



Designation: C1352/C1352M – 09

## Standard Test Method for Flexural Modulus of Elasticity of Dimension Stone<sup>1</sup>

This standard is issued under the fixed designation C1352/C1352M; 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 the procedure for determining the flexural modulus of elasticity of stone by using a simple beam with quarter-point loading.

1.2 Stone tests may be made with load applied perpendicular to the bedding plane or rift and with load applied parallel to the bedding plane or rift.

1.3 Stone tests may be made for wet and dry specimen conditions.

1.4 The specifier of the test shall determine which conditions shall be used.

1.5 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. 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 non-conformance with the standard.

1.6 *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>

- C119 Terminology Relating to Dimension Stone
- C880 Test Method for Flexural Strength of Dimension Stone
- E4 Practices for Force Verification of Testing Machines

### 3. Terminology

3.1 *Definition*—For definitions of terms used in this test method, refer to Terminology C119.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee C18 on Dimension Stone and is the direct responsibility of Subcommittee C18.01 on Test Methods.

Current edition approved April 1, 2009. Published April 2009. Originally approved in 1996. Last previous edition approved in 2008 as C1352–96(2008). DOI: 10.1520/C1352\_C1352M-09.

<sup>2</sup> 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.

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

3.2.1 *modulus of elasticity, n*—stress per unit strain, also known as Young's Modulus.

### 4. Significance and Use

4.1 This test method is useful for providing engineering values for stress and deflection analysis of stone panels. It is also useful in indicating the differences in flexural modulus of elasticity between various dimension stones and stones of the same type in different loading directions (parallel and perpendicular to rift or bedding planes).

### 5. Apparatus

5.1 *Testing Machine* (see Fig. 1), conforming to the requirements of the applicable sections of Practices E4. The quarter-point loading method shall be used in making flexure tests of stone employing bearing blocks that will ensure that forces applied to the beam will be vertical only and applied without eccentricity. The apparatus should be capable of maintaining the span length and distances between load-applying blocks and support blocks constant within  $\pm 0.05$  in. [ $\pm 1$  mm]. The load should be capable of being applied at a uniform rate and in such a manner as to avoid shock.

5.2 *Deflection Gages*, capable of reading to 0.0001 in. [0.002 mm] shall be used to measure mid-span deflections at the two free edges and support deflections at each end.

### 6. Test Specimens

6.1 The test specimens shall measure 4 in. [100 mm] wide by 1.25 in. [30 mm] thick by 15 in. [350 mm] long with a span as tested of 12.5 in. [300 mm]. The sides of the specimens shall be at right angles with the top and bottom. The specimens shall have a fine abrasive finish on the planes perpendicular to the load and a fine saw finish on the other four planes. The dimensions of the specimen shall be measured and recorded to the nearest 0.01 in. [0.1 mm]. A minimum of five specimens shall be tested for each condition of test. The average value calculated from plots of the test results is reported as the flexural modulus of elasticity for that condition.

6.2 Where the job thickness has been set (the thickness of the stone panels for the project has been established), it is often requested to perform flexural modulus of elasticity tests at the job thickness. The following shall govern the specimen size