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SOUTHWEST RESEARCH INSTITUTE

Department of Fire Technology

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INVESTIGATION OF SURFACE BURNING CHARACTERISTICS OF:

BURN BARRIER NO. 149 EXTERIOR INTUMESCENT
FIRE RETARDANT PAINT APPLIED TO DOUGLAS FIR

PROJECT NO. 01-7787-260-a
FINAL REPORT

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I. INTRODUCTION

This report presents the results of a flame spread tunnel test on an exterior intumescent fire-retardant paint, submitted for evaluation by Flame Control Coatings of Niagara Falls, New York. 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 April 10, 1984, the test material was received from the Sponsor. It is described in Table 1 on the following page.

TABLE 1. DESCRIPTIONS

Type:	Coating System
Trade Name:	Exterior Intumescent Fire-Retardant Paint
Identification No.:	BURN BARRIER No. 149
Color:	White
Application:	2 coats of paint @ 220 ft ² /gal ea. (5.4 m ² /L) applied to Douglas Fir
Thickness:	0.75 in. (19.1 mm)
Unit Weight:	2.36 lb/ft ² (11.04 kg/m ²)
Total Weight:	98.9 lb (42.88 kg)
No./Size Received:	2 pieces, 20.88 x 144.25 in. (0.53 x 3.66 m)
Substrate Used:	3/4 x 4-in. (19.05 x 101.6-mm) tongue and groove Douglas fir wood decks assembled in two 21 x 144-in. (0.53 x 3.66-m) sections
Adhesive Used:	None

III. PREPARATION AND CONDITIONING OF TEST SPECIMEN

The 21-in. x 25-ft (0.53 x 7.63-m) specimen was prepared by the Sponsor on February 13 and 14, 1984, using two 21 x 144-in. (0.53 x 3.66-m) tongue and groove Douglas fir substrate sections prepared by Southwest Research Institute and shipped to the Sponsor for coating. According to the Sponsor, the two coats were applied on the given dates at 220 ft²/gal for each coat (5.4-m²/L).

The specimen was conditioned for 14 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 April 25, 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.

