



CAPITAL TESTING AND CERTIFICATION SERVICES

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TEST REPORT

Test Method: ASTM E662-21ae1, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials

Rendered To: AHF Products
3840 Hempland Rd.
Mountville, PA 17554
USA

Product Description: 2.5 mm LVT

Report Number: S-2441

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Test Date: 10/07/2024

Pages: 6



TL-224

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I. SCOPE

This report contains the results from a specimen tested in accordance with ASTM E662, *Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials*. This fire-test-response standard covers determination of the specific optical density of smoke generated by solid materials and assemblies mounted in the vertical position in thicknesses up to and including 1 inch.

II. SUMMARY OF TEST METHOD

The testing is conducted in an 18 ft³ chamber with a photometric system consisting of a light source mounted at the bottom of the chamber and a photocell mounted at the top of the chamber. Measurement is made of the attenuation of a light beam by smoke (suspended solid or liquid particles) accumulating within a closed chamber due to non-flaming pyrolytic decomposition and flaming combustion.

At the beginning of each testing day, the chamber is preheated and checked for airtightness. An electrically heated radiant-energy source is positioned to produce an irradiance level of 2.5 W/cm² averaged over the central 1.5 in. (38.1 mm) diameter area of a vertically mounted specimen that faces the radiant heater. The nominal 3 by 3 in. specimen is mounted within a holder which exposes an area measuring 2.56 by 2.56 in. This exposure provides the non-flaming mode of the test. For the flaming mode, the radiant energy source is utilized, and a six-tube multi-directional burner is added to apply a row of equidistant flames across the lower edge of the exposed specimen area and the trough on the specimen holder. The test specimens are exposed to the flaming and non-flaming conditions within a closed chamber for 20 minutes or until 3 minutes after the minimum light transmittance value has been reached.

III. TEST SPECIMENS

Test specimens should be representative of the material or system which the test is intended to examine. The test specimens should be 3 by 3 +0, -0.03 in. (76.2 by 76.2, +0, -0.8 mm) by the intended installation thickness up to and including 1 in. (25.4 mm).

Prior to testing, the specimens are placed into a 140 ± 5°F (60 ± 3°C) oven for 24 hours. After 24 hours have elapsed, the specimens are conditioned to constant weight at an ambient temperature of 73 ± 5°F (23 ± 3°C) and a relative humidity of 50 ± 5 %.

TEST SPECIMEN INFORMATION	
Product Description	2.5 mm LVT. Nominal thickness: 2.5mm. LFP2520.* Vinyl flooring. Wood patterned and textured. Textured in same direction but different pattern as print.
Specimen Description / Mounting Method	Shape: Square. Flooring material was cut and adhered to the smooth side of ¼" cement board with S-995 flooring adhesive, 1/32" x 1/16" x 1/32" U-notch trowel. Specimens were weighted and cured for 1 day prior to pre-conditioning. Specimens were wrapped in aluminum foil with the dull side facing the specimen and backed by ½" millboard.
Orientation(s) Tested	Grain vertical
Color	Light brown
Samples Selected By	Client
Specimens Prepared By	Capital Testing
Date Received	09/30/2024
Conditioning Time (days)	3

* Information provided by the Client



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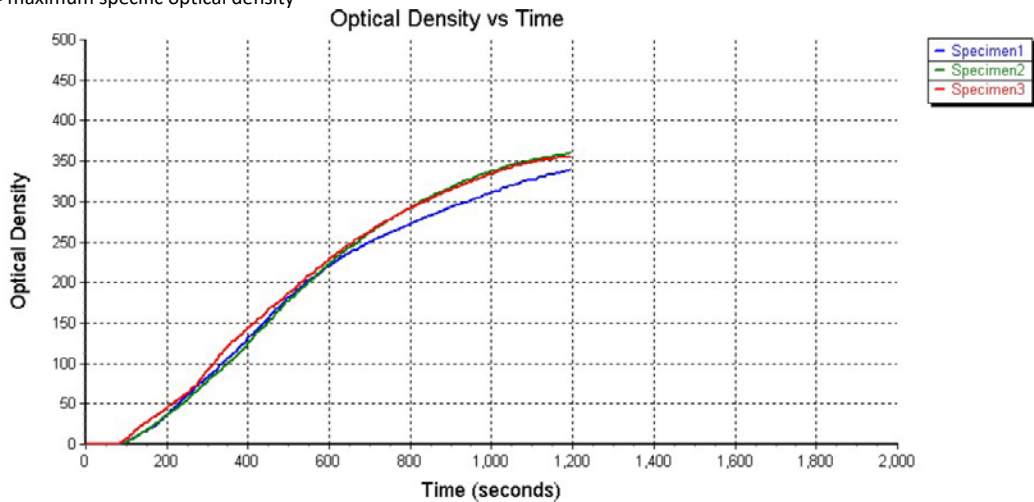
IV. NON-FLAMING MODE DATA AND RESULTS

