

ASTM E84 Surface Burning Characteristics of "Mbrico Fire Rated Tile Decking"

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Submitted by: Element Fire Testing

Report No. 25-002-092(A)
4 Pages

Date: March 28, 2025

1.0 ACCREDITATION

ISO/IEC 17025 for a defined Scope of Testing by the American Association for Laboratory Accreditation (A2LA), Certificate Number: 6524.03.

2.0 SPECIFICATIONS OF ORDER

Determine the Flame Spread and Smoke Developed Indices based upon a single test conducted in accordance with ASTM E84-24, as per Element Quotation No. 25-002-643592 dated January 17, 2025.

2.1 History of Revision

This is the original.

3.0 SAMPLE INFORMATION

Material Identification	"Mbrico Fire Rated Tile Decking"
Supplied Material Description*	2cm porcelain deck tile reinforced with class A fire rated substrate.
Material Thickness	0.75 inch (19 mm)
Date of Material Receipt	2025-03-06
Element Sample Identification No.	25-002-S0092
Test Date	2025-03-28

* The material description as supplied by the client. Element cannot always validate the accuracy of the description provided. If appreciable differences are observed between the material description and the specimen, test data may not be representative. Information or data supplied by the client can affect validity of results.

4.0 TEST PROCEDURE

The method, designated as ASTM E84-24 "Standard Method of Test for Surface Burning Characteristics of Building Materials", is designed to determine the relative surface burning characteristics of materials under specific test conditions, where the material under test is mounted so that it forms the ceiling of a horizontal fire tunnel. A specified airflow is introduced through the tunnel and a specified flame is applied to one end. Observations are then made regarding the rate of flame spread along the specimen. Results are expressed in terms of Flame Spread Index (FSI) and Smoke Developed Index (SDI). There is no established relationship between those two values.

Although the procedure is applicable to materials, products and assemblies used in building construction for development of comparative surface spread of flame data, the test results may not reflect the relative surface burning characteristics of tested materials under all building fire conditions.

5.0 SAMPLE PREPARATION

The test specimen consisted of a total of 12 sections of material, each approximately 21 inches (533 mm) in width by 23.5 inches (597 mm) in length. The sections were butted together end-to-end to create the total specimen length. Prior to testing, the specimen was conditioned to constant weight at a temperature of $73 \pm 5^\circ\text{F}$ ($23 \pm 3^\circ\text{C}$) and a relative humidity of $50 \pm 5\%$. At the time of test initiation, the specimen was self-supporting.

6.0 SUMMARY OF TEST PROCEDURE

The tunnel is preheated to $150 \pm 5^\circ\text{F}$ ($66 \pm 2.8^\circ\text{C}$), as measured by the floor-embedded thermocouple located 23.25 feet (7087 mm) downstream of the burner ports, and is allowed to cool to $105 \pm 5^\circ\text{F}$ ($40.5 \pm 2.8^\circ\text{C}$), as measured by the floor-embedded thermocouple located 13 feet (3962 mm) from the burners. The tunnel lid is then raised and the test specimen is placed along the ledges of the tunnel so as to form a continuous ceiling 24 feet (7315 mm) long,

approximately 12 inches (305 mm) above the floor. Three 96 inch (2438 mm) sections of 0.25 inch (6 mm) cement board are then placed on the back side of the specimen and the lid is then lowered into place. Upon ignition of the gas burners, the flame spread distance is observed and recorded every second. Flame spread distance versus time is plotted. Calculations ignore all flame front recessions and Flame Spread Index (FSI) is determined by calculating the total area under the curve for the test sample. If the area under the curve (A) is less than or equal to 97.5 min-ft, then $FSI = 0.515 \cdot A$; if greater, $FSI = 4900 / (195 - A)$. FSI is then rounded to the nearest multiple of 5.

Smoke Developed Index (SDI) is determined by dividing the total area under the obscuration curve by that established for liquid heptane, and multiplying by 100. SDI is then rounded to the nearest multiple of 5 if less than 200. SDI values over 200 are rounded to the nearest multiple of 50.

7.0 TEST RESULTS

SAMPLE: "Mbrico Fire Rated Tile Decking"

Approx. Time to Ignition (s)	Maximum Flame Front Distance	Time to Maximum Flame Front (s)	Maximum Temperature (° F)	Flame Spread Index (FSI)	Smoke Developed Index (SDI)
85	(ft.): 3.8 (m): 1.16	370	540	15	400

7.1 Observations of Burning Characteristics

The material ignited approximately 85 seconds after exposure to the test burner flame. Surface discoloration and cracking in the area of test burner flame impingement was also observed.

8.0 INTERPRETATION OF RESULTS

Industry documents such as the International Building Code (IBC), NFPA 101 Life Safety Code, etc. refer to ASTM E84 (UL 723, NFPA 255) test results using the following material classification categories:

	Flame-Spread Index (FSI)	Smoke Developed Index (SDI)
Class 1 or Class A	0 - 25	450 Maximum
Class 2 or Class B	26 - 75	450 Maximum
Class 3 or Class C	76 - 200	450 Maximum
Tested Material Results Classification (if applicable):		Class 1 or Class A



