



Coffee Break Training - Fire Protection Series

Inspection Techniques: Wall and Ceiling Covering Flame Spread Classifications

No. FP-2012-37 September 11, 2012

Learning Objective: The student shall be able to explain the classification system for interior finish flame spread ratings.

Even if a building is constructed of noncombustible materials, human occupants often introduce combustible finishes to soften the environment. Many tragic fires have occurred from easily ignited or fast-burning interior finishes on walls or ceilings.

To identify and categorize materials to their relative fire risk, building codes classify interior wall and ceiling materials by flame spread ratings in accordance with requirements of American Society for Testing and Materials (ASTM) E84, *Standard Test Method for Surface Burning Characteristics of Building Materials* and National Fire Protection Association (NFPA) 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*. Materials are classified to indicate their ability to support combustion and flame. Finish materials are compared to the fire spread characteristics of red oak to express their relative risk.

Almost all building codes cite ASTM E84 as the basis for their applied standards. This test, widely known as the Steiner tunnel test, simulates a fire exposure of about 2,400 °F (1,316 °C) in the area of the flame. In the test, a 36 square foot (3.34 m²) test sample is placed in the top of the Steiner tunnel and heated by gas flames for 10 minutes at a rate of about 5,000 British thermal units (BTUs)/minute (88kW). This creates a temperature near the test sample of about 1,600 °F (900 °C).

The time is measured for the flame to travel down the tunnel for the length of the material or until the flame ceases. That time is then imposed on a scale developed by rating cement asbestos board time performance at “0” and the time performance of select grade red oak at “100.” These ratings indicate the rate at which fire will spread across the surface of a material. For example, a wall decorated with paper will have a faster flame spread rating than a bare wall.

The following table represents the classifications from the Steiner tunnel tests. The numbers in the Flame Spread Rating column are derived from mathematical formulas and are **not** interpreted as feet/second, inches/minute, etc.

Flame Spread Classifications

Class	Flame Spread Rating	Maximum Smoke Development
1 or A	0-25	450
2 or B	26-75	450
3 or C	76-200	450

Likewise, the Maximum Smoke Development values are mathematically derived from a light absorption per minute relationship. NFPA 255, Appendix D, provides a detailed explanation of the Steiner tunnel test procedures.



The walls and ceiling of this means of egress must meet specific flame spread rating standards.

