



CAPITAL TESTING AND CERTIFICATION SERVICES

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TEST REPORT

Test Method: CAN/ULC-S102.2:2018-REV1, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies

Rendered To: AHF Products
3840 Hempland Road
Mountville, PA 17554

Product Description: 4.5mm LVT – LFP4520

Report Number: T-17683

Original Issue Date: 11/25/2024

Test Date: 11/11/2024

Pages: 9



TL-224

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I. SCOPE

This test report contains the results from a specimen tested in accordance with CAN/ULC-S102.2, *Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies*. The results of CAN/ULC-S102.2 testing are commonly used by building code officials and regulatory agencies to determine whether interior finish materials are suitable for their intended application.

II. TEST SPECIMENS

Test specimens should be representative of the material which the test is intended to examine. All test specimens should be approximately 10mm narrower than the interior width of the tunnel and 7315 ± 15 mm in length. The maximum allowable thickness is 65mm. The test specimen can be provided in a continuous, unbroken length or multiple sections that will be butted together. Prior to testing, the specimens are conditioned to a constant mass in an environment that is held at 23 ± 3 °C (73.4 ± 5.4 °F) and 50 ± 5% relative humidity.

TEST SPECIMEN INFORMATION	
Product Description	4.5mm LVT; LFP4520. *
Samples Selected By	Client
Date Received	09/30/2024
Conditioning Time (days)	39
Specimen Size (in.)	17-1/2 x 288
Continuous / Sectioned	Sectioned
Number of Sections	3
Avg. Total Weight (lbs.)	123.4
Average Thickness (in.)	0.434
Color	Grey
Exposed Surface	Face Side
Mounting Method	Sample material was adhered onto ¼" cement board by Capital Testing using S-995 adhesive. The adhesive was applied onto the cement board substrate using a 1/32" x 1/16" x 1/32" U-Notch trowel. Each specimen panel consisted of three rows of flooring butted together side-by-side. The center row consisted of two 6" x 48" pieces of flooring butted end-to-end. The left and right row each consisted of two 5-3/4" x 48" pieces of flooring butted end-to-end. Sample material was smoothed out with a 95-lb roller to prevent air bubbles from forming between the substrate and the sample material.

* Information provided by the Client



III. PROCEDURE

The tunnel is preheated to $85 \pm 5 \text{ }^\circ\text{C}$ ($185 \pm 9 \text{ }^\circ\text{F}$) as measured by a thermocouple embedded in the backwall of the furnace at 7090 mm (23.3 ft) from the centerline of the burner. The tunnel is then cooled to $40 \pm 3 \text{ }^\circ\text{C}$ ($104 \pm 5.4 \text{ }^\circ\text{F}$) as measured by a thermocouple embedded in the backwall of the furnace at 4000 mm (13.1 ft) downstream of the centerline of the burner.

After the tunnel has cooled to the required temperature range, the tunnel lid is lifted, and the test specimen is placed on the ledges of the tunnel. The specimen is mounted in a ceiling orientation with the side that will be exposed to the flame facing downward. A 6 mm (0.25 in.) fiber-cement board is placed on the backside of the specimens to protect the tunnel lid during testing.

Once the sample has been loaded into the test chamber, the lid is lowered, and a $1.2 \pm 0.025 \text{ m/s}$ ($236.2 \pm 4.9 \text{ ft/min}$) airflow is established. The test specimen is preheated for approximately 2 minutes prior to applying the 90-kW burner. The burner is positioned at the front end of the tunnel. It has two ports that point downward at a 45° angle toward the face of the specimen. An air ramp is placed at the front end of the specimen to reduce air eddies and to prevent low density material from being blown away from the burner.

After the 2-minute preheat, the burner is ignited, and it remains on for the duration of the 10-minute test. The flame is tracked by an observer, referred to as the Reader, as it progresses down the length of the tunnel. Smoke density is measured with the use of the photometer system on the exhaust duct. Temperature data is recorded throughout the test by a thermocouple probe that is 7000 mm (23 ft) from the centerline of the burner and approximately 25mm (1 in.) below the upper ledges of the tunnel.

