of threaded rigid conduit to the circuit breaker compartments and the plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

Receptacles with plugs interlocked with circuit breakers Listed for Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of the National Electrical Code.

The flexible cord connecting to these devices should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plugs and receptacle. This is achieved, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The basic standard used to investigate products in this category is UL 1010, “Receptacle-Plug Combinations for Use in Hazardous Locations”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and a control number that is used in conjunction with the following product names as appropriate: “Receptacle Interlocked with Circuit Breaker for Hazardous Locations” or “Plug for Hazardous Locations”.

### RECEPTACLES WITH PLUGS INTERLOCKED WITH SWITCHES FOR USE IN HAZARDOUS LOCATIONS (RSPX)

Receptacles covered under this category are (1) completely assembled at the factory or (2) intended for final assembly in the field using components specified in the individual Listings. Final assembly of receptacles in the field is to be done in accordance with instructions provided with the product by the manufacturer.

Receptacles with plugs interlocked with switches Listed under Class I and Class II groups are constructed with interlocked switch and plug so that the plug cannot be withdrawn or inserted when the switch is closed. These devices have provision for connection of threaded rigid metal conduit to the switch compartments. The plugs are for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

Receptacles with plugs interlocked with switches Listed for Class II, Group F locations are for use only in atmospheres containing electrically nonconductive dusts as defined in Article 500 of the National Electrical Code.

The devices which are provided with a factory seal of conductors between switch and the conduit box are so identified on the individual product.

The flexible cord connecting to these devices should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The basic standard used to investigate products in this category is UL 1010, “Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and a control number that is used in conjunction with the following product names as appropriate: “Receptacle Interlocked with Circuit Breaker for Hazardous Locations” or “Plug for Hazardous Locations”.

## REELS, CORD FOR USE IN HAZARDOUS LOCATIONS (SAOX)

This category includes cord reels for use with Type S, SO or STO cord, having a grounding conductor, for connecting portable electrical devices to supply lines. A terminal compartment is provided for connection to threaded rigid conduit systems.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

The flexible cord should be inspected frequently and replaced when necessary. Terminal connections to the cord should be properly made and maintained.

The basic standards used to investigate products in this category are UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations”, and UL 355, “Cord Reels”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name: “Cord Reel for Use in Hazardous Locations”, or other appropriate product name as noted in the individual Listing.

## ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (SSPZ)

### Controllers, Refrigeration for Use in Hazardous Locations (STDX)

**GENERAL**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Refrigeration Controller for Use in Hazardous Locations.”

### COMMERCIAL REFRIGERATORS AND FREEZERS FOR USE IN HAZARDOUS LOCATIONS (STRV)

**GENERAL**

This category covers commercial refrigerators and freezers of the self-contained reach-in type, having provision for connection to threaded rigid conduit.

In the storage of any chemicals in the refrigerators and freezers, consideration should be given to the inherent decomposition and reaction hazards of the chemicals.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.
UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Commercial Refrigerator and/or Freezer for Hazardous Locations.”

WATER COOLERS FOR USE IN HAZARDOUS LOCATIONS (SUIT)

GENERAL
This category covers bottled water and line supplied types of water coolers.

The appliances are self-contained units with complete refrigeration system associated with electrical control. The refrigeration system has provision for connection to threaded rigid conduit.

UNEVALUATED FACTORS
The appliances that are intended to be connected to external water sources have not been investigated with respect to pollution of water supply through reverse action due to low water pressure or other reasons.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division I and 2 Hazardous Locations (AAIZ).

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Water Cooler for Use in Hazardous Locations.”

RELEASING DEVICE EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (TBCX)

Releasing Devices with accessory equipment are designed to release operating weights or air or water under pressure in the functioning of fire protection and fire alarm equipment.

They are available in both heat responsive (automatic) and manual types. The heat responsive types may be had in either fixed temperature or rate-of-rise types or a combination of these.

The heat responsive portions of releasing devices are integral parts of some patterns. In other patterns they are separate parts, such as air chambers which are mounted in the fire area and connected by small-bore tubing to the releasing device; or thermostatically operated electric switches (thermostats) mounted in the fire area and connected by an electric wiring circuit to the releasing device. Devices which have normally open contacts are listed as “Heat-Automatic Fire Detectors” and those which have normally closed contacts are listed as “Heat Detectors for Releasing Device Service.”

Proper location and spacing of the auxiliary heat responsive devices (heat detectors, air chambers, tubing, etc.) involve consideration of service conditions throughout the area to be protected - such as ceiling construction, subdivisions of area, including close compartments, normal temperatures, high temperatures (if existent), resulting from manufacturing processes or other causes and draft conditions. Because of this, the recommendation regarding spacing of detectors gives a maximum limitation only, and it is recognized that specific system conditions, ambient temperature changes, or other field conditions may require downward adjustment of these maximum spacing limits in field installations. Individual Listings should be consulted for details of spacing and locations of the heat responsive devices.

The Inspection Authority Having Jurisdiction should be consulted in all cases before installation of systems or devices.

HEAT DETECTORS FOR RELEASING DEVICE SERVICE FOR USE IN HAZARDOUS LOCATIONS (TBGR)

USE AND INSTALLATION

This category covers heat detectors having normally closed circuit contacts used for thermo-responsive elements of releasing systems.

These heat detectors have been investigated for indoor use only unless otherwise indicated in the individual Listings.

These detectors are intended to be installed in accordance with NFPA 72E, “Automatic Fire Detectors.”

The operating principles included in the Listings are coded as follows:
ROR – Rate of rise; FT – Fixed temperature; ROR-FT – Combination rate of rise and fixed temperature; RC – Rate compensation.

RELATED PRODUCTS
For heat detectors having normally open contacts, see Heat-automatic Fire Detectors for Use in Hazardous Locations (UIRV).

ADDITIONAL INFORMATION
For additional information, see Releasing Device Equipment for Use in Hazardous Locations (TBCX) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Heat Detector for Releasing Device Service for Use in Hazardous Locations.”

RELEASING DEVICES FOR USE IN HAZARDOUS LOCATIONS (TBJW)

Some types of releasing devices are for use in supporting and releasing loads in connection with automatic operating devices or systems where loads at release lever hook do not exceed those specified in the individual Listings.

Other types of releasing devices are for use as a means of releasing air or water under pressure from a piping system confining and conducting that pressure through pipes or tubing to operate any connected pressure-operated mechanism.

A releasing device and its associated detection system may be adjusted to compensate for more or less severe ambient temperature changes by different settings of the release or by varying the size of the compensating vents in the system to increase or decrease the rate of pressure built up caused by exposure to some given temperature rise. Because of this, the recommendation regarding spacing of detectors gives a maximum limitation only, and recognizes that specific system settings, abnormal temperature changes, or other field conditions may require downward adjustment of these maximum spacing limits in field installations.

Additional information on units for Releasing Device Service can be found in the General Information Section of the following categories:

Heat Detectors for Releasing Device Service for Use in Hazardous Locations (TBGR).


The basic ordinary locations standard used to investigate products in this category is UL 964, “Control Units for Fire-Protective Signaling Systems.”

The basic hazardous locations standard used to investigate products in this category is UL 1203, “Explosion-Proof and Dust-Ignition-proof Electrical Equipment for Use in Hazardous (Classified) Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Releasing Devices for Hazardous Locations.”

REPAKAGED HAZARDOUS LOCATIONS EQUIPMENT (TEPD)

Products covered under this category are repackaged Listed or Classified products of the type covered in the Hazardous Locations Equipment Directory.

Required user instructions and ratings are marked or packaged with the smallest unit container in which the product is packaged.

The Listing Mark or Classification Marking of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product
is packaged is the only method provided by UL to identify these products manufactured under its Listing or Classification and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the appropriate product name. The Classification Marking for these products consists of the Classification Marking (and any rating or design information required as part of the Classification Marking) provided by the original manufacturer of the Classified product and a control number. The Classification Marking may include the symbol UL in a circle in conjunction with the word “CLASSIFIED”.

**ROTARY AUTOMATIC PRODUCT FILLING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (TONI)**

This category includes equipment for automatically filling fluids into aerosol cans, bottles and similar containers. The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations”, as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names: “Rotary Automatic Product Filling Equipment for Hazardous Locations”, “Product Filling Equipment for Hazardous Locations” or other appropriate product name as shown in the individual Listing.

**SIGNAL APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (UFXR)**

Equipment for use in hazardous locations investigated for fire-protective signaling service also appears under Signal and Fire Alarm Equipment and Services (SYKJ) in the Fire Protection Equipment Directory.

**AUDIBLE SIGNAL APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (UGKZ)**

**GENERAL**

This category covers audible-signal devices, such as bells, sirens and horns.

Audible-signal devices Listed for use in any of the groups under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. Those for use in any of the groups under Class II hazardous locations have been tested for dusttightness and have been subjected to operation tests to establish safety of operation in the presence of the specific combustible dusts, and also to establish that they will function as intended with dust accumulated on external parts.

**ADDITIONAL INFORMATION**

For additional information, see Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Audible Signal Appliance for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

**EXTINGUISHING SYSTEM ATTACHMENTS FOR USE IN HAZARDOUS LOCATIONS (UGYX)**

**USE AND INSTALLATION**

This category covers devices having electrical signaling contacts that are designed for attachment to extinguishing system equipment so as to provide:

(a) Alarm signals indicating discharge of extinguishing means.

(b) Supervisory signals indicating abnormal conditions of extinguishing system equipment and restoration to normal.

The signal contacts of these attachments may be of the non-coded type or coded type.

Devices classified as non-coded types have contacts which perform a switching function and are for connection to actuating circuits of a separate electrically operated transmitter or to the signaling line circuit of a separate electrical control unit by which their action is indicated.

Devices classified as coded type have contacts which perform a coded signaling impulse function resulting from the operation of a transmitting mechanism which is a part of the attachment and are for connection to the signaling line circuit of a separate electrical control unit by which their action is indicated.

Attachments for automatic sprinkler systems are classified as follows:

- **Waterflow Alarm Signal Types**
  - Alarm Dry-Pipe Valve Attachment — Mechanically operated on lifting of alarm valve clapper or pressure operated by suitable connection to alarm or dry-pipe valve piping trim.
  - Waterflow Indicators — Paddle operated.
  - Special Attachment — Type not included by above classification.

- **Supervisory Signal Types**
  - Valve Position Signal Attachment — Operated by mechanical linkage to movable parts of valve.
  - Water Level Signal Attachment — Operated by tank float.
  - Pressure Signal Attachment — Operated by pressure change of air, steam or water.
  - Temperature Signal Attachment — Operated by water or air temperature change.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II, and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Extinguishing System Attachment for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

**FIRE ALARM DEVICES FOR USE IN HAZARDOUS LOCATIONS (UHMV)**

**USE AND INSTALLATION**

This category covers coded and non-coded fire alarm boxes and fire and watch boxes for use with private fire alarm systems. Authorities Having Jurisdiction should be consulted before installation.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Fire Alarm Box for Hazardous Locations” or “Fire and Watch Box for Hazardous Locations.”
FLAME-AUTOMATIC FIRE DETECTORS FOR USE IN HAZARDOUS LOCATIONS (UIAZ)

USE AND INSTALLATION
This category covers fire detectors designed to detect flames, either in infrared or ultraviolet regions.

Each detector provides signaling contacts for connection to a signal-indicating appliance, electrically actuated transmitters, or a system control unit to form a fire alarm system as indicated by the installation wiring diagram supplied with the unit.

Each unit is intended to be installed in accordance with the manufacturer’s control drawing, the Authority Having Jurisdiction, and NFPA 72E, “National Fire Alarm Code,” or other NFPA Standards which may apply.

DETECTOR LOCATION
The location of flame detectors should be based on an engineering survey of the conditions to be anticipated in service and the principle of operation. Detectors should be installed only after a thorough study has been made of the area or premises to be protected (whether in planning or construction stage) and of the life and property values involved. Prior to engineering, a layout of an installation and a copy of the manufacturer’s technical bulletin should be obtained and reviewed to determine recommended detector locations. Consideration should be given to all factors which could have a bearing on the location and sensitivity of the detectors, including such pertinent factors as coverage in partitioned sections, ceiling heights, and overlapping of areas of cone coverage to provide maximum protection. Test flames should be employed to check proper detector location.

ENVIRONMENTAL CONSIDERATIONS
Where indicated in the individual Listings, detectors are intended for indoor and/or outdoor use. For indoor use, detectors should be located in areas where normal ceiling temperatures prevail. For outdoor use, detectors should be located such that an accumulation of snow, dirt, or road film is not likely to occur on the lens. Accordingly, detectors should be located under a building overhang or positioned on a downward angle to minimize the occurrence of such conditions.

Detectors should not be installed where unwanted false alarms are likely to occur, such as other sources of ultraviolet or infrared radiation.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II, and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 268, “Smoke Detectors for Fire Protective Signaling Systems.”

The basic hazardous (classified) locations standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous (Classified) Locations,” UL 1609, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” and UL 2003, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations,” as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Flame-automatic Fire Detector for Use in Hazardous Locations.”

GROUND INDICATORS FOR USE IN HAZARDOUS LOCATIONS (UIRV)

GENERAL
This category covers electronic type ground indicators, the ratings of which are given on the individual product. These devices indicate by audible or visible signals whether an adequate connection to gasoline tank trucks, tank cars, or drums has been established for dissipation of static electricity.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1609, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Ground Indicator for Use in Hazardous Locations.”

HEAT-ACTUATED DEVICES FOR SPECIAL APPLICATION FOR USE IN HAZARDOUS LOCATIONS (UIPV)

USE AND INSTALLATION
This category covers fixed temperature heat actuated type detectors employing special constructions designed to detect an abnormal increase in ambient temperature. These detectors are intended to be installed adjacent to the equipment being protected in indoor locations in a manner acceptable to the local authority having jurisdiction and in accordance with NFPA 72E, “Automatic Fire Detectors” or other NFPA Standards which may apply, such as for extinguishing system applications. The temperature rating of the detector shall be taken into consideration with regard to installation in specific ambient environments under operating conditions of the equipment to be protected. Detectors are intended to be connected to the initiating device circuits of Listed control units which provide audible alarm signals or employed as part of an extinguishing system. Authorities Having Jurisdiction should be consulted before installation.

Spacings for Equipment Protection Reference should be made to the manufacturer’s installation drawings and instructions. Spacings for smooth ceilings with large bays are included in the individual Listings. For open area protection, see Heat-automatic Fire Detectors for Use in Hazardous Locations (UIBV).

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations,” UL 1609, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Heat Actuated Device for Special Application for Use in Hazardous Locations.”

HEAT-AUTOMATIC FIRE DETECTORS FOR USE IN HAZARDOUS LOCATIONS (UIRV)

USE AND INSTALLATION
This category covers fire alarm heat detectors only, and not wiring or other appliances of which they form a part.

Fire alarm heat detectors are of the fixed temperature, combination fixed temperature and rate-of-rise or rate compensation types. There are basically two types: (1) Spot-type is one in which the thermally sensitive element is a compact unit of small area, and (2) Line-type is one in which the thermally sensitive element is continuous along the line.

Heat detectors are intended for locations where normal ceiling temperatures prevail (below 100°F). Locations where temperatures at ceiling are likely to be undue high, for sources of heat other than fire conditions, demand special consideration and selection of heat detectors operating normally at higher temperatures, and which are capable of withstanding high temperatures for longer periods of time. Care should be exercised to select heat detectors having the proper temperature rating to guard against false alarms from premature operation.

These detectors are intended to be installed in accordance with NFPA 72E, “Automatic Fire Detectors.”

For ceiling temperatures not exceeding 100°F install 135 to 165°F (ordinary) rated thermostats.

For ceiling temperatures exceeding 100°F but not 150°F, install intermediate 175 to 225°F rated thermostats.

For ceiling temperatures exceeding 150°F but not 225°F, install 250 to 300°F (high) rating thermostats.

For ceiling temperatures exceeding 225°F, but not 300°F, install 325 to 360°F (extra high) rating thermostats.

Low-degree rated heat detectors are intended only for installation in areas having controlled temperature conditions at least 20°F below rating.
The spacings specified are for flat, smooth ceiling construction of ordinary height, generally regarded as the most favorable condition for distribution of heated air currents resulting from a fire. Under other forms of ceiling construction reduced spacing of thermostats may be required. The fire tests conducted to determine the suitability of the spacings are conducted in a 60 by 60 ft room having a 15 ft high smooth ceiling and minimum air movement. The test fire (denatured alcohol) is located approximately 3 ft above the floor and of a magnitude so that sprinkler operation is obtained in approximately two minutes. For comparative purposes, automatic sprinklers rated 160°F are installed on a 10 by 10 ft spacing schedule in an upright position with the deflectors approximately 7 in. below the ceiling.

At the maximum permissible spacing for the heat detectors, they must operate prior to operation of the sprinklers.

The placement and spacing of thermostatic devices should be based on consideration of the ceiling construction, ceiling height, room or space areas, space subdivisions, the normal room temperature, possible exposure of the devices to abnormal heat, such as may be produced by manufacturing processes or equipment and to draft conditions likely to be encountered at the time of a fire.

The operating principles included in the listings are coded as follows: ROR – Rate of rise; FT – Fixed temperature; ROR-FT – Combination rate of rise and fixed temperature; RC – Rate compensation.

For Listings that include references to “rain tight type,” the devices have been subjected to tests designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

 Authorities Having Jurisdiction should be consulted before installation.

**RELATED PRODUCTS**

For heat detectors having normally closed contacts used in special applications, see Heat Detectors for Releasing Device Service for Use in Hazardous Locations (TBGR).

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fire Detection Heat Detector for Use in Hazardous Locations.”

**SIGNAL SYSTEM UNITS FOR USE IN HAZARDOUS LOCATIONS (UJFT)**

**USE AND INSTALLATION**

This category covers units intended to be used in combinations with related Listed equipment to form installed systems for general utility signaling purposes.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II, and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fire Detection Heat Detector for Use in Hazardous Locations.”

This category covers miscellaneous signal appliances and equipment used in signaling systems.

**RELATED PRODUCTS**

Equipment that has been investigated for use only in the classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQXX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Monitor Unit (Associated Apparatus) for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

**ADDITIONAL INFORMATION**

For Signal Appliances for Use in Hazardous Locations (UFXR) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

This category covers retrofit devices in kits consisting of parts and/or subassemblies, installation/instruction manuals, and retaining means, intended for field installation in UL Listed audible signaling appliances for use in hazardous locations. These products have been evaluated by UL to determine that when used in accordance with the manufacturer’s instructions they do not adversely affect the operation of the complete unit.

**PRODUCT MARKINGS**

Retrofit devices are marked with electrical and environmental ratings as specified in the individual report.

**ADDITIONAL INFORMATION**

For additional information, see Signal Appliances for Use in Hazardous Locations (UFXR) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic ordinary locations standards used to investigate products in this category are UL 464, “Audible Signal Appliances,” or UL 1480, “Speakers for Fire Protective Signaling Systems,” as appropriate. The basic hazardous locations standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations,” UL 1203, “Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), a control number, “Audible Signal Retrofit Kit,” and “FOR USE WITH LISTED [insert model number(s)] ONLY.”

**VISUAL-SIGNAL DEVICES FOR USE IN HAZARDOUS LOCATIONS (UJTK)**

**GENERAL**

This category covers visual-signal devices such as rotating beacons and strobe lights for use in general signal applications, and subassemblies of visual-signal devices intended for final assembly into visual-signal devices. Subassemblies, such as mounting bodies, globes and guards, and the parts with which they are compatible are identified in the individual Listings.

Where multiple parts are employed to form a complete unit, the specific parts are identified in the individual Listings. Marking on each part references installation instructions which show assembly and installation of the parts to form a Listed product.
Visual-signal devices Listed for use in any of the groups under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. Those for use in any of the groups under Class II hazardous locations have been tested for dust-tightness and have been subjected to operation tests to establish safety of operation in the presence of the specific combustible dusts and also to establish that they will function as intended with dust accumulated on external parts.

RELATED PRODUCTS

Devices intended for use in fire alarm and/or emergency protective signaling applications are covered under Visual-Signal Devices for Fire Protective Signaling Systems for Use in Hazardous Locations (UJRQ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 1638, “Visual Signaling Appliances – Private Mode Emergency and General Utility Signaling.”

The basic hazardous (classified) locations standards used to investigate products in the category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as applicable.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Visual-Signal Appliance for the Hearing Impaired for Use in Hazardous Locations” or “Visual-Signal Appliance Subassembly for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

SIGNALING APPLIANCES AND EQUIPMENT FOR THE HEARING IMPAIRED FOR USE IN HAZARDOUS LOCATIONS (UXWC)

GENERAL

This category covers visual-signalizing appliances, vibrators or other sensory apparatus and associated equipment that has been investigated for fire protective signaling services to alert hearing-impaired persons, and subassemblies of signaling appliances intended for final assembly into signaling appliances.

Subassemblies, such as mounting bodies, globes and guards, and the products with which they are compatible are identified in the individual Listings.

Where multiple parts are employed to form a complete unit, the specific parts are identified in the individual Listings. Marking on each part references installation instructions that show assembly and installation of the parts to form a Listed product.

These signaling appliances are intended to be used in conjunction with Listed compatible fire alarm control units, alarm initiating devices and the like. The interconnection, use and installation requirements of the products are intended to be in accordance with NFPA 72, “National Fire Alarm Code.”

Visual-signaling appliances covered under this category are intended to be used in the “Public Operating Mode” as defined in NFPA 72. Visual-signaling appliances intended to be used in the “Private Mode” are covered under Visual-Signal Devices for Use in Hazardous Locations (UJTJ) and Visual-Signal Devices for Fire Protective Signaling Systems for Use in Hazardous Locations (UJRQ).

The signaling appliances in this category have been investigated as to their ability to alert most hearing-impaired persons. However, since the ability of signal recognition varies among individuals, the effectiveness of alerting a person can only be ensured by actual testing of that person with the installed signaling appliance.

This category does not cover signaling devices for the hearing impaired that are an integral part of other alarm initiating or indicating devices. When such a combination exists, suitability as a signaling appliance for the hearing impaired will be noted in the Listings of the primary product. Refer to Audible-Signal Devices for Use in Hazardous Locations (UGCZ).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 1971, “Signaling Devices for the Hearing Impaired.”

The basic hazardous (classified) locations standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as applicable.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Signaling Appliance for the Hearing Impaired for Use in Hazardous Locations,” “Signaling Appliance for Use in Hazardous Locations,” “Signaling Appliance for the Hearing Impaired for Use in Hazardous Locations,” “Signaling Appliance Subassembly for the Hearing Impaired for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

SOLENOIDS FOR USE IN HAZARDOUS LOCATIONS (VAPT)

USE

This category covers solenoids for connection to threaded rigid conduit. These solenoids are complete devices intended to actuate an external valve or other equipment. This category covers the solenoid only and not the valve or other equipment to which the solenoids are mounted.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 429, “Electrically Operated Valves,” and ANSI/UL 1002, “Electrically Operated Valves for Use in Hazardous Locations.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Solenoid for Use in Hazardous Locations.”

SOLENOID PUMPS FOR USE IN HAZARDOUS LOCATIONS (VAFY)

GENERAL

This category covers solenoid pumps for connection to threaded rigid conduit. The solenoid pumps are complete devices intended to actuate an external metering device or other equipment. These category covers the solenoid pump only and not the metering device or other equipment to which the solenoid pumps are mounted.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1002, “Electrically Operated Valves for Use in Hazardous (Classified) Locations.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Solenoid Pump for Use in Hazardous Locations.”

SOLVENT DISTILLATION UNITS FOR USE IN HAZARDOUS LOCATIONS (VBFY)

This category covers solvent distillation units with a maximum capacity of 60 gal (227 l) which are intended to recycle non-flammable, flammable
or combustible solvents. These units have only been investigated for use with the solvent(s) indicated in the instruction manual provided with the unit. In addition, these units will be marked to indicate the solvent(s) or with a statement referencing the instruction manual.


The equipment covered by this category is intended for installation and use in accordance with the National Electrical Code, NFPA 70, the Flammable and Combustible Liquids Code, NFPA 30, and the Uniform Fire Code, published by the International Fire Code Institute. This listing does not cover carbon-bed units, which are intended to be installed outdoors, units which are intended to distill solvents containing nitrocellulose or other unstable reactives, and units intended for high volume distillation processes typical of the petrochemical or distilled spirits industries.

The storage, use and disposal of any flammable or combustible solvents and hazardous materials used with or produced by the equipment, the physiological effects of these solvents and hazardous wastes, and the purity of the recycled solvent have not been investigated by Underwriters Laboratories Inc. and are not covered by the listing.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Solvent Distillation Unit for Use in Hazardous Locations”, or equivalent.

SOUND METERING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (VBYC)

GENERAL
This category covers equipment that measures and stores the ambient noise levels in industrial areas.

RELATED PRODUCTS
Equipment that has been investigated for use only in the Classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary Equipment (EQQX) in the Flammable and Combustible Liquids and Gases Equipment Directory.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Noise Dosimeter” or “Sound Level Meter,” or other appropriate product name as shown in the individual Listings.

SOUND RECORDING AND REPRODUCING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (VCSV)

USE
This category covers devices such as speakers and similar equipment for use in sound recording or reproducing systems.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Sound Recording Equipment for Use in Hazardous Locations” or “Sound Reproducing Equipment for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

SPRINKLER SYSTEM AND WATER SPRAY SYSTEM DEVICES FOR USE IN HAZARDOUS LOCATIONS (VQTV)

These listings cover devices and equipment for use in sprinkler systems and water spray systems.

ADDITIONAL INFORMATION
These devices and equipment should be installed in compliance with the Standards of National Fire Protection Association, NFPA 13 for Sprinkler Systems, NFPA 15 for Water Spray Systems for Fire Protection, and NFPA 16 for Foam-Water Sprinkler and Spray Systems. Inspection authorities having jurisdiction should be consulted regarding use of these listed devices and equipment before installation.

REQUIREMENTS
These listings cover devices and equipment for use in sprinkler systems and water spray systems.

SPRINKLER SYSTEM AND WATER SPRAY SYSTEM DEVICES FOR USE IN HAZARDOUS LOCATIONS (VQTV)

These listings cover devices and equipment for use in sprinkler systems and water spray systems.

ADDITIONAL INFORMATION
These devices and equipment should be installed in compliance with the Standards of National Fire Protection Association, NFPA 13 for Sprinkler Systems, NFPA 15 for Water Spray Systems for Fire Protection, and NFPA 16 for Foam-Water Sprinkler and Spray Systems. Inspection authorities having jurisdiction should be consulted regarding use of these listed devices and equipment before installation.

REQUIREMENTS
These listings cover devices and equipment for use in sprinkler systems and water spray systems.

SPECIAL SYSTEM WATER CONTROL VALVES AND SYSTEM ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (VQTV)

These listings cover devices and equipment for use in sprinkler systems and water spray systems.

ADDITIONAL INFORMATION
These devices and equipment should be installed in compliance with the Standards of National Fire Protection Association, NFPA 13 for Sprinkler Systems, NFPA 15 for Water Spray Systems for Fire Protection, and NFPA 16 for Foam-Water Sprinkler and Spray Systems. Inspection authorities having jurisdiction should be consulted regarding use of these listed devices and equipment before installation.

REQUIREMENTS
These listings cover devices and equipment for use in sprinkler systems and water spray systems.

SPECIAL SYSTEM WATER CONTROL VALVES, Class I, for Use in Hazardous Locations (VQTVW)

These valves are intended for use in controlling water flow to sprinkler and water spray systems. Unless otherwise stated, deluge valves are to be installed in the vertical position only.

ADDITIONAL INFORMATION
These devices and equipment are intended to be installed in compliance with the Standards of National Fire Protection Association, for the installation of Sprinkler Systems, NFPA 13, for Water Spray Fixed Systems, NFPA 15 or for Foam - Water Sprinkler and Foam-Water Spray Systems, NFPA 16. Inspection authorities having jurisdiction should be consulted regarding use of these Listed devices and equipment before installation.

REQUIREMENTS
The basic standard used to investigate products in this category is UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations.” The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Deluge Valve for Use in Hazardous Locations.”
SWITCHES, PRESSURE FOR USE IN HAZARDOUS LOCATIONS (VRBR)

USE
This category covers pressure-operated switches for use in connection with sprinkler equipment, water spray systems and like protection systems, as a means of initiating electrical alarms upon flow of water in the equipment or for actuation of other auxiliary equipment.

ADDITIONAL INFORMATION
For additional information, see Sprinkler System and Water Spray System Devices for Use in Hazardous Locations (VQNT) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS
The basic standards used to investigate products in this category are UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Pressure Switch for Use in Hazardous Locations.”

STATIC NEUTRALIZING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (VXDY)

This category covers high voltage power units and discharge bars designed for individual installation on equipment in hazardous locations where static charges are not safely dissipated. These installations are generally required where static charges are generated during operation.

Due to the nature of these installations, high voltage parts are necessarily exposed and cannot be completely shielded from contact. Care should be taken to follow the instructions provided with the equipment regarding the installation of the static neutralizers, including proper grounding of the equipment, and operating personnel should be carefully instructed regarding its correct operation and maintenance.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Static Neutralizing Equipment for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listing.

STRAPS, RERAINT, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (VZAR)

These restraint straps made from electrically conductive natural or synthetic rubber are intended for use in hospital operating rooms where accumulation of charges of static electricity presents a hazard due to the possibility of static sparks being formed in the presence of flammable anesthetic-air mixtures.

Tests indicate that these restraint straps in lengths used in hospital operating rooms are sufficiently electrically conductive to equalize electrostatic charges between electrical conductors connected thereby.

As oil is injurious to rubber compounds and impairs the electrical conductive properties of these materials, contact with oil should be avoided.

The basic standard used to investigate products in this category is UL 1067, “Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electrically Conductive Restraint Straps Relating to Hazardous Locations.”

SURGE PROTECTORS AND ISOLATORS FOR USE ON CATHODICALLY PROTECTED SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (VZQO)

GENERAL
This category covers surge protectors and isolators used to provide AC grounding and DC blocking for cathodic protection of underground pipelines and similar installations in hazardous locations. They may also be used to minimize galvanic corrosion between structures of dissimilar metals.

These devices have been investigated for providing effective grounding path characteristics as noted in the 1999 National Electrical Code, Section 250-2(d). Additionally, these devices have been investigated for providing isolation of objectionable DC ground currents as noted in the 1999 National Electrical Code Section 250-6(e). Manufacturers of these devices provide installation instructions and maintenance information to assure proper installation and continuous protection of the equipment.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Surge Protector for Use in Hazardous Locations,” “Overvoltage Protector for Use in Hazardous Locations,” “Polarization Cell Replacement Unit for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

SWITCHES FOR USE IN HAZARDOUS LOCATIONS (WQNV)

Switches rated in horsepower have been tested with respect to interruption of the maximum operating overload current of motors of the same horsepower and voltage ratings. When rated in amps and volts only the switches have not been investigated with respect to use in motor circuits.

SWITCHES, CLOCK OPERATED FOR USE IN HAZARDOUS LOCATIONS (WRBT)

Clock-operated switches listed with horsepower ratings are tested at rated voltage and at six times motor full load running current for ac ratings and at ten times motor full load running current for dc ratings.

Clock-operated switches listed with pilot duty ratings are intended for control of electromagnetic loads, such as a solenoid of a motor controller or electrically operated valve, and are tested with an appropriate electromagnetic load.

The basic standard used to investigate products in this category is UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment For Use In Hazardous (Classified) Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Clock Operated Switch (or other appropriate product name) for Use in Hazardous Locations.”

ENCLOSED SWITCHES FOR USE IN HAZARDOUS LOCATIONS (WRPR)

This category covers enclosed switches either with or without fuse holders for plug or cartridge fuses.

Ratings of listed enclosed switches for hazardous locations are limited to 3600 amp, 500 hp, 600 v.

Enclosed switches with horsepower ratings in addition to amp ratings are suitable for use in motor circuits as well as for general use. Enclosed switches with amp rating are intended for general use.
Enclosed switches as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire in circuits rated 100 amp or less, and the use of 75 C wire for higher amp rated circuits.

Enclosed motor circuit switches and enclosed switches with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full load running current for alternating current ratings and at four times motor full load running current for direct current ratings.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Enclosed Switch For Hazardous Locations".

SWITCHES, MISCELLANEOUS FOR USE IN HAZARDOUS LOCATIONS (WTEV)

Switches in this category are not fixed. The suitability of miscellaneous switches for use on high capacity circuits has not been investigated.

Miscellaneous switches with amp ratings are intended for general use. Switches with horsepower ratings are suitable for use in motor circuits.

Miscellaneous switches listed with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full load running current for a-c ratings and at four times motor full load running current for d-c ratings.

The basic standard used to investigate products in this category is UL 610, "Industrial Control Equipment for Use in Hazardous (Classified) Locations".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Snap Switch for Use in Hazardous Locations".

TANK MONITORING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (WWQS)

This category covers tank monitoring equipment, including control units, indicators, sensors, transmitters, liquid level probes and auxiliary devices used for tank monitoring or as part of tank monitoring systems.

Certain products in this category are associated apparatus and are intended for installation in nonhazardous locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous location.

The basic standards used to investigate products in this category are UL 1203, "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations", UL 913, "Intrinsically Safe Protective Equipment for Use in Hazardous Locations (Classified) Locations", UL 911, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations", UL 1604, "Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations for Use in Hazardous Locations, as appropriate."
TELEPHONES FOR USE IN HAZARDOUS LOCATIONS (WZAT)

USE AND INSTALLATION

This category covers telephones, sound-powered telephones, and communication equipment and systems. Unless identified as intrinsically safe or for use in Division 2 locations only, the equipment is of the explosion-proof design.

The hand set and cord assembly should be carefully inspected and should be replaced if there is any evidence of damage or deterioration.

The equipment should be installed in accordance with the installation instructions provided with the product and in accordance with NFPA 70, “National Electrical Code.”

Station equipment, power supply equipment, protectors, and other equipment as detailed in the installation instructions should be located outside the hazardous area.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Telephone for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

TELEPHONE ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS (WZOR)

USE

This category covers dialing units, push-button stations, relays, snap switches, and also conduit boxes having terminal blocks for connection to telephone sets.

ADDITIONAL INFORMATION

For additional information, see Telephones for Use in Hazardous Locations (WZAT) and Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Telephone Accessory for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

TEMPERATURE-INDICATING AND REGULATING EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS (XBDV)

Temperature-indicating and regulating equipment is listed with a maximum rating of 600 v.

These devices respond directly or indirectly to changes in temperature, humidity, or pressure to effect temperature control, or equipment or appliance operation, etc.

Controls intended for across-the-line motor starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for alternating current motor ratings and at ten times motor full load running current for direct current motor ratings.

A switching device rated in “pilot duty” is intended for control of electromagnetic loads, such as the solenoid of a motor controller or electrically operated valve, and is tested with an appropriate electromagnetic load.

A control rated in amps is tested with an inductive (75-80 per cent power factor) load for alternating current ratings unless a noninductive rating is specified, and with a noninductive load for a direct current rating.

The listings of motor operators do not include valves or other connected mechanical loads.

The Thermostats in the following listings can be adjusted, or are preset to operate at various temperature settings. The exterior surfaces of the equipment to which the thermostats, or remote bulbs of the thermostats, are attached should not exceed the maximum safe temperature for the hazardous locations involved.

Equipment marked “rain tight” has been subjected to tests designed to simulate exposure to a beating rain to determine that such exposure will not result in entrance of water.

The basic standards used to investigate products in this category are UL 873, “Temperature-Indicating and -Regulating Equipment”, and UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Thermostat for Use in Hazardous Locations”, “Temperature-Indicating Equipment for Use in Hazardous Locations”, “Temperature-Indicating Equipment (Associated Apparatus)” or other appropriate product name as shown in the individual Listing.

TIME-INDICATING AND RECORDING APPLIANCES FOR USE IN HAZARDOUS LOCATIONS (XIAZ)

Electric clocks and chart drivers are included under this category.

The basic standards used to investigate products in this category are UL 1203, “Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations”, and UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for use Class I, II and III Division 1, Hazardous Locations”, as appropriate.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Clock for Use in Hazardous Locations” or other appropriate product name.

TIRES, ELECTRICALLY CONDUCTIVE RUBBER, INDUSTRIAL, RELATING TO HAZARDOUS LOCATIONS (XJCV)

These solid industrial tires are made of electrically conductive rubber specially developed and compounded to have an electrical conductivity adequate to dissipate static electricity readily. The conductive rubber tires are vulcanized to metal rims or wheels. They are intended for use on industrial trucks which may be operated in hazardous locations where static sparks would introduce a fire and explosion hazard.

In order for static charges to pass from equipment fitted with the tires, it is necessary that the various parts of the equipment be conductive, and electrically connected together, and that the equipment be operated on an adequately conductive surface or flooring. (See listings under classification, flooring, electrically conductive).

Liquid gasoline and oil are injurious to rubber compounds, and impair the electrically conductive properties of these tires. Accordingly, contact of the tires with liquid gasoline or oil, and the use of floor oils and oily sweeping compounds, should be avoided. Insulating floor waxes should not be used.
The basic standards used to investigate products in this category are UL 583, “Electric Battery Powered Industrial Trucks”, and UL 1067, “Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number and the product name “Electrically Conductive Rubber Industrial Tire Relating to Hazardous Locations”.

TOOLS FOR USE IN HAZARDOUS LOCATIONS (XKVL)

PORTABLE ELECTRIC TOOLS FOR USE IN HAZARDOUS LOCATIONS (XKWH)

USE

This category covers cord-connected and battery-operated power tools intended for securing fasteners. This category does not cover tools such as drills, grinders, circular saws or other equipment that, under normal operation, may produce sparks or hot surfaces. The load on certain tools varies within a wide range. Accordingly, the amp rating marked on such a tool may not be the maximum current that can be drawn by the tool under normal use conditions, but is rather an indication of the thermal capacity of the motor employed. It is indicative of the loading to which the tool may be continuously subjected without causing overheating. This category does not cover attachments such as grinding wheels, sanders, polishers or other attachments that may be offered by the manufacturer to perform operations other than intended by the design of the basic tool.

The use of some tools involves certain inherent hazards related to the risk of injury that cannot be wholly eliminated by practical design features. Such hazards have been reduced to an acceptable degree in the Listed tools.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic hazardous (classified) locations standards used to investigate products in this category are UL 1604, “Electrical Equipment for Use in Class I and II, Division 1 and 2 Hazardous Locations,” and UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations,” as appropriate.

The basic unclassified (ordinary) locations standards used to investigate products in this category are UL 745-1 and UL 745-2-XX, “Portable Electric Tools” and/or UL 745-3 and UL 745-4-XX, “Portable Battery-Operated Tools.” “XX” identifies the number of the standard that contains the particular requirements for a specific type of tool.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “General Purpose Transformer for Use in Hazardous Locations,” “Industrial Control Transformer for Use in Hazardous Locations,” “Air Cooled Reactor for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings. The transformer may be abbreviated “XFRM,” “XFRMR” or “XFORMER.”

TRANSFORMERS, DISTRIBUTION, LIQUID-FILLE Type. OVER 600 V FOR USE IN HAZARDOUS LOCATIONS (XLP)

USE

This category covers liquid-filled, distribution type, pad-mounted and substation type transformers, 69 kV class or less, single- and three-phase. Both the primary and secondary voltage ratings may be greater than 600 V. The transformers may be provided with surge arresters. These transformers may be provided with fan cooling accessories. The use of a fan cooling accessory permits the transformer to experience temporary overloads without exceeding the maximum temperature rating of the transformer insulation system. Transformers equipped with a fan cooling accessory are marked to indicate that they must be connected to an attended annunciator device and that provision must be made for automatic load shedding in the event of overtemperature. The type of liquid used is identified on the transformer nameplate. Additional information on the fluid used is provided in Material Safety Data Sheets (MSDS Sheets) available from the transformer manufacturer. These transformers are intended for installation in accordance with the requirements of NFPA 70, “National Electrical Code.”

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

REQUIREMENTS

The basic unclassified (ordinary) locations standard used to investigate products in this category is IEEE C57.12.00-1987, “Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers”. Additional standards used to investigate pad-mounted types are ANSI C57.12.22-1989, “Standard for Transformers - Pad-Mounted, Compartment-Type, Self-Cooled, Three-Phase Distribution Transformers with High-Voltage Bushings, 2500 kVA and Smaller: High Voltage, 34,500Grd/19,920 Volts and Below; Low-Voltage, 480 Volts and...

The basic hazardous (classified) locations standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Extrication-Proof and Dust-Ignition-Proof Equipment for Use in Explosive Locations.” UL 1449, “Devices for Use in Class I, Division 1, and III, Division 1, Hazardous (Classified) Locations.” UL 1850, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” as control number, and the product name “Liquid-Filled Distribution Transformer for Use in Hazardous Locations.” The word “Transformer” may be abbreviated “XFM,” "XFRM" or "XFORMER."

TRUCKS, INDUSTRIAL, TYPE EX FOR USE IN HAZARDOUS LOCATIONS (XXGV)

GENERAL

This category covers electric battery powered trucks provided with safety guards against fire, electric shock, and explosion hazards. The trucks are intended to be used in hazardous (classified) locations.

Electrical equipment for use in Class I hazardous locations, as defined in NFPA 70, “National Electrical Code” (NEC), is tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors with air, as follows: Class I Group D - Atmospheres containing acetone (glacial), acetonitrile, ammonia, benzene, butane, 1-butanol (butyl alcohol), 2-butanol (secondary butyl alcohol), n-butyl alcohol, isobutyl alcohol, sec-butyl alcohol, di-isobutylene ethane, ethanol (ethyl alcohol), ethyl acetate, ethyl acrylate (inhhibited), ethylene diamine (anhydrous), ethylene dichloride, gasoline, heptanes, hexanes, isoprene, isopropyl ether, mesitylene, methanol (natural gas), methanol (methyl alcohol), 3-methyl-1-butanol (isomyl alcohol), methyl ethyl ketone, methyl isobuty ketone, 2-methyl-1-propanol (isobutyl alcohol), 2-methyl-2-propanol (tertiary butyl alcohol), petroleum naphtha, pyridine octanes, penane, 1-pentanol (amyl alcohol), propane, 1-propanol (propyl alcohol), 2-propanol (isopropyl alcohol), propylene, styrene, toluene, vinyl acetate, vinyl chloride or xylenes.

Dust-explosion-proof electrical equipment for use in Class II hazardous locations, as defined in the NEC, is tested with respect to safety of operation in the presence of combustible dusts in air, as follows: Class II Group G - Atmospheres containing flour, starch, or grain dusts.

Explosion-proof types of devices classified for use in Class I locations are not necessarily acceptable for Class II locations as they may not be dusttight or operate at a safe temperature when blanketed with dust.

Equipment classified in Class I hazardous locations is also suitable for use in Class III locations, except fan cooled type motors where there is a very large amount of lint or combustible flyings which are liable to choke or clog the air passage of the motor.

Class III locations are defined in the NEC as those which are hazardous because of the presence of easily ignitable fibers or flyings, but in which such fibers or flyings are not likely to be in suspension in air in quantities sufficient to produce ignitable mixtures.

2005 GENERAL INFORMATION FROM HAZARDOUS LOCATIONS EQUIPMENT DIRECTORY - PART I

2005 GENERAL INFORMATION FROM HAZARDOUS LOCATIONS EQUIPMENT DIRECTORY - PART I

Unless otherwise indicated, equipment classified for one or more of the hazardous location groups is suitable for use in Divisions 1 and 2 locations as defined in the NEC and in unclassified (ordinary) locations.

The basic standard used to investigate products in this category is UL 583, “Electric Battery Powered Industrial Trucks.”

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

- AS TO FIRE, ELECTRIC SHOCK, AND EXPLOSION HAZARDS - CLASS GROUP , HAZARDOUS LOCATIONS ONLY TYPE EX INDUSTRIAL TRUCK

STORAGE BATTERIES, TRUCKS, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (XXIV)

These are storage batteries for use with Type EX industrial trucks. They are provided with explosion-proof and/or dust-ignition-proof fuse enclosure and interlock switches to prevent insertion or withdrawal of the battery while the plug under load.

The basic standard used to investigate products in this category is UL 583, “Electric Battery Powered Industrial Trucks.”

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify Storage Batteries which have been produced under its Classification and Follow-Up Service.

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.

AS TO FIRE, ELECTRIC SHOCK, AND EXPLOSION HAZARDS ONLY CLASS GROUP , HAZARDOUS LOCATIONS, ELECTRIC TRUCK STORAGE BATTERY

TUBING AND HOSE, ELECTRICALLY CONDUCTIVE, RELATING TO HAZARDOUS LOCATIONS (YDGZ)

This category includes tubing and reinforced hose of electrically conductive plastic or natural or synthetic rubber for conveying gases or vapors in flammable anesthetizing locations where it is necessary for safety to avoid accumulation of static electricity. Unless otherwise indicated with the product they are for use with air of anesthetic-air mixtures at comparatively low pressure.

Tests indicate that this tubing and hose in lengths used in flammable anesthetizing locations is sufficiently electrically conductive to equalize electrostatic charges between electrical conductors connected thereby.
The basic standard used to investigate products in this category is UL 1067, “Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Electrically Conductive Hose Relating to Hazardous Locations” or “Electrically Conductive Tubing Relating to Hazardous Locations”.

**TUNNEL DRILLING GUIDANCE SYSTEMS FOR USE IN HAZARDOUS LOCATIONS (YDUE)**

**USE**

This category covers tunnel drilling guidance systems consisting of instruments for indication, monitoring and/or recording of level, direction and inclination of tunnel drilling machines and the like.

Intrinsically safe systems have been investigated on the basis that all equipment connected to the system is Listed as part of the system unless otherwise indicated and is used as intended.

**INSTALLATION**

This equipment is intended to be installed in a “controlled area” as defined by ANSI Z136.1, “Safe Use of Lasers”, where access is limited to trained operator and service personnel. This equipment is intended to be provided with a marking or installation instructions which state, “To be installed only in a Controlled Area” or similar wording.

With regard to laser radiation hazards, the final installation site location and compliance with final installation site location requirements have not been investigated. The United States Occupational and Safety Act (OSHA) requires the final installation site facility to be in compliance with ANSI Z136.1. ANSI Z136.1 requires the final installation site facility to employ a Laser Safety Officer (LSO) adequately trained in laser safety. It is the responsibility of the LSO to ensure this equipment is installed and operating in compliance with ANSI Z136.1. However, equipment covered under this category has been determined to incorporate all provisions for final installation site location requirements, for example, a remote interlock connector is required, and equipment covered under this category has been determined to incorporate a remote interlock connector. It is the responsibility of the final installation site LSO to ensure the remote interlock connector is connected, operational, and functioning as required.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division I, Hazardous Locations”, UL 1203, “Explosion-Proof and Dust-Ignition Proof Electrical Equipment for Use in Hazardous (Classified) Locations”, and UL 1604, “Electrical Equipment for Use in Class I and Class II, Division 2, and Class III Hazardous (Classified) Locations”, as appropriate.

The basic nonhazardous locations standard used to investigate products in this category is UL 508, “Industrial Control Equipment”.

**Laser radiation hazards** – United States 21 Code of Federal Regulations (21CFR) Parts 1010 and 1040, or, as an alternative, the 21CFR Parts 1010 and 1040 utilizing CDRH Laser Notice 50 (LN50), or, as an alternative, 21CFR Parts 1010 and 1040 with an approved variance, by the Director of the CDRH, to the International Electrotechnical Commission, IEC 60825-1, with Amendment 1 and Amendment 2, “Safe Use of Laser Products.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Tunnel Drilling Guidance System for Hazardous Locations.”

**VALVES, ELECTRIC FOR USE IN HAZARDOUS LOCATIONS (YTSX)**

These are electrically operated valves, which for the purpose of listing, are designated as General Purpose Valves or as Safety Valves. Such valves that may be equipped with complementary or optional mechanical actuators are also included in this classification.

**2005 GENERAL INFORMATION FROM HAZARDOUS LOCATIONS EQUIPMENT DIRECTORY - PART I**

A General Purpose Valve is one intended to control the flow of a fluid, but is not to be depended upon to act as a safety valve. It may be a normally closed or normally open valve. (Such valves were designated Shut-Off Valves heretofore). A Safety Valve is a normally closed valve of the “On” and “Off” type intended to be actuated by a safety control or an emergency device to prevent the unsafe delivery of a fluid. It may also be used as a general purpose valve. (Such valves were designated Shut-Off Valves heretofore). A multiple port valve may be designated as a Safety Valve only with respect to its normally closed port.

Unless otherwise indicated, these valves are for connection to rigid conduit in an ambient temperature normally prevailing in habitable spaces and for handling fluids at a temperature not exceeding 25 C (77 F). The indentification of the specific fluid(s) for which the valve is Listed, along with the fluid temperature and ambient temperature ratings, is included in installation instructions, shown on the smallest carton in which the valve is packaged, or marked on the valve or on a tag attached to the valve.

The basic standard used to investigate products in this category is UL 1002, “Electrically Operated Valves for Use in Hazardous Locations, Class I, Groups A, B, C, and D, Class II, Groups E, F, and G.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “General Purpose Valve for Hazardous Locations” or “Safety Valve for Hazardous Locations.”

**VENTILATORS, POWER FOR USE IN HAZARDOUS LOCATIONS (ZANE)**

This category covers roof and wall mounted power ventilators and duct fans consisting of an impeller and motor installed in a housing. Roof and wall mounted power ventilators have a weather resistant housing and are supported by a weather resistant base intended to fit, usually by means of a curb, over a wall or roof opening.

Duct fans intended to move heated air are investigated to determine the effect of heated air on electrical components and are marked with the maximum temperature of the air.

These ventilators are intended for industrial use and are for the purpose of ventilation only. These ventilators consist of exhaust type and makeup air type devices. Makeup air type ventilators are not equipped for evaporative cooling.

Power ventilators intended for use where they will be exposed to weather are investigated to determine the effect of rain on electrical components.

These ventilators have not been investigated for installation in fire walls or from the standpoint of their effect on venting in case of fire. Their location should be determined after consultation with Authorities Having Jurisdiction.

These ventilators are not intended for the primary removal of grease-laden vapors and residues over restaurant cooking appliances.

Metallic impellers are constructed of medium brass or aluminum, with a hardness not over Rockwell B66. Belt-driven power ventilators are evaluated for the potential risk of ignition from temperature as a result of belt slippage.

Equipment in this category consists of an assembly of UL Listed, Classified and Recognized parts for use in hazardous locations. The basic standards used to investigate equipment in this category are the applicable hazardous locations standards for the parts of the assembly and UL 705, “Power Ventilators.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Power Ventilator for Use in Hazardous Locations”, or other appropriate product name as shown in the individual Listing.

**ELECTRICAL INDUSTRIAL VIBRATORS FOR USE IN HAZARDOUS LOCATIONS (ZBRX)**

**USE AND INSTALLATION**

This category covers devices designed to produce controlled vibration by electromagnetic means or motor rotor eccentrics, and that have provisions...
for mounting to impart the vibrating motion to industrial material handling equipment such as sieves and hoppers.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 674, “Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Industrial Vibrator for Hazardous Locations,” “Industrial Vibrator-Motor for Hazardous Locations.”

**VISCOMETERS FOR USE IN HAZARDOUS LOCATIONS (ZCFV)**

**USE AND INSTALLATION**

This category covers portable instruments for determining viscosities of fluids in locations where specified flammable gases or vapors may be present.

---

**2005 GENERAL INFORMATION FROM HAZARDOUS LOCATIONS EQUIPMENT DIRECTORY - PART I**

The flexible cord connected to the units should be frequently inspected and replaced when necessary.

Authorities Having Jurisdiction should be consulted with regard to conditions under which these portable devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

**UNEVALEUATED FACTORS**

The use and reliability of these devices for measuring viscosities of fluids have not been investigated.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations (AAIZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are UL 913, “Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations,” UL 1203, “Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations” and UL 1604, “Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations,” as appropriate.

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Viscometer for Use in Hazardous Locations.”
2005 General Information from Hazardous Locations Equipment Directory - Part II

PART III
Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ)

GENERAL

Electrical equipment intended for use in and relating to Class I, Zone 0, 1 and 2 hazardous locations has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of Article 505 of ANSI/NFPA 70, “National Electrical Code” (NEC). Attention is called to the limitations of the Listings and Classifications specified in the general Guide Information for each product category, such as current, voltage, horsepower limits, markings, special descriptions and installation provisions.

Unless equipment is identified in 1) the product category title as relating to Class I, Zone 0, 1 and 2 hazardous locations or 2) the individual Listing as apparatus for use in unclassified (ordinary) locations, all product categories contain electrical equipment for use in Class I, Zone 0, 1 and 2 hazardous locations.

HAZARDOUS LOCATIONS — GENERAL INFORMATION

Class I hazardous locations, as defined in the NEC, are locations where fire or explosion hazards may exist due to the presence of flammable gases, vapors, or flammable liquids. Equipment specifically investigated for hazardous locations is identified by a single Class (Class I) that is divided into Zones (0, 1 and 2) and gas Groups (IIA, IIB and IIC), as described in Article 505 of the NEC. Essentially, if the location has a flammable or combustible atmosphere present continuously or for long periods of time, it is a Zone 0 location. If the atmosphere is flammable or combustible and likely to exist under normal conditions, it is a Zone 1 location. If the atmosphere of flammable or combustible gases or vapors is not likely to exist in normal operation, it is a Zone 2 location.

Protection against explosion in hazardous locations requires that all equipment that could be exposed to the flammable or combustible atmospheres be of a type suitable for installation in such locations. The Class, Zone and Groups for which equipment has been Listed or Classified is shown in the individual Listings and Classifications under the respective categories and is marked on the equipment itself.

Protection Techniques

Equipment for use in Class I, Zone 0, 1 or 2 locations may employ one or more of the following protection techniques:

<table>
<thead>
<tr>
<th>Area Classification</th>
<th>Protection Technique</th>
<th>Protection Technique Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 0</td>
<td>Intrinsically safe (2 fault)</td>
<td>ia</td>
</tr>
<tr>
<td>Zone 0</td>
<td>Intrinsically safe (1 fault)</td>
<td>ib</td>
</tr>
<tr>
<td>Zone 0</td>
<td>Flameproof</td>
<td>d</td>
</tr>
<tr>
<td>Zone 1</td>
<td>Purged and pressurized</td>
<td>p</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Increased safety</td>
<td>o</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Encapsulation</td>
<td>e</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Powder filling</td>
<td>m</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Zone 1</td>
<td>q</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Nonsparking</td>
<td>nA</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Sparking with protected contacts</td>
<td>nC</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Restricted breathing</td>
<td>nR</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Associated apparatus with I.S. connections for Zone 0 (2 fault)</td>
<td>[ia] [2 fault]</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Associated apparatus with I.S. connections for Zone 1 (1 fault)</td>
<td>[ib] [1 fault]</td>
</tr>
</tbody>
</table>

Intrinsically Safe — Equipment in which any spark or thermal effect produced under normal or fault conditions is incapable of causing ignition of the atmosphere. See Intrinsically Safe Circuits and Apparatus, and Associated Apparatus below for more information.

Flameproof — The enclosure of the equipment will withstand an internal explosion, and prevent passage of flame to the surrounding atmosphere. Care must be taken to maintain the length and clearance (gap) of flameproof joints in service.
Purged and Pressurized — A protective inert gas is maintained inside the equipment enclosure at a pressure above that of the surrounding atmosphere, in order to prevent ingress of the explosive gas or vapor.

Oil Immersion — Arcing contacts are immersed in a protective liquid.

Increased Safety — The equipment contains no normally arcing parts, and additional measures (such as larger spacings between wiring connections) are taken to prevent the possibility of high temperatures or sparks. A minimum IP rating of IP 54 is required.

Encapsulation — Arcing contacts are completely surrounded by an encapsulating material.

Powder Filling — Arcing contacts are surrounded by a filling material (glass or quartz powder).

Nonsparking — The equipment has no normally arcing parts or thermal effects capable of ignition.

Sparking with Protected Contacts — Arcing contacts are in nonincendive circuits, or are inside a hermetically sealed container or sealed device.

Restricted Breathing — The enclosure relies on tight seals and gaskets to prevent diffusion of the explosive atmosphere into the equipment enclosure. Provision for checking that the restricted breathing properties of the enclosure are maintained is provided.

The one- or two-letter identification of the protection technique is marked on the product. Products employing multiple protection techniques will be marked with all applicable identifications. A control station containing a flameproof switch and an encapsulated pilot light, mounted in an increased safety enclosure, would be marked with all three protection techniques “edm.”

Environmental Considerations

Unless the equipment is marked otherwise, it is to be used indoors where severe corrosive conditions are not likely to be present. Equipment investigated for severe environmental conditions will be marked with an enclosure type designation or other designation indicating the suitability of the equipment in different environments. See Enclosure Considerations for All Equipment below for more information.

Ambient Temperatures

Unless the equipment is marked otherwise it has been investigated only for use under normal atmospheric conditions in an ambient temperature within the range of -20°C (-4°F) to +40°C (+104°F). Use of flameproof equipment under conditions of higher than normal atmospheric pressure or oxygen partial pressure, use in artificial atmospheres, and use under conditions of excessively high ambient temperatures can increase the likelihood of ignition of flammable atmospheres. In addition, low ambient temperatures may increase explosion pressures developed within the equipment. Plastic parts of enclosures or encapsulating materials may not maintain their integrity in excessively high or low ambient, unless marked otherwise.

Overload Protection

Equipment should be installed in circuits with overload and short-circuit protection for established ratings. The ampere or wattage marking on power consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Enclosure Modification and Maintenance

The integrity of an enclosure must be maintained. Making holes (other than conduit openings specified in the instructions) or alterations in the enclosure during installation may compromise the ability of a flameproof enclosure to contain an explosion. Most other protection techniques require a minimum IP rating and alterations in the enclosure may impair the enclosure’s ability to protect against ingress of contaminants or water. See Enclosure Considerations for All Equipment below for more information. Holding bolts and threaded parts must be screwed tight. The continued acceptability of the equipment will depend upon proper maintenance.

Gas Groups

The following paragraphs group flammable and explosive mixtures of specific gases and vapors in accordance with the NEC classifications. For a complete list of group classifications for Class I materials, see ANSI/NFPA 497, “Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas,” or IEC 60079-12, “Classification of Mixtures of Gases or Vapors with Air According to their Maximum Experimental Safe Gaps and Minimum Igniting Currents.”

Equipment for use in Class I, Zone 0, 1 and 2 hazardous (classified) locations, as defined in Article 505 of the NEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. For purposes of area classification, such mixtures have been grouped on the basis of their characteristics, as follows:

Class I, Group IIA — Atmospheres containing acetone, ammonia, benzene, butane, ethanol, gasoline, hexane, methane, methanol, naphtha, propane, or gases of vapors of equivalent hazard.

Class I, Group IIB — Atmospheres containing ethyl ether, ethylene, or gases or vapors of equivalent hazard.
Class I, Group IIC — Atmospheres containing hydrogen, acetylene, ethyl nitrate, or gases or vapors of equivalent hazard.

Divisions 1 & 2
A (acetylene)
B (hydrogen)
C (ethylene)
D (propane)

Zone 0, 1 & 2
IIC (acetylene and hydrogen)
II (ethylene)
IIA (propane)

Temperature Considerations

For equipment investigated for Class I, Zone 0, 1 and 2 hazardous locations the operating temperature is the maximum temperature of any external or internal surface to which the surrounding atmosphere has access, based on the protection method employed.

Equipment is required to be marked with the operating temperature or temperature class (T-code).

The marked temperature or temperature class shall not exceed the ignition temperature of the specific gas or vapor mixture to be encountered.

Intrinsically Safe Circuits and Apparatus, and Associated Apparatus

Intrinsically safe circuits and apparatus may be investigated for any or all of the Class I Zones and Groups as defined in the NEC. In an intrinsically safe circuit, the energy level available in the hazardous location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. To maintain the low energy levels, it is necessary that the intrinsically safe and associated apparatus be installed and interconnected in accordance with Articles 504 and 505 of the NEC and the instructions provided with the equipment.

Associated apparatus is apparatus in which the circuits are not necessarily intrinsically safe, but which affect the energy in the intrinsically safe circuits and which are relied upon to maintain intrinsic safety. Associated apparatus is not intended for use in hazardous locations unless use in hazardous locations is specifically indicated.

When interconnecting associated apparatus with equipment for use in the hazardous location, special attention should be paid to installation instructions, control drawings, or product markings which may limit the types of connections that are acceptable.

Equipment Relating to Hazardous Locations

Equipment relating to Class I, Zone 0, 1 and 2 hazardous locations includes electrical equipment not intended for installation in hazardous locations except for provision of certain intrinsically safe (low energy) circuit extensions as indicated in the Listings and Classifications.

Enclosure Considerations for All Equipment

Section 110.11 of the NEC directs that equipment shall not be used in damp or wet locations; locations where exposed to gases, fumes, vapors, liquids or other agents having a deteriorating effect on the equipment; or locations where exposed to excessive temperatures unless the equipment is identified for use in such environments. Section 300.6 of the NEC provides guidance regarding protection against corrosion. To assist inspection authorities, electrical equipment Listed or Classified for use in and relating to hazardous locations may be investigated for use in certain operating environments and marked with an enclosure type number or numbers. The following table summarizes the intended uses of the various enclosure types:

<table>
<thead>
<tr>
<th>Enclosure Type Number</th>
<th>Provides a Degree of Protection Against the Following Environmental Conditions*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indoor use, limited amounts of falling water</td>
</tr>
<tr>
<td>2</td>
<td>Outdoor use, undamaged by the formation of ice on the enclosure**</td>
</tr>
<tr>
<td>3R</td>
<td>Same as 3R plus windblown dust</td>
</tr>
<tr>
<td>3</td>
<td>Same as 3R plus windblown dust, external mechanisms remain operable while ice laden</td>
</tr>
<tr>
<td>4</td>
<td>Outdoor use; splashing water, windblown dust, hose-directed water, undamaged by the formation of ice on the enclosure**</td>
</tr>
<tr>
<td>4X</td>
<td>Same as 4 plus resists corrosion</td>
</tr>
<tr>
<td>5</td>
<td>Indoor use to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids</td>
</tr>
<tr>
<td>6</td>
<td>Same as 3R plus entry of water during temporary submersion at a limited depth</td>
</tr>
<tr>
<td>6P</td>
<td>Same as 3R plus entry of water during prolonged submersion at a limited depth</td>
</tr>
<tr>
<td>12, 12K</td>
<td>Indoor use, dust, dripping noncorrosive liquids</td>
</tr>
<tr>
<td>13</td>
<td>Indoor use, dust, spraying water, oil, and noncorrosive coolants</td>
</tr>
</tbody>
</table>

*All types of enclosures provide a degree of protection against ordinary corrosion and against accidental contact with the enclosed equipment when doors or covers are closed and in place. All types of enclosures provide protection against a limited amount of falling dirt.

**All outdoor type enclosures provide a degree of protection against rain, snow and sleet. Outdoor enclosures are also suitable for use indoors if they meet the environmental conditions present.

In some cases, individual appliances and equipment may be marked “Raintight” or “Rainproof” indicating that they have been subjected to a test designed to simulate exposure to beating rain. For equipment designated as “Raintight” such exposure will not
result in entrance of water. For equipment designated as “Rainproof” such exposure will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure.

