



Standard Test Method for In Situ Compressive Stress Within Solid Unit Masonry Estimated Using Flatjack Measurements¹

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1. Scope*

1.1 This test method covers the determination of the average compressive stress in existing unreinforced solid-unit masonry (see [Note 1](#)). This test method concerns the measurement of in-situ compressive stress in existing masonry by use of thin, bladder-like flatjack devices that are installed in cut mortar joints in the masonry wall. This test method provides a relatively non-destructive means of determining masonry properties in place.

NOTE 1—Solid-unit masonry is that built with stone, concrete, or clay units whose net area is equal to or greater than 75 % of the gross area.

1.2 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.

1.3 *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:²

[C1180 Terminology of Mortar and Grout for Unit Masonry](#)
[C1232 Terminology of Masonry](#)

[E74 Practice of Calibration of Force-Measuring Instruments for Verifying the Force Indication of Testing Machines](#)

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *shim, n*—item inserted into a flatjack slot prior to testing to minimize the inflation of the test flatjack.

¹ This test method is under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.04 on Research.

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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.

3.1.1.1 *Discussion*—The use of shims may be necessary during testing to achieve a tight fit of the flatjack in the slot and to ensure uniform transfer of pressure (stress) to the masonry over the complete area of the flatjack. See Annex A1 for further discussion on allowable types of shims.

3.1.2 *spacer*—metal plate used in the calibration process to control flatjack thickness.

3.2 For definitions of other terms used in this test method refer to Terminology [C1180](#) for mortar and grout and Terminology [C1232](#) for masonry.

4. Summary of Test Method

4.1 When a slot is formed in the masonry, compressive stress at that point will cause the masonry above and below the slot to move together. Compressive stress in the masonry may be measured by inserting a flatjack into the slot and increasing its internal pressure until the original distance between points above and below the slot is restored. The state of compressive stress in the masonry is approximately equal to the flatjack pressure multiplied by factors which account for the physical characteristics of the jack and the ratio of (a) the bearing area of the jack in contact with the masonry to (b) the bearing area of the slot.

5. Significance and Use

5.1 Stress is applied as pressure over the area of the flatjack. In the case of multi-wythe masonry, stress is estimated only in the wythe in which the flatjack is inserted. Stress in other wythes may be different.

6. Apparatus

6.1 Flatjack:

6.1.1 A flatjack is a thin envelope-like bladder with inlet and outlet ports which may be pressurized with hydraulic fluid. Flatjacks may be of any shape in plan, and are designed to be compatible with the masonry being tested. Typical configurations are shown in [Fig. 1](#).

6.1.2 For determination of the state of compressive stress, dimension A should be equal to or greater than the length of a single masonry unit, but not less than 8 in. (200 mm). Dimension B should be equal to or greater than the thickness of one wythe and not less than 3 in. (75 mm). The radius, R , for

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