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THE DEPARTMENT OF FIRE TECHNOLOGY

INVESTIGATION OF SURFACE BURNING CHARACTERISTICS OF

A FIRE-RETARDANT IMPREGNATED, RED CEDAR
SHINGLE DECK: BURN BARRIER™ NO. 10

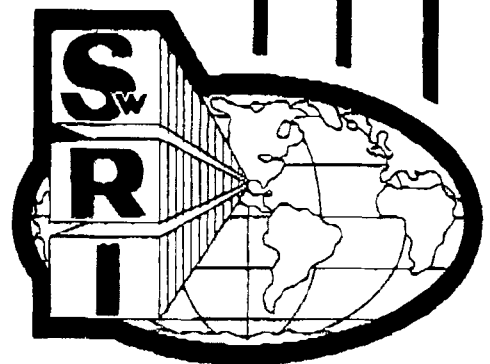
Project No. 01-7787-080

FINAL REPORT

January 11, 1984

Prepared for

FIRE RETARDANTS INC.™
123 Columbia Court North •
Suite 201
Chaska, MN 55318



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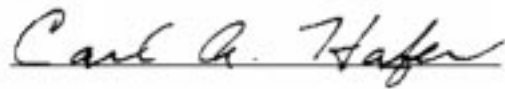
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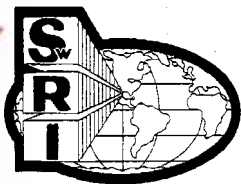
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I. INTRODUCTION

This report presents the results of a flame spread tunnel test on a fire retardant-impregnated, red cedar shingle deck, submitted for evaluation by Fire Retardants Inc, 123 Columbia Court North, Suite 201, Chaska, MN 55318.

The report contains a description of the material tested, the preparation and conditioning of the specimen, the test procedure, and finally, the test results. Note that the results only apply to the specimen tested, in the manner tested, and not to the entire production of this or similar materials, nor to this material's performance when used in combination with other materials. All, test data are on file and are available for review by authorized persons.

The test was conducted in accordance with the provisions of ASTM Designation E84-81a, "Standard Method of Test for Surface Burning Characteristics of Building Materials." This test method is similar to the test method specified in ANSI No. 2.5, NFPA No. 255, UL No. 723, UBC No. 42-1. ASTM E84 is a test procedure method only and does not set requirements for materials. Therefore, SwRI does not assign a classification to the material tested. Building codes, such as the Uniform Building Code, have requirements dependent on building type, occupancy, etc. The building code having jurisdiction in the location a material is to be used will determine compliance of the test results.

The purpose of the test was to evaluate performance of the test specimen in relation to that of mineral-fiber-cement board and red oak flooring under similar fire exposure. The results are expressed in terms of flame spread, fuel contribution, and smoke development during a 10-minute exposure and are recorded as a ratio with mineral-fiber cement board 0 and red oak flooring 100.

II. DESCRIPTION OF MATERIALS

On November 29, 1983, two FR-impregnated, red cedar shingle roof decks were received from the Sponsor. The Sponsor provided the following description.

BURN BARRIER™ No. 10 is a solvent-based, clear transparent fire retardant penetrant that penetrates into cedar wood shingles and other edge grain woods. The liquid penetrant has a net weight of 8.33 lb/gallon (1 kg/2).

III. PREPARATION AND CONDITIONING OF TEST SPECIMEN

According to the Sponsor, the specimen was prepared as follows:

The 21-in. x 25-ft (0.53 x 7.62-m) specimen was prepared using two 21-in. x 12-ft 6-in. (0.53 x 3.61-m) sections. Each section was constructed of 1 x 3 in. (25.4 x 76.2 mm) wood furring strips to form a sub-frame in accordance with the American National Standard ANSI/ASTM method. Three-eighths-in. (9.5-mm) standard CDX plywood was then attached to the sub-frame using 3/6-in. (19.1-mm) staples. No. 1 grade, Blue Label, Red Cedar shingles, conforming with U.B.C. Standards 32-11 were attached to the plywood by means of 3/4-in. (19.1-mm) hot dipped zinc-coated nails, with an average shingle surface exposure of 5 in. (127 mm). The penetrant was applied in two applications, without dilution, using airless spray equipment at a coverage rate of 300 ft²/gal (7.4 m²/l) for each application. The applications were applied with an 18-hour drying period between coats.