Additionally or alternatively, IEC 60529, “Classification of Degrees of Protection Provided by Enclosures,” provides a system for specifying the enclosures of electrical equipment on the basis of the degree of protection provided by the enclosure (or IP rating) as follows:

<table>
<thead>
<tr>
<th>First Characteristics Numeral</th>
<th>Protection Against Ingress of Solid Foreign Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP0X</td>
<td>Not investigated</td>
</tr>
<tr>
<td>IP1X</td>
<td>50 mm diameter or larger</td>
</tr>
<tr>
<td>IP2X</td>
<td>12.5 mm diameter or larger</td>
</tr>
<tr>
<td>IP3X</td>
<td>2.5 mm diameter or larger</td>
</tr>
<tr>
<td>IP4X</td>
<td>1.0 mm diameter or larger</td>
</tr>
<tr>
<td>IP5X</td>
<td>Dust protected</td>
</tr>
<tr>
<td>IP6X</td>
<td>Distight</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Characteristics Numeral</th>
<th>Protection Against Ingress of Water with Harmful Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPX0</td>
<td>Not investigated</td>
</tr>
<tr>
<td>IPX1</td>
<td>Vertically dripping</td>
</tr>
<tr>
<td>IPX2</td>
<td>Dripping (15 degree tilted)</td>
</tr>
<tr>
<td>IPX3</td>
<td>Spraying</td>
</tr>
<tr>
<td>IPX4</td>
<td>Splashing</td>
</tr>
<tr>
<td>IPX5</td>
<td>Jetting</td>
</tr>
<tr>
<td>IPX6</td>
<td>Powerful jetting</td>
</tr>
<tr>
<td>IPX7</td>
<td>Temporary immersion</td>
</tr>
<tr>
<td>IPX8</td>
<td>Continuous immersion</td>
</tr>
</tbody>
</table>

Fittings at Supply Entries

Consideration should be given to the Type or IP rating of fittings used at supply entries. When the manufacturer supplies a fitting with the enclosure, enclosures are to be connected to the wiring system using the fitting provided. If no fitting is provided by the manufacturer, the fitting employed must meet or exceed the Type or IP rating of the enclosure, so that the assembly maintains its protection against contaminants.

Wiring Considerations for All Equipment

Appliances and Utilization Equipment Terminations — Except as noted in the general Guide Information for some product categories, most terminals, unless marked otherwise, are for use only with copper wire. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.” For Type of protection “e;,” increased safety, field wiring conductors shall be copper.

Except as noted in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits as specified in Table 310.16 of the NEC. If the termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Distribution and Control Equipment Terminations — Most terminals are suitable for use only with copper wire. Where aluminum or copper-clad aluminum wire can or shall be used (some crimp terminals may be Listed only for aluminum wire), there is marking to indicate this. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted in the following paragraphs or in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C ampacities for wire sizes 14-1 AWG, and 75°C ampacities for wire sizes 1/0 AWG and larger, as specified in Table 310.16 of the NEC.

Some distribution and control equipment is marked to indicate the required temperature rating of each field-installed conductor. If the equipment, normally intended for connection by wire sizes within the range 14-1 AWG, is marked “75°C” or “60/75°C,” it is intended that 75°C insulated wire may be used at full 75°C ampacity. Where the connection is made to a circuit breaker or switch within the equipment, such a circuit breaker or switch must also be marked for the temperature rating of the conductor.

A 75°C conductor temperature marking on a circuit breaker or switch normally intended for wire sizes 14-1 AWG does not in itself indicate that 75°C insulated wire can be used unless 1) the circuit breaker or switch is used by itself, such as in a separate enclosure, or 2) the equipment in which the circuit breaker or switch is installed is also so marked.

A 75 or 90°C temperature marking on a terminal (e.g., AL7, CU7AL, AL7CU or AL9, CU9AL, AL9CU) does not in itself indicate that 75 or 90°C insulated wire can be used unless the equipment in which the terminals are installed is marked for 75 or 90°C.
Higher temperature rated conductors than specified may be used if the size is based on the above statements.

**Copper-clad Aluminum Conductors** — Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

**Copper Pigtail Leads** — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

**Wiring Devices** — Supply terminals of 15 A and 20 A switches and receptacles not marked “CO/ALR” are for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked “AL/CU” are for use with copper conductors only. Terminals of switches rated 30 A and above marked “AL/CU” are for use with aluminum, copper, and copper-clad aluminum conductors.

**Wire Connectors** — Combinations of dissimilar conductors in terminals or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing. See also the information under Wiring Connectors and Soldering Lugs (ZMVV).

**Terminals** — Product terminals, including wire connectors and terminal screws are acceptable for connection of only one conductor, unless there is marking or a wiring diagram indicating the number of conductors which may be connected.

**Tightening Torque** — Some equipment may be marked to show a tightening torque for wire connectors intended for use with field wiring.

**Supply Cords** — When flexible supply cords or cord sets are replaced on utilization equipment, the replacement should be of the same type, AWG size, voltage rating and temperature rating as originally used.

**Seals in Conduit and Cable Systems** — Equipment with a factory-installed conduit seal is marked “Leads factory sealed” or equivalent wording. The absence of this marking indicates that the need for a field-installed seal in accordance with Section 501.16 of the NEC should be determined.

**Cautionary Statements and Instructions** — It is expected that the user shall strictly adhere to cautionary statements and other instructions appearing on the product and in accompanying literature.

### Standards and Protection Methods

The standards used to investigate these products address the risk of explosion associated with installation in a classified area, as well as the risk of fire and electric shock associated with any electrical equipment. The basic hazardous locations standards used to investigate these products with respect to risk of explosion are referenced below for the area classifications and protection methods shown. Note that for Zone 0 and Zone 1 equipment, ANSI/UL 60079-0, “Electrical Apparatus for Explosive Gas Atmospheres – Part 0: General Requirements,” is also applicable.

<table>
<thead>
<tr>
<th>Area Classification</th>
<th>UL Standard</th>
<th>Protection Method Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 0</td>
<td>ANSI/UL 60079-1, “Electrical Apparatus for Explosive Gas Atmospheres – Part 1: Intrinsic Safety ‘i’”</td>
<td>ia</td>
</tr>
<tr>
<td></td>
<td>ANSI/UL 60079-6, “Electrical Apparatus for Explosive Gas Atmospheres – Part 6: Oil Immersion ‘o’”</td>
<td>o</td>
</tr>
<tr>
<td></td>
<td>ANSI/UL 60079-18, “Electrical Apparatus for Explosive Gas Atmospheres – Part 18: Encapsulation ‘m’”</td>
<td>m</td>
</tr>
<tr>
<td>Zone 1</td>
<td>ANSI/UL 60079-12, “Electrical Apparatus for Explosive Gas Atmospheres – Part 1: Flameproof Enclosures ‘d’”</td>
<td>d</td>
</tr>
<tr>
<td></td>
<td>ANSI/UL 60079-4, “Electrical Apparatus for Explosive Gas Atmospheres – Part 4: Oil Immersion ‘o’”</td>
<td>o</td>
</tr>
<tr>
<td></td>
<td>ANSI/UL 60079-17, “Electrical Apparatus for Explosive Gas Atmospheres – Part 17: Flameproof Enclosures ‘d’”</td>
<td>d</td>
</tr>
</tbody>
</table>

The basic unclassified (ordinary) locations standard used to investigate these products with respect to risk of fire and electric shock is ANSI/UL 508, “Industrial Control Equipment” unless otherwise specified in the general Guide Information for each product category.
MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been investigated in accordance with the applicable requirements of UL, the United States Coast Guard (USCG), the American Boat and Yacht Council, Inc. (ABYC), and the National Fire Protection Association (NFPA). For additional information, see the general Guide Information for the specific product category. Equipment bearing UL’s Marine Mark is suitable for use only with stranded copper wire.

BOXES, JUNCTION AND PULL FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (BGYM)

This category covers sheet-metal boxes, cast-metal boxes, and nonmetallic boxes intended for making wiring connections only. All boxes in this category are for use with threaded rigid conduit or steel intermediate metal conduit, or other approved wiring methods in accordance with Section 505-15 of the NEC, NFPA 70.

Boxes identified with an enclosure type designation are intended for use as indicated in the guide information at the front of this Directory (AANZ).

Cast-metal boxes suitable for field drilling and tapping of holes for conduit connections and mounting are marked to indicate the location and the trade sizes of the openings either on the box or on the packaging carton. Cast-aluminum boxes suitable for use in concrete or cinder fill are marked to indicate this fact either on the box or on the packaging carton. Such boxes are protected with asphalt-base paint or the equivalent.

Where field installation of certain kinds of equipment is acceptable, which may include terminals, jumpers, busbars, conduit fittings, etc., the installation instructions provided with the product will specify the type, number and mounting arrangements for the equipment to be installed.

The basic ordinary location standard used to investigate products in this category is UL 50, “Enclosures for Electrical Equipment”, in conjunction with the Standards referenced in the main guide information (AANZ).

The Listing Mark on the product, or the UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number and one of the following product names: “Junction and Pull Box For Hazardous Locations”, “Junction Box For Hazardous Locations”, “Pull Box For Hazardous Locations”, or other appropriate product name.

CABLE FITTINGS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (CYMJ)

USE

This category covers cable termination fittings and combination cable termination and sealing fittings for threaded connection of cable to equipment in Class I, Zone 0, 1 and 2 hazardous (classified) locations as indicated in the individual Listings. The termination and sealing fittings are for use only with sealing compound as specified by the manufacturer in instructions furnished with the fitting.

These devices are intended for use in sealing the conductors and outer jackets of Listed cable of the type indicated in the individual Listings. No splices of conductors are intended to be made in the fitting. Restrictions on position and/or location of the sealing fitting are indicated in the manufacturer’s instructions.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Type + Cable Sealing Fitting for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings;

CAMERA EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (CYPB)

GENERAL

This category covers cameras and pan and tilt drives intended for use in Class I, Zone 0, 1 and 2 hazardous locations.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic hazardous locations standards used to investigate products in this category are specified in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 60065, “Audio, Video, and Similar Electronic Apparatus – Safety Requirements.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Camera for Use in Hazardous Locations” or “Pan and Tilt Drive for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

CONDUIT FITTINGS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (EBMB)

See also Outlet Boxes for use in Class I, Zone 0, 1 and 2 Hazardous Locations.

The following types of fittings are included in this category:

Conduit fittings for draining or venting are for mounting in existing conduit openings of conduit boxes and electrical devices. Fittings for draining or venting which do not mount in existing conduit openings, such as those with threads smaller than 1/2 in. trade size, are covered under the Component Recognition Program of Underwriters Laboratories Inc.

Conduit unions, 90 degree box connector type are for use at threaded openings of devices in accordance with requirements of the National Electrical Code.

Conduit unions, universal type box connector are for use at threaded openings of devices in accordance with requirements of the National Electrical Code and may be assembled at angle greater than 90 degrees.

Flexible connection fittings are substantial fittings having insulated inner wall and flexible-metal outer wall encased in metal braid. They are intended for use where it is necessary to employ flexible connections in threaded rigid conduit systems. Information on the minimum inside radius of bend for which these fittings have been investigated is provided with the fitting.

Prospective users should first ascertain from authorities having jurisdiction under what conditions these flexible connection fittings will be accepted. The use of flexible fittings should be avoided whenever possible. They should be used only when conditions are such that threaded rigid conduit cannot be used.

Conduit elbows and short radius capped elbows are intended for use where it is desirable to have a 90 degree bend and where wires may be guided when being pulled through the conduit line.

Cord connectors are intended for use in making connections between threaded rigid metal conduit systems or hazardous location devices and extra hard service type flexible cord, having a grounding conductor, for portable equipment.
Fittings which are raintight or concretetight are so marked, or this information is provided with the fitting.

Cast-aluminum alloy conduit fittings covered by these listings are not considered acceptable for installation in concrete or cinder fill, unless protected with asphalt-base paint or the equivalent.

The basic ordinary location standard used to investigate products in this category is UL 514B, “Fittings for Conduit and Outlet Boxes”, in conjunction with the Standards referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Conduit Fitting For Hazardous Locations” or other appropriate product name as shown in the individual Listing.

**CORROSION MEASURING EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (ELHN)**

**USE AND INSTALLATION**

This category covers corrosion measuring equipment, including control units, indicators, sensors, probes and auxiliary devices used as part of corrosion measuring systems.

Certain products in this category are associated apparatus and are intended for installation in unclassified (ordinary) locations. They are provided with intrinsically safe circuit(s) as indicated on the product, for extension into a hazardous (classified) location.

**UNEVALUATED FACTORS**

The accuracy of the equipment covered in this category has not been evaluated.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are identified in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Corrosion Measuring Equipment For Use in Hazardous Locations” or “Corrosion Measuring Equipment (Associated Apparatus)” or other appropriate product name as shown in the individual Listings.

**MARINE SHIPBOARD CABLE FITTINGS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (FDJR)**

This category covers cable termination fittings and combination cable termination and sealing fittings for threaded connection of marine shipboard cable to equipment in hazardous (classified) locations. The termination and sealing fittings are for use only with sealing compound as specified by the manufacturer in instructions furnished with the fittings. No splices of conductors are intended to be made in the fitting. Restrictions on application, position and/or location of the fitting are indicated in the manufacturer’s instructions.

These fittings are intended for use on mobile offshore oil rigs and drilling platforms. Investigations of these fittings include an evaluation for conformity to the installation and use provisions of Subpart 111.60 of the United States Coast Guard Electrical Engineering Regulations, Subchapter J (Title 46 CFR Parts 110 to 113 inclusive) as applied by the Authority Having Jurisdiction.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 2225, “Metal-Clad Cables and Cable-Sealing Fittings For Use in Hazardous (Classified) Locations,” in conjunction with the standards referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Marine Shipboard Cable Fitting For Use in Hazardous Locations” or “Marine Shipboard Cable Sealing Fitting For Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

**EMERGENCY LIGHTING EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (FTHR)**

This category covers automatic transfer switches designed for control of emergency lighting and power circuits in hazardous locations as required by Articles 500, 505 and 700 of the National Electrical Code. The lighting circuit ratings do not exceed 250 V for tungsten lamps. The investigation of automatic transfer switches includes the determination of their suitability for transferring the load from a normal supply circuit to an immediately available emergency supply circuit.

This category also covers Unit Equipment, but not separate lamp heads or lighting fixtures.

The basic ordinary location standard used to investigate products in this category is UL 924, “Emergency Lighting and Power Equipment”, in conjunction with the Standards referenced in the Main Guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Emergency Lighting Equipment For Use in Hazardous Locations”, “Emergency Fluorescent Lighting Fixtures for use in Hazardous Locations”, or other appropriate product name as shown in the individual Listing.

**ENCLOSURES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (FTQH)**

These enclosures are for use in one or more of the following hazardous locations, as indicated on the individual product, in accordance with the National Electrical Code: Class I, Zone 0, 1, and 2. Classification covers the enclosure only.

The basic standards used to investigate products in this category are referenced in the main guide information (AANZ).

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

Classified by Underwriters Laboratories Inc. as to explosion and fire hazard only. Enclosures for use in Hazardous Locations.

**ENCLOSURE ACCESSORIES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (FTQY)**

USE
2005 GENERAL INFORMATION FROM HAZARDOUS LOCATIONS EQUIPMENT DIRECTORY - PART II

This category covers enclosure bodies, flat, domed or window covers, threaded extensions, actuation mechanisms and similar subassemblies of enclosures. They are intended to be assembled at the factory or in the field to form a complete explosion-proof or dust-ignition-proof enclosure. Restrictions on the use and assembly of these devices are marked on each part.

RELATED PRODUCTS
See Enclosures for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FTQH).

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS
The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

ENCLOSURE ACCESSORY FOR USE IN HAZARDOUS LOCATIONS AS TO EXPLOSION AND FIRE HAZARD ONLY
Control No.

EXIT SIGNS AND EXIT APPLIANCES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (FWDD)

EXIT SIGNS AND MARKERS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (FWDJ)

USE

Exit signs that do not comply with the visibility requirements from 100 ft are marked with a maximum viewing distance of 50 or 75 ft, and are intended only for installation in corridors or rooms where the distance to the exit sign cannot exceed the marked maximum distance.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Exit Sign for Use in Hazardous Locations” or “Exit Marker for Use in Hazardous Locations.”

LUMINAIRE FITTINGS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (IHRV)

LUMINAIRE FITTINGS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (IHSN)

USE
This category covers subassemblies of luminaires intended for final assembly into luminaires in the field. Information or instructions are provided specifying the subassemblies that may be used to assemble a luminaire in the field.

2005 GENERAL INFORMATION FROM HAZARDOUS LOCATIONS EQUIPMENT DIRECTORY - PART II

Also included are conduit boxes and bodies with threaded hubs, adjustable hangers, and flexible luminaire fittings with threaded hubs, for support of luminaires. Information on restrictions in the use of these fittings and as applicable to the assembled luminaire is marked on the fittings or provided with the fittings.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 1598, “Luminaires,” in conjunction with the standards referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Fixed Fitting for Hazardous Locations,” “Luminaire Fitting for Hazardous Locations,” “Electric Lighting Fixture for Hazardous Locations When Completely Assembled With UL Listed Fixed Fittings for Hazardous Locations” or “Luminaire for Hazardous Locations When Completely Assembled With UL Listed Luminaire Fittings for Hazardous Locations.”

LUMINAIRE FITTINGS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (IHTF)

USE
This category covers incandescent lamp, fluorescent lamp, high intensity discharge lamp or surgical type luminaires for use in Class I, Zone 0, 1 and 2 hazardous locations.

Luminaires without guards should be used only where not subject to breakage.

Luminaires suitable for wet locations are so marked.

Luminaires marked “Suitable for use in suspended ceilings,” in combination with the Listing Mark, are intended to be mounted in openings of a suspended ceiling. They are marked with the minimum spacings between adjacent luminaires to side walls and to the structural ceiling above the luminaires. The space between the suspended ceiling and the structural ceiling must contain relatively unobstructed air space around the luminaires equal to the marked spacings. Fluorescent lamp type luminaires are suitable for end-to-end mounting. The test conditions do not anticipate external heat sources in the ceiling area such as steam pipes, heating ducts, and the like.

ADDITIONAL INFORMATION
For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 1598, “Luminaires,” in conjunction with the standards referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Lighting Fixture for Hazardous Locations” or “Luminaire for Hazardous Locations.”

FLASHLIGHTS AND LANTERNS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (IJRF)

Flashlights and lanterns Listed for any of the groups under Class I hazardous locations have been tested with respect to use in the presence of specific flammable gas or vapor-air atmospheres. The tests have been conducted using specific lamp and battery combinations. The lamp designation and the number, type, size and voltage of the batteries to be used are marked on the product.

Safety of operation in the presence of explosive mixtures may be endangered if replacement parts other than those specified on the product are used.

The basic standards used to investigate products in this category are referred in the main guide information, (AANZ).
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Flashlight for Use in Hazardous Locations” or “Lantern for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listing.

GAS AND VAPOR DETECTION EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (JLVG)

GAS AND VAPOR DETECTION EQUIPMENT CLASSIFIED FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (JLVV) USE

This category covers gas and vapor detectors and associated equipment used for detecting specific gases and vapors that may be present in the atmosphere incidental to operations or from accidental release and for determining the extent of such release. They may be (1) of the portable type powered by batteries, (2) intended for permanent installation in accordance with ANSI/NFPA 70, “National Electrical Code,” or (3) intended for installation in panel assemblies in accordance with the instructions provided.

These gas and vapor detectors have been investigated for risk of explosion, fire and electric shock only.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

ONLY AS TO INTRINSIC SAFETY FOR USE IN HAZARDOUS LOCATIONS

Control No. or

AS TO FIRE, ELECTRICAL SHOCK AND EXPLOSION HAZARDS

ONLY Control No.

HEATERS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (KHTG)

ELECTRICAL RESISTANCE HEAT TRACING CABLE SETS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (KIHP) USE

This category covers heat tracing cables intended for pipe line or vessel heat tracing.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 515, “Electrical Resistance Heat Tracing for Commercial and Industrial Applications,” in conjunction with the Standards referenced in AANZ.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Heat Tracing Cable Set for Use in Hazardous Locations” or “Heat Tracing Cable System for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listings.

HEATERS, INDUSTRIAL AND LABORATORY FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (KIOU) PRODUCT TYPES

This category covers paint heaters, ovens, hot plates, and other types of heaters as described in the individual Listings.

INSTALLATION INSTRUCTIONS

In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, the necessary instructions are marked on the equipment.

REQUIREMENTS

The basic ordinary locations standard used to investigate products in this category is UL 499, “Electric Heating Appliances,” together with the hazardous locations standards referenced in the main Guide Information (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listings and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “Listed,” a control number, and one of the following product names: “Industrial and Laboratory Heater for Use in Hazardous Locations,” “Industrial Heater for Use in Hazardous Locations,” “Laboratory Heater for Use in Hazardous Locations” or other appropriate product name as shown in the individual Listing.

INDUSTRIAL CONTROL EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (NWEX) USE

The Listing covers the following products:

- Control Panels and Assemblies
- Motor Controllers
- Programmable Controllers

Enclosed industrial control equipment is intended for use as indicated in the general guide information at the front of Part II of this directory. Industrial Control Equipment is for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

Industrial Control Equipment, for which accessory kits are available for the field or distributor modification of the basic product or which may be assembled in many forms from separate components are marked to indicate the suitable accessories or separate components which may be used.

If the rating of the operating coil circuit of a magnetically operated industrial control device exceeds 125 volt-amperes, the coil circuit rating is marked on the device.

Overload relays or industrial control equipment incorporating overload relays are identified as to their maximum tripping time at 600 per cent of the overload relay current element trip rating. The designations “Class 10, Class 20 and Class 30” are used to identify the maximum tripping times, with the Class number indicating the maximum tripping time in seconds. Overload relays with maximum tripping times of 10 or 30 seconds are marked Class 10 or Class 30 respectively. Overload relays with a maximum tripping time of 20 seconds may be marked Class 20. Overload relays with tripping times in excess of 30 seconds are marked with their maximum tripping times. All unmarked overload relays have a maximum tripping time of 20 seconds.

CONTROL PANELS AND ASSEMBLIES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (NWFA) USE AND INSTALLATION

This category covers control panels and assemblies consisting of enclosures and electrical components such as push button stations, pilot lights, motor controllers, and receptacles with plugs.

A single enclosure or a group of interconnected (modular) enclosures may be used for mounting the electrical components.
The enclosures making up a modular assembly are intended to be interconnected either at the factory or in the field by the user. Limitations on the interconnection of the enclosures are given on or with the product. Modular assemblies must be installed in accordance with the installation instructions provided with each part.

The electrical components are provided as part of the product and are intended to be installed either at the factory or in the field by the user. It is intended that wiring between the electrical components of modular assemblies be field installed.

Motor controllers incorporating thermal cutouts, thermal relays, or other devices for motor running overcurrent protection are considered to be suitably protected against overcurrent due to short circuits or grounds by fuses or circuit breakers (overcurrent protective devices) having ratings not in excess of four times the full load current of the motors with which they are intended to be used.

Overload units of motor controllers are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other Listed ratings in order that proper overload units may be furnished. Motor controllers intended for across-the-line starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for AC horsepower ratings and at 10 times motor full load running current for DC horsepower ratings.

Pilot lights without guards should be used only where not subject to breakage.

Receptacles with plugs included on Listed assemblies have been subject to endurance and overload operation tests in the presence of the specific flammable atmospheres for Class I locations. The plugs of the receptacle-plug combinations are for use with extra hard usage flexible cord with grounding conductor.

The flexible cord should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt, or other foreign material.

Authorities Having Jurisdiction should be consulted with regard to conditions under which these assemblies having receptacles with plugs will be permitted for use. It is recognized that portable equipment should be used only where necessary.

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic standards used to investigate products in this category are indicated in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: the name of the motor controller, disconnect means, short-circuit and ground-fault protection and overload protection, the functions may be provided by individual discrete components or be combined in a single controller unit. Motor controllers are marked “Combination Motor Controller” to signify that all of the motor branch circuit functions indicated above have been evaluated and are included in the Listing of the controller.

Combination motor controllers are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating. Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

The basic standards used to investigate products in this category are referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations”, “Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations”, “Industrial Control Equipment (or Ind. Cont. Eq.) for Use In Hazardous Locations”, or “Industrial Control Equipment Enclosure (or Ind. Cont. Eq.) For Use In Hazardous Locations or other appropriate product name as indicated in the individual Listing.” For rebuilt products, the product name is preceded by either “Reconditioned” or “Rebuilt.”

Combination Motor Controllers for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWFP)

This category covers combination motor controllers.

Combination motor controllers provide the motor branch circuit functions of motor controller, disconnect means, short-circuit and ground-fault protection and overload protection. The functions may be provided by individual discrete components or be combined in a single controller unit. Motor controllers are marked “Combination Motor Controller” to signify that all of the motor branch circuit functions indicated above have been evaluated and are included in the Listing of the controller. Combination motor controllers are marked with a short-circuit rating and are intended for connection to circuits in which the available fault current does not exceed the marked short-circuit rating. Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

The basic standards used to investigate products in this category are referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations”, “Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations”, “Industrial Control Equipment (or Ind. Cont. Eq.) for Use In Hazardous Locations”, or “Industrial Control Equipment Enclosure (or Ind. Cont. Eq.) For Use In Hazardous Locations or other appropriate product name as indicated in the individual Listing.” For rebuilt products, the product name is preceded by either “Reconditioned” or “Rebuilt.”

Magnetic Motor Controllers for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWFR)

Magnetic Across-The-Line Starters are listed under this category.

Safety of operation of oil immersed type starters will be endangered should the oil level be below the minimum shown by indicator. These devices should be installed with a Listed sealing fitting adjacent to each opening where threaded rigid conduit is connected.

Magnetic switches for controlling other than motor loads are Listed under Auxiliary Devices.

Enclosures furnished without mechanisms are marked to identify the mechanisms which should be used.

The basic standards used to investigate products in this category are referenced in the main guide information (AANZ).
2005 GENERAL INFORMATION FROM HAZARDOUS LOCATIONS EQUIPMENT DIRECTORY - PART II

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Hazardous Locations", "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosure for Use in Hazardous Locations", or "Industrial Control Equipment (or Ind. Cont. Eq.) Enclosures For Use In Hazardous Locations".

Manual Motor Controllers for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWFU)

Manual Across-the-Line Starters are covered in this category.

Overload units are marked for identification for the particular ratings for which controllers are furnished. The manufacturer should be consulted with regard to use of a controller for other Listed ratings in order that proper overload units may be furnished.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names: "Industrial Control Equipment (or Ind. Cont. Eq.) for Hazardous Locations" or "Industrial Control Equipment (or Ind. Cont. Eq.) For Use In Hazardous Locations" or other appropriate product name as shown in the individual Listings.

PROGRAMMABLE CONTROLLERS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (NWGD)

USE AND INSTALLATION

This category covers programmable industrial control systems for use in hazardous locations utilizing a programmable memory for internal storage of user oriented instructions for specific functions such as logic, sequencing, counting, and controlling various industrial equipment through digital or analog inputs or outputs. This category also includes power supplies, central processing units, input and output accessories, computer interfaces and programming or program diagnostic units associated with programmable control systems.

This category also covers programmable controllers and their accessories that have been reconditioned. Reconditioned programmable controllers and their accessories are factory reconditioned to the extent necessary by disassembly and reassembly using new or reconditioned component parts. The reconditioned programmable controllers and their accessories are subject to the same requirements as new programmable controllers and their accessories.

This category does not cover primary safety controls intended for programming and monitoring the operation of the burner on gas, gas-oil, or oil fired appliances.

ADDITIONAL INFORMATION

For additional information, see Industrial Control Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (NWEX) and Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Industrial Control Equipment for Use in Hazardous Locations" (or "Ind. Cont. Eq. for Use in Haz. Loc.") or "Industrial Control Equipment for Hazardous Locations" (or "Ind. Cont. Eq. for Haz. Loc.") or other appropriate product name as shown in the individual Listings.

For reconditioned products the product name is preceded by the word "Reconditioned", "Rebuilt", "Remanufactured" or "Refurbished.

INFORMATION TECHNOLOGY EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (NWHC)

GENERAL

This category covers information technology equipment for use in hazardous (classified) locations such as, but not limited to, personal computers, card readers and printers, rated 600 V or less, normally used in business establishments and other similar environments.

The equipment and appliances may be electromechanical and/or electronic.

SPECIAL CONSIDERATIONS

Card readers, badge readers and similar identification equipment covered under this category have not been investigated with respect to security or burglary resistance.

PHYSIOLOGICAL EFFECTS

The physiological effects of chemical substances used in or with this equipment have not been investigated.

The long-term characteristics or the possible physiological effects of radio frequency (RF) electromagnetic fields associated with this equipment have not been investigated. Hand-held transportable RF products that interconnect to the telecommunication network through RF transmitters/receivers are additionally investigated for short-term characteristics to ANSI/IEEE C95.1-1999, "Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.”

RELATED EQUIPMENT

Graphic display and touch panel equipment for information technology and telecommunications equipment is covered under Programmable Controllers for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (NWGD).

ADDITIONAL INFORMATION

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

REQUIREMENTS

The basic unclassified (ordinary) locations standards used to investigate products in this category are UL 60950 and UL 1950, “Safety of Information Technology Equipment,” in conjunction with the standards referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

The ability or reliability of these products to perform their intended function in a particular application has not been investigated.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Information Technology Equipment for Use in Hazardous Locations,” “IT.E. for Use in Hazardous Locations” or "Info. Tech. Equip. for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

INFORMATION TECHNOLOGY EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (NYPX)

USE

This category covers equipment intended primarily for the purpose of identifying, examining and investigating materials, and making measurements and tests such as might be associated with manufacturing processes and quality-control procedures.

UNEV ALUATED FACTORS

The accuracy of the equipment has not been evaluated.

REQUIREMENTS

The basic ordinary locations standard used to investigate products in this category is UL 3101-1, “Electrical and Measuring Test Equipment: Part 1: General Requirements”.

The basic hazardous locations standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Inspection Equipment for Hazardous Locations” or “Measuring Equipment for Hazardous Locations” or other appropriate product name as shown in the individual Listings.

**INTRINSICALLY SAFE EQUIPMENT AND SYSTEMS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (OEVX)**

This category covers products and systems which have been investigated as to intrinsic safety only, as it pertains to use in hazardous locations. Included are intrinsically safe products, intrinsically safe systems, associated apparatus with intrinsically safe circuit extensions, and other arrangements involving intrinsic safety as identified in the individual descriptions.

**LOOK FOR CLASSIFICATION MARK ON PRODUCT**

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories Inc. to identify products produced under its Classification and Follow-Up Service.

(Product Name) CLASSIFIED BY UNDERWRITERS LABORATORIES INC. ONLY AS TO INTRINSIC SAFETY FOR USE IN HAZARDOUS LOCATIONS (Control Number)

---

**MOTORS AND GENERATORS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (PRZA)**

**MOTORS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (PRZA)**

This category covers motors intended for use in Class I, Zone 0 and 1 hazardous (classified) locations.

The Listing Mark on a motor applies to the motor, but not to any equipment driving or driven by the motor. In the case of a motor generator set provided with a common base, the motor and generator each will bear its respective Listing Mark.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**REQUIREMENTS**

The hazardous (classified) locations standards used to investigate products in this category are indicated in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 1004, “Electric Motors.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Motor for Use in Class I, Zone 0, 1 and 2 Hazardous Locations.”

**MOTORS, SPECIALTY FOR USE IN CLASS I, ZONE 0, 1, AND 2 HAZARDOUS LOCATIONS (PRZM)**

**USE AND INSTALLATION**

This category covers specialty motors for use in Class I, Zone 0, 1, and 2 hazardous (classified) locations.

These motors are intended for installation and operation in accordance with the instructions provided for each motor by the manufacturer. These motors may require any or all of the following for proper operation: (1) special controllers, (2) special control circuitry, (3) atypical input voltage waveform, (4) atypical input current waveform. Refer to the operating instructions. These motors are not intended for across-the-line operation.

Unless otherwise marked, these motors are intended for use in ambient temperatures within the range of -20°C (+4°F) to +40°C (+104°F).

The Listing Mark on a specialty motor applies to the motor, but not any equipment driving or driven by the motor.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**REQUIREMENTS**

The basic hazardous (classified) locations standards used to investigate products in this category are indicated in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

The basic unclassified (ordinary) locations standard used to investigate products in this category is UL 1004, “Electric Motors.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Specialty Motor for Use in Hazardous Locations.”

---

**OUTLET BOXES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (QBBC)**

See also Conduit and Cable Fittings. Conduit Boxes are for use in threaded rigid conduit or steel intermediate metal conduit wire raceways, or other approved wiring methods in accordance with Section 505-15 of the NEC, NFPA 70 (1996). They provide for splicing of conductors but conductors should not be sealed in conduit boxes. The boxes are marked to indicate when accessories such as unions and sealing fittings are furnished with the box.

Boxes marked “rain tight” have been subjected to tests designed to simulate exposure to beating rain to determine that such exposure will not result in entrance of water. Cast-aluminum alloy outlet boxes are not considered acceptable for installation in concrete or cinder fill unless protected with asphalt base paint or the equivalent.

The Listing Mark of Underwriters Laboratories Inc. on the product or on the smallest unit container in which the product is packaged with or without the UL symbol on the product is the only method provided by UL to identify these products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Outlet Box for Hazardous Locations.”

**PANELBOARDS, LIGHT AND POWER FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (QFKR)**

**USE**

This category covers enclosed panelboards of the manually operable, air-break type, employing circuit breakers having automatic overload protection, and intended for lighting and low-capacity power distribution in Class I, Zone 0, 1 and 2 hazardous locations.

These panelboards are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Each marking is independent of any marking on terminal connectors and is on a wiring diagram or other readily visible location.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Enclosed Panelboard for Hazardous Locations” or “Enclosed Panel-
board for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

**PROCESS CONTROL EQUIPMENT FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (QVAJ)**

**USE AND INSTALLATION**

This category covers process control equipment consisting of instruments for measurement, recording and/or control of process variables, and auxiliary devices used therewith such as sensors, transducers and valve operators.

Equipment intended to be installed only in process control panels is so identified in the individual Listings. Such equipment is not intended for field installation.

Intrinsically safe systems have been investigated on the basis that all equipment connected to the system is listed as part of the system, unless otherwise indicated, and is used as intended.

Safety may be affected if the manufacturer’s installation instructions are not followed.

**RELATED PRODUCTS**

Equipment investigated for use only in hazardous (classified) locations of automotive and marine service stations is covered under Control, Monitoring and Auxiliary Equipment (EQXX).

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Process Control Equipment for Hazardous Locations,” “Process Control System for Hazardous Locations,” “Process Control Unit for Hazardous Locations,” “Process Control Equipment (Associated Apparatus),” “Process Control Unit (Associated Apparatus),” or other appropriate product name as shown in the individual Listings.

**RECEPTACLE-PLUG COMBINATIONS FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (RSUN)**

**RECEPTACLES WITH PLUGS INTERLOCKED WITH SWITCHES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (RSZD)**

Receptacles covered under this category are (1) completely assembled at the factory or (2) intended for final assembly in the field using components specified in the individual Listings. Final assembly of receptacles in the field is to be done in accordance with instructions provided with the product by the manufacturer. Care should be taken to ensure that minimum IP ratings are maintained for field assembled interlocked safety enclosures.

Receptacles with plugs interlocked with switches are constructed with interlocked switch and plug so that the plug cannot be withdrawn or inserted when the switch is closed. These devices have provision for connection of threaded rigid metal conduit or other suitable wiring method to the switch compartments. The plugs for use with Type S, SO, ST or STO flexible cord having a grounding conductor.

The flexible cord connecting to these devices should be frequently inspected and replaced when necessary. Terminal connections to the cord must be properly made and maintained. Safe use also depends on the maintenance of insulation at current-carrying parts of the plug and receptacle. The devices should, therefore, not be used where the insulation may be impaired by moisture, dirt or other foreign material.

Inspection authorities having jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only where necessary.

**REELS, CORD FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (SAOD)**

**USE AND INSTALLATION**

This category covers cord reels intended for use with extra hard usage cord, having a grounding conductor, for connecting portable electrical devices to supply lines. A terminal compartment is provided for connection to threaded rigid conduit systems. Authorities Having Jurisdiction should be consulted with regard to conditions under which these devices will be permitted for use. It is recognized that portable equipment should be used only when necessary.

The flexible cord should be inspected frequently and replaced when necessary. Terminal connections to the cord should be properly made and maintained.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 355, “Cord Reels,” in conjunction with the standards referenced in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Cord Reel for Use in Hazardous Locations.”

**SIGNAL APPLIANCES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (UXUQ)**

**AUDIBLE SIGNAL APPLIANCES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (UXVF)**

This category includes audible-signal devices, such as Bells, Sirens, and Horns.

Audible-signal devices Listed for use in any of the zones under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air.

The basic standards used to investigate products in this category are referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Audible Signal Appliance for Use in Hazardous Locations” or other appropriate product name.

**VISUAL SIGNAL APPLIANCES FOR USE IN CLASS I, ZONE 0, 1 AND 2 HAZARDOUS LOCATIONS (UXVU)**

This category includes visual-signal devices, such as Rotating Beacons and Strobe Lights.
Visual-signal devices Listed for use in any of the zones under Class I hazardous locations have been tested with respect to safety of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air.

The basic standards used to investigate products in this category are referenced in the main guide information under (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product name: “Visual Signal Appliance for Use in Hazardous Locations” or other appropriate product name.

---

**Solenoids for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (VAMH)**

This category includes solenoids for installation on valves. The solenoids are incomplete devices inasmuch as the plungers or pistons are intended to actuate an external valve or other equipment. These Listing cover the solenoid only and not the valve or other equipment to which the solenoids are mounted.

The basic standard used to investigate products in this category is UL 429, “Electrically Operated Valves” in conjunction with the Standards referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product name: “Solenoid for Use in Hazardous Locations” or other product name as indicated in the individual Listing.

---

**Sound Metering Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (VBYX)**

**USE AND INSTALLATION**

This category covers sound metering equipment that measures and stores the ambient noise levels in industrial areas.

Certain products in this category are associated apparatus and are intended for installation in unclassified (ordinary) locations. They are provided with intrinsically safe circuits as indicated on the product, for extension into a hazardous location.

**ADDITIONAL INFORMATION**

For additional information, see Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**REQUIREMENTS**

The basic standards used to investigate products in this category are identified in Equipment for Use in and Relating to Class I, Zone 0, 1 and 2 Hazardous Locations (AANZ).

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Noise Dosimeter for Use in Hazardous Locations,” “Sound Level Meter for Use in Hazardous Locations” or “Sound Level Meter (Associated Apparatus) for Use in Hazardous Locations,” or other appropriate product name as shown in the individual Listings.

---

**Switches for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (WTSN)**

Switches rated in horsepower have been tested with respect to interruption of the maximum operating overload current of motors of the same horsepower and voltage ratings. When rated in amps and volts only the switches have not been investigated with respect to use in motor circuits.

---

**Enclosed Switches for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (WUGF)**

This category covers enclosed switches either with or without fuse hold¬ers, plug or cartridge fuse types.

Ratings of Listed enclosed switches for hazardous locations are limited to 3600 amp, 500 hp, 600 v.

Enclosed switches with horsepower ratings in addition to amperage ratings are suitable for use in motor circuits as well as for general use. Enclosed switches with amperage ratings are intended for general use.

Enclosed switches as listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

Unless the device is marked to indicate otherwise, the wiring space and current-carrying capacity are based on the use of 60 C wire in circuits rated 100 amp or less, and the use of 75 C wire for higher amperage rated circuits.

Enclosed motor-circuit switches and enclosed switches with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full load running current for alternating-current ratings and at four times motor full load running current for direct-current ratings.

The basic standards used to investigate products in this category are indicated in the main Guide Information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of this directory) together with the word “LISTED,” a control number, and the following product name: “Enclosed Switch For Hazardous Locations”.

---

**Telemetering Equipment for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (WYMG)**

This category includes telemetering transmitter coil assemblies, small generators, pulse generators, fluid flow indicators and meters, transmitter and receiver units employing selsyn motors and similar equipment.

Investigation of telemetering equipment marked “Raintight” includes a test designed to simulate exposure to beating rain to determine that such exposure will not result in the entrance of water.

Telemetering equipment provided with a factory seal of conductors entering the device enclosure is so identified on the product.

Equipment that has been investigated for use only in the Classified locations of automotive and marine service stations appears under Control, Monitoring and Auxiliary (VBOX) in Flammable and Combustible Liquids and Casks Equipment Directory.

The basic ordinary location standard used to investigate products in this category is UL 388, “Industrial Control Equipment”, in conjunction with the standards referenced in the main guide information (AANZ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Telemetering Equipment for Use in Hazardous Locations”, “Section of Telemetering Equipment for Use in Hazardous Locations”, “Telemetering Equipment Relating to Hazardous Locations”, or “Section of Telemetering Equipment Relating to Hazardous Locations”, an appropriate abbreviation, or other appropriate product name as shown in the individual Listing.

---

**Temperature-Indicating and Regulating Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (XBAI)**

**INSTALLATION AND USE**

This category covers electrical controls for heating and cooling equipment, room temperature or humidity regulation, and industrial uses.

These devices respond directly or indirectly to changes in temperature, humidity, or pressure to affect temperature control, or equipment or appliance operation, etc.
RATINGS

Temperature-indicating and regulating equipment is Listed with a maximum rating of 600 V.

Controls intended for across-the-line motor starting and for making and breaking the circuit when the motor is stalled are tested at rated voltage and at six times motor full load running current for alternating current motor ratings and at ten times motor full load running current for direct current motor ratings.

A switching device rated in “pilot duty” is intended for control of electromagnetic loads, such as the solenoid of a motor controller or electrically operated valve, and is tested with an appropriate electromagnetic load.

A control rated in amps is tested with an inductive (75-80 percent power factor) load for alternating current ratings unless a noninductive rating is specified, and with a noninductive load for a direct current rating.

The Listings of motor operators do not include valves or other connected mechanical loads.

The Thermostats in the following Listings can be adjusted, or are preset to operate at various temperature settings. The exterior surfaces of the equipment to which the thermostats, or remote bulbs of the thermostats, are attached should not exceed the maximum safe temperature for the hazardous locations involved.

REQUIREMENTS

The basic ordinary locations standard used to investigate products in this category is UL 873, “Temperature-Indicating and Regulating Equipment” together with the standards referenced in the main Guide Information (AANZ).

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names: “Thermostat for Use in Hazardous Locations,” “Temperature-Indicating Equipment for Use in Hazardous Locations,” “Temperature-Indicating Equipment (Associated Apparatus)” or other appropriate product name as shown in the individual Listing.
Electrical equipment for use in unclassified (ordinary) locations is intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC). Electrical equipment for use in hazardous (classified) locations, as defined by the NEC, may also be used in ordinary locations.

INVESTIGATION REQUIREMENTS AND STANDARDS

Electrical equipment for use in ordinary locations has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the NEC.

Some products are certified for uses not within the scope of the NEC. Such products are investigated for the specifications or the use conditions indicated in the general Guide Information for each product category.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

The general Guide Information for each product category describes the limitations relative to the products covered, such as current, voltage and horsepower limits, markings, special descriptions and installation provisions.

INSTALLATION REQUIREMENTS

Ordinary locations, as defined in the NEC, include:

**Damp Location** — Partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, barns, and cold-storage warehouses.

**Dry Location** — A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

**Wet Location** — Installations underground or in concrete slabs or masonry in direct contact with the earth, and locations subject to saturation with water or other liquids, such as vehicle washing areas, and locations exposed to weather and unprotected.

**Outdoor Use** — In general, individual appliances and equipment have been investigated only for use indoors, in dry locations. An exception is where outdoor use is specifically permitted by the Article of the NEC concerned with the product installation. See also the general Guide Information for the product category or included in the individual Listing. In some cases the title (e.g., Snow Movers, Swimming Pool Fixtures) indicates the conditions for which the product has been investigated.

Cord- and plug-connected appliances obviously intended for outdoor use, such as gardening appliances, are not intended for use in the rain, and should be stored indoors when not in use.

Enclosure Types

Section 110.11 of the NEC specifies that equipment shall be identified for use in certain operating environments. Section 300.6 provides guidance regarding protection against corrosion and Table 430.91 provides the basis for selecting motor controller enclosure types for use in specific locations. To assist inspection authorities, UL requires type designations on power distribution and control equipment enclosures such as cabinets and cutout boxes, enclosed panelboards or switchboards, meter sockets, enclosed circuit breakers or switches, industrial control and other equipment. The following table summarizes the intended uses of the various type enclosures for other than hazardous locations:

<table>
<thead>
<tr>
<th>Enclosure Type Number</th>
<th>Provides a Degree of Protection Against the Following Environmental Conditions*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indoor use</td>
</tr>
<tr>
<td>2</td>
<td>Indoor use, limited amounts of falling water</td>
</tr>
<tr>
<td>3R</td>
<td>Outdoor use, undamaged by the formation of ice on the enclosure**</td>
</tr>
<tr>
<td>3</td>
<td>Same as 3R plus windblown dust</td>
</tr>
</tbody>
</table>
Enclosure Type Number | Provides a Degree of Protection Against the Following Environmental Conditions
--- | ---
3S | Same as 3R plus windblown dust, external mechanisms remain operable while ice laden
4 | Same as 4 plus resists corrosion
4X | Same as 4 plus resists corrosion
5 | Same as 4 plus resists corrosion
6 | Same as 4 plus resists corrosion
6P | Same as 4 plus resists corrosion
12, 12K | Same as 4 plus resists corrosion
13 | Same as 4 plus resists corrosion

*All type enclosures provide a degree of protection against ordinary corrosion and against accidental contact with the enclosed equipment when doors of covers are closed and in place. All type enclosures provide protection against a limited amount of falling dirt.

**All outdoor type enclosures provide a degree of protection against rain, snow and sleet. Outdoor enclosures are also suitable for use indoors if they meet the environmental conditions present.

An enclosure that complies with the requirements for more than one type of enclosure may be marked with multiple designations.

Enclosures marked with a type may also be marked as follows:
A Type 1 enclosure may be marked “Indoor Use Only”
A Type 3, 3S, 4, 4X, 6 or 6P enclosure may be marked “Raintight”
A Type 3R enclosure may be marked “Rainproof”
A Type 4, 4X, 6 or 6P enclosure may be marked “Watertight”
A Type 4X or 6P enclosure may be marked “Corrosion Resistant”
A Type 2, 5, 12, 12K or 13 enclosure may be marked “Driptight”
A Type 3, 3S, 5, 12K, or 13 enclosure may be marked “Dusttight”

For equipment designated “Raintight,” testing designed to simulate exposure to a beating rain will not result in entrance of water. For equipment designated “Rainproof,” testing designed to simulate exposure to a beating rain will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure. “Watertight” equipment is so constructed that water does not enter the enclosure when subjected to a stream of water. “Corrosion resistant” equipment is so constructed that it provides degree of protection against exposure to corrosive agents such as salt spray.

“Driptight” equipment is so constructed that falling moisture or dirt does not enter the enclosure. “Dusttight” equipment is so constructed that circulating or airborne dust does not enter the enclosure.

**Sizes and Ratings**

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

Marked ratings of utilization equipment include ampere, wattage or volt-ampere ratings. Motor-operated utilization equipment may also be marked with a horsepower rating. The actual marked ratings (other than the horsepower rating) and other markings or instructions, if any, are to be used to select branch circuit conductors, branch circuit overcurrent protection, control devices and disconnecting means.

The ampere or wattage marking on power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

**Appliance and Utilization Equipment Terminations**

Except as noted in the general Guide Information for some product categories, most terminals, unless marked otherwise, are for use only with copper wire. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits as specified in Table 310.16 of the NEC. If the termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C amperages (for circuits rated 100 A or less) and 75°C amperages (for circuits rated over 100 A) should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).
Distribution and Control Equipment Terminations

Most terminals are suitable for use only with copper wire. Where aluminum or copper-clad aluminum wire can or shall be used (some crimp terminals may be Listed only for aluminum wire), there is marking to indicate this. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted in the following paragraphs or in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C ampacities for wire size Nos. 14-1 AWG, and 75°C ampacities for wire size Nos. 1/0 AWG and larger, as specified in Table 310.16 of the NEC.

Some distribution and control equipment is marked to indicate the required temperature rating of each field-installed conductor. If the equipment, normally intended for connection by wire sizes within the range 14-1 AWG, is marked “75C” or “60/75C,” it is intended that 75°C insulated wire may be used at full 75°C ampacity. Where the connection is made to a circuit breaker or switch within the equipment, such a circuit breaker or switch must also be marked for the temperature rating of the conductor.

A 75°C conductor temperature marking on a circuit breaker or switch normally intended for wire sizes 14-1 AWG does not in itself indicate that 75°C insulated wire can be used unless 1) the circuit breaker or switch is used by itself, such as in a separate enclosure, or 2) the equipment in which the circuit breaker or switch is installed is also so marked.

A 75 or 90°C temperature marking on a terminal (e.g., AL7, CU7AL, AL7CU or AL9, CU9AL, AL9CU) does not in itself indicate that 75 or 90°C insulated wire can be used unless the equipment in which the terminals are installed is marked for 75 or 90°C.

Higher temperature rated conductors than specified may be used if the size is based on the above statements.

**Copper-clad Aluminum Conductors** — Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

**Copper Pigtail Leads** — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

**Wiring Devices** — Supply terminals of 15 A and 20 A switches and receptacles not marked “CO/ALR” are for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded, unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked “AL/CU” are for use with copper conductors only. Terminals of switches rated 30 A and above marked “AL/CU” are for use with aluminum, copper and copper-clad aluminum conductors.

**Wire Connectors** — Combinations of dissimilar conductors in terminal or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing. See also the information under Wire Connectors and Soldering Lugs (ZMVV).

**Terminals** — Product terminals, including wire connectors and terminal screws, are acceptable for connection of only one conductor, unless there is marking or a wiring diagram indicating the number of conductors which may be connected.

**Tightening Torque** — Some equipment may be marked to show a tightening torque for wire connectors intended for use with field wiring.

**Supply Cords** — When flexible supply cords or cord sets are replaced on utilization equipment and appliances, the replacement should be of the same type, AWG size, voltage rating and temperature rating as originally used.

**INSTRUCTIONS AND PRODUCT MARKINGS**

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

**FIELD MODIFICATIONS**

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL’s safety requirements.
The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard marine vessels. Such equipment has been investigated in accordance with the applicable requirements of UL, the United States Coast Guard (USCG), the American Boat and Yacht Council, Inc. (ABYC), and the National Fire Protection Association (NFPA). For additional information, see the general Guide Information for the specific product category. Equipment bearing UL’s Marine Mark is suitable for use only with stranded copper wire.

AIR CONDITIONING EQUIPMENT

(AAYZ)

ACCESSORIES, AIR CONDITIONING EQUIPMENT (ABFY)

USE AND INSTALLATION

This category covers accessories intended for installation only on Listed equipment as designated in the individual Listings of the equipment and accessory. These accessories are intended primarily for field installation, but may be factory installed.

The equipment on which an accessory covered under this category may be field installed is marked to indicate that it is Listed for use with the specific accessory as designated by model, catalog number, part number, etc. in this category. Markings on the equipment also indicate any changes in the equipment ratings with the accessory installed.

WIRING TERMINATION PROVISIONS

Information concerning field wiring connections, mounting location, installation clearances, etc., are marked on the accessory, and/or in detailed installation instructions with the accessory. For permanently connected equipment, the wiring termination provisions are based on tests during product investigation, and Table 310.16 of ANSI/NFPA 70, “National Electrical Code,” as follows:

1. 75°C insulated conductors at the 75°C ampacities.
2. 90°C insulated conductors at the 75°C ampacities, in which case the equipment is marked for 90°C conductors.
3. Insulation temperature rating of 75 or 90°C and wire size as marked on the unit.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1995, “Heating and Cooling Equipment.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product identity “Air Duct Mounted Accessory,” “WITH RESPECT TO ELECTRIC SHOCK, FIRE AND CASUALTY HAZARDS ONLY,” and a control number.

ACCESSORIES, AIR DUCT MOUNTED (ABQK)

USE

This category covers products consisting of parts and/or subassemblies employing ultraviolet lamps for the purpose of treating air by the effects of ultraviolet radiation and having provisions for connection to heating and ventilation ducts used for air distribution.

INSTALLATION

Equipment to be connected to an air duct system is intended for installation in accordance with NFPA 90A, “National Fire Protection Association Standard for Installation of Air Conditioning and Ventilating Systems” or NFPA 90B, “National Fire Protection Association Standard for Warm Air Heating and Air Conditioning Systems.”

PRODUCT MARKINGS

Information concerning field wiring connections, mounting location, installation clearances, etc., are either marked on the accessory and/or in detailed installation instructions accompanying each accessory. Products intended for use with germicidal lamps are marked “This product (fixture) is designed for use with germicidal lamps and must be installed in compliance with competent technical directions so that the user’s eye and bare skin will not be subjected to ultraviolet rays.”

The health aspects associated with the use of these products and their ability to aid in disinfection of environmental air have not been investigated by UL. This limitation is specified in the instruction manual and on the product for all products covered under this category.

ADDITIONAL INFORMATION

For additional information, see Air Conditioning Equipment (AAYZ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Refrigerating Equipment (AHC).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 153, “Portable Electric Lamps,” UL 1598, “Luminaires” and UL 1995, “Heating and Cooling Equipment.”

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product identity “Air Duct Mounted Accessory,” “WITH RESPECT TO ELECTRIC SHOCK, FIRE AND CASUALTY HAZARDS ONLY,” and a control number.

AIR CONDITIONERS, PACKAGED TERMINAL (ACKZ)

GENERAL

This category covers packaged terminal air conditioners and packaged terminal heat pumps. They consist of a wall sleeve, outdoor louvers, and a combination of assemblies designed as a unit and intended for mounting through the wall. They include refrigeration components as the prime source of cooling and dehumidification. They may also have provision for heating by hot water, reverse cycle refrigeration, steam, electric resistance heat or gas-fired burner(s). These units employ alternating current, hermetic refrigerant motor compressors with factory charged refrigeration systems and include a means for ventilation and circulating air. Accesso-

ries intended for use with packaged terminal air conditioners are also covered under this category.

This category does not cover equipment intended for connection to duct systems for the purpose of providing central cooling and/or heating.

INSTALLATION

This equipment is rated 600 V or less and intended to be installed in accordance with the requirements of ANSI/NFPA 70, “National Electrical Code,” is intended for installation in accordance with UL standards and basically intended to serve a single room, zone or space, although some units may have provision to additionally serve an adjacent room.

Permanently-connected units are intended to be connected to a branch circuit protected by overcurrent devices that do not exceed the value marked on the data plate or attached wiring diagram. This marked protective device rating is the maximum for which the unit has been investigated and found acceptable. If the marking specifies fuses, the unit is intended to be protected by fuses only. If time-delay fuses are required for restarting, the unit is so marked.

Units employing gas heat are intended to be installed in accordance with the installation instructions and markings on the appliance, and are intended to be connected to a gas supply of the type specified on the appliance. Equipment is intended to be installed in accordance with the current edition of ANSI Z223.1/NFPA 54, “National Fuel Gas Code.”

PRODUCT MARKINGS

Cord-connected units that require a circuit breaker or time-delay fuses to permit restarting are so marked.

Units with water cooled condensers investigated for connection to ground water sources are so marked.

Some equipment may be designed to accept accessories in the field. In such cases, both the air conditioner and the accessory are marked to relate the two for proper installation.

This equipment typically consists of multiple assemblies or sections that are shipped in separate packages to be assembled in the field. The sections are marked to relate to one another for proper installation. The section incorporating the primary nameplate contains an essential elements label that details the other sections needed to complete the installation.
ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT
SELECTED CATEGORIES FROM THE
GENERAL INFORMATION DIRECTORY
2005

UNEVALUATED FACTORS
The effect of these units on the fire resistance rating of the wall has not been investigated.

RELATED PRODUCTS
See Air Conditioners, Room (ACOT) and Gas-fired Room Heaters, Vented (LPNH). Air conditioners for spot cooling and environmental control of electronic enclosures are covered under Air Conditioners, Special Purpose (ACVS). Dehumidifiers are covered under Dehumidifiers, Refrigeration Type (AFTT). Air conditioning equipment designed for duct connection to multiple rooms is covered under Heating and Cooling Equipment (LFZE).

ADDITIONAL INFORMATION
For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AACH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

The basic standard used to investigate the refrigeration and heating (other than gas) portions of the products in this category is UL 484. “Room Air Conditioners.”

The basic standard used to investigate the gas heating portion of the products in this category, provided the current edition and effective addenda thereto of ANSI Z21.86/CSA 2.32, “Vented Gas-Fired Space Heating Appliances.”

UL MARK
The Listing Mark and Gas-fired Listing Mark, if gas heat is provided, of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Packaged Terminal Air Conditioner,” “Packaged Terminal Heat Pump,” “Section of Packaged Terminal Air Conditioner,” “Cooling Portion of Packaged Terminal Air Conditioner” or “Accessory for Packaged Terminal Air Conditioner.”

The gas-fired Listing Mark for the gas heating portion of these products, if provided, includes the UL symbol with the words “GAS-FIRED” above the UL symbol and the word “LISTED” below the UL symbol (as illustrated in the Introduction of this Directory), a control number, and a product name “Gas Heating Portion of Packaged Terminal Air Conditioner,” and the standard designation “ANSI Z21.86(+) CSA-2.32+(++) Fan-Type Direct Vent Wall Furnace.”

(+) Suffix letter of latest addendum if applicable
(++) Issue year of latest addendum or standard

AIR CONDITIONERS, ROOM (ACOT)
GENERAL
This category covers room air conditioners and recreational vehicle (RV) air conditioners. They are encased assemblies designed as a unit and intended as the prime source of cooling and dehumidification, intended to serve a single room, zone or space. These products may be self-contained or split-system. Accessories intended for use with room air conditioners are also covered under this category.

INSTALLATION
This equipment is rated 600 V or less and is intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code.”

Room air conditioners are intended for installation in windows, through walls, or as consoles located in or adjacent to the room, zone, or space to be conditioned. They may also be split-system, where the evaporator section is installed inside, and the condensing unit is installed outside. The two sections are connected by refrigerant piping and electrical wiring. A console or in-wall type room air conditioner may have provision to addenda thereto of ANSI Z21.86/CSA 2.32, “Vented Gas-Fired Space Heating Appliances.”

Cord-connected units that require circuit breakers or time-delay fuses to permit restarting are so marked. Units with water-cooled condensers investigated for connection to ground water sources are so marked. Some equipment may be designed to accept accessories installed in the field. In such cases, both the room air conditioner and the accessory are marked to relate the two for proper installation.

If parts or sections of the room air conditioner are separately shipped from the factory, they are marked to relate the sections to one another for proper installation.

RELATED PRODUCTS
Packaged terminal air conditioners are covered under Air Conditioners, Packaged Terminal (ACKZ). Air conditioners for spot cooling or environmental control of electronic enclosures are covered under Air Conditioners, Special Purpose (ACVS).

Dehumidifiers are covered under Dehumidifiers, Refrigeration Type (AFTT).

ADDITIONAL INFORMATION
For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AACH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

The basic standard used to investigate products in this category is ANSI/UL 484, “Room Air Conditioners.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Room Air Conditioner,” “Split System Air Conditioner,” “Section of Room Air Conditioner” or “Accessory for Room Air Conditioner.”

AIR CONDITIONERS, SPECIAL PURPOSE (ACVS)
GENERAL
This category covers equipment designed for special purposes, such as portable spot cooling or environmental control of electronic enclosures. These products may be self-contained or sectional, and are designed to provide conditioned air to a single room or space. Accessories are also covered under this category.

INSTALLATION
This equipment is rated 600 V or less and is intended for installation in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC). This equipment consists of one or more factory-made sections. If the equipment is provided in two or more sections, each such section is described by field interconnection with a matched section(s) to make the air conditioner assembly. Unless so indicated in the individual Listings, the evaporator blower is provided as part of the assembly, and may be an integral part of the evaporator section or furnished as a separate section. The individual Listings show the distinctive designation of each section comprising the assembly.

The proper method of electrical installation (number of branch circuits, disconnects, etc.) is shown on the wiring diagram and/or marking required to be attached to the unit. In permanently connected units employing two or more motors or a motor(s) and other loads, operating from a single supply circuit, the motor overload protective devices (including thermal protectors for motors) and other factory-installed motor circuit components and wiring are investigated on the basis of compliance with the motor branch circuit short-circuit and ground-fault protection requirements of Section 430.53(C) of the NEC. Such motor and combination load equipment is intended to be connected only to a circuit protected by fuses or a circuit breaker with a rating that does not exceed the maximum rating marked on the data plate. This marked protective device rating is the maximum for which the equipment has been investigated and found acceptable. Where the marking specifies fuses, or “HACR Type” circuit breakers, the circuit is intended to be protected only by the type of protective device specified.

Accessories for special purpose air conditioners are provided with instructions for installation into the product.

Units suitable for use with Listed field-installed accessories, such as electric resistance heaters, are specifically indicated in the Individual Listings.

PRODUCT MARKINGS
Cord-connected units that require circuit breakers or time-delay fuses to permit restarting are so marked. Units with water-cooled condensers investigated for connection to ground water sources are so marked. Some equipment may be designed to accept accessories installed in the field. In such cases, both the room air conditioner and the accessory are marked to relate the two for proper installation.

If parts or sections of the room air conditioner are separately shipped from the factory, they are marked to relate the sections to one another for proper installation.

RELATED PRODUCTS
Packaged terminal air conditioners are covered under Air Conditioners, Packaged Terminal (ACKZ). Air conditioners for spot cooling or environmental control of electronic enclosures are covered under Air Conditioners, Special Purpose (ACVS).

Dehumidifiers are covered under Dehumidifiers, Refrigeration Type (AFTT).

ADDITIONAL INFORMATION
For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AACH) and Electrical Equipment for Use in Ordinary Locations (AALZ).

The basic standard used to investigate products in this category is ANSI/UL 484, “Room Air Conditioners.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Room Air Conditioner,” “Split System Air Conditioner,” “Section of Room Air Conditioner” or “Accessory for Room Air Conditioner.”

2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY
2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY

LOOK FOR THE UL MARK ON PRODUCT
2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY

214

Some equipment may be designed to accept accessories installed in the field. In such cases, both the air conditioner and the accessory are marked to relate to the two for proper installation.

Where a clearance is required to be maintained to combustible construction, the minimum clearance is designed to the individual Listings and is also marked on the unit. Unless otherwise indicated, the designated clearances (other than “zero”) are based on tests of units with uninsulated sheet-metal ducts and plenum attached. Under these conditions, temperatures below the established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts, and plenum.

RELATED PRODUCTS
See Air Conditioners, Room (ACOT), Air Conditioners, Packaged Terminal (ACKZ) and Heating and Cooling Equipment (LZFE).

ADDITIONAL INFORMATION
For additional information, see Air Conditioning Equipment (AAYZ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AHC).

REQUISITEMENTS
The basic standard used to investigate products in this category is UL 484, “Room Air Conditioners.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Air Filtering Appliance,” “Air Filter,” or other appropriate term.

PACKAGED TERMINAL, REPLACEMENT AIR CONDITIONERS (ADAU)

GENERAL
This category covers replacement packaged terminal air conditioner and replacement packaged terminal heat pump chassis investigated for field installation with existing wall sleeves, louvers, and panels as marked on the unit. They are rated 600 V or less and intended as the prime source of air conditioning and dehumidification. These units may also have provision for heating by hot water, reverse cycle refrigeration, steam or electric resistance elements. They employ alternating current, hermetic refrigerant motor-compressors with factory-charged refrigeration systems, and include a means for ventilating and circulating air.

INSTALLATION
This equipment is intended to be installed in accordance with ANSI/NFPA 70, “National Electrical Code,” and is intended for installations through walls and to serve a single room, zone or space, although some units may have provision to additionally serve an adjacent room.

Permanently-connected units are intended to be connected to a branch circuit protected by overcurrent devices that do not exceed the value marked on the data plate or attached wiring diagram. This marked protective device rating is the maximum for which the unit has been investigated and found acceptable. If the marking specifies fuses, the unit is intended to be protected by fuses only. If time-delay fuses are required for restarting, the unit is so marked.

PRODUCT MARKINGS
Cord-connected units requiring a circuit breaker or time-delay fuses to permit restarting are so marked.

