

**Standard Test Method for Determining the Air Leakage Rate  
Caused by Fasteners Penetrating the Air Barrier (AB) or Air and  
Water-Resistive Barrier (AWRB)**



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## **Foreword**

The procedures used to develop this document and those intended for its further maintenance are described D-114-017 rev 3 ABAA Policy for Balloting Official ABAA Documents.

Any feedback or questions on this document should be directed to [abaa@airbarrier.org](mailto:abaa@airbarrier.org).

## **Introduction**

This document provides a standardized method for laboratory testing to determine the air leakage rate caused when fasteners penetrate the air barrier (AB) or air and water-resistive barrier (AWRB) material.

# Standard Test Method for Determining the Air Leakage Rate Caused by Fasteners Penetrating the Self-Adhered or Fluid-Applied Air Barrier (AB) or Air and Water-Resistive Barrier (AWRB) Material

## 1 Scope

This test method evaluates the air leakage caused by fasteners that penetrate the installed self-adhered or fluid-applied air barrier (AB) or air and water-resistive barrier (AWRB) material. This test method details the specimen preparation, and the test methodology is in accordance with ASTM E2178.

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

This document does not purport to address all the safety concerns, if any, associated with its use. The user's responsibility of this standard is to establish appropriate safety and health practices and determine the applicability of regulatory limitations before use.

## 2 Normative references

The text in this document references the following documents. Unless otherwise stated, the date the document was approved is the edition referenced.

Documents published by the American Society for Testing and Materials (ASTM)  
100 Barr Harbord Drive, PO Box C700, West Conshohocken, PA 19428-2959 USA  
Telephone: (610) 832-9585 Fax: (610) 832-9555  
[www.astm.org](http://www.astm.org)

ASTM E631 Standard Terminology of Building Constructions

ASTM E2178 Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials

## 3 Terms and definitions

For definitions of general terms related to building construction used in this document, refer to ASTM E631, *Terminology of Building Constructions*. For specific terms, the following definitions apply.

**3.1**

**supplier**

entity which declares that their material or product is an air or air and water-resistive barrier material, accessory, component, or assembly.

**3.2**

**air barrier (ab) material**

primary substance that provides the control layer for the movement of air

**3.3**

**air leakage rate [L/(s·m<sup>2</sup>)]**

airflow (L/s) driven through a unit surface area (m<sup>2</sup>) at a unit static pressure difference (Pa) across the material or assembly.

**3.4**

**base specimen**

assembly constructed and ready for installing the barrier material to be tested.

**3.5 initial specimen**

assembly constructed with barrier material and tested before modifications are made, such as installing fasteners.

**3.6**

**penetrated specimen**

assembly constructed with barrier material and tested after modifications are made, such as installing fasteners.

**3.7**

**water-resistive barrier (wrb)**

material behind an exterior wall covering intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly.

**4 Summary of the test method**

This document follows the testing procedures detailed in ASTM E2178. This test method provides installation details for base, initial, and penetrated specimens, i.e., the specimens with fasteners penetrating the self-adhered or fluid-applied AB or AWRB material. This test method does not determine whether a material will seal around a fastener, rather it measures the additional leakage through barrier material due to the addition of fastener penetrations.

**5. Significance and use**

This document determines the impact on air leakage of installed fasteners through the AB, WRB or AWRB material.

**6. Apparatus**

Use the apparatus required in ASTM E2178 for testing.

**7. Test specimen preparation**

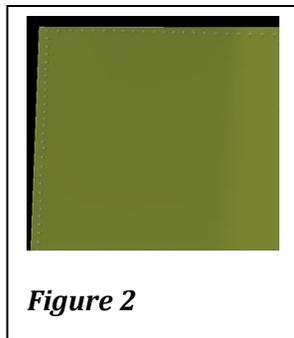
**7.1 Base specimens**

Prepare five specimens by constructing a 16-gauge steel or wood framing with outer dimensions required to fit the test apparatus in ASTM E2178. Construct the specimen using 16-gauge steel “U” channels or wood framing around the perimeter of the specimen.

