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 Road
Mountville, PA 17554
USA

Product Description: Unfazed

Report Number: S-2399 rev.1

Original Issue Date: 05/30/2023

Test Date: 05/25/2023

Pages: 6

IAS ACCREDITED Testing Laboratory
TL-224

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 ft^3 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/cm^2 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	Unfazed. Manufacturer: AHF Products. Manufacturer Address: 1067 Dillerville Rd., Lancaster, PA. Lot Number: S-222. Product Type: Luxury vinyl tile. Composition: PVC, limestone* Type: flooring. Grain patterned and textured test face.
Specimen Description / Mounting Method	The flooring material was cut to size and adhered to ¼" cement board by Capital Testing. Shape: Square. Adhesive: S-295. Trowel: 1/32" x 1/16" x 1/32" U-notch.
Orientation(s) Tested	Printed grain direction vertical
Color	Brown
Samples Selected By	Client
Specimens Prepared By	Capital Testing
Date Received	05/17/2023
Conditioning Time (days)	2

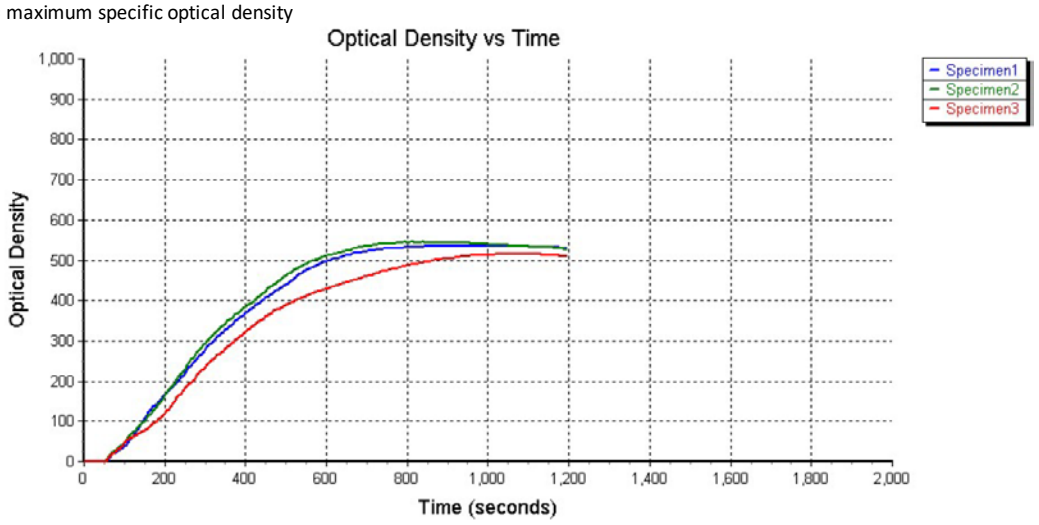
* Information provided by the Client

IV. NON-FLAMING MODE DATA AND RESULTS

NON-FLAMING MODE

	Unit	Specimen 1	Specimen 2	Specimen 3	Average
Room Temp.	°F	72.2	72.2	72.6	**72.3**
Room Humidity	%RH	40.0	41.1	40.8	**40.6**
Chamber Temp.	°F	96.4	95.0	98.4	**96.6**
Exposure Time	s	1200	1200	1200	**1200**
Length	in	2.999	2.996	3.000	**2.998**
Width	in	2.999	2.999	3.000	**2.999**
Thickness	in	0.383	0.377	0.384	**0.381**
Weight	g	63.83	62.88	63.35	**63.35**
Ds (1.5)	-	32	38	35	**35**
Ds (4.0)	-	209	218	169	**199**
Dm	-	537	545	516	**533**
Dm (corr)	-	501	512	471	**495**
t_{Dm}	s	1020	850	1055	**975**

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: Colored layer delaminated and was mostly consumed. White layer cracked and gray after testing.

1: Began blistering at 10s, darkening at 23s, smoking at 28s, and expanding at 39s. Shot smoke into the furnace 53 – 66s before flattening. Colored layer began peeling from edges at 79s. Viewing door closed at 330s.
2: Began blistering at 12s, darkening at 24s, smoking at 30s, and expanding at 35s. Shot smoke into the furnace 50 – 65s before flattening. Colored layer began peeling from edges at 76s. Viewing door closed at 314s.
3: Began blistering at 11s, darkening at 27s, smoking at 33s, and expanding at 38s. Shot smoke into the furnace 51 – 62s before flattening. Colored layer began peeling from edges at 70s. Viewing door closed at 382s.

