



INFORMATION ON CONSTRUCTION REQUIREMENTS

Flame-Spread Ratings

When evaluating building materials for fire safety, many factors including ignition temperature, smoke toxicity and flame-spread are considered. Flame-spread, used to describe the surface burning characteristics of building materials, is one of the most tested fire performance properties of a material. The best known test for developing this rating is the American Society for Testing and Materials (ASTM) Test Method E-84, commonly known as the tunnel test.

The tunnel test measures how far and how fast flames spread across the surface of the test sample. In this test, a sample of the material 20 inches wide and 25 feet long, is installed as ceiling of a test chamber, and exposed to a gas flame at one end. The resulting flame spread rating (FSR) is expressed as a number on a continuous scale where inorganic reinforced cement board is 0 and red oak is 100. The scale is divided into three classes. The most commonly used flame-spread classifications are: Class I or A, with a 0-25 FSR; Class II or B with a 26-75 FSR; and Class III or C with a 76-200 FSR.

In general, inorganic materials such as brick or tile are Class I materials. Whole wood materials are usually Class II, while reconstituted wood materials such as plywood, particle board or hardboard are Class III. Whole wood is defined as wood used in the same form as sawn from the tree.

Though different species of wood differ in their surface burning (flame-spread) rates, most wood products have a flame-spread rating less than 200 and are considered Class C or III material. A few species have a flame-spread index slightly less than 75 and qualify as Class B or II materials. The chart below compiles information from various sources and shows flame-spread ratings for some common building materials:

| Flame-Spread Classification Flame-Spread Rating or Index | | |
|---|--------------------|--------------------|
| Class I (or A) 0 - 25 | | |
| Class II (or B) 26 - 75 | | |
| Class III (or C) 76 - 200 | | |
| Material/species | FlameSpread Rating | Flame-Spread Class |
| Hardboard siding panels | <200 | III |
| APA Wood Structural Panels (includes APA 303 Sidings such as T1-11) | 76-200 | III |
| Birch, Yellow | 80 | III |
| Brick | 0 | I |

| | | |
|--|---------|-----|
| Cedar, Western Red | 69 | II |
| Douglas-fir | 90 | III |
| Fiberboard, Medium Density | 167 | III |
| Gypsum Wallboard | 10-15 | I |
| Gypsum Sheathing | 15-20 | I |
| fiber-cement exterior materials | 0 | I |
| Hemlock, West Coast | 73 | II |
| Idaho white pine | 82 | III |
| Inorganic reinforced cement board | 0 | I |
| Maple | 104 | III |
| Masonite | <200 | III |
| Oak, Red or White | 100 | III |
| Oriented Strand Board (OSB) | 150 | III |
| Particle Board | 116-178 | III |
| Pine, Lodgepole | 98 | III |
| Pine, Ponderosa | 115 | III |
| Plywood, Fire-retardant-treated construction | 0-25 | I |
| Plywood, Oak | 125-185 | III |
| Plywood, Pine | 120-140 | III |
| Spruce, Engelmann | 55 | II |
| T1-11 | 76-200 | III |

The most widely accepted flame-spread classification system appears in the National Fire Protection Association Life Safety Code, NFPA No. 101. This Code groups the following classes in accordance with their flame-spread and smoke development:

Class A - Flame-spread 0-25, smoke developed 0-450.

Class B - Flame-spread 26-75, smoke developed 0-450.

Class C - Flame-spread 76-200, smoke developed 0-450.

NFPA 101 primarily applies this classification to interior wall and ceiling finish materials. Roof coverings must meet a different set of criteria.

Exterior Wall Construction

Exterior wall construction can be classified by its fire-resistance. A fire-resistive rating is the time that exterior wall construction can withstand fire exposure as determined by a standard fire test. Wall construction can be classified as 4-hour, 3-hour, 2-hour, 1-hour and non-rated construction. For example, 1-hour fire-resistant construction will withstand the standard fire exposure for one hour before the structural integrity of the wall fails. Most home construction is currently non-rated. This is not to say that non-rated homes have no fire resistance, it's just less than one hour. Typical home construction provides protection of about 40 to 50 minutes.

The following is Table No. 7-7-W-A from the 1997 U.B.C. Standards:

| Description of Finish | Time (minutes) |
|--------------------------------------|----------------|
| 3/8-inch Exterior-glue plywood | 5 |
| 1/2-inch Exterior-glue plywood | 10 |
| 5/8-inch Exterior-glue plywood | 15 |
| 3/8-inch gypsum wallboard | 10 |
| 1/2-inch gypsum wallboard | 15 |
| 5/8-inch gypsum wallboard | 30 |
| 1/2-inch Type X gypsum wallboard | 25 |
| 5/8-inch Type X gypsum wallboard | 40 |
| Double 3/8-inch gypsum wallboard | 25 |
| 1/2-inch + 3/8-inch gypsum wallboard | 35 |
| Double 1/2-inch gypsum wallboard | 40 |

Wood studs used in exterior wall assemblies are given a rating of 20 minutes (1997 U.B.C. Standards). If the space between the wood studs is filled with rock-wool insulation batts or glass-wool batts, an additional 15 minutes is allowed.

One-hour fire-resistant construction can be accomplished in many ways. The *Fire Resistance Directory*, published by the Underwriters Laboratory, lists many examples of fire-resistant exterior wall construction. Log and heavy timber construction is also considered 1-hour construction. Brick, real stucco, block, and stone meet or exceed the 1-hour requirements.

Summary

Realistically, no home is fire proof! However, fire-resistant home construction, coupled with proper defensible space, provides firefighters an excellent opportunity to protect your home. In the absence of defensible space and FireWise construction, firefighters may likely choose to locate resources elsewhere. FireWise construction need not be more costly than non-rated construction; in many cases it's less expensive!

The following table gives examples of costs for various sheathing and siding materials:

| Material | Flame-Spread Class | Typical Use | Cost | Cost (\$ per sq ft) |
|---------------------------------------|---------------------------|--------------------|-------------------------|----------------------------|
| T1-11 | III | siding | \$31.17 per 4'x8' panel | 0.97 |
| masonite panel | III | siding | \$24.03 per 4'x8' panel | 0.64 |
| Masonite plank | III | siding | \$6.49 per 8"x16' plank | 0.62 |
| Cement fiber panel | I | siding | \$24.03 per 4'x8' panel | 0.75 |
| Cement fiber plank | I | siding | \$5.32 per 8"x12'plank | 0.73 |
| 1" log veneer (pine) | III | siding | \$0.76 per lineal foot | 1.52 |
| 1" OSB | III | sheathing | \$10.94 per 4'x8' panel | 0.34 |
| 1" gypsum sheetrock | I | sheathing | \$4.80 per 4'x8' panel | 0.15 |
| 5/8" Type X exterior gypsum wallboard | I | sheathing | \$8.32 per 4'x8' panel | 0.26 |
| 5/8" Type X interior gypsum wallboard | I | sheathing | \$5.44 per 4'x8' panel | 0.17 |