IV. CALCULATION OF RESULTS

In CAN/ULC-S102 testing, test results for individual burns are reported as Flame Spread Value (FSV) and Smoke Developed Value (SDV). The average indices, that are derived from a minimum of three individual burns, are reported as Flame Spread Rating (FSR) and Smoke Developed Classification (SDC).

The Flame Spread Value is derived by plotting the flame spread distance versus time. Only progressive flame spread is plotted. The total area (A_T) under the flame spread distance-time plot is determined by ignoring any flame front recession. The calculation of FSV is described below:

$$\text{When } A_T \leq 29.7 \text{ m}\cdot\text{min:} \quad \text{FSI} = 1.85 * A_T$$

$$\text{When } A_T > 29.7 \text{ m}\cdot\text{min:} \quad \text{FSI} = 1640 / (59.4 - A_T)$$

The Smoke Developed Value is derived by plotting the photoelectric cell readings versus time. The area under the curve for the tested material is then divided by the area under the curve for select-grade red oak flooring. The resulting value is then multiplied by 100.

The Flame Spread Rating is determined by averaging a minimum of three individual Flame Spread Values and rounding that average to the nearest multiple of 5. The Smoke Developed Classification is determined by averaging a minimum of three individual Smoke Developed Values and rounding that average to the nearest multiple of 5.



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V. DISCUSSION

CAN/ULC-S102.2 Standard Language and Disclaimers

The following language was taken directly from the CAN/ULC-S102.2 standard. It has been included for information purposes.

Smoke Developed Value (SDV) and Flame Spread Value (FSV) are recorded in this test. However, there is not necessarily a relationship between these two measurements. – CAN/ULC-S102.2:2018-REV1, Section 1.4

This method defines the relative surface burning characteristics under specified test conditions. Although the procedure is applicable to materials, products and assemblies used in building construction for development of comparative surface spread of flame data, test results may not reflect the relative surface burning characteristics of tested materials under all building fire conditions. – CAN/ULC-S102.2:2018-REV1, Section 3.1

The “fire hazard” of any material in the light of present knowledge cannot be evaluated on the basis of any one test. A body of tests, each measuring one or more characteristics of a material, product, or assembly, may be needed for full assessment. These assessments are intended as aids to those who have the responsibility for determining acceptable levels of potential hazard. The overall fire hazard of a material as it is to be used can only be determined by an analysis of its behavior under several test conditions in addition to further analysis which includes consideration of building construction, occupancy, location and fire protection features. – CAN/ULC-S102.2:2018-REV1, Section 3.2

VI. TEST RESULTS

FLAME SPREAD RATING (FSR)	SMOKE DEVELOPED CLASSIFICATION (SDC)
20	150

Test Start Date	11/12/2024
Test End Date	11/12/2024
Equipment Operator	Chris Kaiser
Flame Spread Reader	Tony Norris

	Burn #1	Burn #2	Burn #3
Ignition Time (s)	75	81	83
Flame Spread Value (FSV)	32.73	11.47**	26.30**
Smoke Developed Value (SDV)	300.7	133.0	178.1
Maximum Temperature (°C)	354.2	344.4	363.9
Maximum Temperature (°F)	669.5	652.0	687.1
Time to Maximum Temperature (min)	7.22	6.63	8.19
Maximum Flame Spread Distance (m)	1.79	1.16**	2.82**
Maximum Flame Spread Distance (ft)	5.87	3.81**	9.3**
Time to Maximum FS Distance (min)	6.52	6.63**	7.25**



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VII. OBSERVATIONS

During Test

All Burns: None.

After Test

Burn 1: Charring of the exposed surface to 8'. Cracking of the exposed surface to 12'. Blistering of the exposed surface to 12'. Discoloration of the exposed surface to 24'.

Burn 2: Charring of the exposed surface to 7'. Cracking of the exposed surface to 9'. Blistering of the exposed surface to 9'. Discoloration of the exposed surface to 24'.

