

# ROOF DECK FACT CHECK



At one time, roof assemblies were assumed to be fire safe if the deck and its supports were of metal, particularly when the fire hazard of the building's contents were considered low to moderate. This type of roof construction was classed as "non-combustible" even though the vapor barrier, adhesive and roofing used were combustible.

A fire at the General Motors' transmission plant at Livonia, MI in 1953 proved the fallacy of this assumption. In that fire, highly combustible vapors from the asphalt roofing leaked through the metal deck, rapidly spreading fire along the underside of the

"non-combustible" roof assembly. The uncontrolled roof fire quickly spread throughout the 34-½ acre building, collapsing the unprotected metal roof.

The GM fire prompted the development of tests to assess the performance of roof assemblies in this type of fire exposure. The performance is measured by exposing a sample assembly to a controlled fire for 30 minutes in a standard test furnace. For approval and subsequent Underwriters' Laboratories listing as Fire Classified, the flame spread must not exceed 60 ft. in the 100 ft. furnace or 14 ft. in the 25 ft. tunnel furnace. Thermal degradation and combustive damage to the assembly is also evaluated and must diminish at increasing distances from the immediate fire exposure area. These limits were established to determine the acceptability of improved metal decks supporting asphaltic roofing. Tunnel tests on a fire-retardant-treated plywood system called NM 501 at Underwriters' Laboratories in 1961 gave results well below these limits.

Subsequent full scale tests at the Underwriters' Laboratories on a 20 ft. by 100 ft roof assembly with ¾" fire-retardant-treated plywood on fire-retardant-treated 2 x 12 joists spaced 48" on center confirmed the suitability of this roof system to perform on a parity with "Fire Classified" unprotected metal decks. After one-half hour of severe fire exposure simulating the effects of highly combustible contents, flame spread was less than for the metal roof and the fire-retardant-treated plywood system maintained its structural properties and shape longer than steel systems exposed to the same test.

Neither of these previous tests nor their results should be confused with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials and its results. ASTM E84 is a standard method to assess the spread of flame on the surface of a material. Often referred to as the "Tunnel Test," ASTM E84 involves installing a sample of material 20 inches wide and 25 feet long as the ceiling of a horizontal test chamber. The material is exposed to a gas flame on one end of the tunnel for a period of 10 minutes. The rate of flame front progression on the material is compared to selected standards of cement board and red oak and calculations made to assign a numeric value or Flame Spread Index.

An often confusing issue is whether a fire retardant paint or coating on OSB with a Flame Spread Index of 25 or less is the same as fire-retardant-treated plywood. The distinction between these products becomes even more critical when the roof system is used in noncombustible construction. One of the most important aspects to remember is this: Pressure impregnated fire-retardant-treated plywood was developed as an alternative to metal roof decks, it is given comparable insurance rates and fire-retardant-treated wood roof systems are suitable for the same uses. On the other hand, OSB products which claim to be the same as fire-retardant-treated plywood have not been tested in the full scale test and their performance has not been evaluated in comparison to the Fire Classified unprotected metal deck.

For more than 100 years the wood preserving industry has produced wood pressure impregnated with fire-retardant salts to enhance wood's performance in fire. Pressure impregnating lumber and plywood with fire-retardant treatments imparts properties important to fire safety. Fire-retardant-treated wood does not support combustion and there is no significant glowing after flames are removed. Also, fire-retardant treatments substantially reduce the combustion rate of wood while at the same time limiting flame spread.

**PYRO-GUARD®**

INTERIOR FIRE RETARDANT TREATED LUMBER AND PLYWOOD

**EXTERIOR FIRE-X®**

EXTERIOR FIRE RETARDANT TREATED LUMBER AND PLYWOOD



**NOT A PAINT**



**NOT A COATING**



**NOT A LAMINATE**



**JUST CODE  
COMPLIANT FRTW**

**PRESSURE IMPREGNATED THROUGHOUT**

