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INVESTIGATION OF SURFACE BURNING CHARACTERISTICS OF:

A CLEAR, FIRE-RETARDANT COATING,
BURN BARRIER™ 6-3

PROJECT NO. 01-6263-339
FINAL REPORT

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I. INTRODUCTION

This report presents the results of a flame spread tunnel test on a clear, fire-retardant coating, submitted for evaluation by manufacturer. 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 E84-80, "Standard Method of Test for Surface Burning Characteristics of Building Materials." This test method is similar to the test method specified in ANS No. 2.5, NFPA No. 255, UL No. 723, UBC No. 42-1, and ASTM E84-75; however, two improvements have been incorporated in the current E84-80 procedure, i.e., the stack pressure control tap has been relocated to a position forward of the burners and the formulae used to calculate the flame spread have been modified--resulting in slightly lower values.

The purpose of the test was to evaluate performance of the test specimen in relation to that of asbestos-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 asbestos-cement board 0 and red oak flooring 100.

II. DESCRIPTION OF MATERIALS

On June 5, 1981, two gallons of clear BURN BARRIER™ Fire Retardant Solution No. 6-3 were received from the Sponsor. The coating had an average gross unit weight of 10 lb 3 oz per gallon.

III. PREPARATION AND CONDITIONING OF TEST SPECIMEN

The 21-in. x 25-ft (0.53 x 7.63-m) specimen was prepared using two 21 x 150-in. (0.53 x 3.81-m) decks prepared from 1 x 4-in. (25.4 x 101.6-mm) tongue and grooved select Douglas fir wood flooring. The decks were held together with 1 x 4-in. (25.4 x 101.6-mm) wood back straps located at 3 to 4-ft intervals. The clear, fire-retardant solution was applied by hand-sprayer in two coats at 200 sq ft/gal (4.91 ℓ/m^2) each on June 11 and 12, 1981.

The specimen was conditioned for 42 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 July 24, 1981. Reference data were obtained and furnace operation checked by conducting a 10-minute test with asbestos-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 46 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 Classification Table). 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.

CLASSIFICATION TABLE

Test Specimen	Flame Spread Index E84-80	Fuel Contribution	Smoke Density
Asbestos-Cement Board	0	0	0
Red Oak Flooring	100	100	100
BURN BARRIER™ No. 6-3 Fire Retardant, Clear Coating on Douglas Fir, 100 sq ft/gal (2.46 ℓ/m^2)	25	40	5
Uncoated Douglas Fir	60	60	90

VI. OBSERVATIONS DURING AND AFTER TEST

The observations made during and after the test are summarized as follows: Discoloration was observed at 20 seconds with ignition at 50 seconds. The flame front advanced to 12-1/2 ft (3.81 m) at 8 minutes 15 seconds and receded slightly at 9 minutes 30 seconds. Afterflame persisted for 10 minutes 26 seconds.

Char depth ranged from 5/32 in. (3.97 mm) at 3-1/2 ft (0.90 m) to 1/32 in. (0.79 mm) at 11 ft (3.36 m). Surface char had occurred to 14 ft (4.27 m) with stain to the end, 25 ft (7.63 m).