Fire Safety Considerations

Fire Codes

Fire codes are intended to establish minimum requirements that provide a reasonable degree of safety from fire in buildings and structures. These requirements vary depending on the use, occupancy, and construction details of the specific building. From the standpoint of building materials the codes are generally concerned with flammability ratings of interior finish materials, combustibility of the construction and its components, and the ability of a construction to resist exposure to fire.

Interior Finish

Wall and ceiling surfaces are rated by their *flame spread index* (FSI) and *smoke developed index* (SDI). These ratings are determined in accordance with ASTM E 84, *Standard Method of Test of Surface Burning Characteristics of Building Materials*. This test method determines the relative performance value of the material being tested as compared to inorganic reinforced cement board (FSI = 0) and red oak (FSI = 100). Test methods designated NFPA 255, UL 723, and UBC Standard 8-1 are recognized as being equivalent to ASTM E 84.

Building codes have established three classes of performance, based upon flame spread and smoke developed indexes, which are used to specify requirements within the code:

CLASS DESIGNATION	FLAME SPREAD INDEX	SMOKE DEVELOPED INDEX
A or I	0-25	0-450
B or II	26-75	0-450
C or III	76-200	0-450

Floor surface finishes are evaluated for their flame propagation properties using ASTM E 648 or NFPA 253, *Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Source.* This test method measures a performance factor called *critical radiant flux*, measured in watts per square centimeter.

Combustibility

Materials that meet the criteria of ASTM E 136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace*, are classified as being noncombustible. In this test, a material sample is placed in the test furnace and its flaming time and the furnace temperature are measured. This test method is for the base material only and does not cover any surface coverings or coatings.

For materials that have a surface covering, the model building codes further define a noncombustible material as having a base material that meets the requirements of ASTM E 136 and a surface covering less than ⅛" (3mm) in thickness whose flame spread index is not greater than 50.

Model building codes also classify building construction types as noncombustible or combustible based on their materials of construction. Noncombustible constructions typically designated Types I and II are made from steel, iron, concrete or masonry. Combustible construction, typically designated Types III, IV, or V, can be made of materials specifically permitted by the code (typically wood).

Fire Resistance

The ability of a structure to remain in place and prevent the spread of flames and heat when exposed to fire conditions is termed its fire resistance or time fire rating and is determined in accordance with ASTM E 119, Standard Test Method for Fire Tests of Building Construction and Materials. In this test, a large scale construction sample is exposed to a standardized fire condition and performance is measured against test criteria which include temperature rise, ignition of cotton on the unexposed side of the sample, the ability of the sample to remain in place during the test period, and its ability to withstand a hose stream test after the fire test is completed. The fire resistance rating is stated in periods of time such as 2 hour, 1 hour, ¾ hour, and 20 minutes. The test allows the construction to be further classified as bearing or non-bearing walls. Test methods designated NFPA 251, UL 263, and UBC Standard 7-1 are recognized as being equivalent to ASTM E 119.

A number of laboratories and testing agencies throughout the United States are capable of conducting these types of tests. Several of these organizations also publish directories of tested assemblies that can be referenced by the construction industry. These include; *The UL Fire Resistance Directory, The Gypsum Association Fire Resistance Design Manual, The NFPA Fire Protection Handbook,* and the *FM Specification Tested Products Guide*.

Building codes regulate the type and location of materials used in building construction to provide for structural stability as well as for an acceptable degree of occupant safety when the building may be exposed to fire. Local code requirements must be consulted in order to determine specific compliance requirements.

Kraft and standard foil facings, used on CertainTeed products, are combustible and are not intended to be used in exposed applications. These facings must be covered, and in substantial contact, with a code approved interior finish material. Standard foil facing has a flame spread index not greater than 75 and a smoke developed index not greater than 450, meeting code requirements for a Class B surface finish. Kraft facings are not rated for surface burning characteristics.

FSK, ASJ, PSK, mat faced, and unfaced products have flame spread indexes not greater than 25 and smoke developed indexes not greater than 50, meeting code requirements for a Class A surface finish. These products are intended for use in exposed or concealed applications as permitted by local code requirements.

Unfaced AcoustaTherm and Thermal Batts are rated noncombustible in accordance with ASTM E 136.