Install 16-gauge “C” channels or wood members inside the perimeter framing. Orient the “C” channel/wood member parallel to one side of the specimen with an equal distance between the framing members fasten with self-drilling fine thread drywall or wood screws. (Figure 1)



*Figure 1*



*Figure 2*

Fasten the gypsum panel product with #8 – 25 mm (1 inch) minimum length fine-thread self-drilling drywall screws and ensure the gypsum panel product is installed snug against framing members, and the screw heads are flush with face of gypsum panel product. Install the screws 150 mm ± 6 mm (6-inch ± ¼ inch) on centre around the perimeter only and in such a manner that the locations of the perimeter fasteners will be covered within the perimeter seal of the test apparatus, not contributing to the measured air leakage of the test specimen. Seal the edges of the frame and material so that the air only goes through the gypsum panel product. (Figure 2)

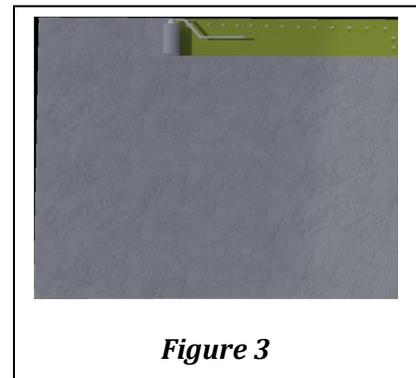
Per ASTM E2178, conduct, calculate and report the air leakage rate of the Base Specimen

**7.2 Initial specimens**

Install the self-adhered or fluid-applied AB or AWRB over the gypsum panel product per the supplier’s published installation instructions and guidelines. For materials that require curing, allow the AB or AWRB to dry and cure as required by the supplier. (Figure 3)

Per ASTM E2178, conduct, calculate and report the air leakage rate of the Initial Specimen no more than 7 days after the required cure or dwell time of the material.

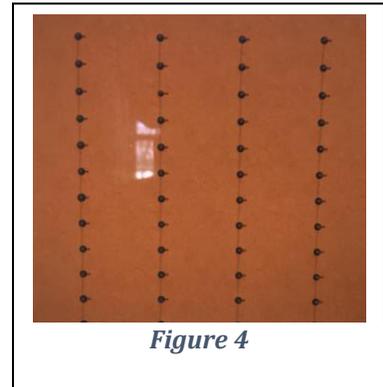
Report the results as the average of the five specimens.



*Figure 3*

### 7.3 Penetrated specimens

Without disrupting the specimens or the mounting in the apparatus, install 48 hex head washer screws into the interior framing members panel equally spaced on the interior framing members in the specimens. The screws are to be #12 40 mm (1 ½ inch) minimum length self-drilling screws with 18 to 36 threads per inch providing at least 6 mm ± 2 mm (¼ inch ± ⅛ inch) beyond steel substrate or into the wood framing and installed 6 mm ± 2 mm (¼ inch ± ⅛ inch) proud of the bottom side of the lowest point of the head to the surface of the material (Annex A Informative). (Figure 4)



*Figure 4*

Following ASTM E2178, conduct and calculate and report the air leakage rate of the Penetrated Specimen within 7 days of testing the installation of fasteners.

Report the results as the average of the five specimens.

### 8. Report

Produce a test report as required in ASTM E2178 Clause 11 Report which includes, as a minimum, the following information:

- A. Date of test,
- B. Name of the entity conducting the test, testing location, name of the person conducting the test,
- C. Brief description of the general nature of the test, such as laboratory testing,
- D. Identification of the material tested, including manufacturer name, material name, material type, and manufacturer production code and tested thickness,
- E. Temperature and relative humidity of the environment during the test period,
- F. Description of the apparatus used, including apparatus manufacturer and model number,
- G. Description of the substrate where the material has been installed, including thickness, type, surface temperature, moisture content, and rigidity,
- H. Average results of the Base Specimens, Initial Specimens, and the Penetrated Specimens test,
- I. Standard deviation of the data set,
- J. Statement that the test method was not modified.

**Annex A – Informative  
Hex head washer screws**

Fasteners installed with approximately 6 mm +/- 2mm (1/4 inch +/- 1/8 inch) between the lowest point of the head to the surface of the material.