Units are marked to indicate the existing wall sleeves, louvers and panels with which they are to be used and field installed.

RELATED PRODUCTS
Room air conditioners are covered under Air Conditioners, Room (ACOT).

Air conditioners intended for spot cooling or environmental control of electronic enclosures are covered under Air Conditioners, Special Purpose (ACVS).

Dehumidifiers are covered under Dehumidifiers, Refrigeration Type (AFFT).

Air conditioning equipment designed for connection to duct systems for the purpose of providing central cooling and/or heating is covered under Heating and Cooling Equipment (LZFE).

ADDITIONAL INFORMATION
For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AHC) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIRMENTS
The basic standard used to investigate products in this category is ANSI/UL 484, “Room Air Conditioners.”

UL MARK
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

REPLACEMENT PACKAGED TERMINAL AIR CONDITIONER FOR FIELD INSTALLATION WITH EXISTING WALL SLEEVES, OUTDOOR LOUVERS, AND INDOOR PANELS AS SPECIFIED ON THE PRODUCT AS TO ELECTRIC SHOCK, FIRE AND CASUALTY HAZARDS ONLY
Control No.

AIR CONDITIONING AND REFRIGERATION SYSTEMS EQUIPMENT (ABDT)
This category covers products with refrigerating systems classified in accordance with Section 9 of ANSI/ASHRAE 15, Safety Code for Mechanical Refrigeration.

Equipment covered in this category has a rated cooling capacity exceeding 135,000 Btu per hour and is intended for commercial or industrial air conditioning and refrigeration applications, to be installed in accordance with the requirements of the National Electrical Code.

Self-contained units include a complete refrigeration system, factory tested and sealed, with associated controls and wiring.

Compressor-condenser units include one or more compressors and condensers with interconnecting refrigerant piping and with associated controls and wiring. These units are intended for field connection to a remote condenser having a marked working pressure not less than that designated by the marking on the Compressor-evaporator unit data plate.

Compressor-evaporator units include one or more compressors and evaporators with interconnecting refrigerant piping and with associated controls and wiring. These units are intended for field connection to a remote condenser having a marked working pressure not less than that designated by the marking on the Compressor-evaporator unit data plate.

For listings of equipment rated 135,000 Btu per hour or less see “Air Conditioners, Central Cooling,” or “Condensing Units” in this directory. For listings of self-contained units with a rated cooling capacity of 135,000 Btu per hour or less and which incorporate gas, oil or gas-oil fired burners, see Heating and Cooling Units (LYRR) in the Heating, Cooling, Ventilating and Cooking Equipment Directory. For separate listings of condensers, evaporators, and unit coolers see Refrigeration Equipment in this directory.

LOOK FOR CLASSIFICATION MARK ON PRODUCT
The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

REFRIGERATING SYSTEM OF (product name shown in individual classifications) CLASSIFIED BY UNDERWRITERS LABORATORIES INC.
IN ACCORDANCE WITH SECTION 9 OF ANSI/ASHRAE 15-1994 (Control Number)

The symbol UL in a circle is not used on or in connection with these products.

AIR FILTERING APPLIANCES (AEDX)
This category covers portable or stationary air filtering appliances intended for window, floor, table and similar mounting. This category also covers fixed air filtering appliances intended for permanent mounting to walls, ceilings, and similar applications. These appliances consist primarily of air-circulating fans and mechanical filters.

Appliances not provided with filters intended for circulating air in rooms are listed under Fans, Ceiling Suspended or Fans, Electric. Appliances consisting of air circulating fans, filters, and radiators that are intended to be connected to existing steam or water lines are listed as Heating, Cooling, and Ventilating Equipment.

The physiological effects of the operation of these appliances beneficial or otherwise, have not been investigated by Underwriters Laboratories Inc.

The basic standard used to investigate products in this category is UL 507, “Electric Fans”. The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as appropriate: “Air Filtering Appliance”, “Air Filter”, or other appropriate product name.
DEHUMIDIFIERS (AERV)

These are self-contained appliances for removing moisture from the air.

DEHUMIDIFIERS, REFRIGERATION TYPE (AFTT)

GENERAL

This category covers portable self-contained household, commercial and industrial dehumidifiers for removing moisture from the air. These appliances are designed for cord connection to a single-phase, alternating current source of supply rated at not more than 250 V. These units employ hermetic refrigerant motor compressors and may also incorporate electric air heaters.

RELATED PRODUCTS

See Air Conditioners, Room (ACOT).

ADDITIONAL INFORMATION

For additional information, see Air Conditioning Equipment (AAYZ), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AACH).

REQUISITES

The basic standard used to investigate products in this category is UL 474, “Dehumidifiers.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Dehumidifier” for a household unit or “Special Purpose Dehumidifier” for a commercial or industrial unit.

ELECTROSTATIC AIR CLEANERS (AGGZ)

This listing covers electrostatic air cleaners of the following types which are intended to remove airborne dust particles and the like:

Duct Type: Room Type-Fixed, Stationary, or Portable.

Electrostatic air cleaners of the Duct Type are for installation in and adjoining heating, air conditioning and ventilating ducts in accordance with the Standard for Installation of Air-Conditioning and Ventilating Systems, NFPA 90A and the Standard for Installation of Residence Type Warm-Air Heating and Air-Conditioning Systems, NFPA 90B. Electrostatic air cleaners of the Duct Type may be for installation in an exhaust system of restaurant type cooking equipment. They are intended for installation in accordance with the Standard of the National Fire Protection Association for the Installation of Equipment for the Removal of Smoke and Grease Laden Vapors from Commercial Cooking Equipment, NFPA 96, and are so marked. When installed in accordance with NFPA 96, a Listed grease filter or extractor must be installed ahead of the air cleaner.

Electrostatic air cleaners of the Room Type are self-contained units. The fixed types are for permanent installation. The portable or stationary types are cord connected.

Electrostatic air cleaners are intended for use where removal of dust and dirt from the equipment is frequent enough to prevent excessive accumulation, which may result in flash over and fire damage. The instructions and warnings supplied with and on each piece of equipment should be carefully observed.

Electrostatic Air Cleaners have either Class 1 or Class 2 filters or adhesive coated ionizer collector cells as follows:

Class 1 filters or adhesive coated ionizer collector cells are those which, when clean, do not contribute fuel when attacked by flame and which emit only negligible amounts of smoke.

Class 2 filters or adhesive coated ionizer collector cells are those which, when clean, burn moderately when attacked by flame or emit moderate amounts of smoke or both.

Electrostatic Air Cleaners designed to be assembled together in the field from component parts are listed by Report. Under this form of Listing, a Report is prepared which provides information sufficient to effect assembly and installation in the field. Copies of the report are available from the Listee.

The basic standard used to investigate products in this category is UL 867, “Electrostatic Air Cleaners.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electrostatic Air Cleaner”.

EVAPORATIVE COOLERS (AGNY)

USE AND INSTALLATION

This category covers evaporative coolers of portable, window and stationary types for residential, commercial and industrial applications. Stationary types may have provision for connection to a duct system for air distribution. Models evaluated for outdoor installation are marked “Outdoor Use.” Motors used in stationary equipment intended for duct system connection are prevented from hazardous overheating by inherent overheating devices, by overcurrent protective devices, or by impedance of the motor windings.

Units permanently connected to the source of supply are intended to be installed in accordance with the requirements of NFPA 70, “National Electrical Code.”

Evaporative media provided on stationary units that are intended for connection to a duct system in accordance with the International Mechanical Code, NFPA 90A, “Standard for the Installation of Air Conditioning and Ventilating Systems” or NFPA 90B, “Standard for the Installation of Warm Air Heating and Air Conditioning Systems” are investigated in accordance with UL 900, “Air Filter Units.” These products are also suitable for installation in accordance with the Uniform Code.

RELATED PRODUCTS

Some stationary, duct-connected evaporative coolers are covered under Evaporative Coolers Evaluated in Accordance with the Uniform Mechanical Code (AGOS). Air coolers that include a motor compressor and refrigeration system are covered under Room Air Conditioners (ACOT). Products intended primarily for circulating moistened air are covered under Humidifiers (AHIV).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AACH).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 507, “Electric Fans.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Evaporative Cooler” or “Evaporative Air Cooler.”

HUMIDIFIERS (AHIV)

This category covers humidifiers for residential and commercial applications that are intended to circulate moistened air and generally incorporate an air circulating fan with or without filters. Stationary types may have provision for connection to heating and ventilating ducts for air distribution.

Motors used in stationary equipment intended for duct connection are prevented from hazardous overheating by inherent overheating devices, overcurrent protective devices, or inherent impedance. Air filters provided on stationary types are investigated in accordance with Standard UL 900 Test Performance of Air Filter Units. The basic standard used to investigate humidifiers is UL 998, “Humidifiers.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the following product name: “Humidifier.”

ANTENNA DISCHARGE UNITS (ASWA)

USE

This category covers antenna discharge units intended to minimize the effects of voltage surges on antenna transmission lines. These products have not been investigated to determine their suitability as lightning protective devices.

REQUIREMENTS

The basic standard used to investigate products in this category is UL 452, “Antenna Discharge Units.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Antenna Discharge Unit” or other appropriate product name as shown in the individual Listings.
BOILERS, ELECTRIC (BDJS)

This category covers electrically heated steam and hot water boilers that are within the scope of ASME Boiler and Pressure Vessel Codes, Volume I (Power Boilers) and Volume IV (Heating Boilers). This category may also include water heaters if, based on water temperature, input rating, or water tank capacity, they fall under the scope of the above ASME codes.

The pressure vessels of these appliances are constructed and stamped in accordance with the applicable section of the ASME Boiler and Pressure Vessel Code. The boilers are equipped with necessary temperature or pressure regulating and limit controls and with the appropriate ASME-rated pressure relief devices, and are marked with the appropriate ASME symbol.

INSTALLATION

Each boiler is provided with a marking that indicates the floor material (combustible or noncombustible) on which the boiler may be mounted and the necessary clearances from all other surfaces of the boiler to combustible materials.

The minimum acceptable clearances in inches between the boiler surfaces and adjacent combustible surfaces and the type of flooring required for mounting the boiler and the proper installation in an alcove or closet are indicated on the published printed cards by appropriate symbols and dimensions. The clearances so designated are the minimum required to avoid overheating; additional clearances may be required for accessibility. Each clearance requirement is indicated on the published printed cards by appropriate symbols and dimensions.

A boiler installation is indicated as follows:

![Boiler Installation Diagram]

Description of dimension, symbols and abbreviations:

A – Clearance above top of boiler
B – From front of boiler. Prefix “C” to numeral indicates suitability for closet or alcove installation; prefix “A,” suitability for alcove installation but not for closet
D – From back of boiler
E₁ – From left side of boiler
E₂ – From right side of boiler
F – Indicates type of flooring: NC = Noncombustible, C = Combustible; numeral indicates minimum clearance below suspended units to combustible floor
G – Total minimum free area in square inches of closet ventilating openings

RELATED PRODUCTS

Water heaters for potable water limited to a maximum water temperature of 99°C (210°F) are covered under the various subcategories of the category Water Heaters (KSAV). Other hot water and steam generating equipment employing construction outside the scope of the ASME Boiler and Pressure Vessel Code are covered under the Heaters and Heating Equipment (KKBV) subcategories of Industrial and Laboratory (KQLR); Cooking Appliances, Commercial (KNGT) and Household (KNUR); and Heaters, Miscellaneous (KSGT).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

UL MARK

The basic standard used to investigate products in this category is UL 834, “Heating, Water Supply, and Power Boilers – Electric.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Boiler,” or other appropriate product name as shown in the individual Listings.

SEASONAL AND HOLIDAY DECORATIVE PRODUCTS (DGVT)

This category covers temporary use, seasonal decorative lighting products and accessories with a maximum input rating of 120 V ac. Temporary use is considered to be a period of installation and use not to exceed 90 days per year. A seasonal product is a product painted in colors to suggest a holiday theme or a snow covering, a figure in a holiday costume, or any decoration associated with a holiday or a particular season of the year.

Products covered under this category are factory assembled, portable, and intended for connection to a receptacle.

In listing seasonal and holiday decorative products, it is assumed that any medium base, intermediate base, candelabra base, miniature base or midget-base lamps to be used in these products are made in accordance with American National Standards Institute specifications, as well as the applicable requirements in UL 588, “Seasonal and Holiday Decorative Products.” The use of lamps that are not in conformance with such standards may present shock hazards or high temperature conditions that are in excess of safe limits of operation.

This category does not cover nonseasonal lighting, nonseasonal products, permanently connected products, nondecorative lighting intended for general illumination only, cord sets (extension cords) or relocatable power taps.

CHRISTMAS TREE AND DECORATIVE OUTFIT ACCESSORIES (DGWU)

This category covers accessories which are intended for use with decorative lighting strings and decorative outfits. This includes such items as flasher controllers with or without sound, and other miscellaneous devices that provide a decorative effect for use with decorative lighting strings and decorative outfits. The accessories may be in the form of a direct plug in type.

This category does not cover decorative lamps, decorative lighting strings, decorative outfits, cord sets (extension cords), temporary power taps, decorative lighting harnesses, or any other nondecorative lighting products.

The basic standard used to investigate products in this category is UL 588, “Seasonal and Holiday Decorative Products.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the following product name: “Decorative Outfit Accessory.”

ELECTRIC ORNAMENTS (DGXC)

USE

This category covers electric ornaments, which are units provided with input leads and adapters intended to take the place of push-in lamps in a series-connected decorative lighting string or decorative outfit. An ornament may be electronically or nonelectronically operated.

An electronically-operated ornament employs at least one of the following: a motor, a printed wiring assembly, electronic components, or the like. This type of ornament may produce sound, be illuminated, animated, or the like, or any combination of the above.

A nonelectronically-operated ornament is provided with a wiring assembly consisting of only a lamp and lampholder on one end and an adapter on the other end. This type of ornament is illuminated only.

ADDITIONAL INFORMATION

For additional information, see Seasonal and Holiday Decorative Products (DGVT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 588, “Seasonal and Holiday Decorative Products.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Electric Ornament.”

LAMPS, DECORATIVE (DGXO)

GENERAL

This category covers intermediate and candelabra-base lamps classified for use in Listed decorative lighting strings and outfits.
These lamps have been investigated in accordance with the requirements specified in Supplement SA of UL 588, “Seasonal and Holiday Decorative Products.” These lamps have been investigated with respect to lamp base gaging, exposure of live parts, envelope-to-base securing, center and side filament protrusion, and lamp-emitting temperature.

**PRODUCT MARKINGS**

In addition to the Classification Mark, the lamp or the smallest unit container is marked with the wattage, voltage, lamp type, manufacturer’s identification and model or catalog number. Each lamp is marked with the manufacturer’s identification, rated voltage and wattage.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**UL MARK**

The Classification Mark of Underwriters Laboratories Inc. on the product or the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

**DECORATIVE LAMP**

*FOR USE IN LISTED DECORATIVE LIGHTING STRINGS AND OUTFITS*

Control No.

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**RELATED PRODUCTS**

This category covers decorative outfits intended for seasonal, temporary use, not to exceed 90 days per year, and includes factory-assembled decoration units providing a seasonal theme, such as wreaths, stars, tree-top units, sprays, light sculptures, molded figures, such as a pumpkin or a snowman, candles or candle sets with lamp shades, tree stands, and motorized decorative displays having illumination or other decorative effects. Decorative lighting strings provided with lamp shades or diffusers over the lamps are also considered decorative outfits. Decorative outfits are intended for connection to a receptacle by means of an attachment plug and are portable.

Decorative outfits are marked with the maximum number of strings, of the same type, to be connected together for series-connected outfits or the maximum number of lampholders for outfits that are parallel connected. Parallel type products should not be intermixed with series type products. Decorative outfits are not intended to be permanently connected, and are not intended to be used as toys.

**PRODUCT MARKINGS**

Decorative lighting strings are not intended to be permanently connected or provide general illumination.

**LIGHTING STRINGS AND OUTFITS**

This category covers decorative lighting strings intended for seasonal, temporary use, not to exceed 90 days per year, consisting of a string of lights which may be draped over or around trees or other objects for decorative effect. Decorative lighting strings are factory assembled with replaceable lamps and are connected by means of an attachment plug or the like.

Strings are not intended for installation on artificial trees employing metal or metalized plastic needles, leaves or branch coverings. They also should not be installed in a manner which can cut or damage wire insulation.

Decorative lighting strings are not intended to be permanently connected or provide general illumination.

This category also covers coin-operated vacuum cleaners and motor-operated vacuum cleaners and blower cleaners intended for household and commercial (industrial) use. Products intended for household use only are so marked. Attachments packaged with the products or indicated in the instruction manual packaged with the product are also covered under this category.

Central vacuum cleaners are intended for installation as part of a permanent central suction system in a building and investigated for remote operating control. The use is for private, residential use. This category also covers electrically driven inlet valve assemblies for use in central vacuum cleaning systems. These valve assemblies are intended for installation in accordance with Section 422.15 of NFPA 70, “National Electrical Code.” The assemblies are shipped as a kit comprised of the mounting plate/rough-in box and cover plate. The cover plate identifies the appropriate hoses and nozzles Listed for use with the valve. The assembly bears the Listing Mark.

**REBUILT PRODUCTS**

This category also covers vacuum cleaners that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt vacuum cleaners are rebuilt...
to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt vacuum cleaners are subject to the same requirements as new vacuum cleaners.

**UNEVALED FACTORS**

Any health hazards that may be associated with the use of vacuum cleaners or combination blower and vacuum cleaners, such as dispersion of pathological, chemical, physical, radioactive, or other contaminating agents have not been investigated.

**ADDITIONAL INFORMATION**

For additional information, see Cleaning Machines (DMDT) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1017, “Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the appropriate product name as shown in the individual Listings.

For rebuilt products the word “Rebuilt,” “Refurbished” or “Remanufac-
tured” precedes the product name.

**CUSTOM-BUILT KIOSKS (EMHH)**

**GENERAL**

This category covers kiosks, rated 240 V or less, normally found in offices and business establishments, educational facilities and other similar environments classified as ordinary locations. These kiosks are intended but are not limited for business applications purposes, electronic point-of-sale, information or ticket machine, multimedia machine with components such as amplifiers, cabling, CD-ROM drive and a floppy drive clock keyboard, CPU/monitor, DVD player or from a database on network-server computer, ethernet card (dial-up connection or network link), input devices: trackball, number pad, light-pen/stylus, (magnetic strip) card reader, barcode reader, character keyboard (physical or virtual), Internet connectivity, light sensor enabling automatic adjustment of the monitor intensity, modem, monitor (touch screen capacity), movement sensor used to call attention of passersby, multimedia machine with ample RAM and fast hard drive access, power supply, printer: laser, dot matrix, and thermal, speakers (touch screen), serial and printer ports for any peripheral device like modems or ISDN boards for communications and digital or analog 1/O board used to control different kinds of processes, stereo speakers, telecommunications, telephone accessories, “Watched” timer that can ensure that the system resets in unlikely case of hang-ups, UPS or video graphics card.

**EQUIPMENT TYPES**

Assemblies and subassemblies may include but are not limited to central processing units (CPUs), disk drives, fiber optic transceivers, monitors, personal computers, plotters, printers, point of sale kiosk, scanners, including portable barcode scanners, tape drives, workstations, multimedia equipment/accessories: digital cameras, microphones, speakers, video conferencing systems, network connection equipment. Assemblies and subassemblies may include telecommunication equipment: telephone sets, facsimile machines, ISDN systems and telephones, modems, key tele-
phone systems. Assemblies and subassemblies may include reproduction equipment: copiers or duplicating machines.

Interconnecting cable assemblies: cable assemblies intended for use within the kiosk.

**INSTALLATION**

Kiosks have been determined to be suitable for use in ambient tempera-
ture not exceeding the manufacturer’s indicated ambient temperature as specified in the equipment’s installation instructions.

**UNEVALED FACTORS**

Card readers, badge readers and similar identification equipment used in the kiosk have not been investigated with respect to security. The physiological effects of chemical substances used or with this equipment have not been investigated. The long-term characteristics or the possible physiological effects of radio frequency (RF) electromagnetic fields associated with this equipment have not been investigated.

Automated teller machines (ATMs) investigated for security and burglary resistance are covered under Automated Teller Systems (TPEU).

**2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY**

ATMs that have not been investigated for security and burglary protection are covered under Bank Equipment (BALT).

**REQUIREMENTS**

The basic standard used to investigate the individual assembly and sub-
assembly components is UL 1990, “Information Technology Equipment Including Electrical Business Equipment.” The basic requirements used to investigate the overall product consisting of various assemblies and subassemblies enclosed in a cabinet are contained in Subject 2361, “Outline of Investigation for Custom-built Kiosks.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Custom-built Kiosk,” or another appropriate product name as shown in the individual Listings.

**DOOR, DRAPERY, GATE, LOUVER, AND WINDOW OPERATORS AND SYSTEMS (FDDR)**

This category covers electrical and pneumatic door and gate systems, and door, drapery, gate, louver, and window operators together with controls and accessories for use with such operators, and similar devices.

This category covers door operators that have been investigated from an electrical and casualty viewpoint only. For door operators that have been additionally investigated for use on fire doors, see Fire Doors (GSNV) in Volume 3 of the Fire Resistance Directory.

Door and gate systems include doors or gates, operators, and controls, tested as complete units. Components of a system are specifically desig-
nated in the installation instructions provided with the system.

Residential door operators are intended for intermittent use on counter-
balanced doors, usually of the overhead type, in residential buildings of one to four single-family occupancies. When provided, external entrap-
ment protection devices such as photoelectric sensors or door edge sensors must be installed in accordance with installation instructions provided. In addition all installation instructions, including the installation of warning labels adjacent to the wall mounted actuating switch, should be followed.

This category also covers residential garage door operators that are re-
built by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt residential garage door operators are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned component parts. Rebuilt resi-

dential garage door operators are subjected to the same requirements as new residential garage door operators.

Accessories for residential garage door operators, such as external en-
trapment protection devices, should be installed and used only on door operators for which they are intended as marked on installation instruc-
tions and/or packaging.

Commercial and industrial door operators should not be installed in applications where the maximum power in foot-pounds per second or the maximum pull in lbs marked on the appliance. Light-
duty, commercial vehicular door or door operators should not be installed in locations where the number of operations per hour exceed that marked on the appliance.

Operators intended for use with other than counter-balanced types of doors, gates or windows are tested in conjunction with the doors, gates or windows for which they are designed.

Residential drapery operators are intended for intermittent use control-
ing a maximum drapery weight of one lb per foot, unless otherwise marked.

Commercial drapery operators are intended for intermittent use control-
ing drapery of the maximum weight marked on the assembly.

It has been determined that the casualty hazards inherent in the prod-
ucts covered by this category have been reduced to an acceptable degree. However, the ultimate safety is dependent upon proper installation, and the Authorities Having Jurisdiction should be consulted. Installation should be performed by a qualified installer. Components of a system may include modifications resulting in change of the installation. Special care should be exercised during installation of all Operators to ensure that recommended safety devices such as photoelectric sensors or reversing edge switches are properly installed. When so marked, indus-
trial door operators shall be mounted a minimum of 8 ft (2.44 m) above the floor.

This category does not cover door operators incorporated as integral parts of walk-in panel units for use with refrigerator cooler installations; see Door Panel Assemblies (FDIT).

This category does not cover door or gate systems or other assemblies including break out or hinged sections intended to facilitate safe egress of persons in case of emergency. For such Listings see Controlled Exit Panic
DOOR PANEL ASSEMBLIES (FDIT)

GENERAL

This category covers "walk-in" and "reach-in" door panel assemblies and related auxiliary devices intended for use with environmental, freezer or cooler rooms and cabinets.

The equipment is intended for permanent connection to alternating current systems rated at not more than 600 volts.

Panel assemblies and auxiliary devices are provided with an electrical system which serves to provide one or more of the following functions: illumination, prevention of ice formation, prevention of condensation, motor drives for opening and closing doors, etc.

Door panel assemblies consist of the door and/or the door frame.

Auxiliary devices consist of equipment other than door panel assemblies associated with the foregoing apparatus or functions, including insulated panels with electrical components.

Door panel assemblies are identified with an enclosure type designation or as "Rain tight" or "Rainproof" are intended for use as indicated in Electrical Equipment for Use in Ordinary Locations (AAHZ).

RELATED PRODUCTS

Refrigerated cabinets and cases are covered under Commercial Refrigerators and Freezers (GKGW). Noninsulated insulated wall panels are covered under Building Units (BLBT). Refrigeration units are covered under Units, Refrigerating (SPYX).

Factory assembled walk-in refrigerators and freezers are covered under Walk-in Units, Commercial (SQTV)

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AAHZ) and Heating, Cooling, Ventilating and Cooking Equipment (AHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 471, "Commercial Refrigerators and Freezers."

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names, as appropriate: "Door Operator," "Gate Operator," "Drapery Operator," "Window Operator," "Louver Operator" or other appropriate product name.

The Listing Mark for rebuilt residential garage door operators additionally includes the words "Rebuilt," "Remanufactured" or "Reconditioned" preceding the product name.

FANS, CEILING SUSPENDED (GPRT)

This category covers ceiling-suspended fans intended to be mounted to a ceiling outlet box or ceiling building structure, and whose blades rotate below the ceiling to move air for the purpose of air circulation.

This category does not cover ceiling-suspended fans intended to be used in hazardous locations as defined by the National Electrical Code, or NFPA 70, or intended to be installed over solvents or chemically flammable liquids or vapors or located in a chemically corrosive environment.

FANS, ELECTRIC (GPWV)

USE AND INSTALLATION

This category covers fans and blowers intended to move air for the purpose of air circulation or ventilation. Also see Listings under Ventilators, Power (ZACT). Fans which include filters or means to control humidity or cool air are Listed under Air Conditioning Equipment – Air Filtering Appliances (AEDX). Air Conditioning Equipment – Humidifiers (AHIV) or Air Conditioning Equipment – Evaporative Coolers (AGNY).

This category covers dry type fans used for drying carpets or floors. This category covers range hoods for permanent connection to the power supply or for cord-connection to the power supply. Accessory kits to adapt a rangehood that is intended for permanent connection to the power supply to a cord-connected rangehood are Listed under Rangehood Cord-Connection Kits (GQFM).

Fan type deodorizers and fan type air fresheners are Listed under Deodorizers and Air Fresheners (EDCX).

Fans intended to be mounted to a ceiling outlet box or ceiling building structure and whose blades rotate below the ceiling to move air are listed under Fans, Ceiling-Suspended (GPRT). Light kits for ceiling-suspended fans are Listed under Fan Light Kits (GQFM).

This category does not cover fans intended to be used in hazardous locations as defined by the National Electrical Code, or to be installed over solvents or chemically flammable liquids or vapors or located in a chemically corrosive environment.

This category does not cover air heaters incorporating fans, heating-ventilating units, or blowers comprising of such equipment as furnaces, mechanical-refrigeration equipment, or air conditioners.

Fans evaluated for use in barns, poultry houses, dairy barns or the like, as covered by Article 547 of the National Electrical Code, are marked "For Use in Agricultural Buildings" or with an equivalent statement.

Fans intended to be mounted over tubs or showers have been evaluated for such purposes and are marked "Acceptable for use over a bathtub or shower when installed in a GFCI protected branch circuit."

Fans intended for mounting beneath a ceiling structure such as provided on porches or patios have been subjected to a rain test and are marked as being acceptable for such use.

Fans and accessories installed for permanent installation are provided with means for connection to permanent wiring systems.

Fans Listed in this category have not been investigated for installation in fire walls or from the standpoint of their effect on venting in case of fire. Their location should be determined after consultation with Authorities Having Jurisdiction.

Fans intended for use where they will be exposed to weather are investigated to determine the effect of rain on electrical components and are marked "Outdoor Use." Mounted fans are investigated to determine the effect of rain on electrical components, but are not required to be marked for outdoor use. Gable-mounted attic fans are normally installed with shutters and are not subjected to a rain test; similarly, wall insert fans are not subject to a rain test, if marked to indicate that shutters are to be provided. Fans intended for mounting in interior walls or ceilings are marked to indicate the intended use, unless the design is such as to make the intended method of installation obvious.
FLEXIBLE LIGHTING PRODUCTS (ILGJ)

USE

This category covers flexible lighting products intended for decorative use, consisting of nonreplaceable lamps connected in series/parallel strings and enclosed within a flexible polymeric tube or extrusion.

Flexible lighting products are provided with an attachment plug for connection to a nominal 120 V, 15 or 20 A branch circuit. These lights do not have provisions for permanent mounting to a building or structure and should not be installed in a manner that can cut or damage the outer insulation. They are intended to be connected as a complete unit and not field cut. These flexible lighting products have not been investigated for use within another enclosure.

This category also covers flexible light sculptures, which are intended for decorative use and consist of a polymeric or rigid frame to which a flexible lighting product is attached. The flexible lighting product attached to the light sculpture provides outline lighting of the figure or object created by the frame. Flexible lighting sculptures whose primary purpose is to be a sign (not decorative) are not covered under this category.

This category also covers low-voltage flexible lighting products that are intended for use with a low-voltage transformer or power supply. Flexible lighting products are intended for dry and indoor use unless marked for damp or wet locations.

RELATED PRODUCTS

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The listing mark consists of the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fan,” “Electric Fan,” “Fan Accessory” or other appropriate product name as shown in the individual Listings.

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 507, “Flexible Fans.”

None of the fans covered in this category have been investigated for use over cooking appliances which use fuel.

GAS DACTORS, RESIDENTIAL AND RECREATIONAL VEHICLES (JKIS)

USE

This category covers gas detectors intended to detect natural gas and LP-gas (propane) which may be present in residential buildings or recreational vehicles as a result of gas leaking from gas-fired equipment. These devices are intended to sound an alarm at or below 25 percent of the lower flammable limit of natural gas or LP-gas (propane).
HEALTH CARE FACILITIES EQUIPMENT (KEVQ)

This category covers appliances, utilization equipment and construction materials which have been judged to be particularly applicable to a health care facility as defined by Article 517 of NFPA 70, “National Electrical Code.”

The general information under the specific categories indicate the areas in which the individual Listings are intended to apply in health care facility installations. This equipment, unless otherwise indicated, is for installation in unclassified (ordinary) areas of health care facilities.

HOSPITAL GROUND JACKS AND GROUNDING CORD ASSEMBLIES (KEVX)

This listing covers hospital ground jacks and mating grounding cord assemblies intended for grounding equipment in a health care facility to a patient grounding point or other appropriate reference grounding point.

The basic standard used to investigate products in this category is UL 467, “Electrical Grounding and Bonding Equipment”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Residential Gas Detector” or “Recreational Vehicle Gas Detector.”

ISOLATED POWER SYSTEMS EQUIPMENT (KEWV)

These listings indicate isolated power centers which incorporate complete assemblies of isolation transformers and one or more isolated secondary circuits terminated in integrally mounted grounding type load receptacles in an overall enclosure which are intended for use in health care facilities. This category covers prefabricated medical headwalls and medical supply units that are factory-built assemblies for use in, within, or part of health care facilities, and may be part of a building structure.

Other distribution panels listed as isolated power panelboards incorporate the same features as described above except that they may be supplied with power from a separate isolation transformer. They are connected by an approved wiring method to remote receptacles located in operating rooms or other anesthetizing location areas of health care facilities.

Accessory equipment, such as terminal assemblies located in patient care areas, are also included in these listings.

The basic standard used to investigate products in this category is UL 1047, “Isolated Power Systems Equipment”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Isolated Power Systems Equipment”.

ISOLATED POWER WALL MODULES (KEWX)

These listings include Isolated Power Wall Modular Sections for use in, within, or as part of, health care facilities, and may be part of a building structure. They are designed for permanent connection to the building wiring in accordance with the provisions of Article 517 of the National Electrical Code.

These sections incorporate factory installed wiring and equipment comprising part of an isolated power system such as the components of an isolated power center or an isolated power panelboard, or accessory equipment such as terminal boards. They have been investigated to determine compliance with the National Electrical Code. These wall modular sections are intended for installation subject to approval by the authority having jurisdiction.

The fire hazard classification of the building materials used in the wall module sections, including the resistance of any plywood to delamination under fire exposure, has been investigated. The fire hazard classification of the building materials used in prefabricated assemblies has the following maximum ratings applied to the finished panel and to core material (if used) in comparison with asbestos cement boards as zero and untreated red oak lumber as 100:

A. Flame spread rating 75
B. Smoke developed 200

These sections do not contain any grounded power systems except that necessary for connection to the primary of an isolating transformer, if provided. Sections which are intended for use with grounded power systems are Listed under the classification of Prefabricated Buildings and Assemblies.

The pre-installed components and wiring of a prefabricated section may be concealed and except for the branch circuit connections, may not be accessible for inspection at the inspection site.

Additional information under this classification includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Isolated Power Wall Module”.

PREFABRICATED MEDICAL HEADWALLS AND MEDICAL SUPPLY UNITS (KEZR)

This category covers prefabricated medical headwalls and medical supply units that are factory-built assemblies for use in, within, or part of health care facilities, and may be part of a building structure. These assemblies incorporate pre-installed materials and Listed equipment which is usually concealed and may not be accessible for inspection at the installation site. The Listed equipment incorporated in these assemblies includes, but is not limited to, receptacles, switches, clocks, timing devices, patient monitors, vacuum stations and gas fittings.

These assemblies, including any field wiring for units that are not factory wired, are intended for installation subject to approval by the Authority Having Jurisdiction.

The fire hazard of building materials employed in the assemblies is judged to be no greater than that of ordinary lumber used in site-constructed buildings. Finished surfaces are of materials having flame spread and smoke developed ratings of 200 or less. Products with a rating less than 200 indicated in the individual Listings may be included as part of the product marking.

LOOK FOR THE UL MARK ON PRODUCT
MEDICAL AND DENTAL EQUIPMENT, PROFESSIONAL (KFQB)

This listing covers equipment which, unless otherwise noted, is designed for professional use by personnel in hospitals, nursing homes, medical care centers, medical and dental offices, and similar health care facilities. This equipment has been investigated from the standpoint of electrical, fire, and accident hazards. Other hazards, including those which may result from use of this equipment in the presence of flammable anesthetics have not been investigated. The effect on a patient of simultaneous use of this equipment with other electrical apparatus and the physiological effects, beneficial or otherwise, which may be produced by this equipment, have not been investigated.

Some listings of Medical and Dental Equipment, Professional are predicated on the provision of one of two alternate attachment plug caps specifically referred to in the listing of “Attachment Plugs-Fuseless.” One is a locking type cap identified by the marking “Hospital Only” and the other is a nonlocking type ANSI Standard configuration grounding type cap identified by the marking “Hospital Grade” and a green dot on the body of the cap. The identification is visible after installation on the flexible cord.

Baby incubators, and similar equipment for use with oxygen enriched atmospheres, have been investigated with respect to the increased hazard resulting from the presence of oxygen and electrical parts within the equipment. Motor operated beds are marked if they are suitable for use with oxygen. It is not possible to make devices such as these inherently safe from external sources of ignition. This hazard is greatly increased by the presence of oxygen, which makes materials familiar to igniter and greatly increases the burning rate. Accordingly, for safety, it is essential that all possible sources of ignition be kept away from these devices. Possible sources of ignition against which precautions should be taken include open flames, matches, cigarettes, accumulations of static electricity, and reducing valves on oxygen tanks which occasionally project flame or sparks due to ignition or explosion of rubber valve seats.

Oil bath sterilizers and similar equipment have been investigated with respect to their use with oils such as are recommended by the sterilizer manufacturers.

For listings of medical and dental equipment including refrigerated components, such as refrigeration therapy equipment, refer to Refrigeration Equipment.

Equipment which has been investigated to determine its suitability or safety for use where a flammable anesthetic is likely to be present may be found in Underwriters Laboratories Inc. Hazardous Location Equipment Directory under Medical Equipment.

Household health care equipment is listed in the product category “Personal Hygiene and Health Care Appliances.”

Heating pads are listed in the product category “Heating Pads, Electric.”

The basic standard used to investigate products in this category is UL 544, “Electric Medical and Dental Equipment.”

This category also covers medical and dental equipment which is rebuilt by the original manufacturer or any other party that has the necessary facilities, technical knowledge, and skills.

Rebuilt medical and dental equipment is factory rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned components. Rebuilt medical and dental equipment is subject to the same requirements as new medical and dental equipment.

ACCIDENTAL WASTE DISPOSAL SYSTEMS, EQUIPMENT AND ACCESSORIES (KFCC)

GENERAL

This category covers products that neutralize or collect biological or medical waste as indicated by the manufacturer. These products are intended for use in hospitals, nursing homes, medical care centers, medical and dental offices and similar professional health care facilities. They include, but are not limited to syringe destroyers, waste disposers and similar equipment.

Approval to market these products in the United States is regulated by the Federal Food, Drug, and Cosmetic Act, P.L. 94-295, and the code of Federal Regulations, Title 21, Parts 800-895. Underwriters Laboratories Inc.’s investigation is, therefore, limited to Classification as to electrical shock, fire and mechanical hazards only. The environmental impact and health aspects associated with the use of these products and their ability to neutralize, identify, or neutralize biological and medical waste which has not been investigated by UL. This limitation is specified in the instruction manual for all products covered under this category.

Unless otherwise noted, these products have not been investigated for use with the presence of flammable materials. Equipment which has been investigated to determine its suitability for use in hazardous locations as defined by NFPA 70, “National Electrical Code” may be found in UL’s Hazardous Locations Equipment Directory.

For additional information, see Health Care Facilities Equipment (KEVQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

For additional information, see Health Care Facilities Equipment (KEVQ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

Additional Classifications are covered under Medical and Dental Equipment, Professional, Disposal Systems and Accessories (KFBY).

FACILITY USE

For listings of medical and dental equipment intended for household use is also investigated to the applicable requirements in UL 1431, “Personal Hygiene and Health Care Appliances.”

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), a control number, and the name of the specific type of product as shown in the individual Listing or the word “Rebuilt” or “Remanufactured” followed by the following product names as appropriate: “Medical Equipment”, “Dental Equipment”, or the name of the specific type of product as shown in the individual Listing.

POWER SUPPLIES FOR USE IN HEALTH CARE FACILITIES (KFCG)

This category covers indoor use power supplies having input ratings not more than 600 V, direct and alternating current intended for use with professional medical and dental equipment in unclassified (ordinary) locations of a health care facility in accordance with NFPA 70, “National Electrical Code.”

Power supplies not provided with standard output receptacles are marked for use with the intended end-use equipment, the combination of which has been evaluated for compliance with the relevant standards of this category as noted below. Consideration should be given for the combination of products to be classified under Medical Equipment (PIDF).

REBUILT PRODUCTS

This category also covers power supplies that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt power supplies are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt power supplies are subject to the same requirements as new power supplies.
HEATERS AND HEATING EQUIPMENT (KKBV)

This listing covers cord and plug connected air heaters of the natural convection and fan assisted movable types, wall-hung (other than at the baseboard level), and ceiling hung types.

Movable and wall- or ceiling hung heaters are intended to act as sources of heat for the purpose of raising or maintaining the comfort level in a desired area.

Some movable and wall- or ceiling hung heaters may present fire hazards. Some come in contact with combustible materials such as draperies, furniture, carpeting, bedding and the like or if they are covered or blocked against such contact and should not be located where they can be covered or blocked, for example at the baseboard level. Uses that do not result in a fire hazard, still may cause discoloration or scorching (but no glowing embers or flaming) of adjacent materials.

Certain air heaters which have been subjected to the equivalent of a beating rain are considered to be acceptable for outdoor installation and are marked “Outdoor Use”. All other heaters have been investigated for indoor use only.

Fixed and Location Dedicated Electric Room Heaters are Listed under a separate category “Air Heaters, Room, Fixed And Location Dedicated”.

Permanently mounted heaters which have provisions for drawing in outside air are Listed as “Room Fan-Heater Units” under Heating, Cooling, and Ventilating Equipment.

Portable baseboard heaters and accessories are Listed under separate categories “Baseboard Heaters” and “Baseboard Heater Accessories” respectively.

These heaters have not been investigated for their acceptability when used with a control at a relatively low temperature for heat treatment or steam and dry bath applications. Steam and dry bath units are Listed under a separate category “Steam and Dry Bath Units”.

The basic Standard used to investigate products in this category is UL 1272, “Movable and Wall- or Ceiling-Hung Electric Room Heaters.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as appropriate: “Movable Heater”, “Movable Fan Type Heater”, “Wall-Hung
AIR HEATERS, ROOM, FIXED AND LOCATION DEDICATED (KKWS)

This category covers electric air heaters of the fixed and location dedicated room type for residential, commercial and industrial applications. These heaters are of the portable, cabinet, and fan-assisted types intended for mounting in various positions, such as on or in a wall, (except at the baseboard level), on, or in suspended from a ceiling or integrated in a floor. Combination units that include lights have been investigated with regard to heat release and suitability for use in rooms. Commercial-industrial types include heaters intended to be suspended from a ceiling or wall, or to provide an air curtain in a doorway. Accessory equipment furnished as kits for field installation on heaters such as switch and thermostat assemblies, speed controllers, mounting brackets, and wall-tool enclosures are included within these listings. These air heaters are intended to act as sources of heat for the purpose of raising or maintaining the comfort level in a desired area. These units have not been investigated for their acceptability when installed in confined areas and operated at elevated temperatures for heat treatment or steam and dry bath applications. Some air heaters may present fire hazards if they come in contact with combustible materials such as draperies, furniture, carpeting, bedding and the like or if they are located or blocked in such a manner. Such heaters intended to be installed as to provide safeguards against such contact and should not be located where they can be covered or blocked, for example at the baseboard level. Installations that do not result in a fire hazard, still may cause discoloration or scorching (but no glowing embers or flaming) of adjacent materials. Certain room heaters have been evaluated for outdoor use and are specifically indicated by product markings. All other heaters have been investigated for indoor installation only. The acceptability of such heaters when installed in semi-protected, or otherwise shielded locations is determined by the local inspection authority having jurisdiction. In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the National Electric Code must be observed in installation or use, suitable warnings and necessary special instructions are marked on the equipment itself. Steam and dry bath units are listed in a category of that name. Movable and Wall- or Ceiling-Hung Heaters are listed in a category of that name. Heaters which have provisions for drawing in outside air are listed as "Room Fan-Heater Units under Heating, Cooling, and Ventilating Equipment." Listings of baseboard heaters and accessories appear respectively under Baseboard Heaters and Baseboard Heater Accessories categories. The basic standard used to investigate products in this category is UL 2021, "Fixed and Location Dedicated Heaters." The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "Listed," a control number, and "Room Heater," or other appropriate product name.

BASEBOARD HEATERS (KLDR)

This listing covers space heaters of the portable and permanently mounted types intended to be positioned or installed on or in the wall at the baseboard level, or on the floor. Baseboard heaters have been investigated and found to incorporate suitable safeguards against establishment of fire hazards that might result from contact with combustible materials such as draperies, furniture, carpeting, bedding and the like; however, discoloration or scorching (but no glowing embers or flaming) may result on adjacent materials. Heaters, other than those marked to indicate that they are not for residential use, have been investigated to determine that the accessible surface temperatures are low enough to reduce the likelihood of burns from accidental contact. Electrical cords, drapes, and other furnishings should be kept away from baseboard heaters. To reduce the likelihood of cords contacting the heater, the heater is not to be located beneath electrical receptacles. Listings for receptacle accessories for use with an individual manufacturer’s baseboard heaters are included under the category "Baseboard Heater Accessories" (KLQZ). Baseboard mounted equipment consists of two types: Complete units intended for individual mounting in specific locations, and complete systems, which include accessories to enable the heating units to be interconnected around the perimeter of a room. Listings for accessories appear under Baseboard Heater Accessories. With reference to these systems, each manufacturer is required to furnish detailed instructions covering the assembly of the basic units and accessories, and indicating the method in which ground continuity is intended to be maintained between adjacent sections. Electrical fittings are provided with each heater of a system to insure ground continuity between adjacent units and to protect interconnected wiring, unless investigation shows that standard fittings which are available in the field will accomplish the same result. A system which is factory furnished with all interconnecting wiring, fittings, raceways, etc., to complete the installation is considered suitable for connection to a single outlet branch circuit. The basic standard used to investigate products in this category is UL 1042, "Electric Baseboard Heating Equipment." The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Electric Baseboard Heater".

Baseboard Heater Accessories (KLQZ)

This category covers accessories intended to be used in conjunction with individual manufacturer’s baseboard heater systems (see Baseboard Heaters) and accessories included in these systems which permit use of either the heating system by itself, or a separate room air conditioner by itself, are intended to be connected to a single branch circuit of appropriate capacity. The basic standard used to investigate products in this category is UL 1042, "Electric Baseboard Heating Equipment." The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Baseboard Heater Accessories."
2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY

**CLOTHES DRYER TRANSITION DUCTS (KMIK)**

*USE*

This category covers clothes dryer transition ducts intended for venting the exhaust air of electric and gas clothes dryers of household or commercial type. These ducts are rigid or flexible metal types. Flexible types are a maximum 8 ft. long for use in single lengths only. These ducts are intended for use only in connecting a clothes dryer to permanent ducting provided as a part of the building structure. These ducts are intended for installation in accordance with the installation instructions provided with the product.

**ADDITIONAL INFORMATION**

For additional information, see Clothes Dryers (KMX), Heaters, and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AHC).

**REQUIREMENTS**

The basic requirements used to investigate products in this category are ANSI/UL 2158, “Electric Clothes Dryers” and UL 1240, “Electric Commercial Clothes-Drying Equipment.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Clothes Dryer Transition Duct.”

**Laundry Equipment Accessories Classified for Use in Specified Equipment (KMKD)**

The products covered in this category are investigated for use with household clothes dryers of the electric and gas type. The basic standards used to investigate products in this category are Subject 2365, “The Outline of Investigation for Laundry Equipment Accessories,” the “Standard for Electric Clothes Dryers”, UL 2158, and the “ANSI Standard for Gas Clothes Dryers”, Z21.5.1.

Refill kits intended to replace disposed components of the accessory are investigated for use with the basic product. Laundry equipment accessories for installation on specific models of laundry equipment are Classified under the category Laundry Equipment Accessories, Classified for Use in Specified Equipment (OWK).

**CONTROL PANELS, REMOTE, FOR ELECTRIC DUCT HEATERS (KMLW)**

This listing covers electrical panels incorporating control and/or overcurrent protective devices intended specifically for remote use with electric duct heaters. Overcurrent protective devices in these panels are intended to provide overcurrent protection in accordance with Sec. 424-22(c) of the National Electrical Code.

Unless otherwise specified in the manufacturer’s installation instructions, these panels are intended to be mounted remote from the electric duct heaters, in a location where they will not be affected by heat or condensation from operation of the equipment.

The proper installation of these panels requires careful consideration of the individual manufacturer’s installation instructions and wiring diagrams.

General purpose panels are not limited to use with specific makes and models of electric duct heaters. These panels are provided with installation instructions and wiring diagrams showing supply connections, connections to the electric duct heaters, and control circuit connections to be completed at the time of installation.

For general purpose panels containing only overcurrent protective devices or only manually operated switching devices, the panel should be marked either under “Panelboards” or “Industrial Control Equipment,” respectively.

Panels to be used only with specific Listed equipment will be so identified and the equipment marked to require the particular panel. The installation instructions and wiring diagrams for these panels may be provided with the panel or may be provided only with the Listed electric duct heaters.

The basic standard used to investigate products in this category is UL 1996, “Electric Duct Heaters.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as appropriate: “General Purpose Control Panel for Electric Space Heating Equipment” or “Control Panel for Specific Electric Space Heating Equipment” — see equipment nameplate and installation instructions.

**HEATERS, COOKING APPLIANCES (KMSV)**

Commercial Cooking Appliances (KNGT)

*USE AND INSTALLATION*

This category covers cooking equipment intended for commercial indoor use, such as coffee machines, espresso coffee makers, (cold water) dispensers, conductive cookers, food warmers including heated food servers, fryers, griddles, nut warmers, ovens, popcorn machines, steam kettles, ranges, and other appliances for use in commercial kitchens, restaurants, or other business establishments where food is dispensed.

This category also covers custom-built food preparation and/or serving equipment consisting of drop-in components, shelf heaters, plate warmers, lighted and/or heated food displays, etc. These appliances are intended for commercial use in unclassified (ordinary) locations in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC), and are intended to be installed in accordance with ANSI/NFPA 96, “Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.”

Commercial cooking appliances of certain types are designed for permanent connection to water supply and sewer lines at the point of installation. Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

If a product is suitable for built-in installation, side-by-side mounting or stacking, it is indicated in the installation instructions.
2005 GENERAL INFORMATION DIRECTORY

2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY

REBUILT PRODUCTS

This category also covers commercial cooking equipment that is rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt commercial cooking equipment is rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt commercial cooking equipment is subject to the same requirements as new commercial cooking equipment.

PRODUCT MARKINGS

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, suitable warnings or special instructions are marked on the equipment.

Appliances covered under this category are suitable for wiring with either copper or aluminum power supply conductors, unless marked “Use Copper Wire Only For Power Supply Connections.”

RELATED PRODUCTS

For similar types of gas-fired food service equipment intended for commercial use, see Gas-fired Food Service Equipment (LQXX).

For cooking oil filters that are not an integral part of another appliance, see Filters for Cooking Oil (KNRF).

For cooking equipment with an air filtering system, see Filters for Cooking Oil, Commercial (KNRG).

The basic standard used to investigate products in this category is ANSI/UL 197, “Commercial Electric Cooking Appliances.”

Appliances with an integral recirculating air system have been additionally investigated to ANSI/UL 1889, “Commercial Cooling, Ventilating and Cooking Equipment (AACV).”

ADDITIONAL INFORMATION

For additional information, see Heaters and Heating Equipment (KBBV), Electrical Equipment for Use in Ordinary Locations (AALZ), and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 197, “Commercial Electric Cooking Appliances.” Commercial cooking appliances with integral recirculating ventilation systems that not only meet the appropriate requirements of UL but also have been investigated in accordance with ANSI/NSF 4, “Commercial Cooking, Rethermalization and Powered Hot Food Holding and Transport Equipment.”

ADJUNCT SERVICES

Underwriters Laboratories Inc. (UL) provides a service for the Classification of commercial cooking appliances that not only meet the appropriate requirements of UL but also have been investigated in accordance with ANSI/NSF 4, “Commercial Cooking, Rethermalization and Powered Hot Food Holding and Transport Equipment.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED” and a control number, and the product name “Commercial Cooking Appliance” or “Cooking Appliance,” or other appropriate product name as shown in the individual Listings.

For rebuilt products the word “Rebuilt,” “Reconditioned,” or “Manufacturer’s Rebuilt” precedes the product name.

Combination Listing/Classification Mark — A Listing Mark combined with a Classification Mark is provided on products that have additionally been investigated to ANSI/NSF 4. The combined Listing/Classification Mark consists of the Listing Mark elements detailed above, the EPH Mark, and the text “ANSI/NSF 4.” The EPH Mark includes, within a triangle, the UL symbol, the word “CLASSIFIED” above the UL symbol, and the letters “EPH” below the UL symbol.

Commercial Cooking Appliances with Integral Recirculating Ventilation Systems (KNKG)

USE AND INSTALLATION

This category covers cooking equipment intended for commercial use, such as deep fat fryers, griddles and other appliances for use in commercial kitchens, restaurants, or other business establishments where food is prepared. Each appliance covered in this category is manufactured with an integral recirculating ventilation system.

The integral recirculating ventilation systems of these appliances consist of a fan, a collection hood, an air filtering system consisting of a grease filter, and may also incorporate other air filtering devices. These systems incorporate an automatic fire extinguisher unit which has been investigated with the cooking equipment section.

Integral recirculating ventilation systems are intended for venting captured and filtered air back into the room in which the equipment is located. These products are not intended for connection to a ducted exhaust system.

Commercial, with Integral Systems for Limiting the Emission of Grease-laden Air (KNLZ)

This category covers cooking equipment intended for commercial use, such as pressurized deep fat fryers and other appliances for use in commercial kitchens, restaurants or other business establishments where food is prepared. Each appliance covered in this category is manufactured with an integral system feature to limit the emission of grease-laden air from the cooking process to the room ambient.

These appliances have been evaluated for the limit of 5 mg/m³ for the emission of grease-laden air to the room ambient in accordance with the recommendations of the National Fire Protection Association Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96, using the EPA-202 test method prescribed for cooking appliances provided with integral recirculating air systems.
These products are not intended for connection to a ducted exhaust system.

Appliances in this category are not provided with an integral fire extinguishing system. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to fire extinguishing systems, such as the need for held installed systems in accordance with NFPA 96.

For products with integral recirculating systems including fire extinguishing systems, refer to Commercial, with Integral Recirculating Systems (KNKG).

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installations or use, suitable warnings or special instructions are marked on the equipment.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name: “Commercial Filter,” or other appropriate product name.

Custom-built Food Service Equipment (KNNS)

This category covers custom-built commercial food serving and/or cooking equipment that includes various combinations of electric broilers, food warmers including heated food servers, fryers, griddles, ranges, ovens, lighted and/or heated food displays, shelf heaters, plate warmers, convection ovens, and the like. It may also include refrigerated beverage coolers/dispensers, drinking water coolers, ice makers, icemakers, refrigerators, soda fountain units, and the like.

Custom-built food service equipment has been evaluated for installation in accordance with the National Electrical Code, NFPA 70 (NEC) and the recommendations of NFPA 96, “National Fire Protection Association Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.”

Certain types of custom-built food service equipment are designed for permanent connections to water supply and sewer lines at the point of installation. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

Installation Instructions

Custom-built food service equipment of such size that shipment in one carton or fully assembled is impractical, may be divided into sections. Each section may bear a “Custom-built Food Service Equipment Section” Listing Mark and is marked “Section __ of __” The first blank space is filled with the number of the section. The second blank space is filled with a number indicating the total number of custom-built food service equipment sections that constitute the complete custom-built food service equipment. The custom-built food service equipment has installation instructions describing or illustrating the proper assembly, mounting and connection of the numbered custom-built food service equipment sections. The acceptability of the assembly of the sections in the field rests with the Authority Having Jurisdiction.

Product Markings

This equipment includes factory-built assemblies incorporating pre-installed materials and components which after installation are usually concealed and may not be accessible for inspection at the installation site. Electrical connections made during installation, other than supply connections, are identified by markings on the product.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, suitable warnings or special instructions are marked on the equipment.

Equipment in this category is suitable for wiring with either copper or aluminum power supply conductors unless marked “Use Copper Wire Only For Power Supply Connections.”

The acceptability of the assembly of the sections in the field rests with the Authority Having Jurisdiction.

2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY

2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY

Part IV

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, suitable warnings or special instructions are marked on the equipment.

Equipment in this category is suitable for wiring with either copper or aluminum power supply conductors unless marked “Use Copper wire only for power supply connections.”

UnEvaluated Factors

Neither the toxicity of emissions nor the physiological effects on persons consuming food products prepared or served by use of this equipment has been investigated.

Related Products

For refrigerated food service equipment without food heating functions, see Refrigeration Equipment (SCEN). For gas-fired food service equipment intended for commercial use, see Gas-Fired Food Service Equipment (LQGX).

Additional Information

For additional information, see Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AAIZ) and Heating, Cooling, Ventilating and Cooking Equipment (AHAC).

Requirements

The basic standards used to investigate products in this category are ANSI/UL 197, “Commercial Electric Cooking Appliances”, and ANSI/UL 471, “Commercial Refrigerators and Freezers”.

Appliances in this category with an integral cooking oil filter have been additionally investigated and marked according to ANS UL 197, “Commercial Filters for Cooking Oil”. For cooking oil filters that are not an integral part of another appliance, see Commercial Filters for Cooking Oil (KNRF). For cooking oil filters that form an integral part of another appliance, see Commercial Cooking Appliances (KNGT), Commercial, with Integral Recirculating Systems (KNKG); Commercial, with Integral Systems for Limiting the Emission of Grease-laden Air (KNLZ); Custom Built Food Service Equipment (KNNS); Commercial Cooking Appliances (LBOZ) or Gas-Fired Service Equipment (LQGX).

Filters for Cooking Oil, Commercial (KNRF)

This category covers filters rated 600 volts or less for cooking oil, and intended for commercial use.

Oil filters covered by this Listing filter the cooking oil used in deep fat fryers usually found in commercial kitchens, restaurants, or other business establishments where food is prepared. These filters include a pump and may include an integral oil heater. This Listing includes portable filters and fixed filters whether intended for use with a specific fryer or for general use.

For cooking oil filters that form an integral part of another appliance, see Commercial Cooking Appliances (KNGT); Commercial, with Integral Recirculating Systems (KNKG); Commercial, with Integral Systems for Limiting the Emission of Grease-laden Air (KNLZ); Custom Built Food Service Equipment (KNNS); Commercial Cooking Appliances (LBOZ) or Gas-Fired Service Equipment (LQGX).

Filters suitable for built-in installation, side-by-side mounting or stacking are indicated in the installation instructions for the filter.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, suitable warnings or special instructions are marked on the equipment.

Appliances listed in this category are suitable for wiring with either copper or aluminum power supply conductors unless marked “Use Copper wire only for power supply connections” or the equivalent.

Neither the toxicity of emissions nor the physiological effects on persons consuming food products prepared using filtered oil from these appliances has been investigated.

The basic standard used to investigate products in this category is UL 1989, “Commercial Filters for Cooking Oil”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name. "Commercial Filter for Cooking Oil” or “Commercial Filter for Cooking Oil”, or other appropriate product name related to commercial preparation/serving of food such as “Food Kiosk” or “Food Service Work Table.”

Household Cooking Appliances, Classified (KNSY)

This category covers household cooking appliances intended for use on standard electrical distribution systems utilizing other than NEMA configuration wiring devices.
DE-ICING AND SNOW MELTING EQUIPMENT (KOBQ)

This category covers fixed outdoor electric de-icing and snow melting systems for use in accordance with Article 426 of the National Electrical Code. The equipment is provided with means for permanent wiring connections, except that equipment rated 20A or less and 150V ac or less to ground may be of the plug and cord connected construction.

To supplement the general requirements in the National Electrical Code, the manufacturer is required to provide with the units or mats, specific installation instructions concerning any limitations of the installation and any instructions as to the use of the unit. The instructions also state that the unit is intended for burial in concrete specifically indicate that the slab must be a double pour (poured in two parts) if that is the only acceptable means of installation. If such a limitation is not specifically mentioned, either a single or double pour may be used.

For listing of pipe heating cable see "Pipe Heating Cables" (KQUF).

The basic requirements for products in this category are contained in the Subject 1588 Outline Of Investigation.

The basic standards used to investigate products in this category are UL 1026, "Electric Household Cooking and Food Serving Appliances"; UL 1082, "Household Electric Coffee Makers and Brewing-Type Appliances"; and UL 1083, "Household Electric Skillets and Frying-Type Appliances".

Range and range components intended for separate installation in kitchen cabinets or walls, such as built-in surface unit assemblies and ovens are listed under "Ranges, Household Electric." (KRXM), Microwave ovens are listed under Microwave Cooking Appliances (KQSQ).

The basic standards used to investigate products in this category are UL 1026, "Electric Household Cooking and Food Serving Appliances"; UL 1082, "Household Electric Coffee Makers and Brewing-Type Appliances"; and UL 1083, "Household Electric Skillets and Frying-Type Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "De-icing and Snow-Melting Equipment".

DUCT HEATERS, ELECTRIC (KOHZ)

Duct heaters are intended for installation in noncombustible ducts and are designed to be used individually and in groups as supplementary heat sources in hot air heating systems or as primary heat sources with separate blowers where the available heat from the duct heaters is sufficient to take care of local conditions.

Duct heaters which are suitable for outdoor installation are so marked. Heaters not marked as suitable for outdoor installation are for indoor use only.

In duct heaters rated more than 48 amps, the loads are subdivided so that each load does not exceed 48 amps and is protected at not more than 60 amps. The overcurrent protective devices are either included as an integral part of the heater or are furnished as a separate assembly. If the protective devices are furnished as a separate assembly, the heater is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies which are specifically Listed for use with Electric Duct Heaters, see "Control Panels, Remote, for Electric Duct Heaters (KMLW)." Other Listed separate assemblies, as referenced on the duct heater marking, may also be used.

Each duct heater incorporates integral limit controls which are intended to protect against abnormal operating conditions which might arise from blocked inlets, blocked outlets, or fan failures. Magnetically operated switching devices or similar components required for use with these limit controls are either included as an integral part of the heater or are furnished as a separate assembly as described in the preceding paragraph. Supplementary controls, are not necessarily supplied as part of the duct heater.

A separate room thermostat must be provided to control the room air temperatures. For listings of thermostats and similar devices, see Temperature Indicating and Regulating Equipment (XAPX) in the Electrical Construction Equipment Directory. Provision for an interlock circuit, to assure operation of the separate blower when the duct heater is located in the heater or in the separate assembly as described above.

The proper installation of these heaters requires careful consideration of the individual manufacturer's design characteristics, taking into consideration the number of heaters employed, the volume of air passing through the heaters, and the ambient temperatures and source of the air on the input side of the heater installation.

The air duct system should be installed in accordance with Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems No. 90A; Warm Air Heating and Air Conditioning Systems, No. 90B.

The manufacturer's application and installation instructions which are furnished with each heater should be consulted to determine the factors affecting the particular installation, including clearances between the heater and turns in the ducts, changes in duct sizes, air filters, humidifiers, etc. Unless these instructions specify other distances, for horizontal or upflow installations, (1) turns in the duct on the inlet side of the heater should be located at least 4 feet from the heater. (2) turns in the duct on the outlet side of the heater should be located at least 2 feet from the heater and (3) changes in duct sizes, air filters, humidifiers, etc. should be located at least 4 feet from either side of the heater.

Unless specifically indicated in the individual listings as "Suitable for zero clearance installation" the duct heater units should be installed in ducts with the clearances to combustible materials as specified in the manufacturers installation instructions and marked on the duct heater unit itself. Care should be taken to ensure that duct heaters are positioned properly (horizontal air flow or vertical air flow) since required clearances are affected by the position of the duct work in some instances.

Unless otherwise indicated, the designated clearances (other than "zero") are based on tests of units with uninsulated sheet metal ducts attached. Under these conditions, clearances may be reduced in those instances where they are not required to be specified by the manufacturer, provided that the tests indicated distances are maintained. Tests have indicated that no adverse thermal effects are obtained when duct heaters are located at a distance of not less than 4 feet from the ducts.

Tests have indicated that no adverse thermal effects are obtained when duct heaters are located at a distance of not less than 4 feet from the ducts. Duct heaters are located downstream at least 4 feet from the nearest surfaces of the heat pump, central cooling air conditioner, or fan-coil units. The basic standard used to investigate products in this category is UL 1996, "Electric Duct Heaters."

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the following product name: "De-icing and Snow-Melting Equipment".
HEATERS, SAUNA AND STEAM BATH (KPVJ)

This Listing covers bath heating equipment with sub-categories of Sauna Heating Equipment and Steam Bath Equipment. These bath heaters have not been investigated to determine their suitability for use as air heaters. See the categories Air Heaters, Moveable and Wall-or Ceiling-Hung (KKPT) and Air Heaters, Fixed and Location-Dedicated (KKWS) for such equipment.

Sauna Heating Equipment (KPSX)

This Listing covers heating equipment intended for concentrated heating at elevated temperatures in relatively confined areas with or without the addition of moisture.

Particular attention should be paid to the heater installation restrictions, such as warning markings, remote thermostats and control installations, guards, minimum clearances, venting, and distance from adjacent surfaces which are marked on the heater.

Factors such as the physiological effects of heat, reduced ventilation, and other conditions which may be found within the room where the heater is installed, have not been investigated.

The equipment listed in this category are intended for permanent connection to the supply source except for some sauna heater-room combination units which may be cord connected as specifically indicated.

For listing of steam bath equipment, see “Steam Bath Equipment” (KQBV).

