



Fire-Retardant Treated Plywood

This guide was produced to provide information regarding concerns associated with fire-retardant treated (FRT) plywood used for roof sheathing.

Starting in the early 1980s, several model building codes recognized FRT plywood roof sheathing as an alternate method to the use of parapets to provide a fire-rated assembly at the roof line in situations where building codes required fire-separation walls between dwelling units in townhouses, condominiums and apartment buildings. This product was actually designed so that exposure to fire would initiate a process called acid hydrolysis, where the release of acids would actually increase its resistance to flame spread during a fire. The rate of the reaction, which is affected by temperature, determines whether the wood will still retain sufficient strength after the degradation process starts.

By using FRT plywood along the fire-rated wall used to separate individual dwelling units, or groups of units, the required fire rating could be obtained at a much lower cost than constructing parapets through the roof. However, by the mid-1980s it became apparent that a large-scale problem was developing with several brands of FRT roof sheathing in that the sheathing was deteriorating to an unsatisfactory condition within several years after installation without any exposure to fire. At that time it was estimated that potentially defective FRT plywood was used in roof sheathing on over 1,000,000 housing units.

The problem with the early generation of certain fire-retardant treated plywood roof sheathing products was the premature deterioration and severe strength loss within several years of installation. This occurred even under the typical environmental conditions the sheathing was exposed to externally or within the attic. Subsequent studies indicated that the major factors in this premature degradation included:

- A plywood industry changeover to less corrosive chemicals, in the early 1980s resulted in some treatments that resulted in a breakdown of the wood at temperatures as low as 150°F (65° C).
- Roof sheathing temperatures exceeding 150°F, which, if it initiated acid hydrolysis, could render the plywood unserviceable and unsound within a period of a few months to a few years, depending on the treatment and the temperatures to which it had been exposed.
- Re-drying of the product during manufacture at only moderately elevated temperatures (above 150°F), following FRT pressure treatment could initiate degradation and a serious reduction in strength even before it was installed on a roof.
- Elevated attic humidity was also claimed by some experts to be a major contributor to deterioration.

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Fire-Retardant Treated Plywood (continued)

FRT plywood that is suitable for long-term use as a fire-rated roof sheathing is produced by using certain chemicals, which are buffered to neutralize acids that form at elevated temperatures, and by using certain organic compounds to “lock” treatment salts into the wood. Several producers had the right manufacturing process and quality control to ensure an acceptable product, others did not. But the variation in treatment methods made it difficult to determine whether a particular application would be subject to failure without an in-depth evaluation.

The characteristic dark reddish-brown, charred appearance of FRT plywood that has experienced degradation is one way of identifying possibly defective materials. Identification, however, is difficult in the early stages without removing the roofing, as the damage is most severe on the surface directly beneath the roofing. In some cases the plywood may warp severely and have a wavy appearance when seen from a distance. This can occur within a few months of installation or suddenly begin to develop based on the temperatures to which it has been exposed. In advanced cases, the plywood becomes brittle, and cracks and crumbles when stressed, as by pushing from the underside. Some FRT plywood has reportedly deteriorated in less than three years to the point that it will not support a person. For this reason, the presence of FRT Plywood is a concern to firefighters and any one that might work on a roof.

If a series of connected dwellings (such as townhouses, condominiums, apartments, etc.) do not show evidence of a firewall extending through the roof between them, FRT plywood may have been used. When this is the case, it is not a simple matter to evaluate the plywood. As indicated earlier, a number of factors need to be considered such as the manufacturer of the plywood, ventilation provisions, pre-installation conditions, etc.

Neither the presence of FRT plywood (or other treated framing products), nor its structural integrity and fire resistance can be verified as part of a home inspection. Many building owners, managers and owner associations have had suspect roof assemblies evaluated for the presence of defective products or signs of degradation or strength loss. These evaluations are often completed by engineering firms familiar with the various suspect products and issues. As part of these evaluations, efforts are made to determine the manufacturer of the plywood and the FRT plywood is physically inspected and strength-tested to determine its current condition. Projected future performance and replacement needs are based on the results of these tests and information obtained from manufacturers or other independent studies.

Before purchasing a dwelling unit that might contain FRT plywood roof sheathing, it would be prudent to contact the owner or property manager and inquire about any studies completed and/or reports relative to the issue. While the roof is a communal element in many cases and funds for repairs may be collected from the all owners in the complex, some have assigned full responsibility for repairs to the individual unit owners. Even when the money for repairs will come from the association, sometimes heavy surcharges have been or will be allocated to the members to raise the unanticipated funds.

If no separate evaluation report exists and the presence of FRT plywood is suspected, an inspection of a complex or individual unit can be performed by a consultant familiar with the FRT issue. A consultant should be able to identify the product, perform a strength test, and provide an estimate of its remaining useful life and/or estimated replacement cost.

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