Burn 3: Charring of the exposed surface to 10'. Cracking of the exposed surface to 13'. Blistering of the exposed surface to 16'. Discoloration of the exposed surface to 24'.

Note: Reported observation distances are relative to the entire length of the test specimen.

VIII. REMARKS

The average thickness and average total weight reported includes the sample material, adhesive, and cement board substrate.

**Due to electrical noise on test burns 2 and 3, the reported maximum distance (Maximum FS), time to the maximum distance (MAX FS Time), Flame Spread Area (FS Area), and Raw Flame Spread Index (Raw FSI) on their associated data sheets are incorrect. The correct values for maximum flame spread distance (m), maximum flame spread distance (ft), time to maximum FS distance, and the Flame Spread Value have been corrected on the Test Results section on page 4 of this report.



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IX. GRAPHS AND INDIVIDUAL BURN DATA

Test Method Project # Date Time (Test Start) Test No.

Specimen ID

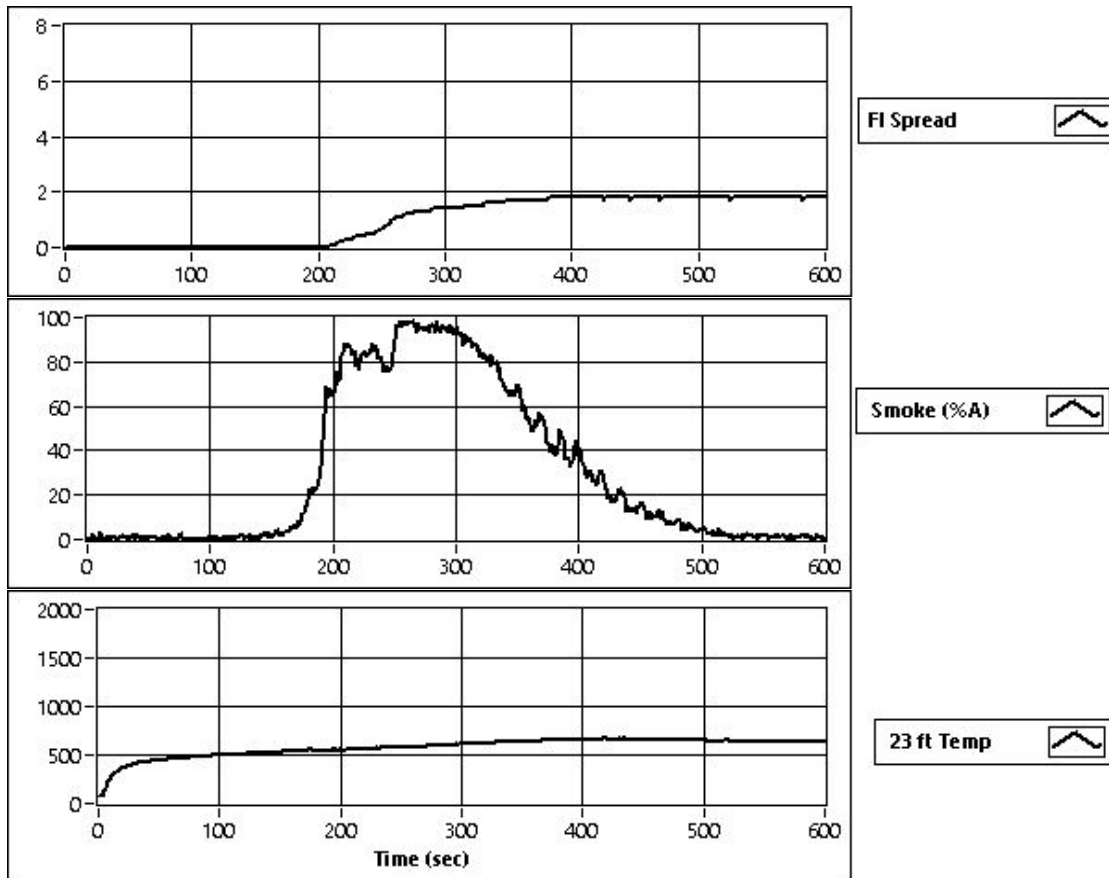
Specimen Description

Mounting Procedure

Fuel (CF) Time to 980F (min) Max Temp (F) Time to Max Temp (min)

