



Designation: E2273 – 25

Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies¹

This standard is issued under the fixed designation E2273; 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 determines the drainage efficiency of EIFS clad wall assemblies when subjected to a water spray rate in accordance with Test Method E331.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered standard.

1.3 *This standard may involve hazardous materials, operations and equipment. 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

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

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E2110 Terminology for Exterior Insulation and Finish Systems (EIFS)

¹ This test method is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.58 on Exterior Insulation and Finish Systems (EIFS).

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

3. Terminology

3.1 Definitions used in this standard shall be in accordance with Terminology E2110.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *drainage efficiency, n*—a percentage value based on the amount of water that passed through the test specimen and was collected divided by the amount of water sprayed into the slot fault.

3.2.2 *test specimen, n*—the entire assembled unit submitted for testing as described in Section 7.

3.2.3 *test specimen slot fault, n*—an opening in the test specimen where the insulation board, and other components, have been removed, exposing the weather-resistive barrier to which water spray is directed.

3.2.4 *water drainage, n*—the ability of the test specimen to drain water.

4. Summary of Test Method

4.1 This test method consists of sealing a spray box to the test specimen and then concentrating a water spray into the slot fault of the test specimen.

5. Significance and Use

5.1 This test method is a standard procedure for determining the drainage efficiency of an EIFS clad wall assembly.

6. Apparatus

6.1 *Spray Box*—A transparent plastic, or equivalent, box measuring 622 mm by 241 mm by 184 mm (24½ in. by 9½ in. by 7¼ in.) containing a water spray system that is sealed to the test specimen.

6.2 *Water Spray System*—Two spray nozzles installed in the spray box, oriented to apply all the water into the slot fault and located 13 mm (½ in.) from the open side of the spray box and 150 mm (6 in.) to the right and left of vertical center of the slot fault. A pressure regulator, flow meter, and an inline water filter to the spray nozzles control the flow rate of water sprayed into the slot fault. The water spray system shall deliver water at a rate of 106 g (0.234 lb) per minute +10 % – 0 %.

6.3 *Drained Water Container(s)*—A container, or containers, tared to the nearest 1.0 g (0.002 lb) of sufficient size to retain the water drained from the test specimen.

6.4 *Balance*, with a capacity of 20 kg (45 lb) and accuracy of 1.0 g (0.002 lb).

6.5 A means of collection such as a trough, to direct the drained water to the drained water container. The collection method may also be the tared container.

7. Calibration of Flow Rate

7.1 Collect the water from the water spray system in a tared container for a period of 15 min. Obtain the weight of the collected water and adjust the flow rate if necessary to obtain a weight of water of 1590 g (3.5 lb) to 1745 g (3.8 lb). Multiply this weight by 5 to obtain the amount of water that is delivered to the test specimen and report it in 10.1.7.

8. Test Specimen

8.1 The EIFS clad wall assembly test specimen shall be a minimum of 1220 mm (48 in.) by 2440 mm (96 in.).

8.2 The test specimen shall consist of the same materials and details, and be prepared by the same methods as used in actual construction.

8.3 A 51 mm (2 in.) by 610 mm (24 in.) slot fault shall be constructed in the insulation board, lamina, and other components at a distance of 304 mm (12 in.) from the top of the slot fault to the top of the test specimen so that the weather resistive barrier is exposed. The slot fault shall be centered on the vertical center line of the panel. The top and sides of the test specimen shall be sealed at the interface of the insulation board and substrate. This can be accomplished by edge wrapping the test specimen with base coat and reinforcing mesh. The insulation board edge around the perimeter of the slot fault shall be exposed. See Fig. 1.

