



Standard Test Method for Organic Impurities in Fine Aggregates for Concrete¹

This standard is issued under the fixed designation C 40; 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 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 given in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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:*

- C 33 Specification for Concrete Aggregates²
- C 87 Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar²
- C 125 Terminology Relating to Concrete and Concrete Aggregates²
- C 702 Practice for Reducing Samples of Aggregate to Testing Size²
- C 1005 Specification for Reference Masses and Devices for Determining Mass for Use in the Physical Testing of Hydraulic Cements³
- D 75 Practice for Sampling Aggregates⁴
- D 1544 Test Method for Color of Transparent Liquids (Gardner Color Scale)⁵

¹ This test method is under the jurisdiction of ASTM Committee C-9 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.20 on Normal Weight Aggregates.

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² *Annual Book of ASTM Standards*, Vol 04.02.

³ *Annual Book of ASTM Standards*, Vol 04.01.

⁴ *Annual Book of ASTM Standards*, Vol 04.03.

⁵ *Annual Book of ASTM Standards*, Vol 06.01.

3. Significance and Use

3.1 This test method is used in making a preliminary determination of the acceptability of fine aggregates with respect to the requirements of Specification C 33 that relate to organic impurities.

3.2 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 C 87.

4. Apparatus

4.1 *Glass Bottles*—Colorless glass graduated bottles, approximately 350 to 470-mL (12 to 16-oz) nominal capacity, having approximately oval cross section, equipped with water-tight 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 60 mm (2½ in.) or less than 40 mm (1.5 in.). The graduations on the bottles shall be in millimetres, or ounces (U.S. fluid), except that unmarked bottles may be calibrated and scribed with graduations by the user. In such case, graduation marks are required at only three points as follows:

4.1.1 *Standard Color Solution Level*—75 mL (2½ oz (U.S. fluid)),

4.1.2 *Fine Aggregate Level*—130 mL (4½ oz (U.S. fluid)), and

4.1.3 *NaOH Solution Level*—200 mL (7 oz (U.S. fluid)).

4.2 *Glass Color Standard*

4.2.1 Glass standard colors shall be used as described in Table 1 of Test Method D 1544.

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 9.2.



5. Reagent and Standard Color Solution

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

5.2 *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.

6. Sampling

6.1 The sample shall be selected in general accordance with Practice D 75.

7. Test Sample

7.1 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 C 702.

8. Procedure

8.1 Fill a glass bottle to the approximately 130-mL (4½-fluid oz) level with the sample of the fine aggregate to be tested.

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

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

9. Determination of Color Value

9.1 *Standard Color Solution Procedure*—At the end of the 24-h standing period, fill a glass bottle to the approximately 75-mL (2½-fluid oz) level with the fresh standard color solution, prepared not longer than 2 h previously, as prescribed

in 5.2. 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.

9.2 *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 9.1 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.

10. Interpretation

10.1 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.

11. Precision and Bias

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

12. Keywords

12.1 colorimetric test; fine aggregate; organic impurities

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