

ZIP System® Sheathing Air Barrier Testing Methods

ZIP System® sheathing is a combination wood structural panel, water-resistive barrier and air barrier. It is code-recognized in ICC-ES ESR 1474 as an alternative to the air barrier requirements listed in Sections 402.4.1 and 502.4.3 in the ICC International Energy Conservation Code. When panels have been installed according to Huber Engineered Woods installation guidelines and all panel seams and penetrations have been sealed with ZIP System™ Tape as required by Section 4.2.1 in ESR-1474, ZIP System sheathing performs as an Air Barrier Assembly.

The following testing methods were performed to establish the air leakage properties of ZIP System sheathing when installed as a wall assembly (ASTM E2357) and as a standalone material (ASTM E2178).

Air Barrier Material (ASTM E2178):

In order to determine and evaluate the air leakage properties of ZIP System sheathing, independent 3rd party testing was conducted in accordance with ASTM E2178 *Standard Test Method for Air Permeance of Building Materials*.

Test Procedure:

A 1 m² section of ZIP System sheathing is covered with a polyethylene film and secured to the testing apparatus illustrated below. Air leakage rates are then measured at the following pressures: 25, 50, 75, 100, 150 and 300 Pa.

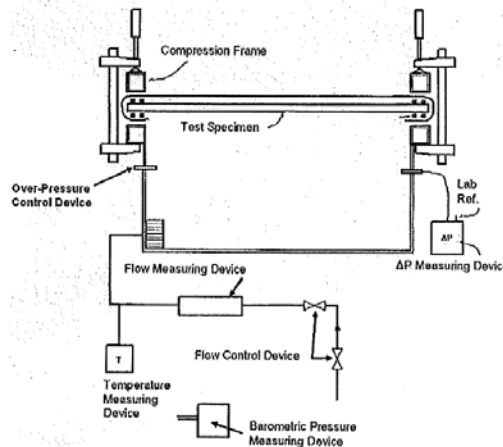


Figure 1: Air barrier material testing apparatus (ASTM E 2178)

The Air Barrier Association of America (ABAA) defines an air barrier material as one that has been tested to have an air leakage rate of less than 0.02 L/s·m² at 75 Pa (0.004 cfm/ft² at 1.57 lb/ft²). The average air leakage for the ZIP System sheathing at 75 Pa was below the detection limit of the test setup. Even at 300 Pa, the average air

leakage for the ZIP System sheathing was 0.0016 L/s-m². At both 75 Pa and 300 Pa, ZIP System sheathing performed as an excellent air barrier.

Air Barrier Assembly (ASTM E2357):

Individual air barrier materials tests, such as ASTM E2178, do not provide sufficient data to describe the air leakage of wall assemblies. ASTM E2357 simulates real-life field conditions by exposing the air barrier assembly to both positive and negative air pressures, reproducing wind loads that occur in the field. To demonstrate that ZIP System® sheathing panels and tape create a high performing air barrier assembly, independent 3rd party testing was completed in accordance with ASTM E2357 *Standard Test Method for Determining Air Leakage of Air Barrier Assemblies*.

Test Procedure:

An 8'x8' ZIP System sheathing wall is constructed according to Huber Engineered Woods installation guidelines. The wall section is then placed into an ASTM E283 air-tightness test chamber and sealed to the chamber on all sides. Testing is conducted on two separate wall specimens. Specimen 1 is an opaque wall absent openings or penetrations. Unlike the first specimen, Specimen 2 contains a rough opening for a window as seen in Figure 2. In addition, Specimen 2 contains the following penetrations according to ASTM E2357:

- (1) 600 mm x 1200 mm sealed window
- (1) 38 mm PVC pipe
- (1) 100 square galvanized duct
- (1) round exterior junction box
- (1) rectangular exterior junction box
- (6) masonry ties



Figure 2: Specimen 1 (Left) and Specimen 2 (Right) ZIP System Wall Assembly

Initial testing is performed at positive and negative pressures from 25 up to 300 Pa. The walls are then subjected to wind pressure conditioning. Tested wind pressures can be approximately equated to wind speeds ranging from 14 mph (25 Pa) – 48 mph (300 Pa). The wind pressure conditioning schedule per ASTM E2357 is shown in Figure 3 below.

Structural (Wind) Loading Schedule

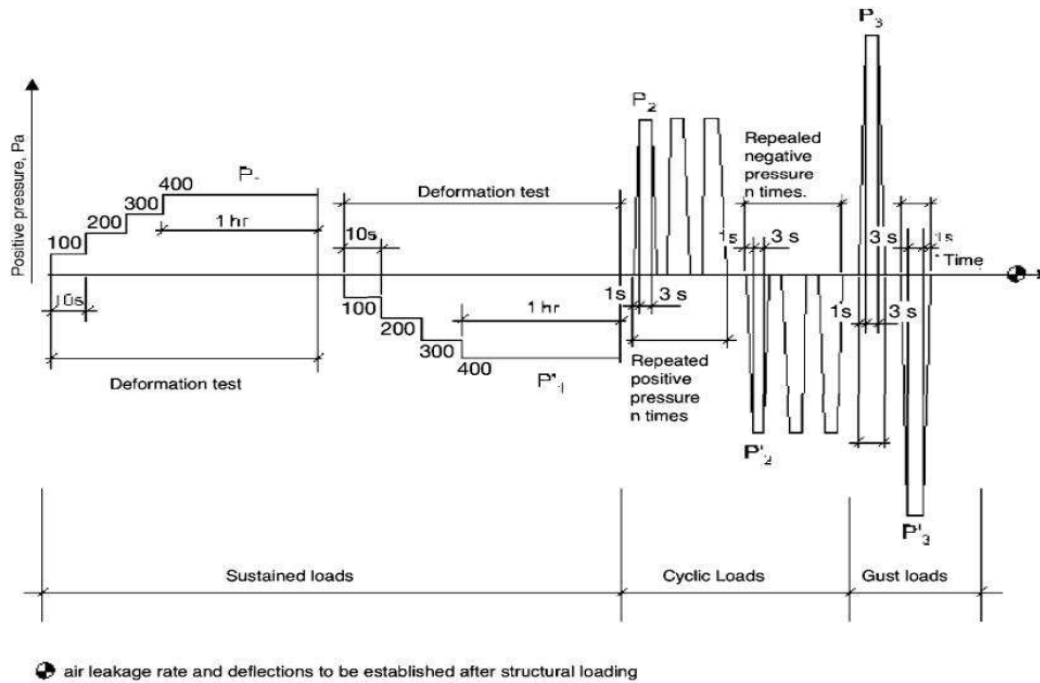


Figure 3: Structural (Wind) Pressure Loading Schedule

The cumulative results of ASTM E 2357 include the air permeance of the material and the permeance of the air barrier components. The air leakage results produced are achieved from combining those elements.

Based on ABAA criteria, the maximum allowable air leakage rate (air flow) for an air barrier assembly is 0.2 L/s·m² at 75 Pa (0.04 cfm/ft). With air leakage rate results of 0.037 L/s·m² (infiltration) and 0.012 L/s·m² (exfiltration), air flow through the ZIP System® panel test assembly was well below (less than 1/5th) the maximum allowable level.

In conclusion, the performance of an air barrier assembly is more representative than the air permeance of an individual material. When ZIP System sheathing and tape is installed in accordance with Huber Engineered Woods installation instructions, it is code-recognized as a high performing air barrier assembly.

Please visit zipsystem.com or contact our technical department at 800-933-9220 Ext 2716 or at techquestions@huber.com with any questions or comments.