The basic standard used to investigate products in this category is UL 875, “Electric Dry Bath Heater”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the introduction of the Directory) together with the word “LISTED”, a control number and “Sauna Heater”, “Sauna” or other appropriate product name.

Steam Bath Equipment (KQBV)

This Listing covers steam bath generators combination room and steam generator systems, and steam bath cabinets intended for high humidity concentrated heating at elevated temperatures for personal bathing.

Steam bath equipment accessories, such as gangable steam units, timer options, and drain options, are also included in these listings. The accessories often used in conjunction with these Listing units are Listed for installation only on Listed equipment as designated in the individual Listings of the equipment and accessories. The accessories are intended primarily for field-installation, but may be factory-installed.

Information concerning field wiring connections, mounting location, installation clearances, end-use equipment catalog numbers, etc., are marked on the accessory, and/or in detailed installation instructions accompanying each accessory.

Particular attention should be paid to installation instructions of the steam generator and markings on the product for restrictions, such as minimum distances to adjacent surfaces, valving of the steam outlet, etc.

Factors such as physiological effects of heat, reduced ventilation, and other conditions that may be found within the room where the steam is discharged or where the steam bath is installed, have not been investigated.

Steam generators Listed in this category have not been investigated for their suitability as a source of steam for space-heating purposes or for industrial or commercial use.

For listing of sauna heating equipment, see “Sauna Heating Equipment” in this directory.

For steam generators for industrial or commercial use, see “Heaters, Industrial and Laboratory” in this directory.

The basic standard used to investigate products in this category is UL 499, “Electric Heating Appliances”.

The Listing Mark of Underwriters Laboratories Inc. on the product, or on the most recent container in case of an accessory, is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as appropriate: “Steam Bath Heater”, “Steam Bath Cabinet”, “Shower/Steamer Unit”, or other appropriate product name.

2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY

ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT

In the following listing of industrial and laboratory hot plates, ovens, or other similar products, the explosion and fire hazard involved in the heating of chemicals has not been investigated.

Vapor degreasers are intended for use only with the specific cleaning fluids. Adequate ventilation is required for this equipment and the manufacturer’s installation and operation instructions should be followed. The physiological effects of the cleaning fluids intended for use with the degreasing equipment have not been investigated by Underwriters Laboratories Inc.

Steam generators and boilers listed in this category are required to be provided with tanks built in conformance with the ASME Boiler Construction Code, and suitable pressure relief mechanisms. Water temperatures are not limited to a maximum of 90°C.

An explosion hazard may exist in steam generators because of the accumulation of oxygen and hydrogen in an unvented system which is operated under stand-by conditions for long periods of time, or to which condensed is returned. Suitable venting devices should be installed and such systems should be purged frequently.

The heaters incorporated in steam generators and boilers have not been investigated for their suitability as a source of hot water or steam for space-heating purposes.

The basic standard used to investigate products in this category is UL 499, “Electric Heating Appliances”.


Portable electric heating devices of soldering iron type present certain inherent hazards. The temperatures necessary for their normal use are high enough to cause fire if they are left in contact with combustible materials.

Infra-red heating equipment has not been investigated for use in hazardous locations, as defined in the National Electrical Code.

In cases where the nature or construction of equipment is such that special precautions beyond those for installation of the National Electrical Code must be observed in installation or use, suitable warnings and necessary special instructions are marked on the equipment itself.

In the following listing of industrial and laboratory hot plates, ovens, or other similar products, the explosion and fire hazard involved in the heating of chemicals has not been investigated.

Water, Laboratory furnaces and dryers, Mobile drying ovens, Soldering guns and irons, Soldering stations and tables, Vacuum ovens, Water baths.
This category covers cooking equipment incorporating one or more microwave generators operating in the normal ISM bands of 915 + or - 25 and 2450 + or - 50 megahertz.

The appliances are intended for household or commercial use in ordinary locations in accordance with the National Electrical Code. In cases where the nature or construction of the equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installation or use, the necessary special instructions are marked on the appliances themselves or are included in the installation instructions provided with the appliance.

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances have been investigated.

All microwave cooking appliances, cord connected and permanently connected, have provision for being properly grounded.

This category includes portable and stationary microwave cooking appliances employing resistive-type heating elements for baking, broiling, broiling, convection cooking, or similar operations.

This category also includes combination microwave oven/vent hood fans, and kits for converting counter top units to built-in, under-cabinet, wall-mounted or similar installations.

Products specifically designed for field installation in or on a microwave cooking appliance or to adapt a microwave cooking appliance from one type of installation to another are covered in this category under the individual listing and are marked to identify the microwave cooking appliance(s) with which they have been investigated.

Counter top and under-cabinet mounted units have been tested individually in two sided right-angle alcoves. Products that have been investigated and found suitable for some other type of usage, such as built-in installation, side-by-side mounting, stacking or field installation over electric or gas ranges are identified for such usage by installation instructions, product markings, or both.

Units that have been investigated and found suitable for installation above a range or counter mounted cooking unit are identified for such installation and the minimum acceptable vertical clearance between the microwave cooking appliance and the range or counter mounted cooking unit is specified in instructions, product markings, or both.

Household electric ranges and built-in ovens incorporating a microwave cooking feature are Listed under Ranges, Household Electric category.

Listed microwave cooking appliances have been evaluated to demonstrate that the microwave radiation emission is within the limits prescribed by the U.S. Dept. of Health and Human Services, Food and Drug Administration, Center for Devices and Radiological Health. Listed microwave cooking appliances are provided with a marking indicating whether they are intended for household use, commercial use, or both.

Only those microwave ovens bearing the Marine Listing Mark or the Marine Listing Mark for Use Only On Vessels Over 65 Ft. have been investigated to determine the suitability of the microwave oven in a marine environment such as aboard boats or ships. See also guide EJ0Y in the Marine Products Directory.

The basic standard used to investigate products in this category is UL 923, "Microwave Cooking Appliances". This category also covers microwave cooking appliances which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt microwave cooking appliances are rebuit to the extent necessary to disassemble and reassemble using new or reconditioned component parts. Rebuilt microwave cooking appliances are subject to the same requirements as new microwave cooking appliances.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names "Microwave Oven", "Microwave Food Warmer", "Microwave Cooking Appliance", "Microwave/Oven Vent Hood Fan", or other appropriate product name indicated in the individual Listings.

The Listing Mark for rebuilt microwave cooking appliances additionally includes the word "Rebuilt", "Remanufactured" or "Reconditioned" preceding the above product name.

PIPE HEATING CABLE (KQUF)

This category covers electric heating cable designed to be secured to pipes to reduce the likelihood of freezing or to facilitate flow of viscous liquids. Some units incorporate a thermostat that automatically turns on the heating cable when the temperature drops below a predetermined value.

Pipe heating cable is intended to be installed in accordance with the manufacturer's installation instructions.

Information is provided, either as marking on the cable or in the installation instructions, as to the intended application of the heating cable. The Listings appear separately under the following subcategories: Mobile/ Manufactured Home Pipe Heating Cable (KQVU), Pipe Heating Cable, Industrial and Commercial (KQXR) and Residential Pipe Heating Cable (KQYI).

The ability of heating cable to maintain temperatures of liquids in pipes depends upon ambient temperature conditions and has not been investigated.

RELATED PRODUCTS

For de-icing and snow melting equipment, see the category of the same name (KQBQ).

Mobile/manufactured home pipe heating cable (KQVU)

USE AND INSTALLATION

This category covers electric heating cable intended to reduce the likelihood of water freezing in exposed pipes of mobile/manufactured homes. The cable is provided with an attachment plug and are intended to be connected to a receptacle outlet on the underside of the mobile/manufactured home.

Equipment is intended to be installed in accordance with the requirements of Articles 427 and 550 of NFPA 70, "National Electrical Code." Pipe heating cable is intended to be installed in accordance with the manufacturer's installation instructions.

Unless specifically indicated otherwise by marking on the heating cable or in the installation instructions, this heating cable is intended for use only on metallic pipes.

UNEVALUATED FACTORS

The physiological effects on persons consuming liquid effected by use of this equipment has not been investigated.

RELATED PRODUCTS

For additional information, see Pipe Heating Cable (KQVF), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 1462, "Outline of Investigation for Mobile/ Manufactured Home Pipe Heating Cable.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Mobile/Manufactured Home Pipe Heating Cable."

Pipe Heating Cable, Industrial and Commercial (KQXR)

USE AND INSTALLATION

This category covers electric heating cable intended to be installed on or in pipes in accordance with Article 427 of ANSI/NFPA 70, "National Electrical Code."

The heating cable is intended to be connected to the supply system by permanent wiring methods.

Unless specifically indicated otherwise by marking on the heating cable or in the installation instructions, the heating cable is intended for use only on metallic pipes.

RELATED PRODUCTS

For additional information, see Pipe Heating Cable (KQVF), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS


The basic standard used to investigate products in this category is UL 515, “Electrical Resistance Heat Tracing for Commercial and Industrial Applications.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Pipe Heating Cable.”

**Residential Pipe Heating Cable (KQYI)**

**USE**

This category covers electric heating cable intended to reduce the likelihood of freezing of water-filled pipes. This cable is provided with a flexible cord and attachment plug and is intended specifically for residential pipe heating uses, such as sprinkler systems and in crawl spaces, basements, well houses, and the like.

This cable is intended for use in accessible locations only. This cable is suitable for use on metal and rigid plastic water-filled pipes.

**ADDITIONAL INFORMATION**

For additional information, see Pipe Heating Cable (KQUF), Electrical Equipment for Use in Ordinary Locations (AAIZ), Heating, Cooling, Ventilating and Cooking Equipment (AHAC).

**REQUIREMENTS**

The basic requirements used to investigate products in this category are contained in UL Subject 2049, “Outline of Investigation for Residential Pipe Heating Cable.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Residential Pipe Heating Cable.”

**HEATERS, RADIANT HEATING EQUIPMENT (KQYZ)**

**USE AND INSTALLATION**

This category covers radiant heating equipment such as space heating cable, heating panels and heating panel sets intended to be installed as fixed equipment for space heating for use in accordance with Article 242 of ANSI/NFPA 70, “National Electrical Code” (NEC). These products form an integral part of the building construction after on-site assembly, installation and connection.

To supplement the general requirements given in the applicable Article of the NEC, the manufacturer is required to provide with the units specific installation instructions concerning any limitations of the installation and/or use of the equipment. Flexible ceiling heating panels and heating panel sets are intended to be installed without air gaps in direct contact with thermal insulation. Failure to comply with all installation instructions may result in a risk of fire or electric shock.

Radiant heating panels and heating panel sets are marked “Radiant Ceiling Heating Panel,” “Radiant Floor Heating Panel” or “Radiant Concrete Heating Panel,” as appropriate. Units intended for concrete installation are further marked “Concrete Installation Only.” The instructions for panel or cable units intended for burial in concrete specifically indicate that the slab must be a double pour (poured in two parts) if that is the only acceptable means of installation. If such a limitation is not specifically mentioned, either a single or double pour may be used. Cable units are provided with a tag attached to the nonheating leads which supplement the installation instructions.

The instructions for heating panels and heating panel sets intended for connection of single conductor supply cable specify the type of cable to be used and state that “Type NM and NMC nonmetallic-sheathed cable is not suitable for installing this product.” Cable units furnished with nonheating leads of single conductor Type UF cable, or pre-loomed Type TW wire, have been investigated to determine if the use of additional flexible nonmetallic tubing is not required over the nonheating leads when the cable units are installed. The single conductor Type UF cable may be identified by the type designation printed at frequent intervals on the cable.

See also listings for room thermostats, controls and other wiring devices in the Electrical Construction Equipment Directory.

Connectors to be assembled to wire in the field using a special tool are to be assembled using the tool specified by the manufacturer.

Stapling guns, if used in the installation of heating cable units require specially designed heads to prevent damage to the conductor insulation. Only those guns recommended by the cable unit manufacturer should be used for this purpose.

**RANGES, HOUSEHOLD ELECTRIC (KRMX)**

Listings in this category include household type all electric cooking equipment (consisting of oven and surface units), combination electric and solid fuel cooking equipment (consisting of electric ovens and surface units, together with a solid fuel combustion section), wall-mounted and counter mounted cooking equipment.

Cooking equipment-refrigerator combinations are Listed under Kitchen Units, Refrigerated (SIPT).

Cooking equipment is investigated and tested to determine that it can be properly installed in accordance with the installation instructions provided by the manufacturer. Some of the more common arrangements are described in the following paragraphs.

**General** — Microwave cooking appliances and hood fans with or without a shelf or compartment to accommodate a microwave oven, that have been investigated and found suitable for installation above a counter level range or a counter mounted cooking unit are identified for such installation. The minimum acceptable vertical clearance between the counter level range or counter mounted unit and this appliance is specified in the appliance installation instructions, product markings or both. See Guide Information for Microwave Cooking Appliances (KQQ) and Electric Fans (GPW).

All Electric Arrangements

**COUNTER-LEVEL RANGES —** (See Fig. 1)

The range with or without a warming tray located on the top of the back guard may be installed close against vertical walls at the back and at both sides and a top cabinet may be installed not less than “A” inches above the top of the cooking platform. See Dimension “A” in Fig. 1.

"A = 30 in. minimum clearance between the top of the cooking platform and the bottom of an unprotected wood or metal cabinet; or A = 24 in. (not applicable when an electrically heated warming tray is provided on the back guard) when the bottom of the wood or metal cabinet is protected by not less than 1/4 in. flame retardant millboard covered with not less than No. 28 MSG sheet steel, 0.015 in. stainless steel, 0.024 in. aluminum or 0.020 in. copper.

![FIG. 1](image-url)
**EYE-LEVEL RANGES — (See Fig. 2)**

The range (with either one or two ovens) may be installed close against a vertical wall at the back and a top cabinet may be installed above the upper oven. If the range does not have a top control panel (this design not shown in illustration) an upper end cabinet of the same depth as the cabinet above the oven and a base cabinet both 6 in. minimum width shall be installed at the end of the range opposite the hinged end of the door. If a top control panel is provided at that end, the upper end cabinet and base cabinet may be omitted and the range may be installed close against a vertical wall at that end. The end of the range on which the hinges are located may be installed close against a vertical wall; except that when the wall prevents opening of the door to a position which will permit the removal of an oven rack, an upper end cabinet of the depth mentioned above and a base cabinet (both of sufficient width) may be installed such that the required opening of the door is achieved. If a lower oven or storage area is not provided to permit floor mounting, the range may be installed on a bottom cabinet or over any specific appliance with which the range is intended to be used.

All Electric Wall-Mounted Ovens and Counter-Mounted Cooking Units

These include wall-mounted and counter mounted cooking equipment or combinations thereof intended to be permanently installed on or in the building structure. Spacings to combustible materials are the minimum allowed by the construction of the device. Unless specifically indicated by marking on the appliances, the individual oven units or counter mounted cooking units are intended for single unit installation only and are not intended for stacking or placing in pairs side by side or back to back. When double unit installation is intended the installation instructions give the minimum centerline spacings unless the units are suitable for the smallest clearance between units permitted by the construction. For cooking units a top cabinet may be installed “A” inches above the top of the cooking platform. See Dimension “A” in Fig. 3, and note following Fig. 1. FIG. 3

**COMBINATION RANGES**

As permitted by the installation marking, the range may be installed close against a vertical wall or with no more than a 6 in. air space to a vertical wall at the end where electrical units are located. See the table below for the spacings at the flue or vent and at the end of the range where solid fuel is burned.

**ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY**

<table>
<thead>
<tr>
<th>Type or Fuel &amp; Range Construction</th>
<th>Spacing to Wall From Nonelectrical End of Range in In.</th>
<th>Spacing From Flue or Vent in In.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid fuel, fire pot without fire-clay lining</td>
<td>36</td>
<td>18</td>
</tr>
<tr>
<td>Solid fuel, fire pot with fire-clay lining</td>
<td>24</td>
<td>18</td>
</tr>
</tbody>
</table>

All electric ranges, wall-mounted and counter mounted cooking equipment and combination ranges, intended for nominal 125/250 V or less (including those rated 120/208), three-wire, operation are provided with a bonding connection between the frame of the appliance and the neutral to provide grounding in accordance with the provisions of the National Electrical Code. Unless the appliance is marked “Warning-Frame Grounded To Neutral Of Appliance Through A Link. This Range Not For Use In Mobile Homes Or In Areas Where Local Codes Do Not Permit Grounding Through Neutral” instructions are provided for disconnecting the bond and making a direct connection of the metallic parts or the unit to ground.

The flexible metal conduit and high temperature insulated leads provided with some ranges are tested and recognized as a component part of the equipment. Unless a conduit fitting or outlet box is installed at the factory, type or other means is provided at the end of the conduit to protect the conductors during shipment. This protection is not intended to take the place of a conduit bushing or fitting which is required by the National Electrical Code.

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances has been investigated.

The basic standards used to investigate products in this category are UL 858, “Household Electric Ranges”, and UL 923, “Microwave Cooking Appliances”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Range”, “Electric Range”, or other appropriate product name.

**WATER HEATERS (KSAV)**

This listing covers water heaters with sub-categories of Commercial Storage Tank and Booster, Heat Pump, Heat Pump for Specific Use, Household Storage Tank, Immersion, Miscellaneous and Space Heating. These water heaters have been investigated to determine their suitability for uses as indicated for each sub-category.

**Commercial Storage Tank and Booster Water Heaters (KSBZ)**

This listing covers water heaters intended to supply hot water for commercial or industrial use, and to be installed in ordinary locations in accordance with the National Electric Code.

These water heaters are equipped with a temperature-regulating device that limits the water temperature to a maximum of 90 C (194 F). These heaters are also equipped with a manually reset temperature limit control that restricts the water temperature to a maximum of 99 C (210 F) should a regulating control fail.

A combination temperature-pressure relief value is supplied or factory installed on these heaters. When supplied separately adequate instructions for mounting the valve are provided with the heater.

Water heaters listed in this category and which have also been found suitable for marine use, are also listed under the category applicable to marine water heaters. For these, see “Water Heater, Marine” (LXWV) in the Marine Products Directory.

For additional information see Water Heaters (KSAV).

The basic standard used to investigate products in this category is UL 1453, “Electric Booster and Commercial Storage Tank Water Heaters”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Commercial Storage Tank Water Heater”, “Booster Water Heater”, or other appropriate product name.

**Heat Pumps for Special Use (KSCZ)**

This category covers products intended to heat water utilizing the heat of rejection from a mechanical refrigeration system. These are limited to installation with specific makes and models of storage tank water heaters as marked on the heat pump product.
Water Heaters, Space Heating (KSDR)

This category covers those products intended for the heating of water and storage of hot water for space-heating purposes, to be installed in accordance with ANSI/NFPA 70, "National Electrical Code." These heaters are intended for use in jurisdictions that permit the use of hot water space-heating systems that do not employ tanks constructed and marked in accordance with the ASME Boiler and Pressure Vessel Code. Authorities Having Jurisdiction should be consulted before installation. These heaters are equipped with temperature-regulating devices that allow a water temperature not higher than 90°C (194°F) and also with temperature-limiting devices that limit the water temperature to a maximum of 99°C (210°F).

RELATED PRODUCTS
Pressurized electric water heaters intended for space-heating applications that are constructed and marked in accordance with the ASME Boiler and Pressure Vessel Code are covered under Boiler, Electric (BDJS).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

Household Water Heaters, Storage Tank (KSDT)

This listing covers storage tank water heaters rated 12 kW or less and having a tank capacity of more than one gal and not more than 120 gals. They are intended for household use in ordinary locations and permanent connection to the supply source in accordance with the National Electrical Code.

Household storage tank water heaters are equipped with a temperature-limiting device intended to restrict the water temperature to a maximum of 85 deg C (185 deg F). This device has been preset at the factory to a setting of 60 deg C (140 deg F). These Heaters are also equipped with a manually reset temperature limit control that restricts the water temperature to a maximum of 99 deg C (210 deg F) should a regulating control fail. Safety devices, such as temperature-pressure relief mechanisms, are not required to be furnished as part of the Listed water heater, but markings and instructions accompany each water heater indicating that a suitable safety device which complies with the local plumbing codes should be connected to the heater at the time it is installed.

Water heaters listed in this category and which have also been found suitable for marine use, are also listed under the category applicable to marine water heaters. For these, see "Water Heater, Marine" (LXWV) in the Marine Products Directory.

Water heaters which have been found to be in accordance with Part 280.707(d) (1) of HUD Mobile Home Construction and Safety Standards for Energy Efficiency are provided with the marking: Design evaluated by UL in accordance with Part 280.707(d) (1) of HUD Mobile Home Construction and Safety Standards for Energy Efficiency.

Solar-electric water heaters listed in this category are also listed under the category applicable to solar water heaters. For these, see Water Heaters, Solar (UWZV).

For additional information, see Water Heaters (KSAV).

The basic standard used to investigate products in this category is UL 174, "Household Electric Storage Tank Water Heaters." The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Household Storage Tank Water Heater" or other appropriate product name.

Immersion Heaters (KSFX)

This listing covers immersion heaters, both cord connected and for permanent connection.

Some immersion heaters intended for permanent connection incorporate thermostats and auxiliary switches which respond to the temperatures created by the immersion heater. The acceptability of thermostats or auxiliary switch construction; as temperature regulating and/or safety controls when incorporated in the ultimate equipment assembly for which they are intended, must be determined in accordance with the requirements applicable to that equipment.

For additional information see Water Heaters (KSAV).

The basic standard used to investigate products in this category is UL 499, "Electric Heating Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Instantaneous Water Heater", "Water Heater", or other appropriate product name.

Miscellaneous Water Heaters (KSGR)

This listing covers instantaneous heaters, strap-on type heaters, heaters for sink or water cooler mounting, and other water heaters not covered under Household Storage Tank Water Heaters, Commercial Storage Tank and Booster Water Heaters, or Immersion Heaters.

For additional information see Water Heaters (KSAV).

The basic standard used to investigate products in this category is UL 499, "Electric Heating Appliances".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED" and one of the following product names as appropriate: "Instantaneous Water Heater", "Water Heater", or other appropriate product name.

Heaters, Waterbeds (KSHU)

This listing covers cord connected electric heaters, usually in the form of mats, for use under the mattress of waterbeds. Heaters employing external adjustable temperature control units are units covered as a unit, for installation in accordance with the manufacturer’s instructions.

The basic standard used to investigate products in this category is UL 1445, "Electric Water Bed Heaters".

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Instantaneous Water Heater", "Water Heater", or other appropriate product name.

Heaters, Specialty (KDOT)

This category covers heating appliances rated 600 V or less for use in accordance with ANSI/NFPA 70, "National Electrical Code" (NEC). This includes heating appliances for household and industrial applications, as well as products that generate steam for other than space heating purposes, and have an electrical power rating of 15 kW or less per steam generating vessel. A heating appliance is defined as an electrically energized product that directly or indirectly generates heat to perform its intended function.

Heating devices may present certain inherent hazards. The temperatures necessary for their normal use can be high enough to cause fire if they are left in contact with combustible material.

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the NEC must be observed in installation or use, necessary special instructions are marked on the equipment.

UnEvaluated Factors

The physiological effects of the liquids which may be employed in conjunction with the heating devices have not been investigated.

Additional Information

For additional information, see Heaters and Heating Equipment (KKBV), Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).
HEATERS, EMITTER TYPE, CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (KSSG)

USE
This category covers heaters intended for installation on specific models of UL Listed heating equipment that are shipped from the factory without heaters installed. These heaters have been investigated by UL in specific models identified in markups or instructions to determine that, when used in accordance with the manufacturer’s instructions, the complete product complies with applicable requirements.

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 499, “Electric Heating Appliances.”

The Classification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Hand Dryer,” “Pet Dryer,” “Embossor,” “Stock Tank Heater,” “Charcoal Igniter,” or the name of the specific type of product as shown in the individual Listings.

HEATING AND COOLING EQUIPMENT (LZFE)

GENERAL
This category covers various types of heating and cooling equipment typically used for space conditioning.

Individual categories following the GENERAL INFORMATION section below are identified for each type of equipment. Not all statements in GENERAL INFORMATION are applicable to all types of equipment covered under this category; only the statements that are applicable are applicable. Refer to the individual categories for the general information that is applicable.

Wiring Termination Provisions
For permanently connected equipment, the wiring termination provisions are based on tests during product investigation, and Table 310.16 of ANSI/NFPA 70, “National Electrical Code” (NEC) as follows:

1. 75°C insulated conductors at the 75°C ampacities.
2. 90°C insulated conductors at the 75°C ampacities in which case the equipment is marked for 90°C temperature.
3. Insulation temperature rating of 75 or 90°C and wire size as marked on the unit.

Also see IV. INSTALLATION REQUIREMENTS (Appliance and Utilization Equipment Terminations) under Electrical Equipment for Use in Ordinary Locations (AALZ) and VIII. ELECTRICAL INSTALLATIONS under Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

GENERAL INFORMATION
Each unit is intended to be used for one of the applications listed below:

1. The following defines the types of systems covered in the individual categories below:
A. Self-contained — Refrigeration system in one section, factory assembled, with refrigerant charge and tested for leaks.
B. Compressor Unit — Includes one or more compressors with associated controls and wiring, and may also include a receiver. These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit, and to a remote condenser having a marked working pressure not less than designated by the marking on the unit data plate. (The term is applicable both to refrigeration equipment of any size and also to air conditioning equipment. The term “air conditioning systems equipment, compressor unit” is used for air conditioning equipment rated over 135,000 Btu/h.)
C. Compressor Condenser Unit — Includes one or more compressors and condensers with interconnecting refrigerant piping and with associated controls and wiring. These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit. (The term is applicable to air conditioning systems equipment only)
D. Compressor-Evaporator (Cooler) Unit — Includes one or more compressors and evaporators (coolers) with interconnecting refrigerant tubing or piping and with associated controls and wiring. The unit is factory assembled and tested for leaks. The refrigerant type is marked on the unit and the operating refrigerant charge may or may not be provided as indicated on the unit nameplate. These units are intended for field connection to a remote condenser having a marked working pressure not less than designated by the marking on the unit data plate. (The term “compressor-evaporator” is applicable to air conditioning systems equipment and special purpose air conditioners, and the term “compressor-cooler” is applicable to liquid chillers.)
E. Compressor Evaporator/Condenser — Refrigeration system in two sections, one including the compressor and the evaporator and the other, the condenser. The sections are intended to be installed remote from each other. The interconnecting refrigerant tubng may or may not be provided. The operating refrigerant charge may or may not be provided, as indicated on the compressor evaporator unit nameplate. Each section is tested for leaks. (The term “condensing unit/evaporator” is applicable to central cooling air conditioners and special purpose air conditioners, and the term “outdoor/indoor unit” is applicable to heat pumps.)
F. Compressor Evaporator/Condenser Unit/Evaporator (Outdoor/Indoor Unit) — Refrigeration or air conditioning system in two sections, the condensing unit (or outdoor) section including the compressor and condenser and the other section the evaporator (indoor section). The sections are intended to be installed remote from each other. The interconnecting refrigerant tubing may or may not be provided. The operating refrigerant charge may or may not be provided, as indicated on the condensing unit nameplate. Each section is tested for leaks. (The term “condensing unit/evaporator” is applicable to central cooling air conditioners and special purpose air conditioners, and the term “outdoor/indoor unit” is applicable to heat pumps.)
G. Heating, Cooling, and Ventilating Equipment — Intended for use as part of a complete system and, when installed, may be associated with other equipment and components that are separately Listed. Unless indicated in the individual Listings for the other equipment, this equipment has not been investigated for operation when combined with other Listed equipment in a complete system in the field.
H. Condensing Unit — Includes one or more compressors and air- or water-cooled condensers with interconnecting refrigerant piping and with associated controls and wiring, and may also include a receiver. These units are intended for field connection to a remote evaporator, unit cooler or fan-coil unit. (Same as “C” above, except the term is applicable to refrigeration equipment or to air conditioning equipment of any size.)

2. Heating and cooling equipment of the unitary type consists of one or more factory-built sections. If the equipment is provided in two or more sections, each such section is designed for field interconnection with a matched section(s) to make the heating and/or cooling equipment. Equipment provided in two or more sections is either marked to identify the appropriate sections for proper installation, or the markings on the sections comprising the assembly are shown in the individual Listings. Where so designated, a separately Listed electric central heating furnace, fan-coil or fan unit may serve as a portion of the assembly.

3. Listed equipment is rated 600 V or less and centrifugal type units as identified in the individual Listings are rated 7200 V or less.

Installation Codes
4. This equipment is intended to be installed in accordance with the requirements of the NEC.

5. Equipment to be connected to an air duct system is intended for installation in accordance with NFPA 90A, “Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.”


7. For equipment intended to be installed in mobile homes, reference should be made to The Code of Federal Regulations, Chapter 24, Part 3280.

8. For equipment intended to be installed in recreational vehicles, reference should be made to NFPA 1192, “Standard on Recreational Vehicles.”
9. Equipment is marked with the refrigerant type used and some units may employ alternative refrigerants that are not currently listed in ASHRAE IC 15, “Safety Code for Mechanical Refrigeration,” but are included in ASHRAE 34-1994, “Designation and Safety Classification of Refrigerants.” The use of these alternative refrigerants resulted from environmental restrictions on some refrigerants currently listed in the code. Using requirements as applied to specified refrigerants in ASHRAE IC 15, UL’s Listing Reports, available from the manufacturer, identify installation requirements applicable to the alternative refrigerants in the same manner as shown in ASHRAE IC 15 for currently used refrigerants. The refrigerants classified AI or AI/1 by ASHRAE IC 15 and have been determined to be nonflammable or practically nonflammable in accordance with the requirements in UL 2182, “Refrigerants.”

Wiring Diagrams

10. The proper method of electrical installation (number of branch circuits, control wiring connections, etc.) is shown on the wiring diagram and/or marking attached to the equipment.

Units Used with Duct Heaters

11. Unless otherwise indicated in the individual Listings, Listed duct heaters that may be installed in conjunction with the equipment covered in the Listings are intended to be installed at least 4 ft downstream from the equipment.

Field-installed Accessories

12. Heating and cooling equipment installed for use with Listed field-installed accessories, such as electric resistance heaters (including duct heaters), is specifically indicated in the individual Listings. See Accessories, Air Conditioning Equipment (ABY) and Duct Heaters, Electric (KTP). When zero clearance is specified, temperatures are measured directly on the unit cabinet with uninsulated sheet metal ducts and plenum attached. When clearances other than zero are specified, temperatures are measured on a wood test enclosure spaced at the specified clearances from the unit cabinet with ducts and plenum.

13. Units investigated for use with field-installed steam, hot water, or refrigerant coils or with electric resistance heaters (including Listed accessories or duct heaters as noted in paragraph 11 above) are marked to so indicate.

Electric Heat Considerations

14. Units that incorporate factory- or field-installed electric resistance heaters are identified in the individual Listings.

Field-installed electric resistance heaters that have been investigated for use with the Listed equipment at the time of listing, are identified on the heating and cooling equipment nameplate by manufacturer’s name and part number, or are covered under Electric Heater Assemblies Classified for Use on Specified Equipment (LZPU).

15. Where a clearance from combustible materials is required, the clearance is marked on the heating and/or cooling equipment and is designated in the individual Listings. The clearances are the minimum required to avoid overheating; additional clearances may be required for accessibility.

When zero clearance is specified, temperatures are measured directly on the unit cabinet with uninsulated sheet metal ducts and plenum attached. When clearances other than zero are specified, temperatures are measured on a wood test enclosure spaced at the specified clearances from the unit cabinet with ducts and plenum.

16. In heating and cooling equipment employing electric resistance heaters rated more than 48 A, the loads are subdivided so that each load does not exceed 48 A and is protected by overcurrent devices at not more than 4A.

The overcurrent devices are either included as an integral part of the heating and cooling equipment or furnished as a separate assembly. If the overcurrent devices are furnished as a separate assembly, the unit is marked to specify that it is to be used with that particular separate assembly. For such separate assemblies specifically recognized for use with electric space heaters provided as part of this equipment, see CONTROL PANELS FOR SPECIFIC ELECTRIC SPACE HEATING EQUIPMENT below. Other Listed separate assemblies, as referenced on a marking on the heating and cooling equipment, may also be used.

Unit Installation

17. Unless otherwise specified in the marking on the equipment, the unit may be installed on combustible flooring.

18. Attic type units are so indicated in the individual Listings. Such units are suitable for installation in an attic or comparable normally unoccupied location as designated by the marking or instructions provided on the unit.

19. Units/Sections suitable for outdoor installation are so marked and identified in the individual Listings either by the term “outdoor section” or by an appropriate footnote. Units/Sections not marked as suitable for outdoor installation are for indoor use only.

Motor Group Installation

20. In permanently connected units employing two or more motors or a motor(s) and other loads operating from a single supply circuit, the motor overload protective devices (including thermal protection for motors) and other factory-installed motor components and wiring are investigated on the basis of compliance with the motor branch circuit, short-circuit and ground-fault protection requirements of Section 430.35(C) as referenced in Section 440.22 of the NEC. Such multimotor and combina-

2005 GENERAL INFORMATION DIRECTORY

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Ventilating, and Cooling Equipment (AHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1995, “Heating and Cooling Equipment.” Other standards may also be used where specifically indicated in the individual categories below.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listings and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the product name as shown in the following individual categories or in the individual Listings.

1. The Gas-fired Listing Mark of Underwriters Laboratories Inc. for gas-fired products includes the UL symbol with the words “GAS-FIRED” above the UL symbol and the word “LISTED” below the UL symbol (as illustrated in the Introduction of this Directory), a control number, the product identity, and the standard designation as shown in the following individual categories or in the individual Listings.

ABSORPTION AIR CONDITIONING EQUIPMENT

GENERAL INFORMATION paragraphs 1A, 2, 3, 4, 5, 6, 9, 19 and 20 are applicable to this equipment.

This category covers equipment of the unitary type employing an absorption type refrigeration system, intended for commercial or domestic cooling, or heating and cooling of a liquid such as water or a water-antifreeze solution. This equipment is intended primarily, but not exclusively, for air conditioning purposes.

The direct energy source for cooling and heating is a hot fluid (such as gas, liquid or steam) as obtained from a source such as a solar-heat system or waste-heat, and/or gas-, oil-, or gas-oil-fired burners. Absorption air conditioning equipment provided with gas-, oil-, or gas-oil-fired burner(s) as the direct energy source for cooling and heating is covered under Absorption Air Conditioning Equipment (KTFV).

AIR CONDITIONING SYSTEMS EQUIPMENT, SELF-CONTAINED UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COOLING PORTION OF SELF-CONTAINED UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR-COOLING UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMRESSOR-CONDENSER UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR UNITS

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Ventilating, and Cooling Equipment (AHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1995, “Heating and Cooling Equipment.” Other standards may also be used where specifically indicated in the individual categories below.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listings and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the product name as shown in the following individual categories or in the individual Listings.

1. The Gas-fired Listing Mark of Underwriters Laboratories Inc. for gas-fired products includes the UL symbol with the words “GAS-FIRED” above the UL symbol and the word “LISTED” below the UL symbol (as illustrated in the Introduction of this Directory), a control number, the product identity, and the standard designation as shown in the following individual categories or in the individual Listings.

ABSORPTION AIR CONDITIONING EQUIPMENT

GENERAL INFORMATION paragraphs 1A, 2, 3, 4, 5, 6, 9, 19 and 20 are applicable to this equipment.

This category covers equipment of the unitary type employing an absorption type refrigeration system, intended for commercial or domestic cooling, or heating and cooling of a liquid such as water or a water-antifreeze solution. This equipment is intended primarily, but not exclusively, for air conditioning purposes.

The direct energy source for cooling and heating is a hot fluid (such as gas, liquid or steam) as obtained from a source such as a solar-heat system or waste-heat, and/or gas-, oil-, or gas-oil-fired burners. Absorption air conditioning equipment provided with gas-, oil-, or gas-oil-fired burner(s) as the direct energy source for cooling and heating is covered under Absorption Air Conditioning Equipment (KTFV).

AIR CONDITIONING SYSTEMS EQUIPMENT, SELF-CONTAINED UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COOLING PORTION OF SELF-CONTAINED UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR-COOLING UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMRESSOR-CONDENSER UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR UNITS

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Ventilating, and Cooling Equipment (AHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1995, “Heating and Cooling Equipment.” Other standards may also be used where specifically indicated in the individual categories below.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listings and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the product name as shown in the following individual categories or in the individual Listings.

1. The Gas-fired Listing Mark of Underwriters Laboratories Inc. for gas-fired products includes the UL symbol with the words “GAS-FIRED” above the UL symbol and the word “LISTED” below the UL symbol (as illustrated in the Introduction of this Directory), a control number, the product identity, and the standard designation as shown in the following individual categories or in the individual Listings.

ABSORPTION AIR CONDITIONING EQUIPMENT

GENERAL INFORMATION paragraphs 1A, 2, 3, 4, 5, 6, 9, 19 and 20 are applicable to this equipment.

This category covers equipment of the unitary type employing an absorption type refrigeration system, intended for commercial or domestic cooling, or heating and cooling of a liquid such as water or a water-antifreeze solution. This equipment is intended primarily, but not exclusively, for air conditioning purposes.

The direct energy source for cooling and heating is a hot fluid (such as gas, liquid or steam) as obtained from a source such as a solar-heat system or waste-heat, and/or gas-, oil-, or gas-oil-fired burners. Absorption air conditioning equipment provided with gas-, oil-, or gas-oil-fired burner(s) as the direct energy source for cooling and heating is covered under Absorption Air Conditioning Equipment (KTFV).

AIR CONDITIONING SYSTEMS EQUIPMENT, SELF-CONTAINED UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COOLING PORTION OF SELF-CONTAINED UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR-COOLING UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMRESSOR-CONDENSER UNITS

AIR CONDITIONING SYSTEMS EQUIPMENT, COMPRESSOR UNITS

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Ventilating, and Cooling Equipment (AHC).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1995, “Heating and Cooling Equipment.” Other standards may also be used where specifically indicated in the individual categories below.

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listings and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the product name as shown in the following individual categories or in the individual Listings.
<table>
<thead>
<tr>
<th>2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY</th>
<th>2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CENTRAL COOLING AIR CONDITIONERS</strong></td>
<td>Each electric central heating furnace is provided with an individual marking and instructions. If a noncombustible floor material is required, the necessary clearances to combustible constructions and proper installation in an alcove or closet are specified in the marking and/or instructions.</td>
</tr>
<tr>
<td><strong>ACCESSORIES FOR CENTRAL COOLING AIR CONDITIONERS</strong></td>
<td>Furnaces consist of one or more factory-built sections. Equipment provided in more than one section is designed for field interconnection of matched sections to make the complete assembly. The individual sections that comprise the assembly are identified in the individual Listings and by a cross-reference marking on at least one of the sections.</td>
</tr>
<tr>
<td><strong>GENERAL INFORMATION</strong> paragraphs 1A, 1E, 1F, 2, 3, 4, 5, 7, and 9 through 20 inclusive are applicable to this equipment. This category covers equipment of the unitary type for commercial or domestic central cooling applications. Unitary air conditioners consist of one or more factory-made sections, as described under GENERAL INFORMATION. Unless so indicated in the individual Listings, the evaporator blower is provided as part of the assembly, and may be an integral part of the evaporator section or furnished as a separate section.</td>
<td>Furnaces with a field-installed refrigerant coil and the refrigerant coil(s) are so identified in the individual Listings, and the refrigerant coil(s) for such use are identified by a marking on the furnace. Tests of furnaces with these field-installed coils intended for cooling, or with integral factory-installed coils intended for cooling, have indicated no adverse effects on the furnace. The assembly of a furnace with a field- or factory-installed refrigerant coil to a condensing unit of a central cooling air conditioner has been investigated only for those specific combinations identified in the individual Listings as “Air Conditioners, Central Cooling.” The effect of refrigerant heating on the furnace has not been investigated for other combinations.</td>
</tr>
<tr>
<td><strong>CONDENSING UNITS</strong></td>
<td><strong>ENVIRONMENTAL AIR TERMINAL UNITS</strong></td>
</tr>
<tr>
<td><strong>COMPRESSOR UNITS</strong></td>
<td><strong>GENERAL INFORMATION</strong> paragraphs 1G, 3, 4, 5, 9, 10, 11, 12, 13, and 15 through 20 inclusive are applicable to this equipment. This category covers fixed appliances that include a motor-operated fan or blower with or without electric resistance heaters. The appliances are intended to be installed in accordance with the manufacturer’s installation instructions in plenums above hung (suspended) ceilings where the inlet air to the appliance is taken from this plenum space in accordance with Section 300.22(C) of the NEC. The air outlet may be free discharge or be ducted to ceiling diffusers. <strong>FAN-COIL UNITS</strong></td>
</tr>
<tr>
<td><strong>ACCESSORIES FOR CONDENSING UNITS</strong></td>
<td><strong>SECTIONS OF FAN-COIL UNITS</strong></td>
</tr>
<tr>
<td><strong>ACCESSORIES FOR COMPRESSOR UNITS</strong></td>
<td><strong>GENERAL INFORMATION</strong> paragraphs 1G, 2, 3, 4, 5, and 9 through 20 inclusive are applicable to this equipment. This category covers appliances that include a motor-operated fan or blower together with a cooling coil, a heating coil, or both, and may also include an electric heater. The fan or blower is designed to recirculate air or to draw in outside air, or both. The coil may be designed for refrigerant cooling, for refrigerant heating, for chilled water cooling, for hot water heating, for steam heating, or for combinations of these functions. A fan-coil unit is intended to be piped to a remote source of heat, or cooling, or of both. Authorities Having Jurisdiction should be consulted as to the requirements for this equipment with respect to connection to water supply lines. <strong>ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT</strong></td>
</tr>
<tr>
<td><strong>GENERAL INFORMATION</strong> paragraphs 3 and 4 are applicable to this equipment. This category covers electrical panels incorporating control and/or overcurrent devices intended specifically for remote use with electric space heating equipment, for example, air conditioning equipment with electric resistance space heaters. Overcurrent protective devices in these panels are intended to provide overcurrent protection in accordance with Section 424.22(C) of the NEC.</td>
<td>Equipment intended for use with hot water is marked for a maximum inlet water temperature. Equipment intended for use with steam is marked for a maximum inlet steam pressure. A fan-coil unit containing a refrigerant coil that has been additionally investigated as part of a split-system cooling air conditioner, special purpose air conditioner or heat pump, is also identified as part of that system in the individual Listings as “Air Conditioners, Central Cooling,” “Air Conditioners, Special Purpose” or “Heat Pumps.” A fan-coil unit, as covered by these requirements, may be designed for free delivery of air to the room or may be provided with means for duct connection. Represented units are so identified as floor-mounted, wall-mounted, ceiling-hung, and wall- or ceiling-insert (built-in) units. A room-type unit is designed to circulate air to the conditioned space directly, or by means of duct work having a static-pressure drop not exceeding 0.05 in. of water. Units that are similar to fan-coil units with electric resistance heaters, but not provided with a refrigerant, steam or water coil, are identified in the individual Listings as “Room Fan Heater Units.” <strong>FAN UNITS</strong></td>
</tr>
<tr>
<td><strong>CONTROL PANELS FOR SPECIFIC ELECTRIC SPACE HEATING EQUIPMENT</strong></td>
<td><strong>GENERAL INFORMATION</strong> paragraphs 1G, 3, 4, 5, 9, 10, 12, 13, and 15 through 20 inclusive are applicable to this equipment. This category covers equipment intended to be connected to a duct system that supplies conditioned air for environmental heating and/or cooling. The units consist of a motor-operated fan or blower and may have air control dampers. The units may be thermostatically operated by integral or remote controls. The units do not include factory-installed heat exchangers or other integral heating or cooling means. <strong>ENVIRONMENTAL AIR TERMINAL UNITS</strong></td>
</tr>
<tr>
<td><strong>GENERAL INFORMATION</strong> paragraphs 1, 2, 4, 5, 7, 8, 9, 15, 16 and 20 are applicable to this equipment. This category covers electrically operated central heating furnaces intended for use in space heating applications in homes and other types of buildings, including mobile homes and recreational vehicles, as indicated in the manufacturer’s installation instructions.</td>
<td>Fan units with field-installed heater accessories as detailed in paragraph 12 under GENERAL INFORMATION are the equivalent of “Electric Central Heating Furnaces.”</td>
</tr>
<tr>
<td><strong>ELECTRIC CENTRAL HEATING FURNACES</strong></td>
<td></td>
</tr>
</tbody>
</table>
HEAT PUMP WATER HEATERS

ACCESSORIES FOR HEAT PUMP WATER HEATERS

GENERAL INFORMATION

Paragraphs 3, 4, 9, 10, 15, 19 and 20 are applicable to this equipment.

This category covers units designed to be connected to the terminal end of a single duct or duct system supplying air from a remotely located air-handling unit for the purpose of providing heating, ventilation and/or cooling.

The unit types include floor-mounted, wall-mounted, ceiling-hung, and wall- or ceiling-insert constructions.

Units incorporating electric heat have an automatic resetting temperature limiting control that is intended to protect against abnormal operating conditions and, in addition, each unit is provided with a replaceable thermal cutoff or a manually resettable temperature limiting control. In addition to UL 995, the standard used to investigate units incorporating electric heat is UL 996, “Electric Duct Heaters.”

The proper installation of these units requires careful consideration of the individual manufacturer’s design characteristics, taking into consideration the volume of air passing through the units and the temperature of the input air.

The manufacturer’s application and installation instructions furnished with each unit should be consulted to determine the factors appropriate to the particular installation including required distances between the unit and turns in the duct, changes in duct sizes, air filters, humidifiers, etc. should be at least 2 ft from the unit, and 3) changes in duct size, air filters, humidifiers, etc. should be located at least 4 ft from either side of the unit.

Units incorporating electric heat may have provision for interlocking the air supply and the electric element circuit.

Units may include provision for a coil designed for cooling by refrigerant or chilled water, or heating by steam or hot water, or for combinations of such coils.

ROOM FAN HEATER UNITS

GENERAL INFORMATION

Paragraphs 1G, 3, 4, 5, 9, 10, 11, 12, 13, and 15 through 20 inclusive are applicable to this equipment.

This category covers fixed appliances that include a motor-operated fan or blower and electric resistance heater, or an electrically heated heat exchanger.

These appliances are designed to serve a single room or space. Included are units similar to fan-coil units with electric resistance heaters but which are not provided with a refrigerant, steam or water coil, and units similar to air heaters, but which draw in air from outside the heated space. Air heaters are covered under Air Heaters, Room, Fixed and Location Dedicated (KTSV).

A room fan heater may be designed for free delivery of air to the room, or may be provided with a means for connection of a short extension duct. Representative types include floor-mounted, wall-mounted, ceiling-hung, and wall- or ceiling-insert (built-in) units.

Information concerning required installation clearances, etc. is designated in markings and/or installation instructions as indicated under GENERAL INFORMATION. This information also appears in the individual Listings.

SPECIAL PURPOSE AIR CONDITIONERS

SECTIONS OF SPECIAL PURPOSE AIR CONDITIONERS

ACCESSORIES FOR SPECIAL PURPOSE AIR CONDITIONERS

PART IV
2005 GENERAL INFORMATION DIRECTORY

HEATING, COOLING AND VENTILATING EQUIPMENT (LZLZ)

Equipment in this category covers fan-coil units, plenum air terminal units, room air terminal units, room fan heater units, and other equipment intended for comfort heating, cooling and ventilating. Listed equipment is rated 600 volts or less.

Equipment in this category is intended for use as part of a complete system and when installed may be associated with other equipment and components which are separately Listed. The equipment has not been investigated from the standpoint of operation when combined with other equipment in a complete system assembled in the field, unless indicated in individual Listings for the other equipment.

Where a clearance is required to be maintained between the unit or attached duct work and combustible constructions, the clearance is designated in the individual Listing, and is also marked on the unit. Unless otherwise indicated, the designated clearances (other than “zero”) are based on tests of units with uninsulated sheet metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, duct and plenum.

Unless otherwise specified in the individual listing and marking, the unit may be installed in combustible floors. Attic type units are so indicated in the individual Listings. Such units are suitable for installation in an attic or comparable normally unoccupied location as designated by the marking or instructions provided with the unit.

Separately shipped steam, hot water, or refrigerant coils which are suitable for field installation in conjunction with heating, cooling, and ventilating equipment are identified in this section of the Directory (1) by the word "accessory"; (4) FOR USE WITH * UL LISTED MODEL ** *** ; (5) a control number.

ACCESSORIES CLASSIFIED FOR USE WITH SPECIFIED EQUIPMENT (LZNI)

The units covered in this category are miscellaneous accessories for use with the specific UL Listed Heating and Cooling Equipment (LZFE) as identified by marking on the accessories and in accordance with the installation instructions packaged with the accessories. The company name of the Classified accessory and the name of the Listee of the specified heating and cooling equipment are the same. All parts and materials necessary to accomplish the installation are included with the accessories. The Classification Marking indicates that the accessory has been investigated and found suitable for use in combination with the specified Listed Equipment.

The basic standard used to investigate products in this category is UL 1995, "The Standard for Heating and Cooling Equipment". This Standard is also applicable to the product which the accessory is to be used in combination with.

ACCESSORIES CLASSIFIED FOR USE WITH SPECIFIED EQUIPMENT (LZNI)

The units covered in this category are miscellaneous accessories for use with the specific UL Listed Heating and Cooling Equipment (LZFE) as identified by marking on the accessories and in accordance with the installation instructions packaged with the accessories. The company name of the Classified accessory and the name of the Listee of the specified heating and cooling equipment are the same. All parts and materials necessary to accomplish the installation are included with the accessories. The Classification Marking indicates that the accessory has been investigated and found suitable for use in combination with the specified Listed Equipment.

The basic standard used to investigate products in this category is UL 1995, "The Standard for Heating and Cooling Equipment". This Standard is also applicable to the product which the accessory is to be used in combination with.

BLOWER ASSEMBLIES (LZOS)

The blower assemblies covered in this category are intended for field installation on the specific heating and cooling equipment identified by marking and the installation instructions packaged with the installation instructions packed with the blower assemblies. All parts and materials necessary to accomplish the installation are included with the blower assemblies.

The basic standards used to investigate products in this category are the standards applicable to the heating and cooling equipment on which the products are to be installed.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification and Follow-Up Service. The UL Classification marking includes: (1) the UL symbol; (2) the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of the UL Standard "E30-1970" and in the following table); (3) FOR USE WITH * UL LISTED MODEL ** *** ; (4) FOR USE WITH * UL LISTED MODEL ** *** ; (5) a control number.

* Heating and Cooling Equipment Listee’s name.
** Category of Listed Equipment.
*** Listed Equipment number.

For Installation Only On The Specified Heating and Cooling Equipment Marked On The Product.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product, together with a control number, is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.
ELECTRIC HEATER ASSEMBLIES CLASSIFIED FOR USE ON SPECIFIED EQUIPMENT (LZPU)

The electric heater assemblies covered in this category are intended for field installation on the specific UL Listed Heating and Cooling Equipment (LZFE) identified by marking on the electric heater assemblies, and in accordance with the installation instructions packaged with the electric heater assemblies. All parts and materials necessary to accomplish the installation are included with the electric heater assemblies. The Classification Marking indicates that the heater assembly has been investigated and found suitable for use in combination with the specified Listed equipment and that this Marking supplements or supersedes any markings related to the heater assemblies marked on the Listed equipment.

The basic standard used to investigate products in this category is UL 1812, “Ducted Heat Recovery Ventilators.” This Standard is also applicable to the product into which the heater assembly is to be installed.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product, together with a control number, is the only method provided by Underwriters Laboratories Inc. to identify products which have been produced under its Classification and Follow-Up Service.

CLASSIFIED BY UNDERWRITERS LABORATORIES INC.

FOR USE WITH * UL LISTED MODEL **

*** Category of Listed Equipment.

For Installation Only On The Specified Heating and Cooling Equipment Marked On The Product.

HEAT RECOVERY VENTILATORS, DUCTED (LZTW)

This category covers fixed equipment intended to remove air from buildings, replace it with outside air and in the process transfer heat from the warmer to the colder air. The equipment is intended to be connected to duct systems that interconnect rooms or spaces within buildings for exhausting the indoor air and/or distributing the outdoor air. For Heat Recovery Ventilators, Non-Ducted see Guide LZUU.

The basic standard used to investigate products in this category is UL 1812, “Ducted Heat Recovery Ventilators.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number and the following product indication: “Ducted Heat Recovery Ventilator” or “Accessory for Ducted Heat Recovery Ventilator”.

HEAT RECOVERY VENTILATORS, NON-DUCTED (LZUU)

This category covers stationary or fixed equipment intended to remove air from buildings, replace it with outside air and in the process transfer heat from the warmer to the colder air. The equipment is not intended to be connected to a duct system, other than the short duct runs necessary to bring air to and from the equipment. For equipment designed to be connected to ducts that interconnect rooms or spaces within buildings for exhausting the indoor air and/or distributing the outdoor air, see Heat Recovery Ventilators, Ducted (LZTW).

The basic standard used to investigate products in this category is UL 1815, “Non-Ducted Heat Recovery Ventilator” in accordance with the word “LISTED,” a control number, and the product name “Non-Ducted Heat Recovery Ventilators”.

HYDROMASSAGE BATHTUBS (NCHX)

USE AND INSTALLATION

2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY

This category covers indoor hydromassage bathtubs (also known as whirlpool baths) rated 250 V or less, for residential and commercial use, for permanent connection to the building plumbing, and intended for installation and use in accordance with Article 680 of ANSI/NFPA 70, “National Electrical Code.” They are intended for either permanent connection to the electrical supply or are provided from the factory with a maximum 3 ft. type SJ or equivalent service cord terminating in a grounding type attachment plug. A hydromassage bathtub may have provision for a maximum of two supply sources.

A hydromassage bathtub consists of a drainable tub, a recirculating pump and optional equipment such as lights, a heater, a control and an air blower. A bathtub may also be provided with an air-blower and no recirurculation pump or with an integral shower unit.

This category also covers heaters intended to be installed after a hydromassage bathtub leaves the factory. These field-installed heaters are Listed as hydromassage bathtub accessories. They are provided with markings on the heater and on the heater packaging to indicate the hydromassage bathtub models with which they are suitable.

Hydromassage bathtubs and hydromassage bathtub accessory heaters are intended to be protected by a ground-fault circuit interrupter.

Double Insulation — Hydromassage bathtubs may utilize double insulated pumps, as per UL 1795, “Hydromassage Bathtubs.” Double insulated pumps intended for permanent connection to the supply may or may not have provision to terminate an equipment grounding conductor. Cord-connected double insulated pumps may be provided with a power supply cord terminating in a nongrounding type attachment plug. Double insulated pumps are not provided with a pressure wire connector for equipotential bonding.

The physiological effect of using this equipment has not been determined. The suction fittings used in these hydromassage bathtubs have been investigated with respect to body and hair entrapment in accordance with ASME/ANSI A112.19.7M—1987.

INSTRUCTIONS/MARKINGS

Factory Configuration Information — Each hydromassage bathtub is provided with a marking on the wiring diagram, in the installation instructions or on a separate configuration sheet, to identify the factory-installed components of the unit. These components include pumps, controls, heaters, luminaires, and supply cords. This configuration marking and the installation instructions are intended to be available during installation and inspection.

Field-installed Options — Field-installed options that have been investigated and found to be suitable for addition to the unit are specified in the installation instructions. Hydromassage bathtubs intended for accessory heaters to be installed in the field are factory configured with fittings for this purpose. These bathtubs are marked “Suitable for Field-Installed Heater Accessory” and “Use only Accessory Heaters Marked for Use with This Bathhtub.”

RELATED PRODUCTS

Portable hydromassage equipment is covered under Personal Hygiene and Health Care Appliances (QGRZ). This category does not cover hydrotherapy tubs used in health care facilities. For professional equipment, see Medical and Dental Equipment, Professional (KFBQ) under Health Care Facilities Equipment (KFBQ). For prefabricated assemblies, prefabricated sinks, showers, see Prefabricated Assemblies, Sections and Units (QQXX). For sauna and steam bath heating equipment, see Heaters, Sauna and Steam Bath (KPFV). Self-contained spas and hot tubs are covered under Self-contained Spas and Hot Tubs (WCZW).

For unjetted bathtubs, shower stalls, and the like tested in accordance with the applicable ANSI Z124 series standards, see Plastic Plumbing Fixtures (QNNP).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Plumbing and Associated Products (AAPP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 1795, “Hydromassage Bathtubs.”

ADJUNCT SERVICES

Underwriters Laboratories Inc. (UL) provides a service for the Classification of hydromassage bathtubs that not only meet the appropriate requirements of UL but also have the hydromassage bathtub accessories, listed in the standards or parts detailed below. These products are intended for installation and use in accordance with the applicable model plumbing code.

1. ASME/ANSI A112.19.7M—, “Requirements for Whirlpool Bath Appliances”
2. Water retention test requirement from ASME/ANSI A112.19.7M—
   + Issue date of standard or latest addendum

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with a control number, the word “LISTED,” and the following product indication: “Ducted Heat Recovery Ventilator” or “Accessory for Ducted Heat Recovery Ventilator.”
2005 GENERAL INFORMATION DIRECTORY

2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY

240

**INFORMATION TECHNOLOGY EQUIPMENT INCLUDING ELECTRICAL BUSINESS EQUIPMENT (NWGQ)**

This category covers equipment, appliances and systems rated 600 V or less normally found in offices and other business establishments, residences (homes), educational facilities, and other similar environments classified as ordinary locations.

Equipment in this category has been investigated for installation in information technology equipment (computer) rooms as defined in ANSI/NFPA 75, “Protection of Electronic Computer/Data Processing Equipment”, and Article 645 of ANSI/NFPA 70, “National Electrical Code” (NEC), unless the equipment is otherwise identified by a marking or instruction.

**EQUIPMENT TYPE**

Equipment may be electronic or electromechanical in design or a combination thereof.

Various groupings of equipment are included for the manufacturers, such as:

- Information processing equipment: automated information storage equipment, central processing units (CPUs), disk drives, fiber optic transceivers, hand-held computers (personal assistants), laptop computers, monitors, personal computers, plotters, printers, point-of-sale terminals, scanners, including portable barcode scanners, tape drives, workstations.
- Telecommunication equipment: cellular site equipment, cordless telephone sets, facsimile machines, ISDN systems and telephones, modems, key telephone systems, private automated branch exchanges (PABXs), telephone answering machines, telephone sets, voicemail systems, wireless telephony systems.
- Office appliances: adding machines, bursters, calculators, collators, dictation and transcribing machines, electric typewriters, erasers, folding, embossing and sealing machines, label printers, microfilm readers, motor operated file cabinets, paper cutters, paper shredders, pencil sharpeners, sorters, stackers, staplers.
- Reproduction equipment: copiers, duplicating machines, microfilm printers, mimeograph machines.
- Mailing, banking and currency handling equipment: cash registers, coin counters, -feeders, -dispensers, accounting machines, check-writing, -assigning, -dating, -inserting, -mailing, -numbering and -stamping machines, point-of-sale terminals.
- Multi-media equipment/accessories: CD-ROM/DRW drives, digital cameras, microphones, speakers, video conferencing systems.
- Network equipment: baluns, bridges, hubs, nodes, repeaters, routers, switches, transceivers.
- PC card accessories: PCMCIA-memory, -modem cards.
- Wireless (RF, infrared) transceiver equipment: RF modems, hand-held computers with integral transceivers.
- Static neutralizing equipment: power units with discharge bars used with or within copiers, collators, film plate processors, digital printers, duplicating machines and similar equipment.
- Interconnecting cable assemblies: cable assemblies intended for use beneath raised floors of computer rooms. These assemblies also may be found under Computer Interconnection Cable Assemblies (DVPI) in the Electrical Construction Equipment Directory.
- Included within the above groupings is equipment which is battery powered, either by standard size consumer replaceable batteries (e.g., AA, C, D), or nonstandard sizes specified by manufacturer, type and ratings.
- This category also covers power distribution units (PDUs) and computer power centers which are investigated as part of the computer system for use exclusively in information technology equipment (computer) rooms in accordance with Article 645 of the NEC. This equipment is connected to branch circuits, and it distributes power to other units in the computer

**RELATED EQUIPMENT**

Power distribution centers for communications equipment are covered under Power Distribution Centers for Communications Equipment (QPPY). Power supplies for information technology and telecommunications equipment are covered under Power Supplies, Information Technology Equipment Including Electrical Business Equipment (QQQG) and Power Supplies, Telephone (QQIE).

Static neutralizing equipment may be covered under Static Neutralizing Equipment and Wires (VWWZ). High voltage parts that may be accessible after installation have been investigated as Limited Current Circuits.

Air conditioning equipment for use in computer rooms or other areas in which information technology equipment is installed is covered under A/C Conditioning Equipment (AAYZ).


Filing cabinets covered under this category have not been investigated with respect to fire resistance or security. Fire resistant filing cabinets are Listed in the Building Materials Directory under Record Protection Equipment (RVPH).

Smoke detectors and alarm equipment are found in the Fire Protection Equipment Directory.

Other equipment associated with information technology/processing but not included for use in offices, residences or computer rooms may be found under Graphics Arts Equipment (KQOT), Teaching and Instruction Equipment (WYFW), Medical and Dental Equipment, Professional (KFBQ), Marking and Coding Equipment, Electronic (JGBE), Photographic Equipment (JQOR) and X-ray Equipment (JQOR). Other multi-media equipment and accessories may be found under Audio/Video Apparatus (AZSQ) and Audio and Video Equipment (AZUJ). Other telecommunications appliances and equipment may be found under Telephone Appliances and Equipment (WYQQ).

Modular assemblies of telecommunication equipment (e.g. racks, circuit card assemblies) which are designed for field installation by trained service personnel are covered under Custom-Built Telecommunication Equipment (WYKQ).

Equipment intended to be installed on the network side of the subscriber demarcation point and installed and maintained by telephone companies, CATV companies and similar network communication companies, is covered under Communication Service Equipment (DUZO).

Cabinet, enclosure and raceway systems that are not complete information technology (IT) or telecommunication equipment, but include components and assemblies that are intended to provide, protect, heat, cool of otherwise support IT or telecommunications equipment that will be installed at a later time are Investigated Information Technology and Telecommunication Equipment Cabinets, Enclosures and Racks (NWQIN).

**SPECIAL CONSIDERATIONS**

Card readers, badge readers and similar identification equipment covered under this category have not been investigated with respect to security.

The burglary and theft protection features of coin-operated equipment, banking and currency handling equipment, cash registers, coin counters and the like have not been investigated under this category.

Automated teller machines (ATMs) that have been investigated for security and burglary resistance are Listed under Automated Teller Systems (TPEU). ATMs that have not been investigated for security and burglary protection are Classified under Bank Equipment (BALT).

**INSTALLATION**

Some equipment has been investigated for installation in a restricted access location, such as a dedicated equipment room or telecommunication equipment closet, where access is limited to trained service personnel. Such equipment is provided with a marking or installation instructions which state “To be installed only in a Restricted Access Location” or similar wording. If also intended for installation over a concrete or noncombustible surface, such equipment will also be marked “Suitable for mounting on concrete or other noncombustible surface only” or similar wording. Equipment installed in a restricted access location generally receives power from a centralized d.c. power source. If field wiring terminals are not contained in an internal compartment, both protection of exposed wiring terminals and wiring methods used for such equipment are intended to be provided in accordance with (1) markings on or instructions with the equipment, and (2) the provisions of Sections 110.26 and 110.27 of the NEC.
LAMPS, TUNGSTEN HALOGEN (OOOJ)

GENERAL

This category covers tungsten halogen lamps employing an integral shield that has only been investigated in accordance with the guard and shield requirements applicable to lighting products for use with tungsten halogen lamps. These lamps may be used in all listed lighting products with or without a containment barrier as permitted by the product markings. The lamp or the smallest unit container is marked with the wattage, voltage, lamp type, manufacturer and model number.

