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TECHNICAL BULLETIN

FLAME SPREAD VS. FIRE RESISTANCE

Several test methods are used to evaluate building materials for fire safety. We are often asked to explain the difference between flame spread (combustibility of a particular product) versus a test which measures the amount of time it takes for a fire to burn through a wall or roof assembly.

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 E84, commonly known as the tunnel test. The tunnel test measures how far and how fast flames spread across the surface of the test sample. For this test, a sample of the material is cut to 20 inches wide and 25 feet long. The sample is installed as the ceiling of the test chamber and exposed to a gas flame at one end. The FSR scale is represented on a scale of 0-100 with 0 being the best performer and 100 being the worst. 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.

ASTM E119 is a fire test used to determine the fire resistance of complete assemblies of materials. Fire resistance is expressed in hours. It is the length of time the assembly will contain a fire or retain its structural integrity. The time exposure of the test is pre-determined by the fire resistance requirement. In other words, if a two hour fire resistance is required, the testing time is two hours. Three hour resistance would be a three hour test, etc. An assembly is built, installed in the test chamber and (under highly controlled conditions) a fire is started on one side of the assembly. Failure occurs if the structural integrity of the assembly is compromised or if the fire burns through the assembly before the hour requirement has elapsed. The assembly passes the test if neither of these events occurs.

ASTM E84 and E119 (or their UL equivalents) are so different from one another that they simply cannot be compared. Many building materials can pass ASTM E84 but would never hold back a sustained fire for any length of time.

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