FOREST PRODUCTS LABORATORY TECHNICAL REPORT

Evaluation of In-place Wooden Roof Treatments

Summary Report

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Introduction

Following a change in the Structural Pest Control Act creating a Branch 4 covering roofers who applied in-place treatments to prolong the life of wooden shake and shingle roofs, some of which were known to contain pesticides, the Structural Pest Control Board funded research to investigate the efficacy of treatments in common use. Samples of treatments were obtained from Branch 4 Operators and their suppliers. Most suppliers required anonymity so, to allow the results to have meaning, the active ingredients of each material have been characterized in a generic manner.

The main test involved the dipping of No.1 western red cedar shingles in a treatment solution for 5 minutes and exposing them on a test fence with south-facing exposure, at a 45-degree angle, near San Francisco Bay. Performance was rated visually by the third author on a 10-point scale, with 1 being the worst and 10 the best performance. The rating was based upon the severity of mold attack, dirt pick-up, and deterioration of the protective film or penetrating finish. They were considered unserviceable when the rating dropped below 5. Back up samples were provided by dipping slats which then were exposed to accelerated weathering in a QUV Weatherometer; these results were not considered unless they differed markedly from the field exposure results. Thirdly, test blocks obtained from dip-treated white fir shakes, and cedar and redwood sapwood rods, were exposed to decay fungi in an agar-block test. These treatments were not expected to provide significant decay resistance, but several of them did provide remarkable protection for a dip. Lastly, 1" x 1" x 4" pieces of white fir and western red cedar lumber, having their end-grain sealed with epoxy, were dipped in each treatment for 5 minutes. After drying under controlled conditions, weight gain and tangential swelling after 2-to 8-hours immersion in water were recorded and the five best performers were selected in each test. Those treatments ranking among the top five in two of the three tests are listed in Table 1.

Results

Results of the visual assessment, the agar/block evaluation, and the water repellent effectiveness tests are presented in Table 1. For the water repellent effectiveness tests, only those treatments which were ranked as the top five performers in two of the three tests are listed in Table 1. Few generalizations can be drawn from these results except that there are many materials in use which appear ineffective. By visual assessment, treatments 8, 19, and 26 were the most effective in providing long-term protection, while treatments 3, 5, 17, 22, 24, and 25 provided protection for up to 2 years. Treatments 9, 12, 16, and 26 provided a significant water repellent effectiveness. The main overlap in these results is with treatment 26, which provided visual serviceability of over 2 years, significant decay resistance, and appeared to be an effective water repellent (although testing was incomplete-see footnote to Table 1). The enigma here is that treatment 26 is intended to provide fire retardantcy; if it does so, it has the added benefit of providing the most protection against discoloration and deterioration (and, possibly, water uptake) of any of the materials tested. Treatment 19 provided over 2 years protection effectiveness (visual) and high water repellent effectiveness. Treatments 16, 24, and 28 provided high water repellent effectiveness and some visual effectiveness.

Treatment 2, pressure-treated with CCA as a control, was declared unserviceable after less than one year, primarily because of mold growth; it was expected that this treatment would be the standard against which all other treatments would be compared. Apparently, it was attacked by copper-tolerant molds. Of the visually most effective treatments, two contained a resin, which appeared to have retarded water uptake into the samples as well, and two contained both linseed oil and a fungicide. However, other treatments which contained oils and fungicides, such as 4, 6, 9, 20, 23, and 30, were not effective. Of the most effective water repellent treatments, three (and possibly four, counting "undisclosed oils") contained linseed oil and three contained alkyd resin. Treatment 11, containing oil and resin, was not effective visually, but was a good water repellent, and another fire retardant treatment, 15, also was not effective. Of the three visually most successful treatments, two were solvent-borne and one, the fire retardant, was water-borne; of the four treatments most successful in resisting decay, three were solvent-borne and one, again the fire retardant, was water borne; of the five treatments with the best water repellent effectiveness, all were solvent-borne (with the water-borne fire retardant again placing highly but with incomplete testing).

Conclusions

Many of the materials in use in in-place treatment of wooden roofs at the time that Branch 4 was active appear to be ineffective. Of the three treatments which were visually effective, two of them shared the characteristic of containing both linseed oil and an effective fungicide, with the addition of an alkyd resin appearing to be useful as well. Two of the three also appeared to be among the best in terms of water repellent effectiveness. The resin incorporated into a fire-retardant treatment would appear to be primarily responsible for its appearance as the most effective treatment tested for improving the durability of wooden roofing materials.