NON-FLAMING MODE

	Unit	Specimen 1	Specimen 2	Specimen 3	Average
Room Temp.	°F	71.3	71.7	71.8	71.6
Room Humidity	%RH	63.3	57.4	55.7	58.8
Chamber Temp.	°F	96.4	97.8	96.1	96.8
Exposure Time	s	1200	1200	1200	1200
Length	in	2.993	2.988	3.000	2.994
Width	in	2.995	3.000	2.989	2.995
Thickness	in	0.411	0.422	0.382	0.405
Weight	g	78.83	80.73	77.94	79.17
Ds (1.5)	-	1	1	3	2
Ds (4.0)	-	56	51	60	56
Dm	-	339	360	355	351
Dm (corr)	-	328	345	342	338
t _{Dm}	s	1190	1190	1195	1192

Ds (1.5) = specific optical density at 1.5 minutes
 Ds (4.0) = specific optical density at 4 minutes
 Dm = maximum specific optical density

Dm (corr) = corrected maximum specific optical density
 t_{Dm} = time to maximum specific optical density



V. NON-FLAMING MODE OBSERVATIONS

All: Black with ~1" circle of light brown/grey in middle after testing. Center expanded. Core softened and blackened on visible edges.

- 1: Began darkening at 44s, expanding and blistering at 60s, smoking and split at 79s. Viewing door closed at 963s.
- 2: Began darkening at 40s, expanding and blistering at 59s, smoking and split at 78s. Shot smoke into furnace 110 – 134 s and 196 – 336s. Viewing door closed at 847s.
- 3: Began darkening at 42s, expanding and blistering at 60s, smoking and split at 70s. Shot smoke into furnace 70 – 120s. Viewing door closed at 855s.

