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American Association State Highway and Transportation Officials Standard  
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# Standard Specification for Aggregate for Masonry Mortar<sup>1</sup>

This standard is issued under the fixed designation C144; 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.

*This standard has been approved for use by agencies of the U.S. Department of Defense.*

## 1. Scope\*

1.1 This specification covers aggregate for use in masonry mortar.

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

1.3 The following precautionary caveat pertains only to the test methods portion, Section 8, of this standard. *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

**C40/C40M** Test Method for Organic Impurities in Fine Aggregates for Concrete

**C87/C87M** Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar

**C88/C88M** Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

**C117** Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing

**C123/C123M** Test Method for Lightweight Particles in Aggregate

<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 C12.04 on Specifications for Aggregates 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.

**C128** Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate

**C136/C136M** Test Method for Sieve Analysis of Fine and Coarse Aggregates

**C142/C142M** Test Method for Clay Lumps and Friable Particles in Aggregates

**C270** Specification for Mortar for Unit Masonry

**C404** Specification for Aggregates for Masonry Grout

**C1180** Terminology of Mortar and Grout for Unit Masonry

**C1713** Specification for Mortars for the Repair of Historic Masonry

**D75/D75M** Practice for Sampling Aggregates

## 3. Terminology

3.1 For definitions of terms used in this specification, refer to Terminology C1180.

## 4. Materials and Manufacture

4.1 Aggregate for use in masonry mortar shall consist of natural sand or manufactured sand. Manufactured sand is the product obtained by crushing stone, gravel, or air-cooled iron blast-furnace slag specially processed to ensure suitable gradation.

NOTE 1—Care should be taken to ensure a suitable particle shape, since excessive quantities of flat and elongated particles have historically caused problems with workability.

## 5. Grading

5.1 Aggregate for use in masonry mortar shall be graded within the following limits, depending upon whether natural sand or manufactured sand is to be used:

| Sieve Designation | Percent Passing |                   |
|-------------------|-----------------|-------------------|
|                   | Natural Sand    | Manufactured Sand |
| 4.75-mm (No. 4)   | 100             | 100               |
| 2.36-mm (No. 8)   | 95 to 100       | 95 to 100         |
| 1.18-mm (No. 16)  | 70 to 100       | 70 to 100         |
| 600-μm (No. 30)   | 40 to 75        | 40 to 75          |
| 300-μm (No. 50)   | 10 to 35        | 20 to 40          |
| 150-μm (No. 100)  | 2 to 15         | 10 to 25          |
| 75-μm (No. 200)   | 0 to 5          | 0 to 10           |

5.2 The aggregate shall not have more than 50 % retained between any two consecutive sieves of those listed in 5.1 nor more than 25 % between 300-μm (No. 50) and the 150-μm (No. 100) sieve.

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

5.3 If the fineness modulus varies by more than 0.20 from the value assumed in selecting proportions for the mortar, the aggregate shall be rejected unless suitable adjustments are made in proportions to compensate for the change in grading.

NOTE 2—For heavy construction employing joints thicker than 12.5 mm (½ in.), a coarser aggregate may be desirable; for such work a fine aggregate conforming to Specification C404 is satisfactory.

5.4 When an aggregate fails the gradation limits specified in 5.1 and 5.2, its use is permitted provided the mortar can be prepared to comply with the aggregate ratio, water retention, air content, and compressive strength requirements of the property specifications of Specification C270.

NOTE 3—For exceptions for aggregate gradation for historic masonry, refer to Specification C1713, subsection 4.2.

## 6. Composition

6.1 *Deleterious Substances*—The amount of deleterious substances in aggregate for masonry mortar, each determined on independent samples complying with the grading requirements of Section 5, shall not exceed the following:

| Item                                                                       | Maximum Permissible Weight Percent |
|----------------------------------------------------------------------------|------------------------------------|
| Friable particles                                                          | 1.0                                |
| Lightweight particles, floating on liquid having a specific gravity of 2.0 | 0.5 <sup>A</sup>                   |

<sup>A</sup>This requirement does not apply to blast-furnace slag aggregate.

### 6.2 Organic Impurities:

6.2.1 The aggregate shall be free of injurious amounts of organic impurities. Except as herein provided, aggregates subjected to the test for organic impurities and producing a color darker than the standard shall be rejected.

6.2.2 Aggregate failing in the test may be used, provided that the discoloration is due principally to the presence of small quantities of coal, lignite, or similar discrete particles.

6.2.3 Aggregate failing in the test may be used provided that, when tested for the effect of organic impurities on strength of mortar, the relative strength at seven days calculated in accordance with the Procedure Section of Test Method C87/C87M, is not less than 95 %.

## 7. Soundness

7.1 Except as herein provided, aggregate subjected to five cycles of the soundness test shall show a loss, weighted in accordance with the grading of a sample complying with the limitations set forth in Section 5, not greater than 10 % when sodium sulfate is used or 15 % when magnesium sulfate is used.

7.2 Aggregate failing to meet the requirements of 7.1 may be accepted, provided that mortar of comparable properties made from similar aggregates from the same source has been exposed to weathering, similar to that to be encountered, for a period of more than five years without appreciable disintegration.

## 8. Test Methods for Sampling and Testing

8.1 Sample and test the aggregate in accordance with the following standards, except as otherwise provided in this specification:

8.1.1 *Sampling*—Practice D75/D75M.

8.1.2 *Sieve Analysis and Fineness Modulus*—Method C136/C136M.

8.1.3 *Amount of Material Finer Than (75-µm) No. 200 Sieve*—Test Method C117.

8.1.4 *Organic Impurities*—Test Method C40/C40M.

8.1.5 *Effect of Organic Impurities on Strength*—Test Method C87/C87M.

8.1.6 *Friable Particles*—Test Method C142/C142M.

8.1.7 *Lightweight Constituents*—Test Method C123/C123M.

8.1.8 *Soundness*—Test Method C88/C88M.

8.1.9 *Density*—Determine the density of the fine aggregate in accordance with Test Method C128. In calculating the air content of mortars, use the method described in Specification C270.

## 9. Keywords

9.1 aggregate; fine aggregate; masonry; mortar; sand; soundness

## SUMMARY OF CHANGES

Committee C12 has identified the location of selected changes to this standard since the last issue (C144–17) that may impact the use of this standard. (December 1, 2018)

(1) Added Section 3 and 3.1 referencing Terminology C1180.

Committee C12 has identified the location of selected changes to this standard since the last issue (C144–11) that may impact the use of this standard. (December 15, 2017)

(1) Added reference to C1713 in Section 2.

(2) Added Note 3, after 4.4, referring to exceptions listed in C1713 regarding historic masonry.