



Standard Test Method for Clay Lumps and Friable Particles in Aggregates¹

This standard is issued under the fixed designation C142/C142M; 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 approximate determination of clay lumps and friable particles in aggregates.

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.

NOTE 1—Sieve sizes openings are identified by their Specification E11 designation with their alternative Specification E11 designation given in parentheses 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:*²

C33 Specification for Concrete Aggregates

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

C125 Terminology Relating to Concrete and Concrete Aggregates

C1005 Specification for Reference Masses and Devices for Determining Mass and Volume for Use in the Physical Testing of Hydraulic Cements

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 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. Significance and Use

3.1 This test method is of primary significance in determining the acceptability of aggregate with respect to the requirements of Specification C33.

4. Apparatus

4.1 *Balance*—A balance or scale accurate to within 0.1 % of the mass of the test sample at any point within the range of use. Balances shall conform to the accuracy of the applicable sections of Specification C1005.

4.2 *Containers*—Rust-resistant containers of a size and shape that will permit the spreading of the sample on the bottom in a thin layer.

4.3 *Sieves*—Sieves conforming to Specification E11.

4.4 *Drying Oven*—An oven providing free circulation of air and capable of maintaining a temperature of $110 \pm 5^\circ\text{C}$ [$230 \pm 10^\circ\text{F}$].

5. Samples

5.1 Aggregate for this test method shall consist of the material remaining after completion of testing in accordance with Test Method C117. To provide the quantities designated in 5.3 and 5.4, it may be necessary to combine material from more than one test by Test Method C117.

5.2 Dry the aggregate to substantially constant mass at a temperature of $110 \pm 5^\circ\text{C}$ [$230 \pm 10^\circ\text{F}$].

5.3 Test samples of fine aggregate shall consist of the particles coarser than a 1.18-mm (No. 16) sieve and shall have a mass not less than 25 g.

5.4 Separate the test samples of coarse aggregate into different sizes, using the following sieves: 4.75-mm (No. 4), 9.5-mm ($\frac{3}{8}$ -in.), 19.0-mm ($\frac{3}{4}$ -in.), and 37.5-mm ($1\frac{1}{2}$ -in.). The test sample shall have a mass not less than indicated in the following table:

Size of Particles Making Up Test Sample	Mass of Test Sample, min, g
4.75 to 9.5-mm (No. 4 to $\frac{3}{8}$ -in.)	1000
9.5 to 19.0-mm ($\frac{3}{8}$ to $\frac{3}{4}$ -in.)	2000
19.0 to 37.5-mm ($\frac{3}{4}$ to $1\frac{1}{2}$ -in.)	3000
Over 37.5-mm ($1\frac{1}{2}$ -in.)	5000

5.5 In the case of mixtures of fine and coarse aggregates, separate the material on the 4.75-mm (No. 4) sieve, and prepare the samples of fine and coarse aggregates in accordance with 5.3 and 5.4.

6. Procedure

6.1 Determine the mass of the test sample to the accuracy specified in 4.1 and spread it in a thin layer on the bottom of the container, cover it with distilled water, and soak it for a period of 24 ± 4 h. Roll and squeeze particles individually between the thumb and forefinger to attempt to break the particle into smaller sizes. Do not use the fingernails to break up particles, or press particles against a hard surface or each other. Classify any particles that can be broken with the fingers into fines removable by wet sieving as clay lumps or friable particles. After all discernible clay lumps and friable particles have been broken, separate the detritus from the remainder of the sample by wet sieving over the sieve prescribed in the following table:

Size of Particles Making Up Sample	Size of Sieve for Removing Residue of Clay Lumps and Friable Particles
Fine aggregate (retained on 1.18-mm (No. 16) sieve)	850- μ m (No. 20)
4.75 to 9.5-mm (No. 4 to $\frac{3}{8}$ -in.)	2.36-mm (No. 8)
9.5 to 19.0-mm ($\frac{3}{8}$ to $\frac{3}{4}$ -in.)	4.75-mm (No. 4)
19.0 to 37.5-mm ($\frac{3}{4}$ to 1 $\frac{1}{2}$ -in.)	4.75-mm (No. 4)
Over 37.5-mm (1 $\frac{1}{2}$ -in.)	4.75-mm (No. 4)

Perform the wet sieving by passing water over the sample through the sieve while manually agitating the sieve, until all undersize material has been removed.

6.2 Remove the retained particles carefully from the sieve, dry to substantially constant mass at a temperature of 110 ± 5 °C [230 ± 10 °F], allow to cool, and determine the mass to the nearest 0.1 % of the mass of the test sample as defined in 5.3 or 5.4.

7. Calculation

7.1 Calculate the percent of clay lumps and friable particles in fine aggregate or individual sizes of coarse aggregate as follows:

$$P = [(M - R)/M] \times 100 \quad (1)$$

where:

P = percent of clay lumps and friable particles,

M = mass of test sample (for fine aggregate the mass of the portion coarser than the 1.18-mm (No. 16) sieve as described in 5.3), and

R = mass of particles retained on designated sieve as determined in accordance with 6.2.

7.2 For coarse aggregates, the percent of clay lumps and friable particles shall be an average based on the percent of clay lumps and friable particles in each sieve size fraction weighted in accordance with the grading of the original sample before separation or, preferably, the average grading of the supply represented by the sample. Should the aggregate contain less than 5 % of any of the sizes specified in 6.1, that size shall not be tested but, for the purpose of calculating the weighted average, shall be considered to contain the same percent of clay lumps and friable particles as the next larger or next smaller size, whichever is present.

8. Precision and Bias

8.1 *Precision*³—The estimate of the precision of this test method is provisional and is based on samples of one fine aggregate that was tested by ten different operators at nine different laboratories. For that sample, the average “percent of clay lumps and friable particles” in the aggregate was 1.2 %, and the standard deviation was 0.6 %. Based on this standard deviation, the acceptable range of two test results on samples from the same aggregate sent to different laboratories is 1.7 %.

8.2 *Bias*—Since there is no acceptable reference material for determining the bias for the procedure in this test method, no statement is being made.

9. Keywords

9.1 aggregates; clay lumps; friable particles

³ Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:C09-1016.

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