



Designation: E518/E518M – 22

Standard Test Methods for Flexural Bond Strength of Masonry¹

This standard is issued under the fixed designation E518/E518M; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope*

1.1 These test methods cover determination of the flexural bond strength of unreinforced masonry assemblages. Two procedures are provided:

1.1.1 *Test Method A*—Simply supported beam with third-point loading.

1.1.2 *Test Method B*—Simply supported beam with uniform loading.

NOTE 1—Third-point loading (Test Method A) produces a moment distribution that is significantly different from uniformly distributed loading (Test Method B). Third-point loading (Test Method A) subjects more mortar joints to the maximum moment and thus, is likely to produce more conservative capacities than uniform loading (Test Method B).

1.2 The text of this standard refers to notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.3 These test methods cover the application of the tests using either inch-pound or SI units. The values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, the inch-pound units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.4 *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.*

1.5 *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.*

¹ These test methods are under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and are the direct responsibility of Subcommittee C15.04 on Research.

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2. Referenced Documents

2.1 ASTM Standards:²

C67/C67M Test Methods for Sampling and Testing Brick and Structural Clay Tile

C78/C78M Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

C140/C140M Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

C270 Specification for Mortar for Unit Masonry

C778 Specification for Standard Sand

C1232 Terminology for Masonry

C1717 Test Methods for Conducting Strength Tests of Masonry Wall Panels

E4 Practices for Force Calibration and Verification of Testing Machines

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

3. Terminology

3.1 For terms used in these test methods, refer to Terminology C1232.

4. Significance and Use

4.1 These test methods are intended to provide simplified and economical means for gathering comparative research data on the flexural bond strength developed with different types of masonry units and mortar or for the purpose of checking job quality control (materials and workmanship).

NOTE 2—These test methods are not intended for use in establishing design stresses. For this purpose, Test Methods C1717 should be used.

5. Apparatus

5.1 *Testing Machine*, conforming to the requirements of Practices E4.

5.2 *Test Method A*—The third-point loading method is illustrated in Fig. 1. The minimum span between supports shall not be less than 2.5 multiplied by the average depth of the

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

*A Summary of Changes section appears at the end of this standard

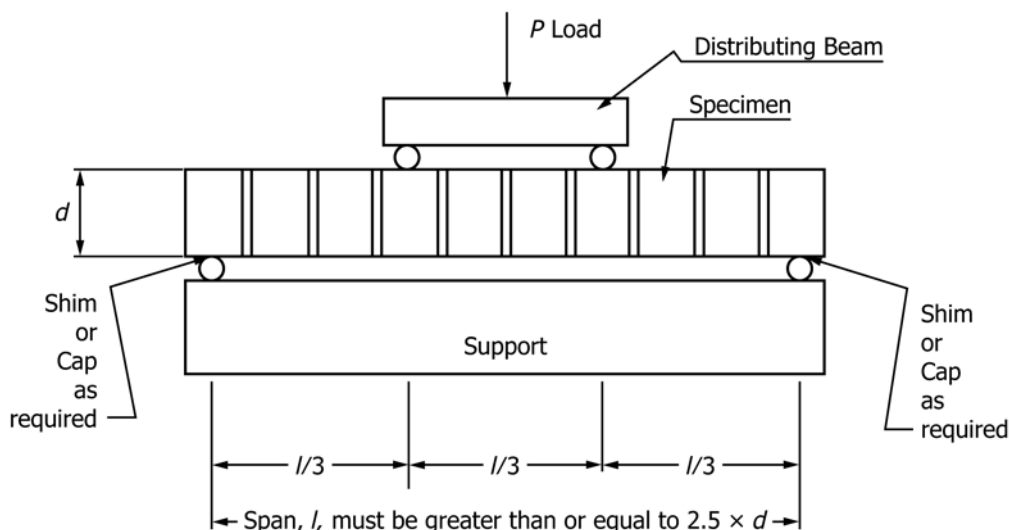


FIG. 1 The Third-Point Loading Method (Test Method A)

specimen. The distance between each support and the adjacent distributed point load shall be one-third of the span length ± 3 mm [0.1 in.]. Steel rods with a maximum diameter of 25 mm [1 in.] shall be used to support the specimen and apply the load. The steel rods shall extend over the full width of the specimen and shall have the same nominal diameter.

NOTE 3—The loading apparatus is intended to be similar to that used in Test Method C78/C78M to reduce the need for redundant testing equipment.

5.3 *Test Method B*—The uniform loading method is illustrated in Fig. 2. The minimum span between supports shall not be less than 2.5 multiplied by the average depth of the specimen. Uniformly distributed transverse load shall be applied by air pressure using an air bag over the full surface of the specimen. The air bag reaction frame shall fully contact one surface of the air bag and shall be sufficiently stiff as to not deflect more than the span divided by 600 during testing.

NOTE 4—Air bags manufactured using 0.5 mm [0.02 in.] thick polyvinyl chloride have been successfully used with this test. When testing specimens constructed with a high bond-strength mortar, or whose thickness is greater than a nominal 100 mm [4 in.], the applied load

required to fail the specimen may be such as to rupture the seams of the air bag. In such cases Test Method A is recommended.

6. Sampling and Testing

6.1 *Masonry Units*—Representative masonry units shall be sampled and tested in accordance with the following applicable methods: Test Methods C67/C67M for brick, or Test Methods C140/C140M for concrete masonry units. Minimum tests required shall be compressive strength, and initial rate of absorption for brick or absorption for concrete masonry units.

6.2 *Mortar*—One of the types of mortar in Specification C270 shall be used, or the mortar shall conform to that specified for the construction. Sand sieve analysis shall be performed and recorded, except when ASTM C778 standard sand is used. If ASTM C778 standard sand is used, the record shall identify the sand as 20–30 sand, graded sand, or a blend of indicated proportions of each sand by weight.

6.2.1 Mortar for prism fabrication shall be mixed to a workable consistency. The compressive strength, initial flow, and water retention of the mortar shall be determined in

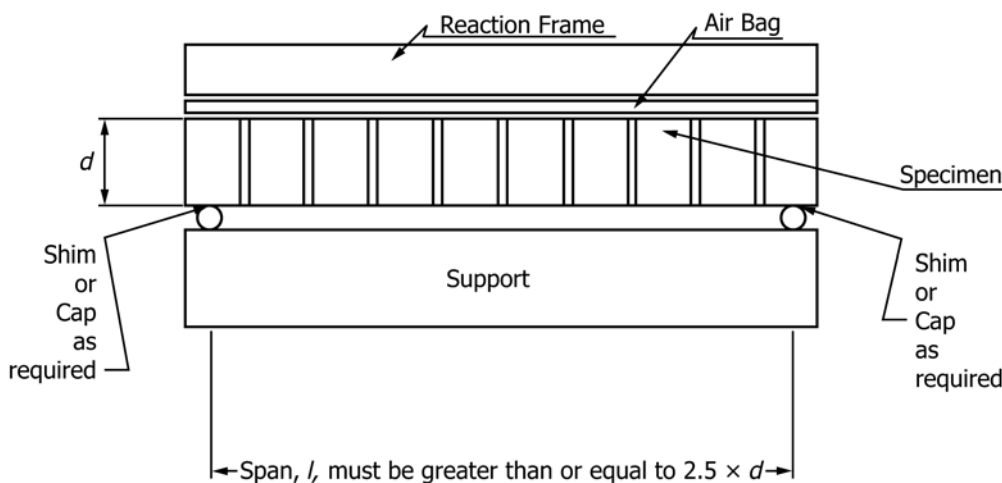


FIG. 2 The Uniform Loading Method (Test Method B)