



# Standard Test Method for Static Load Testing of Framed Floor or Roof Diaphragm Constructions for Buildings<sup>1</sup>

This standard is issued under the fixed designation E455; 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 This test method covers procedures designed (1) to evaluate the static shear capacity of a typical segment of a framed diaphragm under simulated loading conditions, and (2) to provide a determination of the stiffness of the construction and its connections. A diaphragm construction is an assembly of materials designed to transmit shear forces in the plane of the construction.

1.2 No effort has been made to specify the test apparatus, as there are a number that can be used as long as the needs of the testing agency are met. If round-robin testing is to be conducted, test apparatus and testing procedures shall be mutually agreed upon in advance by the participants.

1.3 The text of this standard contains notes and footnotes that provide explanatory information and are not requirements of the standard. Notes and footnotes in tables and figures are requirements of this standard.

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

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.* For specific precautionary statements, see Section 6.

## 2. Referenced Documents

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

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is 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.

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

E631 Terminology of Building Constructions

## 3. Terminology

3.1 For definitions of terms used in this standard, refer to Terminology E631.

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *deflection*—in-plane deformation (distortion) of a diaphragm due to bending and shear excluding translational displacement due to movement of supports.

3.2.2 *diaphragm*—horizontal or sloped system acting to transmit lateral forces to the vertical resisting elements.

3.2.2.1 *Discussion*—A diaphragm is analogous to a horizontal deep beam with interconnected membrane elements such as panels, sheathing, or cladding acting as the deep beam web, intermediate elements such as joists acting as web stiffeners, and perimeter boundary elements such as girders acting as deep beam chords.

3.2.3 *displacement*—the distance between the initial and the final position of a point on the diaphragm in a given direction.

### 3.3 Symbols Specific to This Standard:

|           |                                                                                                                                                    |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| $E$       | = modulus of elasticity of flange or web material, depending upon which material is held constant in a transformed section analysis, psi (or MPa). |
| $G$       | = shear modulus of the web material, psi (or MPa).                                                                                                 |
| $G'$      | = apparent shear stiffness of the diaphragm, which is derived from the apparent shear deflection of the diaphragm, lbf/in. (or N/mm).              |
| $I$       | = moment of inertia of the transformed section of the diaphragm based on webs or flanges, in. <sup>4</sup> (or mm <sup>4</sup> ).                  |
| $L$       | = total span of diaphragm, in. (or mm).                                                                                                            |
| $P$       | = concentrated load, lbf (or N).                                                                                                                   |
| $P_{max}$ | = maximum jack load applied to test frame, lbf (or N).                                                                                             |
| $R_u$     | = maximum diaphragm reaction, lbf (or N).                                                                                                          |
| $S_u$     | = ultimate shear strength of the diaphragm, lbf/ft (or N/m).                                                                                       |