FS Area Maximum FS MAX FS Time (min)

Smoke Area (%A min) Calibration Smoke Area Raw SD Raw FSI



Final SD

Test Room Temperature (°F): 72.6

Test Room Humidity (%RH): 51.5

Note: Distances on this page are reported in meters.



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Test Method Project # Date Time (Test Start) Test No.

Specimen ID

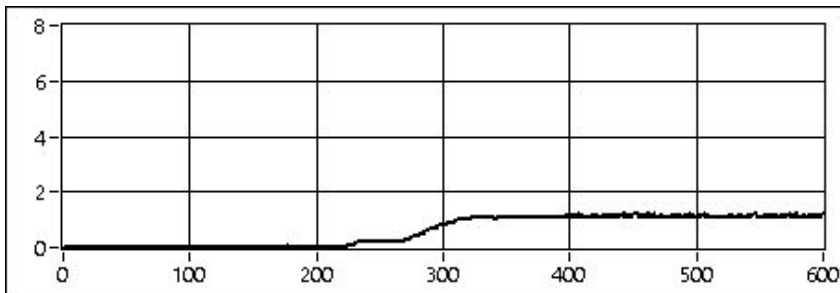
Specimen Description

Mounting Procedure

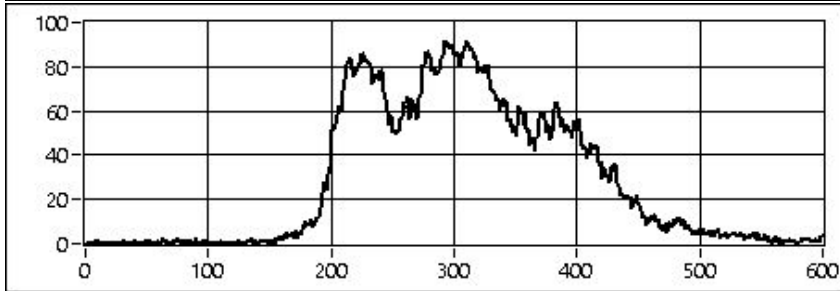
Fuel (CF) Time to 980F (min) Max Temp (F) Time to Max Temp (min)

FS Area Maximum FS MAX FS Time (min)

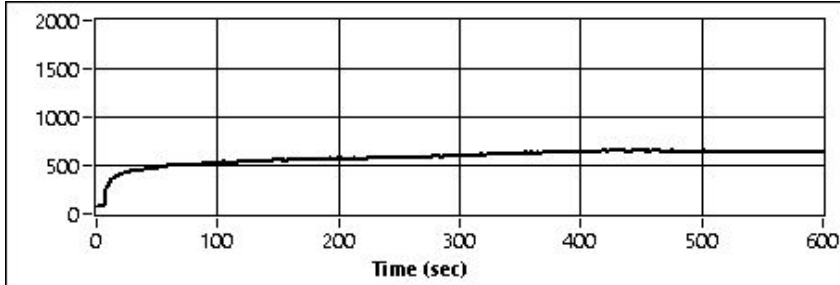
Smoke Area (%A min) Calibration Smoke Area Raw SD Raw FSI



FI Spread



Smoke (%A)



23 ft Temp

Final SD

Test Room Temperature (°F): 73.9

Test Room Humidity (%RH): 50.0

Note: Distances on this page are reported in meters.



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Test Method Project # Date Time (Test Start) Test No.