LAMPS, SPECIALTY (OONB)

USE AND INSTALLATION

This category covers specialty lamps, usually of the common bulb shapes, containing assemblies of light sources (such as miniature incandescent bulbs, light-emitting diodes) and associated electrical components, and provided with bases of various sizes, usually of the standard configurations covered in ANSI C82.61-1990, “Electric Lamp Bases.” These lamps are intended for use in Listed equipment, such as exit fixtures or emergency lighting equipment, where the product marking specifies the use of a lamp cover with a specified characteristic (e.g., “50% light output” or “25% light output”).

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

PRODUCT MARKINGS

Interchangeability of these lamps with commonly available lamps has not been investigated.

ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 496, “Edison-Base Lampholders.”

UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory) and the following additional information:

SPECIALTY LAMP FOR USE IN PRODUCTS MARKED TO USE UL CLASSIFIED LAMP (+) (-) (+) Control No.

(-) Company identification

(+), (+) Lamp catalog number
For additional information, see Electrical Equipment for Use in Ordinary Locations (AAZL).

The basic standard used to investigate products in this category is UL 153, "Portable Electric Luminaires."

UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

TUNGSTEN HALOGEN LAMP FOR PARTICLE CONTAINMENT ONLY
Control No.

MEDICAL EQUIPMENT (PIDF)

USE AND INSTALLATION

This category covers equipment intended to diagnose, treat, or monitor a patient under medical supervision and which involves physical or electrical contact with the patient and/or transfers energy to or from the patient and/or detects such energy transfer to or from the patient. This equipment includes those accessories as defined by the manufacturer which are necessary for the normal use of the equipment. Unless otherwise noted, this equipment is designed for professional use by qualified personnel in hospitals, nursing homes, medical care centers, medical and dental offices, and similar health care facilities, and in remote areas under the direction of qualified personnel, in accordance with the instructions specified by the manufacturer.

This equipment has been classified with respect to electric shock, fire, mechanical and other specified hazards incident to its use in ordinary locations. The other specified hazards are those which are included in UL 2601-1 and the Particular and/or Collateral Standards to which the equipment has been evaluated.

The wiring methods for installation of these products are covered by Article 517 of NFPA 70, “National Electrical Code” (NEC). The individual units of a system may be designed to be interconnected by means of one or more of the wiring methods outlined in the NEC.

The nature of some of this equipment, such as X-ray, nuclear imaging, and magnetic resonance equipment, is such that it involves features of installation and use not ordinarily presented in utilization equipment. Such features are covered in the manufacturer’s installation instructions. Installation must, if possible, be made in a room or compartment in which provision is made to prevent fire or injury to persons and, in all cases, be in accordance with the manufacturer’s installation instructions and in accordance with the equipment and the requirements of the Authorities Having Jurisdiction.

X-radiation safety and performance requirements are regulated under Public Law 90-602 and are enforced by the U.S. Department of Health and Human Services. X-radiation concerns are outlined in Title 21, Parts 1000 to 1999. Compliance with the applicable regulations under the conditions of normal and abnormal operation has not been investigated by UL.

Some of the Medical Equipment Classifications are prefaced on the provision of one of two alternate attachment plugs specifically referred to in Attachment Plugs, Fuseless (AXUT) in the Electrical Construction Equipment Directory. One is a locking type identified by the marking “Hospital Only” and the other is a nonlocking type ANSI standard configuration grounding type identified by the marking “Hospital Grade” and a green dot on the body. The identification is visible after installation on the flexible cord.

Baby incubators, and similar equipment for use with oxygen enriched atmospheres, have been investigated with respect to the increased hazard resulting from the presence of oxygen and electrical parts within the equipment. Motor operated beds are marked if they are suitable for use with oxygen. It is not possible to make devices such as these inherently safe from external sources of ignition. The hazard is greatly increased by the presence of oxygen, which makes materials easier to ignite and greatly increases the burning rate. Accordingly, for safety, it is essential that all possible sources of ignition be kept away from these devices. Possible sources of ignition against which precautions should be taken include open flames, matches, cigarettes, accumulations of static electricity, and reducing valves on oxygen tanks which occasionally project flame and sparks due to ignition or explosion of rubber valve seats.

Oil bath sterilizers and similar equipment have been investigated with respect to their use with oils such as are recommended by the sterilizer manufacturer.

REQUIREMENTS

Requirements are the conditions of normal and abnormal operation. These include the conditions of normal operation as specified in the device or equipment manufacturer’s installation instructions, and those as specified in this Directory. These are determined by UL and are covered by the Classification Mark.

Individual components of the equipment, when applicable, are covered by the applicable standard in this or another code. The classification of the product is based on the classification of the component or components unless Particular Requirements of this Directory are applied.

Additional information as new medical equipment.

EVALUATED FACTORS

The physiological effects, beneficial or otherwise, which may be produced by this equipment have not been investigated.

The effects of the combination of therapies arising from the use of this equipment with other medical equipment have not been investigated.

RELATED PRODUCTS

Medical equipment that includes refrigerated components, such as refrigeration therapy equipment, is covered under Refrigeration Equipment (SCER).

Equipment that has been investigated to determine its suitability for use in hazardous locations as defined in the NEC is covered under Medical Equipment for Use in Hazardous Locations (PINR).

For household health care equipment, see Personal Hygiene and Health Care Appliances (QGRZ). For heating pads, see Heating Pads, Electric (MNUV).

MEDICAL EQUIPMENT (PIDF)

REQUIREMENTS

For additional information, see Electrical Equipment for Use in Ordinary Locations (AAZL).

PRODUCT MARKING (with respect to applicable standards) — As part of the Classification Mark the reference to the UL 2601-1 Standard is included. For products that have been evaluated in accordance with the applicable Particular (IEC 60601-2-XX) and/or Collateral (IEC 60601-1-XX) Standards, reference to these standards is made on the product or in the accompanying documents.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product name “Medical Equipment” or other appropriate product name as shown in the individual Classifications, the statement “WITH RESPECT TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY.  IN ACCORDANCE WITH,” the standard number* and a control number.

Rebuilt or remanufactured products are prefaced by the words “Rebuilt,” “Remanufactured” or “Reconditioned.”

Field-installed products are prefaced by the words “Field Installed.”

* Based on the certification coverage of the product, the standard number may be UL 2601-1, applicable Particular (IEC 60601-2-XX) and/or related Collateral (IEC 60601-1-XX) Standards for which the product has been found to comply by UL.

As an alternate, the Classification Mark includes the UL symbol in conjunction with the word “CLASSIFIED,” the product name as described above, the phrase “See Accompanying Documents” or the symbol of a triangle containing the exclamation point (IEC 348, Symbol 14 - △ ), the standard number* and a control number. As a minimum, the standard
MICROWAVE AND CABLE COMMUNICATION EQUIPMENT (POFV)

This category covers microwave communication equipment, cable communication equipment, communication antennas and antenna positioning equipment intended for household or commercial use.

This equipment has been investigated with respect to risk of fire, electric shock and personal injury. Where such equipment is included in systems that involve other pieces of equipment or mechanical operations, the investigation of the risk of fire, electric shock and personal injury have included only the equipment specifically noted in the individual Listings. Video tape recorders, video cameras and related accessories are covered under Audio/Video Apparatus (AZSQ) and Audio and Video Equipment (AZUJ).

ANTENNA POSITIONING EQUIPMENT (POQJ)

This category covers satellite or microwave antenna positioning products and accessories intended for household or commercial use, such as: satellite and microwave antenna rotating systems (azimuth and elevation positioning) and similar products that do not employ a Cathode-Ray-Tube display.

For additional information see Microwave, and Cable Communication Equipment, Guide POFV.

The basic standards used to investigate products in this category are UL 150, Antenna Rotators, and UL 149, Low-Voltage Video Products Without Cathode-Ray-Tube Displays.

Products of the above types may also be Listed under the categories Audio/Video Apparatus (AZSQ) and Audio And Video Equipment (AZUJ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Microwave and Cable Communication Equipment", "Satellite Antenna Positioning Equipment", "Microwave Antenna Positioning Equipment", "Antenna Positioning Equipment", or "Product", or the name of the specific type of product as shown in the individual Listings, or combinations of the preceding identities.

COMMUNICATION ANTENNAS (POQK)

This Listing covers satellite or microwave receiving and transmitting antennas and antennas intended for household or commercial use, such as: satellite antenna dishes, microwave antenna horns or waveguides, receiving and transmitting antennas, antenna mounting/support hardware (tripods, masts, polar mounts) and similar products.

For additional information see Microwave, and Cable Communication Equipment, Guide POFV.

The basic standards used to investigate products in this category are UL 149, Low-Voltage Video Products Without Cathode-Ray-Tube Displays.

Field wiring is investigated to the applicable portions of UL 1950, Information Technology Equipment including Electrical Business Equipment, and UL 873, Electrical Temperature-Indicating and -Regulating Equipment.

Products of the above types may also be Listed under the categories Audio/Video Apparatus (AZSQ) and Audio/Video Equipment (AZUJ).

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and one of the following product names as appropriate: "Microwave and Cable Communication Equipment", "Satellite Antenna Equipment", "Microwave Antenna Equipment", "Antenna Equipment", or "Product", or appropriate product name, as shown in the individual Listing.

MICROWAVE COMMUNICATION EQUIPMENT CLASSIFIED FOR USE IN SPECIFIED EQUIPMENT (POVJ)

These products are retrofit kits consisting of parts intended for field installation in microwave communication equipment. These products have been evaluated by UL to determine that when installed in accordance with the manufacturer's instructions they do not adversely affect the operation of the specified equipment. The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service.

For additional information see the Guide Information for Microwave and Cable Communication Equipment (POFV).

The basic standard used to investigate these retrofit kits is UL 1409, Low-Voltage Video Products Without Cathode Ray Tube Displays.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (as shown below) on the product, together with the control number, is the only method provided by Underwriters Laboratories Inc. to identify products which have been conducted under its Classification and Follow-Up Service.

Microwave Communication Equipment
Retrofit Kit
Classified By
Underwriters Laboratories Inc.®
For Installation in Specified Microwave Communication Equipment
Identified in the
Manufacturers Installation Instructions.

OFFICE FURNISHINGS (QAWZ)

The office furnishings covered by this listing are portable and consist of panels, study carrels, work stations and pedestal-style systems that may be mechanically interconnected to form an office furnishing system to be installed in accordance with Article 605 of the National Electrical Code. These may be provided with an electrical distribution system, including switches, and receptacles. They may contain channels for routing communication cables within the system components separate from power circuit raceways. The systems may include filing cabinets, desks, work surfaces, shelves, storage units and the like that have a particular electrical or mechanical function unique to an office furnishing system.

Partitions that extend to the ceiling or that are used to support the building structure are not covered as office furnishing. They may be Listed as Prefabricated Sections and Units or Classified as Composite Panels with respect to one or more model Building Codes, Plumbing Codes, National Electrical Code, a State Building Code and/or an applicable local building code.

The surface burning characteristics of building materials employed in these assemblies is judged to be no greater than that of ordinary lumber used in on site construction. Finish surfaces are of materials having a flame spread rating of 200 or less and, unless otherwise marked, a smoked developed rating equal to or greater than 10.

Products specifically designed and arranged for field installation in individual designs of office furnishings such as lighting units, receptacles, clocks, power distribution elements, work surfaces, shelves, etc. are covered in the individual listings and are marked to identify the specific office furnishing with which they have been investigated.

Lighting units for use with office furnishings are Listed under Office Furnishing Lights, QAXB.

Office furnishings are marked with the designation of one of the following types:

Type I - A system that includes all parts and contains pre-wired modular raceways and accessories necessitating only quick-connect type of electrical interconnections. A Type I system may be shipped with the accessories installed in the panel, or field installed where marked for use in the system. Means for permanent wiring connections to the branch circuit supply are provided.

Type II - A system that provides raceways and devices for routing and terminating of wiring. All wiring is installed in the field.

Type III - A system that is not intended to be wired and has no provision for routing and termination of wiring.

The basic standard used to investigate products in this category is UL 1286, "Office Furniture".

This category also covers office furnishings and office furnishing accessories which are rebuit.

Rebuilt office furnishings and rebuilt office furnishing accessories are factory rebuilt to the extent necessary to disassemble and reassemble using new or reconditioned component parts. Rebuilt office furnishings and rebuilt office furnishing accessories are subject to the same requirements as new office furnishings and office furnishing accessories.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and "Office Furnishing", "Office Furniture", "Office Furnishing Accessory", "Rebuilt Office Furnishing", or "Rebuilt Office Furnishing Accessory".
OFFICE FURNISHING LIGHTS (QAXB)

GENERAL
This category covers lights intended for use with office furnishings when installed in accordance with Articles 410 and 605 of ANSI/NFPA 70, "National Electrical Code." This category covers both freestanding and mounted lamps that may be electrically or mechanically connected to an office furnishing. Products specifically designed and arranged for use with an individual design of office furnishing are marked to identify the specific office furnishing with which they have been investigated.

Products that require electrical assembly in the field are covered as kits or kits and light accessories. The individual listing, Kits and light accessories are completely wired to the extent permitted by the intended field installation, with all splices and connections completed and with all electrical components mounted.

A kit forms a complete office furnishing light when assembled in accordance with the instructions provided.

A light accessory and the required office furnishing or a combination of light accessories form a complete office furnishing light when assembled in accordance with the instructions provided.

The following designations are used to specify the type(s) of products covered under this category. Presence of the Roman numerals in an individual listing indicates products of that type are covered. The "type" numerals denote the following:
- II – Incandescent
- III – Fluorescent
- VI – Tungsten Halogen
- XII – High Intensity Discharge (HID)
- XVI – Kits
- XVII – Light Accessories
Types I, IV, V, VII-XI, and XIII-XV are reserved.

REBUILT PRODUCTS
This category also covers office furnishing lights that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt office furnishing lights are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt office furnishing lights are subject to the same requirements as new office furnishing lights.

RELATED PRODUCTS
Office furnishing lights investigated to UL 153, "Portable Electric Luminaires," may also be covered under Luminaires, Portable (QOWZ). Office furnishing light accessories investigated to UL 153 may also be covered under Portable Luminaire Kits and Subassemblies (QPAU). Office furnishing light accessories investigated to UL 1598, "Luminaires," may also be covered under Luminaires, Portable (QOWZ).

ADDITIONAL INFORMATION
For additional information, see Office Furnishings (QAWZ) and Electrical Equipment for Use in Ordinary Locations (AALZ).

PORTABLE LIGHTING PRODUCTS (QOTU)

GENERAL
This category covers lamps, shades, nightlights, office furnishing lights, portable cabinet luminaires, portable luminaire kits and subassemblies, portable luminaires, portable work lights, and sun and heat lamps.

RELATED PRODUCTS
Portable lighting products and associated furnishings evaluated for use together are covered under Furnishings, Household and Commercial (IYQX).

Portable lighting products used as hand lamps are covered under Portable Electric Hand Lamps (QQRX) or Portable Hand Lamp Accessories (QOSV).

Portable lighting products intended for seasonal use are covered under Christmas Tree and Decorative Outfit Accessories (DGXW) or Strings, Decorative Lighting (DGZZ).

PORTABLE LIGHTING PRODUCTS (QOTU)

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Office Furnishing Light," "Office Furnishing Light Kit," "Office Furnishing Light Accessory" or "Rebuilt Office Furnishing Light."

RELATED PRODUCTS
This category also covers office furnishing lights intended for installation into open or enclosed portable cabinets such as china hutches, bookcases, bars, consoles, bed headboards, and similar locations.

This category also covers low-voltage lighting systems intended for installation under a shelf, cabinet, or similar structural surface, in accordance with Article 411 of ANSI/NFPA 70, "National Electrical Code" (NEC), where the power supply is of the attachment plug equipped, cord-connected type, or is a direct plug-in type.

This category also covers portable cabinet luminaire accessories, such as interconnecting cord sets and dimmer and switch assemblies intended for use with portable cabinet luminaires.

A surface-mounted portable cabinet luminaire is also suitable for installation under a shelf or kitchen cabinet when the line voltage power supply cord is not concealed.

These products are not intended for installation in recessed walls or ceilings, or in permanently installed cabinets where the wiring is concealed or passed through openings in the structure.

A recessed-mounted portable cabinet luminaire connected to a Class 2 power supply is suitable for installation in a kitchen cabinet or other built-in furnishing when the power supply and the line voltage power supply cord is not concealed.

Portable cabinet luminaires have been investigated for mounting in accordance with the clearances marked on the product. Portable cabinet luminaires not marked with clearances may be mounted as close to any surface as permitted by the housing, an integral mounting flange, bracket, or spacer.

A restrictive marking is provided for portable cabinet luminaires intended for use only in open top cabinets. Portable cabinet luminaires without the restrictive marking are investigated for a 13 mm (1/2 in.) minimum clearance from the top.

Presence of the Roman numerals in an individual Listing indicates products of that type are covered. The "type" numerals denote the following:
- II – Incandescent
- III – Fluorescent
- IV – Portable Cabinet Luminaire Accessories
- VI – Tungsten Halogen
- XII – High Intensity Discharge

Types I, IV, VII-XI and XIII-XV are reserved.

ADDITIONAL INFORMATION
For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is ANSI/UL 153, "Portable Electric Luminaires."

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Portable Cabinet Luminaire," "Portable Cabinet Light" or "Portable Cabinet Luminaire Accessory."

LUMINAIRES, PORTABLE (QOWZ)

GENERAL
This category covers portable luminaires (lamps) whose primary function is task or ambient illumination. These products are provided with a flexible cord and an attachment plug for connection to a nominal 120 V, 15
or 20 A branch circuit and intended for use in accordance with ANSI/NFPA 70, “National Electrical Code” (NEC).

This category also covers low-voltage lighting systems intended for installation under a shelf, cabinet, or similar structural surface, in accordance with Article 411 of the NEC, where the power supply is of the attachment plug equipped, cord-connected type, or is a direct plug-in type.

The following designations are used to specify the type(s) of product(s) covered under this category. Presence of the Roman numerals in an individual Listing indicates products of that type are covered. All companies in this category may produce products of types II and III even though these designations do not appear in the individual Listings. The “type” numerals denote the following:

II — Incandescent Units
III — Fluorescent Units
IV — Specific Features (with toy, motor, transformer, electronic circuits, etc.)
V — Tungsten Halogen Units
VI — See Listings of Portable Luminaire Kits and Subassemblies (QPAU)
 VII — Convertible Units (Products Convertible to Luminaires)
 IX — Interchangeable Units
 X — Track-Style Units
 XII — HID Units
 XIII — Neon Units
 XIV — Wet Location Units
 Types I, V, and XI are reserved.

**PRODUCT MARKINGS**

Products investigated as Convertible Units (VIII) are marked to indicate acceptability as a luminaire when used with the appropriate conversion kit.

Products investigated for use in wet locations are marked, in combination with the UL Listing Mark, “Suitable for Wet Locations.”

**RELATED PRODUCTS**

Portable luminaires that comply with the requirements in UL 48, “Electric Signs,” may also be Listed as Signs (UXYT). Unassembled portable luminaires are covered under Portable Luminaire Kits and Subassemblies (QPAU).

**ADDITIONAL INFORMATION**

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 153, “Portable Electric Luminaires.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol, the word “LISTED,” a control number, and one of the following product names: “Portable Luminaire,” “Portable Lamp,” “Rebuilt Portable Luminaire” or “Rebuilt Portable Lamp.”

**LAMPSHADES (QOxz)**

**USE**

This category covers lampshades intended for use on incandescent and fluorescent types of portable lamps (see Luminaires, Portable [QOWZ]) and provided with a means of assembly to the portable lamps. These lampshades are intended for use in specific building environments that are identified as or considered by the Authority Having Jurisdiction to be high risk occupancies, including hotels, nursing homes, hospitals and educational institutions.

These products exhibit resistance to propagation of flames beyond the area exposed to a source of flaming ignition before and after accelerated aging exposure. In addition, these products exhibit resistance to ignition when directly exposed to the heat from a 300 watt light bulb both before and after accelerated aging exposure.

The flame resistance of these lampshades may be inherent in the material used or may be the result of chemical treatment to retard ignition and spread of flame.

Authorities Having Jurisdiction should be consulted as to the specific requirements covering the acceptance and use of these Classified products in the intended occupancies.

**ADDITIONAL INFORMATION**

This category covers night lights for direct plug-in use in parallel slot, general purpose receptacles rated 15 or 20 A, 125 V.

**RELATED PRODUCTS**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 1786, “Nightlights.”

**UL MARK**

The UL symbol on the product and the Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged, or the Listing Mark on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Nightlight.”

**PORTABLE LUMINARE KITS AND SUBASSEMBLIES (QPAU)**

**USE AND INSTALLATION**

This category covers portable luminaire kits and subassemblies of the following types:

**Portable Luminaire Kit** — The portable luminaire kit is intended to be used for reconstructing a complete portable luminaire using ordinary tools to assemble and/or attach the parts to a support base in accordance with the instructions provided with the kit. All parts needed to assemble the product in accordance with the instructions are provided.

**Portable Luminaire Subassembly** — The portable luminaire subassembly is intended to be used for modernizing, or replacing defective parts on existing luminaires in accordance with the instructions provided with the subassembly. It may also be used for constructing a new portable luminaire in accordance with the instructions provided with the subassembly. All electrical components needed to assemble the product in accordance with the instructions are provided.

**ADDITIONAL INFORMATION**

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 153, “Portable Electric Luminaires.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Portable Lamp Kit,” “Portable Luminaire Kit,” “Portable Lamp Subassembly” or “Portable Luminaire Subassembly.”
### SUN AND HEAT LAMPS (QPDY)

**USE**

This category covers portable sun and heat lamps of the household variety intended for the production of ultraviolet (sun) radiation, infrared (heat) radiation, or both.

**UNEVALUATED FACTORS**

The physiological effects, beneficial or otherwise, which may be produced by these lamps have not been investigated.

**RELATED PRODUCTS**

For sun and heat lamps intended for professional use, see Medical Equipment (PIDS).

**ADDITIONAL INFORMATION**

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 482, "Portable Sun/Heat Lamps."

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names as appropriate: "Infrared Lamp," "Ultra-Violet Lamp," "Heat Lamp" or "Sun Lamp."

### TELECOMMUNICATION EQUIPMENT (WYIE)

Listing of the following products appear in this section:

- Custom-Built Telecommunication Equipment
- Telephone Apparatus and Accessories
- Telephones, Cellular.

Telephone power supplies are listed under "Power Supplies, Telephone" (QQE). Telecommunication Equipment covered under this category has not been evaluated for use in computer/information technology rooms as defined in the "Standard for the Protection of Electronic Computer/Data Processing Equipment", NFPA 75. Computers and related equipment, including telecommunication equipment, that interface with electronic data processing systems and are intended for use in computer/information technology rooms are Listed under "Data Processing Equipment, Electronic" (ENRT) or "Information Technology Equipment" (NWQ).

Telecommunication equipment which is identified as suitable for outdoor locations is marked with an enclosure type designation or as "Rain tight" or "Rainproof" and is intended for use as indicated in the guide information. For use in Ordinary Locations (AALZ) or other similar movable object.

Work lights may be freestanding, clamp-on, or similar portable mounting means, or be provided with a means for mounting to a tool, machine or a similar movable object.

Work lights may be placed on combustible floors. Special care must be employed to avoid overheating and to keep away from draperies, furniture, etc.

**PRODUCT MARKINGS**

A work light marked "Dry Location Use" is intended to be used only in a dry location.

A work light marked "Suitable For Wet Location Use" is intended for use in a wet or dry location.

A work light marked "Suitable For Outdoor Use Only" is suitable for use in a wet location and is intended to be used only in an outdoor location.

**RELATED PRODUCTS**

Portable outdoor flood lights for illumination or landscape, outdoor decorations, patios and play areas are covered under Luminaires, Portable (QOWZ) and Portable Electric Hand Lamps (QORX).

**ADDITIONAL INFORMATION**

For additional information, see Portable Lighting Products (QOTU) and Electrical Equipment for Use in Ordinary Locations (AALZ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 153, "Portable Electric Luminaires."

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and the product name "Work Light," "Portable Work Light" or "Work Light Accessory."

### CUSTOM-BUILT TELECOMMUNICATION EQUIPMENT (WYKM)

**GENERAL**

This category covers custom-built, modular telecommunication equipment and accessories that include various combinations of cabinets, racks, circuit card assemblies, power supplies, and the like designed for field installation by trained service personnel. They are intended for installation in accordance with Article 800 of ANSI/NFPA 70, "National Electrical Code" (NEC).

Custom-built telecommunication equipment is intended to be installed only in restricted access locations, such as equipment rooms or closets, where access is limited to trained service personnel, unless it is installed in a Listed rack, cabinet, or similar enclosure identified with the installation code "E."

Some units may have accessible parts (such as the output terminals of a low power ring-generator power supply) that operate at Class 3 voltage levels. The location of these units either in the restricted access location or in the final system configuration is intended to be such that unintentional contact with these parts is unlikely.

Unless identified with the installation code "B" or "E," custom-built telecommunication equipment is intended to be installed only over a noncombustible surface or in a Listed rack, cabinet, or similar enclosure that is identified with the installation code "B" or "E."

Custom-built telecommunication equipment is intended to be configured in a system and installed in accordance with the manufacturer's installation instructions and the network carrier's installation practices. In order to ensure proper coordination of the individual units in the final installation, letter codes are provided to identify significant input, output, and
### Installation Codes (IC)

Installation codes provide information relating to the location and/or installation of the unit.

**A** — Where provided, this designation indicates that additional information is provided regarding the installation of the unit. Such information may be provided in the form of a permanent tag or information sheet attached to the unit.

**B** — Where provided, this designation indicates that the equipment provides side and bottom enclosures that minimize the risk of spread of fire. Cabinets, racks, and similar equipment identified with an installation code "B" are not intended to completely enclose or limit accessibility to Listed subassemblies mounted within the enclosure and are, therefore, not intended for use outside of restricted access locations.

**E** — Where provided, this designation indicates that the equipment provides a complete enclosure for parts that may present a risk of electric shock, electrical energy/high current levels, or fire and limits accessibility to these parts. Cabinets, racks, and similar equipment identified with an installation code "E" are intended to enclose and limit accessibility to Listed subassemblies mounted within the enclosure and may be used outside of restricted access locations.

### Telecommunication Codes (TC)

Telecommunication codes provide information relating to the characteristics of the telecommunication circuits that may be connected to the unit.

**T** — Provided as an output code, this designation indicates that the equipment provides isolation from “exposed” circuits requiring protection in accordance with Section 800.30 of the NEC.

**X** — As an input code, this designation indicates that the input or output telecommunication circuits are suitable for connection to “exposed” circuits requiring protection in accordance with Section 800.30 of the NEC. Absence of this code is an indication that the equipment is intended to be isolated from “exposed” circuits by equipment with an output code designation “T.”

### Codes (PC), Telecommunication Codes (TC), and Installation Codes (IC).

Power codes provide information relating to the type of power required to be supplied to the unit (input) or the type of power supplied by the unit (output).

**C** — As an input code, this designation requires the power inputs to the unit to be limited to normal telecommunication levels. Acceptable sources of power are Listed telephone power supplies identified as having “Level C” outputs, Listed custom-built telecommunication equipment with an output code “C,” or communication line powering from Listed telephone equipment or the public network. As an output code, this designation indicates that the outputs are limited to normal telecommunication levels (Level C) and are suitable for connection to typical telecommunication networks and distribution wiring that are installed in accordance with Article 800 of the NEC.

**F** — As an input code, this designation requires the power inputs to the unit to be provided with overcurrent protection or be otherwise power limited. Acceptable sources of power are Listed telephone power supplies identified as having “Class 2” or “Level C” outputs, a Listed Class 2 power source, or Listed custom-built telecommunication equipment with an output code of “F” or “C.”

**L** — As an input code, this designation indicates that the unit provides power-limited outputs that are intended to be used for custom-built telecommunication equipment in the same system. These outputs have not been investigated as Class 2 circuits or communication circuits unless identified as such.

**L** — As an output code, this designation indicates that the unit provides power-limited outputs that are source limited to 250 VA and the current source be limited to 1000 V max. Acceptable types of limited power sources are Listed Class 2 power supplies, a Listed telephone power supply with outputs identified as being source limited, or Listed custom-built telecommunication equipment with a power output code “L.”

**L** — As an output code, this designation indicates that, with overcurrent protection bypassed, the unit provides power outputs that are source limited to 250 VA with the current limited to 1000 V max. The following table summarizes acceptable power sources for units with input power codes C, F and L.

<table>
<thead>
<tr>
<th>Power Source</th>
<th>May Supply Unit With</th>
<th>Input Power Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output power code “L”</td>
<td>L</td>
<td>C, F</td>
</tr>
<tr>
<td>Output power code “F”</td>
<td>F</td>
<td>C, L</td>
</tr>
<tr>
<td>Output power code “C”</td>
<td>C, L</td>
<td>L</td>
</tr>
<tr>
<td>Class 2 power source</td>
<td>L</td>
<td>F, C</td>
</tr>
<tr>
<td>Communication circuits (e.g., public network)</td>
<td>L, F, C</td>
<td></td>
</tr>
</tbody>
</table>

Listed telephone power supplies with identified “Level C” outputs

Listed telephone power supplies with identified “source-limited” outputs

---

**PERMANENT MARKING**

The codes are marked in the following format:

<table>
<thead>
<tr>
<th>Power Code (PC)</th>
<th>Telecommunication Code (TC)</th>
<th>Installation Code (IC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>X</td>
<td>A</td>
</tr>
</tbody>
</table>

In this example, the “F” Power Code (PC) for the input indicates that the power inputs require overcurrent protection from the equipment that provides power to this unit. The “C” Power Code (PC) for the output indicates that the outputs are limited to levels compatible with communication wiring systems. The “X” input Telecommunication Code (TC) means that the communication circuit inputs are suitable for connection to exposed circuits. The “T” Telecommunication Code (TC) for the output indicates that the unit provides isolation between the exposed circuits connected at the input and the telecommunication output ports. The “X” Telecommunication Code (TC) for the output indicates that the output circuits are also suitable for connection to exposed circuits. The “A” Installation Code (IC) indicates that additional important installation information is provided on a tag or an attached information sheet. The lack of any other installation codes indicates that the equipment should be installed in restricted access locations over a noncombustible surface or mounted in a suitable enclosure with an installation code “E” or “B”.

Power supplies and assemblies containing power supplies or power distribution components are marked with electrical ratings. Assemblies that present a load on the power system are marked with a load or input rating. The total load ratings for any system should not exceed the power supply/distribution ratings.

Custom-built telecommunication equipment is intended to be installed or situated in a location or position that does not cause excessive heat build-up or interfere with proper ventilation.

---

**ADDITIONAL INFORMATION**

For additional information, see Telecommunication Equipment (WYIE) and Electrical Equipment for Use in Ordinary Locations (AA/ALZ).

**REFERENCES**

Information technology equipment is covered under Information Technology Equipment Including Electrical Business Equipment (NVQ).

Equipment intended to be installed on the network side of the customer demarcation point and installed and maintained by telephone companies, CATV companies, and similar network communication companies is covered under Communication Service Equipment (DUZO).

Cabinet, enclosure and rack/frame systems that are not complete information technology (IT) or telecommunication equipment, but include components and assemblies that are intended to power, protect, heat, cool of otherwise support IT or telecommunication equipment that will be installed at a later time, are covered under Information Technology and Communications Equipment Cabinet, Enclosure and Rack Systems (NWIN).

---

**UNEAVALUATED FACTORS**

Possible physiological effects of these devices have not been investigated.
## ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT DIRECTORY

### 2005 GENERAL INFORMATION DIRECTORY

<table>
<thead>
<tr>
<th>ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE</strong></td>
</tr>
<tr>
<td><strong>ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT</strong></td>
</tr>
<tr>
<td><strong>DIRECTORY</strong></td>
</tr>
<tr>
<td><strong>2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE</strong></td>
</tr>
<tr>
<td><strong>ELECTRICAL APPLIANCE AND UTILIZATION EQUIPMENT</strong></td>
</tr>
<tr>
<td><strong>DIRECTORY</strong></td>
</tr>
</tbody>
</table>

### RELATED PRODUCTS

Cell site equipment and similar equipment that forms the “base station” for a cellular communications network, and incorporates the interface to the wired telecommunication network, controllers, amplifiers, and transmitting/receiving equipment is covered under Telephone Appliances and Equipment (WYQQ) or Information Technology Equipment Including Electrical Business Equipment (NWWG).

### ADDITIONAL INFORMATION

For additional information, see Telecommunication Equipment (WYQQ) and Electrical Equipment for Use in Ordinary Locations (AAALZ).

### REQUIREMENTS

The basic standard used to investigate products in this category is UL 60950, “Audio/Video and Musical Instrument Equipment for Household, Commercial, and Similar General Use.” UL 60950-1, “Audio, Video and Similar Electronic Apparatus – Safety Requirements,” UL 1492, “Audio-Video Products and Accessories,” or UL 6950 or UL 6950-1, “Safety of Information Technology Equipment,” as well as the product certification requirements to current FCC Regulations.

### UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Cellular Telephone” (or “Telephone, Cellular”) or other appropriate product name as shown in the individual Listings.

### EQUIPMENT TYPES

Examples of equipment covered under this category include:
- Telephones, telephone answering devices, and telephone dialers that do not deliver a recorded message.
- Key telephone systems, automatic telephone call sequencers, customer administration panels, four-wire channel terminating units, intelligent switching subsystems, message transmitters, mounting shelves, PABX (private automatic branch exchange) systems, phone line TV interface systems, remote telephone base stations, telecontrollers, terminals, terminal sets, WATS boxes and cordless telephones.

### INSTALLATION

Cabinet, enclosure and rack/frame systems that are not complete in a fixed position (AAALZ). Telephone Appliances and Equipment: This category covers appliances and equipment intended to be electrically connected to a telecommunication network that has an operating voltage to ground that does not exceed 200 V peak, 300 V peak-to-peak or 150 V rms, installed or used in accordance with ANSI/NFPA 70, “National Electrical Code.”

### RELATED EQUIPMENT

Information technology equipment, including other telecommunication appliances and equipment, is covered under Information Technology Equipment Including Electrical Business Equipment (NWWG).

### ADDITIONAL INFORMATION

For additional information, see Telecommunication Equipment (WYQQ) and Electrical Equipment for Use in Ordinary Locations (AAALZ).

### REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 1499, “Telephone Equipment.”

Certain types of equipment have been investigated for installation in an environmental air space and are provided with a marking or installation instruction, which states “Suitable for Use in Other Environmental Air Space in Accordance with Section 500.22(C) of the National Electrical Code,” or similar wording. In such cases, UL 1043, “Fire Test for Heat and Visible Smoke Release for Discrete Products and their Accessories Installed in Air-Handling Spaces,” has been applied.

### UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names: “Telephone Appliance,” “Telephone Equipment,” “Telecommunication Equipment,” “Telephone Answering Appliance,” “Telephone Call Divertor,” “Automatic Dialer,” or other appropriate product name as shown in the individual Listings.

The product name for field-installed accessories or subassemblies is provided with the additional word “Accessory” or “Subassembly.”

## TELEPHONE EQUIPMENT, LEGACY INSTALLATIONS (WYXR)

### USE

This category covers equipment with remote feeding telecommunication circuits intended for backwards compatibility in legacy telecommunication equipment.

This equipment is limited to that which forms part of a telecommunication network up to and including the demarcation point. The circuitry associated with this type of equipment is intended to be installed and located in service access areas only, which may or may not be provided by the equipment housing. This equipment is generally considered central office equipment, though it may be deployed elsewhere in similarly controlled environments.

### PRODUCT TYPES

Examples of equipment covered under this category are:
- Circuit packs or cards with existing or new technologies designed to be installed into shelf assemblies that form part of a service provider’s existing infrastructure.
- Shelf assemblies intended as replacements for existing shelf assemblies mounted in frame line-ups that form part of a service provider’s existing infrastructure.
- Shelf assemblies or enclosures intended as replacements for existing service provider infrastructure equipment that are required to be compatible with cards or circuit packs already in service.

### REQUIREMENTS

The basic requirements used to investigate products in this category are contained in Subject 2391, “Outline of Investigation for Equipment with Remote Feeding Telecommunication Circuits Intended for Backwards Compatibility in Legacy Telecommunication Equipment”.

### UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Circuit Pack,” “Shelf Assembly,” or other appropriate product name as shown in the individual Listings.

## TOOLS (XJXX)

Tools, Semi-Automatic Woodworking Equipment (XKHS)

### USE AND INSTALLATION

This category covers production and accessory equipment for attended or unattended fabrication or modification of material used in manufacturing products or subassemblies in industrialized or commercial applica-
2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE & UTILIZATION EQUIPMENT DIRECTORY

2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE ELECTRICAL APPLIANCE & UTILIZATION EQUIPMENT DIRECTORY

ADDITIONAL INFORMATION
For additional information, see Tradeshow Equipment (XNRI).

Requirements
The basic standards used to investigate convention center cord sets are UL 2305, “Exhibition Display Units – Fabrication and Installation”, and UL 817, “Cord Sets and Power-Supply Cords”.

UL Mark
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Exhibition Display Unit – Accessories.”

EXHIBITION DISPLAY UNITS, CUSTOM (XNSA)

Use and Installation
This category covers devices consisting of custom-built panels, sections or complete exhibition display units.

Custom exhibition display units are uniquely designed for display at a particular exhibition, show, meeting or assembly. The unique construction design is intended to be used for a particular product, service or organization.

Custom exhibition display units are built partially or wholly on site.

Surface Burning Characteristics
The surface burning characteristics of building materials employed in these assemblies is judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame spread rating of 200 or less and, unless otherwise marked, a smoke developed rating of 200 or less.

Additional Information
For additional information, see Tradeshow Equipment (XNRI).

Requirements
The basic standard used to investigate products in this category is UL 2305, “Exhibition Display Units – Fabrication and Installation.”

UL Mark
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Exhibition Display Unit – Custom.”

EXHIBITION DISPLAY UNITS, PORTABLE AND MODULAR (XNSN)

Use and Installation
This category covers portable tradeshow display, hanging components and other exhibit assemblies that may be interconnected to form an exhibition display unit.

Portable exhibition display units are intended to be moved. They are hand carried and set up without tools and/or a ladder. They do not require trained personnel to setup.

Modular exhibition display units are systems consisting of a series of components that are tubular in design, and are mechanically connected together to form the supporting structure of an exhibition display unit or portion of a unit. A modular system uses a locking means of connection whereby the strength and integrity of the connection is maintained. Elements of these systems are intended to be used repeatedly in various configurations.

Surface Burning Characteristics
The surface burning characteristics of building materials employed in these assemblies are judged to be no greater than that of ordinary lumber used in on-site construction. Finished surfaces are of materials having a flame spread rating of 200 or less and, unless otherwise marked, a smoke developed rating of 200 or less.

Additional Information
For additional information, see Tradeshow Equipment (XNRI).

Requirements
The basic standard used to investigate products in this category is UL 2305, “Exhibition Display Units – Fabrication and Installation.”

UL Mark
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Exhibition Display Unit.”

EXHIBITION DISPLAY UNITS, REBUILT (XNST)

This category covers rebuilt exhibition display units.

TRADESHOW EQUIPMENT (XNRI)

Use and Installation
This category covers equipment intended for indoor use for the purpose of illuminating, animating, activating, or displaying with respect to temporary exhibitions, exhibits, shows, conventions, meetings or assemblies.

These units are for temporary construction and display at exposition events and are intended to be installed and used in accordance with Article 318 of the National Electrical Code, NFPA 70. The requirements of the Authorities Having Jurisdiction should be consulted regarding use of these devices and equipment before installation.

Additional Information
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

Exhibition Display Units, Accessories (XNRU)

Use
This category covers accessories consisting of equipment that is complete and is specifically and solely for use in the tradeshow industry as peripheral or related devices. This includes convention center cord sets.

Product Markings
Convention center cord sets are surface marked “Parallel Convention Center Cable for Temporary Tradeshow Use Only.”

SPECIAL CONSIDERATIONS
Devices included in this category are not intended for the handling of hazardous material. The use of some equipment involves certain inherent hazards related to the risk of injury that cannot be wholly eliminated by practical design features. Such hazards have been reduced to an acceptable degree in the Listed equipment.

RELATED EQUIPMENT
Self-sustaining production equipment designed to be programmed for the assembly of products or subassemblies in a specific manufacturing application, such as assembly of components, packaging, sorting, or counting of parts, and which only incorporates manufacturing processes involving heating or cooling, drying, or gluing of parts are covered by Factory Automation Equipment (FPE) in the Electrical Construction Equipment Directory.

Robotics and associated control equipment are covered under Robots and Robotic Equipment (TRRZ) in the Electrical Construction Equipment Directory. Industrial Control Panels are covered under their own category (NITW) in the Electrical Construction Equipment Directory.

Equipment that may be used in residential applications is covered under Tools, Stationary (XXJU).

Equipment intended primarily for identifying, examining and investigating materials, and making measurements and tests such as might be associated with manufacturing and quality-control procedures are covered under Inspection and Measuring Equipment (NYRW).

Additional Information
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

Rebuilt Equipment
This category also covers rebuilt semi-automatic woodworking equipment that may or may not be rebuilt by the original manufacturer. Rebuilt semi-automatic woodworking equipment is factory rebuilt to the extent necessary by disassembly and reassembly of new or reconditioned component parts. Rebuilt semi-automatic woodworking equipment is subject to the same requirements as new semi-automatic woodworking equipment.

Requirements
The basic requirement used to investigate products in this category is Subject 2385, “Outline of Investigation for Semi-automatic Woodworking Equipment”.

UL Mark
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Semi-automatic Woodworking Equipment” or other appropriate product name. For rebuilt semi-automatic woodworking equipment the product name is preceded by the word “Rebuilt,” “Refurbished” or “Remanufactured.”

EXHIBITION DISPLAY UNITS, ACCESSORIES (XNRU)

Use
This category covers accessories consisting of equipment that is complete and is specifically and solely for use in the tradeshow industry as peripheral or related devices. This includes convention center cord sets.

Product Markings
Convention center cord sets are surface marked “Parallel Convention Center Cable for Temporary Tradeshow Use Only.”

2005 GENERAL INFORMATION DIRECTORY

PART IV

LOOK FOR THE UL MARK ON PRODUCT
VENTILATORS, POWER (ZACT)

GENERAL
This category covers roof- and wall-mounted power ventilators and duct fans consisting of an impeller and motor installed in a housing. Roof- and wall-mounted power ventilators have a weather resistant housing and are supported by a weather resistant base intended to fit, usually by means of a curb, over a wall or roof opening.

These ventilators are intended primarily for commercial or industrial use and are for the purpose of ventilation only. These ventilators consist of exhaust type and makeup air type devices. Makeup air type ventilators equipped for evaporative cooling are covered under Humidifiers (AHIV).

Duct fans intended to move heated air are investigated to determine the effect of heated air on electrical components and are marked with the maximum temperature of the air.

Power ventilators intended for use where they will be exposed to weather are investigated to determine the effect of rain on electrical components.

These ventilators have not been investigated for installation in fire walls or from the standpoint of their effect on venting in case of fire. Their location should be determined after consultation with the Authority Having Jurisdiction.

RELATED PRODUCTS
For ventilators intended for the primary removal of grease-laden vapors and residues over restaurant cooking appliances, see Power Ventilators for Restaurant Exhaust Appliances (YZHW).
For other types of fans and blowers, see Fans, Electric (GPWV).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 705, “Power Ventilators.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Power Ventilator.”

ADDITIONAL INFORMATION
For additional information, see Tradeshow Equipment (XNRI).

RELATED PRODUCTS
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 705, “Power Ventilators.”

UL MARK
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

INDUSTRIAL MATERIAL HANDLERS (ZAJS)

USE
This category covers products intended for continuous movement of material laden air.

The instruction manual states these devices are intended for exhausting, material conveying, pollution control and air circulation. These devices are Classified as to risks of electric shock and mechanical hazard only.

RELATED PRODUCTS
Ventilation equipment is covered under Power Ventilators (ZACT).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 705, “Power Ventilators.”

UL MARK
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

INDUSTRIAL MATERIAL HANDLER
AS TO ELECTRIC SHOCK AND MECHANICAL HAZARD ONLY
Control No.

WIDEN CABINETS (ZNXR)

This category covers wire cabinets, such as illuminated display cases. Cabinets provided with or designed for use with refrigeration equipment are covered under Commercial Refrigerators and Freezers (SGKW). Cabinets intended for other than merchandise display are covered under Furnishings, Household and Commercial (IYQX).

ADDITIONAL INFORMATION
For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ).

REQUIREMENTS
The basic standard used to investigate products in this category is UL 65, “Wired Cabinets.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Wired Cabinet.”
2005 General Information for Selected Categories from the Fire Protection Equipment Directory

PART V

Fire Protection Equipment (AAFP)

GENERAL

Fire protection equipment includes fire suppression equipment and systems, fire alarm equipment and fire fighting equipment, such as fire hoses, fire service protective clothing, and automotive fire apparatus. Also included are furnishings in buildings investigated for combustibility, such as upholstered furniture, mattresses, and warehouse pallets.

This equipment is intended for use only as described in the general Guide Information for each product category and individual Listings. This equipment has been investigated for use as described in the instructions and markings provided with the equipment. The use of the equipment in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category has not been investigated by UL.

CERTIFICATE SERVICE

Fire alarm systems require extensive installation work and maintenance by the Listed installing company. UL’s Standards for these systems cover installation methods, extent of protection, and maintenance service, which are supervised under UL’s Certificate Service.

Under Certificate Service, UL authorizes the issuance of UL’s certificates to installations which the Listed installing company represents to be in compliance with requirements established for the product category. The certificate indicates the classification, extent, location of equipment, period covered by the certificate, and name of the installing company.

UL conducts countercheck field examinations of representative installations of the Listed installing company. UL assumes no liability for any loss that may result from failure of the equipment, incorrect certification or nonconformity with requirements. If installations not in compliance with UL’s requirements are found as a result of field examinations, they are subject to correction by the Listed installing company or cancellation of the certificate.

All of a company’s alarm system installations may not be covered under UL’s Certificate Service. Only those installations for which a certificate has been properly issued are covered under UL’s Certificate Service.

UL maintains a Certificate Verification Service (ULCVS) that allows Authorities Having Jurisdiction (AHJs) to verify up-to-date Certificate information and identify companies eligible to issue Certificates as of the date of the inquiry. Only those alarm or signal system installations for which a Certificate has been issued are covered under UL’s Certificate Service. The verification of a Certificate on ULCVS is the only method UL provides to identify the Certificated alarm systems actively covered under its Listing and Follow-Up Service.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association, and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.
These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

**INSTRUCTIONS AND PRODUCT MARKINGS**

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

**FIELD MODIFICATIONS**

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL’s safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

**INDOOR AND OUTDOOR USE**

Unless outdoor use is specifically indicated in the general Guide Information for the product category or included in the individual Listings of the product, individual appliances have been investigated only for use indoors, unless the product, by its inherent nature, is obviously intended for use outdoors.

**ELECTRICAL INSTALLATIONS**

**General** — The ampere or wattage marking on electrical power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to electric heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

**Supply Conductors** — Except as noted in the general Guide Information for some product categories, most terminals are for use only with copper wire unless marked otherwise. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted below or in the general Guide Information for certain product categories, the electrical termination provisions on equipment are based on the use of 60°C insulated conductors in circuits rated 100 A or less and the use of 75°C insulated conductors in higher rated circuits.

If the electrical termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) specified in Table 310.16 of ANSI/NFPA 70, “National Electrical Code” (NEC), should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

**Terminations** — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Supply terminals of 15 A and 20 A switches and receptacles not marked “CO/ALR” are for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked “AL/CU” are for use with copper conductors only. Terminals of switches rated 30 A and above marked “AL/CU” are for use with aluminum, copper and copper-clad aluminum conductors.

Combination of dissimilar conductors in terminal or splicing connectors is acceptable only in dry locations and when the connectors are identified as suitable for such intermixing.
PUMPING EQUIPMENT FOR FIRE SERVICE (QVUT)

The following information and listings relate to fire pumps, drivers, controllers and accessory equipment used in supplying water for fire protection purposes.

A fire pump unit generally includes the separately Listed fire pump, driver, controller, and other accessory equipment. The individually Listed products are intended to be installed and tested for acceptable performance in accordance with the requirements of the Standard of the National Fire Protection Association for the Installation of Centrifugal Fire Pumps, NFPA 20.

Authorities having jurisdiction should be consulted before installation.

BATTERY CHARGERS FOR USE WITH INTERNAL COMBUSTION ENGINES DRIVING CENTRIFUGAL FIRE PUMPS (QWIR)

This Category covers battery chargers for automatically controlling and maintaining the charge on batteries used to start internal combustion engines driving centrifugal fire pumps. The equipment consists of rectifying stacks, transformer, controlling relays, switches, and meters.

The basic standard used to investigate products in this category is UL 1236, “Battery Chargers for Charging Engine Starter Batteries.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Battery Charger For Use With Fire Pumps.”

FIRE PUMP MOTORS (QXZF)
USE

This category covers motors intended for use in fire pump systems. These motors are used to drive centrifugal pumps used for fire service.

PRODUCT MARKINGS

This equipment is marked as follows:
1. Manufacturer’s name or trademark
2. Factory identifier (if produced at more than one factory)
3. Model or catalog number
4. Rated voltage
5. Full-load input amperes or watts (or both)
6. Rated temperature rise or the insulation system class
7. Rated ambient temperature
8. Time rating, or, if it is a continuous duty motor, then “Continuous” or “CONT”
9. Rated horsepower when 1/8 hp (93 W) or more
10. Code letter to indicate locked-rotor amperes in accordance with ANSI/NFPA 70, “National Electrical Code,” for an alternating-current motor rated 1/2 hp (373 W output) or more
11. Secondary volts and full-load amperes, when product is a wound-rotor induction motor
12. Rated full-load speed
13. Rated frequency expressed in one of the following terms: hertz (Hz), cycles per second (cps or c/s), ac-dc, (number of cycles)/dc (e.g., 60/cycle)/dc, or ac only – or direct current; and, for a motor intended for use on a polyphase circuit, number of phases
14. Winding – straight shunt, stabilized shunt, compound, or series, for a direct-current motor
15. Service factor (1.15 or less)
16. Amperes and horsepower at each speed, for a multi-speed motor
17. Service factor (1.15 or less)
18. Amperes and horsepower at each speed, for a multi-speed motor other than a shaded-pole or a permanent-split-capacitor motor

ADDITIONAL INFORMATION

For additional information, see Pumping Equipment for Fire Service (QVUT) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 1004, “Electric Motors,” and UL 1004A, “Fire Pump Motors.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the product name “Fire Pump Motor.”

PUMP CONTROLLERS, FIRE (QYZS)

This listing covers the following products:

- Fire Pump Controllers
- Circuit Breakers for Fire Pump Controllers
- Emergency Manual Operators
- Remote Alarm Panels

Fire pump controllers are intended for starting and stopping centrifugal fire pumps and include nonautomatic types and automatic types for electric driven pumps. Unless otherwise indicated, these controllers are intended for use with spark ignition (gasoline or natural gas) or diesel engines.

Controllers suitable for use with spark ignition internal combustion engines are intended for such engines installed prior to 1974.

Fire pump controllers intended for starting and stopping foam concentrate pump motors, are marked “Foam Pump Controller” or “Limited Service Foam Pump Controller.”

Controllers for electric driven, standard-size centrifugal fire pumps are intended for use with squirrel-cage or wound rotor motors rated 600 v or less.

Controllers for squirrel-cage motors may be for across-the-line starting or reduced voltage starting as indicated in the individual listings.

“Limited Service Controllers” are for across-the-line type squirrel-cage motors of 30 hp or less, 600 v or less. Authorities having jurisdiction should be consulted before installing controllers of these types.

Manually operable, open type circuit breakers are for use within enclosures of fire pump controllers.

Emergency manual operators are for use with internal combustion engines.

Some controllers are suitable for use as service equipment and are so marked. Such marking is an integral part of other required marking.

The basic standards used to investigate products in this category are UL 508, “Electric Industrial Control Equipment”, and UL 218, “Fire Pump Controllers.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Fire Pump Controller”, “Limited Service Controller”, “Foam Pump Controller”, “Limited Service Foam Pump Controller”.

PUMP CONTROLLERS, FIRE, OVER 600 V (QZGR)

This listing covers fire pump controllers having AC Voltage ratings in the range of 2.2 kV to 2.5 kV, 4.0 kV to 5.0 kV or 6.2 kV to 7.2 kV intended for starting and stopping centrifugal fire pumps and include nonautomatic types and automatic types for electric driven pumps.

These fire pump controllers are intended for use with squirrel-cage motors rated 7.2 kV or less.

Equipment in this category has been investigated for use on three-phase circuits having available fault levels not exceeding the MVA rating appearing on the nameplate. The three-phase available symmetrical MVA is equal to the product of the available symmetrical rms short-circuit current, the line to line open circuit voltage, and a phase factor of 1.73 x 10^-6.

These controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, accordingly they are tested at six times the continuous current rating of the controller at rated voltage.

Some fire pump controllers are provided with an integrally mounted surge arrester to meet the required impulse withstand.

Fire pump controllers are suitable for use as service equipment and are so marked. Such marking is an integral part of other required marking.

Fire pump controllers are so constructed that falling dirt or water dripping from the downward vertical does not interfere with the successful operation of the equipment.

Fire pump controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

Fire pump controllers intended for starting and stopping foam concentrate pump motors are marked “Foam Pump Controller” or “Limited Service Foam Pump Controller.”

The basic standards used to investigate products in this category are UL 347, “High Voltage Industrial Control Equipment”, and ANSI/NFPA 20, “Centrifugal Fire Pumps”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Direc-
This Listing covers fire pump controllers intended for starting, stopping and protecting centrifugal fire pumps in one and two-family dwellings and mobile homes. These controllers are automatic or nonautomatic type for electric driven pumps.

Residential fire pump controllers are intended for use with squirrel-cage motors rated 250 V or less.

Equipment in this category has been investigated for use on single-phase alternating current circuits having available fault current levels not exceeding the short-circuit withstand rating appearing on the nameplate.

These controllers are intended for across-the-line starting and for making and breaking the circuit when the motor is stalled, accordingly they are tested at six times the continuous current rating of the controller at rated voltage.

Those controllers which are suitable for use as service equipment are so marked. Such marking is an integral part of other required marking.

These controllers are so constructed that falling dirt or water dripping from the downward vertical does not interfere with the successful operation of the equipment.

Residential pump controllers are substantially complete when shipped from the factory and final acceptability for service does not depend upon assembly of parts in the field.

The basic standards used to investigate products in this category are UL 508, "Industrial Control Equipment", and NFPA 20, "Centrifugal Fire Pumps", as applicable to limited service fire pump controllers.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number, and the product name "Residential Fire Pump Controller".

This category covers equipment designed for the detection, initiation, notification and control of signals indicative of fire, supervisory, watchman, releasing operation, and the control of the flow of smoke.

This category also covers service companies who are capable of certifying systems that comply with nationally recognized installation standards.

This equipment is intended to be installed, maintained, and operated as system arrangements in conformity with the following:

ANSI/NFPA 12, "Standard on Carbon Dioxide Extinguishing Systems"
ANSI/NFPA 12A, "Standard on Halon 1301 Fire Extinguishing Systems"
ANSI/NFPA 13, "Standard for the Installation of Sprinkler Systems"
ANSI/NFPA 17, "Standard for Dry Chemical Extinguishing Systems"
ANSI/NFPA 17A, "Standard for Wet Chemical Extinguishing Systems"
ANSI/NFPA 72, "National Fire Alarm Code"
ANSI/NFPA 92A, "Recommended Practice for Smoke-Control Systems"
ANSI/NFPA 92B, "Guide for Smoke Management Systems in Malls, Atria, and Large Areas"

Users of this equipment should consult Authorities Having Jurisdiction (AHJ) concerning the particular types to be used, number and location of appliances, character to be assigned to installation of wiring, methods to be followed in the receipt and disposition of signals, keeping of records, rendering of reports, and all other details having a bearing on adequate installation, maintenance and use of the system to be employed.

Listed equipment is subjected to investigation to determine its suitability for its intended service and for installation, maintenance and use in conformity with the applicable NFPA standards, with particular regard to design and construction, practicability of application and reliability of performance in addition to the possible electrical hazards involved in its use.

A complete system is considered to be a combination of interrelated signal-initiating devices, signal-transmitting devices, signal-notification appliances and control unit installed in accordance with regulations enforced by the AHJ who determines the suitability of the installation for its particular application. The Listing indicates that wiring diagrams have been submitted with the equipment, which provide details for interconnecting it to other interrelated devices for the intended application. The interconnection details are shown on the equipment or are in a separate installation document provided with the equipment and referenced in the marking on the equipment by drawing number and issue date and/or revision level.

Equipment may be used in different combinations to form a system. All Listed equipment forming the system may be either of one manufacturer or of different manufacturers. The installation wiring diagram provided as a part of the Listed equipment should be consulted for specific details.

A system formed of separately Listed parts to provide a central station fire alarm system may be certified by a company Listed under Protective Signaling Services – Central Station (UUFX).

A system formed of separately Listed parts to provide a local, auxiliary, remote station, or proprietary fire alarm system may be certified by a company Listed under Protective Signaling Services – Local, Auxiliary, Remote Station, and Proprietary (UUJS).

Products may be certified in accordance with the applicable Parts of European Norm (EN) 54, "Fire Detection and Fire Alarm Systems." For additional information, see Fire Detection and Alarm Equipment Classified in Accordance with International Publications (UTHN).

This category covers electrical control units for fire protective signaling systems to be employed in ordinary indoor locations in accordance with the Standards of the National Fire Protection Association for Central Station, Local, Auxiliary, Remote Station and Proprietary Protective Signaling Systems for Watchman, Fire Alarm and Supervisory Service.

A control unit consists of a unit assembly of electrical parts having provision for connection of power supply circuits routed through the control unit equipment by a prescribed scheme of circuiting. The circuits are extended to separate devices by which the operating parts of the control units are actuated for signals and to separate or incorporated appliances by which the signals are indicated, so as to form a coordinated system combination for definite signaling services.

The Listing of a control unit furnishes the related actuating devices and signal indicating appliances for use with the control unit or indicates the particular devices and appliances required and supplies any instructions necessary to complete their interconnection at the installation.

The Listing indicates that wiring diagrams have been submitted with the control unit, along with information regarding its intended application, and the unit has been tested with representative actuating devices and signal indicating devices to be used with it as an interrelated assembly. Reference is made in the marking of the control unit to the wiring diagram showing complete information except when the installation wiring diagram is secured to the control unit.

Identification of the information in the Listings is as follows:

Local System Type (L)
Local System Type with Shunt Type Connection to Master Box (LS)
Auxiliary System Type (A)
Remote Station System Type (RS)
Proprietary System Type (P)
Central Station System Type (CS)

System Control Unit with Emergency Voice Communication — A system control unit with emergency voice communication consists of a control unit that employs a speaker system in lieu of conventional general alarm indicating circuits. The control unit may also have additional provision for telephone communication by use of hand sets. A tape deck with a prerecorded message may also be employed as a supplementary feature.

System Control Unit with Emergency Telephone Communication — A system control unit with emergency telephone communication consists of a control unit with conventional general alarm indicating circuits and additionally employs telephone communication circuits to remote telephone hand sets for emergency communication during a fire condition, usually for use by fire department personnel.

The type of devices that can be connected for the service indicated in the Listings for each type control unit are as follows:

A – Automatic fire alarm: Thermostats, smoke detectors, etc.
M – Manual fire alarm: Manually operated boxes
WF – Waterflow alarm: Waterflow switches
SS – Sprinkler supervisory: Gate valves, water level switches, temperature switches, etc.
WSS – Watchman supervisory service

The type of signaling service applicable to each type control unit is as follows: C – Coded; NC – Non-Coded; M – March Time; MX – Multiplex; RF – Radio Frequency; DAC – Digital Alarm Communicator.
Where more than one type control unit is indicated for a model number, such as Type (L, LS, A, RS), that particular model is suitable for all indicated applications. The change from one type to another may be made by deletion or addition of a panel or module inside the control unit cabinet or revisions to operating software to provide the additional function. In other cases a control unit may be suitable for a dual function without any panel changes, such as a Type (P, RS). Authorities Having Jurisdiction should be consulted before installation or revision.

Where model numbers are indicated in the Listings, 100 percent of the manufacturer’s production for those models is required to be labeled. Where model numbers are not indicated, the manufacturer is not obliged to label 100 percent of production.

RELATED PRODUCTS

For additional information regarding central station systems, see Central Station Protective Signaling Services (UUFX).

ADDITIONAL INFORMATION

For additional information, see Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

REQUIREMENTS

The basic standard used to investigate products in this category is UL 864, “Control Units for Fireprotective Signaling Systems.”

ADJUNCT SERVICES

Underwriters Laboratories Inc. provides a service for Classification of control units that not only meet the requirements of UL 864, but also have been investigated in accordance with ANSI/SIA CP-01-2000, “Control Panel Standard – Features for False Alarm Reduction.”

UL MARK

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names, with or without the word “Commercial,” as appropriate: “Signal System Control Unit,” “Signal System Equipment Enclosure,” “Signal System Equipment Enclosure Part” or “Signal System Control Unit Sub-Assembly.”

The Listing Mark for Signal System Control Units may include the designation “___ of ___.” The first space is stamped with the number indicating the position that the panel occupies in the series of panels constituting the Signal System Control Unit. The latter space is stamped with the total number of units in the Listed Signal System Control Unit.

When so indicated in the individual Listings, one of the following statements is also included: “Also Suitable as a Control Unit for Releasing Device Service,” “Also Suitable as a Household Fire Warning System Control Unit – Refer to Installation Diagram Attached to Control Unit or Refer to UL’s Control Unit Marking for Instruction,” “Also Suitable for Use as Burglar Alarm System Control Unit,” “Also Suitable for Use as a Commercial Burglar Alarm System Control Unit” or “Also Suitable for Use as Process Management Equipment.”

Products that have also been investigated in accordance with ANSI/SIA CP-01-2000, “Control Panel Standard – Features for False Alarm Reduction,” are marked, in combination with the Listing Mark, “Also Classified IN ACCORDANCE WITH ANSI/SIA CP-01-2000.”

DETECTORS, AUTOMATIC FIRE (UPLV)

These are either individual devices or prescribed combinations of devices designed to detect flame, heat, smoke, or combustion gases resulting from a fire and to automatically operate electrical signaling contacts. The signaling contacts may be integral parts of an individual device or parts of a separate device to which the detecting element is connected as an extended component.

The signaling contacts of the detector are intended to be connected to the circuit conductors of fire protective signaling systems recognized by the National Fire Protection Association Standards, so that the fire alarm signal initiated by the detector will be indicated by the system.

The kind of system (central station, proprietary, auxiliary, remote station, or local) with which the detector can be used depends upon the design of the signaling circuit to which the detector contacts are intended to be connected. A detector may have non-coded signaling contacts connected directly to the actuating circuit of system control unit or to the actuating circuit of an electrically operated transmitter which will transmit coded signals over the signaling line circuit of a local, auxiliary, proprietary, remote station, or central station system.

The wiring diagram of the transmitter or system control unit with which the detector is used will indicate the circuit application of the detector. A combination type detector depends upon two or more related but separate pieces of equipment which are designed to be installed together so as to form a complete detector.

Smoke-automatic Fire Detectors (UROX)

GENERAL

This category covers detecting combinations designed to detect smoke sensors. Smoke detectors may or may not be designed to be connected to fire alarm system control units. See “Applications” section.

A heat detector and/or an audible signaling appliance may be provided integral with the detector.

The primary function of duct detectors is to shut down the blowers and/or dampers of air conditioning and ventilating systems in an attempt to prevent a possible panic and smoke damage from distribution of smoke. DUCT DETECTORS ARE NOT INTENDED AS A SUBSTITUTE FOR OPEN AREA PROTECTION.

