



Standard Test Method for Organic Impurities in Fine Aggregates for Concrete¹

This standard is issued under the fixed designation C40/C40M; 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 test method covers two procedures for an approximate determination of the presence of injurious organic impurities in fine aggregates that are to be used in hydraulic cement mortar or concrete. One procedure uses a standard color solution and the other uses a glass color standard.

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.

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

C33 Specification for Concrete Aggregates

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

C125 Terminology Relating to Concrete and Concrete Aggregates

C702 Practice for Reducing Samples of Aggregate to Testing Size

D75 Practice for Sampling Aggregates

D1544 Test Method for Color of Transparent Liquids (Gardner Color Scale)

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.

Current edition approved Dec. 1, 2016. Published January 2017. Originally approved in 1921. Last previous edition approved in 2011 as C40/C40M-11. DOI: 10.1520/C0040_C0040M-16.

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. Terminology

3.1 For definitions of terms used in this test method, refer to Terminology C125.

4. Significance and Use

4.1 This test method is used in making a preliminary determination of the acceptability of fine aggregates with respect to the requirements of Specification C33 that relate to organic impurities.

4.2 The principal value of this test method is to furnish a warning that injurious amounts of organic impurities may be present. When a sample subjected to this test produces a color darker than the standard color it is advisable to perform the test for the effect of organic impurities on the strength of mortar in accordance with Test Method C87.

5. Apparatus

5.1 *Bottles*—Colorless glass or plastic graduated bottles, approximately 240 to 470-mL [8 to 16-oz] nominal capacity, equipped with watertight stoppers or caps, not soluble in the specified reagents. In no case shall the maximum outside thickness of the bottles, measured along the line of sight used for the color comparison, be greater than 63.5 mm [2.5 in.] or less than 38.1 mm [1.5 in.]. Replace bottles when no longer colorless due to use.

5.2 *Standard Color Solution Level*—75 mL [2.5 oz (U.S. fluid)],

5.3 *Fine Aggregate Level*—130 mL [4.5 oz (U.S. fluid)], and

5.4 *NaOH Solution Level*—200 mL [7 oz (U.S. fluid)].

5.5 *Glass Color Standard*

5.5.1 Glass standard colors shall be used as described in Table 1 of Test Method D1544.

NOTE 1—A suitable instrument consists of five glass color standards mounted in a plastic holder. Only the glass identified as Gardner Color Standard No. 11 is to be used as the Glass Color Standard in 10.2.

6. Reagent and Standard Color Solution

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

6.2 *Standard Color Solution*—Dissolve reagent grade potassium dichromate ($K_2Cr_2O_7$) in concentrated sulfuric acid (sp gr 1.84) at the rate of 0.250 g/100 mL of acid. The solution must be freshly made for the color comparison using gentle heat if necessary to effect solution.

7. Sampling

7.1 The sample shall be selected in general accordance with Practice **D75**.

8. Test Sample

8.1 The test sample shall have a mass of about approximately 450 g [1 lb] and be taken from the larger sample in accordance with Practice **C702**.

9. Procedure

9.1 Fill a glass bottle to the approximately 130-mL [4.5-fluid oz] level with the sample of the fine aggregate (see Terminology **C125**) to be tested.

9.2 Add the sodium hydroxide solution until the volume of the fine aggregate and liquid, indicated after shaking, is approximately 200 mL [7 fluid oz].

9.3 Stopper the bottle, shake vigorously, and then allow to stand for 24 h.

10. Determination of Color Value

10.1 *Standard Color Solution Procedure*—At the end of the 24-h standing period, fill a glass bottle to the approximately 75-mL [2.5-fluid oz] level with the fresh standard color solution, prepared not longer than 2 h previously, as prescribed in **6.2**. Hold the bottle with the test sample and the bottle with the standard color solution side-by-side, and compare the color of light transmitted through the supernatant liquid above the

sample with the color of light transmitted through the standard color solution. Record whether the color of the supernatant liquid is lighter, darker, or equal to the color of the standard color solution.

10.2 *Glass Color Standard Procedure*—To define more precisely the color of the supernatant liquid of the test sample, five glass standard colors shall be used using the following colors:

Gardner Color Standard No.	Organic Plate No.
5	1
8	2
11	3 (standard)
14	4
16	5

The comparison procedure described in **10.1** shall be used, except that the organic plate number which is nearest the color of the supernatant liquid above the test specimen shall be reported. When using this procedure, it is not necessary to prepare the standard color solution.

11. Interpretation

11.1 When a sample subjected to this procedure produces a color darker than the standard color, or Organic Plate No. 3 (Gardner Color Standard No. 11), the fine aggregate under test shall be considered to possibly contain injurious organic impurities. It is advisable to perform further tests before approving the fine aggregate for use in concrete.

12. Precision and Bias

12.1 Since this test produces no numerical values, determination of the precision and bias is not possible.

13. Keywords

13.1 colorimetric test; fine aggregate; organic impurities

SUMMARY OF CHANGES

Committee C09 has identified the location of selected changes to this standard since the last issue (C40/C40M-11) that may impact the use of this standard. (Approved Dec. 1, 2016.)

(1) Added Section 3.

(2) Revised 5.1 and renumbered remainder of section.

(3) Removed Note 1.

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