



Designation: C1591 – 04

Standard Test Method for Determination of the Modulus of Elasticity of AAC¹

This standard is issued under the fixed designation C1591; 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 This procedure covers the determination of the modulus of elasticity of Autoclaved Aerated Concrete (AAC) in compression by determining the stress-strain behavior. AAC is a cementitious product based on calcium silicate hydrates in which low density is attained by the inclusion of an agent resulting in macroscopic voids, and is subjected to high pressure steam curing.

NOTE 1—Installed units covered by this standard must be protected against direct exposure to moisture using a coating material accepted by the AAC manufacturer.

1.2 AAC tested in accordance with this test method shall comply with Specification C1386.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

C39/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens

C1386 Specification for Precast Autoclaved Aerated Concrete (AAC) Wall Construction Units

E4 Practices for Force Verification of Testing Machines

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

¹ This test method is under the jurisdiction of ASTM Committee C27 on Precast Concrete Products and is the direct responsibility of Subcommittee C27.60 on Precast Autoclaved Aerated Concrete.

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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. Significance and Use

3.1 This test method is intended to provide simplified and economical means for obtaining data on the chord modulus of elasticity developed for different types of AAC grades.

4. Apparatus

4.1 *Testing Machine*, conforming to the requirements of Practices E4 (Constant-Rate-of-Traverse CRT-Type Testing Machine section). The spherical head and bearing blocks shall confirm to the Apparatus Section of Test Method C39/C39M.

4.2 *Calipers*—Calipers shall allow a reading with a precision of 0.1 mm.

4.3 *Drying Ovens*—Two ovens typically are used for this test procedure. One maintained at a temperature of $105 \pm 5^\circ\text{C}$ and another maintained at a temperature of $70 \pm 5^\circ\text{C}$.

4.4 *Compressometer*, may be used to determine the strain behavior of the specimen during compression and shall have a precision of 0.001 mm.

5. Specimens

5.1 *Shape of Specimens*—The modulus of elasticity is determined on prisms having the dimensions of 100 mm (4 in.) by 100 mm (4 in.) by 200 mm (8 in.). Prisms of other sizes or cylindrical specimens can be used provided that the width (diameter) of such other specimens is not less than 75 mm (3 in.) and the ratio between the height and the width shall be 2.

5.2 *Number and Orientation of Specimens*—A test set shall consist of three specimens. Whenever possible one specimen shall be prepared for the upper third of the product, one from the middle third, and one from the bottom third as determined by the direction of rising of the mass during manufacturing. Specimens are prepared such that the loading is applied to the 100 mm (4 in.) by 100 mm (4 in.) surface and is perpendicular to the direction of rising during manufacture.

5.3 *Preparation of the Specimens*—The specimens shall be dried to a moisture content between 5 and 15 % by weight. After drying and before testing the specimens shall be stored at room temperature until the specimens have reached an equilibrium temperature.