



Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference¹

This standard is issued under the fixed designation E1646; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the determination of the resistance of exterior metal roof panel systems to water penetration when water is applied to the outdoor face simultaneously with a static air pressure at the outdoor face higher than the pressure at the indoor face, that is, positive pressure. This test method is a specialized adaption of Test Method E331.

1.2 This test method is applicable to any roof area and is intended to measure only the water penetration associated with the field of roof including panel side laps and structural connections. It does not include leakage at openings or perimeter or any other details.

1.3 This test method is limited to specimens in which the side seams and attachments are clearly visible and in which the source of leakage is readily determined. Composite systems in which the source cannot be readily determined are outside the scope of this test method.

1.4 The proper use of this test method requires a knowledge of the principles of pressure and flow measurement.

1.5 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only and may be approximate.

1.6 The text of this test method references notes and footnotes excluding tables and figures, which provide explanatory material. These notes and footnotes shall not be considered as requirements of the test method.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see 7.1.

2. Referenced Documents

2.1 ASTM Standards:²

E331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

E631 Terminology of Building Constructions

E1680 Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems

E1592 Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

2.2 Other Standards:

AAMA 501 Methods of Test for Metal Curtain Walls³

3. Terminology

3.1 *Definitions*—For definitions of general terms relating to building construction used in this test method, see Terminology E631.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *specimen*—the entire assembled unit submitted for test as described in Section 8.

3.2.2 *test pressure difference*—the specified difference in static air pressure across the assembled and fixed specimen expressed as pounds-force per square foot (newtons per square metre (pascals)).

3.2.3 *water leakage*—penetration of water onto the exposed inside surface of the test specimen under specified conditions of air pressure difference across the specimen during a 15-min test period. Water penetration at or around end dams or side rails is not leakage; end dams and side rails are installed to cause and control ponding over the panels and to support the panels. They are not part of the roof.

¹ This test method is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.57 on Performance of Metal Roof Systems.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from Architectural Aluminum Manufacturers Association (AAMA), 1827 Walden Office Square, Suite 550, Schaumburg, IL 60173, <http://www.aamanet.org>.