

EXTERIOR FIRE RETARDANT TREATMENTS FOR WOOD

P.A. Cooper, University of Toronto

Certain wood products in exterior use must be made fire resistant to meet the requirements of local building codes. For example, cedar shakes and shingles applied to residential homes in most of California and Texas must be fire rated; in other municipalities in the U.S.A. and Canada, wood roofs applied to more critical occupancies, e.g. row housing, apartment buildings or public buildings must be fire resistant. This is accomplished by pressure treating the wood with a leach-resistant fire retardant.

For a fire retardant to be rated "Weather resistant", treated wood must pass relevant ASTM or Canadian Standard fire tests after exposure to an accelerated rain test (ASTM D2898). In this test, treated material is exposed to alternate cycles of water spray and oven-drying at 140 F over a 12-week exposure period. About 800 inches of water are sprayed on the surface during the test. Also, panels of treated products are exposed to natural weathering for up to 10 years. Panels removed after 1,2,3,5 and 10 years and exposed to the relevant fire test.

For cedar shakes and shingles, weathered panels are evaluated by three fire tests under Standard ULC-S107 or ASTM E-108 "Fire Resistance of Roof Covering Materials":

Intermittent flame test simulates a flame lapping up over the eaves of a roof in an intermittent way, fanned by a wind.

Burning brand test simulates exposure of a roof to a piece of burning wood that lands on the roof and is fanned by a wind.

Flying brand test tests whether flaming or glowing pieces of wood are blown off a roof that has been exposed to a constant flame for a given period, then exposed to high wind velocity. The severity of exposure e.g. temperature of the flame, number and duration of flame exposures and size of burning brands are higher for fire retardant roofs (Class A or B) than for fire resistant roofs (Class C).

Treated lumber and plywood are evaluated by the 25 foot tunnel test (CAN S102 or ASTM E-84), again after exposure to the accelerated and natural weathering exposures.

Commercial exterior-rated fire retardants are based on the reaction products of various water soluble amino-formaldehyde resins and inorganic phosphorus compounds. The treating solutions are clear and colourless and do not affect the colour of treated wood. Since the resins are thermosetting, treated wood must be exposed to a drying cycle, followed by a relatively high temperature curing cycle. This may result in some embrittlement of the product, especially if the wood is overdried. This is a particular problem in cedar shakes or shingles, as treated wood may be more prone to splitting during installation.

Studies show that treated wood is more resistant to decay than untreated wood, and some bulking or dimensional stabilization of treated wood has been demonstrated.

At this time, there is only one treating plant in Canada treating with an exterior fire retardant: B.C. Cleanwood Preservers Ltd., Surrey, B.C.

As local building codes place more stringent fire resistance requirements on building materials for different uses, it is evident that the demand for exterior rated fire retardants will grow.