The specimen was conditioned for 37 days in an atmosphere maintained between 68 and 78°F (20 and 26°C) temperature and 45- to 55-percent relative humidity.

IV. TEST PROCEDURE

The test was conducted on January 6, 1984. Reference data were obtained and furnace operation checked by conducting a 10-minute test with mineral- fiber-cement board on the day of the test and by periodic tests with red oak flooring. These tests provided the 0 and 100 references for flame spread, fuel contribution, and smoke density. Ignition over the burners was noted 55 seconds after the start of the test in the most recent calibration with red oak flooring. Each specimen to be evaluated was tested in accordance with the standard procedure.

V. TEST RESULTS

The test results were calculated on the basis of observed flame travel and the measurement of areas under the recorder curves of furnace temperature and smoke density (see Table 2). To allow for possible variations in results due to limitations of the test method, the numerical results were adjusted to the nearest figure divisible by 5.

Recorded data for flame spread, fuel contribution, and smoke density of the specimen are shown in the figures at the end of this report as a solid line on each graph.

TABLE 2. CLASSIFICATION

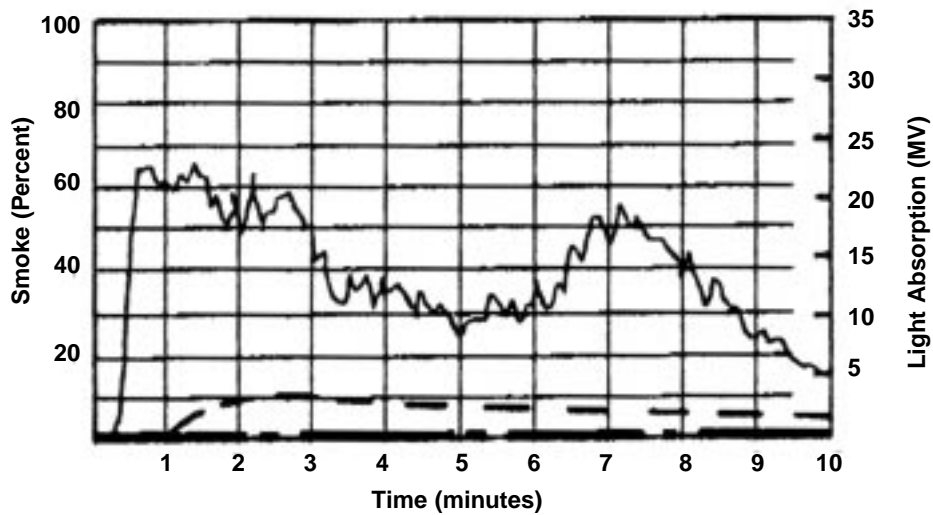
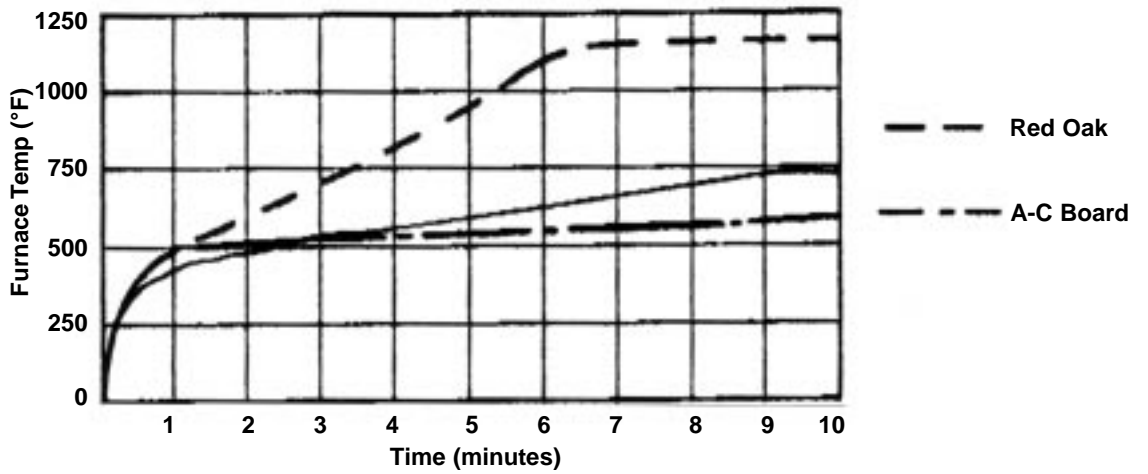
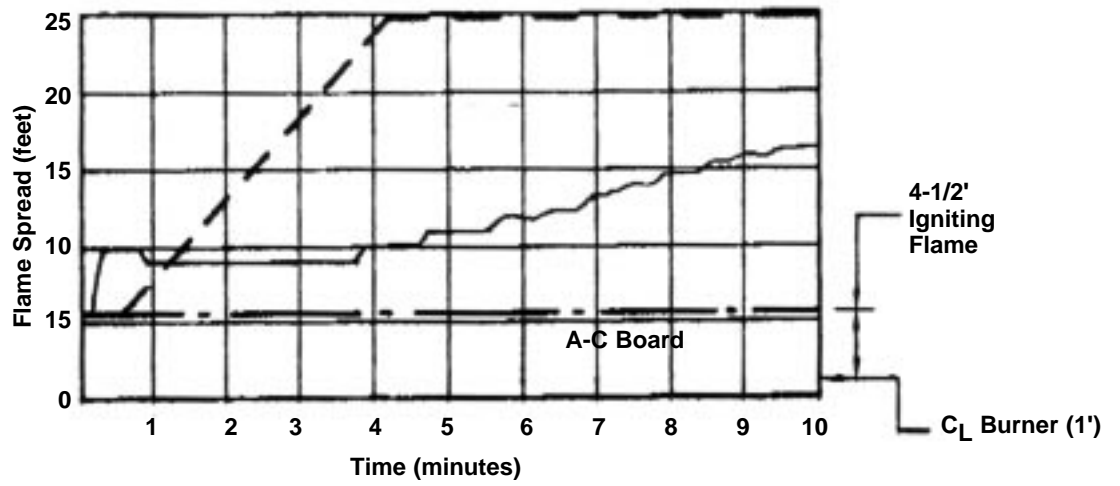
Test Specimen	Flame Spread Index E84-81a	Fuel Contribution	Smoke Density
Mineral-Fiber Cement Board	0	0	0
Red Oak Flooring	100	100	100
Fire Retardant-Impregnated, Red Cedar Shingle Deck: BURN BARRIER™ No. 10	35	10	690

According to the requirements of NFPA 703-80, Para. 2-2.1.3, BURN BARRIER No. 10 passes the Class B rating.

II. OBSERVATIONS DURING AND AFTER TEST

The observations made during and after the test are summarized as follows; Ignition was noted at 10 seconds. The maximum flame front advance to 17 ft (5.18 in) occurred at 1.0 minutes. After flame persisted for more than 3 minutes.

The shingles were charred through to 5 ft (1.52 m) and the single butt edges were charred to 15 ft (4.57 m). An intumescent char extended to 22 ft (6.70 m).



**SURFACE BURNING CHARACTERISTICS OF A
FIRE-RETARDANT-IMPREGNATED, RED CEDAR SHINGLE
DECK: BURN BARRIER NO. 10**