



# TECHNICAL BULLETIN

## ASTM E84 Flame Spread and Smoke Development Testing, Meaning and Classification of W. R. MEADOWS AIR-BARRIERS

This technical bulletin is intended to explain ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials. The purpose of this ASTM test method is to determine the relative burning behavior of a material by observing the flame spread along the specimen including the amount of smoke developed during the associated burning. The flame spread and smoke index are reported. There is no correlation between flame spread and smoke index. The ASTM E84 procedure is comparable to UL 723, ANSI/NFPA No. 255, and UBC No. 8-1.

The International Building Code (IBC) specifies the requirements for interior finishes in buildings. The code requires that interior wall and ceiling finish materials meet certain flame spread and smoke development criteria. The test method used to evaluate these criteria is ASTM E84. The test measures how fast and far the flames spread across the specimen's surface and the amount of smoke developed throughout the test, typically through optical sensors. During the ten-minute test, a technician will monitor the specimen through the windows and perform real-time analysis of sensors in the test tunnel.

ASTM E84 is also now used to test air barrier materials for conformance to both the IBC and National Fire Protection Association (NFPA) Flame Spread and Smoke Development standards. The relative flame spread rating of a material, applied inside a cavity wall assembly, will provide comparative data to the material's tendency to propagate a flame originating from the interior or exterior source and traveling across the external face of the building structure.

Per ASTM E84, the W. R. MEADOWS AIR-SHIELD branded air barriers listed below have flame spread and smoke development values of at or less than 25 and 450, respectfully. These are the required values to qualify as Class A materials in accordance with the NFPA and IBC.

**W. R. MEADOWS AIR-BARRIER ASTM E-84 PROPERTY TABLE**

W. R. MEADOWS PRODUCT	Flame Spread Index	Smoke Development Index	Classification (IBC, NFPA & UL 723)
AIR-SHIELD LMP	10	30	CLASS A
AIR-SHIELD LMP BLACK	25	40	CLASS A
AIR-SHIELD TMP	10	10	CLASS A
AIR-SHIELD SMP	0	10	CLASS A
AIR-SHIELD LSR	10	115	CLASS A
AIR-SHIELD BUTYL FLASHING	Not Applicable <sup>1</sup>	Not Applicable <sup>1</sup>	Not Applicable <sup>1</sup>
AIR-SHIELD LIQUID FLASHING	Not Applicable <sup>2</sup>	Not Applicable <sup>2</sup>	Not Applicable <sup>2</sup>
AIR-SHIELD THRU-WALL FLASHING	Not Applicable <sup>1</sup>	Not Applicable <sup>1</sup>	Not Applicable <sup>1</sup>
AIR-SHIELD ALUMINUM FLASHING	Not Applicable <sup>1</sup>	Not Applicable <sup>1</sup>	Not Applicable <sup>1</sup>

1. AAMA 711 Standard – Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products and IBC, both do not require ASTM E84 testing for Fenestration Materials.
2. AAMA 714 Standard – Voluntary Specification for Liquid Applied Flashing Used to Create a Water-Resistive Seal around Exterior Wall Openings in Buildings, do not require ASTM E84 testing for Fenestration Materials.



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**Flame Spread Classification per Building Code Reference Table**

NFPA CLASS <sup>1</sup>	IBC CLASS <sup>2</sup>	FLAME SPREAD	SMOKE DEVELOPED
A	A	0 through 25	Less than or equal to 450
B	B	26 through 75	Less than or equal to 450
C	C	76 through 200	Less than or equal to 450

**BUILDING CODES CITED:**

1. National Fire Protection Association, ANSI/NFPA No. 101, "Life Safety Code"
2. International Building Code, Chapter 8, Interior Finishes, Section 803.

**Meaning of Results**

ASTM E84 is intended for comparative measurements, providing information on surface flame spread and smoke density. The classifications mentioned, NFPA CLASS and IBC CLASS, help users understand the performance characteristics of the materials in terms of flame spread and smoke development. ASTM E84 does not provide or indicate a material as combustible or noncombustible.

**Difference between ASTM E84 and NFPA 255**

ASTM E84 and NFPA 255 are both test methods used to evaluate the surface burning characteristics of building materials. ASTM E84 is titled "Standard Test Method for Surface Burning Characteristics of Building Materials" and is used to measure the flame spread and smoke development of interior finishes in buildings. NFPA 255 is titled "Standard Method of Test of Surface Burning Characteristics of Building Materials" and is used to evaluate the surface burning characteristics of building materials. Both ASTM E84 and NFPA 255 utilize the same equipment and test method, and are essentially the same test. However, NFPA 255 was withdrawn in 2011 and now references ASTM E84

**Summary of Testing Procedure**

The test specimen, a material between 20" - 24" in width by 24' +/- 12" in length, is loaded onto the fire test chamber when tested to ASTM E84. The inside dimensions are 17 3/4" +/- 1/4" wide by 12" +/- 1/2" deep by 25 feet long.

The fire test chamber is a rectangular horizontal duct with a removable lid. The sides and base of the chamber are lined with an insulated firebrick with pressure-tight observation windows on one side for a technician to observe flame progression for the duration of the 10-minute test period. The chamber lid is lowered into test position with a non-combustible concrete board placed between the specimen and chamber lid. A draft of air delivered at a rate of 240' (73.2 m) per minute is maintained inside the test chamber throughout the test. This air is supplied by an electric fan afterburner and is controlled by an electronically controlled damper door located downstream within the exhaust duct network. The test is started when the test flame is ignited at the front of the test chamber. An electronic photocell system located in the exhaust system downstream from the test chamber is used to plot the smoke developed for use in calculating the smoke-developed index while a technician plots the flame spread distance used in determining the flame spread index. The test is run for the 10-minute duration in accordance with the method.

**ASTM E108 versus ASTM E84**

For comparison, and due to the varying roofing slopes, roofing products are not evaluated per ASTM E84, but instead are tested to ASTM E108 Standard Test Methods for Fire Tests of Roof Coverings, which also gives roofs a classification of letter A, B, or C as explained in Chapter 15 of the IBC.



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