



# Standard Specification for Thin-bed Mortar for Autoclaved Aerated Concrete (AAC) Masonry<sup>1</sup>

This standard is issued under the fixed designation C1660; 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 specification applies to thin-bed mortar for autoclaved aerated concrete (AAC) masonry.

1.2 The testing laboratory performing these test methods shall be evaluated in accordance with Practice C1093.

1.3 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.

1.4 This standard may involve hazardous materials, operations, and equipment. *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>

- C91 Specification for Masonry Cement
- C144 Specification for Aggregate for Masonry Mortar
- C150 Specification for Portland Cement
- C207 Specification for Hydrated Lime for Masonry Purposes
- C595 Specification for Blended Hydraulic Cements
- C1006 Test Method for Splitting Tensile Strength of Masonry Units
- C1093 Practice for Accreditation of Testing Agencies for Masonry
- C1157 Performance Specification for Hydraulic Cement
- C1180 Terminology of Mortar and Grout for Unit Masonry
- C1232 Terminology of Masonry
- C1329 Specification for Mortar Cement

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C12 on Mortars and Grouts for Unit Masonry and is the direct responsibility of Subcommittee C12.03 on Specifications for Mortars.

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<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.

- C1384 Specification for Admixtures for Masonry Mortars
- C1386 Specification for Precast Autoclaved Aerated Concrete (AAC) Wall Construction Units
- C1452 Specification for Reinforced Autoclaved Aerated Concrete Elements
- C1555 Practice for Autoclaved Aerated Concrete Masonry
- C1600/C1600M Specification for Rapid Hardening Hydraulic Cement

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminologies C1180 and C1232, and Specification C1386.

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

3.2.1 *thin-bed mortar*—preblended mortar for use in construction of AAC unit masonry whose joints are approximately  $\frac{1}{16}$  to  $\frac{1}{8}$ -in. (2 to 3-mm) thick.

## 4. Significance and Use

4.1 This specification applies to the thin-bed mortar materials used in the construction of AAC masonry. It references directly the AAC materials standards under the jurisdiction of ASTM Committees C15 and C27 including Specifications C1386, C1452, and C1555.

## 5. Materials

5.1 Materials used in the preparation of thin-bed mortar for AAC masonry shall conform to the requirements specified.

5.1.1 Masonry cement shall conform to Specification C91.

5.1.2 Fine aggregates shall conform to Specification C144 with the exception of the gradation requirements, which shall not apply. The maximum aggregate size shall be that passing a #6 standard sieve.

5.1.3 Portland cement shall conform to Specification C150.

5.1.4 Hydrated lime shall conform to Specification C207. Type N lime is permitted if shown by test or performance record not to be detrimental to soundness of mortar.

5.1.5 Blended hydraulic cement shall conform to Specification C595.

5.1.6 Hydraulic cement shall conform to Specification C1157.

5.1.7 Mortar cement shall conform to Specification C1329.

5.1.8 Rapid hardening hydraulic cement shall conform to Specification C1600/C1600M.

5.1.9 *Adhesives*—At the maximum recommended dosage, the adhesive admixture shall add not more than 65 ppm (0.0065 %) water soluble chloride, or 90 ppm (0.0090 %) acid-soluble chloride to the mortar’s overall chloride content as determined by testing of the reference and admixed mortars in accordance with the Soluble Chloride Content section of Specification C1384.

5.1.10 Other materials are permitted if shown by test or performance record not to be detrimental to the durability of the mortar or embedded items.

**6. Methods of Test**

6.1 *Splitting Tensile Strength Test:*

6.1.1 Conduct the splitting tensile strength test in accordance with Test Method C1006 with the following modifications.

6.1.1.1 *Sampling*—Sample the mortar materials and AAC block used in the preparation of test specimens so that they are representative of the lot from which they are selected.

6.1.1.2 *Test Block Selection*—Dry-cut test specimens from AAC material conforming to Specification C1386. Each test set shall consist of five (5) pairs of test specimens. Each pair of test specimens shall be cut from a full-size block as shown in Fig. 1. Dry-cut cubes from block, each measuring 4 by 4 by 4 in. (100 by 100 by 100-mm), ±¼-in. (±6-mm). Clean cutting dust from the cubes with dry air.

6.1.1.3 *Sample Preparation*—Mix the mortar according to instructions of the mortar manufacturer.

(1) Orient the pairs so that the surface to be mortared is the manufactured face of the unit and not the cut face. Apply mortar, in an amount recommended by the mortar manufacturer, to the joint area of the specimen to produce a full bedded joint, approximately ¼-in. (2-mm) to ⅛-in. (3-mm) thick. Place the other specimen pair on top of the mortar so that the manufactured surfaces of the pair are now both in contact with the mortar. Press firmly by hand to ensure intimate contact

between unit specimens and mortar. Clean excess mortar from the joint around the perimeter of the joined specimen to produce a smooth, uniform surface across the joint. Cure the specimens in air at a temperature of 75 ± 15°F (24 ± 8°C) and a relative humidity of less than 80 % for at least 28 days, or for a time prescribed by the mortar manufacturer, in a stacked position.

(2) Measure each cured test specimen to obtain an average cross-sectional area of the mortared joint.

6.1.1.4 *Testing:*

(1) Attach ½-in. (13-mm) diameter steel rods, at least 4-in. (100-mm) long, to the test specimen using hot glue or other appropriate method so that the rods touch and are aligned with the upper and lower edges of the mortar joint between the two halves of the test specimen (Fig. 2).