8.4 The EIFS clad wall assembly shall be cured for a minimum of 28 days prior to testing.

9. Test Procedure

9.1 Photograph the test set-up.

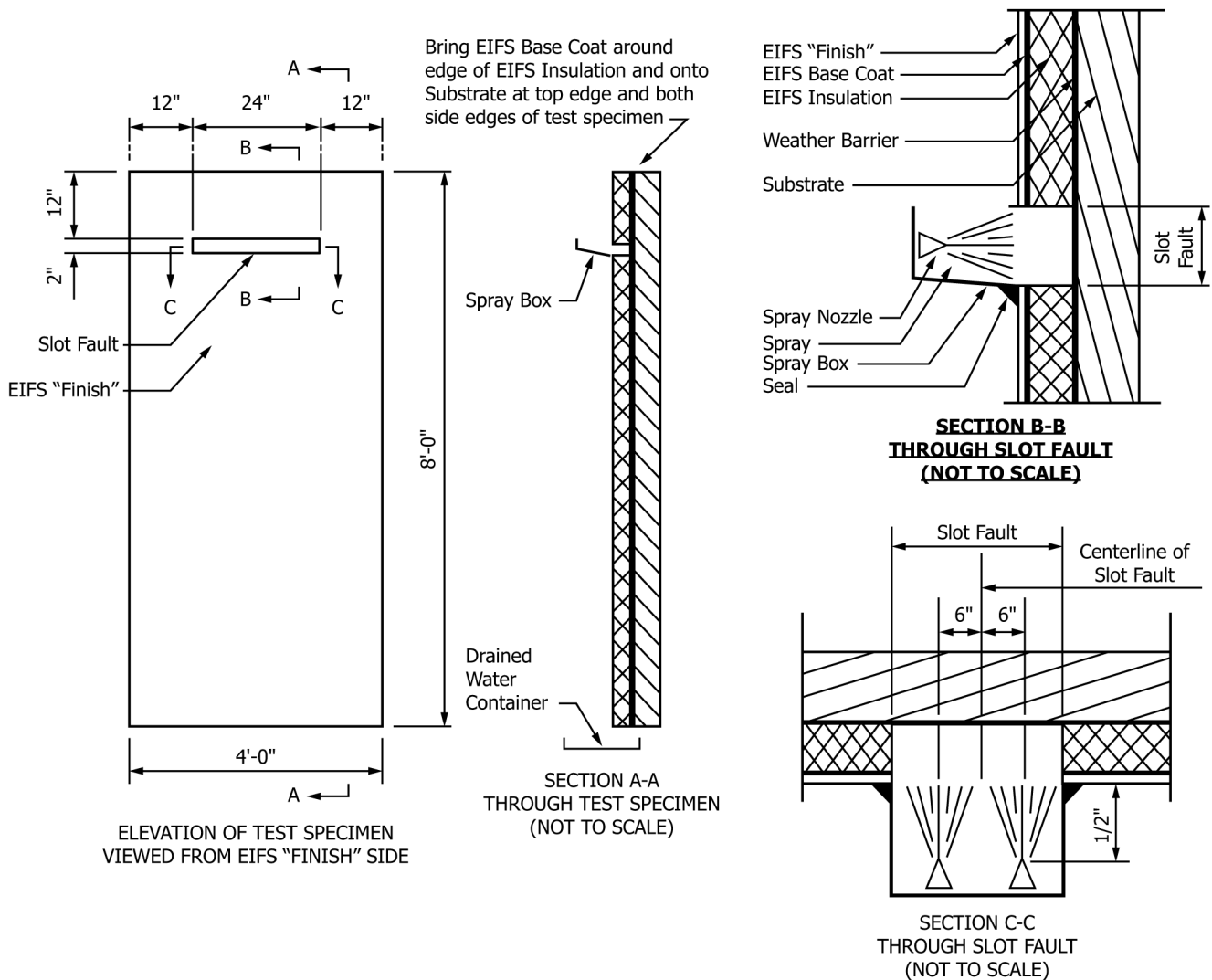


FIG. 1 EIFS Test Specimen

9.2 Mount and seal the spray box to the test specimen in such a manner that all water enters the slot fault. Center the spray box with the bottom edge of the spray box even with the bottom edge of the slot fault. Position the test specimen vertical and plumb.

9.3 Place the means of water collection or the tared container on a scale balance at the base of the test specimen in order to collect and weigh the drained water.

9.4 Begin water spray and start time.

9.5 Observe if water build-up occurs in the spray box and report duration and depth.

9.6 Record the weight of drained water at 15 min intervals (5 times during the test period) to the nearest 1.0 g (0.002 lb).

