



# Coffee Break Training - Fire Protection Series

## Inspection Techniques: Floor Covering Fire Tests

No. FP-2012-38 September 18, 2012

**Learning Objective:** The student shall be able to explain the difference between Class I and Class II interior floor finishes.

Floor surfaces, because of their orientation and radiation feedback from heated upper layers of a fire, respond differently from walls or ceiling finishes. Consequently, they must be tested under different conditions.

Floor covering samples are tested in accordance with American Society for Testing and Materials (ASTM) E648, *Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Source* or National Fire Protection Association (NFPA) 253, *Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source* that measure “critical radiant flux”: the amount of energy from an overhead test apparatus that will ignite the floor finish. The test is intended to simulate the conditions from a room flashover.



Depending upon the local codes, the combustible carpet in this picture may have to comply with Class I or II interior floor finish requirements.

The building and fire codes establish floor finish “classes” based on the materials’ ignition resistance. Class I indicates a higher amount of heat is required ( $0.45 \text{ watts per square centimeter (W/cm}^2\text{)}$ ) to ignite the test sample. Class II indicates a lower amount of heat is required ( $0.22\text{W/cm}^2$ ). From a fire safety perspective, Class I is preferable to Class II.

Local building and fire codes should be reviewed for applicability of this test. Generally, critical radiant flux limits for specific use areas where automatic sprinkler protection is not provided are as follows:

- Class I: average minimum  $0.45\text{W/cm}^2$  within exits, access to exits (corridors) of health-care facilities, including hospitals, nursing homes, and new construction detention and correctional facilities; and
- Class II: average minimum  $0.22\text{W/cm}^2$  within exits, access to exits (corridors) of day care centers, existing detention and correctional facilities, hotels, dormitories, and apartment buildings.

These limits are based upon known performance of traditionally used materials and the performance of flooring systems when subjected to full-scale corridor fire tests. The higher level of critical radiant flux recommended within health-care occupancies is based on the assumption that nonambulatory occupants (patients) require a higher level of protection than would be necessary in buildings where occupants are mobile and rapid escape is possible.

Fire officials must remember that before approving a product for installation, the test data must represent the conditions in which the material will be used. For example, carpeting that will be installed on a wall must be tested in accordance with the flame spread requirements established in ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials* or NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials* (the Steiner tunnel test) rather than the critical radiant flux procedures.



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