The location of toxicity produced by the combustibles at which smoke detectors actuate has not been investigated by UL.

The applicable UL performance standard for open area and releasing service detectors is UL 268A. For duct detectors the applicable performance standard is UL 268A.

Where model numbers are indicated in the Listings, 100 percent of the manufacturer’s production for these models are required to be listed and marked. Where model numbers are not indicated, the manufacturer is not obliged to have 100 percent of production bear the UL Listing Mark.

DETECTOR TYPES

Photoelectric (P) — Designed to detect an abnormal density of smoke particles, either by obstruction of a projected light path or reflection of light from the smoke particles onto a light sensitive element.

Ionization (I) — An ionization smoke detector has a small amount of radioactive material which ionizes the air in the sensing chamber, thus rendering a conducting current to flow through the air between two charged electrodes. This gives the sensing chamber an effective electrical conductance. When smoke particles enter the ionization area, they decrease the conductance of the air by attaching themselves to the ions, causing a reduction in mobility. When the conductance is less than a predetermined level, the detector circuit responds.

Combination Photoelectric/Ionization (PI/P) — Employs both principles of detection in one unit.

Projected Beam (PB) — Light beam is projected across space of area to be protected.

Air Sampling (AS) — Consists of air sampling ports at ends of piping or tubing extending from the detector unit to the areas to be protected. A pump draws air from the protected area through the ports and tubing to the detector where the air is analyzed for fire products.

APPLICATIONS

Open Area Protection (OAP) — Requires detector connection to a compatible system control unit for operation.

Releasing Service (RS) — Detectors provided for detector connection only to releasing devices, such as electromagnetic door holders, fire dampers, etc.

Open Area Protection with Releasing Service (OAP/RS) — Incorporates supplementary switching contacts for additional connection to releasing devices.

Duct Detector (DT) — Intended for installation on side of duct. Employs sampling tubes which extend into duct.

Duct Detector (DD) — For installation inside duct.

COMPATIBILITY WITH CONTROL UNITS

Smoke detectors listed for open area protection are intended to be connected to the initiating device circuit of a fire alarm system control unit. Multiple wire detectors, employing power supply terminals or leads that do not obtain power from the initiating device circuit of a system control unit, are compatible with any listed system control unit if failure of the power to the detector is supervised at the control unit. Two wire detectors, whose power supply terminals or leads are the same as the signaling terminals, and obtain power from the initiating device circuit of a system control unit, are evaluated for compatibility either by test or a review of the circuit parameters of both the detector and control unit. Listing is restricted only to those control units with which such an evaluation was made. Interconnection limitations and compatible models are indicated on installation wiring diagram of control unit and/or detectors.

INSTALLATION


Spacings — Although there are no assigned spacings to these detectors, test fires, using the maximum amount of combustible for the risk involved, may be employed. See NFPA 72 for additional guidelines.

Environmental Considerations — Open area detectors are intended for indoor use only where normal ceiling temperatures [Max 37.8 C (100 F)] prevail. Care should be used that detectors are not installed in areas where conditions may cause unwanted (false) alarms.

Duct detectors are intended to be installed in ducts of heating, ventilating, and air conditioning systems where temperatures at the detector do not exceed 37.8 C (100 F).
Ionization detectors should not be used in an environment of high level radiation unless tests in the actual environment have shown that the radiation will not interfere with operation of the detectors.

### Effect of Velocity
The velocities indicated in the individual Listings are the maximum and minimum to which the detector has been subjected in performance tests without indication of a false alarm or abnormal shift in sensitivity. The performance of photoelectric type detectors is not affected by velocity. Velocity limits for duct detectors are based on response to fire tests in UL 268A.

### Stability Test
In view of the innumerable environmental conditions which exist in the field, it is recommended that the stability of detectors be monitored prior to connection to a fire alarm system for at least three months or more to screen out locations of detectors where unwanted alarms may occur. Relocation of the detectors, use of a detector with a different principle of operation, or a change in the sensitivity setting where permitted in the marking of the detector, may be required.

Authorities Having Jurisdiction should be consulted before installation.

### UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and the appropriate product name. The Listing Mark System employs two types of separable detector heads and bases. This permits the separate shipment of bases to facilitate installation and maintenance. The Listing Marks on the separable units, coupled with a marking cross reference between head and base, identifies the parts to be used together to complete a detector assembly.

Detectors with the designation “with integral audible signal” in the text of the UL Listing Mark include an audible signaling appliance in the unit (head or base) which is energized under an alarm condition. Detectors with the designation “with integral heat detector” in the text of the UL Listing Mark include a heat detector in the unit which is connected internally to the smoke detector alarm circuit. Actuation of the heat detector results in the same alarm signal as obtained from the smoke detector.

### NON-SEPARABLE HEADS AND BASES

1. SMOKE-AUTOMATIC FIRE DETECTOR (+) FOR OPEN AREA PROTECTION.
2. SMOKE-AUTOMATIC FIRE DETECTOR (+) FOR OPEN AREA PROTECTION. ALSO SUITABLE FOR RELEASING DEVICE SERVICE.
3. SMOKE-AUTOMATIC FIRE DETECTOR (+) FOR RELEASING DEVICE SERVICE.
4. SMOKE-AUTOMATIC FIRE DETECTOR (+) FOR DUCT APPLICATION.

### SEPARABLE HEADS

1. SMOKE-AUTOMATIC FIRE DETECTOR (+) HEAD FOR USE WITH A (*) UL LISTED BASE.
2. SMOKE-AUTOMATIC FIRE DETECTOR HEAD (+) FOR OPEN AREA PROTECTION WHEN USED WITH A (*) UL LISTED BASE.
3. SMOKE-AUTOMATIC FIRE DETECTOR HEAD (+) FOR OPEN AREA PROTECTION WHEN USED WITH A (*) UL LISTED BASE. ALSO SUITABLE FOR DUCT APPLICATION.
4. SMOKE-AUTOMATIC FIRE DETECTOR HEAD (+) FOR DUCT APPLICATION.
5. SMOKE-AUTOMATIC FIRE DETECTOR HEAD (+) FOR DUCT APPLICATION.
6. SMOKE-AUTOMATIC FIRE DETECTOR BASE (+) FOR USE WITH A (*) UL LISTED HEAD.
7. SMOKE-AUTOMATIC FIRE DETECTOR BASE (+) FOR USE WITH A (*) UL LISTED HEAD.
8. SMOKE-AUTOMATIC FIRE DETECTOR BASE (+) FOR USE WITH A (*) UL LISTED HEAD.
9. AUTOMATIC FIRE DETECTOR BASE (+) FOR USE WITH A (*) UL LISTED HEAD.
10. AUTOMATIC FIRE DETECTOR BASE (+) FOR USE WITH A (*) UL LISTED HEAD. ALSO SUITABLE FOR DUCT APPLICATION.
11. AUTOMATIC FIRE DETECTOR BASE (+) FOR USE WITH A (*) UL LISTED HEAD. ALSO SUITABLE FOR RELEASING DEVICE SERVICE.
12. AUTOMATIC FIRE DETECTOR BASE (+) FOR USE WITH A (*) UL LISTED HEAD. ALSO SUITABLE FOR RELEASING DEVICE SERVICE AND DUCT APPLICATION.

### SEPARABLE BASES AND DUCT HOUSING

1. AUTOMATIC FIRE DETECTOR BASE (+) FOR USE WITH A (*) UL LISTED HEAD.

### SMOKE-AUTOMATIC FIRE DETECTOR ACCESSORIES

#### Smoke Detectors for Special Applications (URXG)

**General** — Devices included under this Listing are Smoke-Automatic Fire detectors employing a special construction different from conventional detectors and are designed to detect products of combustion in a specific location. THESE DETECTORS ARE NOT INTENDED AS A SUBSTITUTE FOR OPEN AREA PROTECTION.

**Types of Detectors**

- **Photoelectric (P):** Designed to detect an abnormal density of smoke particles, either by obscuration of a projected light path or reelevation of light from the smoke particles onto a light sensitive element.

- **Ionization (I):** An ionization smoke detector has a small amount of radio-active material which ionizes air in the sensing chamber, thus rendering it conductive and permitting a current flow through the air between two charged electrodes. This gives the sensing chamber an effective electrical conductance. When smoke particles enter the ionization area, they decrease the conductance of the air by attaching themselves to the ions, causing a reduction in mobility. When the conductance is less than a predetermined level, the detector circuit responds.

**Combination Photoelectric/Ionization (PI):** Employs both principles of detection in one unit.

**Air Sampling (AS):** Consists of air sampling ports at ends of piping or tubing extending from the detector unit to the area to be protected. A pump draws air from the protected area through the ports and tubing to the detector where the air is analyzed for fire products.

**Effect of Velocity** — The velocities indicated in the individual listings are the maximum and minimum to which the detector has been subjected in performance tests without indication of a false alarm or abnormal shift in sensitivity. Velocity limits for duct detectors are based on response to fire tests in UL 268A.

**Installation** — These detectors are intended to be installed in accordance with the manufacturer’s installation instructions, in a manner acceptable to the local authority having jurisdiction and in accordance with NFPA 72 or other NFPA Standards which may apply, such as for extinguishing system applications. The sensitivity rating of the detector shall be taken into consideration with regard to installation in an area to be protected under operating conditions to guard against false alarms. The detectors may be connected to the initiating device circuits of Listed control units which provide audible alarm signals, or employed as part of an extinguishing system. Authorities having jurisdiction should be consulted in all cases before installation.

The basic standards used to investigate products in this category are UL 268, “Smoke-Automatic Fire Detectors” and UL 268A, “Smoke Detectors for Duct Application”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word...
Single- and Multiple-station Heat Detectors (UTFS)

The following listings cover single- and multiple-station heat detectors intended to be employed in indoor locations.

**Single-Station Type.**

Single-station heat detectors are self-contained units incorporating a release mechanism, operating mechanism, and an alarm mechanism. In operation, heat actuates the releasing element permitting stored energy (stored compressed gas or spring) embodied in the unit to sound an audible signal. These devices are interconnected by tubing.

Individual listings give limitations on the maximum length of tubing, between fire alarm detectors and other system components, and on operating temperature ratings, spacing limitations (sensitivity), and other details pertinent to the use of these devices.

Both single- and multiple-station units using compressed gas as the operating mechanism, employ a sight glass or visual indicator to check for loss of contents by leakage, tampering or operation.

Ordinarily these devices are intended for locations where normal ceiling temperatures prevail (below 100°F). Locations where temperatures at ceiling are likely to be unduly high, from sources of heat other than fire conditions such as boiler rooms, etc., demand special consideration. Under these conditions, alarm devices operating normally at higher temperatures and capable of withstanding high temperatures for long periods of time may be required. Care should be exercised to select alarm devices having the proper temperature rating to guard against false alarms from premature operation.

For ceiling temperatures exceeding 100°F, but not 150°F, the 174 to 212°F (intermediate) rating devices are recommended.

For ceiling temperatures exceeding 100°F, but not 150°F, the 174 to 212°F (intermediate) rating devices are recommended.

The spacings specified in individual listings are for flat, smooth, and multiple-station smoke detectors intended to be employed in indoor locations.

**PART V**

**2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE FIRE PROTECTION EQUIPMENT DIRECTORY**

This category covers single- and multiple-station smoke alarms intended to be employed in ordinary indoor locations where sensitivity testing and maintenance of alarms, per Section 10.4.4 of ANSI/NFPA 72, “National Fire Alarm Code” (2002 Edition), is required by code, Authorities Having Jurisdiction, or other requirement.

This category also covers single- and multiple-station smoke alarms that have been performance tested to a minimum 10-year extended battery life under normal ambient conditions. Unless otherwise noted in the individual Listings, the alarms are intended for flush-mounted installation only, and are not intended for use on surface-mounted boxes.

**Single Station** — Self-contained units that incorporate a smoke chamber, an optional heat detector, and related electrical components to initiate an audible alarm signal from the unit when abnormal smoke or heat (when a supplementary heat detector is provided) actuates the unit. These devices may be energized from a commercial power supply source by means of permanent wiring in accordance with ANSI/NFPA 70, “National Electrical Code;” flexible supply cord, use of limited energy cable or equivalent wiring connected to the output of a suitable Class 2 power supply, or by one or more batteries.

Where a battery is employed as the main supply, its depletion below the level at which an alarm signal would be obtained is indicated by a distinctive audible trouble signal which persists for at least seven days.

**Multiple Station** — Similar to single-station units but provided with leads or terminals to permit the interconnection of single-station units so that actuation of any one unit results in actuation of the audible alarms of all units. The installation instruction (manual) indicate the maximum number of units that can be interconnected.

Refer to Chapter 8 of ANSI/NFPA 72 and the instruction manual provided with each smoke alarm for installation data. ANSI/NFPA 72 includes installation requirements of fire warning equipment in family living units. This is intended for family living uses only and not common use areas of multifamily buildings such as corridors, lobbies, stairwells, etc.

**Travel Alarm** — Consists of a battery-operated smoke alarm provided with a mounting bracket for top of door mounting only. May also consist of a battery-operated single-station smoke alarm with the addition of a mounting bracket. The device bears the UL Listing Mark.

**Alarm for Recreational Vehicles** — ANSI/UL 217 applies, except more stringent environmental tests are conducted. Where applicable, supplementary devices and accessories for use with these units, such as a remote horn, are indicated in the individual Listings.

**REBUILT PRODUCTS**

This category also covers single- and multiple-station smoke alarms that are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt single- and multiple-station smoke alarms are rebuilt to the extent necessary for assembly and repair to meet requirements of the UL Listing Mark. Rebuilt single- and multiple-station smoke alarms are subject to the same requirements as new single- and multiple-station smoke alarms.

**ADDITIONAL INFORMATION**

For additional information, see Fire Alarm Devices, Single and Multiple Station, and Accessories (UTER), Signal and Fire Alarm Equipment and Services (SYK) and Fire Protection Equipment (AAFP).

**REQUIREMENTS**

The basic standard used to investigate products in this category is ANSI/UL 217, “Single and Multiple Station Smoke Alarms.”

Units marked “For The Hearing Impaired” also comply with ANSI/UL 1971, “Signaling Devices for the Hearing Impaired.”

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names as appropriate: “Single-Station Smoke Alarm,” “Multiple-Station Smoke Alarm,” “Single- and/or Multiple-Station Smoke Alarm,” “Single- and/or Multiple-Station Smoke Alarm Accessory,” “Single- and/or Multiple-Station Smoke Alarm Accessory – Also Suitable for Use as a Household Burglar Warning System Control Unit,” “Single- and/or Multiple-Station Smoke Alarm Accessory – Also Suitable for Use as a Household Burglar Warning System Control Unit, Home Health Care Control Unit, and Signal Appliance Control Unit,” “Single- and/or Multiple-Station Smoke Alarm Accessory – Also Suitable as a Household Burglar Warning System Control Unit Accessory, Personal Call Unit, and Signal Appliance Environment Transmitter,” “Travel Smoke Alarm,” “Single-Station Smoke Alarm – Also Suitable as a Travel Smoke Alarm,” “Single-Station Smoke Alarm – Also Suitable for Use in Recreational Vehicles,” “Single-Station Smoke Alarm – Also Suitable for Use in Recreational Vehicles,” “Travel Smoke Alarm.”
HEAT ACTUATED DEVICES FOR SPECIAL APPLICATION (UTHV)

General - Devices included under this category are fixed temperature heat actuated type detectors employing a special construction different from conventional thermostats and are designed to detect an abnormal increase in air temperature.

Installation - These detectors are intended to be installed adjacent to the equipment being protected in ordinary indoor locations in a manner acceptable to the local authority having jurisdiction and in accordance with NFPA No. 72 or other NFPA Standards which may apply, such as for extinguishing system applications. The temperature rating of the detector shall be taken into consideration with regard to installation in the ambient temperature of the equipment to be protected under operating conditions to guard against false alarms. The detectors are intended to be connected to the initiating device circuits of Listed control units which provide audible alarm signals or employed as part of an extinguishing system. Authorities having jurisdiction should be consulted in all cases before installation.

Spacings For Equipment Protection - Reference should be made to the manufacturer's installation drawings and instructions. Spacings for smooth ceilings with large bays are included in the individual Listings. For open area protection see additional information under the Classification Thermostats Guide USCV.

The basic standard used to investigate products in this category is UL 521, “Heat Detectors for Fire Protective Signaling Systems”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names: “Heat Actuated Device For Special Application,” “Control Unit for Special Application” and “Control Unit Accessory for Special Application”.

Additional equipment and materials such as bells, horns, heat detectors, smoke detectors, and limited energy fire detector circuit wiring may be required in various applications to complete a system. Separate listings of such equipment can be found in the following categories in this Directory: Audible Signal Appliances (ULSZ); Smoke—Automatic Fire Detectors (UROX); Heat—Automatic Fire Detectors (UQGS); Fire Alarm Devices, Single and Multiple Station (UTER); see also Wires, Miscellaneous (ZMHX) in the Electrical Construction Equipment Directory.

INSTALLATION — The units comprising a system are intended to be installed in accordance with the applicable requirements of Chapter 2 of the National Fire Protection Association Standard for National Fire Alarm Code (NFPA 72). Authorities Having Jurisdiction, such as the local fire authority, shall be notified of the installation.

AT LEAST ONE SMOKE DETECTOR IS REQUIRED TO BE PROVIDED IN A HOUSEHOLD FIRE-WARNING SYSTEM. The smoke detector can be either electrically wired to and operated from the control unit, or be a separately operated device such as an electrically operated single-station fire alarm device.

An installation drawing and/or detailed instructions are employed as the controlling factor for proper installation and interconnection among units. This material may be attached to the control unit, provided detached, or included as part of an instruction booklet.

2005 GENERAL INFORMATION DIRECTORY

INSTRUCTIONS — An instruction booklet illustrating typical install layouts, operation, maintenance, servicing, and test procedures is supplied with the main control unit. Printed information for a household emergency evacuation plan may be separate or included as part of the booklet. The basic standard used to investigate products in this category is UL 985, “Household Fire Warning System Units.”

Control Units and Accessories, Household System Type (UTOU)

This category covers control units and accessories intended to be used as part of a household fire-warning system.

Control Unit — Consists of a unit assembly of electrical parts having provision for connection of power supply, signal actuating devices (thermostats, smoke detectors, switches, etc.), and signal indicating devices (bells, horns, etc.).

Combination Control Unit — A control unit may additionally include circuit facilities for connection to burglar alarm devices to form a combination fire-burglary control unit. In such a combination unit the fire alarm signal takes precedence over the burglar alarm signal and a distinction between alarm signals is required. A common trouble signal may be employed for both.

Modular Control or Combination Unit — A control unit may be prefabricated at the factory or assembled from readily installed modules. A listed burglary module can be added after the unit is installed to expand the system capability. The installation diagram indicates the type and number of modules that can be employed in a control unit.

Where model numbers are included in the Listings, 100 percent of the manufacturer’s production for those models is required to be labeled. Where model numbers are not indicated, the manufacturer is not obliged to label 100 percent of production.

This category also covers household fire warning system units which are rebuilt by the original manufacturer or another party having the necessary facilities, technical knowledge and manufacturing skills. Rebuilt household fire warning system units are rebuilt to the extent necessary by disassembly and reassembly using new or reconditioned parts. Rebuilt household fire warning system units must meet the current UL requirements.

ADDITIONAL INFORMATION

For additional information, see Household Fire-warning System Units (UTLQ), Signal and Fire Alarm Equipment and Services (SYKJ) and Fire Protection Equipment (AAFP).

ADJUNCT SERVICES

Underwriters Laboratories Inc. provides a service for Classification of control units and accessories for use in household fire-warning systems that not only meet the requirements of UL 985, but also have been investigated in accordance with ANSI/SIA CP-01-2000, “Control Panel Standard – Features for False Alarm Reduction”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names, as appropriate: “Household Fire Warning System Control Unit,” “Household Fire and Burglary Warning System Control Unit for Use with Listed Modules,” “Household Fire and Burglary Warning System Control Unit Assembly,” “Household Fire Warning System Control Unit for Use with Listed Modules,” “Household Fire and Burglary Warning System Control Unit,” “Household Fire and Burglary Warning System Control Unit Assembly,” “Household Fire and Burglary Warning System Control Unit Assembly.”

The Listing Mark for rebuilt household fire warning system units includes the word “Rebuilt,” “Reranufactured” or “Reconditioned” preceding the above product name.

Products that have also been investigated in accordance with ANSI/SIA CP-01-2000, “Control Panel Standard – Features for False Alarm Reduction” marked, in combination with the UL Mark, “Also Classified IN ACCORDANCE WITH ANSI/SIA CP-01-2000.”
Fire resistance ratings are included for:
1. Assemblies, such as beams, floors, roofs, columns, and walls and partitions. These fire resistance designs provide the detailed construction of the assemblies and the components used.
2. Systems, such as construction joint systems, through-penetration firestop systems, electrical circuit protective systems and duct assemblies. These designs provide the detailed construction of the systems and the components used.
3. Opening protectives, such as dampers, fire doors, glazing and related equipment. Opening protectives are used to protect openings in fire resistance rated assemblies.

These materials are intended for use only in specific assembly or system designs as described in the general Guide Information for each product category and individual Listings, except for opening protectives. Opening protectives have been investigated for use as described in the instructions and markings provided with the opening protectives. The use of the materials and opening protectives in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category has not been investigated by UL.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association (NFPA), and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.

These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL’s safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.
TECHNICAL SERVICE

Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.

Design Modifications

Careful consideration needs to be given to alterations or modifications of the fire resistance assemblies.

When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.

Contacting UL

UL provides assistance to users of fire resistance assemblies and products, which includes clarification of the published information.

UL also provides a service to investigate modifications to the fire resistance assemblies when requested by the design submitter or by an end user. Requests for clarification should describe the change and include drawings, if necessary.

Requests for clarifications or investigations can be made by contacting UL at:

Phone: +1 847-664-2364
Fax: +1 847-509-6292
E-mail: nbk.architectural.services@us.ul.com
or
UL’s website: www.ul.com

---

LUMINAIRES AND LUMINAIRE ASSEMBLIES CLASSIFIED FOR FIRE RESISTANCE (CDHW)

USE

This category covers luminaires and luminaire assemblies for recessed installation in ceilings in accordance with the provisions of ANSI/NFPA 70, “National Electrical Code.” They have been shown to provide a degree of fire resistance with the floor or roof assemblies with which they have been tested.

These luminaires and luminaire assemblies have been investigated and found to comply with applicable electrical requirements and are so labeled.

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic standards used to investigate products in this category are UL 263, “Fire Tests of Building Construction and Materials” and UL 1598, “Luminaires.”

UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

* or “LUMINAIRE ASSEMBLY” as appropriate

SPEAKER ASSEMBLIES FOR FIRE RESISTANCE (CHML)

USE AND INSTALLATION

This category covers speaker assemblies that have been investigated for installation in ceilings of fire resistive floor-ceiling and roof-ceiling assemblies. They have been shown to provide a degree of fire resistance when installed in the specific designs described for each Classified company.

The speaker assemblies have been investigated for use in specific ceilings with respect to: (1) maximum size of the individual speaker assemblies, (2) minimum spacing between individual speakers and (3) maximum aggregate area of the speaker assemblies per 100 sq ft of ceiling area. Speaker assemblies are intended to be installed in accordance with the installation instructions supplied with the product and as described in the individual fire resistive designs.

Some of these speaker assemblies are provided with an outer enclosure. The insulation material that surrounds the enclosure that is exposed to the airflow in a return air plenum space has also been evaluated to ANSI/UL 723, “Test for Surface Burning Characteristics of Building Materials”. These materials have a flame spread value of 25 or less and a smoke developed value of 50 or less.

ADDITIONAL PRODUCTS

Speakers for use in non-hourly fire rated ceiling systems and rated for plenum use are covered under Speakers and Amplifiers for Fire Protective Signaling Systems (UUMW) in the Fire Protection Equipment Directory.

ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS

The basic standard used to investigate products in this category is ANSI/UL 263, “Fire Tests of Building Construction and Materials”.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product identity “SPEAKER ASSEMBLY FOR FIRE RESISTANCE” and a control number.

WALL OPENING PROTECTIVE MATERIALS (CLIV)

USE AND INSTALLATION

This category covers proprietary compositions which are used to maintain the hourly ratings of fire resistive walls and partitions containing flush mounted devices such as outlet boxes, electrical cabinets and mechanical cabinets.

The General Design Information Section of the UL Fire Resistance Directory, Walls and Partitions, Metallic Electrical Outlet Boxes specifies the conditions under which Listed metallic outlet and switch boxes may be installed within fire resistance rated wall assemblies constructed with bearing and nonbearing wood or steel studs and gypsum board facings. In addition, the category Nonmetallic Outlet Boxes and Fittings Classified for Fire Resistance (CEYY) includes Classifications for nonmetallic outlet boxes along with the conditions under which such outlet and switch boxes may be installed within fire resistive wall assemblies. With either type of outlet or switch box, it may be possible to install the boxes under less stringent conditions when such boxes are used in conjunction with wall opening protective materials. Use of wall opening protective materials may allow for (1) reducing the spacing between boxes contained on opposite sides of the wall, (2) increasing the size of the boxes, (3) increasing the density of boxes installed, and/or (4) allowing the use of boxes on each side of staggered stud walls. The individual Classifications within this cat-
ELECTRICAL CIRCUIT PROTECTIVE SYSTEMS (FHIT)

GENERAL

This category covers electrical circuit protective systems consisting of components and materials intended for installation as protection for specific electrical wiring systems, with respect to the disruption of electrical circuit integrity upon exterior fire exposure.

Ratings apply only to the entire protective system assembly, constructed using the combination of components and materials specified in the system. Individual components and materials are designated for use in a specific system(s) for which corresponding ratings have been developed, and are not intended to be interchanged between systems. Ratings are not assigned to individual system components or materials. As an example, caulking or putty used in one system cannot be interchanged with the caulking or putty specified in another system.

Electrical circuit protective systems should be fastened to a concrete or masonry wall or a concrete floor-ceiling assembly. The fire rating of the wall or floor-ceiling assembly should be equal to or greater than the rating of the electrical circuit protective system. This is to ensure that the complete electrical circuit protective system will survive during fire and hose stream exposure.

Systems incorporating cable protected with electrical circuit protective materials are investigated to Subject 1724, “Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems.” Systems constructed with fire-resistive cable are investigated to ANSI/UL 2196, “Tests for Fire Resistive Cables.” Fire-resistive cable with the “CI” marking is also investigated to ANSI/UL 2196. CI cable is covered under Power-limited Fire Alarm Cable (HNIR) or Nonpower-limited Fire Alarm Cable (HNHT).

SYSTEMS INCORPORATING CABLE PROTECTED WITH ELECTRICAL CIRCUIT PROTECTIVE MATERIALS

These protective systems are investigated with respect to fire exposure and with respect to water hose stream performance. Performance criteria are based on temperatures within the enclosure and visual examination after the water hose stream.

Classification of these protective systems contemplates installation in interior environments with representative heating and air conditioning, unless stated otherwise in the individual Classifications.

Where indicated in the system, the ampacity reduction due to the electrical circuit protection system has been determined for normal ambient temperature operating conditions in accordance with IEEE 484-1996, “IEEE Standard Procedure for the Determination of the Ampacity Derating of Fire-Protected Cables.” If not specified in the individual system, the effect of the electrical circuit protection system “CI” marking has not been investigated. The specifications for the protective system and its assembly are important details in the development of the ratings. Information concerning these details is described on the individual systems.

The products used in these systems are intended to be installed in accordance with the applicable accompanying instructions.

SYSTEMS CONSTRUCTED WITH FIRE-RESISTIVE CABLE

These protective systems are investigated with respect to fire exposure and water hose stream performance. ANSI/UL 2196 describes two fire exposure conditions. The normal temperature rise (to ANSI/UL 2196, “Fire Tests of Building Construction and Materials”) is intended to represent a fully developed interior building fire. The rapid temperature rise (to ANSI/UL 1790, “Fire Tests of Building Construction and Materials for Structural Steel”) is intended to represent a hydrocarbon pool fire. If not stated otherwise, it is assumed that the normal temperature rise exposure was used. There are two hose stream levels, normal and low impact. The low impact fog nozzle hose stream is applied only to cable to be marked with the “-CI” suffix. The normal impact hose stream, applied with a standard-taper, smooth-bore playpipe, is applied to all other types of cable. Performance criteria are based on functionality of the cable during the fire and after hose stream.

CI cable is tested on steel rings to simulate installation in free air. If CI cable is intended to be installed in raceway it shall be so tested. CI cable that has been tested in a raceway will be specified in the UL system.

Each design of fire-resistive cable is tested per ANSI/UL 2196. One conductor or multi-conductor tested as separate, only, as separate only, as well as shielded or unshielded, and stranded or solid conductors. The system contains the construction details of the tested configuration. The minimum conductor size, minimum number of conductors, UL Type, voltage rating, etc., are construction details that are also provided. Cable is UL Listed to a National Electrical Code Type and constructed to a UL standard for the cable (such as Type MC per UL 1569, “Metal-Clad Cables”; Type RH/ RWH to UL 44, “Thermoset-Insulated Wires and Cables”; Type FPL per UL 1424, “Cables for Power-Limited Fire-Alarm Circuits”; Type NPLF per UL 1425, “Cables for Non-Power-Limited Fire-Alarm Circuits”; and Type TC per UL 1277, “Electrical Power and Control Tray Cables with Optional Optical-Fiber Members”).

Cable is tested as a complete system. The system includes the cable or raceway, support conduit bodies, supports, insulating materials, raceways, vertical supports, grounds, pulling lubricants, cable tray, etc. Cable or raceway supports need to hold the cable in place during the fire and hose stream. The hardware, clamps, strut, etc. are generally stated to be made of steel.

Systems that require a raceway are tested with the minimum raceway diameter and the minimum number of raceways per type with the highest rating(s). Raceways having larger diameters are acceptable. Raceways with greater wall thickness are also acceptable. Intermediate metal conduit (IMC) or rigid metal conduit (RMC) are acceptable for use in systems where (R2L) or (R2M) is specified.

The raceway should be connected together using the coupling type referenced in the system, such as steel setscrew type for EMT or threaded types of coupling for IMC and RMC. No other coupling should be used unless stated in the specification. As an example, couplings should not be used in place of steel setscrew coupling for EMT unless otherwise specified in the system. If IMC or RMC is substituted where EMT is specified, the raceway should be connected together with threaded types of coupling.

If a box, conduit body, supports (such as a grip), splice or other components are tested, it is noted in the system. Otherwise, the hourly fire rating applies only to continuous lengths of cable and/or raceway with couplings passing completely through a fire zone and terminating a minimum of 12 inches beyond the fire-rated wall or floor bounding the fire zone. For systems installed in a raceway, ANSI/NFPA 70, “National Electrical Code” (NEC), requires not more than 360 degrees of bends without a pull point (such as conduit bodies or boxes). Therefore, for most practical installation, the conduit body or box can be required. Where a splice will be used, conduit bodies and boxes, if found acceptable, are described in the system. Since boxes are tested with a single raceway, each individual raceway should have an independent box used for pull points or splices. If a splice is tested, it is also described in the system. Boxes should be sized per the method described in the NEC.

The supports are an important part of the systems and each individual system has specific support requirements. The maximum distance between the supports is determined in the individual systems and should not be exceeded even if an alternate raceway is used. As an example, if 5-feet spacing between supports is specified for EMT, this same support distance should be used with any other raceway (IMC, RMC, etc.), unless stated otherwise in the system or a lesser support spacing is specified in the NEC. The type of support and the distance between the steel supports is unique to that specific system and is for all sizes/types of cable and/or conduit/raceway unless otherwise noted in a specific system. Spacing of the tray support should also be the same as the raceway support spacing unless otherwise noted.

The support requirements are for both the horizontal and vertical configuration unless otherwise noted in a specific system. The supports for both the vertical or horizontal configuration are intended to be the support for the cable/raceway installed in a vertical stack and not supported by the raceway. This is in contrast to MI or MC cable, where a support on the outside of the cable also supports the conductors. The ability of cable to support the equivalent cable weight of the distance specified in Table 300.19 of the NEC (or a lesser distance), without breaking the conductor, and compatibility/mechanical considerations of the support mechanism may be investigated in the test by simulating the weight of the vertical cable run. When so investigated, the vertical distance tested and the support mechanism are detailed in the system.

Compatibility of materials used in fire-rated systems is also a concern. Some materials can provide carbon residue that is conductive, or conductive gases that can cause premature failure. A dedicated raceway is the

2005 GENERAL INFORMATION DIRECTORY FOR SELECTED CATEGORIES FROM THE FIRE RESISTANCE DIRECTORY

2005 GENERAL INFORMATION DIRECTORY FOR SELECTED CATEGORIES FROM THE FIRE RESISTANCE DIRECTORY

LOOK FOR THE UL MARK ON PRODUCT

PART VI

2005 GENERAL INFORMATION DIRECTORY FOR SELECTED CATEGORIES FROM THE FIRE RESISTANCE DIRECTORY

LOOK FOR THE UL MARK ON PRODUCT

PART VI
required configuration unless otherwise noted in the system (such as the option of bare ground wires, or insulated ground wires). The bare or insulated ground wire may be of special manufacture to be compatible with the system. The system will specify the manufacturer of an allowable ground wire. If not specified, the ground shall be the same as the fire-rated wire described in the system. Use of any other ground wire violates the system fire rating. As an example, THHN ground wire should not be used with a fire-rated system unless specified in the system. If a pulling lubricant has been tested with the system, it will be so noted in the system.

These systems are intended to be installed in accordance with all provisions of the NEC and as amended by the details of each individual system (such as type of supports and distance between supports).

Authorities Having Jurisdiction should be consulted as to the specific requirements of the local or regional electrical code. The electrical circuit protective system components identified by an (*) in the description text are Classified under the Classification and Follow-Up Service of Underwriters Laboratories Inc. Such components and names of manufacturers who are authorized to apply the Classification Mark are identified under the specific product category.

ADDITIONAL INFORMATION
For additional information, see Fire Resistance Ratings (BXRH).

Electrical Circuit Protective Materials (FHIY)
Electrical circuit protective materials are of proprietary composition and are intended for installation in accordance with the application instructions provided with the product, and as specified on the design card for an individual electrical circuit protective system. Properties of these materials, other than the degree of fire resistance provided to specific electrical wiring systems, have not been investigated.

Authorities Having Jurisdiction should be consulted before installation.

REQUIREMENTS
The basic standard used to investigate the electrical circuit protective systems in which these products are installed is Subject 1724, “Outline of Investigation for Fire Tests of Electrical Circuit Protective Systems.”

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

ELECTRICAL CIRCUIT PROTECTIVE MATERIALS FOR USE IN ELECTRICAL CIRCUIT PROTECTIVE SYSTEMS
SYSTEM NO.
SEE UL BUILDING MATERIALS DIRECTORY
(Control No.)

Fire Resistive Cable (FHJR)

USE AND INSTALLATION
This category covers fire resistive cable which is insulated electrical cable intended for installation as specified in the individual electrical circuit protective systems. This cable has been investigated for its ability to remain electrically functional during a fire exposure and after the impact, erosion and cooling effect of a water hose stream test.

The cable as used in the specified systems has been investigated and found to comply with applicable electrical requirements and is so listed in UL’s Electrical Construction Equipment Directory. This cable is intended to be installed in accordance with the provisions of ANSI/NFPA 70, “National Electrical Code.”

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION
For additional information, see Electrical Circuit Protective Systems (FHIT) and Fire Resistance Ratings (BXRH).

REQUIREMENTS
The basic standard used to investigate the electrical circuit protective systems in which these products are installed is UL 2196, “Tests for Fire Resistive Cables.”

Data concerning the insulation resistance and leakage current performance of the electrical cables during tests conducted in accordance with UL 2196 are contained in the test report. Test reports are available from the Classified company.

UL MARK
The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

2005 GENERAL INFORMATION DIRECTORY
FOR USE IN ELECTRICAL CIRCUIT PROTECTIVE SYSTEMS
SYSTEM NO.
SEE UL FIRE RESISTANCE DIRECTORY
Control No.

PLASTICS USED IN SEMICONDUCTOR TOOL CONSTRUCTION (QMTW)

This category covers plastic materials used in the semiconductor tool construction industry. Plastic in the form of sheets, panels and strips has been investigated with respect to flammability characteristics only. The structural, washability, light reflectivity, durability, toxicity or environmental impact of the products of combustion and other properties have not been investigated. In addition, the suitability of the materials to be fabricated has not been investigated.

The following flammability and physical properties are investigated and published in the individual Classifications:
• Flame Propagation Index (FPI)
• Smoke Damage Index (SDI)
• Nominal Thickness (in.)
• Product Geometry
• Manufacturing Method

In addition to the above, the following data is available based on authorization of the test sponsor:
• Parallel Panel Test, Maximum Vertical Flame Propagation (ft.) [if required]
• Maximum Heat Release Rate (kW/m²)
• Maximum Smoke Release Rate (m³/sec)
• Critical Ignition Flux (kW/m²)
• Time Dependent Plot of Heat Release Rate
• Time Dependent Plot of Mass Loss Rate
• Time Dependent Plot of Smoke Obscuration
• Time Dependent Plot of CO Concentration
• Time to Ignition (sec)
• Flame Duration (sec)
• Total Smoke (m³)
• Mass Loss (%)
• Average Effective Heat of Combustion
• Average Specific Extinction Area

The materials are identified as “Non-Propagating – Class 1,” “Limited Propagating – Class 2” or “Slow Propagating – Class 3.” The individual Classifications are defined as follows:

Test | Description Non-propagating, Class 1 | Limited propagating, Class 2 | Slow propagating, Class 3
---|---|---|---
Parallel Panel Test | Flame propagation | Pooling of melted material | No
Heat and smoke release | Fire propagation index (FPI) | Smoke damage index (SDI) | 0.4 or less


The basic standard used to investigate products in this category is UL 2360, “Test Methods for Determining the Combustibility Characteristics of Plastics Used in Semiconductor Tool Construction.” The combustibility characteristics provide data with regard to the Flame Propagation Index (FPI) and the Smoke Damage Index (SDI).

LOOK FOR CLASSIFICATION MARK ON PRODUCT
The Classification Marking of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products produced under its Classification and Follow-Up Service. The Classification Marking includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), the product name.
“Plastic,” the statement “For use in semiconductor tool construction” including the “propagating” statement “(Non-Propagating – Class 1),” “Limited Propagating – Class 2,” or “Slow Propagating – Class 3”) applicable to the product, and a control number.

THERMAL BARRIER SYSTEMS (XCLF)

Thermal barrier systems consist of components and materials that are intended for installation as protection for electrical wiring systems specified in the individual system designs with respect to heat transmission from exterior fire exposure. The specifications for the thermal barrier systems and their assembly are important details in the development of the ratings. Information concerning these details are described in the individual systems. System components identified with an (*) in the description text are Classified under the Classification and Follow-Up Service Program of Underwriters Laboratories Inc. Such components and names of manufacturers who are authorized to apply the Classification Marking, are identified under the specific product category.

These thermal barrier systems are evaluated by the fire exposure test as described in the Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components ASTM E1725-95. Ratings apply only to the entire thermal barrier system. Individual components and materials are designed for use in a specific system(s) for which corresponding ratings have been developed and are not to be interchanged between systems. Ratings are not assigned to individual system components or materials.

When indicated in the system, the ampacity reduction due to the thermal barrier system has been determined for normal ambient temperature conditions in accordance with the “Procedure for the Determination of the Ampacity Derating of Fire Protected Cables”, IEEE P848-96. If specified in the individual system, the effect of the barrier system on the ampacity of the electrical conductors has not been investigated.

Classification of these thermal barrier systems contemplates installation in interior environments with representative heating and air conditioning, unless stated otherwise in the individual Classifications.

The products used in these systems are to be installed in accordance with the applicable accompanying instructions. Authorities having jurisdiction should be consulted before installation.

Batts and Blankets (XCLR)

This category covers insulating batts and blankets used to wrap electrical wiring systems in accordance with the application instructions provided with the product, and as specified in the individual thermal barrier system.

Properties of these materials, other than the degree of fire resistance to specific electrical wiring systems, have not been investigated. Authorities Having Jurisdiction should be consulted before installation.

Packing Materials (XCMD)

Packing materials are of proprietary composition and are intended for installation in accordance with the application instructions provided with the product, and as specified in the individual thermal barrier system. Properties of these materials, other than the degree of fire resistance to specific electrical wiring systems, have not been investigated. Authorities Having Jurisdiction should be consulted before installation.

requirements

The basic standard used to investigate the thermal barrier systems in which these products are installed is ASTM E1725-95, “Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components”. The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

LOOK FOR CLASSIFICATION MARK ON PRODUCT

FOR USE IN THERMAL BARRIER SYSTEMS SEEN UL FIRE RESISTANCE DIRECTORY

(Branch No.)

Packaging Materials

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

LOOK FOR CLASSIFICATION MARK ON PRODUCT

FOR USE IN THERMAL BARRIER SYSTEMS SEE UL FIRE RESISTANCE DIRECTORY

(Branch No.)

Packaging Materials

The basic standard used to investigate the thermal barrier systems in which these products are installed is ASTM E1725-95, “Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components”. The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

LOOK FOR CLASSIFICATION MARK ON PRODUCT

FOR USE IN THERMAL BARRIER SYSTEMS SEE UL FIRE RESISTANCE DIRECTORY

(Branch No.)

Packaging Materials

Preformed Mineral and Fiber Units (XCMK)

This category covers preformed mineral and fiber units used to protect electrical wiring systems in accordance with the application instructions provided with the product, and as specified in the individual thermal barrier system.

Properties of these materials, other than the degree of fire resistance to specific electrical wiring systems, have not been investigated. Authorities Having Jurisdiction should be consulted before installation.

requirements

The basic standard used to investigate the thermal barrier systems in which these products are installed is ASTM E1725-95, “Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components”.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

PREFORMED MINERAL AND FIBER UNITS FOR USE IN THERMAL BARRIER SYSTEMS SEE UL FIRE RESISTANCE DIRECTORY

(Branch No.)

Packaging Materials

GENERAL

A firestop system is a specific construction consisting of a wall or floor assembly, a penetrating item passing through an opening in the wall or floor assembly, and the materials designed to prevent the spread of fire through the openings. The specifications for materials in a firestop system and the assembly of the materials are details that directly relate to the established ratings. Information concerning these details is described in the individual systems. The hourly ratings apply only to the complete systems. Individual components are designated for use in a specific system to achieve specified ratings. The individual components are not assigned ratings and are not intended to be interchanged between systems. Additionally, the installation or orientation of components required in a system should not be made unless specifically permitted in the individual system or in these general guidelines.

The basic standard used to investigate products in this category is ANSI/UL 1479 (Firestop Systems). The F rating criteria prohibits flame passage through the system and requires acceptable hose stream test performance. The F rating criteria applies to the complete system and requires acceptable hose stream test performance.

The L rating criteria determines the amount of air leakage, in cu feet per minute per square foot of opening (CFM/sq ft) through the firestop system at ambient and/or 40°F air temperatures at an air pressure differential of 0.30 in. W.C. The L ratings are intended to assist Authorities Having Jurisdiction, and others, in determining the suitability of firestop systems for the protection of penetrations and miscellaneous openings in floors and walls, and barriers for the purpose of restricting the movement of smoke in accordance with NFPA 101, “Code for Safety to Life from Fire in Buildings and Structures.”

A W rating is also available for firestop systems. The Class 1 W rating determines the capability of the firestop system to maintain watertightness of the penetration through a floor or wall construction at ambient air conditions under 3 ft of water pressure head (1.3 psi) for a period of 72 hours.
Acceptance is based upon the ability of the firestop system to withstand the applied pressure without the passage of any water through the firestop system. After the Class 1 watertightness test, the firestop system is conditioned in accordance with the requirements of ANSI/UL 1479 and the fire and hose stream tests described in the standard are conducted.

The W rating is intended to assist Authorities Having Jurisdiction and others in determining the suitability of firestop systems in applications where submersion in water may be a factor.

Materials used in firestop systems shall be to be installed in accordance with the manufacturer’s instructions provided with the materials. The structural integrity of the floor or wall assembly needs to be evaluated when providing openings for the penetrating items.

NFPA 90A, “Standard for the Installation of Air Conditioning and Ventilation Systems,” contains requirements on the use of fire dampers in conjunction with ventilation systems. Unless specified in the system, the ratings for firestop systems installed in walls apply when either face of the wall is exposed to fire. The ratings for firestop systems installed in a floor apply when the underside or ceiling surface is exposed to fire.

The hourly fire endurance rating of the walls and floors incorporating these systems are not indicated. Volume 1 of the Fire Resistance Directory covers the hourly fire endurance ratings of floor and wall assemblies. Firestop systems that specify installation in concrete floors may include installation in floors consisting of slabs or corrugated steel deck topped with structural concrete, provided that (1) the concrete topping thickness measured above the plane of the steel deck is equal to or greater than the minimum concrete thickness specified in the system, and (2) the firestop system does not require any portion of the forming material or fill material to extend below the bottom plane of the floor.

Some firestop systems specify the use of hollow-core precast concrete unit floor assemblies. Where not specified, firestop systems utilizing caulk, sealant, putty or spray materials installed over a mineral wool or ceramic blanket may be installed in hollow-core floors, provided that (1) the thickness of the hollow-core floor is equal to or greater than the minimum concrete thickness specified in the system, (2) the minimum size of the opening is 7 in. diameter or 7 in. by 7 in., and (3) any cores of the prestressed concrete units penetrated as a result of the firestop system are sealed with a minimum 4 in. depth of either firmly packed minimum 4 pcf mineral wool or ceramic fiber blanket, or concrete, grout or mortar. Additionally, firestop systems utilizing a firestop device or wrap strips/steel collar installed around the penetrant beneath the floor may be installed in hollow-core floors, provided that (1) the thickness of the hollow-core floor is equal to or greater than the minimum concrete thickness specified in the system, and (2) the maximum size of the opening is 7 in. diameter or 7 in. by 7 in.

ANSI/NFPA 70, “National Electrical Code” (NEC), contains requirements for permissible installation and percentages of electrical conductor fill for conduits, cable trays and other electrical conductor raceways. Authorities Having Jurisdiction should be consulted as to the particular requirements covering the installation and use of these Classified systems. Those materials identified by an (*) in the system description test are eligible to be produced under the Follow-Up Service Program of Underwriters Laboratories Inc. The Classification Mark of UL on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

### PENETRATING ITEMS

When the penetrating item is indicated as being conduit, the conduit is intended for use as a raceway for electrical conductors in accordance with the NEC. Electrical conductors may be used without conduit only when permitted by and installed in accordance with the NEC, and when electrical conductors are specifically described in the firestop system. The maximum conductor size and the maximum number of conductors in the individual cables are specified in each system. All electrical conductors are to be copper unless indicated otherwise in the system.

When the penetrating item is indicated as being pipe, the pipe is intended for the transport of gases, liquids and the like. The maximum diameter, the minimum wall thickness and the specific material for conduit and pipes are specified in each system. All nonmetallic pipes are to be of the solid core type unless indicated otherwise in the system.

Further specifications for the various types of penetrating items may be found in the documents tabulated below:

#### PENETRATING ITEMS

<table>
<thead>
<tr>
<th>Penetrating Item</th>
<th>Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Metallic Tubing (EMT)</td>
<td>UL 797</td>
</tr>
<tr>
<td>Intermediate Metal Conduit (IMC)</td>
<td>UL 1242</td>
</tr>
<tr>
<td>Rigid Metal Conduit</td>
<td>UL 6</td>
</tr>
<tr>
<td>Copper Tubing</td>
<td>ASTM B88</td>
</tr>
<tr>
<td>Copper Pipe</td>
<td>ASTM B42</td>
</tr>
<tr>
<td>Flexible Metal Conduit</td>
<td>UL 1</td>
</tr>
<tr>
<td>Liquid Tight Flexible Nonmetallic Conduit</td>
<td>UL 1660</td>
</tr>
<tr>
<td>Rigid Nonmetallic PVC Conduit</td>
<td>UL 651</td>
</tr>
<tr>
<td>Electrical Nonmetallic Tubing (ENT)</td>
<td>UL 1653</td>
</tr>
<tr>
<td>Cross-linked Polyethylene (PEX) Tubing</td>
<td>ASTM D2737</td>
</tr>
<tr>
<td>Solid Core Polyvinyl Chloride (PVC) Pipe</td>
<td>ASTM D1785 and ASTM D2665</td>
</tr>
<tr>
<td>Cellular Core Polyvinyl Chloride (PVC)</td>
<td>ASTM F891</td>
</tr>
<tr>
<td>Chlorinated Polyvinyl Chloride (CPVC) Pipe</td>
<td>ASTM F442</td>
</tr>
<tr>
<td>Solid Core Acrylonitrile Butadiene</td>
<td>ASTM D1327 and ASTM D2661</td>
</tr>
<tr>
<td>Styrene (ABS) Pipe</td>
<td>ASTM F628</td>
</tr>
<tr>
<td>Cellular Core Acrylonitrile Butadiene</td>
<td>ASTM D2737</td>
</tr>
<tr>
<td>Styrene (ABS) Pipe</td>
<td>ASTM D3000</td>
</tr>
<tr>
<td>Polybutylene (PB) Pipe</td>
<td>ASTM F1673</td>
</tr>
<tr>
<td>Polyvinylidene Fluoride (PVDF) Pipe</td>
<td>ASTM D2997</td>
</tr>
<tr>
<td>Fiberglass Pipe</td>
<td>ASTN F778</td>
</tr>
<tr>
<td>Rigid Nonmetallic PVC Conduit</td>
<td>ASTM D1785 and ASTM D2665</td>
</tr>
<tr>
<td>Intermediate Metal Conduit (IMC)</td>
<td>UL 1242</td>
</tr>
<tr>
<td>Copper Tubing</td>
<td>ASTM B88</td>
</tr>
<tr>
<td>Copper Pipe</td>
<td>ASTM B42</td>
</tr>
<tr>
<td>Flexible Metal Conduit</td>
<td>UL 1</td>
</tr>
<tr>
<td>Liquid Tight Flexible Nonmetallic Conduit</td>
<td>UL 1660</td>
</tr>
<tr>
<td>Rigid Nonmetallic PVC Conduit</td>
<td>UL 651</td>
</tr>
<tr>
<td>Electrical Nonmetallic Tubing (ENT)</td>
<td>UL 1653</td>
</tr>
<tr>
<td>Cross-linked Polyethylene (PEX) Tubing</td>
<td>ASTM D2737</td>
</tr>
<tr>
<td>Solid Core Polyvinyl Chloride (PVC) Pipe</td>
<td>ASTM D1785 and ASTM D2665</td>
</tr>
<tr>
<td>Cellular Core Polyvinyl Chloride (PVC)</td>
<td>ASTM F891</td>
</tr>
<tr>
<td>Chlorinated Polyvinyl Chloride (CPVC) Pipe</td>
<td>ASTM F442</td>
</tr>
<tr>
<td>Solid Core Acrylonitrile Butadiene</td>
<td>ASTM D1327 and ASTM D2661</td>
</tr>
<tr>
<td>Styrene (ABS) Pipe</td>
<td>ASTM F628</td>
</tr>
<tr>
<td>Cellular Core Acrylonitrile Butadiene</td>
<td>ASTM D2737</td>
</tr>
<tr>
<td>Styrene (ABS) Pipe</td>
<td>ASTM D3000</td>
</tr>
<tr>
<td>Polybutylene (PB) Pipe</td>
<td>ASTM F1673</td>
</tr>
<tr>
<td>Polyvinylidene Fluoride (PVDF) Pipe</td>
<td>ASTM D2997</td>
</tr>
<tr>
<td>Fiberglass Pipe</td>
<td>ASTM F778</td>
</tr>
</tbody>
</table>

Where the individual system specifies the penetrating item is to be rigidly supported on both sides of wall or floor, the support system should be designed based upon the premise the firestop system provides no support.

Where the penetrating item is indicated as a metallic pipe, conduit, tube, duct or cable, and the firestop system consists of a fill material (such as sealants, putty or mortar) and a packing material, the penetrant may pass through the opening in the wall or floor assembly at an angle, provided the annular space is maintained on both sides of the wall or floor assembly. In all other cases, except where otherwise indicated in the system, the penetrating item shall penetrate the wall or floor assembly at a 90° angle.

Some systems do not include penetrating items. These firestop systems are intended to be sealed openings where the penetrating items have been removed or where the penetrating items have not yet been installed.

Forming materials specified for a firestop system are not to be removed after cure of the fill material, unless removal is specified in the description of the system.

### FILL MATERIALS

When more than one fill, void or cavity material is specified under a single item number within a firestop system, it is intended that any single one of the materials may be used.

### CONDUCTOR AMPACITY

Where indicated in the system, the ampacity reduction due to the firestop system has been determined in accordance with Subject 1712, “Outline of Investigation for Tests for Ampacity of Insulated Electrical Conductors Installed in Fire Protective Systems.” If not specified in the individual system, the effect of the firestop system on the ampacity of electrical conductors has not been investigated.

### NUMBERING SYSTEM

The systems are identified in this category by an alpha-alphanumeric identification system. The alpha components identify the type of assembly being penetrated and the numeric component identifies the type of penetrating item.

The first alpha component is an F, W or C. The F signifies a floor being penetrated, the W signifies a wall being penetrated, and C signifies either a floor or a wall being penetrated.

The second alpha component may be any letter. The significance of the letter used is:

<table>
<thead>
<tr>
<th>Letter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Concrete floors with a minimum thickness less than or equal to 5 in.</td>
</tr>
<tr>
<td>B</td>
<td>Concrete floors with a minimum thickness greater than 5 in.</td>
</tr>
<tr>
<td>C</td>
<td>Framed floors</td>
</tr>
<tr>
<td>D</td>
<td>Steel decks in marine vessels</td>
</tr>
<tr>
<td>E</td>
<td>Floor-ceiling assemblies consisting of concrete with membrane protection</td>
</tr>
<tr>
<td>F</td>
<td>Not used at present time</td>
</tr>
<tr>
<td>G</td>
<td>Concrete or masonry walls with a minimum thickness less than or equal to 8 in.</td>
</tr>
<tr>
<td>H</td>
<td>Concrete or masonry walls with a minimum thickness greater than 8 in.</td>
</tr>
<tr>
<td>I</td>
<td>Framed walls</td>
</tr>
<tr>
<td>J</td>
<td>Bulkheads in marine vessels</td>
</tr>
</tbody>
</table>
## 2005 GENERAL INFORMATION FOR SELECTED CATEGORIES FROM THE FIRE RESISTANCE DIRECTORY

<table>
<thead>
<tr>
<th>Letter</th>
<th>Description</th>
<th>No. Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Composite panel walls</td>
<td>0000-9999</td>
</tr>
<tr>
<td>O through Z</td>
<td>Not used at present time</td>
<td></td>
</tr>
</tbody>
</table>

The numeric component uses sequential numbers to identify the penetrating item. The significance of the number used is:

<table>
<thead>
<tr>
<th>No. Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000-0999</td>
<td>No penetrating items</td>
</tr>
<tr>
<td>1000-1999</td>
<td>Metallic pipe, conduit or tubing</td>
</tr>
<tr>
<td>2000-2999</td>
<td>Nonmetallic pipe, conduit or tubing</td>
</tr>
<tr>
<td>3000-3999</td>
<td>Electrical cables</td>
</tr>
<tr>
<td>4000-4999</td>
<td>Cable trays with electrical cables</td>
</tr>
<tr>
<td>5000-5999</td>
<td>Insulated pipes</td>
</tr>
<tr>
<td>6000-6999</td>
<td>Miscellaneous electrical penetrants such as buss ducts</td>
</tr>
<tr>
<td>7000-7999</td>
<td>Miscellaneous mechanical penetrants such as air ducts</td>
</tr>
<tr>
<td>8000-8999</td>
<td>Groupings of penetrations including any combination of items listed above</td>
</tr>
<tr>
<td>9000-9999</td>
<td>Not used at present time</td>
</tr>
</tbody>
</table>

## ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

### FILL, VOID OR CAVITY MATERIALS (XHFW)

#### GENERAL

This category covers fill, void or cavity materials that are proprietary materials installed at the job site in accordance with the application instructions provided with the product and with the instructions specified in the individual joint system, perimeter fire containment system or through-penetration firestop system. Except as specified below, properties of the fill, void or cavity materials other than the capacity to provide a degree of fire resistance to openings provided in fire resistive walls or floors have not been investigated.

In addition to Classification for use in joint systems, perimeter fire containment systems or through-penetration firestop systems, where indicated in the individual Classifications, fill, void or cavity materials have also been investigated in accordance with ASTM E136-99e1, “Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C”. Authorities Having Jurisdiction should be consulted before installation.

### ADDITIONAL INFORMATION

For additional information, see Fire Resistance Ratings (BXRH).

#### REQUIREMENTS


### UL MARK

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.

### FILL, VOID OR CAVITY MATERIALS FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS SEE UL FIRE RESISTANCE DIRECTORY

### INSTALLATION

Firestop devices should be installed in accordance with the instructions provided with the device and described in this Directory. Classification of these firestop devices contemplates installation within a heated and air conditioned environment, unless stated otherwise in the individual Classifications. Authorities Having Jurisdiction should be consulted before installation.

### REQUIREMENTS

The basic standard used to investigate the through-penetration firestop systems in which these products are installed is ANSI/UL 1479, “Fire Tests of Through-Penetration Firestops”. The Classification Mark includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

#### FIRESTOP DEVICES (XHFW)

This category covers forming materials manufactured from proprietary materials, processed into the form of boards or sheets and formed into various sizes and shapes. Properties of the forming materials other than the capacity to provide a degree of fire resistance to openings provided in fire resistive walls or floors have not been investigated.

### INSTALLATION

These materials are used as a form and seal to prevent leakage during the installation and curing of some fill, void or cavity materials and should be installed in accordance with the instructions specified in the individual joint system, perimeter fire containment system or through-penetration firestop system. After installation, forming materials are left in place and together with the fill material provide a degree of fire resistance for the opening. Authorities Having Jurisdiction should be consulted before installation.

### REQUIREMENTS

The basic standards used to investigate the systems in which these products are installed are ANSI/UL 1479, “Fire Tests of Through-Penetration Firestops”, an assimilation of the methods and conditions of acceptance contained in NFPA 285, “Test for Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus” (1998 edition), and ANSI/UL 2079, “Tests for Fire Resistance of Building Joint Systems”.

## LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service.
For forming materials investigated for use in through-penetration firestop systems, the Classification Mark includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

FORMING MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)

For forming materials investigated for use in joint systems, the Classification Mark includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

FORMING MATERIAL
FOR USE IN JOINT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)

For forming materials investigated for use in perimeter fire containment systems, the Classification Mark includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

FORMING MATERIAL
FOR USE IN PERIMETER FIRE CONTAINMENT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)

For forming materials investigated for use in firestop systems, joint systems and/or fire containment systems, the Classification Mark includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), along with the following additional information:

FORMING MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS AND/OR JOINT SYSTEMS AND/OR PERIMETER FIRE CONTAINMENT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)

THROUGH-PENETRATING PRODUCTS (XHLY)
USE AND INSTALLATION

This category covers through-penetrating products that are proprietary products (cable, conduit, pipe and tubing) whose fire resistive properties have been investigated for specific applications in which they pass through openings in fire rated walls or floors, or both, within a building.

Where indicated in the individual Classifications, products have also been investigated for heat and smoke release characteristics in accordance with UL 2043, “Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.” Through-penetrating products and their accessories that have been investigated for mounting in air-handling spaces are specifically identified by markings on the product and in the individual Classifications.

Where indicated in the individual Classifications, products have also been investigated to determine their suitability for exposure to ultraviolet light in accordance with UL 746C, “Polymeric Materials – Use in Electrical Equipment Evaluations.”

Unless otherwise specified, properties of the through-penetrating products other than their capacity to provide a degree of fire resistance to openings in fire rated walls or floors have not been investigated.

Authorities Having Jurisdiction should be consulted before installation.

ADDITIONAL INFORMATION
For additional information, see Fire Resistance Ratings (BXRH).

REQUIREMENTS
The basic standard used to investigate the through-penetration firestop systems in which these products are installed is ANSI/UL 1479, “Fire Tests of Through-Penetration Firestops”.

UL MARK
The Classification Mark of Underwriters Laboratories Inc. on the product or smallest unit container is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), and the following additional information:

THROUGH-PENETRATING PRODUCTS
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
(Control No.)
Building materials include adhesives, coatings, acoustical materials and the like, investigated for surface burning characteristics, such as flame spread and smoke developed during fire exposure. Other building materials include prefabricated buildings, structural building products, gypsum board, fireplaces and chimneys, elevator equipment, and exiting equipment, such as exit signs, exit appliances, and emergency lighting and power equipment.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. There may not always be a published standard for investigating a product to determine its acceptability for Listing or Classification. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association (NFPA), and applicable model codes identified in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.

These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL’s safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.

PREFABRICATED BUILDINGS (QRAR)

These are factory-built buildings, structures, and building assemblies incorporating pre-installed materials and equipment which, after installation, are usually concealed and may not be accessible for inspection at the installation site.

They are intended for installation subject to approval by the Authority Having Jurisdiction.

The buildings, structures, and building assemblies have been investigated in accordance with one or more Model Codes (such as Building, Fire, Plumbing, Mechanical, Gas, Energy) and the National Electrical Code and/or a State Code and/or an applicable Building Code of the local jurisdiction. As an alternate, the building, structure, and building assem-
COMPOSITE PANELS (QRSY)

Composite panels are factory-built assemblies for use in, within, or as part of the structure of buildings for commercial, industrial, and residential use. These factory-built panels may incorporate pre-installed materials and equipment which after installation are concealed and which may not be accessible for inspection at the installation site.

These factory built panels are intended for installation subject to approval by the authority having jurisdiction. These panels have been investigated in accordance with the applicable sections of one or more Model Building Code, Plumbing Code, the National Electrical Code, a State Building Code and/or an applicable Building Code of the local jurisdiction.

As an alternate the panels may have been investigated in accordance with only one or more specific areas of a code such as electrical, plumbing, mechanical, structural, etc.

Structural strength requirements vary with wind and snow conditions of each locality and stability is to a large measure dependent upon the attachment of the panels to field-erected foundations or structures. Local inspection authorities should be consulted with respect to their requirements for the methods to be employed to attach the panels.

Prefabricated Composite Panel
Prefabricated Office Divider Panels
When the Building Code does not include specific requirements for such features as air cooling and heating systems, fuel supply systems, chimney and venting systems, flame spread, etc. the applicable requirements of the National Fire Codes are used.

COMPOSITE PANEL CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.
IN ACCORDANCE WITH
(BUILDING CODE, NATIONAL ELECTRICAL CODE, ETC.)

RESIDENTIAL BUILDINGS (QTDT)

This category includes single- and multi-family prefabricated modular buildings and building additions.

These modular buildings and building additions have been classified in accordance with one or more Model (Building) Codes and the National Electrical Code and/or a State Building Code and/or an applicable Building Code of the local jurisdiction.

As an alternate, the building or building addition has been classified in accordance with one or more specific areas of a Building Code such as electrical, electrical, plumbing, mechanical, structural, etc.

When the Building Code does not include specific requirements for such features as air cooling and heating systems, fuel supply systems, chimney and venting systems, etc., the applicable requirements of the National Fire Codes are used.

These factory built buildings are intended for installation subject to approval by the authority having jurisdiction.

Residential building additions consisting of a group of wall, ceiling and floor panels and/or modules are intended to be site attached to an existing residence or Use Group R structure. The addition may contain or be designed to contain all or a portion of the minimum facilities (living, eating, sleeping etc.) of the applicable building codes for a residential occupancy. Attachment of the building to the existing structure and features of the final completed structure with addition such as minimum facilities, egress, area/height limitations, thermal envelope and others is subject to approval by the local authority having jurisdiction.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by Underwriters Laboratories, Inc. to identify Residential Buildings produced under its Classification and Follow-Up Service.

