



Designation: C1692 – 09

Standard Practice for Construction and Testing of Autoclaved Aerated Concrete (AAC) Masonry¹

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INTRODUCTION

Masonry units of autoclaved aerated concrete (AAC) can be produced with dimensional tolerances as small as 0.06 in. (1.5 mm). As a consequence, AAC masonry units can be laid with mortar joints approximately 0.38 in. (10 mm) thick, and also with thinner joints. The exterior face of the resulting AAC masonry wall is then protected from the elements using an exterior wythe of masonry, a cladding system, or a breathable coating resistant to penetration by liquid water. The interior face can be plastered, furred, or painted.

1. Scope

1.1 This practice applies to construction and testing of masonry made of AAC units. It includes or references terminology, material specifications, and methods of test. It references specifications and test methods.

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

C270 Specification for Mortar for Unit Masonry

C476 Specification for Grout for Masonry

C1072 Test Methods for Measurement of Masonry Flexural Bond Strength

C1232 Terminology of Masonry

C1691 Specification for Unreinforced Autoclaved Aerated Concrete (AAC) Masonry Units

C1693 Specification for Autoclaved Aerated Concrete (AAC)

E72 Test Methods of Conducting Strength Tests of Panels for Building Construction

E96/E96M Test Methods for Water Vapor Transmission of Materials

E514 Test Method for Water Penetration and Leakage Through Masonry

E518 Test Methods for Flexural Bond Strength of Masonry

E519 Test Method for Diagonal Tension (Shear) in Masonry Assemblages

2.2 *Other Standard:*

TMS 602-08 / ACI 530.1-08 / ASCE 6-08 Specification for Masonry Structures³

3. Terminology

3.1 *Definitions*—Terms defined in Terminology C1232 shall apply in this practice.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *autoclaved aerated concrete (AAC)*—low-density cementitious product of calcium silicate hydrates in which the low density is obtained by the formation of macroscopic air bubbles, mainly by chemical reactions within the mass during the liquid or plastic phase. The air bubbles are uniformly distributed and are retained in the matrix on setting, hardening, and subsequent high-pressure steam curing, to produce a cellular structure. Material specifications for this product are prescribed in Specification C1693.

3.2.2 *thick-bed AAC masonry*—AAC masonry whose mortar joints are approximately 0.38-in. (10-mm) thick.

¹ This practice is under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.10 on Autoclaved Aerated Concrete Masonry Units.

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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 Available from The Masonry Society, 3970 Broadway, Suite 201-D Boulder, CO 80304-1135, http://www.masonrysociety.org.

3.2.3 *thin-bed AAC masonry*—AAC masonry whose mortar joints are approximately 0.06-in. (1.5-mm) thick.

4. Significance and Use

4.1 This practice applies to the materials and methods used in the construction of AAC masonry. It directly references the AAC materials standards under the jurisdiction of ASTM Committee C27 and the workmanship requirements of **TMS 602-08 / ACI 530.1-08 / ASCE 6-08** and supplements those workmanship requirements with additional requirements particular to AAC masonry.

5. Materials

5.1 AAC masonry units shall conform to Specification **C1691**.

5.2 Mortar for thick-bed AAC masonry shall meet the performance standards prescribed by the AAC manufacturer.

5.3 Mortar for thin-bed AAC masonry shall meet the performance standards prescribed by the AAC manufacturer.

NOTE 1—In general, AAC manufacturers' performance standards for mortar for AAC masonry address minimum dry compressive strength, minimum wet compressive strength, minimum bond strength, minimum open time, and minimum working time. They also require that the mortar provide sufficient bond to the AAC masonry unit so that flexural tensile strength is controlled by the flexural tensile strength of the units rather than by the bond between units and mortar.

5.4 Grout shall conform to Specification **C476**.

6. Methods of Test

6.1 *Compressive Strength Test for AAC Masonry*—Report the compressive strength of the AAC masonry as the strength of the AAC material determined in accordance with Specification **C1693**.