(2) Place the test specimen into the compression testing machine using compressible foam tubing as positioning aids (Fig. 2). Load to failure. Record peak load readings after each specimen is tested.

**7. Reporting Requirements**

7.1 Manufacturer of AAC block and its reported strength class, determined in accordance with Specification C1386.

7.2 Manufacturer, brand name and lot of evaluated thin-bed mortar.

7.3 Peak load and corresponding splitting tensile strength for each specimen, computed in accordance with Specification C1006.

**8. Strength Requirements**

8.1 The average splitting tensile strength of the mortared AAC specimens shall equal or exceed the value shown in Table 1 for the corresponding strength class of AAC.

**9. Keywords**

9.1 autoclaved aerated concrete (AAC); masonry; splitting tensile strength; thin-bed mortar

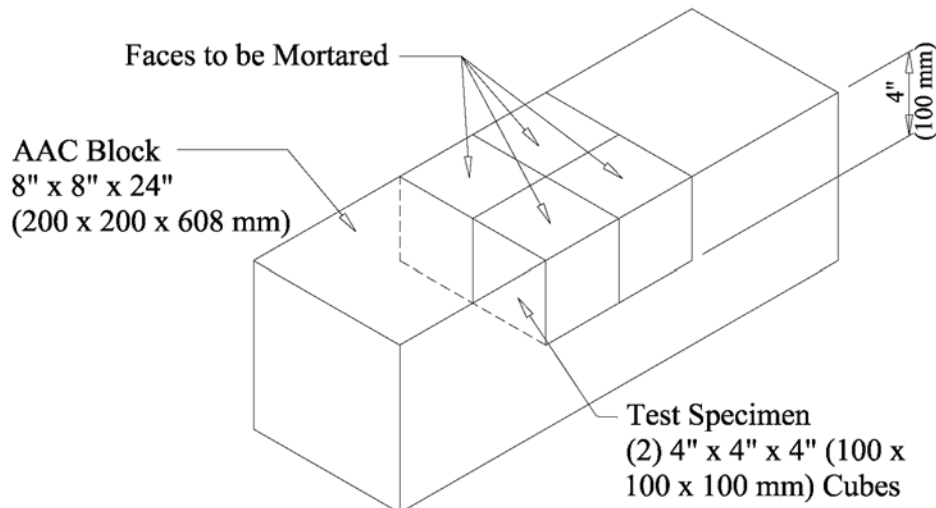


FIG. 1 Extracting Cubes for Specimen

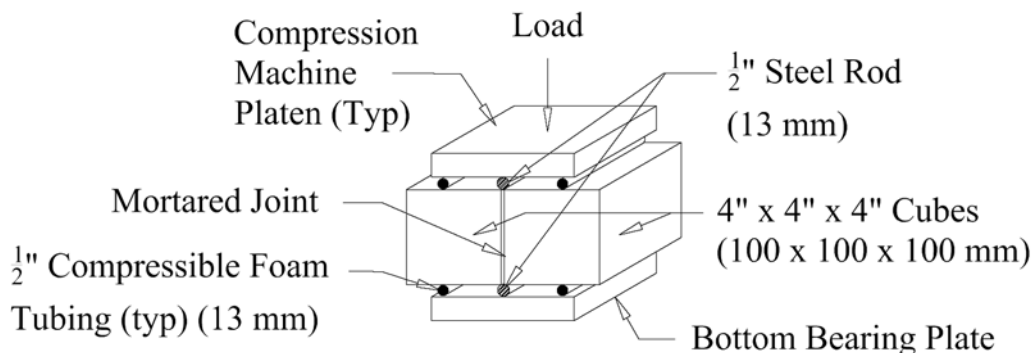


FIG. 2 Test Setup For Measuring Splitting Tensile Strength

TABLE 1 Minimum Splitting Tensile Strength of Test Specimen<sup>A</sup>

| AAC Strength Class | Specified Compressive Strength of AAC, $f'_{AAC}$ , psi (MPa) | Minimum Splitting Tensile Strength of the Specimen, $f_{t,AAC}$ , psi (MPa) <sup>B</sup> |
|--------------------|---|--|
| AAC2               | 290 (2.0)   | 41 (0.28)  |
| AAC3               | 435 (3.0)   | 50 (0.34)  |
| AAC4               | 580 (4.0)   | 58 (0.40)  |
| AAC6               | 870 (6.0)   | 71 (0.49)  |

<sup>A</sup> Specification C1386 defines various AAC strength classes as well as the respective minimum specified compressive strength for each class. Table 1 defines minimum splitting tensile strengths for each AAC strength class.

<sup>B</sup> Values for minimum splitting tensile strength as shown in Table 1 are determined from the following equations:

$$f_{t,AAC} = 2.4\sqrt{f'_{AAC}}$$

where  $f_{t,AAC}$  and  $f'_{AAC}$  are expressed in units of pounds per square inch, psi, or

$$f_{t,AAC} = 0.2\sqrt{f'_{AAC}}$$

where  $f_{t,AAC}$  and  $f'_{AAC}$  are expressed in units of mega-pascals, MPa.

## BIBLIOGRAPHY

- (1) *Autoclaved Aerated Concrete: Properties, Testing, and Design*, RILEM Recommended Practice, Taylor & Francis, 1st Ed., 1993.
- (2) TMS 602-08/ACI 530.1-08/ASCE 6-08, *Specification for Masonry Structures*, available from The Masonry Society, 3970 Broadway, Suite 201-D Boulder, CO 80304-1135, <http://www.masonrysociety.org>.

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