(Residential Building) or (Residential Building Addition)
CLASSIFIED BY UNDERWRITERS LABORATORIES INC. IN ACCORDANCE WITH
(Building Code, National Electrical Code, Etc.)

PREFABRICATED UNITS (QRHQ)

Prefabricated units are factory built assemblies for varying uses such as rooms within buildings or rooms within rooms of buildings for commercial, industrial or residential use, outdoor or exterior roofed structures, and canopies.

These prefabricated units are intended for installation subject to approval by the Authority Having Jurisdiction.

These units have been investigated in accordance with the applicable sections of one or more Model Codes (such as Building, Fire, Plumbing, Mechanical, Gas, Energy), the National Electrical Code, a State Code or an applicable Code of the local jurisdiction. As an alternate, the units may have been investigated in accordance with only one or more specific areas such as electrical, plumbing, mechanical, etc.

When the Building Code does not include specific requirements for such features as air cooling and heating systems, fuel supply systems, chimney and venting systems, flame spread, etc., the applicable requirements of the National Fire Codes are used.

For additional information, see Prefabricated Buildings (QRAR).

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories Inc. (shown below) on the product is the only method provided by UL to identify prefabricated units produced under its Classification and Follow-Up Service. The Classification Marking includes the UL symbol, the word “CLASSIFIED” above the UL symbol (as illustrated in the Introduction of this Directory), “PREFABRICATED UNIT IN ACCORDANCE WITH” (Building Code, National Electrical Code, etc.).

The Classification Marking includes reference to the specific codes (including editions) to which the product was investigated. One Classification Marking is applied to each prefabricated unit at a location visible after the unit is erected. In addition, a manufacturer’s data plate is applied adjacent to the UL Mark, where necessary to convey applicable information such as the equipment and appliances factory furnished as part of the classified unit, the structural design loads, and any site-completed items subject to review by the local regulatory authority. If the unit is shipped knocked down, the number and description of the sections required to complete the unit is included on the data plate.

COMMERCIAL AND INDUSTRIAL BUILDINGS (QRNZ)

This category includes automotive service station buildings, food stands, toll booths, motel or similar prefabricated buildings.

Prefabricated service station buildings employ building materials having flame spread rating of 25 or less for interior and exterior surfaces. These modular buildings have been classified in accordance with one or more Model (Building) codes and the National Electrical Code and/or a State Building Code and/or an applicable Code of the local jurisdiction.

As an alternate, the building has been classified in accordance with one or more specific areas of a Building Code such as electrical, plumbing, mechanical, structural, etc.

When the Building Code does not include specific requirements for such features as air cooling and heating systems, fuel supply systems, chimney and venting systems, etc., the applicable requirements of the National Fire Codes are used for classification purposes.

Prefabricated commercial and industrial buildings are intended for installation subject to approval by the authority having jurisdiction.

LOOK FOR CLASSIFICATION MARK ON PRODUCT

The Classification Marking of Underwriters Laboratories, Inc. (shown below) on the product is the only method provided by Underwriters Laboratories, Inc. to identify Commercial Buildings produced under its Classification and Follow-Up Service.

"Commercial Building Classified by Underwriters’ Laboratories, Inc. in accordance with (Building Code, National Electrical Code, Etc.)."

One Classification Marking is applied to each building at a location visible after the building is erected. In addition, information covering the equipment and appliances factory furnished as part of the classified building and, if the building is shipped knocked down, the number and description of the sections required to complete the building is included on a data plate.
This equipment is intended for heating, cooling, refrigerating, ventilating and cooking, and uses various energy sources including electricity, gas, petroleum-base liquid, solid fuel or solar energy.

Fuel-fired equipment is intended for use only with the fuels described in the general Guide Information for each product category and individual Listings. This equipment has been investigated for use as described in the instructions and markings provided with the equipment. The use of the equipment with other fuels, and in conditions other than described in the instructions, markings and the general Guide Information for the applicable product category, has not been investigated by UL.

INVESTIGATION REQUIREMENTS AND STANDARDS

The scope of product sizes and ratings appearing in the general Guide Information for some product categories is intended to indicate the current range of Listed products, however, it is not necessarily indicative of limitations for those Listed products.

The standards used to investigate products are identified in the general Guide Information for each product category. If no applicable standard is available, UL will exercise its judgment in the selection of applicable requirements from related standards and other sources to develop the requirements to cover uses and conditions for which specific requirements did not previously exist.

Products, equipment and construction materials certified by UL in accordance with international or regional standards only (e.g., products Classified to an IEC or ISO Standard) are intended for distribution, installation and use in areas of the world where the specified standards have been adopted and are in effect as national or regional standards.

INSTALLATION REQUIREMENTS

The limitations for the equipment as specified in the general Guide Information for each product category such as voltage and temperature limits, markings, special descriptions and installation provisions need to be noted prior to installation and use.

Equipment has been investigated with reference to risks to life and property and for potential conformity to the installation and use provisions of the applicable installation codes and standards of the National Fire Protection Association (NFPA), and applicable model codes identified in the general Guide Information for each product category.

In addition, certain products have been investigated with reference to environmental and public health effects and for potential conformity to the installation and use provisions of applicable environmental and public health requirements, if so indicated in the general Guide Information for each product category.

Some products are certified for uses not within the scope of nationally recognized installation codes and standards. Such products are investigated for the specifications or use conditions indicated in the general Guide Information for each product category.

These products are intended for installation subject to approval by the Authority Having Jurisdiction. Authorities Having Jurisdiction should be consulted before installation.

INSTRUCTIONS AND PRODUCT MARKINGS

These products are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

FIELD MODIFICATIONS

The UL Mark applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL’s safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been investigated for use in that particular switchboard. Only grounding kits that are included on the product have been investigated for use in that product.
INDOOR AND OUTDOOR USE

Unless outdoor use is specifically indicated in the general Guide Information for the product category or included in the individual Listings of the product, individual appliances have been investigated only for use indoors, unless the product, by its inherent nature, is obviously intended for use outdoors.

ELECTRICAL INSTALLATIONS

**General** — The ampere or wattage marking on electrical power-consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to electric heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

**Supply Conductors** — Except as noted in the general Guide Information for some product categories, most terminals are for use only with copper wire unless marked otherwise. If aluminum or copper-clad aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as “AL-CU.”

Except as noted below or in the general Guide Information for certain product categories, the electrical termination provisions on equipment are based on the use of 60°C insulated conductors in circuits rated 100 A or less and the use of 75°C insulated conductors in higher rated circuits.

If the electrical termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75 or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) specified in Table 310.16 of ANSI/NFPA 70, “National Electrical Code” (NEC), should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Copper-clad aluminum conductors are subject to the ampacity requirements applicable to aluminum conductors.

**Terminals** — Copper pigtail leads may be used with aluminum or copper-clad aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum, 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Supply terminals of 15 A and 20 A switches and receptacles not marked “CO/ALR” are for use with copper and copper-clad aluminum conductors only. Terminals marked “CO/ALR” are for use with aluminum, copper and copper-clad aluminum conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper and copper-clad aluminum conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked “AL/CU” are for use with copper conductors only. Terminals of switches rated 30 A and above marked “AL/CU” are for use with aluminum, copper and copper-clad aluminum conductors.

Combination of dissimilar conductors in terminal or splicing connectors is acceptable only in dry locations and when the connectors are identified as suitable for such intermixing.

**Hazardous Locations** — Electrical equipment and appliances are not intended for use in hazardous (classified) locations, as defined in the NEC, unless specifically identified as suitable for use in hazardous locations.

---

**HEATING Appliances (KTCR)**

**GENERAL**


Heating appliances are investigated to determine the suitability of the construction and performance of the appliances as an assembly and of the fuel-burning apparatus, controls, electrical features and other parts furnished by the manufacturer as part of the listed assembly. It is also determined that combustible walls and surfaces adjacent to or in contact with the appliance will not attain unsafe temperatures when the appliance is installed and used as directed.

Heating appliances are marked to indicate minimum clearances in inches, type of flooring, when they may be installed in an alcove or closet, and the total free area of the required air openings into a closet. Unless otherwise indicated, the designated clearances (other than “zero”) are based on tests of units with uninsulated sheet-metal ducts and plenum attached. Under these conditions, temperatures below established criteria have been measured on a wooden test enclosure, representing combustible construction, spaced at the specified clearance (air) from the unit, ducts and plenum.

When the Listing Mark on an appliance designates the primary safety control to be used, such appliances are suitable for operation when a competent attendant may not be present provided the appliance is so equipped. The primary safety control is designated by the control group number in accordance with the plan and classification under Controls, Primary Safety (see MCCZ).
The safety control to be used with the appliance will be indicated by either stating the manufacturer’s name and marking of the particular control or controls to be used, or by stating the group number of the control to be used. When the group number is specified, the burner shall be provided with one of the controls classified as “Interchangeable.” When a control manufacturer’s name is specified with the group number, only the controls of that manufacturer classified in that group should be used.

Some burners are provided with integral primary safety controls or integral anti-flooding devices and, when such controls are provided, the Listing Mark will specify “Integral” with or without the group designation, in which case only the control included as part of the appliance by the manufacturer shall be used.

For convenience, the primary safety control manufacturers’ names will be abbreviated by using the first letter of each word in their corporate name when necessary to refer to them in the individual Listings.

When the Listing Mark on an appliance includes the statement “For Operation Only In Presence of Competent Attendant,” such appliances are not furnished with primary safety controls and are intended for operation only in the presence of a competent attendant.

The Listing Mark applied to an oil-burning appliance designates the ASTM D396 grade number of the fuel oil, or other fuel, for which the appliance is Listed.

If the appliance is also investigated in accordance with a standard other than a UL Standard, the marking on the appliance includes the designation of that standard.

**BOILER ASSEMBLIES (KVFT)**

Gas-fired, gas-oil-fired, and oil-fired boiler assemblies are intended for installation on the kind of floors and with clearances to combustible construction not less than indicated on the boiler assembly. They are provided with primary safety controls as indicated on the boiler assembly Listing Mark or on the burner Listing Mark and with limit controls.

On gas-fired, gas-oil-fired, and oil-fired boiler assemblies, the sketches, dimension symbols, and abbreviations as illustrated below are used in listings, published on 3x5 in. listing cards available from the Listee, to indicate minimum clearances in inches, kind of flooring, and when an appliance may be installed in an alcove or closet, and the total free area of the required air openings into a closet. This information is also marked on the appliance. The clearances so designated are the minimums required to avoid overheating; additional clearances may be needed for accessibility.

When a gas-fired, gas-oil-fired, or oil-fired boiler assembly is listed for typical installation clearances, the listing refers to the Form designation; but when the clearances are not typical, each clearance is indicated by the appropriate symbols in the listing. If a boiler assembly listed for an alcove or closet installation is installed in a room which is large in relation to the size of the boiler assembly it may be installed at the minimum clearances specified for closet and alcoves or as indicated by the designated optional Form.

**Field-erected Boiler Assemblies (KVQE)**

Gas-fired, gas-oil-fired, and oil-fired boiler assemblies listed for Forms II, III, and IIa are low heat appliances, those listed for Forms IV and IVa are medium heat appliances, all of which are to be flue connected to suitable chimneys.

Gas-fired, gas-oil-fired, and oil-fired boiler assemblies listed for Forms XII and Xlla and those listed for Form III and IIa equipped with draft hoods, are low heat gas appliances suitable for venting to Type B vents for gas appliances.

Solid fuel-fired boiler assemblies are intended for installation on the kind of floors and with clearances to combustible construction from sides, rear, front and chimney connector not less than indicated on the boiler assembly. The chimney connectors must be connected to a chimney suitable for use with residential type and building heating appliances which burn solid fuel.

Solid fuel-fired boiler assemblies are intended for installation on the kind of floors and with clearances to combustible construction from sides, rear, front and chimney connector not less than indicated on the boiler assembly. The chimney connector must be connected to a suitable chimney.

---

**FIELD ERECTED BOILER ASSEMBLIES (KVQE) USE AND INSTALLATION**

This category covers gas-fired, oil-fired and gas-oil-fired boiler assemblies intended to be assembled in the field by qualified service personnel. By design, the boiler contains factory-built subassemblies or segments and is furnished with appropriate controls and detailed instructions to accommodate assembly and installation pertaining to clearances, types of adjacent surfaces, and proper vent installation, in addition to the appropriate NFPA standards and local codes.

The boiler may be furnished either with an integral burner or intended for installation with a factory-built burner to accommodate the boiler as indicated in the individual Listings.

Authorities Having Jurisdiction should be consulted with regard to the inspection of field-erected boiler assemblies.

**RELATED PRODUCTS**

See Gas-fired Boiler Assemblies (KVTR), Oil-fired Boiler Assemblies (KWUX) and Burner Assemblies with Reduced Emissions (KXPU).

**ADDITIONAL INFORMATION**

For additional information, see Boiler Assemblies (KVFT), Heating Appliances (KTCL) and Flammable and Combustible Liquids and Gases Equipment (AAPQ).

**REQUIREMENTS**

The basic standard used to investigate products in this category is UL 2106, “Field ERECTED Boiler Assemblies.”

**UL MARK**

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED,” a control number, and one of the following product names and information as appropriate:

A) “Gas-fired (or Oil-fired or Gas-Oil-fired) Field-erected Boiler Assembly, for Use with Integral Primary Safety Control.”

B) “Field-erected Boiler Assembly, for Use Only with [Company Name] Labeled Gas (or Oil or Gas-Oil) Burner Models(s) ___, Maximum Input Gas BTU Per Hour, (Oil ___ Gals. Per Hour). Refer to Burner Label for Control and Fuel Specifications.”

A field-erected gas-, oil-, or gas-oil-fired boiler assembly that includes the burner as an integral part of the front head assembly bears a Listing Mark with the product name and information similar to (A).

A field-erected boiler assembly designed for installation with a Listed burner bears a Listing Mark with the product name and information similar to (B), which covers the boiler only. The burner bears a separate Listing Mark as described for Gas Burners (KXWT), Oil Burners (KYXZ) or Gas-Oil Burners (KYKR). The proper assemblies of boilers and burners to make unit assemblies are as specified on the boiler Listing Mark.

---

### Table: Clearances for Various Types of Floorings

<table>
<thead>
<tr>
<th>Form</th>
<th>A</th>
<th>B</th>
<th>C_a</th>
<th>C_y</th>
<th>D</th>
<th>E_a</th>
<th>E_y</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>6</td>
<td>24</td>
<td>18</td>
<td>18</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>III</td>
<td>6</td>
<td>24</td>
<td>18</td>
<td>18</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>IVa</td>
<td>48</td>
<td>96</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Xlla</td>
<td>6</td>
<td>18</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>XIIa</td>
<td>6</td>
<td>18</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>
SANITATION, FOOD SERVICE EQUIPMENT (TSQS)

VENDING MACHINES FOR FOOD AND BEVERAGES (TSYA)

This category covers food and beverage vending machines that dispense unit servings of food or beverages, in bulk or in packages, upon insertion of a coin, paper currency, token, card, key or by manual operation. These machines are intended for commercial use.

RELATED PRODUCTS
For vending machines intended for commercial use investigated to UL Safety Standards, see Vending Machines (YWXV) and Vending Machines, Refrigerated (SQMX).

ADDITIONAL INFORMATION
For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS
The basic standard used to investigate products in this category is ANSI/NSF 25, “Vending Machines for Food and Beverages.”

UL MARK
The Classification Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Classification and Follow-Up Service. The Classification Mark for these products includes the EPH Mark (as illustrated in the Introduction of this Directory) and the following additional information:

VENDING MACHINE FOR FOOD AND BEVERAGES*

ANSI/NSF 25
Control No.

* or other appropriate product name as shown in the individual Classifications

For those products which are also Listed by Underwriters Laboratories Inc. under Vending Machines (YWXV) or Vending Machines, Refrigerated (SQMX), the marking includes the appropriate Listing Mark, the EPH Mark, and the text “ANSI/NSF 25” below the EPH Mark.

VENTILATING EQUIPMENT FOR COMMERCIAL COOKING APPLIANCES (YXLT)

Ventilating equipment includes Exhaust Hoods With or Without Exhaust Dampers, Power Ventilators for Restaurant Exhaust Appliances, Grease Ducts, Grease Duct Enclosures, and Hood and Duct Accessories intended for installation in ventilating systems serving commercial cooking equipment. This equipment is intended for installation in accordance with the National Fire Protection Association Standard for the Installation of Equipment for the Removal of Smoke and Grease Laden Vapors from Commercial Cooking Equipment, NFPA 96, or other recognized codes or standards as indicated for the individual product categories.

In addition, Recirculating Ductless Hoods for Use with Specified Commercial Cooking Appliances are also included in this Section.

EXHAUST HOODS WITH EXHAUST DAMPERS (YXZR)

Exhaust hoods with exhaust dampers are intended to be installed over commercial cooking equipment. These hoods are provided with fire actuated exhaust dampers. They have been investigated to determine that they are capable of preventing the exhaust duct gas temperatures from exceeding 375°F and the passage of flame into the exhaust duct under conditions simulating a fire in the cooking area under a hood. Electrical components, if provided, are investigated as part of the Listing of the hood assembly.

Exhaust hoods with exhaust dampers may be provided with manually or automatically operated cleaning or washing systems. These systems are not investigated for grease extraction efficiency. These systems are not investigated for their suitability as fire extinguishing system units for the protection of grease removal devices and hoods, unless specifically indicated in the individual Listing and product markings on the hood.

Exhaust Hoods with exhaust dampers may be provided with sprinklers or automatic spray nozzle assemblies for protection of unlimited length of grease duct in accordance with NFPA 13. If provided, it shall be indicated in the individual Listing and product markings on the hood. The sprinklers or automatic spray nozzle assemblies intended for the protection of grease ducts are intended to be installed in accordance with NFPA 13, Standard for the Installation of Sprinkler System. These devices are intended for installation in accordance with the National Fire Protection Association Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96 and the National Electrical Code, NFPA 70.

All exhaust hoods with exhaust dampers are marked relative to minimum exhaust air flow and maximum supply air flow directed into the hood and/or out the bottom (if provided). Air flow rates are established under draft free laboratory conditions. Greater exhaust and/or lesser supply air flow rates may be required for each specific installation to obtain complete vapor and smoke removal.

Exhaust hoods provided with integral installed sprinklers or automatic spray nozzle assemblies for the protection of unlimited length of grease ducts are marked “Supplied With Factory Installed (Sprinklers) (Spray Nozzles)” for the protection of unlimited length of Grease Duct having a maximum duct (diameter) (perimeter) of (inches) (feet). Connect to NFPA 13 sprinkler system water supply only.

Authorities having jurisdiction should be consulted before installation. The basic standard used to investigate products in this category is UL 710, “Exhaust Hoods For Commercial Cooking Equipment”.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and one of the following product names as appropriate: (A) “Exhaust Hood With Exhaust Damper”, (B) “Hood Assembly For Exhaust Hood With Exhaust Damper For Use Only With (Company Name) Labeled Sub-Assembly For Exhaust Hood With Exhaust Damper Part No. “, (C) “Sub-Assembly For Exhaust Hood With Exhaust Damper Part No. For Use Only With (Company Name) Labeled Hood Assembly For Exhaust Hood With Exhaust Damper”.

“Exhaust Hoods With Exhaust Dampers” that are complete in one factory-built assembly bear a Listing Mark with a product name similar to (A). “Exhaust Hoods With Exhaust Dampers” that consist of a hood assembly and one or more sub-assemblies have a Listing Mark with the product name shown in (B) on the hood assembly and a Listing Mark with the product name shown in (C) on each sub-assembly.

POWER VENTILATORS FOR RESTAURANT EXHAUST APPLIANCES (YZHW)

GENERAL
This category covers power roof- and wall-mounted ventilators and proximity type ventilators consisting of an impeller and motor in a housing. Roof- and wall-mounted ventilators have a weather resistant housing and are supported by a weather resistant steel base designed to fit, usually by means of a steel curb, over a roof or wall exhaust duct opening for venting restaurant cooking appliances. These ventilators are designed for the removal of smoke and grease laden vapors at an exhaust air temperature not exceeding the maximum temperature shown in the individual Listings and on the Listed device.

Power ventilators for restaurant exhaust appliances are intended for installation in accordance with NFPA 96, “Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.” Authorities Having Jurisdiction should be consulted to determine that these appliances are acceptable for use in any given location.

Proximity type ventilators have an enclosure and are positioned adjacent to the cooking appliance that they serve.

RELATED PRODUCTS
For other types of power ventilators, see Ventilators, Power (ZACT) in the Electrical Appliance and Utilization Equipment Directory.

ADDITIONAL INFORMATION
For additional information, see Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

REQUIREMENTS
The basic requirements used to investigate products in this category are contained in UL 705, “Power Ventilators” and Subject 762, “Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances.”

UL MARK
The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word “LISTED”, a control number, and the product name “Power Ventilator for Restaurant Exhaust Appliances.”
## INDEX OF PRODUCT CATEGORIES

This index includes all product categories sorted alphabetically. In addition, those product categories that are a sub-set of a main product category are indented under the main category to illustrate the grouping of a family of related categories. This index also includes specific product types covered within a product category and these product names are followed by the applicable product category in parentheses.

<table>
<thead>
<tr>
<th>Page</th>
<th>Advertising Displays, Nonilluminated (AAUV)</th>
<th>273</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aluminum Sheathed Cable Fittings (ARYV)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Appliance Controls (ATNZ)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Appliance Controls (ATYZ)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Appliance Controls, Molded-Case (ATXV)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Commercial Appliance Outlet Centers (AUZU)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Residential Appliance Outlet Centers (AVGQ)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arc-fault Circuit Interrupters (AVYI)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Arc-fault Circuit Interrupters, Branch/Feeder Type (AVZQ)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Arc-fault Circuit Interrupters, Copper Type (AWAH)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Arc-fault Circuit Interrupters, Cord Type (AWAY)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Arc-fault Circuit Interrupters, Outdoor Branch Circuit Type (AWBZ)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Arc-fault Circuit Interrupters, Portable Circuit Type (AWDO)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Architectural and Floating Fountains (AWEG)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Armored Cable (AWEZ)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Armored Cable Connectors, Type AC (AWSX)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attachment Plugs (AXGV)</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Attachment Plugs, Fluorescent (AXUT)</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Attachment Plugs with Switches (AYJR)</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Attachment Plugs with Overload Protection (AVYZ)</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Boat Cable (BDFX)</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Boxes, Enclosures, Handholes and Vaults, Underground, Utility Specification (BGHL)</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Boxes, Junction and Pull (BGUZ)</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Boxes, Metal-enclosed, Over 600 V (CVZW)</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Busways and Associated Fittings (CWF7)</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Cabinets and Cutout Boxes (CYIV)</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Cable Assemblies and Fittings for Industrial Control and Signal Distribution (CYJV)</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Cable Limiters (CYMT)</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Cable Trays (CYNW)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Cable Trays, Nonmetallic (CYOV)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Capacitors (CYWT)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Circuit Breakers (DHIR)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Adapters, Circuit Breaker (DHWZ)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Adapters, Circuit Breaker, Classified for Use in Specified Equipment (DICQ)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Circuit Breaker Accessories (DIHS)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Circuit Breaker and Secondary Surge Arresters (DIMV)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Circuit Breaker and Transient Voltage Surge Suppressors (DIPP)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Circuit Breaker Current Limiters (DIRW)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Circuit Breakers for Use in Communications Equipment (DITI)</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Circuit Breakers, Molded-case and Circuit Breaker Enclosures (DIVQ)</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Circuit Breakers, Molded-case, Classified for Mitigating the Effects of Arcing Faults (DIWL)</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Circuit Breakers, Molded-case, Classified for Use in Specified Equipment (DIXF)</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Circuit Breakers with Equipment</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Ground-fault Protection (DIYA)</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Fused Circuit Breakers (DIYY)</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Circuit Breaker and Ground-fault Circuit Interrupters (DKUY)</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Circuit Breaker and Metal-clad Switchgear, Over 600 V (DLAH)</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Circuit Breakers, Medium Voltage</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Equipment (DLBC)</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Circuit Breaker Switchgear, Metal-enclosed, Over 600 V (DLBK)</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Circuit Protectors (DLBX)</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Class 2 and Communication Cable Management Systems (DIY2)</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Cathode Transformers and Power Supplies (DUEC)</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Communication Cable Assemblies (DUNH)</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Communications Cable (DUXZ)</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Communications Cable Verified in Accordance with National or International Specifications (DVBI)</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Data Transmission Cable Verified in Accordance with National or International Specifications (DVBC)</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Community Antenna Television Cable (DVCS)</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Computer Interconnection Cable Assemblies (DVPI)</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Conductor Termination Compounds (DVYW)</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Conduit and Fittings (DWFV)</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Conduit and Cable Hardware (DWMU)</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Conduit Fittings (DWTT)</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Flexible Conduit, Liquid-tight (DWY3)</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Flexible Metal Conduit Assemblies, Liquid-tight (DXAS)</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Flexible Metal Conduit, Liquid-tight (DXHR)</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Flexible Nonmetallic Conduit, Liquid-tight (DXOQ)</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Flexible Metal Conduit (DXUZ)</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Interim Ferrous Metal Conduit (DDBY)</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Rigid Ferrous Metal Conduit (DHYX)</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Rigid Nonferrous Metallic Conduit (DHYW)</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Reinforced Thermosetting Resin Conduit (DZKT)</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Rigid Nonmetallic Schedule 40 and Schedule 80 PVC Conduit (DZTY)</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Conduit, Rigid Underground, Other Than Plastic, Fiber Type (EALZ)</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Rigid Nonmetallic Underground Conduit, Plastic (EAZX)</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Connectors, Special Purpose (ECIS)</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Cord Sets and Power Supply Cords (ELBZ)</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Cord Restraint Devices (ELDW)</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Outdoor Seasonal Use Cord-connected Wiring Devices (ELEI)</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Seasonal Use Cord Sets (ELEY)</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Utility Service Cord Sets (ELFT)</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Cord Sets with Leakage Current Detection and Interruption (ELGN)</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Crane and Hoist Electrification Systems (ELFX)</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Current Taps and Adapters (EMDV)</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Data Processing Cable (EMRB)</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Dielectric Mediums (EOUV)</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Transformer Fluids (EOVK)</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Dimmers (EOVZ)</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Dimmers, Commercial (EOXT)</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Dimmers, General Use Switch (EOXY)</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Dimmers, Theaters, Controls (EPTC)</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Earthquake Actuated Equipment (FFPC)</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Earthquake Actuated Shutoff Systems (FFPH)</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Electric Vehicle Systems (FFQM)</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Electric Vehicle Battery Packs (FFRW)</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Electric Vehicle Cable (FFSO)</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Electric Vehicle Charging System Equipment (FFTE)</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Electric Vehicle Charging Systems, Indoor Charging Without Ventilation (FFTY)</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Electric Vehicle Charging System Personnel Protection Equipment (FFUQ)</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Electric Vehicle Power Outlets (FPWA)</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Electrical Metallic Tubing (FJMX)</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Electrical Metallic Tubing Fittings (FKAV)</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Electrical Nonmetallic Tubing (FKHU)</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Fittings (FKKI)</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Electric Discharge Lamp Control Equipment (FKOT)</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Fluorescent Ballasts (FKVS)</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>HID Ballasts (FLCR)</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Holders For Automatic Starters (FLPZ)</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Starters, Automatic (FMIDX)</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Starters, Manual (FMRY)</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Miscellaneous (FNFT)</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Electrically Conductive Corrosion-resistant Compounds (FOIZ)</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Elevator Equipment (FQKR)</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Elevator Controls and Accessories (FQMW)</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Elevator Door Locking Devices and Contacts (FQXZ)</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Elevator Oil Buffers (FQZD)</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Elevator Switches (FRAH)</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Passenger Elevator Car Enclosures (FRBK)</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Emergency Lighting and Power Equipment (FTBR)</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Engine Generators (FTCA)</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Engine Generators for Portable Use (FTCN)</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Engine Generators for Recreational Vehicles (FTCZ)</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Energy Usage Monitoring Systems (FTRZ)</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Engine Generators (FTSR)</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Equipment Ground-Fault Protective Devices (FTTE)</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Exit Fixtures (FWBO)</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Exit Signs, Self-luminous and Photoluminescent (FWBX)</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Exit Sign Conversion Kits (FWCF)</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Exit Fixture to Exit Light Conversions, Retrofit (FWC)</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Exit Sign Retrofit Kits (GFET)</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Factory Automation Equipment (GPNY)</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Fan Speed Controls (CQHG)</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>FC Cable (GQKT)</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>FC Cable Fittings (QRQS)</td>
<td>40</td>
</tr>
<tr>
<td>Page</td>
<td>Page</td>
<td>Page</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Fire Alarm Cable (HNVT)</td>
<td>41</td>
<td>Non-power-limited Fire Alarm Cable (HNHT)</td>
</tr>
<tr>
<td>Power-limited Fire Alarm Cable (HNIR)</td>
<td>41</td>
<td>Luminaire and Fittings (HYXT)</td>
</tr>
<tr>
<td>Luminaires and Fittings (HYXT)</td>
<td>41</td>
<td>Fixtures, Stage Type (IDDX)</td>
</tr>
<tr>
<td>Fixtures, Stage Type (IDDX)</td>
<td>42</td>
<td>Fixtures, Submersible (IDRV)</td>
</tr>
<tr>
<td>Luminaires and Fittings, Special Purpose, Miscellaneous (IERT)</td>
<td>42</td>
<td>Luminaires (IERT)</td>
</tr>
<tr>
<td>Luminaires (IERT)</td>
<td>43</td>
<td>Luminarie Conversions, Retrofit (IEUQ)</td>
</tr>
<tr>
<td>Luminarie Conversions, Retrofit (IEUQ)</td>
<td>43</td>
<td>Luminarie Foles (IEUR)</td>
</tr>
<tr>
<td>Luminarie Foles (IEUR)</td>
<td>43</td>
<td>Fluorescent Lamp Type Luminaires (IEUT)</td>
</tr>
<tr>
<td>Fluorescent Lamp Type Luminaires (IEUT)</td>
<td>44</td>
<td>Fluorescent Surface Mounted Luminaires (IEUZ)</td>
</tr>
<tr>
<td>Fluorescent Surface Mounted Luminaires (IEUZ)</td>
<td>44</td>
<td>Fluorescent Recessed Luminaires (IEV)</td>
</tr>
<tr>
<td>Fluorescent Recessed Luminaires (IEV)</td>
<td>46</td>
<td>Light Diffusers and Lenses for Handling Luminaires, Fluorescent (IEWR)</td>
</tr>
<tr>
<td>Light Diffusers and Lenses for Handling Luminaires, Fluorescent (IEWR)</td>
<td>45</td>
<td>High Intensity Discharge Lamp Type Luminaires (IEWX)</td>
</tr>
<tr>
<td>High Intensity Discharge Lamp Type Luminaires (IEWX)</td>
<td>45</td>
<td>High Intensity Discharge Lamp Rear Vent (KDER)</td>
</tr>
<tr>
<td>High Intensity Discharge Lamp Rear Vent (KDER)</td>
<td>45</td>
<td>Special Purpose Luminaires (IFAT)</td>
</tr>
<tr>
<td>Special Purpose Luminaires (IFAT)</td>
<td>48</td>
<td>Canopy Luminaire (IFAW)</td>
</tr>
<tr>
<td>Canopy Luminaire (IFAW)</td>
<td>48</td>
<td>Electric Discharge Lighting Systems, Cold Cathode (IFAY)</td>
</tr>
<tr>
<td>Electric Discharge Lighting Systems, Cold Cathode (IFAY)</td>
<td>48</td>
<td>Landscape Lighting Systems, Low Voltage (IFDH)</td>
</tr>
<tr>
<td>Landscape Lighting Systems, Low Voltage (IFDH)</td>
<td>48</td>
<td>Luminaires and Luminaire Assemblies Classified for Fire Resistance (IFDL)</td>
</tr>
<tr>
<td>Luminaires and Luminaire Assemblies Classified for Fire Resistance (IFDL)</td>
<td>49</td>
<td>Low Voltage Luminaires for Recreational Vehicle Use (IFDQ)</td>
</tr>
<tr>
<td>Low-voltage Incandescent Luminaires and Fittings (IFDR)</td>
<td>49</td>
<td>Medical-dental Luminaires (IFDT)</td>
</tr>
<tr>
<td>Medical-dental Luminaires (IFDT)</td>
<td>50</td>
<td>Stage and Studio Luminaires and Connectors (IFER)</td>
</tr>
<tr>
<td>Stage and Studio Luminaires and Connectors (IFER)</td>
<td>50</td>
<td>Submersible Luminaires (IFEV)</td>
</tr>
<tr>
<td>Submersible Luminaires (IFEV)</td>
<td>50</td>
<td>Track Lights and Tracks (IFFR)</td>
</tr>
<tr>
<td>Track Lights and Tracks (IFFR)</td>
<td>51</td>
<td>Fixtures for Fixtures Tracking Lighting (IFGT)</td>
</tr>
<tr>
<td>Fixtures for Fixtures Tracking Lighting (IFGT)</td>
<td>51</td>
<td>Recessed Luminarie Trims (IFCW)</td>
</tr>
<tr>
<td>Recessed Luminarie Trims (IFCW)</td>
<td>52</td>
<td>Flat Conductor Cable (IKKT)</td>
</tr>
<tr>
<td>Flat Conductor Cable (IKKT)</td>
<td>52</td>
<td>Flexible Metallic Tubing (ILJW)</td>
</tr>
<tr>
<td>Flexible Metallic Tubing (ILJW)</td>
<td>52</td>
<td>Flexible Metallic Tubing Assemblies (ILLT)</td>
</tr>
<tr>
<td>Flexible Metallic Tubing Assemblies (ILLT)</td>
<td>53</td>
<td>Fixtures, Stage Type Lighting Power Cable (ILPH)</td>
</tr>
<tr>
<td>Fixtures, Stage Type Lighting Power Cable (ILPH)</td>
<td>53</td>
<td>Fuel Cell Equipment (IRGX)</td>
</tr>
<tr>
<td>Fuel Cell Equipment (IRGX)</td>
<td>53</td>
<td>Hand-held or Hand-transportable Fuel Cell Power Units and Disposable Fuel Cartridges (ITRX)</td>
</tr>
<tr>
<td>Hand-held or Hand-transportable Fuel Cell Power Units and Disposable Fuel Cartridges (ITRX)</td>
<td>53</td>
<td>Stationary Fuel Cell Power Systems (ITRX)</td>
</tr>
<tr>
<td>Stationary Fuel Cell Power Systems (ITRX)</td>
<td>53</td>
<td>Gas Booster compressor Equipment (IUXX)</td>
</tr>
<tr>
<td>Gas Booster compressor Equipment (IUXX)</td>
<td>54</td>
<td>Fused Power Circuit Devices (IYRS)</td>
</tr>
<tr>
<td>Fused Power Circuit Devices (IYRS)</td>
<td>54</td>
<td>Fuseholders, Cartridge Fuse (IZLT)</td>
</tr>
<tr>
<td>Fuseholders, Cartridge Fuse (IZLT)</td>
<td>54</td>
<td>Fuseholders, Special Purpose (IZND)</td>
</tr>
<tr>
<td>Fuseholders, Special Purpose (IZND)</td>
<td>55</td>
<td>Fittings for Fuseholders (IZZR)</td>
</tr>
<tr>
<td>Fittings for Fuseholders (IZZR)</td>
<td>55</td>
<td>Fuseholders, Plug Fuse (JAMZ)</td>
</tr>
<tr>
<td>Page</td>
<td>Page</td>
<td>Page</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Mounting Posts and Pedestals for Distribution Equipment (PUPR)</td>
<td>82</td>
<td>Polyvinyl Chloride Solvent Cement (QORY)</td>
</tr>
<tr>
<td>Multioilet Assemblies (PVGT)</td>
<td>83</td>
<td>Portable Power Cable (QPMU)</td>
</tr>
<tr>
<td>Multioilet Assembly Fittings (PVUR)</td>
<td>83</td>
<td>Power and Control Tray Cable (QPOR)</td>
</tr>
<tr>
<td>Nonmetallic Transformers and Power Supplies (PWIK)</td>
<td>83</td>
<td>Power and Control Tray Cable Connectors (QPOZ)</td>
</tr>
<tr>
<td>Network-powered Broadband Communications Cable (PWIP)</td>
<td>84</td>
<td>Power Cable Assemblies (QPPL)</td>
</tr>
<tr>
<td>Nonmetallic-sheathed cable Connectors (PJVX)</td>
<td>84</td>
<td>Power Converters/Inverters and Power Converter/Inverter Systems (QPYY)</td>
</tr>
<tr>
<td>Nonmetallic Extensions (PXXT)</td>
<td>84</td>
<td>Power Distribution Blocks (QPQS)</td>
</tr>
<tr>
<td>Nonmetallic Extension Fittings (PYYZ)</td>
<td>84</td>
<td>Power Distribution Centers for Communications Equipment (QPQY)</td>
</tr>
<tr>
<td>Nonmetallic Surface Extensions (PXMX)</td>
<td>85</td>
<td>Power Distribution Equipment, Portable (QPQRW)</td>
</tr>
<tr>
<td>Nonmetallic-sheathed cable Interconnectors (QAAV)</td>
<td>85</td>
<td>Portable Power Distribution Units and Devices (QPSH)</td>
</tr>
<tr>
<td>Optical Fiber Cable (QAYK)</td>
<td>85</td>
<td>Portable Power Distribution Panels (QPSM)</td>
</tr>
<tr>
<td>Optical Fiber Cable, Field Assembled (QAZD)</td>
<td>85</td>
<td>Power Outlets and Power Outlet Fittings (QPTV)</td>
</tr>
<tr>
<td>Optical Fiber Cable Verified in Accordance with National or International Specifications (QAZQ)</td>
<td>86</td>
<td>Power Supplies (QQAQ)</td>
</tr>
<tr>
<td>Optical Fiber Cable Verified in Accordance with New York City Transit Specification TO-76 (QQAR)</td>
<td>86</td>
<td>Power Supplies, Specialty (QQJH)</td>
</tr>
<tr>
<td>Optical Fiber/Communications/Signaling/Coaxial Cable Raceways (QAZM)</td>
<td>86</td>
<td>Power Supplies, Telephone (QQJF)</td>
</tr>
<tr>
<td>Optical Fiber Raceway Assemblies (QAZQ)</td>
<td>87</td>
<td>Power Supplies, Gas Tube Sign (QQKK)</td>
</tr>
<tr>
<td>Optical Fiber/Communications Cable Routing Assemblies for Use in Telecommunication Installations (QBAA)</td>
<td>87</td>
<td>Press and Other Power-operated Machine Controls and Systems (QEQX)</td>
</tr>
<tr>
<td>Optical Fiber Branching Devices (QBEA)</td>
<td>88</td>
<td>Presence Sensing Devices (QQHP)</td>
</tr>
<tr>
<td>Optical Fiber Branching Devices Verified in Accordance with National or International Specifications (QBEQ)</td>
<td>88</td>
<td>Press Controls (QQKQ)</td>
</tr>
<tr>
<td>Optical Fiber Raceway Assemblies and Connectors (QBFA)</td>
<td>88</td>
<td>Process Control Equipment, Electrical (QUXV)</td>
</tr>
<tr>
<td>Optical Fiber Cable Assemblies and Connectors Verified in Accordance with National or International Specifications (QBFN)</td>
<td>88</td>
<td>Process Control Equipment, Electrical (QUXX)</td>
</tr>
<tr>
<td>Outlet Boxes and Fittings (QBFZ)</td>
<td>89</td>
<td>Quick-connect Terminals (RFWV)</td>
</tr>
<tr>
<td>Outlet Boxes and Fittings Classified for Fire Resistance (QBWY)</td>
<td>89</td>
<td>Raceways (RGKT)</td>
</tr>
<tr>
<td>Metallic Outlet Boxes (QCTI)</td>
<td>89</td>
<td>Cellular Concrete Floor Raceways (RGYR)</td>
</tr>
<tr>
<td>Conduit Bods and Covers Classified for Use with Specified Equipment (QCKW)</td>
<td>90</td>
<td>Cellular Concrete Floor Raceway Fittings (RHILZ)</td>
</tr>
<tr>
<td>Nonmetallic Outlet Boxes (QCMX)</td>
<td>90</td>
<td>Cellular Metal Floor Raceway Fittings (RHXZ)</td>
</tr>
<tr>
<td>Outlet Bushings and Fittings (QCRI)</td>
<td>91</td>
<td>Metal Cellular Floor Raceway Fittings (RIN)</td>
</tr>
<tr>
<td>Wall Opening Protective Materials (QCSN)</td>
<td>91</td>
<td>Strut-type Channel Raceways (RIUU)</td>
</tr>
<tr>
<td>Outdoor Circuit Testers (QCWU)</td>
<td>91</td>
<td>Fittings for Strut-type Channel Raceways (RIY)</td>
</tr>
<tr>
<td>Panelboards (QEVU)</td>
<td>92</td>
<td>Underground Raceways (RKKZ)</td>
</tr>
<tr>
<td>Temporary Panelboard Ingress Barriers (QEWI)</td>
<td>93</td>
<td>Underground Raceway Fittings (RKQX)</td>
</tr>
<tr>
<td>Panelboards, Modular (QFOF)</td>
<td>93</td>
<td>Raised Floor Wireways (RQFW)</td>
</tr>
<tr>
<td>Distributed Generation Power Systems Equipment (QHWW)</td>
<td>93</td>
<td>Receptacle Closures (RRQY)</td>
</tr>
<tr>
<td>Accessory Equipment (QHGB)</td>
<td>93</td>
<td>Receptacles (RTFF)</td>
</tr>
<tr>
<td>Motor Starters (QHGB)</td>
<td>94</td>
<td>Receptacles for Plugs and Attachment Plugs (RRTT)</td>
</tr>
<tr>
<td>Photovoltaic Module Systems (QIKL)</td>
<td>94</td>
<td>Receptacles, Stage Type (RUF)</td>
</tr>
<tr>
<td>Static Inverters and Converters for Use in Independent Power Systems (QIKS)</td>
<td>95</td>
<td>Receptacles with Switches (RUSZ)</td>
</tr>
<tr>
<td>Pin-and-Sleeve Type Power Units (QILY)</td>
<td>94</td>
<td>Utility Service Receptacles (RINNW)</td>
</tr>
<tr>
<td>Static Inverters and Converters for Use in Independent Power Systems (QIKS)</td>
<td>95</td>
<td>Repackaged Electrical Construction Equipment (TFOZ)</td>
</tr>
<tr>
<td>Pin-and-Sleeve Type Power Units (QILY)</td>
<td>94</td>
<td>Robots and Robotic Equipment (TETZ)</td>
</tr>
<tr>
<td>Pin-and-Sleeve Type, Classified for Use in Specific Combinations (QILK)</td>
<td>96</td>
<td>Semiconductor Manufacturing Equipment (TWKH)</td>
</tr>
<tr>
<td>Analysis and Measurement Equipment (TWLR)</td>
<td>111</td>
<td>Automation and Wafer Handling Equipment (TWPF)</td>
</tr>
<tr>
<td>Control Panels (TWFR)</td>
<td>112</td>
<td>Liquid Chemical Distribution Systems (TWSP)</td>
</tr>
<tr>
<td>Miscellaneous Equipment (TWTZ)</td>
<td>112</td>
<td>Power Supplies (TWFZ)</td>
</tr>
<tr>
<td>Process Equipment (TWMT)</td>
<td>113</td>
<td>Service Cable (TXTK)</td>
</tr>
<tr>
<td>Semiconductor Manufacturing Equipment, Limited Production (TWZ)</td>
<td>113</td>
<td>Service Entrance Cable (TYLZ)</td>
</tr>
<tr>
<td>Service Entrance Cable Fittings (TYYK)</td>
<td>113</td>
<td>Shipboard Cable, Marine (UBVZ)</td>
</tr>
<tr>
<td>Shipboard Cable, Cable Fittings, Marine (UBWE)</td>
<td>114</td>
<td>Structured Cabling Programs (VZYY)</td>
</tr>
<tr>
<td>Signboards (VZAM)</td>
<td>115</td>
<td>Levels XP Structured Cabling Program (VZLL)</td>
</tr>
<tr>
<td>Proprietary Structured Cabling Programs (VZZX)</td>
<td>118</td>
<td>Swimming Pool and Spa Equipment (WABX)</td>
</tr>
<tr>
<td>Swimming Pool and Spa Equipment Classified in Accordance with NSF Standard Number 50 (WABZ)</td>
<td>122</td>
<td>Potting Compounds (WCRR)</td>
</tr>
<tr>
<td>Chlorinators (WAPY)</td>
<td>121</td>
<td>Pumps (WCSX)</td>
</tr>
<tr>
<td>Control (WADY)</td>
<td>123</td>
<td>Self-contained Spas (WCWZ)</td>
</tr>
<tr>
<td>Covers for Swimming Pools and Spas (WBAH)</td>
<td>119</td>
<td>Swimming Pool and Spa Cover Operators, Electric (WDDI)</td>
</tr>
<tr>
<td>Ozone Generators (WCKA)</td>
<td>121</td>
<td>Swimming Pool and Spa Transformers (WDGY)</td>
</tr>
<tr>
<td>Water Treatment Equipment (WDLZ)</td>
<td>123</td>
<td>Suction Fittings for Swimming Pools and Spas (WDEB)</td>
</tr>
<tr>
<td>Switchboards, Combined (WEUR)</td>
<td>124</td>
<td>Switchboards, Combined (WEUR)</td>
</tr>
<tr>
<td>Switchboards, Combined (WEXI)</td>
<td>123</td>
<td>Switchboards, Special Purpose (WFIX)</td>
</tr>
<tr>
<td>Switchboards, Special Purpose (WFIX)</td>
<td>124</td>
<td>Switches (WFXV)</td>
</tr>
</tbody>
</table>
Pullout Switches, Detachable Type (WGEU) ........................................ 125
Switches, Automatic (WGLT) .................................................. 125
Switches, Clock Operated (WZGR) ........................................ 125
Switches, Open Type (WHTY) ............................................... 125
Switches, Dead-front (WHXS) .............................................. 126
Switches, Enclosed (WIXA) .................................................. 126
Switches, Knife (WIOV) ...................................................... 127
Switches, Load Interrupter and Isolating, Over 600 V (WIOQ) ............. 127
Switches, Molded Case (WJAZ) ............................................. 127
Switches, Photovoltaic (WJCT) ............................................ 128
Photo Controls, Plug-in, Locking Type (WJFZ) .................................. 128
Snap Switches (WJQ0) ....................................................... 128
Switches, Door (WLVF) ....................................................... 129
Switches, Fixture (WLTI) ..................................................... 129
Switches, Fixture, Socket and Special Mechanism Type (WMHR) .......... 129
Switches, Flush (WMUZ) ...................................................... 129
Switches, Pendant (WIXI) .................................................... 129
Switches, Pendant, Socket and Special Mechanism Type (WNVV) ....... 129
Switches, Surface (WOKT) .................................................... 129
Transfer Switches (WPTZ) .................................................... 130
Accessories, Transfer Switch (WPVQ) ...................................... 130
Automatic Transfer Switches for Use in Emergency Systems (WPWR) .... 130
Automatic Transfer Switches for Use in Optional Standby Systems (WPXT) 130
Automatic Transfer Switches, Over 600 V (WPYC) .................................. 130
Nonautomatic Transfer Switches (WPYP) .................................... 132
Switchgear Assemblies, Metal Enclosed, Low-voltage Power Circuit Breaker Type (WUTZ) .......................................................... 131
Switchgear, Gas Insulated Type, Over 600 V (WVEK) .......................... 131
Temperature-indicating and Regulating Equipment (XAFP) ................. 132
Temperature-indicating and Regulating Equipment, Electrical (XATF) ..... 132
Temporary Lighting Strings (XBRT) ........................................ 133
Relocateable Power Taps (XYBS) ............................................. 133
Termination Boxes (XCKT) ................................................... 133
Traffic Signal Cable Classified in Accordance with IEC Specifications (XNTL) 134
Transformers (XNWX) ......................................................... 134
Transformers, Class 2 and Class 3 (XOYI) ................................... 134
Transformers, Dimmers (XOYT) .............................................. 135
Transformers, Distribution, Dry Type, Over 600 V (XPFS) .................... 135
Transformers, Distribution, Liquid-filled Type, Over 600 V (XPLH) ........ 135
Transformers, Gas Tube Sign (XPMR) ....................................... 135
Transformers, General Purpose (XPTQ) .................................... 135
Transformers, High Voltage (XQTW) ....................................... 136
Power and General Purpose Transformers, Dry Type (XQNX) ............... 136
Transformers, Toy (XRBV) .................................................... 136
Transient Voltage Surge Suppressors (XUHT) ................................ 137
Transient Voltage Surge Suppressor/Panelboard Extension Modules, Classified for Use With Specified Equipment (XUPD) ......................... 137
Transit Application Equipment and Systems (XUPY) .......................... 138
Switches, Isolating (XUTE) ................................................... 138
Underground Feeder and Branch Circuit Cable (YDXU) .......................... 138
Uninterruptible Power Supply Equipment (YEDU) .................................. 139
Maintenance Service for Uninterruptible Power Supply Systems (YEFT) .... 139
Unit Substations (YEFR) ..................................................... 139
Unit Substations Over 600 V (YEFP) ....................................... 140
Valves, Transfer Switch Relief (YUIC) ..................................... 140
Wind Turbine Generating Systems (ZGXW) ................................ 140
Small Wind Turbine Generating Systems (ZGYW) ................................ 141
Large Wind Turbine Generating Systems (ZGYZ) ................................ 141
Wind Turbine Generating Systems Subassemblies (ZGZJ) .................. 141
Wire (ZGZX) ................................................................. 141
Festoon Cable (ZIPF) ......................................................... 141
Fixture Wire (ZIPR) .......................................................... 141
Flexible Cord (ZJCC) ......................................................... 142
Gas-Tube-Sign Cable (ZJQV) ............................................... 142
Machine-tool Wire (ZHKZ) .................................................. 142
Processed Wire (ZKLU) ...................................................... 143
Thermoset-insulated Wire (ZKST) ........................................... 143
Thermoplastic-insulated Wire (ZLGR) ...................................... 144
Welding Cable (ZMAV) ....................................................... 145
Wire, Special Purpose (ZMIX) .............................................. 145
Wire Connectors (ZMXX) .................................................... 145
Crimp Tools Classified for Use with Specified Wire Connectors (ZMLS) ...... 145
Wire Connector Adapters (ZMOW) ........................................... 145
Wire Connectors and Soldering Lugs (ZMV) .................................. 146
Wire Connectors, Insulated for Use with Underground Conductors (ZMVW) 147
Wire Connectors and Soldering Lugs Classified in Accordance with IEC Publications (ZNKD) ...................................................... 147
Positioning Devices (ZODZ) ................................................ 147
Wire-pulling (ZOKZ) ........................................................ 148
Wireways, Auxiliary Gutters and Associated Fittings (ZOYX) ................ 148
Access Control System Units for Use in Hazardous Locations (AAFT) ... 154
Air Conditioning Equipment for Use in Hazardous Locations (AHAY) ...... 154
Air Conditioners for Use in Hazardous Locations (AIDR) .................... 154
Room Air Conditioners for Use in Hazardous Locations (AINU) .......... 154
Air Filtering Appliances for Use in Hazardous Locations (AISH) .......... 155
Air Conditioning Units for Use in Hazardous Locations (AOL0) .......... 155
Air Conditioning Units for Use in Hazardous Locations (ARCX) .......... 155
Intrusion Detection Units for Use in Hazardous Locations (ARDK) .......... 156
Lubricant Dispensing Equipment for Use in Hazardous Locations (BAYZ) 155
Brakes, Electric for Use in Hazardous Locations (BHXY) .................... 156
Cable Sizing for Use in Hazardous Locations (CYMX) ...................... 156
Camera Equipment for Use in Hazardous Locations (CPHY) .............. 156
Casters, Rubber, Electrically Conductive, Relating to Hazardous Locations (CZXX) .......................................................... 156
Centrifuges for Use in Hazardous Locations (DAVZ) ........................ 156
Circuit Breakers for Use in Hazardous Locations (DKAR) .................... 156
Branch Circuit and Service for Use in Hazardous Locations (DKNZ) ...... 157
Cleaning Machines for Use in Hazardous Locations (DMRR) ............... 157
Combustion Detection Equipment for Use in Hazardous Locations (DUFK) 157
Conductivity Testing Equipment Relating to Hazardous Locations (DVRX) 157
Conduit Fittings for Use in Hazardous Locations (EBNV) .................... 157
Corrosion Measuring Equipment for Use in Hazardous Locations (ELHS) 158
Data Processing Equipment, Electronic for Use in Hazardous Locations (ENWS) 158
Distributed Generation Power Systems Equipment for Use in Hazardous Locations (FCHD) ...................................................... 158
Photovoltaic Modules and Panels for Use in Hazardous Locations (FCJU) 158
Downdraft Operators for Use in Hazardous Locations (FCQJ) .............. 159
Door Holders for Use in Hazardous Locations (FDGF) ........................ 159
Drilling Equipment for Use in Hazardous Locations (FDZJ) ................. 159
Drilling Instrumentation for Use in Hazardous Locations (FDXK) ........ 159
Marine Shipboard Cable Sealing Fittings for Use in Hazardous Locations (FDLW) 159
Electromagnets for Use in Hazardous Locations (POGZ) ..................... 160
Elevator Appliances for Use in Hazardous Locations (FRZV) ................ 160
Elevator Door Locking Devices and Contacts for Use in Hazardous Locations (FSNT) ............... 160
Emergency Lighting Equipment for Use in Hazardous Locations (FTEV) 160
Emergency Lighting Equipment Fittings for Use in Hazardous Locations (FTGJ) ...................................................... 160
Enclosures for Metering Equipment for Use in Hazardous Locations (FTRQ) 160
Enclosures for Use in Hazardous Locations (FTRX) .......................... 161
Engine Control Equipment for Use in Hazardous Locations (FTVV) ........ 161
Ignition Controls for Use in Hazardous Locations (FTWX) ................. 161
Exit Signs and Exit Appliances for Use in Hazardous Locations (FWBC) ... 161
Self-luminous Exit Signs and Markers for Use in Hazardous Locations (FWBH) 161
Fans, Portable Electric for Use in Hazardous Locations (GQJA) ............ 162
Luminaires and Fittings for Use in Hazardous Locations (IGZG) .......... 162
Luminaires for Use in Hazardous Locations (IFUX) ........................ 162
Luminaires, Paint Spray Booth for Use in Hazardous Locations (IFYJ) .... 162
Luminaires, Recessed Type for Use in Hazardous Locations (IGBW) ....... 163
Luminaires Fittings for Use in Hazardous Locations (IGV) .................. 163
Luminaires Fittings for Use with Specified Fittings for Use in Hazardous Locations (IKMX) .................. 164
Lighting Unit Fittings, Auxiliary for Use in Hazardous Locations (IGOY) ... 164
Flashlights and Lanterns for Use in Hazardous Locations (IKBR) .......... 164
Floor Cleaners for Use in Hazardous Locations (ILQV) ...................... 164
INDEX OF PRODUCT CATEGORIES

