Designation: E1089 – 86 (Reapproved 2007)

StandardTest Method for Water Penetration of Flat Plate Solar Collectors by Uniform Static Air Pressure Difference[1]

This standard is issued under the fixed designation E1089; 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 flat plate solar collectors to water penetration when water is applied to their outer surfaces with a static air pressure at the outer surface higher than the pressure at the interior of the collector.

1.2 This test method is applicable to any flat plate solar collector.

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

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *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.* Specific precautionary information is contained in Section 6.

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

E823 Practice for Nonoperational Exposure and Inspection of a Solar Collector (Withdrawn 2010)[3]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *specimen, n*—the entire assembled unit as submitted for test.

3.1.2 *test pressure difference, n*—the specified difference in static air pressure across the specimen expressed as pascals or pounds-force per square foot.

3.1.3 *water leakage, n*—penetration of water into the inner surfaces of the test specimen under specified conditions of air pressure difference across the specimen during a 15-min test period.

4. Summary of Method

4.1 The test consists of either of the following:

4.1.1 Sealing the test specimen into or against one face of a test chamber, supplying air to or exhausting air from the chamber at the rate required to maintain the test pressure difference across the specimen, while spraying water onto the outdoor face of the specimen at the required rate and observing any water leakage,

4.1.2 Alternately exhausting air from the interior of the collector to create the pressure differential, or

4.1.3 Any other method that can create a similar pressure difference.

5. Significance and Use

5.1 The rain spray test described in 8.1 as Method A is based upon Test Method E331 which is intended for use in the evaluation of exterior windows, curtain walls, and doors. This test method is intended to supplement the water spray test in Practice E823 that does not include the effects of wind-driven rain. This method includes the use of a pressure differential to enhance the penetration of water into the assembly being tested. This type of pressure differential can occur with many types of solar collector mounting configurations. In the case of solar collectors that form a building element, for example, a roof, this pressure differential will be caused by differences of pressure inside and outside the building. In the case of solar collectors mounted on standoffs or racks, this pressure differential will be caused by positive and negative wind forces acting simultaneously on faces of the collector.

5.2 Water leakage due to joint expansion can be influenced by several factors, including: the specific collector design and materials used, the test specimen temperature, and the water

[1] This test method is under the jurisdiction of ASTM Committee E44 on Solar, Geothermal and Other Alternative Energy Sources and is the direct responsibility of Subcommittee E44.05 on Solar Heating and Cooling Systems and Materials.

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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] The last approved version of this historical standard is referenced on www.astm.org.