Specimen ID

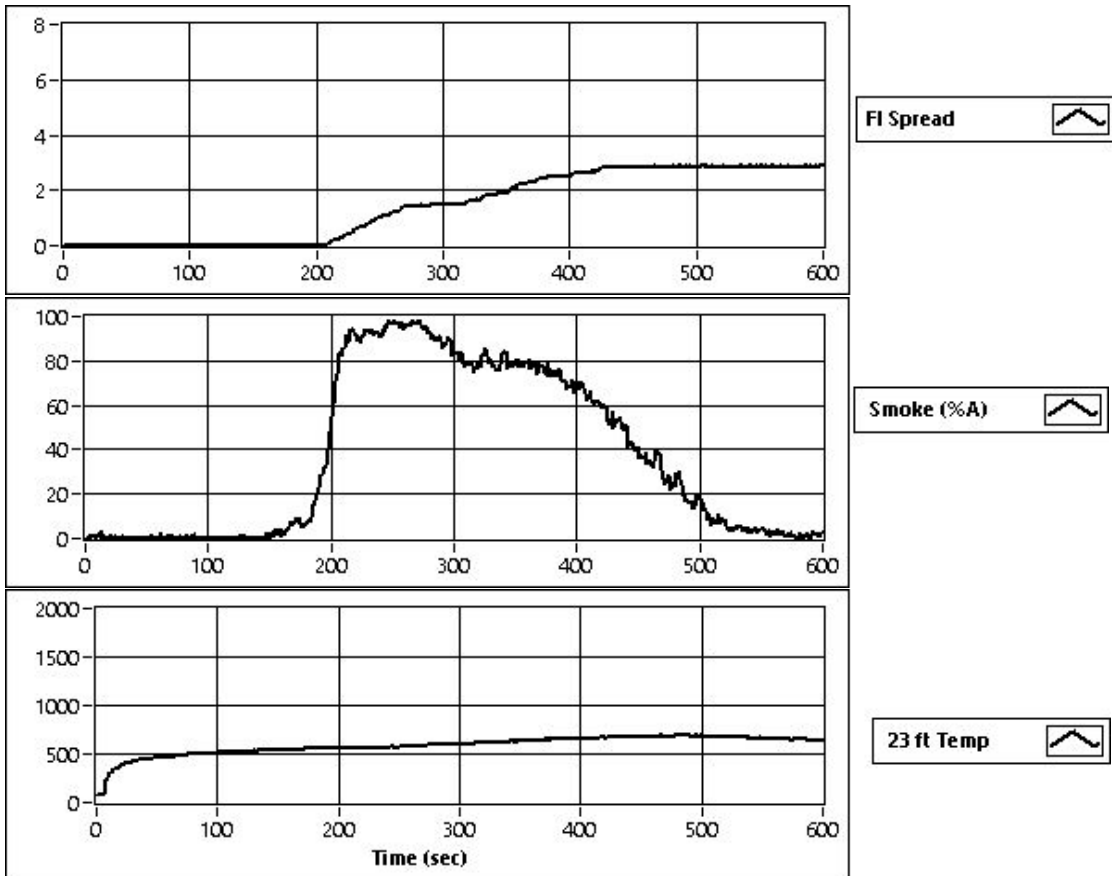
Specimen Description

Mounting Procedure

Fuel (CF) Time to 980F (min) Max Temp (F) Time to Max Temp (min)

FS Area Maximum FS MAX FS Time (min)

Smoke Area (%A min) Calibration Smoke Area Raw SD Raw FSI



Final SD

Test Room Temperature (°F): 74.4

Test Room Humidity (%RH): 46.4

Note: Distances on this page are reported in meters.



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X. AUTHORIZED SIGNATURES

Report Written By:

Chris Kaiser
Lab Technician II

11/25/2024

Date

Reviewed and Approved By:

Chris Palumbo
Sr. Manager of Product Testing

11/25/2024

Date

XI. REVISION HISTORY

Revision Number	Date	Summary
0	11/25/2024	Original Report Issued

XII. ACCREDITATION

Capital Testing and Certification Services is an ISO/IEC 17025 accredited testing laboratory whose scope includes CAN/ULC S102.2. Accrediting Body: International Accreditation Service, Inc. (IAS). Testing Laboratory TL-224.