NOTE 2—Bond-strength requirements for AAC masonry mortar (Note 1) result in AAC masonry assemblages that behave monolithically. The compressive strength of an AAC prism depends on the prism's aspect ratio only, and not on the presence, number, or orientation of joints. Any reasonable aspect ratio can be used to verify compressive strength, provided that the same aspect ratio is used to calibrate design equations. Design equations for AAC masonry are calibrated using compressive strengths determined in accordance with Specification **C1693**. It is therefore appropriate to report those same strengths, which Specification **C1693** requires AAC manufacturers to determine and report.

6.2 *Flexural Strength Test for AAC Masonry Assemblages*—If required, conduct flexural strength tests in accordance with Test Methods **E72**, **E518**, or **C1072**.

6.2.1 If conducting flexural strength tests in accordance with Test Methods **E518**, construct at least five test specimens as stack-bonded prisms at least 32 in. (0.81 m) high. Use mortar meeting the performance requirements of the AAC manufacturer. Conduct the flexural strength test in accordance with Test Methods **E518**, Test Method A (Simply Supported Beam with Third-point Loading).

6.2.2 If conducting flexural strength tests in accordance with Test Method **C1072**, construct test specimens as stack-bonded prisms comprising at least three bed joints. Test a total of at least five joints. Use mortar meeting the performance requirements of the AAC manufacturer.

NOTE 3—Until a relationship is developed between full panel tests (Test

Methods **E72**) and small-scale test specimens (Test Methods **E518** and **C1072**) for AAC masonry, Test Methods **E72** should be used to establish design stresses.

6.3 *Shear Strength Test for AAC Masonry Assemblages*—If required, conduct shear strength tests in accordance with Test Method **E519**. Cure the gypsum capping material for at least six hours prior to testing.

6.4 *Modulus of Elasticity of AAC Units*—If required, determine the modulus of elasticity in accordance with Specification **C1693**.

7. Workmanship for Thick-bed AAC Masonry

7.1 Workmanship shall be in accordance with **TMS 602-08 / ACI 530.1-08 / ASCE 6-08** (Part 3—Execution), and with the additional requirements of this practice.

7.2 Install the first course in a full bed of mortar conforming to Specification **C270**, Type M, S or N.

7.3 Use thick-bed mortar complying with **5.2**.

7.4 Mix thick-bed mortar as prescribed by the AAC manufacturer.

7.5 Lay subsequent courses using thick-bed mortar, following the provisions of **TMS 602-08 / ACI 530.1-08 / ASCE 6-08** (Part 3—Execution) for laying solid units.

7.6 Make minor adjustments by sanding the surfaces of the units using a sanding board.

7.7 If it is necessary to field-cut units, cut them to tolerances consistent with **5.1**.

7.8 If AAC masonry is to be grouted, wet it thoroughly before grouting, to ensure that the grout flows to completely fill the space to be grouted.

8. Workmanship for Thin-bed AAC Masonry

8.1 Workmanship shall be in accordance with **TMS 602-08 / ACI 530.1-08 / ASCE 6-08** (Part 3—Execution), and with the additional requirements of this practice.

8.2 Install the first course in a full bed of mortar conforming to Specification **C270**, Type M, S or N.

8.3 Use thin-bed mortar complying with **5.3**.

8.4 Mix thin-bed mortar as prescribed by the AAC manufacturer.

8.5 Lay subsequent courses using thin-bed mortar. Use the special notched trowel available from the AAC manufacturer to spread the thin-bed mortar so that it completely fills the bed joints. Similarly fill the head joints, unless the units are designed to be connected across the head joints by tongue-and-groove or other mechanical means rather than by thin-bed mortar. Spread mortar and place the next unit before the mortar dries. Set the units into final position, in mortar joints approximately 0.06-in. (1.5-mm) thick, by striking on the end and top of the unit with a rubber mallet.

8.6 Lay units in alignment with either the inside or the outside plane of the wall. Align vertically and plumb using only the first course for reference. Make minor adjustments by sanding the surfaces of the units with a sanding board.

8.7 If it is necessary to field-cut units, cut them to tolerances consistent with **5.1**.

8.8 If AAC masonry is to be grouted, wet it thoroughly before grouting, to ensure that the grout flows to completely fill the space to be grouted.