Page 277

Flooring, Electrically Conductive, Relating to Hazardous Locations (INJE) .......................... 164
Flooring, Static Dissipative, Relating to Hazardous Locations (INTX) ................................. 165
Fume Filtration Equipment for Use in Hazardous Locations (IYNK) ................................. 165
Gas and Vapor Detection Equipment for Use in Hazardous Locations (ITQO) ..................... 165
Gas and Vapor Detection Equipment Enclosures for Use in Hazardous Locations (ITPD) .... 165
Gas and Vapor Detection Equipment Listed for Use in Hazardous Locations (JTPX) .......... 165
Ground-fault Circuit Interrupters for Use in Hazardous Locations (KCYN) ......................... 166
Heaters for Use in Hazardous Locations (KFHT) .............................................................. 166
Heaters, Air for Use in Hazardous Locations (KFVR) ......................................................... 166
Electric Resistance Heat Tracing Cable Sets for Use in Hazardous Locations (KGFU) ......... 166
Heaters, Industrial and Laboratory for Use in Hazardous Locations (KGIZ) ......................... 166
Heaters, Miscellaneous for Use in Hazardous Locations (KGWX) ..................................... 166
Surface Heaters for Use in Hazardous Locations (KHCM) .................................................. 166
Water-driven Ventilators for Use in Hazardous Locations (NGCV) .................................... 167
Industrial Control Equipment for Use in Hazardous Locations (NNGZ) ............................... 167
Control Panels and Assemblies for Use in Hazardous Locations (NNNY) ......................... 167
Control Assembly Covers for Use in Hazardous Locations (NRRL) .................................. 167
Flame Control Panels for Use in Hazardous Locations (NNTQ) ........................................ 168
Enclosed Slip Rings for Use in Hazardous Locations (NQMD) ........................................... 169
Motor Controllers for Use in Hazardous Locations (NNUX) ............................................ 168
Auxiliary Devices for Use in Hazardous Locations (NOIV) ................................................ 168
Combination Motor Controllers for Use in Hazardous Locations (NPTX) ......................... 169
Float- and Pressure-operated Motor Controllers for Use in Hazardous Locations (NQLX) .... 169
Power Conversion Equipment for Use in Hazardous Locations (NRAA) ............................ 170
Programmable Controllers for Use in Hazardous Locations (NRAG) ................................ 170
Industrial Control Equipment Relating to Hazardous Locations (NRAX) .......................... 170
Industrial Control Panels Relating to Hazardous Locations (NRBX) ................................... 170
Motor Controllers Relating to Hazardous Locations (NRCY) ............................................ 170
Auxiliary Devices Relating to Hazardous Locations (NRDX) ............................................ 171
Information Technology Equipment for Use in Hazardous Locations (OERX) ................. 171
Intrinsically Safe Equipment and Systems for Use in Hazardous Locations (OEXI) .......... 171
Laboratory Equipment for Use in Hazardous Locations (OCNA) ...................................... 171
Leak Detection Equipment for Use in Hazardous Locations (OIPH) .................................. 172
Mattresses and Pads, Electrically Conductive, Relating to Hazardous Locations (PHLV) ......... 172
Measurement Equipment Classified for Use in Hazardous Locations (PICH) ...................... 172
Medical Equipment for Use in Hazardous Locations (PINF) ........................................... 172
Metal-clad Cable for Use in Hazardous Locations (PIPP) ................................................ 172
Mineral-insulated Cables for Use in Hazardous Locations (POWD) ................................. 173
Mineral-insulated Cable Fittings for Use in Hazardous Locations (POWX) ......................... 173
Motors and Generators for Use in Hazardous Locations (PSBV) ....................................... 173
Generators for Use in Hazardous Locations (PTDR) ......................................................... 173
Motors for Use in Hazardous Locations (PTDM) ............................................................... 173
Motors, Division 2 for Use in Hazardous Locations (PTHE) ............................................ 173
Motors and Generators, Rebuilt for Use in Hazardous Locations (PTKQ) ......................... 174
Motors, Specialty for Use in Hazardous Locations (PUCJ) ............................................... 174
Outlet Box Accessories for Use in Hazardous Locations (QAZV) ..................................... 174
Outlet Boxes for Use in Hazardous Locations (QBCR) ..................................................... 174
Painting Equipment for Use in Hazardous Locations (QDHY) ......................................... 175
Paint Spray and Finishing Equipment for Use in Hazardous Locations (QEEA) .................. 175
Paint Spray Booths Without Fire Protection Systems for Use in Hazardous Locations (QEFY) .. 175
Panelboards for Use in Hazardous Locations (QFHW) ..................................................... 176
Personal Protective Equipment for Use in Hazardous Locations (QPXK) ......................... 176
Occupational Head Protection for Use in Hazardous Locations (QXGT) ......................... 176
Plumbing Accessories for Use in Hazardous Locations (QNYH) ....................................... 176
Portable Lighting Units for Use in Hazardous Locations (QPKX) ....................................... 176
Process Control Equipment for Use in Hazardous Locations (QZUW) ................................ 177
Purging and Pressurizing Controls and Accessories for Use in Hazardous Locations (RFPW) .. 177
Radio Devices for Use in Hazardous Locations (RMRG) .................................................. 177
Radio Devices, Rebuilt for Use in Hazardous Locations (RMZG) ....................................... 177
Receptacle-Plug Combinations for Use in Hazardous Locations (RRAI) ............................ 178
Receptacle-Plug Combination Accessories for Use in Hazardous Locations (RRHS) .......... 178
Receptacles with Plugs for Use in Hazardous Locations (RROH) ...................................... 178
Receptacles with Plugs Interlocked with Circuit Breakers for Use in Hazardous Locations (RSBZ) 179
Receptacles with Plugs Interlocked with Switches for Use in Hazardous Locations (RSXP) .... 179
Reels, Cord for Use in Hazardous Locations (SAOX) ....................................................... 179
Refrigeration Equipment for Use in Hazardous Locations (SSCR) ..................................... 179
Accessories for Use in Hazardous Locations (SSPF) ......................................................... 179
Controllers, Refrigeration for Use in Hazardous Locations (STDX) ................................... 179
Commercial Refrigerators and Freezers for Use in Hazardous Locations (STVR) .............. 179
Water Coolers for Use in Hazardous Locations (SUFT) ...................................................... 180
Releasing Device Equipment for Use in Hazardous Locations (TBXG) .............................. 180
Heat Detectors for Releasing Device Service for Use in Hazardous Locations (TBGR) .......... 180
Releasing Devices for Use in Hazardous Locations (TBW) .............................................. 180
Repackaged Hazardous Locations Equipment (TEFS) ...................................................... 180
Rotary Automatic Product Filling Equipment for Use in Hazardous Locations (TONI) ....... 181
Signal Appliances for Use in Hazardous Locations (UFXR) .............................................. 181
Audible Signal Appliances for Use in Hazardous Locations (UGKZ) ................................ 181
Extinguishing System Attachments for Use in Hazardous Locations (UGHX) .................. 181
Fire Alarm Devices for Use in Hazardous Locations (UHMV) ......................................... 181
Flame-automotive Fire Detectors for Use in Hazardous Locations (UQAO) ....................... 182
Ground Indicators for Use in Hazardous Locations (UJMR) .............................................. 182
Heat-automated Devices for Special Application for Use in Hazardous Locations (UJPF) .... 182
Heat-automatic Fire Detectors for Use in Hazardous Locations (UIR) ............................... 182
Signal System Units for Use in Hazardous Locations (UIJT) ............................................ 183
Signal Appliances, Miscellaneous for Use in Hazardous Locations (UIPA) ....................... 183
Signal Equipment Accessories for Use in Hazardous Locations (UQGO) ........................... 183
Visual-Signal Devices for Use in Hazardous Locations (UJTK) ........................................ 183
Signal Appliances and Equipment for the Hearing Impaired for Use in Hazardous Locations (UXC) 184
Solendom for Use in Hazardous Locations (VAPT) ......................................................... 184
Solendom Pumps for Use in Hazardous Locations (VAWS) .............................................. 184
Solvent Distillation Units for Use in Hazardous Locations (VMIC) .................................. 184
Sound Metering Equipment for Use in Hazardous Locations (VBHY) ............................. 185
Sound Recording and Reproducing Equipment for Use in Hazardous Locations (VCSV) ..... 185
Sprinkler System Water Control and System Devices for Use in Hazardous Locations (VQNT) 185
Special System Water Control Valves and System Accessories for Use in Hazardous Locations (VQTR) 185
Special System Water Control Valves, Class I, for Use in Hazardous Locations (VQBW) .... 185
Switches, Pressure for Use in Hazardous Locations (VRBR) ........................................... 186
<table>
<thead>
<tr>
<th>Page</th>
<th>Static Neutralizing Equipment for Use in Hazardous Locations (VXDY)</th>
<th>186</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Straps, Restraint, Electrically Conductive, Relating to Hazardous Locations (VZAR)</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Surge Protectors and Isolators for Use on Cathodically Protected Systems for Use in Hazardous Locations (VZQO)</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Switches for Use in Hazardous Locations (WQN)</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Switches, Clock Operated for Use in Hazardous Locations (WRBD)</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Enclosed Switches for Use in Hazardous Locations (WRPR)</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Snap Switches for Use in Hazardous Locations (WSQX)</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Switches, Miscellaneous for Use in Hazardous Locations (WTEY)</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Tank Monitoring Equipment for Use in Hazardous Locations (WWQ)</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Telemetering Equipment for Use in Hazardous Locations (WYMV)</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Telemetering Equipment Accessories for Use in Hazardous Locations (YWSO)</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Telephones for Use in Hazardous Locations (WZAT)</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>Telephone Accessories for Use in Hazardous Locations (WZC)</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>Temperature-indicating and Regulating Equipment for Use in Hazardous Locations (XIAZ)</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>Time-indicating and Recording Appliances for Use in Hazardous Locations (XCV)</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>Tools for Use in Hazardous Locations (XVLX)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Portable Electric Tools for Use in Hazardous Locations (XKWH)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Transformers for Use in Hazardous Locations (XPAF)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Transformers, General Purpose for Use in Hazardous Locations (XJIP)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Transformers, Distribution, Liquid-filled Type, Over 600 V for Use in Hazardous Locations (XPLP)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Trucks, Industrial for Use in Hazardous Locations (XVHY)</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Trucks, Industrial for Use in Hazardous Locations (XXG)</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Storage Batteries, Trucks, Electric for Use in Hazardous Locations (XXIV)</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Tubing and Hose, Electrically Conductive, Relating to Hazardous Locations (YDGDZ)</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Tunnel Drilling Guidance Systems for Use in Hazardous Locations (YDUE)</td>
<td>191</td>
</tr>
<tr>
<td></td>
<td>Valves, Electric for Use in Hazardous Locations (YTS)</td>
<td>191</td>
</tr>
<tr>
<td></td>
<td>Ventilators, Power for Use in Hazardous Locations (XPF)</td>
<td>191</td>
</tr>
<tr>
<td></td>
<td>Electrical Industrial Vibrators for Use in Hazardous Locations (ZBRX)</td>
<td>191</td>
</tr>
<tr>
<td></td>
<td>Viscometers for Use in Hazardous Locations (ZCFC)</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>Boxes, Junction and Pull for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (BQYM)</td>
<td>198</td>
</tr>
<tr>
<td></td>
<td>Cable Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (CYMY)</td>
<td>198</td>
</tr>
<tr>
<td></td>
<td>Camera Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (CYPB)</td>
<td>198</td>
</tr>
<tr>
<td></td>
<td>Conduit Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (ERBM)</td>
<td>198</td>
</tr>
<tr>
<td></td>
<td>Corrosion Measuring Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (ELHN)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Drilling Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FDJJ)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Marine Shipboard Cable Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FDJF)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Emergency Lighting Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FTHR)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Enclosures for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (FTQH)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Enclosure Accessories for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (FTRI)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Exit Signs and Exit Apparatus for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (FWDD)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Exit Signs and Markers for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (FWDI)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Luminaire Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (HSSN)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Luminaire Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (IHRV)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Luminaires for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (KIJH)</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Gas and Vapor Detection Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (LJVC)</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Gas and Vapor Detection Equipment for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (LJVR)</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Heat exchanger Cable Sets for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (KHTD)</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Heaters, Industrial and Laboratory for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (KOU)</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Lamps, Decorative (DGXO)</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>Lamps, Decorative Ornaments (DGXC)</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>Christmas Tree and Decorative Outfit Accessories (DGWU)</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>Electric Ornaments (DGXO)</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>Electric Ornaments, Decorative (DGXW)</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>buurt 2 Hazardous Locations (VZQO)</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Surge Protectors and Isolators for Use on Cathodically Protected Systems for Use in Hazardous Locations (VZQO)</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Switches for Use in Hazardous Locations (WQN)</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Switches, Clock Operated for Use in Hazardous Locations (WRBD)</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Enclosed Switches for Use in Hazardous Locations (WRPR)</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Snap Switches for Use in Hazardous Locations (WSQX)</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Switches, Miscellaneous for Use in Hazardous Locations (WTEY)</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Tank Monitoring Equipment for Use in Hazardous Locations (WWQ)</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Telemetering Equipment for Use in Hazardous Locations (WYMV)</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Telemetering Equipment Accessories for Use in Hazardous Locations (YWSO)</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Telephones for Use in Hazardous Locations (WZAT)</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>Telephone Accessories for Use in Hazardous Locations (WZC)</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>Temperature-indicating and Regulating Equipment for Use in Hazardous Locations (XIAZ)</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>Time-indicating and Recording Appliances for Use in Hazardous Locations (XCV)</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>Tools for Use in Hazardous Locations (XVLX)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Portable Electric Tools for Use in Hazardous Locations (XKWH)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Transformers for Use in Hazardous Locations (XPAF)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Transformers, General Purpose for Use in Hazardous Locations (XJIP)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Transformers, Distribution, Liquid-filled Type, Over 600 V for Use in Hazardous Locations (XPLP)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Trucks, Industrial for Use in Hazardous Locations (XVHY)</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Trucks, Industrial for Use in Hazardous Locations (XXG)</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Storage Batteries, Trucks, Electric for Use in Hazardous Locations (XXIV)</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Tubing and Hose, Electrically Conductive, Relating to Hazardous Locations (YDGDZ)</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Tunnel Drilling Guidance Systems for Use in Hazardous Locations (YDUE)</td>
<td>191</td>
</tr>
<tr>
<td></td>
<td>Valves, Electric for Use in Hazardous Locations (YTS)</td>
<td>191</td>
</tr>
<tr>
<td></td>
<td>Ventilators, Power for Use in Hazardous Locations (XPF)</td>
<td>191</td>
</tr>
<tr>
<td></td>
<td>Electrical Industrial Vibrators for Use in Hazardous Locations (ZBRX)</td>
<td>191</td>
</tr>
<tr>
<td></td>
<td>Viscometers for Use in Hazardous Locations (ZCFC)</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>Drilling Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FDJJ)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Marine Shipboard Cable Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FDJF)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Emergency Lighting Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (FTHR)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Enclosures for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (FTQH)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Enclosure Accessories for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (FTRI)</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>Exit Signs and Exit Apparatus for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (FWDD)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Exit Signs and Markers for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (FWDI)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Luminaire Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (HSSN)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Luminaire Fittings for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (IHRV)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Luminaires for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (KIJH)</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Gas and Vapor Detection Equipment for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (LJVC)</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Gas and Vapor Detection Equipment for Use in Class I, Zone 0, 1, and 2 Hazardous Locations (LJVR)</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Heat exchanger Cable Sets for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (KHTD)</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Heaters, Industrial and Laboratory for Use in Class I, Zone 0, 1 and 2 Hazardous Locations (KOU)</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Lamps, Decorative (DGXO)</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>Lamps, Decorative Ornaments (DGXC)</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>Christmas Tree and Decorative Outfit Accessories (DGWU)</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>Electric Ornaments (DGXO)</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>Electric Ornaments, Decorative (DGXW)</td>
<td>216</td>
</tr>
<tr>
<td>Category</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>Cleaning Machines (DMDT)</td>
<td>217</td>
<td></td>
</tr>
<tr>
<td>Vacuum Cleaning Machines and Blower Cleaners (DMLW)</td>
<td>217</td>
<td></td>
</tr>
<tr>
<td>Custom-built Kitchen Units (KDIT)</td>
<td>218</td>
<td></td>
</tr>
<tr>
<td>Door, Drapery, Gate, Louver, and Window Operators and Systems (FDDR)</td>
<td>218</td>
<td></td>
</tr>
<tr>
<td>Door Panel Assemblies (FDIT)</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td>Fans, Ceiling Suspended (GPRT)</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td>Fans, Electric (GPWV)</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td>Flexible Lighting Products (ILCI)</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>Garage Equipment (KGVV)</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>Gate and Elevator, Residential and Recreational Vehicles (KJIS)</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>Health Care Facilities Equipment (KEVQ)</td>
<td>221</td>
<td></td>
</tr>
<tr>
<td>Hospital Ground Jacks and Grounding Cord Assemblies (KEVX)</td>
<td>221</td>
<td></td>
</tr>
<tr>
<td>Isolated Power Systems Equipment (KEVW)</td>
<td>221</td>
<td></td>
</tr>
<tr>
<td>Isolated Power Wall Modules (KEXS)</td>
<td>221</td>
<td></td>
</tr>
<tr>
<td>Medical and Dental Equipment, Professional (KFBQ)</td>
<td>222</td>
<td></td>
</tr>
<tr>
<td>Medical Waste Systems (KFGZ)</td>
<td>222</td>
<td></td>
</tr>
<tr>
<td>Power Supplies for Use in Health Care Facilities (KFGC)</td>
<td>222</td>
<td></td>
</tr>
<tr>
<td>Television/Video Equipment for Use in Health Care Facilities (KFCV)</td>
<td>223</td>
<td></td>
</tr>
<tr>
<td>Uninterruptible Power Supplies for Use in Health Care Facilities (KFGF)</td>
<td>223</td>
<td></td>
</tr>
<tr>
<td>Heaters and Heating Equipment (KBBV)</td>
<td>223</td>
<td></td>
</tr>
<tr>
<td>Air Heaters, Moveable and Wall or Ceiling Hung (KKPT)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Air Heaters, Room, Fixed and Location (KDDL)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Board Base Heaters (KDES)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Baseboard Heater Accessories (KLQZ)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Clothes Dryers (KMX)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Clothes Dryer Transition Ducts (KMIX)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Laundry Equipment Accessories (KNKD)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Control Panels, Remote, for Electric Duct Heaters (KMLW)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Heaters, Cooking Appliances (KMSV)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Commercial Cooking Appliances (KXNS)</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Commercial Cooking Appliances with Integral Recirculating Ventilation Systems (KKNG)</td>
<td>226</td>
<td></td>
</tr>
<tr>
<td>Commercial, with Integral Systems for Limiting the Emission of Grease-laden Air (KNLZ)</td>
<td>226</td>
<td></td>
</tr>
<tr>
<td>Custom-built Food Service Equipment (KNNS)</td>
<td>227</td>
<td></td>
</tr>
<tr>
<td>Filters for Cooking Oil, Commercial (KNRF)</td>
<td>227</td>
<td></td>
</tr>
<tr>
<td>Household Cooking Appliances, Classified (KNSY)</td>
<td>227</td>
<td></td>
</tr>
<tr>
<td>Household Cooking Appliances (KNUR)</td>
<td>228</td>
<td></td>
</tr>
<tr>
<td>De-icing and Snow Melting Equipment (KQBO)</td>
<td>228</td>
<td></td>
</tr>
<tr>
<td>Duct Heaters, Electric (KOHZ)</td>
<td>228</td>
<td></td>
</tr>
<tr>
<td>House, Sauna and Steam Bath (KPIV)</td>
<td>229</td>
<td></td>
</tr>
<tr>
<td>Sauna Heating Equipment (KPSX)</td>
<td>229</td>
<td></td>
</tr>
<tr>
<td>Steam Bath Equipment (KBQZ)</td>
<td>229</td>
<td></td>
</tr>
<tr>
<td>Immersion Tank Liquid Heaters, Industrial (KQGV)</td>
<td>229</td>
<td></td>
</tr>
<tr>
<td>Heaters, Industrial and Laboratory (KQJ)</td>
<td>229</td>
<td></td>
</tr>
<tr>
<td>Microwave Cooking Appliances (KQSSQ)</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>Pipe Heating Cable (KQFU)</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>Mobile/manufactured Home Pipe Heating Cable (KQVF)</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>Heating Cable (KVU)</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>Pipe Heating Cable, Industrial and Commercial (KQXR)</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>Residential Pipe Heating Cable (KQYI)</td>
<td>231</td>
<td></td>
</tr>
<tr>
<td>Heaters, Radiant Heating Equipment (KQYZ)</td>
<td>231</td>
<td></td>
</tr>
<tr>
<td>Ranges, Household Electric (KRMX)</td>
<td>231</td>
<td></td>
</tr>
<tr>
<td>Water Heaters (KSAV)</td>
<td>232</td>
<td></td>
</tr>
<tr>
<td>Commercial Storage Tank and Booster Water Heaters (KSBZ)</td>
<td>232</td>
<td></td>
</tr>
<tr>
<td>Heat Pumps for Special Use (KSCZ)</td>
<td>232</td>
<td></td>
</tr>
<tr>
<td>Water Heaters, Space Heating (KSDR)</td>
<td>233</td>
<td></td>
</tr>
<tr>
<td>Household Water Heaters, Storage Tank (KSDT)</td>
<td>233</td>
<td></td>
</tr>
<tr>
<td>Immersion Heaters (KSFX)</td>
<td>234</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous Water Heaters (KSGR)</td>
<td>234</td>
<td></td>
</tr>
<tr>
<td>Heaters, Waterbeds (KSSH)</td>
<td>234</td>
<td></td>
</tr>
<tr>
<td>Heaters, Specialty (KSOT)</td>
<td>234</td>
<td></td>
</tr>
<tr>
<td>Heat Recovery Ventilators, Ducted (LZTW)</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>Hydraulic Bath Tub Systems (NCHX)</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>Information Technology Equipment (NQG)</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>Lamps (OKHP)</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>Lamps, Self-ballasted and Lamp Adapters (OOLR)</td>
<td>241</td>
<td></td>
</tr>
<tr>
<td>Lamps, Specialty (OONB)</td>
<td>241</td>
<td></td>
</tr>
<tr>
<td>Lamps, Tungsten Halogen (OOOJ)</td>
<td>241</td>
<td></td>
</tr>
<tr>
<td>Medical Equipment (PDDF)</td>
<td>242</td>
<td></td>
</tr>
<tr>
<td>Microwave and Cable Communication Equipment (PONP)</td>
<td>243</td>
<td></td>
</tr>
<tr>
<td>Antenna Positioning Equipment (POQ)</td>
<td>243</td>
<td></td>
</tr>
<tr>
<td>Communication Antennas (POQQ)</td>
<td>243</td>
<td></td>
</tr>
<tr>
<td>Microwave Communication Equipment (POVJ)</td>
<td>243</td>
<td></td>
</tr>
<tr>
<td>Office Furnishing Equipment (POVY)</td>
<td>243</td>
<td></td>
</tr>
<tr>
<td>Office Furnishing Lights (QAXB)</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>Portable Lighting Products (QOTV)</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>Portable Cabinet Luminaires (QOVJ)</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>Luminaires, Portable (QOWZ)</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>Lampshades (QOXX)</td>
<td>245</td>
<td></td>
</tr>
<tr>
<td>Nightlits (QOYX)</td>
<td>245</td>
<td></td>
</tr>
<tr>
<td>Portable Louver Kits and Subassemblies (QPAM)</td>
<td>245</td>
<td></td>
</tr>
<tr>
<td>Portable Work Lights (QPCJ)</td>
<td>245</td>
<td></td>
</tr>
<tr>
<td>Sun and Heat Lamps (QFDY)</td>
<td>245</td>
<td></td>
</tr>
<tr>
<td>Telecommunication Equipment (QWYE)</td>
<td>246</td>
<td></td>
</tr>
<tr>
<td>Custom-built Telecommunication Equipment (QYKM)</td>
<td>246</td>
<td></td>
</tr>
<tr>
<td>Telephones, Cellular (WLYR)</td>
<td>247</td>
<td></td>
</tr>
<tr>
<td>Telephone Appliances and Equipment (WYYQ)</td>
<td>247</td>
<td></td>
</tr>
<tr>
<td>Telephone Equipment, Legacy Installations (WYYX)</td>
<td>248</td>
<td></td>
</tr>
<tr>
<td>Tools (XIZS)</td>
<td>248</td>
<td></td>
</tr>
<tr>
<td>Tools, Semi-Automatic Woodworking Equipment (XKHS)</td>
<td>249</td>
<td></td>
</tr>
<tr>
<td>Tradeshow Equipment (XNR)</td>
<td>249</td>
<td></td>
</tr>
<tr>
<td>Exhibition Display Units, Accessories (XNRU)</td>
<td>249</td>
<td></td>
</tr>
<tr>
<td>Exhibition Display Units, Custom (XNSA)</td>
<td>249</td>
<td></td>
</tr>
<tr>
<td>Exhibition Display Units, Portable and Modular (XSNX)</td>
<td>249</td>
<td></td>
</tr>
<tr>
<td>Exhibition Display Units, Rebuilt (KNST)</td>
<td>249</td>
<td></td>
</tr>
<tr>
<td>Ventilators, Power (ZACT)</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Industrial Material Handlers (ZAS)</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Wreapped Cabinets (ZMHH)</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Pumping Equipment for Fire Service (QVUT)</td>
<td>253</td>
<td></td>
</tr>
<tr>
<td>Battery Chargers for Use with Internal Combustion Engines Driving</td>
<td>253</td>
<td></td>
</tr>
<tr>
<td>Centrifugal Fire Pumps (QWIR)</td>
<td>253</td>
<td></td>
</tr>
<tr>
<td>Fire Pump Motors (QXZ)</td>
<td>253</td>
<td></td>
</tr>
<tr>
<td>Pump Controllers, Fire (QYJS)</td>
<td>253</td>
<td></td>
</tr>
<tr>
<td>Pump Controllers, Fire, Over 600 V (QZGR)</td>
<td>253</td>
<td></td>
</tr>
<tr>
<td>Pump Controllers, Fire, Residential (QKE)</td>
<td>254</td>
<td></td>
</tr>
<tr>
<td>Signal and Fire Alarm Equipment and Services (SYKJ)</td>
<td>254</td>
<td></td>
</tr>
<tr>
<td>Control Units, System (UOIZ)</td>
<td>254</td>
<td></td>
</tr>
<tr>
<td>Detectors, Automatic Fire (UPLV)</td>
<td>255</td>
<td></td>
</tr>
<tr>
<td>Smoke-automatic Fire Detectors (URXO)</td>
<td>255</td>
<td></td>
</tr>
<tr>
<td>Smoke-automatic Fire Detector Accessories (URQO)</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>Smoke Detectors for Special Applications (URXG)</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>Fire Alarm Devices, Single- and Multiple-Station, and Accessories (UTER)</td>
<td>257</td>
<td></td>
</tr>
<tr>
<td>Single- and Multiple-station Heat Detectors (UTED)</td>
<td>257</td>
<td></td>
</tr>
<tr>
<td>Single- and Multiple-station Smoke Alarms (UTGT)</td>
<td>257</td>
<td></td>
</tr>
<tr>
<td>Heat Actuated Devices for Special Application (UTGU)</td>
<td>258</td>
<td></td>
</tr>
<tr>
<td>Household Fire-Warning System Units (UJLQ)</td>
<td>258</td>
<td></td>
</tr>
<tr>
<td>Control Units and Accessories, Household System Type (UOUT)</td>
<td>258</td>
<td></td>
</tr>
<tr>
<td>Luminaires and Luminaire Assemblies Classified for Fire Resistance (CDHW)</td>
<td>260</td>
<td></td>
</tr>
<tr>
<td>Speaker Assemblies for Fire Resistance (CHML)</td>
<td>260</td>
<td></td>
</tr>
<tr>
<td>Wall Opening Protective Materials (CLIV)</td>
<td>260</td>
<td></td>
</tr>
<tr>
<td>Electrical Circuit Protective Systems (FHI)</td>
<td>261</td>
<td></td>
</tr>
<tr>
<td>Electrical Circuit Protective Materials (FHIY)</td>
<td>262</td>
<td></td>
</tr>
<tr>
<td>Fire Resitive Cable (FHJR)</td>
<td>262</td>
<td></td>
</tr>
<tr>
<td>Plastics Used in Semiconductor Tool Construction (QMTW)</td>
<td>263</td>
<td></td>
</tr>
<tr>
<td>Thermal Barrier Systems (XCLF)</td>
<td>263</td>
<td></td>
</tr>
<tr>
<td>Batts and Blankets (XCLR)</td>
<td>263</td>
<td></td>
</tr>
<tr>
<td>Packing Materials (XCMC)</td>
<td>263</td>
<td></td>
</tr>
<tr>
<td>Preformed Mineral and Fiber Units (XCMK)</td>
<td>263</td>
<td></td>
</tr>
<tr>
<td>Through-penetration Firestop Systems (XHEZ)</td>
<td>263</td>
<td></td>
</tr>
<tr>
<td>Fill, Void or Cavity Materials (XHHW)</td>
<td>265</td>
<td></td>
</tr>
<tr>
<td>Firestop Devices (XHJ)</td>
<td>265</td>
<td></td>
</tr>
<tr>
<td>Forming Materials (XHKU)</td>
<td>265</td>
<td></td>
</tr>
<tr>
<td>Through-penetration Products (XHUM)</td>
<td>266</td>
<td></td>
</tr>
<tr>
<td>Prefabicated Buildings (QAR)</td>
<td>267</td>
<td></td>
</tr>
<tr>
<td>Prefabicated Units (QRHQ)</td>
<td>268</td>
<td></td>
</tr>
<tr>
<td>Commercial and Industrial Buildings (QRNZ)</td>
<td>268</td>
<td></td>
</tr>
<tr>
<td>Composite Panels (QRSY)</td>
<td>268</td>
<td></td>
</tr>
<tr>
<td>Residential Buildings (QTDT)</td>
<td>268</td>
<td></td>
</tr>
<tr>
<td>Heating Appliances (KCTR)</td>
<td>270</td>
<td></td>
</tr>
<tr>
<td>Boiler Assemblies (KVT)</td>
<td>271</td>
<td></td>
</tr>
<tr>
<td>Field-erected Boiler Assemblies (KQVE)</td>
<td>271</td>
<td></td>
</tr>
<tr>
<td>Sanitation, Food Service Equipment (TSQS)</td>
<td>272</td>
<td></td>
</tr>
<tr>
<td>Vending Machines for Food and Beverages (TSYA)</td>
<td>272</td>
<td></td>
</tr>
<tr>
<td>Ventilating Equipment for Commercial Cooking Appliances (XYLX)</td>
<td>272</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>Exhaust Hoods with Exhaust Dampers (YXZR)</td>
<td>272</td>
<td></td>
</tr>
<tr>
<td>Power Ventilators for Restaurant Exhaust Appliances (YZHW)</td>
<td>272</td>
<td></td>
</tr>
</tbody>
</table>
OVERVIEW OF THE UL FAMILY OF COMPANIES, THE UL MARK AND CONFORMITY ASSESSMENT SERVICES

The UL family of companies worldwide provides an extensive global network of conformity assessment services by thinking globally, acting locally and servicing fully. Globalization of the UL family of companies involves local delivery of a wide variety of conformity assessment services, including product certification programs. In UL’s globalized organization, each product certification program can be delivered from many geographical locations in order to meet customer service needs. Those who accept the UL product certification programs, both in the market and in governments, demand consistency and integrity in the programs regardless of the number of service delivery locations used. These acceptance interests believe all UL family product certification programs are and will be at the highest possible level of consistency and integrity. UL is dedicated to “working for a safer world.”

Clients from around the world request the UL family of companies to evaluate their products to applicable requirements. UL also evaluates products to requirements such as performance, environmental health, energy efficiency, software safety, and electromagnetic compatibility. Manufacturers whose products comply with the appropriate requirements are authorized to apply the UL Mark. UL audits products at manufacturing facilities through its factory Follow-Up Services, a critical part of its comprehensive safety certification program to check the means used by the manufacturers to determine that these products continue to meet the applicable requirements.

To manufacturers, regulatory authorities and consumers, the UL Mark is the most accepted and recognized safety certification mark. These Marks provide manufacturers with enhanced regulatory acceptance in many markets through one submittal process.

UL has been active internationally for more than 70 years, and has developed considerable global safety certification resources and expertise. UL helps manufacturers do business worldwide by identifying applicable international or regional product certification requirements, and by working with organizations in many countries to gain product testing and certification to these requirements.

In addition to investigating and certifying products, UL also conducts assessments of organizations to register them to the ISO 9000 quality management system standards, as well as ISO 13485 and 13488 for medical devices, ISO 14001 for environmental management systems, QS 9000 for automotive industry suppliers and TL 9000 for telecommunication industry suppliers.

Through UL’s conformity assessment services which include comprehensive safety certification and quality registration services, and a host of other activities, UL is dedicated to helping manufacturers, regulatory authorities, consumers and other groups to work for a safer world.

UL Marks

The prominence of UL’s certification mark, which includes the highly recognizable “UL in a circle symbol,” is UL’s greatest asset in UL name recognition, since it is applied to nearly 16 billion products each year. The “UL in a circle symbol” is authorized to be used as one of the required elements in UL’s certification mark, which is applied to products covered under UL’s Listing and Classification Service.

Conformity Assessment Services

UL’s Conformity Assessment Services include a broad spectrum of global programs and services that range from its core product safety certification services to management system registration and commercial inspection and testing services.

Listing Service

UL’s Listing Service is the most familiar form of UL’s product safety certification programs. The UL Listing Mark on a product means that the manufacturer has demonstrated the ability to produce a product that complies with appropriate requirements regarding reasonably foreseeable risks associated with the product. The UL Listing Mark for Canada is applied to products for use in Canada that have been evaluated to Canadian safety requirements. The UL Listing Mark for Canada and the U.S. is applied to products for use in the U.S. and Canada that have been evaluated to the requirements of both countries. UL conducts Follow-Up Service as an audit of the means the manufacturer uses to determine continued
compliance of the product with UL’s requirements.

**Classification Service**

With UL’s Classification Service, UL determines that a manufacturer has demonstrated the ability to produce a product that complies with its requirements for the purpose of classification or evaluation regarding one or more of the following: (1) specific risks only, such as casualty, fire or shock; (2) performance under specified conditions; (3) regulatory codes; (4) other standards, including international or regional standards; or (5) other conditions UL may consider desirable. UL conducts Follow-Up Service as an audit of the means the manufacturer uses to determine continued compliance of the product with UL’s requirements.

UL’s Classification Mark includes a qualifying statement designated by UL. A UL Classification Mark for Canada is used for products intended for the Canadian marketplace. It indicates that UL has used Canadian standards to evaluate the product for specific hazards or properties. A UL Classification Mark for Canada and the U.S. is used for products intended for the Canadian and U.S. marketplaces. This Mark indicates that UL has used the requirements of both countries to evaluate the product for specific hazards or properties.

**Component Recognition Service**

Many UL investigations of equipment involve an evaluation of the suitability of components such as relays, thermostats, switches, etc. for specific applications. Where such components are designed to comply with all the construction and performance requirements of the category, they are eligible for UL Listing and suitable for either field or factory installation.

In some situations, components of special design may be incomplete in construction or restricted in performance capabilities and not Recognized for use as field-installed components. These components may be entirely suitable for factory installation on other equipment where the limitations of use are known to the manufacturer and where their use within such limitations may be evaluated by UL.

With UL’s Component Recognition Service, UL determines that a manufacturer has demonstrated the ability to produce a component for use in an end product that complies with UL’s requirements. This type of evaluation takes into account the performance and construction characteristics of the end product and how the component will be used in that product. UL conducts Follow-Up Service as an audit of the means the manufacturer uses to determine continued compliance of the component with UL’s requirements.

UL Recognized Components, or their packaging, are eligible to bear the UL Recognized Component Mark, the UL Recognized Component Mark for Canada, or the UL Recognized Component Mark for Canada and the U.S. **The Recognized Component Mark does not provide evidence of listing or labeling which may be required by the National Electrical Code® or other installation codes or standards.**

*For more information about UL’s Listing, Classification or Component Recognition Services, contact a UL Customer Service Professional (see phone numbers listed on page 303) at the nearest UL office.*
Multiple Product Category Evaluation

Under this type of investigation, a product eligible for Listing, Classification or Recognition under more than one product category can be simultaneously evaluated for each category with one product submittal.

Certificate Service

UL’s Certificate Service is for field-installed systems consisting of Listed products, or for specific quantities of certain products intended for use at specified locations, where it is impractical to apply the UL Mark to the individual product. A UL Certificate is given to an authorized installer or manufacturer who can then provide it to a property owner or another ultimate user of the product or system.

Listing Card Service

This service provides information to customers on their Listing, Classification or Recognition. For pricing and ordering information, visit http://www.ul.com/info/listing.html or contact UL at (847) 664-2899 or fax (847) 509-6243.

Multiple Listing, Recognition or Classification Service

At a customer’s request, UL authorizes the customer’s distributors, retailers, manufacturers or others to apply their name to specific products submitted by the customer, evaluated by UL and authorized to bear the UL Mark. For more information on this service, contact a UL Customer Service Professional at the nearest UL office (see phone numbers listed on page 303).
Other UL Services

In addition to its Listing, Classification and Component Recognition Services, UL can provide manufacturers with a variety of related assessment, inspection and facility registration services.

Field Engineering Services

The UL Mark applies to the product as it is originally manufactured, when shipped from the factory. Authorized use of the UL Mark is the manufacturer’s declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know the effect a modification may have on the safety of the product or the continued validity of the UL Certification Mark unless the field modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate whether such changes “void” the UL Mark, or that the product continues to meet UL’s safety requirements.

An exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the marking on the product have been evaluated for use in that product.

UL evaluates installed equipment in the field that does not bear the UL Mark as well as equipment with the UL Mark that has been modified after shipment from the factory. A description of UL’s Field Engineering Services for installed equipment are described below.

For additional information regarding UL’s Field Engineering Services, visit our website at http://www.ul.com/regulators/field.html.

Field Evaluation Service

This service covers on-site safety evaluations of installed products or systems, conducted by UL technical staff. UL’s Field Evaluated Product Mark (below) can be applied to the product in the field if the product complies with UL’s safety requirements.

Field Investigation Service

This service covers on-site safety investigations of installed products that can’t be completely evaluated in the field. UL will investigate the product and issue a report to a regulatory authority. The report will describe the tests that could and could not be performed, as well as aspects of the product or installation that comply or do not comply with safety requirements. For the Field Investigation Service, UL does not apply a certification Mark to the product. However, a label (below) can be applied to the product that refers to UL’s letter report covering the investigation.
Field Inspection Service

This service covers on-site safety inspections of products that were eligible to bear a UL Mark at the time of manufacture, but the UL Mark is not present on the product. A UL representative can perform an inspection, and if the product is determined to meet UL requirements, a UL Mark will be applied to the product.

Electromagnetic Compatibility Testing

UL conducts a wide range of electromagnetic compatibility (EMC) tests on many electrical products. These tests include electromagnetic emissions and susceptibility evaluations.

The International “emc-Mark”

UL and five other organizations -- TüV Product Service GmbH and VDE Testing and Certification Institute of Germany; the Italian Quality Mark Institute (IMQ); the British Approvals Board for Telecommunication (BABT); and Quality Assurance Services Pty Ltd (QAS) in Australia -- offer clients EMC testing and certification to European, U.S., Japanese and Australian EMC requirements. Products may be evaluated simultaneously to any combination of these four markets for eligibility to bear the International “emc-Mark” (see above). In addition, clients receive an International “emc-Mark” Certificate, valid for one year, as evidence of EMC compliance. For details on any UL EMC service, contact a UL Customer Service Professional (see phone numbers listed on page 303) at the nearest UL office.

Performance Testing

Some products must conform to certain requirements or specifications related to their function, such as those designed for purposes of lighting, heating, cooling, communications or other functions. UL investigates these products for compliance to applicable performance requirements or specifications.

LAN Cable Performance Testing

UL evaluates local area network (LAN) cable for Verification to industry performance specifications. A related program covers electrical connecting hardware for compatibility with LAN cable. For more information on UL’s LAN Cable Verification Service, contact a UL Customer Service Professional (see page 303). For more information on UL’s program for connecting hardware, contact a UL Customer Service Professional (see page 303).

Energy Verification Service

UL’s Energy Verification Service helps manufacturers meet both the requirements of U.S. and Canadian regulations and demonstrate the energy efficiency ratings of their products to inspection authorities, utilities, distributors, customers and others. UL evaluates electric motors, lighting products, household appliances, heating and cooling equipment, and other types of energy-consuming products for energy efficiency. Products covered under UL’s Energy Verification Service are shown in UL’s Products Verified to Energy Efficiency Standards Directory. For more information concerning this service or to obtain the directory, contact a UL Customer Service Professional (see phone numbers listed on page 303) at the nearest UL office.

Other Performance Testing

UL evaluates the performance of many signaling devices such as fire and burglar alarm systems. In addition, UL evaluates telecommunications equipment to Bell Communication Research (Bellcore) specifications, as well as to the requirements of the Federal Communications Commission (FCC) and the Telecommunications Industry Association (TIA). For details about telecommunications equipment testing, contact a UL Customer Service Professional (see page 303).

In addition, UL evaluates products for compliance with the performance criteria of other organizations, including regional and international organizations or industry groups.
UL’s Services for Registration of Management Systems

To help companies meet the requirements of their industry, government purchasers and other customers, UL provides accredited management system Registration services to a variety of national or regional standards. UL’s Registration services are backed by a century of experience evaluating and inspecting products and systems in many different industries.

Multiple Accreditations and Worldwide Recognition

The Registration Programs offered by UL are accredited by:

<table>
<thead>
<tr>
<th>UL Registration Program</th>
<th>ANSI-RAB NAP</th>
<th>JAB</th>
<th>RvA</th>
<th>SAI</th>
<th>SCC</th>
<th>UKAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 9000 Series</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>ISO 14001 Series</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>QS 9000</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SA 8000</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TL 9000</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*ANSI-RAB NAP — Registrar Accreditation Board, National Accreditation Program

JAB — Japan Accreditation Board for Quality System Registration

RvA — Raad voor Accreditatie (formerly RvC)

SAI — Social Accountability International

SCC — Standards Council of Canada

UKAS — United Kingdom Accreditation Service

These accreditations, and UL’s longstanding reputation in the U.S. and abroad, means that a Registration from UL is recognized and accepted around the world.

UL also has an international network of registrar partners to help clients gain local registrations in a variety of countries. With a single registration process, clients can obtain registrations from many of the world’s leading organizations.

A Well-known Mark

To further enhance the recognition of a UL Registration, UL provides Registered clients with the UL Registered Firm Mark to use in advertising and promotional materials. Also, the names of UL Registered Firms appear in UL’s Registered Firms Directory, used by many purchasers seeking Registered companies.
For more information on UL Registration Programs, or other quality or management system standard requirements, such as AS 9000, BS 8800, TE Supplement, TÜ 16949, VDA 6.1, call 1-800-2UL-4ISO (1-800-285-4476) in the U.S. or Canada or call the nearest UL office (listed at the back of this Directory). Also visit our website at www.ul.com.

International Certification

With the expansion of the global marketplace, manufacturers and exporters are finding opportunities to sell products in many new markets. To enter these new markets, however, their products must meet diverse national, regional and international requirements. With over 70 years in the international arena, UL has the knowledge and experience to help customers gain access to international markets in a smooth and timely manner.

Through cooperative arrangements with international standards, testing, certification and quality registration organizations, UL can evaluate products to other countries’ standards and help gain acceptance by multiple certification organizations with one product submittal. UL can help customers receive national certifications under the CB Scheme, assist them in obtaining the European CE Marking and other regional and national marks, and can also Register clients’ facilities to international quality and environmental management system standards.

In North America, Europe, Asia and Latin America, UL has the accreditations, agreements, and affiliate facilities and expert staff to help customers gain access to international markets.

UL’s accreditation from the Standards Council of Canada (SCC) enables UL to evaluate products intended for the Canadian marketplace to Canadian codes and standards, and authorize customers to label these products with the UL Mark for Canada -- a Mark accepted in all Canadian provinces and territories. In addition, through UL’s affiliation with Underwriters’ Laboratories of Canada (ULC), UL can also offer customers with applicable products authorization to use the ULC Mark for Canada. In Mexico, through an arrangement with the government-accredited product certification organizations ANCE and NYCE, UL can help manufacturers anywhere in the world to obtain the NOM Mark, the government-required Mexican certification mark.

UL offers customers worldwide direct European safety certification of their products through UL International DEMKO A/S. UL International DEMKO A/S can provide UL customers with third-party verification to apply the CE Marking to their products. This verification can enable customers to market their products in countries throughout the European Union with a minimum of disruption.

In addition, UL operates affiliates in Europe to maximize service to customers. UL affiliates, UL International (U.K.) Ltd., UL International Germany GmbH, UL International Netherlands, UL International (France) SA and UL International Italia S.r.l., provide local testing of products for European manufacturers, to help them obtain the UL Mark, the UL Mark for Canada, the GS Mark for Germany and the Danish D Mark, and to support their use of the CE Marking for products sold in Europe.

In Asia, UL operates affiliates in Taiwan, Hong Kong, Korea, India, Japan and China as well as offices in Singapore, Thailand and Malaysia (addresses for these and other offices are listed at the back of this Directory.)

In addition, UL works with manufacturers in over 90 countries worldwide through nearly 200 Inspection Centers and Local Engineering Service offices, and has associations with other standards and certification organizations throughout the world.

For more information, contact International Certification Services.

Specialized Services

UL has specialized services and staff to help customers and others with various product certification and information needs.

Customer Service Professionals (CSPs)

At each of UL’s testing facilities, there are Customer Service Professionals (CSPs) who can answer questions, provide information and assist customers as they work with UL. CSPs help customers...
understand the product submittal process, identify the UL technical experts and learn about the variety of UL services. Contact a CSP by phone, fax or e-mail, see page 303 for locations and contact information.

**Regulatory Services**

What are the conditions of installation for products Listed or Classified by UL? How do these conditions relate to installation codes and standards?

UL’s Regulatory Services staff can provide answers to questions like these and can also furnish technical information and educational materials.

For more information, contact a Regulatory Services staff member at any of the U.S. offices listed at the back of this Directory or visit us online at http://www.ul.com/regulators.

**Local Engineering Services**

UL’s Local Engineering Services (LES) offices give customers access to UL engineers in their own local areas. In key centers around the U.S., UL operates LES offices that offer fast and convenient service. Customers can use these offices as quick sources of information or to receive on-site product investigations, Field Engineering Services or other engineering evaluations locally. The locations and addresses of these LES offices are listed at the back of this Directory.

**Fact-Finding Investigations**

In the interest of public safety, UL conducts Fact-Finding Investigations on an individual contract basis for manufacturers, trade associations, government agencies and others. Fact-Finding Investigations provide information or data that the sponsor can use, in seeking support for a proposed amendment to a nationally recognized installation code. These investigations result in a Fact-Finding Report. Contact a Customer Service Professional at any of UL’s offices (listed at the back of this Directory) for referral to the appropriate engineering staff.

**Research Services**

One more way that UL serves the interests of the public is by conducting research evaluations -- both for its own use and use by others -- on products or materials to help identify safety concerns and to assist in the development of appropriate safety requirements. This research is particularly useful when new technologies emerge or new safety concerns are explored. UL’s research expertise and facilities are available to manufacturers, trade associations, government and other groups. Contact a Customer Service Professional at the nearest UL U.S. office (see the back of this Directory) for referral to the appropriate engineering staff.

**Commercial Inspection and Testing Services**

UL’s trained field representatives and engineers, located throughout the U.S. and in many other countries, are available to perform specific inspections for inspection authorities, government officials, industry groups and others. UL’s Commercial Inspection and Testing Services are available for retailers, manufacturers, importers and exporters who require their sources or vendors to have products inspected before shipment. These inspections include Factory Assessment Inspections, First Article Inspections and other inspections as specified by the retailer or manufacturer. For more information, call UL’s Northbrook, Ill., office at (847) 272-8800, ext. 43651 or 43778 or e-mail cits@us.ul.com.
Manufacturers, regulatory authorities and other groups look to UL as a uniquely broad and accessible source of technical information in areas such as product testing and certification, domestic and international standards, international compliance requirements, and quality system registration. UL provides a variety of technical information services.

**Product Directories and CDs**

UL’s Online Certifications Directory of UL certified products can be accessed at www.ul.com.

UL’s printed Product Directories and CDs are published annually. Order a directory or CD by visiting http://www.ul.com/info/uldirs.htm or by contacting UL at (847) 664–2899 or fax (847) 509–6243.

Following is a list of the Product Directories and CDs currently available from UL:

<table>
<thead>
<tr>
<th>Annual Product Directory or CD</th>
<th>Month Distributed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Materials directory</td>
<td>February</td>
</tr>
<tr>
<td>Fire Protection Equipment directory</td>
<td>February</td>
</tr>
<tr>
<td>Fire Resistance directory</td>
<td>February</td>
</tr>
<tr>
<td>Roofing Materials &amp; Systems directory</td>
<td>February</td>
</tr>
<tr>
<td>Recognized Component directory</td>
<td>April</td>
</tr>
<tr>
<td>Plastics Recognized Component directory</td>
<td>April</td>
</tr>
<tr>
<td>Recognized Component &amp; Plastics Recognized Component CD</td>
<td>April</td>
</tr>
<tr>
<td>Electrical Appliance &amp; Utilization Equipment directory</td>
<td>June</td>
</tr>
<tr>
<td>Electrical Construction Equipment directory</td>
<td>June</td>
</tr>
<tr>
<td>Hazardous Locations Equipment directory</td>
<td>June</td>
</tr>
<tr>
<td>General Information for Electrical Equipment directory</td>
<td>June</td>
</tr>
<tr>
<td>Marine Products directory</td>
<td>August</td>
</tr>
<tr>
<td>Flammable &amp; Combustible Liquids &amp; Gases Equipment directory</td>
<td>October</td>
</tr>
<tr>
<td>Heating, Cooling, Ventilating &amp; Cooking Equipment and Food Safety Equipment directory</td>
<td>October</td>
</tr>
<tr>
<td>Plumbing &amp; Associated Products directory</td>
<td>October</td>
</tr>
<tr>
<td>Heating, Cooling, Ventilating &amp; Cooking Equipment, Food Safety Equipment, Plumbing &amp; Associated Products and Flammable &amp; Combustible Liquids &amp; Gases Equipment CD</td>
<td>October</td>
</tr>
</tbody>
</table>

**UL’s Website on the Internet**

Visit UL at www.ul.com for information on UL’s products and services. Topics include:

- UL Marks;
- UL product testing and certification, facility registration, and related services;
- seminars;
- technical information resources, such as Standards (including access to the Standards Electronic Bulletin Board System) and UL’s Online Certifications Directory.
- UL news and activities, including the latest news releases;
- information for regulatory authorities; and
- consumer information, and
- retailers
Helping Clients Promote Their UL Certification in Advertising Materials

By using the UL Mark and references to their UL product certifications in advertising and other communications, UL clients can show their customers that they care about safety. There are certain guidelines clients should follow, however, to be sure they’re clearly and accurately communicating this information to their customers.

To promote your UL Certifications, UL’s website www.ul.com/mark/show.html provides various tools, including information on how to correctly use the UL Mark in your promotion and packaging. The website also includes downloadable Marks as well as UL staff to contact if you have any questions.

As a service to clients, UL will review their use of the UL Mark and references to UL in promotional copy. Contact the UL staff at the office to which you normally submit your products.

On The Mark -- UL’s Publication on Global Conformity Assessment Issues

For UL clients and other constituents, this quarterly publication provides a wealth of timely information on a variety of U.S. and global conformity assessment trends and issues, including global trade opportunities resulting from changes in certification systems around the world. To request a free subscription to On The Mark, contact a Communication Services staff member at UL’s Northbrook, Ill., office at (847) 272-8800, ext. 43844 or 42440, or send a fax to (847) 509-6235. This publication is also available in an electronic format from UL’s Website at www.ul.com/about/otm/index.html.

UL Standards for Safety

UL Standards for Safety and Outlines of Investigation contain the requirements used to investigate products, materials, systems and components to determine whether they are eligible to bear UL’s Listing, Classification or Recognized Component Marks, or other applicable UL Marks. UL publishes more than 800 Standards and Outlines of Investigation. Approximately 70 percent of UL Standards have been approved as American National Standards by the American National Standards Institute (ANSI).

UL is a leading developer of voluntary product safety standards in the U.S. and also helps develop and harmonize safety requirements internationally. UL Standards are developed through an open process which includes the input of interested parties. UL Standards are also designed to be compatible with nationally recognized installation, building and safety codes.

For the convenience of users, UL Standards are available in electronic formats on computer diskette or electronic delivery through the Internet and in an electronic format on CD-ROM. UL Standards can be purchased separately, in sets with Standards for similar products, or through UL’s Standards Subscription Services. More information on these services is available in UL’s Standards for Safety Catalog.

Standards and Standards-on-Diskette Subscription Services

Subscribers to either of these services are informed of proposed Standards requirements and given the opportunity to comment on those requirements before they are adopted.

UL Standards Publications


To order Standards services

UL StandardsInfoNet

UL StandardsInfoNet — the Internet Website for information on UL Standards activities.

UL StandardsInfoNet provides access to UL’s current Standards for Safety Catalog and Product Index.

UL StandardsInfoNet provides up-to-date information pertaining to UL’s various Standards activities, such as information about new editions, revisions, proposed Standards, Bulletins, and Outlines of Investigation; a list of UL Standards approved by ANSI and the DoD; UL/CSA and UL/IEC harmonized Standards; the scope of each Standard and Outline of Investigation; meeting announcements, and the like.

UL StandardsInfoNet can be accessed at no cost by setting your browser’s URL to:

http://ulstandardsinfonet.ul.com

UL University Workshops

UL offers in-depth, hands-on and on-line educational workshops in key areas of interest. Topics covered by UL technical workshops include:

• Appliances: Designing for Compliance to IEC 335-1
• Audio/Video Equipment and Musical Instruments: Designing for Compliance to UL 6500 and IEC 60065
• The CE Marking: Strategies for European Compliance
• EMC: Planning for Compliance in the U.S., Europe, and the Pacific Rim
• Globalability: The Key to International Compliance
• Global Harmonization of Hazardous (Classified) Locations
• Information Technology and Communication Equipment: Designing for compliance to IEC 60950-1/CSA 60950-1/UL 60950-1 (1st Edition)
• Insulation and Thermal Concerns in Magnetics: Designing for Compliance to UL 1446
• The Medical Devices Directive
• Medical Device Software (IEC 60601-1-4): A Practical Guide to Software Process Control and Documentation
• Medical Equipment and Systems: Designing for Compliance to UL 60601-1 and IEC 60601-1
• Plastics in Electrical, Electronic and Mechanical Applications: Specifying and Evaluating Materials for Use
• Roofing Materials and Systems: Designing for Fire Safety
• Test, Measurement and Laboratory Use Equipment: Designing for Compliance to UL 61010A-1 (formally UL3101-1), UL 61010B-1 (formally UL 3111-1), and IEC 61010-1 (1st and 2nd Edition)
• Restrictive Substances Compliance Solutions (WEEE/RoHS)
• Hazard Based Safety Engineering
• UL 22 — Standard for Amusement & Gaming Equipment (5th Edition)
• Risk Management for Medical Devices
• China Symposium & CCC Workshop
• NEBS for the International Marketplace: US Network Entrance Requirements
• Food Facility Design
• North America Market Access for Wind Energy
• TC108
• UL 48 — Electrical Signs
• ISO/TS 16949 – Internal Quality Auditor Training
UL offers these workshops publicly throughout the year on-line, at locations around the world and privately at client’s facilities. For more information on these workshops, contact UL University Customer Care staff at 888-503-5536 or at support@uluniversity.com.
List of Underwriters Laboratories Inc. Locations

**United States**

**Northbrook Division, Illinois**
Corporate Headquarters
333 Pfingsten Road
Northbrook, IL 60062-2096
Customer Service:
Phone: +1-877-ULHELPS (1-877-854-3577)
Fax: +1 847-272–8129
E-mail: customerservice.nbk@us.ul.com
Web address: www.ul.com

**Brea Division, California**
2929 E. Imperial Hwy
Suite 100
Brea, CA 92821–6729
Phone: +1 714–223–3600
E-mail: +1 714–223–3660
E-mail: Shari.L.Hunter@us.ul.com

**Santa Clara Division, California**
1655 Scott Boulevard
Santa Clara, CA 95050-4169
Customer Service:
Phone: +1-877-ULHELPS (1-877-854-3577)
Fax: +1 408–296–3256
E-mail: customerservice.scl@us.ul.com
Web address: www.ul.com

**Novi Division, Michigan**
25175 Regency Drive
Novi, MI 48375-2155
Customer Service:
Phone: +1-800–341–4892
Fax: +1-248-427-5360
E-mail: novi.emc@us.ul.com
Web address: www.ul.com

**New York Division**
1285 Walt Whitman Road
Melville, NY 11747-3081
Customer Service:
Phone: +1-877-ULHELPS (1-877-854-3577)
Fax: +1-631-271–8259
E-mail: customerservice.mel@us.ul.com
Web address: www.ul.com

**North Carolina Division**
12 Laboratory Drive
P. O. Box 13995
Research Triangle Park, NC 27709-3995
Customer Service:
Phone: +1-877-ULHELPS (1-877-854-3577)
Fax: +1 919–547-6000
E-mail: customerservice.rtp@us.ul.com
Web address: www.ul.com

**Camas Division, Washington**
2600 N.W. Lake Road
Camas, WA 98607-8542
Customer Service:
Phone: +1-877-ULHELPS (1-877-854-3577)
Fax: +1 360–817-6000
E-mail: customerservice.cam@us.ul.com
Web address: www.ul.com

**Local Engineering Service Locations**

**Alaska**
P. O. Box 872261
Wasilla, AK 99687–2261
Phone: +1 907–356–5421
Fax: +1 907–356–5442
E-mail: David.F.Lombardo@us.ul.com

**California**
Brea – Los Angeles South
2929 E. Imperial Hwy
Suite 100
Brea, CA 92821
Phone: +1 818–381–7495
Fax: +1 661–257–4863
E-mail: Christopher.T.Spiker@us.ul.com

**Florida**
Woodland Corporate Center
8192 Woodland Center Boulevard
Tampa, FL 33614-2418
Phone: +1 813–882-3118
Fax: +1 813–882-3009
E-mail: Scott.J.Ritchie@us.ul.com

**Georgia**
2046 West Park Place
Suite F
Stone Mountain, GA 30087-3536
Phone: +1 770–498-9156
Fax: +1 770–498-9157
E-mail: Kimberly.M.Smith@us.ul.com

**Massachusetts**
7 Stuart Road
Chelmsford, MA 01824–4107
Phone: +1 978–250-7411
Fax: +1 978–250-5093
E-mail: Michael.Neuffer@us.ul.com

**Minnesota**
3550 Labore Rd.
Suite 1
Vadnais Heights, MN 55110
Phone: +1 651–765-1981
Fax: +1 651–765-1982
E-mail: James.A.Kleinke@us.ul.com
Missouri
14500 S. Outer Forty Drive
Suite 206
Chesterfield, MO 63017-5736
Phone: +1 314–205-0212
Fax: +1 314–205-0213
E-mail: Brian.W.Pegg@us.ul.com

Nevada
330 E. Warm Springs Rd.
Suite B-30
Las Vegas, NV 89119–4240
Phone: +1 702–315-4208
Fax: +1 702–315-4287
E-mail: John.A.Lechowicz@us.ul.com

Texas
14675 Midway Road
Suite 104
Addison, TX 75001-3149
Phone: +1 972–960-2669
Fax: +1 972–960-1022
E-mail: Donna.E.Barrett@us.ul.com

Washington State
144 Railroad Avenue
Suite 101
Edmonds, WA 98020-4121
Phone: +1 425–775-0688
Fax: +1 425–775-0688
E-mail: Karl.Keip@us.ul.com

Washington, DC
Government Services Office
1850 M. St. N.W.
Suite 1000
Washington, DC 20036–5833
Phone: +1 202–296-7840
Fax: +1 202–872-1576
E-mail: Gordon.Gillerman@us.ul.com

Indiana
Environmental Health Laboratories
110 S. Hill St.
South Bend, IN 46617–2702
Phone: +1 800–332–4345
Fax: +1 574–233–8207
E-mail: ehl@uhl.ul.com

International
UL Affiliates and Offices

Asia
China
UL-CCIC Company Ltd.
Suite 3201
CITIC Square
1168 Nanjing Xi Lu
Shanghai 200041 China
Customer Service:
Phone: +86–21–5292–9588
Fax: +86–21–5292–9515
E-mail: customerservice.sh.cn@cn.ul.com
Web address: www.ul-ccic.com

China
UL-CCIC Company Ltd.
Beijing Branch
3F, CIQ Bldg.
16 Ronghua Zhong Rd.
Beijing Economic &
Technological Development Area
Beijing, 100176 China
Phone: +86–10-6787–3739
Fax: +86–10-6787–4606
E-mail: customerservice bj.cn@cn.ul.com
Web address: www.ul-ccic.com

China
UL-CCIC Company Ltd.
Guangzhou Branch
34th Floor
The Jianlibao Tower
410 Dongfeng Zhong Road
Guangzhou 510030 China
Phone: +86–20–8348–6999
Fax: +86–20–8348–6777
E-mail: customerservice.gz.cn@cn.ul.com
Web address: www.ul-ccic.com

China
Underwriters Laboratories Inc.
Guangzhou Representative Office
34th Floor
The Jianlibao Tower
410 Dongfeng Zhong Road
Guangzhou 510030 China
Phone: +86–20–8348–7088
Fax: +86–20–8348–7188
E-mail: customerservice.gz.cn@cn.ul.com
Web address: www.ul-asia.com

China
UL-CCIC Company Ltd.
Shanghai Branch
Suite 2510 CITIC Plaza
1168 Nanjing Xi Lu
Shanghai 200041 China
Phone: +86–21–5292–9888
Fax: +86–21–5292–9886
E-mail: customerservice.sh.cn@cn.ul.com
Web address: www.ul-ccic.com

China
Underwriters Laboratories Inc.
Guangzhou Representative Office
34th Floor
The Jianlibao Tower
410 Dongfeng Zhong Road
Guangzhou 510030 China
Phone: +86–20–8348–7088
Fax: +86–20–8348–7188
E-mail: customerservice.gz.cn@cn.ul.com
Web address: www.ul-asia.com
Hong Kong
UL International Ltd.
18F, Delta House
3 On Yiu Street
Shatin, N.T. Hong Kong
Customer Service:
Phone: +852-2276-9898
Fax: +852-2276-9828
E-mail: customerservice.hk@hk.ul.com
Web address: www.ul-asia.com

India
UL India Private Ltd.
Titanium, #135
1st Floor, Airport Road
Kodihalli
Bangalore 560 017 India
Customer Service:
Phone: +91–80–5138–4500
Fax: +91 80 5204407
E-mail: customerservice.in@in.ul.com
Web address: www.ul-asia.com

Japan
UL Apex Co., Ltd.
4383–326 Asama-cho
Ise-shi Mie 516–0021 Japan
Customer Service:
Phone: +81–45–342-1200
Fax: +81–59–624–8020
E-mail: customerservice.jp@jp.ul.com
Web address: www.ul-asia.com

Japan
UL Apex Co., Ltd.
Yokohama Office Technical Center
Yokohama Business Park
134 Godo-cho, Hodogaya-ku
Yokohama-shi, Kanagawa 240–0005 Japan
Phone: +81–45–342–1111
Fax: +81–45–342–1600
E-mail: customerservice.jp@jp.ul.com
Web address: www.ul-asia.com

Japan
UL Apex Co., Ltd.
Head Office EMC Laboratory
4383–326 Asama-cho,
Ise-shi Mie 516–0021 Japan
Phone: +81–59–624–8116
Fax: +81–59–624–8124

Japan
UL Apex Co., Ltd.
Yokowa EMC Laboratory
Newstage Yokohama Bldg. 1F
1–1–32 Shin-Urashima-cho
Kanagawa-ku, Yokohama-shi Kanagawa
221–0031 Japan
Phone: +81–45–450–1515
Fax: +81–45–450–1534

Japan
UL Apex Co., Ltd.
Yamakita EMC Laboratory
907 Kawanishi, Yamakita-cho
Ashigarakami-gun Kanagawa 258–0124 Japan
Phone: +81–46–577–1011
Fax: +81–46–577–2112

Korea
UL Korea Ltd.
33rd Fl. Star Tower
737 Yeoksam-dong Kangnam-gu
Seoul 135–984 Korea
Customer Service:
Phone: +82–2–2009 9114
Fax: +82–2–2009 9400
E-mail: customerservice.kr@kr.ul.com
Web address: www.ul-asia.com

Malaysia
UL Services (Malaysia) Sdn. Bhd.
43-B, Jalan USJ 10/1A
47620 Subang Jaya
Selangor Darul Ehsan Malaysia
Phone: +603 5632–5922
Fax: +603 5632–5923
E-mail: customerservice.my@my.ul.com
Web address: www.ul-asia.com
Singapore
UL International Services Ltd.
Singapore Branch
1 Maritime Square, #09–17
Harbourfront Centre 099253 Singapore
Phone: +65–6274-0702
Fax: +65–6271-3867
E-mail: customerservice.sg@sg.ul.com
Web address: www.ul-asia.com

Taiwan
UL International, L.L.C.
Taiwan Branch
1st Floor
260 Da-Yeh Rd.
Pei Tou
Taipei Taiwan 112
Customer Service:
Phone: +886–2–2896-7790
Fax: +886–2–2891-7644
E-mail: customerservice.tw@tw.ul.com
Web address: www.ul-asia.com

Canada
Head Office and Laboratory
Underwriters Laboratories of Canada (ULC)
7 Underwriters Rd.
Toronto, Ontario, M1R 3B4 Canada
Phone: +1 866-937–3852 or
Phone: +1 416 757-3611
Fax: +1 416-757-9540
E-mail: customerservice@ulc.ca
Web address: www.ulc.ca

Montreal Engineering Laboratory
6505 Trans-Canada Highway
Suite 330
St-Laurent, QC H4T 1S3 Canada
Phone: +1 866–937–3852 or
Phone: +1 514–363–5941
Fax: +1 514–363–7014
E-mail: serviceclientele@ulc.ca
Web address: www.ulc.ca

Vancouver Engineering Laboratory
Underwriters Laboratories of Canada
130 - 13775 Commerce Parkway
Richmond, British Columbia V6V 2V4 Canada
Phone: +1 866–937–3852 or
Phone: +1 604–214-9555
Fax: +1 604–214-9550
E-mail: customerservice@ulc.ca
Web address: www.ulc.ca

Ottawa Standards and Government Relations Office
Underwriters Laboratories of Canada
440 Laurier Avenue West
Suite 200
Ottawa, Ontario K1R 7X6 Canada
Phone: +1 613–755–2729
Fax: +1 613–782–2228
E-mail: customerservice@ulc.ca
Web address: www.ulc.ca

Europe

Denmark
UL International DEMKO A/S
Lyskaer 8
P.O. Box 514
DK-2730
Herlev, Denmark
Phone: +45–44 85-65-65
Fax: +45–44-85-65-00
E-mail: info.dk@dk.ul.com
Web address: www.ul-europe.com

France
UL International (France) SA
Domaine Technologique de Saclay
Batiment Hermes
4 rue Rene Razel F-91400
Saclay, France
Phone: +33-(0)1-60-19-88-00
Fax: +33-(0)1-60-19-88-80
E-mail: info.fr@fr.ul.com
Web address: www.ul-europe.com

Germany
UL International Germany GmbH
Candidplatz 11 D–81543
Munchen, Germany
Phone: +49-(0)89-622703-0
Fax: +49-(0)89-622703-31
E-mail: info.de@de.ul.com
Web address: www.ul-europe.com

Italy
UL International Italia S.r.l.
Via Archimede, 42 I–20041
Agrate Brianza (MI), Italy
Phone: +39-039-6410-101
Fax: +39-039–6410–600
E-mail: info.it@it.ul.com
Web address: www.ul-europe.com

ITALY
UL International Italia S.r.l.
Zona Industriale Predda
Niedda St. 18 I–07100
Sassari, Italy
Phone: +39-079-2636-600
Fax: +39-079-260348
E-mail: info.it@it.ul.com
Web address: www.ul-europe.com
ITALY

Sicur Control S.r.l.
Via delle Industrie, 6 I–20061
Carugate (MI), Italy
Phone: +39-029-253–431
Fax: +39-029-2150062
E-mail: sicurcontrol@it.ul.com
Web address: www.ul-europe.com

Netherlands

UL International (Netherlands) B.V.
Landjuweel 52
NL-3905 PH Veendael, Netherlands
Phone: +31 (0) 318 581-310
Fax: +31 (0) 318 581-340
E-mail: info.nl@nl.ul.com
Web address: www.ul-europe.com

Norway

UL International Norway
Gaustadalleen 21
N-0340 Oslo, Norway
Phone: +47–22–95–80–46
Fax: +47–22–95–80–47
E-mail: info.no@no.ul.com
Web address: www.ul-europe.com

Spain

Underwriters Laboratories Iberica S. L.
Av. Diagonal 490 3° 1a
E–08006 Barcelona, Spain
Phone: +34–93-342-7500
Fax: +34–93-342-4996
E-mail: info.es@es.ul.com
Web address: www.ul-europe.com

Sweden

UL International (Sweden) AB
Stormbyvagen 2-4
Spanga Center
S-163 29 Spanga, Sweden
Customer Service:
Phone: +46-8-795-4373
Fax: +46-8-760-0317
E-mail: info.se@se.ul.com
Web address: www.ul-europe.com

Switzerland

UL International (Switzerland) Ltd.
Ringstr. 1
CH-8603 Schwerzenbach, Switzerland
Phone: +41–(0)43–355–402–0
Fax: +41–(0)43–355–403–9
E-mail: info.ch@ch.ul.com
Web address: www.ul-europe.com

United Kingdom

UL International (UK) Ltd.
Wonesh House
The Guildway
Old Portsmouth Road
UK — Guildford,
Surrey, GU3 1LR United Kingdom
Customer Service:
Phone: +44–(0)1483–402–010
Fax: +44–(0)1483–302–230
E-mail: info.uk@uk.ul.com
Web address: www.ul-europe.com

LATIN AMERICA

Argentina
UL de Argentina
Reconquista 1088 — Piso 11°
(C1003ABQ) Capital Federal
Buenos Aires, Argentina
Phone: +54-11-4316–8213
Fax: +54-11-4316–8260
E-mail: info.ar@ar.ul.com
Web address: www.ul-latinamerica.com

Brazil
UL do Brasil
Rua Fidencio Ramos, 195 - 2° Andar
Vila Olimpia 04551-010
Sao Paulo (SP), Brazil
Phone: +55-11-3049–8300
Fax: +55-11-3049–8252
E-mail: info.br@br.ul.com
Web address: www.ul-latinamerica.com

Chile
UL de Chile
Avenida Ricardo
Lyon 222 — Piso 13°
Oficina 1302
Providencia
Santiago, Chile
Phone: +56(2)–378–0053
Fax: +56(2)–424–2009
E-mail: info.cl@cl.ul.com
Web address: www.ul-latinamerica.com

Mexico
UL de Mexico
Monte Pelvoux No. 220 PB
Col. Lomas de Chapultepec
11000 Mexico D.F., Mexico
Phone: +52(55)–3000–5400
Fax: +52(55)–5294–7089
E-mail: info.mx@mx.ul.com
Web address: www.ul-latinamerica.com
Regulatory Services Staff

To contact UL Regulatory Services staff members, call the nearest UL office in the U.S. and ask for Regulatory Services. For more detailed contact information including contact names, phone, fax and e-mail addresses, visit the Regulators website at https://www.ul.com/auth/regcon.cfm.

Santa Clara, California
Phone: +1 800 595-9843

British Columbia, Canada
Phone: +1 250 598-1286

Ontario, Canada
Phone: +1 519 942-8962

Northbrook, Illinois
Phone: +1 800 595-9844

Melville, New York
Phone: +1 800 595-9842

Research Triangle Park, North Carolina
Phone: +1 800 595-9841

Taiwan
Phone: +011 886-2-2896-7790

Camas, WA
Phone: +1 800 595-9845

Seattle, WA
Phone: +1 425 778-2710, ext. 17