



Designation: **E1803 – 06 E1803 – 14**

## Standard Test Methods for Determining Strength Capacities of Structural Insulated Panels<sup>1</sup>

This standard is issued under the fixed designation E1803; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 These test methods cover procedures for determining strength properties under specified loads for rigid-faced structural insulated panels. These test methods are appropriate for structural insulated panels with rigid facings having a minimum thickness of ~~4 mm (0.16 in.)~~ 0.16 in. (4 mm) and an insulating core with a minimum thickness of ~~38 mm (1.5 in.)~~ 1.5 in. (38 mm). These specified loads include:

- 1.1.1 Transverse loads,
- 1.1.2 Axial loads,
- 1.1.3 Shear loads,
- 1.1.4 Diaphragm loads,
- 1.1.5 Uplift loads,
- 1.1.6 Long Term loads
- 1.1.7 Impact loads, and
- 1.1.8 Concentrated loads.

1.2 Structural insulated panels are intended to resist structural loads in permanent building structures.

1.3 These test methods are not intended for quality control purposes and do not evaluate the individual components of the structural insulated panels.

1.4 These test methods are not intended to measure dimensional stability.

1.5 The text of this standard references notes and footnotes, excluding tables and figures, which provide explanatory information. These notes and footnotes shall not be considered requirements of the standard.

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

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.*

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

**D1037** Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials

**E72** Test Methods of Conducting Strength Tests of Panels for Building Construction

**E455** Test Method for Static Load Testing of Framed Floor or Roof Diaphragm Constructions for Buildings

**E575** Practice for Reporting Data from Structural Tests of Building Constructions, Elements, Connections, and Assemblies

**E631** Terminology of Building Constructions

**E695** Test Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee **E06** on Performance of Buildings and are the direct responsibility of Subcommittee **E06.11** on Horizontal and Vertical Structures/Structural Performance of Completed Structures.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). 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*—~~Definitions are in accordance with~~ For definitions of general terms related to building construction used in this test method, refer to Terminology **E631** unless otherwise indicated.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *SIP*—acronym for structural insulated panel.

3.2.1 *structural insulated panel, panel (SIP), n*—a prefabricated assembly consisting of an insulating core laminated between two rigid facings suitable to resist structural loads in permanent building structures.

### 4. Summary of Test Methods

4.1 SIPs are tested using various structural loading methods to determine their strength properties for use as elements in permanent structures.

### 5. Significance and Use

5.1 SIPs are used as roof, wall, and floor components in building structures. The structural performance properties need to be determined for design purposes.

## TEST METHODS

### 6. Transverse Loads for Walls, Roofs, and Floors

6.1 SIPs shall be tested in accordance with Test Methods E72, Section 11, with the following modifications:

6.2 Support conditions shall closely represent actual construction and the bearing area shall be the minimum area required by the manufacturer.

6.3 Incremental loads shall be applied.

6.3.1 The deflection shall be recorded at initial load and after each increase in load increment.

6.4 After 0.75, 1.50, and 2.0 times the anticipated design load is achieved, decrease the load to the initial load and record the set. Continue incremental loads and record the deflections at each load until further loading risks damage to the deflection measuring devices.

6.5 Increase the load continuously until the maximum load is determined.

### 7. Axial Loads for Walls

7.1 SIPs shall be tested in accordance with Test Methods E72, Section 9, with the following modifications:

7.2 Bearing conditions at the bottom of the SIP shall be according to manufacturers' requirements.

7.3 A minimum of one gage at midwidth is required to measure axial displacement and a minimum of one gage located at midspan is required to measure transverse displacement. See **Fig. 1**.

### 8. Shear Loads for Walls

8.1 SIPs shall be tested in accordance with Test Methods E72, Section 14, with the following modifications:

8.2 The SIP manufacturer's method for attaching the SIPs together and for attaching the SIPs to the top and bottom plates shall be followed. The SIPs shall not be attached to an external prefabricated framework. Apply the load through the load beam to the top plate.

8.3 *Test Specimens:*

8.3.1 The test specimen shall be a minimum of ~~2.4 by 2.4 m (8 by 8 ft)~~ 8 by 8 ft (2.4 by 2.4 m) consisting of a minimum of two ~~1.2 by 2.4 m (4 by 8 ft)~~ 4 by 8 ft (1.2 by 2.4 m) SIPs.

8.3.2 Fasteners or adhesives, or both, as required by the manufacturer, shall be of the type and spacing intended for actual construction. Boundary members shall be installed per the manufacturer's requirements at the ends of SIP assembly. See **Fig. 2**.

### 9. Diaphragm Loads for Floors or Roofs

9.1 SIPs shall be tested in accordance with Test Method E455 with the following modifications:

9.2 *Cantilever Diaphragm and Simple Beam Diaphragm:*

NOTE 1—The test assembly will be at least ~~2.4 by 4.8 m (8 by 16 ft)~~ 8 by 16 ft (2.4 by 4.8 m) if the smallest element is ~~1.2 by 2.4 m (4 by 8 ft)~~ 4 by 8 ft (1.2 by 2.4 m).

9.2.1 Add to ~~4.1.3.16.1~~ of Test Method E455: the diaphragm shall contain not less than four individual elements.

9.2.2 Modify paragraph ~~7.2-9.2~~ of Test Method E455 to read at 0.75, 1.5, and 2 times the anticipated design load remove the load and measure the recovery after 5 min. Delete the 10 min requirement to reach full design load.