



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

This standard is issued under the fixed designation C1692; 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 (ϵ) indicates an editorial change since the last revision or reapproval.

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
- C1660 Specification for Thin-bed Mortar for Autoclaved

Aerated Concrete (AAC) Masonry

- C1691 Specification for Unreinforced Autoclaved Aerated Concrete (AAC) Masonry Units
- C1693 Specification for Autoclaved Aerated Concrete (AAC)
- C1717 Test Methods for Conducting Strength Tests of Masonry Wall Panels
- 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 Standards:

- TMS 402-08 / ACI 530-09 / ASCE 5-08 Building Code Requirements for Masonry Structures³
- 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.

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

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.

Current edition approved Dec. 1, 2011. Published December 2011. Originally approved in 2009. Last previous edition approved in 2010 as C1692 – 10. DOI: 10.1520/C1692-11.

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>.

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 comply with Specification C1660.

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.

NOTE 3—The tests noted in subsections 6.2 through 6.4 are not required by TMS 402-08 / ACI 530-09 / ASCE 5-08 or TMS 602-08 / ACI 530.1-08 / ASCE 6-08. They may be required for research purposes or other reasons.

6.2 *Flexural Strength Test for AAC Masonry Assemblages*—If required, conduct flexural strength tests in accordance with Test Methods C1717, 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 complying with 5.2 or 5.3 as appropriate.

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. Use mortar complying with 5.2 or 5.3 as appropriate.

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.

9. Exterior Surface Treatment

9.1 AAC masonry exposed to weather shall be protected with an exterior wythe of masonry, a cladding system, or a coating complying with the requirements of 9.2 and 9.3.

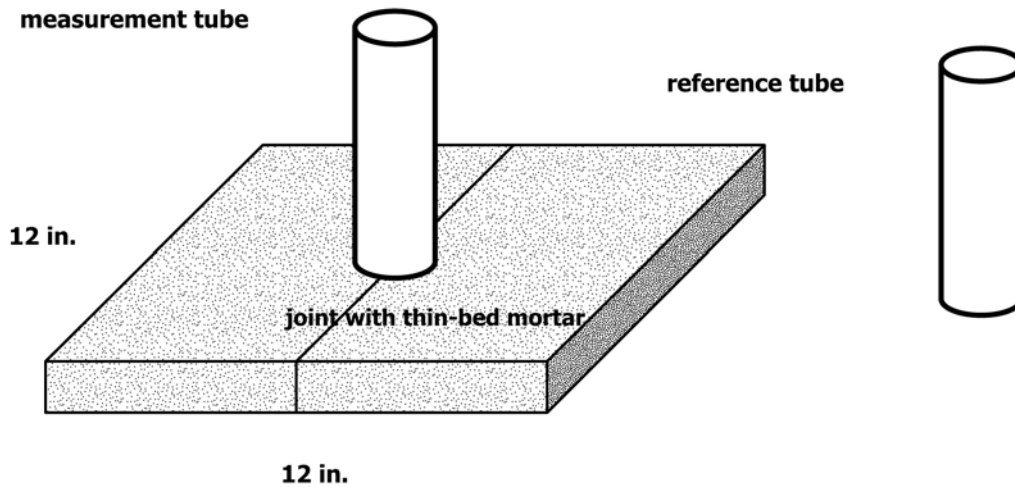


FIG. 1 Masonry Assemblage for Testing Liquid Permeability of Exterior Surface Treatment for AAC Masonry

9.2 *Vapor Permeability*—The PERM rating of the coating, determined in accordance with Test Methods E96/E96M, shall not be less than 5.

9.3 *Liquid Permeability*—The coating shall show no leakage when tested using the following procedure:

9.3.1 As shown in Fig. 1, prepare an AAC masonry assemblage with plan dimensions of 12 by 12 in. (0.3 by 0.3 m) and a thickness of 1 in. (25 mm). Make the assemblage using two pieces of AAC material with a vertically oriented joint between them. Join the two pieces at the joint using thin-bed or thick-bed mortar as appropriate to the AAC masonry being tested. Cover the top surface with the coating to be tested. Affix to the top surface of the specimen, over the joint, a clear glass or plastic measurement tube with an inside diameter between 2 and 4 in. (50 and 100 mm), and a height of at least 24 in. (0.6 m). Prepare a reference tube, closed at the bottom, of the same

material and dimensions as the measurement tube. Fill the measurement tube and the reference tube with water to a height of 21.6 in. (0.55 m), within a tolerance of ± 1 in. (25 mm). Note the original height of water, and the height after 5 h, in the measurement tube and in the reference tube. Record the difference between the initial height and the final height of water in the measurement tube, and in the reference tube. If those differences differ by less than 1 mm, the coating shall be considered to have shown no leakage.

NOTE 4—The above test method is intended to verify the water-penetration resistance of the coating only, when applied to an AAC masonry substrate. To examine the water-penetration resistance of an AAC masonry system, tests such as Test Method E514 are appropriate.

10. Keywords

10.1 autoclaved aerated concrete (AAC); masonry; workmanship

BIBLIOGRAPHY

- (1) *Autoclaved Aerated Concrete: Properties, Testing, and Design*, RILEM Recommended Practice, Taylor & Francis, 1st Ed., 1993 .

SUMMARY OF CHANGES

Committee C15 has identified the location of selected changes to this standard since the last issue (C1692 – 10) that may impact the use of this standard. (Approved Dec. 1, 2011.)

(1) Deleted redundant definition of autoclaved aerated concrete from Section 3.

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