

METHODS OF SAMPLING AND TESTING
MT 223-04
METHOD OF TEST FOR CLAY LUMPS AND FRIABLE PARTICLES IN AGGREGATES
(Modified AASHTO T 112)

1 Scope:

- 1.1 This method covers the approximate determination of clay lumps and friable particles in natural aggregates.
- 1.2 This standard may involve hazardous materials, operations and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2 Referenced Documents:

2.1 AASHTO:

T 112 Clay Lumps and Friable Particles in Aggregate

MT Manual:

MT 202 Sieve Analysis of Fine and Coarse Aggregate
MT-405 Sieves for Testing Purposes

3 Apparatus:

- 3.1 *Balances* - Balances or scales for determining the mass of the test samples shall be sensitive to 0.1 percent of the mass of the sample. The residue (Section 5) shall be weighed on a balance or scale sensitive to 0.02 percent of the mass of the original test sample.
- 3.2 *Containers* - Rust-resistant containers of a size and shape that will permit the spreading of the sample on the bottom in a thin layer.
- 3.3 *Sieves* - Sieves conforming to MT-405, Sieves for Testing Purposes.
- 3.4 *Oven* - Oven capable of maintaining a temperature of $230 \pm 9^{\circ}\text{F}$ ($110 \pm 5^{\circ}\text{C}$).

4 Samples:

- 4.1 The aggregate shall be dried to substantially constant mass at a temperature of $230 \pm 9^{\circ}\text{F}$ ($110 \pm 5^{\circ}\text{C}$).
- 4.2 Test samples of fine aggregate shall consist of particles coarser than a 1.18 mm (No.16) sieve and shall weigh not less than 450 grams.
- 4.3 Test samples of coarse aggregate shall be separated into different sizes, using the following sieves: 4 Mesh (4.75 mm), 3/8 in. (9.5 mm), 3/4 in. (19.0 mm), and 1½ in. (37.5 mm). The test sample shall weigh not less than indicated in the following table:

4 Samples: (continued)

Minimum Size of Particles Making up Sample	Mass of Test Sample, Min, g.
4-M to 3/8 in. (4.75 to 9.5 mm)	1000
3/8 to 3/4 in. (9.5 to 19.0 mm)	2000
3/4 to 1½ in. (19.0 to 37.5 mm)	3000
Over 1½ in. (37.5 mm)	5000

4.4 If the grading of the original sample provides less than 5% of any of the sizes indicated in Section 4.3, do not test that size.

4.5 In the case of aggregate which is composed of substantial amounts of both fine and coarse aggregate sizes, separate the material into two sizes at the 4.75 mm (No. 4) sieve, and prepare the samples of fine and coarse aggregate in accordance with sections 4.3 and 4.4. Any aggregate containing 50 percent or more material retained on the 4.74 mm (No. 4) sieve is considered to be coarse aggregate.

Note 1 – In most cases, only the plus 4.75 mm (No. 4) fraction of coarse aggregate needs to be evaluated by this test, regardless of the amount of minus 4.75 mm (No. 4) material present. However, the amount of 1.18 mm (No. 16) to 4.75 mm (No. 4) material present shall be included in the weight of the test sample in Section 5.1 when calculating the percent of clay lumps and friable particles.

5 Procedure:

5.1 Weigh the test sample and spread it in a thin layer on the bottom of the container, cover it with water, and allow it to soak for a period of 24 ± 4 hours. Roll and squeeze particles individually between the thumb and forefinger to attempt to break particles into smaller sizes. Do not use fingernails to break up particles, or press particles against a hard surface or each other. Any particles that can be broken with the fingers into fines removable by wet sieving shall be classified as clay lumps or friable particles. After all discernible clay lumps and friable particles have been broken, separate the undersized material from the remainder of the sample by wet sieving over the sieve prescribed in the following table.

Size of Particles Making up Test Sample	Size of Sieve for Removing Residue of Clay Lumps and Friable Particles
Fine Aggregate retained on 16-M (1.18 mm)	20-M (0.850 μ m)
4-M to 3/8 in (4.75 to 9.5 mm)	8-M (2.36 mm)
3/8 to 3/4 in. (9.5 to 19.0 mm)	4-M (4.75 mm)
3/4 to 1½ in. (19.0 to 37.5 mm)	4-M (4.75 mm)
Over 1½ in. (37.5 mm)	4-M (4.75 mm)

Wet sieve is to be accomplished by passing water over the sample through the sieve while manually agitating the sieve until all undersize material has been removed.

5.2 The retained particles shall be carefully removed from the sieve and dried to substantially

constant mass at a temperature of $230 \pm 9^{\circ}\text{F}$ ($110 \pm 5^{\circ}\text{C}$), allowed to cool, and weighed to an accuracy of 0.02 percent, based on the original mass of the test sample.

6 Calculations

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

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

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 16-m (1.18 mm) sieve as described in Sec. 4.2, and

R = mass of particles retained on designated sieve, as determined in accordance with Section 5.2.

- 6.2 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 weighed 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 percent of the material in a given size, that size 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.