Smoke Color: White Grey Black Other: _____



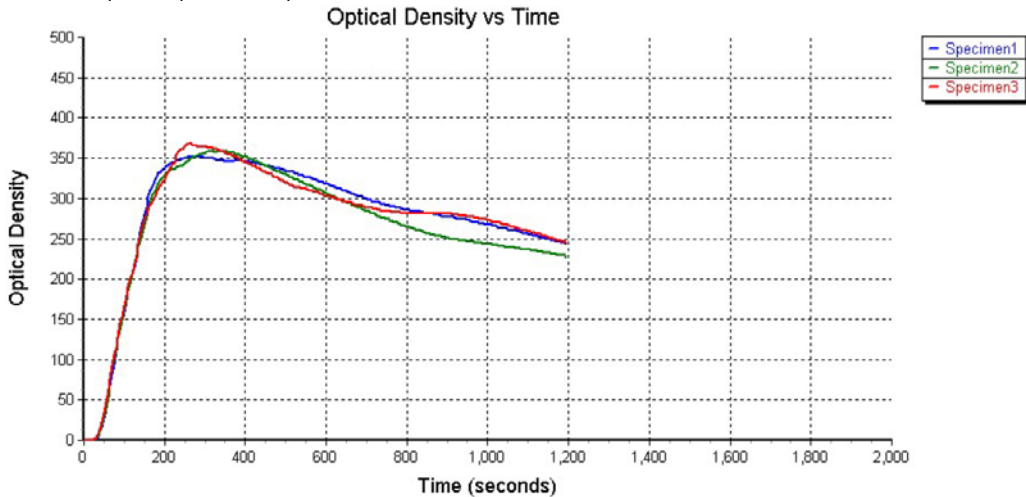
VI. FLAMING MODE DATA AND RESULTS

FLAMING MODE

	Unit	Specimen 1	Specimen 2	Specimen 3	Average
Room Temp.	°F	70.7	72.2	71.2	71.4
Room Humidity	%RH	53.8	51.5	51.7	52.3
Chamber Temp.	°F	94.2	95.5	96.7	95.5
Exposure Time	s	1200	1200	1200	1200
Length	in	2.994	2.994	2.986	2.991
Width	in	2.998	2.990	2.987	2.992
Thickness	in	0.426	0.397	0.407	0.410
Weight	g	78.77	80.99	77.95	79.24
Ds (1.5)	-	139	136	145	140
Ds (4.0)	-	349	341	362	351
Dm	-	352	359	368	360
Dm (corr)	-	316	325	334	325
t _{Dm}	s	280	340	265	295

Ds (1.5) = specific optical density at 1.5 minutes
 Ds (4.0) = specific optical density at 4 minutes
 Dm = maximum specific optical density

Dm (corr) = corrected maximum specific optical density
 t_{Dm} = time to maximum specific optical density



VII. FLAMING MODE OBSERVATIONS

All: Black with ~1" circle white and light brown in middle after testing.

- 1: Ignited and began darkening at 5s. Began expanding at 15s. Viewing door closed at 162s.
- 2: Ignited and began darkening at 5s. Began expanding at 14s. Viewing door closed at 170s.
- 3: Ignited and began darkening at 6s. Began expanding at 15s. Viewing door closed at 179s.

Smoke Color: White Grey Black Other: _____



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VIII. REMARKS

Reported weights and thicknesses include the flooring material, adhesive, and cement board.

Orientation screening was not performed at the request of the client. All specimens were tested with the grain direction vertical.

Smoke was ejected into the furnace for non-flaming specimens 2 and 3. Measured smoke values for specimens 2 and 3 may be lower than actual.

IX. DISCUSSION

Interpreting Results

ASTM E662 results are frequently used by code officials and regulatory agencies to determine whether a product is suitable for its intended application. The test standard itself does not establish specific performance criteria or contain a classification system. Check appropriate regulations and consult the authority having jurisdiction (AHJ) to determine the suitability of a material for the intended application.

ASTM E662 Standard Language and Disclaimers

The following language was taken directly from the ASTM E662 standard. It has been included for informational purposes.

ASTM E662-21ae1, Section 1.5 - This standard measures and describes the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products or assemblies under actual fire conditions.

ASTM E662-21ae1, Section 5.1 - This test method provides a means for determining the specific optical density of the smoke generated by specimens of materials and assemblies under the specified exposure conditions. Values determined by this test are specific to the specimen or assembly in the form and thickness tested and are not to be considered inherent fundamental properties of the material tested. Thus, it is likely that closely repeatable or reproducible experimental results are not to be expected from tests of a given material when specimen thickness, density, or other variables are involved.

ASTM E662-21ae1, Section 5.2 - The photometric scale used to measure smoke by this test method is similar to the optical density scale for human vision. However, physiological aspects associated with vision are not measured by this test method. Correlation with measurements by other test methods has not been established.

ASTM E662-21ae1, Section 5.4 - The test method is of a complex nature and the data obtained are sensitive to variations which in other test methods might be considered to be insignificant.

ASTM E662-21ae1, Section 6.3 - The results of the test apply only to the thickness of the specimen as tested. There is no common mathematical formula to calculate the specific optical density of one thickness of a material when the specific optical density of another thickness of the same material is known.

ASTM E662-21ae1, Section 13 Note 6 - Prior to the adoption of this test method, it was customary to report the maximum smoke accumulated as D_m (corr), and for that reason it has been included as a part of the test report. Subsequently, a statistical analysis of the round-robin data upon which the precision statement is based, showed that the D_m values were more uniform. Therefore, it is required that both D_m and D_m (corr) be reported.



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X. AUTHORIZED SIGNATURES

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10/09/2024

Date

Reviewed and Approved By:

Chris Palumbo
Sr. Manager of Product Testing

10/15/2024

Date

XI. REVISION HISTORY

Revision Number	Date	Summary
0	10/15/2024	Original Report Issued

XII. ACREDITATION

Capital Testing and Certification Services is an ISO/IEC 17025 accredited testing laboratory whose scope includes ASTM E662. Accrediting Body: International Accreditation Service, Inc. (IAS). Testing Laboratory TL-224.