9.7 After 75 min, terminate the water spray.

9.8 Continue to collect water for 60 min after termination of water spray. Weigh the container(s) of drained water and calculate the total weight of drained water.

10. Report

10.1 At a minimum, include the following information in the report:

10.1.1 Date of test and report.

10.1.2 Identification of test specimen to include manufacturer, materials, construction details, dimensions, application instructions, literature, and other pertinent information.

10.1.3 Detailed drawings of the test specimen providing a description of the EIFS clad wall assembly.

10.1.4 The rate of water spray.

10.1.5 The weight of water collected at each 15 min interval.

10.1.6 Total weight of water collected after 60 min draining period.

10.1.7 Total weight of water sprayed into the slot fault.

10.1.8 The drainage efficiency of the test specimen.

10.1.8.1 EIFS clad wall assembly Drainage Efficiency (%) = (Total weight of collected water ÷ Total weight of water delivered to the test specimen) × 100.

10.1.9 Any water leakage through the back of the test specimen.

10.1.10 Photographs.

10.1.11 Duration and depth of water build-up in the spray box.

11. Precision and Bias

11.1 The precision of this test method is based on an interlaboratory study of ASTM E2273, Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies, conducted in 2022. Eight volunteer laboratories were asked to test two different materials. Every “test result” represents an individual determination, and all participants were instructed to report three replicate test results for each material. Practice E691 was

followed for the design of study and analysis of the data; the details are given in ASTM Research Report No. RR:E06-2001.³

11.1.1 *Repeatability Limit (r)*—The difference between repetitive results obtained by the same operator in a given laboratory applying the same test method with the same apparatus under constant operating conditions on identical test material within short intervals of time would in the long run, in the normal and correct operation of the test method, exceed the determined values only in 1 case in 20.

11.1.1.1 Repeatability limit can be interpreted as the maximum difference between two results, obtained under repeatability conditions, that is accepted as plausible due to random causes under normal and correct operation of the test method.

11.1.1.2 Repeatability limits are listed in Table 1.

11.1.2 *Reproducibility Limit (R)*—The difference between two single and independent results obtained by different operators applying the same test method in different laboratories using different apparatus on identical test material would, in the long run, in the normal and correct operation of the test method, exceed the following values only in 1 case in 20.

11.1.2.1 Reproducibility limit can be interpreted as the maximum difference between two results, obtained under reproducibility conditions, that is accepted as plausible due to random causes under normal and correct operation of the test method.

11.1.2.2 Reproducibility limits are listed in Table 1.

11.1.3 The above terms (repeatability limit and reproducibility limit) are used as specified in Practice E177.

11.1.4 Any judgment in accordance with 11.1.1 would normally have an approximate 95 % probability of being correct, however the precision statistics obtained in this ILS must not be treated as exact mathematical quantities which are applicable to all circumstances and uses. The limited number of materials tested essentially guarantees that there will be times when differences greater than predicted by the ILS results will arise, sometimes with considerably greater or smaller frequency than the 95 % probability limit would imply. Consider the repeatability limit as a general guide, and the associated probability of 95 % as only a rough indicator of what can be expected.

11.2 *Bias*—At the time of the study, there was no accepted reference material suitable for determining the bias for this test method, therefore no statement on bias is being made.

11.3 The precision statement was determined through statistical examination of 48 results, from 8 laboratories, on 2 materials.

12. Keywords

12.1 drainage; drainage efficiency; drainage performance; EIFS; EIFS clad wall assembly; exterior insulation and finish system

³ Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:E06-2001. Contact ASTM Customer Service at www.astm.org/contact.

TABLE 1 Drainage Efficiency (%)

Material	Number of Laboratories	Average ^A	Repeatability Standard Deviation	Reproducibility Standard Deviation	Repeatability Limit	Reproducibility Limit
	n	\bar{x}	S_r	S_R	r	R
Sample 1	8	97.02	1.13	2.43	3.17	6.80
Sample 2	8	96.34	2.08	3.19	5.84	8.92

^A The average of the laboratories' calculated averages.

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