



## HPVA LABORATORIES

42777 Trade West Drive, Sterling, VA 20166 703-435-2900

Report On  
Surface Burning Characteristics of Building Materials  
As Determined By  
**ASTM E84 Test Method**

Prepared For:

Test Number:

Date of Issue:



ACCREDITED®

Testing  
Laboratory

TL - 224

**I. SCOPE**

This report contains the reference to the test method, purpose, test procedure, rounding procedures, preparation and conditioning of specimens, description of materials, test and post test observation data, and test results.

**II. TEST METHOD**

The test was conducted in accordance with ASTM E 84-17, "Standard Test Method for Surface Burning Characteristics of Building Materials." The 25-foot tunnel method is also described by NFPA 255 and UL 723.

**III. PURPOSE**

The purpose of the test is to determine the relative performance of the test material under standardized fire exposure. Results are given for Flame Spread and Smoke Developed Index. The values obtained from burning the test material represent a comparison with that of 1/4" inorganic reinforced cement board expressed as zero and red oak flooring expressed as 100.

The flame spread results of 25-foot tunnel tests are frequently used by building code officials and regulatory agencies in the acceptance of interior finish material for various applications. The most widely accepted classification system is epitomized by the International Code Council (ICC) and National Fire Protection Association (NFPA) Life Safety Code, NFPA 101:

Class A*	0 - 25 flame spread	0-450 smoke developed
Class B*	26 - 75 flame spread	0-450 smoke developed
Class C*	76 - 200 flame spread	0-450 smoke developed

\*Class A, B and C correspond to I, II and III, respectively, in other historical codes such as UBC and BOCA.

This flame spread classification system is based on the premise that the higher the flame spread numbers, the greater the fire spread potential. The actual relationship between the numbers developed under this test and life safety from fire has not been adequately established.

**IV. TEST PROCEDURE NOTES**

The furnace was preheated to a minimum of 150oF as measured by an 18 AWG thermocouple embedded in cement 1/8" below the floor surface of the chamber, 23-1/4' from the centerline of the ignition burners. The furnace was then cooled to 105oF (+ 5oF) as measured by a thermocouple embedded 1/8" below the floor surface of the test chamber 13' from the fire end.

Prior 10-minute tests with 1/4" inorganic reinforced cement board provided the zero reference for flame spread. Periodic 10-minute tests with unfinished select grade red oak flooring provided for the 100 reference for flame spread and smoke developed as noted in Section III.

**A. FLAME SPREAD**

The flame spread distance is observed and recorded at least every 15 seconds or every 2 feet of progression. The peak distance is noted at the time of occurrence. The flame spread distance is plotted over time. The total area under the flame spread distance-time curve is determined; flame front recessions are ignored. The flame spread is then calculated as a function of the area under the curve relative to the standard red oak curve area. The value for flame spread classification for the tested material may be compared with that of inorganic reinforced cement board and select grade red oak flooring.

**B. SMOKE DEVELOPED**

The smoke developed during the test is determined by the reduction in output of a photoelectric cell. A light beam vertically orientated across the furnace outlet duct is attenuated by the smoke passing through the duct. The output of the photoelectric cell is related to the obscuration of the light source through the duct caused by the smoke. A curve is developed by plotting photoelectric cell output against time. The value of smoke developed is derived by calculating the net area under the curve for the test material and comparing this area with the net area under the curve for unfinished select grade 18mm red oak flooring.

**V. FLAME SPREAD RATING AND SMOKE DEVELOPED CLASSIFICATION**

Single test calculated flame spread and smoke developed values are averaged and rounded to the nearest multiple of 5 and reported as the Flame Spread Rating and Smoke Developed Classification. Actual test values are available on request.

**VI. PREPARATION AND CONDITIONING OF TEST SAMPLES**

Three or four sections are generally used in the preparation of a complete test specimen which is 20-1/2" wide and 24' long. Materials 8' in length may be tested by using three sections 20-1/2" wide by 8' long for a total specimen length of 24'. A 14" length of uncoated 16 gauge steel sheet is used to make up the remainder of the test specimen; it is placed at the fire end of the test chamber. Prior to testing, three 8' long sections of 1/4" inorganic reinforced cement board are placed on the back side of the specimens to protect the furnace lid assembly. Test specimens are conditioned at a controlled temperature of 73.4oF (+ 5oF) and a controlled relative humidity of 50 + 5 percent.

**VII. LABORATORY ACCREDITATION**

HPVA Laboratories is an internationally accredited testing laboratory according to ISO/IEC 17025 and recognized by state and local building code jurisdictions. International Accreditation Service (IAS) Accredited Testing Laboratory Number: TL-224.



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**Test Number:****Test Date:****Report Prepared For:****Material Tested:****Sample Information:****Detailed Product  
Description:****Mounting Method:****Sample Selection:****Surface Exposed:****Average Thickness (in.):****Conditioning Days:****Sample Color:****Total Weight (lbs.):****Test Results****Ignition Time (seconds):****Flame Spread Index:****Max. Temperature (F):****Smoke Developed Index:****Max. Flame Spread Distance (ft):****Class Rating:****Observations:****Remarks:****Test Operator:****Reader:**

Report Prepared By:

Manager of Fire Testing - Engineer

Report Reviewed By:

Director of HPVA Laboratories

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