NATIONAL ELECTRIC MANUFACTURERS ASSOCIATION
Low Voltage Distribution Equipment Section

April 7, 2010

International Association of Certified Home Inspectors
Attn: Standards of Practice Committee
1750 30th Street
Boulder, CO 80301

On behalf of the National Electrical Manufacturers Association (NEMA), I respectfully ask the IACHI revise its electrical standards (section 2.7) contained within the IACHI Residential Standards of Practice as they pertain to the testing of arc fault circuit breakers (AFCIs). The specific standard reads:

> *2.7. Electrical*
>
> > *I. The inspector shall inspect:*
> >
> > > *H. a representative number of switches, lighting fixtures, and receptacles, including receptacles observed and deemed to be AFCI-protected during the inspection using an AFCI tester, where possible;*

The standard is unclear regarding the purpose of conducting a test using an "AFCI tester," officially listed as an AFCI Indicator. Is it to determine if an AFCI circuit breaker has been installed on a circuit that would require AFCI protection in accordance with the National Electrical Code or is it to determine if the AFCI function of the circuit breaker is functioning? Neither of these purposes can be definitively determined using an "AFCI tester." In fact, using an AFCI tester/indicator may yield confusing and conflicting results.

The UL standard for AFCIs (UL 1699) sets forth the requirements for the proper functioning of the device. A number of the tests are efficacy tests that subject the AFCI to various arcing scenarios. The AFCI must detect the arc and open the circuit before the cotton fire indicator ignites at the arcing location. In addition, the AFCI has to be able to resist tripping under a number of "normal arcing" scenarios that are established in the standard.

It is important to recognize that the UL 1699 standard does not set forth the method that a manufacturer must use to detect hazardous arcing conditions and resist normal arcing conditions. Manufacturers can and do utilize different and unique methods to achieve the expected result. For example, Manufacturer A may use one algorithm for detection and Manufacturer B may use something completely different. Both meet the standard and are acceptable AFCIs. This is an important concept to grasp in order to understand why "AFCI testers" may not necessarily work as intended in the field.

The reality is that there is no portable "AFCI tester" on the market today. If one looks closely at the products, they carry a listing as an "AFCI indicator." UL 1436 – Outlet Testers and Similar Indicating Devices is careful to refer to such devices as AFCI indicators not as "AFCI testers." In fact, the standard recognizes the differing nature of arc detection and requires a marking or notation in the instructions that states:

> *"CAUTION: AFCIs recognize characteristics unique to arcing, and AFCI indicators produce characteristics that mimic some forms of arcing. Because of this the indicator may give 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."*

Because of the variation in AFCI designs, an AFCI indicator may work with one manufacturer's product but may not work properly with another. It is also important to remember that AFCI manufacturers are constantly improving their products. These improvements can also result in an AFCI that functions properly and meets that standard, but no longer works with a specific AFCI indicator.

Additionally, the manufacturer of the AFCI indicator may not be familiar with the acceptable tolerances within the design of the AFCI itself. The AFCI indicator may function correctly with a device that falls into the middle of its tolerance band, but not work with an AFCI that is at the high or low end of the tolerance band, even though all of the devices represent a properly functioning AFCI. To determine whether an AFCI is functioning properly, only the "test" button on the AFCI should be used. Pushing the test button should result in the device opening. This is not a "mechanical" test. Pushing the "test" button imposes a simulated arcing condition on the circuit and the AFCI must be able to detect that arcing condition and open. If the device does not open, then the AFCI should be replaced. If the device opens when the "test" button is pressed and it can be reset, then it is a properly functioning AFCI and it has been "tested."

If the "test" button shows proper operation, then the AFCI is functioning correctly. This is true even if an AFCI indicator device does not trip the AFCI. AFCI manufacturers have seen cases where an AFCI has been replaced in the field only to be found functioning properly upon further evaluation. Some of these cases were the result of a false indication received from an AFCI indicator.

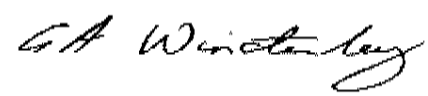
UL addressed this issue in a publication dated March 21, 2005, a copy of which is enclosed.

In summary, the "test" button on the AFCI is the only recognized method for testing the proper operation of an AFCI and using the handle of an AFCI circuit breaker to turn the power off is the only sure way to determine if outlets on a given branch circuit have been properly connected to an AFCI.

NEMA respectfully requests that either this requirement in your standard be deleted or a notation be added to clearly indicate that this may not be a definitive test. One possible solution would be to include the cautionary note from UL.

NEMA would appreciate a response from you indicating what action you intend to take. Thank you for your attention to this matter.

Sincerely yours,



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**AFCI indicators**

Recently, there have been a number of questions from the field about the response of arc fault circuit interrupter (AFCI) circuit breakers to commercially available AFCI indicators. AFCI indicators operate by producing a waveform similar to an arc fault. However, because they cannot produce an actual arc fault, an AFCI indicator may not trip every available AFCI.

Therefore, if an AFCI indicator plugged into a receptacle protected by an AFCI does not trip the AFCI, it does not mean that the AFCI protecting the circuit is defective and needs to be replaced. When this situation occurs, you should push the "Test" button provided as an integral part of the AFCI itself. If the integral test button does not trip the AFCI circuit breaker, it should be replaced.

To notify users of this product limitation, Underwriters Laboratories Inc. requires AFCI indicators to be marked or be provided with instruction manuals that state the following or equivalent:

> CAUTION: AFCIs recognize characteristics unique to arcing, and AFCI indicators produce characteristics that mimic some forms of arcing. Because of this the indicator may give 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.

For more information on AFCI indicators, contact Steve Brown in Melville, N.Y., by phone at +1-631-271-6200, ext. 22420; or by e-mail at Steven.A.Brown@us.ul.com. If you find a defective AFCI, please alert the product's manufacturer and UL through UL's AHJ Product Report Form available online at https://www.ul.com/regulators/ahjprod.cfm.

For more information on AFCI's, see the AFCI section of the Regulators Page on UL.com at http://www.ul.com/regulators/afci/index.cfm