Designation: C 1555 – 03a

Standard Practice for Autoclaved Aerated Concrete Masonry[1]

This standard is issued under the fixed designation C 1555; 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 1⁄16 in. (1.5 mm). As a consequence, AAC masonry units can be laid with mortar joints approximately 3⁄8 in. (9 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 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units which 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:*

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[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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***A Summary of Changes section appears at the end of this standard.**

C 270 Specification for Mortar for Unit Masonry[2]
C 476 Specification for Grout for Masonry[2]
C 1072 Test Method for Method for Measurement of Flexural Bond Strength[2]
C 1232 Terminology of Masonry[2]
C 1386 Specification for Precast Autoclaved Aerated Concrete High-Precision Wall Construction Units[2]
E 72 Methods of Conducting Strength Tests of Panels for Wall Construction[2]
E 96 Test Methods for Water Vapor Transmission of Materials[2]
E 514 Test Method for Water Penetration and Leakage Through Masonry[2]
E 518 Test Methods for Flexural Bond Strength of Masonry[2]
E 519 Test Method for Diagonal Tension (Shear) in Masonry Assemblages[2]

2.2 *Other Documents:*

Autoclaved Aerated Concrete: Properties, Testing and Design, RILEM Recommended Practice, RILEM Technical Committees 78-MCA and 51-ALC, E & FN Spon, London, 1993

Specification for Masonry Structures (ACI 530.1-02 / ASCE 6-02 / TMS 602-02), as reported by the Masonry Standards Joint Committee (MSJC), American Concrete Institute (Farmington Hills, Michigan), American Society of Civil Engineers (Reston, Virginia), and The Masonry Society, Boulder, Colorado), 2002

3. Terminology

3.1 *Definitions*—Terms defined in Terminology C 1232 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 C 1386.

3.2.2 *thick-bed AAC masonry*—AAC masonry whose mortar joints are approximately ⅜ in. (10 mm) thick.

3.2.3 *thin-bed AAC masonry*—AAC masonry whose mortar joints are approximately 1⁄16 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 standards of the Specification for Masonry Structures, and supplements those workmanship standards with additional requirements particular to AAC masonry.

5. Materials

5.1 AAC masonry units shall conform to Specification C 1386.

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 C 476.

6. Methods of Test

6.1 *Compressive Strength Test for AAC Masonry*—Report the compressive strength of AAC masonry determined in accordance with Specification C 1386.

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. Draft design equations for AAC masonry are calibrated using compressive strengths determined in accordance with Specification C 1386. It is therefore appropriate to report those same strengths, which Specification C 1386 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 E 72, E 518, or C 1072.

6.2.1 If conducting flexural strength tests in accordance with Test Methods E 518, 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 E 518, Test Method A ("Simply Supported Beam with Third-point Loading").

[2] *Annual Book of ASTM Standards*, Vol

6.2.2 If conducting flexural strength tests in accordance with Test Method C 1072, construct test specimens as stack-bonded prisms comprising at least 3 bed joints. Test a total of at least 5 joints. Use mortar meeting the performance requirements of the AAC manufacturer.

NOTE 3—Until a relationship is developed between full panel tests (Methods E 72) and small-scale test specimens (Test Methods E 518 and C 1072) for AAC masonry, Methods E 72 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 E 519. Cure the gypsum capping material for at least 6 h prior to testing.

6.4 *Modulus of Elasticity of AAC Units*—

NOTE 4—If required, the modulus of elasticity should be determined in accordance with CXXXX, currently under development by C27.60.

7. Workmanship for Thick-bed AAC Masonry

7.1 Workmanship shall be in accordance with the Specification for Masonry Structures (Part 3–Execution), and with the additional requirements of this standard.

7.2 Install the first course in a full bed of mortar conforming to Specification C 270, 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 the Specification for Masonry Structures (Part 3–Execution) for laying solid units.

7.6 Make minor adjustments by sanding the ~~exposed faces~~ 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 the Specification for Masonry Structures (Part 3–Execution), and with the additional requirements of this standard.

8.2 Install the first course in a full bed of mortar conforming to Specification C 270, 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 1/16 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 ~~exposed faces~~ 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.

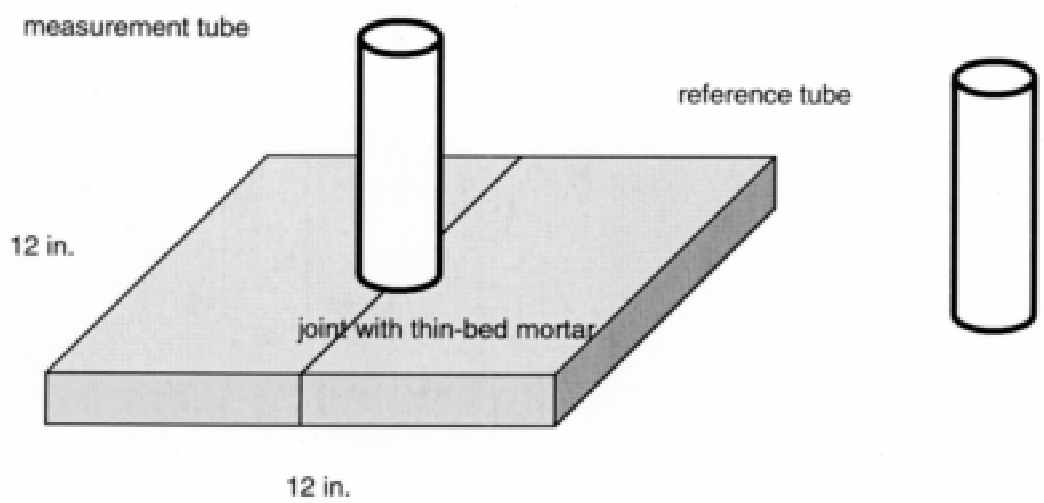

FIG. 1 Masonry Assemblage for Testing Liquid Permeability of Exterior Surface Treatment for AAC Masonry

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.

9.2 Vapor permeability: the PERM rating of the coating, determined in accordance with Test Methods E 96, 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 in. by 12 in. (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 5—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 E 514 are appropriate.

10. Keywords

10.1 autoclaved aerated concrete; masonry; workmanship

SUMMARY OF CHANGES

Committee C 15 has identified the location of the following changes since C 1555–03 that may impact the use of this standard.

(1) 7.6 and 8.6 were modified to address a possible ambiguity created by the wording “exposed faces”