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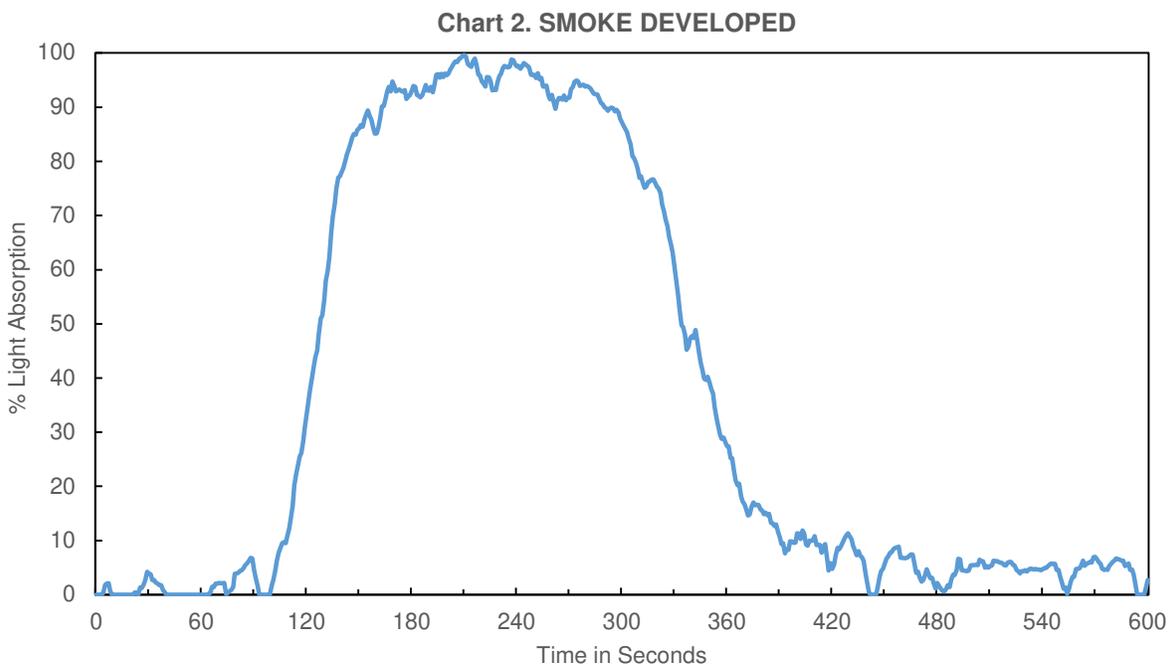
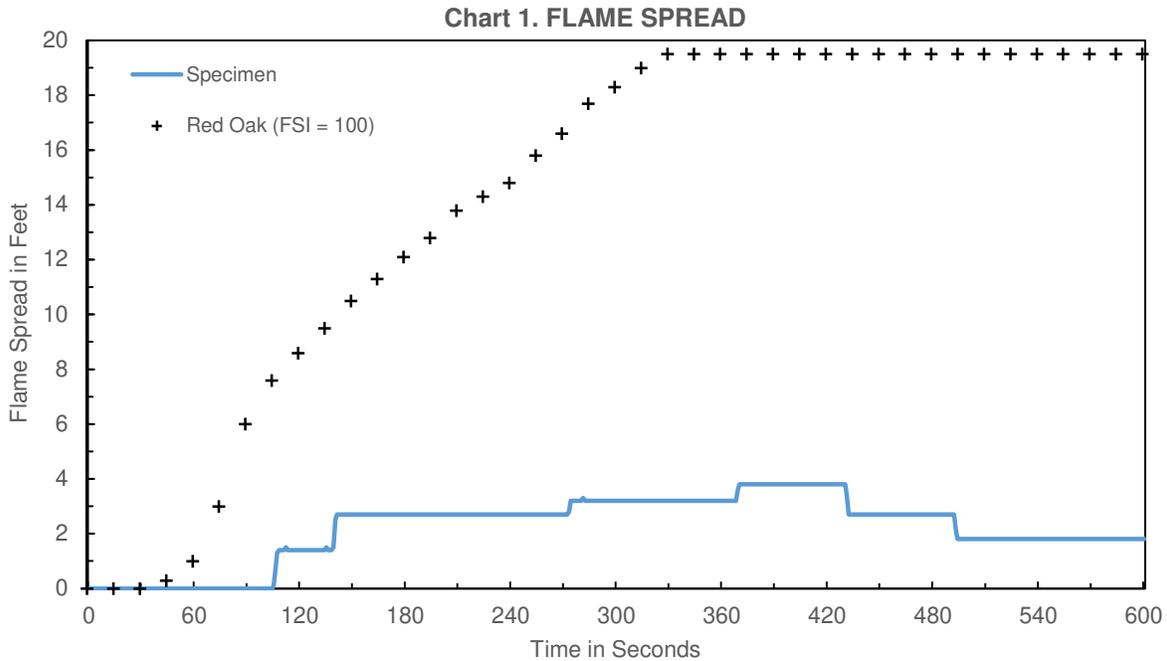
Notes: This report is related only to the sample identified and shall not be reproduced, except in full, without approval. It is covered under Element Materials Technology Canada Inc. Standard Terms and Conditions of Contract, which are accessible at www.element.com, or by calling 1-866-263-9268. ASTM E84 is a well-established test method that reports data in the form of indices. As such, MU cannot be calculated. In the reporting instructions, calculated values are rounded to the nearest multiple of 5 for FSI, and 5 or 50 for SDI, depending on the result. Since the rounding ranges establish precision and include potential uncertainty, by following the reporting instructions, the lab is considered to have satisfied the MU reporting requirements of ISO/IEC 17025.

Client is responsible for informing Mbrico Tile Decks of any requirements for fire rating on project.

9.0 TEST CHARTS

ASTM E84-24

Sample: "Mbrico Fire Rated Tile Decking"



Calculated Flame Spread (CFS)	Rounded Flame Spread Index (FSI)	Calculated Smoke Developed (CSD)	Rounded Smoke Developed Index (SDI)	Maximum 23' Air Temperature (°F)
13.8	15	399.2	400	540

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