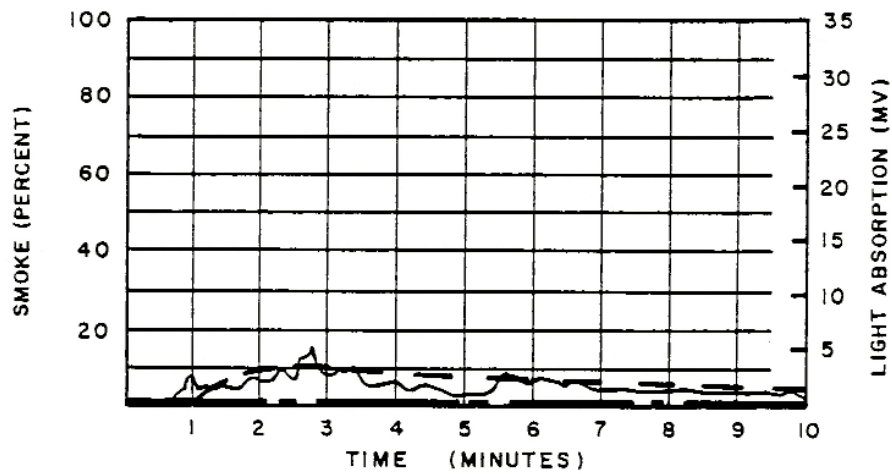
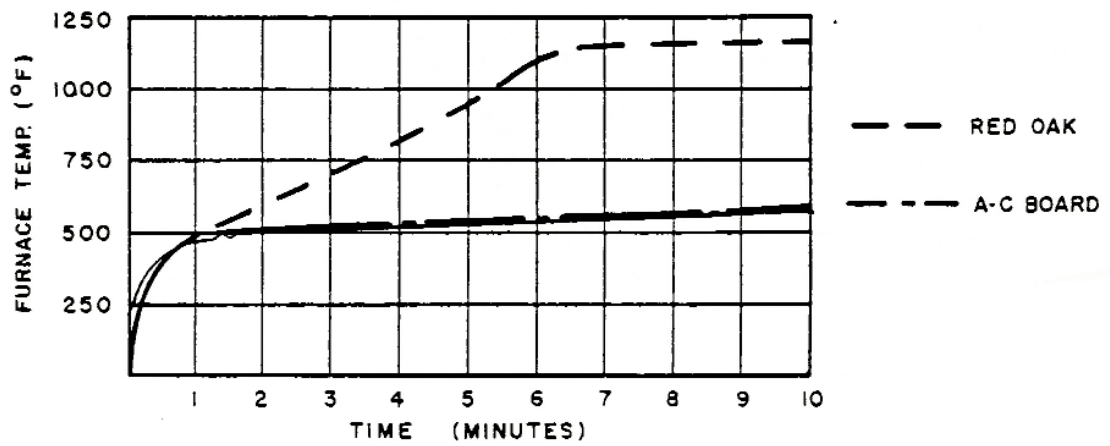
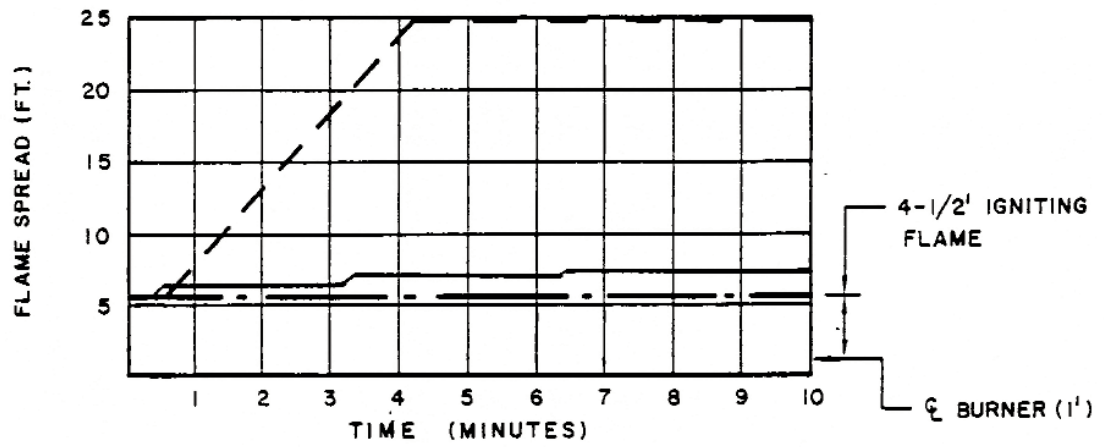
TABLE 2. CLASSIFICATION

Test Specimen	Flame Spread		
	Index E84-81a	Fuel Contribution	Smoke Density
Mineral-Fiber-Cement Board	0	0	0
Red Oak Flooring	100	100	100
Exterior Intumescent Fire- Retardant Paint Applied to Douglas Fir: BURN BARRIER No. 149	10	5	90

VI. OBSERVATIONS DURING AND AFTER TEST

The observations made during and after the test are summarized as follows: At 29 seconds an intumescent char shell started to form with ignition of the specimen at 1 minute 15 seconds where cracks began to appear in the char shell. The maximum flame front advance to 7-1/2 ft (2.29 m) occurred at 6 minutes 15 seconds. Afterflame persisted for 21 seconds.

The coating was consumed to 6 ft (1.83 m) and showed surface char to 10 ft (3.05 m). At 4 ft (1.22 m) the char depth was 0.56 in. (14.3 mm), at 5 ft (1.52 m), the depth was 0.59 in. (15.1 mm), and at 7 ft (2.13 m), the char depth was 0.28 in. (7.1 mm).



SURFACE BURNING CHARACTERISTICS OF AN
 EXTERIOR INTUMESCENT FIRE-RETARDANT PAINT APPLIED TO
 DOUGLAS FIR: BURN BARRIER 149