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LABORATORIES

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

PREPARED FOR:

SEOHAN ANTAMINE CO., LTD.

Nam Dong Industrial Complex 165B 6L, 51, Aenggogae-ro 622 beon-gil
Namdong-gu Incheon, Korea

TEST NUMBER T-15548

MATERIAL TESTED:

High Pressure Laminate

DATE OF ISSUE 4/11/2017

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 (± 5°F) and a controlled relative humidity of 50 ± 5 percent.

VII. LABORATORY ACCREDITATION

ACCREDITED

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.

VIII: MATERIAL TESTED

1)	Manufacturer:	SEOHAN ANTAMINE CO., LTD. Namdong-gu Incheon Korea
2)	Burn Number:	1
3)	Average Thickness(in.):	0.317
4)	Average Weight (lbs./sq.ft.):	2.174
5)	Product Description:	High Pressure Laminate The material was adhered to a 0.25" thick cement board backer using USP Icredi-Bond™ Professional Grade Multi-Purpose Epoxy (2 part - resin, hardener).
6)	Color:	Brown
7)	Surface:	Face Side
8)	Sample Selection:	Manufacturer
9)	Date of Selection:	3/17/2017
10)	Material Description By:	Manufacturer
11)	Method of Mounting:	Self-Supporting
12)	Days in Conditioning:	4

IX: TEST CONDITIONS AND DATA

1)	Specimen Preheat Time (min.)	2:00
2)	Tunnel Brick Temp (deg. F):	103
3)	Time to Zero Mark (seconds):	18
4)	Time to End of Tunnel or Flamefront Distance:	5'@0:45
5)	Time-Distance Curve Area (min./ft.):	48.6
6)	Fuel and Temperature	
	a) Fuel (cu.ft./min.):	5.617
	b) Max. Vent End Temp. (deg.F):	680
	c) Time to Max. Temp (min.):	8:14
7)	After Flaming:	Yes

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:

High Pressure Laminate

Material Description	Flame Spread Index	Smoke Developed Index
High Density Inorganic Reinforced Cement Board	0	0
T-15548	25	45

Observations:

Burned through to backer to 5'. Cracking and charring to 15'. Blistering to 18'. Discoloration to 24'.

Remarks:

The sample consisted of five 5' long panels laid end-to-end.

Conclusions:

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

REPORT PREPARED BY:

Chris Palumbo

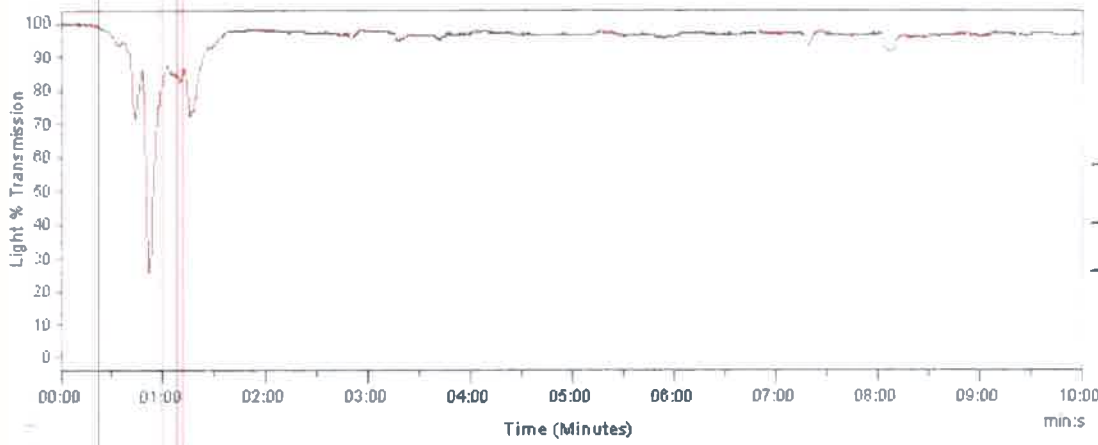
Manager of Fire Testing - Engineer

REPORT REVIEWED BY

Brian Sause

Director - HPVA Laboratories

This is a factual report of the results obtained from laboratory tests of sample products. The results may be applied only to the products tested and should not be construed as applicable to other similar products of the manufacturer HPVA Laboratories does not verify the description of materials and products when the description is provided by the client The report is not a recommendation or a disapprobation by HPVA Laboratories of the material or product tested. While this report may be used for obtaining product acceptance it may not be used in advertising



Smoke Data

Test Time
600
seconds

FS Counts
48.6

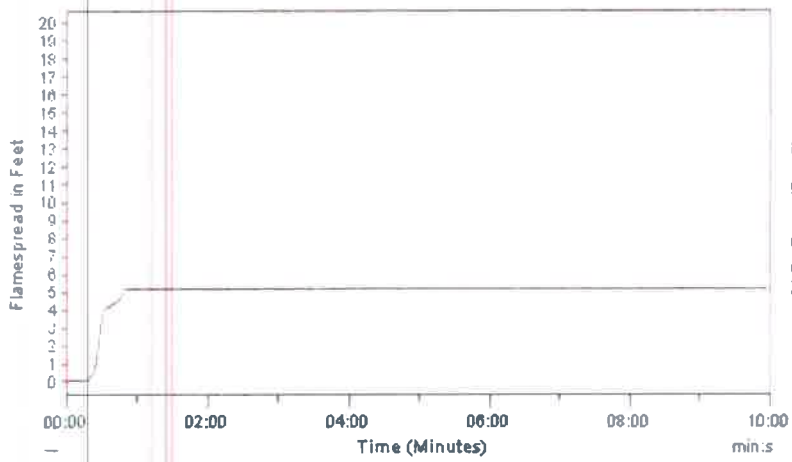
Fuel Counts
827

Smk Cts
87

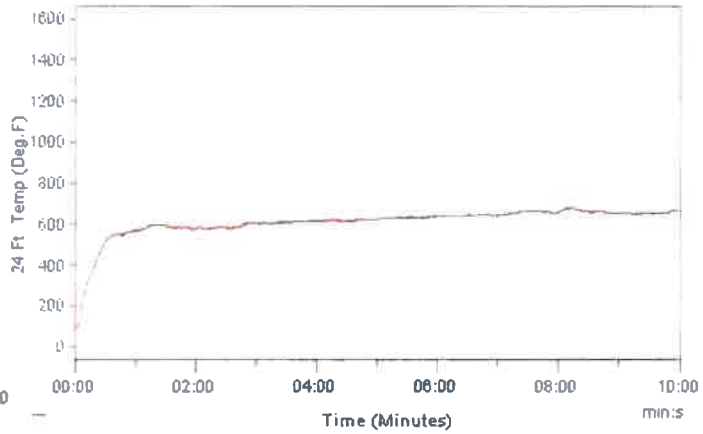
STOP Early
NEW TEST
progrm

Flame Progression (mV)
Smoke (mV)
24 Ft. Temp (Deg. F)
13 Ft. Temp (Deg F)
24 Foot Floor TC (Deg F)

Max Temp = 680
@ Time - 494



Flamespread Data



Fuel Data

test ON/OFF

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