



Designation: ~~C87/C87M~~—10 ~~C87/C87M~~ – 17

Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar¹

This standard is issued under the fixed designation C87/C87M; 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.

1. Scope*

1.1 This test method covers the determination of the effect on mortar strength of the organic impurities in fine aggregate, whose presence is indicated using Test Method ~~C40C40/C40M~~. Comparison is made between compressive strengths of mortar made with washed and unwashed fine aggregate.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard. Some values have only SI units because the inch-pound equivalents are not used in the practice.

NOTE 1—Sieve size is identified by its standard designation in Specification E11. The alternative designation given in parentheses is for information only and does not represent a different standard sieve size

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.* **(Warning—**Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to exposed skin and tissue upon prolonged exposure.)²

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:³

- ~~C33C33/C33M~~ Specification for Concrete Aggregates
- ~~C40C40/C40M~~ Test Method for Organic Impurities in Fine Aggregates for Concrete
- ~~C109/C109M~~ Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
- ~~C125~~ Terminology Relating to Concrete and Concrete Aggregates
- ~~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
- ~~E150C150/C150M~~ Specification for Portland Cement
- ~~C230/C230M~~ Specification for Flow Table for Use in Tests of Hydraulic Cement
- ~~C305~~ Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
- ~~C511~~ Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
- ~~C670~~ Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- ~~E702C702/C702M~~ Practice for Reducing Samples of Aggregate to Testing Size
- ~~D75D75/D75M~~ Practice for Sampling Aggregates
- ~~D3665~~ Practice for Random Sampling of Construction Materials
- ~~E11~~ Specification for Woven Wire Test Sieve Cloth and Test Sieves

¹ This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.20 on Normal Weight Aggregates.

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² See section on Safety Precautions, *Manual of Aggregate and Concrete Testing, Annual Book of ASTM Standards*, Vol 04.02.

³ 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.

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

3. Terminology

3.1 Definitions:

3.1.1 For definition of terms used in this test method, refer to Terminology [C125](#).

4. Summary of Test Method

4.1 A portion of the fine aggregate that produced a color darker than the standard in Test Method [C40C40/C40M](#) is used to prepare mortar cube specimens. A separate portion of the same fine aggregate is washed in sodium hydroxide solution to remove the organic impurities that caused the failing result when tested in accordance with Test Method [C40C40/C40M](#), and that washed fine aggregate is used to prepare another set of mortar cube specimens.

4.2 After curing for a stated period, the compressive strengths of the two sets of cube specimens are determined and compared.

5. Significance and Use

5.1 This test method is of significance in making a final determination of the acceptability of fine aggregates with respect to the requirements of Specification [C33C33/C33M](#) concerning organic impurities.

5.2 This test method is applicable to those samples which, when tested in accordance with Test Method [C40C40/C40M](#), have produced a supernatant liquid with a color darker than standard color plate No. 3 or color solution.

5.3 Many specifications provide for the acceptance of fine aggregate producing a darker color in the Test Method [C40C40/C40M](#) test, when testing by this test method indicates the strength of the mortar cubes prepared with the unwashed fine aggregate is comparable to the strength of mortar cubes made with the washed fine aggregate.

6. Apparatus

6.1 *Flow Table, Flow Mold, and Caliper*, as described in Specification [C230/C230M](#).

6.2 *Tamper, Trowel, Cube Molds, and Testing Machine*, as described in Test Method [C109/C109M](#).

6.3 *Mixer, Bowl, and Paddle*, as described in Practice [C305](#).

6.4 *Curing Apparatus*, as described in Specification [C511](#).

6.5 *pH Paper*, 0–14.

6.6 *pH Meter*, capable of reading to 0.1 pH units or better.

7. Reagents and Materials

7.1 Portland cement shall be Type I or Type II, meeting the requirements of Specification [C150C150/C150M](#).

7.2 *Sodium Hydroxide Solution (3 %)*—Dissolve 3 parts by mass of sodium hydroxide (NaOH) in 97 parts water.

7.3 *Phenolphthalein*—Dissolve 1 g of reagent grade phenolphthalein in 1 L of 95 % reagent grade ethyl alcohol.

8. Sampling and Sample Preparation

8.1 If sufficient material remains from the sample used for testing in accordance with Test Method [C40C40/C40M](#), use this material for the tests described in this test method. If there is insufficient material remaining, obtain another field sample from the same source in accordance with Practice [D75D75/D75M](#) and Practice [D3665](#).

NOTE 2—At least 20 kg of fine aggregate should be available for the testing described herein.

8.2 If the fine aggregate contains particles coarser than the 4.75-mm (No.4) sieve, remove the coarser particles by sieving on the 4.75-mm (No.4) sieve, so that when the particles are mixed in the designated mixer, there will be no damage to the mixer or crushing of the fine aggregate particles. Determine the percentage of the sample removed. (**Warning**—The clearances between the paddle and the bowl specified in Practice [C305](#) are suitable when using the mortar made with graded standard sand. To permit the mixer to operate freely and to avoid serious damage to the paddle and bowl when coarser aggregates are used, it may be necessary to set the clearance adjustment bracket to provide greater clearances than specified. A clearance of approximately 4.0 mm is required in Practice [C305](#); a clearance of approximately 5.05 mm [$\frac{3}{16}$ in.] has been found to be satisfactory for this method when used with fine aggregate from which the material retained on the 4.75-mm (No. 4) sieve has been removed.)

8.3 Split the fine aggregate to be used for these tests into two approximately equal portions, using the procedure described in Practice [C702C702/C702M](#). Set one portion aside to be used in the unwashed condition. The second portion is to be washed before use.

8.4 *Preparing Washed Fine Aggregate:*

8.4.1 Perform the washing and rinsing of the fine aggregate with care to minimize the loss of fines, so that the aggregate after washing and rinsing has a fineness modulus within 0.10 of that of the unwashed aggregate.