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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Adherent Fines[1]

This standard is issued under the fixed designation D 5711; 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 percent by mass of fine dust, clay or silt, or both, present as a coating on coarse aggregate particles. The nature of the fines adhering to the coarse aggregate is not determined.

NOTE 1—The nature of the fines can be determined by other tests such as Test Methods D 2419 and D 4318.

1.2 This proposed test method is intended for use with 50 mm (2 in.) maximum size aggregate and smaller.

1.3 The values shown in SI units are to be regarded as the standard, except for the frame size of testing sieves, for which inch-pound units are to be regarded as standard.

1.4 *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 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates[2]

C 702 Practice for Reducing Samples of Aggregate to Testing Size[2]

D 75 Practice for Sampling Aggregates[3]

E 11 Specification for Wire-Cloth Sieves for Testing Purposes[4]

D 2419 Test Method for Sand Equivalent Value of Soils and Fine Aggregate[3]

D 4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils[5]

3. Terminology

3.1 *Definitions:*

3.1.1 *adherent fines, n*—fine particles smaller than 75 µm created from handling or silt or clay that sticks (adheres) to the coarse aggregate particles.

3.1.2 *coarse aggregate, n*—aggregate predominately retained on the 4.75 mm (No. 4) sieve.

4. Summary of Test Method

4.1 A sample of dry aggregate of known mass is separated through a series of sieves of progressively smaller openings to remove loose (non-adhering) fines from the sample. After determining the mass, the sample is then slaked and washed to remove the fines still adhering to the coarse aggregate particles. The sample is dried and the mass measured to determine the quantity of fines removed during washing.

5. Significance and Use

5.1 This proposed test method assigns a measurable value to the amount of fine material adhering to the coarse aggregate due to handling or contamination by silt or clay.

6. Apparatus

6.1 *Balances*—Balances or scales used in testing shall have readability and accuracy to 0.1 g at any point within the range of use.

6.2 *Sieves*—Three 8-in. (203.2 mm) round sieves, a 4.75-mm (No. 4), a 9.5-mm (⅜-in.), and a 75 µm (No. 20) conforming to the requirements of Specification E 11.

6.3 *Mechanical Sieve Shaker*—A mechanical sieve shaker shall impart a vertical, or lateral and vertical, motion to the sieve, causing the particles thereon to bounce and turn so as to present different orientations to the sieving.

NOTE 2—Tyler Rotap, Soiltest model CL-305A and Tyler RX-8 shakers have been found to be acceptable.[6] Others which provide comparable results to these models are also acceptable.

6.4 *Oven*—An oven of appropriate size capable of maintaining a uniform temperature of 110 ± 5°C (230 ± 9°F).

7. Sampling

7.1 Sample the aggregate in accordance with Practice D 75. The mass of the field sample shall be the mass shown in Practice D 75 or four times the mass required in 8.2, whichever is greater.

7.2 Thoroughly mix the sample and reduce it to an amount suitable for testing using the applicable procedures described in

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

[3] *Annual Book of ASTM Standards*, Vol 04.03.

[4] *Annual Book of ASTM Standards*, Vol 14.02.

[5] *Annual Book of ASTM Standards*, Vol 04.08.

[6] Available from W. S. Tyler, 3200 Bessemer City Road, Box 8900, Gastonia, NC 28053, and Soiltest Inc., 86 Albreicht Dr., P.O. Box 8004, Lake Bluff, IL 60044-8004.

Practice C 702. The test sample shall be approximately of the mass desired when dry and shall be the end result of the field sample reduction. Reduction to an exact predetermined mass shall not be permitted.

8. Procedure

8.1 Dry the sample to constant mass at a temperature of 110 ± 5°C (230 ± 9°F).

8.2 Obtain a minimum laboratory sample of 1500 g as described in Practice C 702.

8.3 Stack the 9.5 mm (⅜ in.) and 4.75 mm (No. 4) sieves on a sieve pan. Place approximately one half of the prepared sample on the top sieve. Place the sieve cover on the stack of sieves and sieve in sieve shaker for 3 min ± 15 s.

NOTE 3—Shaking more or less than 3 min may affect test results.

8.4 Remove the stack of sieves and empty each into a dry pan, discarding the material passing the 4.75 mm (No. 4) sieve. Empty both sieves into one pan of convenient size. Do not keep the sieved material separate in sizes but combined to form one sample.

8.5 Sieve the remaining half of the sample in the same manner, saving and discarding material as before.

8.5.1 If any material (not coated particles of aggregate) is present in the material that will slake down during the decantation test, this material should be visually identified, removed, and discarded. The material remaining constitutes the decantation test sample.

8.6 Determine the mass of the material coarser than the 4.75 mm (No. 4) sieve to the nearest 0.1 g and record the mass as *B*.

8.7 Place the test sample in a dish pan (or similar container) and add sufficient water to cover it. Allow the sample to soak completely covered with water for 24 h.

8.8 At the end of the soaking period, agitate the contents of the pan vigorously with hands and immediately pour the wash water over the 75 mm (No. 200) sieve. Agitate with sufficient vigor to result in the complete separation from the coarse particles of all adherent particles finer than the 75 mm (No. 200) sieve, and to bring the fine material into suspension in order that it will be removed by decantation from the coarse particles of the sample.

8.9 Add water to the pan and repeat the procedure in 8.8 until the wash water is clear.

8.10 Return all the material retained on the 75 mm (No. 200) sieves to the washed sample. Dry the washed aggregate to a constant mass as indicated in 8.1.

8.11 Determine the mass of the dried aggregate to the nearest 0.1 g and record the mass as *C*.

9. Calculation

9.1 Calculate the percent adherent fines as follows:

$$\text{Percent Adherent Fines} = [(B - C)/B] \times 100 \quad (1)$$

where:

B = original dry mass, and
C = dry mass after washing.

10. Report

10.1 Report the following information:

10.1.1 The percent adherent fines to the nearest 0.1 %, and

10.1.2 The manufacturer and model number of the mechanical shaker used in the test.

11. Precision and Bias

11.1 Precision data are being developed: limited testing indicates that the precision of this test for adherent fines will be similar to that described in Test Method C 136.

11.2 *Bias*—Since there is no accepted reference material for determining the bias for the procedure in this test method, no statement on bias is made.

12. Keywords

12.1 adherent fines; aggregate; fines; sieve analysis