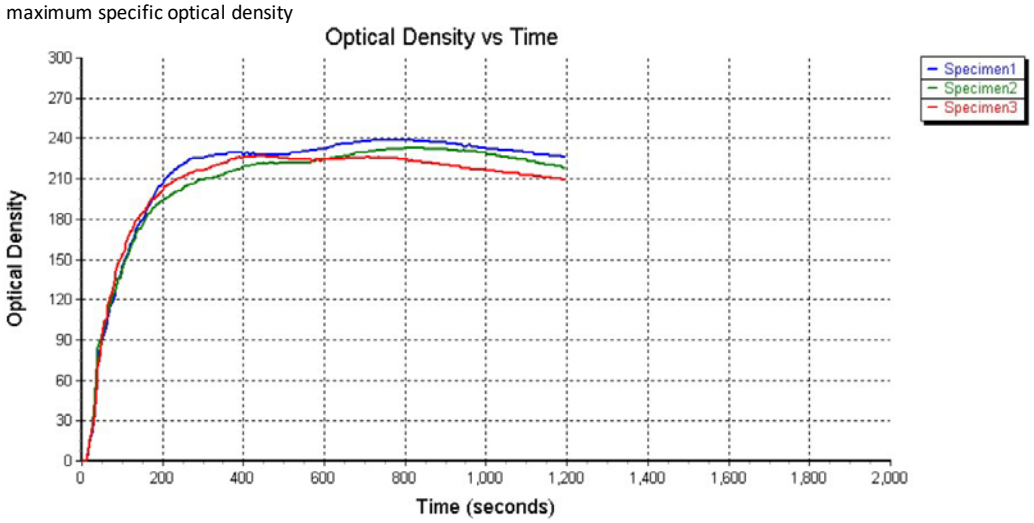
Smoke Color: ☐ White ☒ Grey ☐ Black ☐ Other: _____

VI. FLAMING MODE DATA AND RESULTS

FLAMING MODE

	Unit	Specimen 1	Specimen 2	Specimen 3	Average
Room Temp.	°F	73.0	72.7	71.6	**72.4**
Room Humidity	%RH	40.5	40.0	40.1	**40.2**
Chamber Temp.	°F	97.9	96.1	97.5	**97.2**
Exposure Time	s	1200	1200	1200	**1200**
Length	in	2.996	2.996	2.995	**2.996**
Width	in	2.992	2.994	2.998	**2.995**
Thickness	in	0.349	0.381	0.371	**0.367**
Weight	g	62.88	63.80	63.38	**63.35**
Ds (1.5)	-	135	136	147	**139**
Ds (4.0)	-	219	201	210	**210**
Dm	-	239	233	227	**233**
Dm (corr)	-	219	212	206	**212**
t_{Dm}	s	770	825	430	**675**

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: Ignited and began blistering at 3s. Green, indigo, and violet flames near face. Colored layer delaminated and was mostly consumed.

Smoke Color: ☐ White ☐ Grey ☒ Black ☐ Other: _____

VIII. REMARKS

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

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

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.

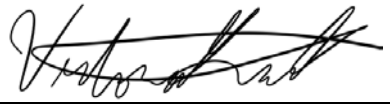
ASTM E662-21ae1, Section 5.4 - The test method is of a complex nature and the data obtained are sensitive to variations which in other test methods might be considered to be insignificant.

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 Dm (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 Dm values were more uniform. Therefore, it is required that both Dm and Dm (corr) be reported.

X. AUTHORIZED SIGNATURES

Report Written By:



Victoria Gastrock
Lab Technician I

01/12/2024
Date

Reviewed and Approved By:

Chris Palumbo
Sr. Manager of Product Testing

01/12/2024
Date

XI. REVISION HISTORY

Revision Number	Date	Summary
0	05/30/2023	Original Report Issued
1	01/12/2024	Report reissued with changes to the product description – "American Personality Pro" revised to "Unfazed" at the request of the client.

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.