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TEST REPORT

Test Method: ASTM E648-19ae1 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

Rendered To: Armstrong Flooring Inc.
2500 Columbia Ave, P.O. Box 3025
Lancaster, PA 17604

Product Description: Empower™

Report Number: FRP-1180

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Pages: 6

IAS ACCREDITED Testing Laboratory
TL-224

I. SCOPE

This test report contains the results from a specimen tested in accordance with ASTM E648, *Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source*. This fire-test-response standard measures the critical radiant flux at flame-out. It provides a basis for estimating one aspect of fire exposure behavior for floor-covering systems. The imposed radiant flux simulates the thermal radiation levels likely to impinge on the floors of a building whose upper surfaces are heated by flames or hot gases, or both, from a fully developed fire in an adjacent room or compartment. ASTM E648 is considered to be technically equivalent to NFPA 253.

II. DEFINITIONS

critical radiant flux —the level of incident radiant heat energy on the floor covering system at the most distant flame-out point. It is reported as W/cm^2.

flame-out —the time at which the last vestige of flame or glow disappears from the surface of the test specimen, frequently accompanied by a final puff of smoke.

flux profile —the curve relating incident radiant heat energy on the specimen plane to distance from the point of initiation of flaming ignition, that is, 0 cm.

III. PROCEDURE

The test chamber is heated for a minimum of 1.5 hrs. at the beginning of each testing day. After preheating the chamber, a “dummy board” is loaded into the chamber and allowed to preheat for an additional 0.5 hrs. The dummy board is used to establish the radiant energy flux distribution that is created by the radiant panel. The panel is adjusted to yield a flux profile with a nominal maximum of 1.1 W/cm^2 to a minimum of 0.1 W/cm^2. After the flux profile standardization is complete, the dummy board is removed, and the chamber is allowed to equilibrate.

For each burn, the test specimen is loaded into a stainless-steel mounting frame and backed with 13 mm thick inorganic millboard. The specimen is then placed onto a horizontal mounting platform and a pilot burner is ignited. The pilot burner is kept at least 50 mm from the sample surface during the first 5 minutes of the test. At this time, the specimen is only being exposed to the radiant heat gradient that is created by the panel. After the initial 5 minutes have elapsed, the pilot burner is lowered so that it is directly impinging on the edge of the specimen that is closest to the radiant panel. The pilot burner is left in contact with the specimen for an additional 5 minutes. When 5 minutes have elapsed, the pilot is removed from the sample surface and extinguished.

The test is ended if the specimen does not propagate flame during the 5-minute exposure to the pilot burner. For specimens that do propagate flame, the test is continued until flame out or until the flame advances to the full length of the specimen. The distance of the flame travel is measured, and that distance is converted to a radiant flux value in W/cm^2.

IV. TEST SPECIMENS

Test specimens should be representative of the material or system which the test is intended to examine. All test specimens should be at least 250 mm (9.84 in.) wide and 1050 mm (41.33 in.) in length. Prior to testing, the specimens are conditioned in an environment that is held at 21 ± 3 °C (69.8 ± 5.4 °F) and 50 ± 5% relative humidity for a minimum of 48 hours. Carpet specimens that have been glued down are conditioned for a minimum of 96 hours.

TEST SPECIMEN INFORMATION	
Description	Empower™ Product Category: Locking Rigid Core LVT. Production Date: 02/01/2020. Lot Number: 020120. Composition: LVT, Diamond 10 Technology coating, mineral core, IXPE attached pad.*
Samples Selected By	Client
Date Received	06/25/2020
Conditioning Time (days)	6
Specimen Size (in.)	9-3/4 x 41
Finished Tile Dimensions (in.) **	-
Average Weight (lbs.)	5.7
Average Thickness (in.)	0.28
Color	Grey and Brown
Mounting Method	Each sample consisted of two pieces of flooring material loosely laid over 1/4" cement board. The pieces of flooring material varied in width.

* Information provided by the Client

** Test results are applicable to tiles of smaller dimensions

V. TEST RESULTS

AVERAGE CRITICAL RADIANT FLUX (W/cm^2)	STANDARD DEVIATION	COEFFICIENT OF VARIATION
0.99	**0.00**	**0.41**

Test Date	07/01/2020
Flux Profile Date	07/01/2020
Test Conducted By	Christoper Kaiser

Burn Number	Maximum Burn Length (cm)	Time to Maximum Burn Length (min)	Critical Radiant Flux (W/cm^2)
1	10.2	10.29	0.99
2	9.6	10.18	1.00
3	9.9	10.08	0.99

VI. OBSERVATIONS

All burns: Blistering of the material surface during 5:00 minute preheat.

VII. REMARKS

Each sample consisted of two boards of varying width.
Sample 1: 5-7/8" x 41" and 3-3/4" x 41"
Sample 2: 7-1/8" x 41" and 2-5/8" x 41"
Sample 3: 5-3/4" x 41" and 3-3/4" x 41"
Reported weights and thicknesses do not include the cement board.

VIII. DISCUSSION

ASTM E648 Standard Language and Disclaimers

The following language was taken directly from the ASTM E648 standard. It has been included for information purposes.

The standard was developed to simulate an important fire exposure component of fires that develop in corridors or exitways of buildings and is not intended for routine use in estimating flame spread behavior of floor covering in building areas other than corridors or exitways. – ASTM E648-19ae1, Section 1.2

The test is applicable to floor-covering system specimens that follow or simulate accepted installation practice. Tests on the individual elements of a floor system are of limited value and not valid for evaluation of the flooring system. – ASTM E648-19ae1, Section 5.4

Interpreting Results

ASTM E648 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. The most commonly used classification system can be found in the International Code Council publication International Building Code (IBC), the National Fire Protection Association publication NFPA 101 (Life Safety Code), and the National Fire Protection Association publication NFPA 5000 (Building Construction and Safety Code).

Class	Critical Radiant Flux (CRF)
I	CRF ≥ 0.45 W/cm^2
II	CRF ≥ 0.22 W/cm^2

Other applications may only specify the minimum allowable critical radiant flux. For example, in rail applications, NFPA 130 (Standard for Fixed Guideway Transit and Passenger Rail Systems) and the Federal Railroad Administration's 49 CFR Part 238 specify a minimum allowable critical radiant flux of 0.5 W/cm^2. The US Navy's MIL-STD-1623 specifies a minimum allowable critical radiant flux of 0.45 W/cm^2 for floor covering materials that will be used on naval ships.

The classifications and performance criteria above do not preclude a material from being otherwise classified by the authority having jurisdiction (AHJ).

IX. AUTHORIZED SIGNATURES

2020.07.01 15:13:15 -04'00'

Chris Kaiser
Laboratory Technician II

07/01/2020
Date

Reviewed and Approved By:

Date: 2020.07.07 13:04:03 -04'00'

Chris Palumbo
Sr. Manager of Product Testing

07/07/2020
Date

X. REVISION HISTORY

Revision Number	Date	Summary
0	07/07/2020	Original Report Issued