



Report On  
Surface Burning Characteristics Determined By  
ASTM E84/ (UL 723) Twenty-Five Foot Tunnel  
Furnace Test Method

TEST NUMBER T-15514

MATERIAL TESTED:  
21501076-07-19mm Black

DATE OF ISSUE 4/10/2017



**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 84-16, "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 150°F 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 105°F (± 5°F) 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 23/32" red oak flooring.

V. FLAME SPREAD AND SMOKE DEVELOPED ROUNDING PROCEDURES

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

For multiple tests, the individual calculated flame spread and smoke developed values are recorded, averaged, and the results rounded to the nearest multiple of 5. The averaged, rounded number is reported as the Flame Spread or Smoke Developed Index.

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 73.4°F ( $\pm$  5°F) and a controlled relative humidity of 50  $\pm$  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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**VIII: MATERIAL TESTED**

- 1) Manufacturer: Enka NC
  
- 2) Burn Number: 1
- 3) Average Thickness(in.): 0.534
- 4) Average Weight (lbs./sq.ft.): 0.073
  
- 5) Product Description: 21501076-07-19mm Black
- 6) Color: Black
- 7) Surface: Face Side
- 8) Sample Selection: Manufacturer
- 9) Date of Selection: 3/22/2017
- 10) Material Description By: Manufacturer
- 11) Method of Mounting: Supported with 1/4" diameter steel rods spaced 24 inches on center and 2" hexagonal wire mesh
- 12) Days in Conditioning: 19

**IX: TEST CONDITIONS AND DATA**

- 1) Specimen Preheat Time (min.) 2:00
- 2) Tunnel Brick Temp (deg. F): 109
- 3) Time to Zero Mark (seconds): 12
- 4) Time to End of Tunnel  
or Flamefront Distance: 3.5'@0:30
- 5) Time-Distance Curve Area  
(min./ft.): 33.7
- 6) Fuel and Temperature
  - a) Fuel (cu.ft./min.): 5.631
  - b) Max. Vent End Temp. (deg.F): 598
  - c) Time to Max. Temp (min.): 9:27
- 7) After Flaming: Yes



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**X: TEST RESULTS**

Test results calculated on the basis of the area under the curves of flame spread distance and smoke developed versus time are provided in the table below for calibration materials and for:

21501076-07-19mm Black

Material Description	Flame Spread Index	Smoke Developed Index
High Density Inorganic Reinforced Cement Board	0	0
T-15514	15	125

Observations:

Melting and dripping onto tunnel floor during test.  
Melting to 21', discoloration to 24'.

Remarks:

The sample consisted of one continuous 24' long piece of material.

Conclusions:

Meets Class A, Flame Spread Index 25 or less and Smoke Developed Index 450 or less.

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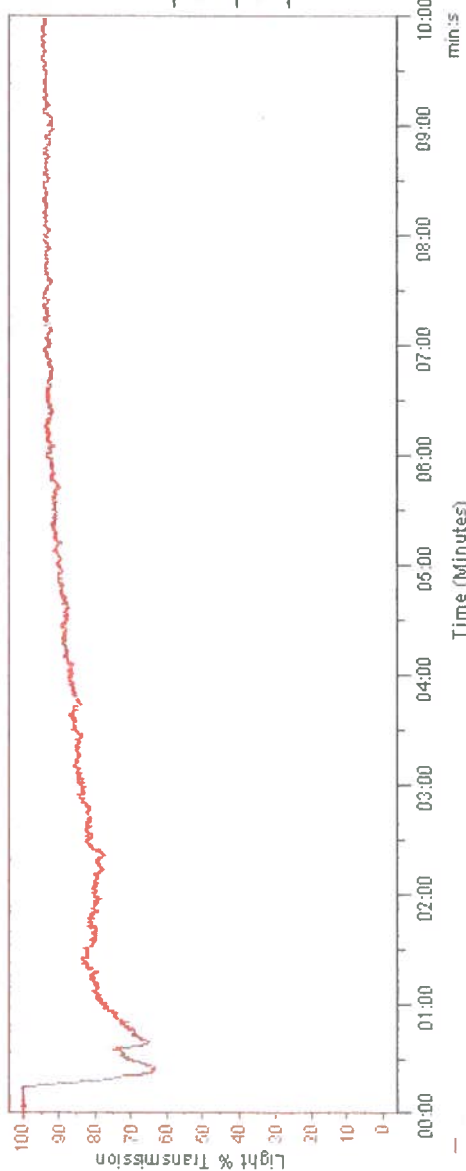
Director - HPVA Laboratories

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**Test Time** 600 seconds  
**FS Counts** 33.7  
**Fuel Counts** 706  
**Smk Cts** 219

STOP Early  
 NEW TEST  
 program



Max Temp = 588  
 @ Time = 5:567

Flame Progression (mV) 18.80  
 Smoke (mV) 8.48  
 24 Ft. Temp (Deg. F) 588  
 13 Ft. Temp (Deg. F) 309  
 24 Foot Floor TC (Deg. F) 171

