

5.16.07 CLAY LUMPS AND FRIABLE PARTICLES IN AGGREGATE (Kansas Test Method KT-7)

a. SCOPE

This method of test covers the procedure of determining the percentage of clay lumps and friable particles in aggregate. Whenever mud balls and clay balls are referred to in specifications, they shall be considered as clay lumps. Clay lumps in aggregate shall be defined as any particles or aggregation of particles which when thoroughly wet, can be distorted when squeezed between the thumb and forefinger, or will disintegrate into individual grain sizes when immersed for a short period in water.

Friable particles are defined as particles which vary from the basic aggregate particles in that they may either readily disintegrate under normal handling and mixing pressures imposed upon them by construction procedures, or break down after being incorporated into the work. **KT-7** reflects testing procedures found in AASHTO T 112.

b. REFERENCED DOCUMENTS

b.1. KT-3; Material Passing 75 μm (No. 200) Sieve by the Wash Method

b.2. KT-8; Shale or "Shalelike" Materials in Aggregate

b.3. AASHTO M 92; Wire-Cloth Sieves for Testing Purposes

b.4. AASHTO M 231; Balances Used in the Testing of Materials

b.5. AASHTO T 112; Clay Lumps and Friable Particles in Aggregate

c. APPARATUS

c.1. The balance shall conform to the requirements of AASHTO M 231 for the class of general purpose balance required for the principal sample mass of the sample being tested.

c.2. Drying pans.

c.3. Sieves conforming to AASHTO M 92 requirements.

c.4. Oven providing free circulation of air and capable of maintaining a temperature of $110 \pm 5^{\circ}\text{C}$ ($230 \pm 9^{\circ}\text{F}$).

d. SAMPLE PREPARATION

d.1. Aggregate for this test shall consist of the material remaining after completion of **KT-3**. To provide the quantities designated in **d.3.** and **d.4.** it may be necessary to combine material from more than one test by **KT-3**.

d.2. The aggregate shall be dried to substantially constant mass at a temperature of $110 \pm 5^{\circ}\text{C}$ ($230 \pm 9^{\circ}\text{F}$).

d.3. Test samples of fine aggregate shall consist of the particles coarser than a 1.18 mm (No. 16) sieve and shall weigh not less than 100 g.

d.4. Test samples of coarse aggregate shall be separated into different sizes using the following sieves: 4.75 mm (No. 4), 9.5 mm (3/8 in), 19.0 mm (3/4 in), and 37.5 mm (1 1/2 in). The test sample shall have a mass not less than indicated in the following table:

Table 5.16.07-1
Sample Sizes for Coarse Aggregate
When Testing for Clay Lumps and Friable Particles

Sizes of Particles Making Up Test Sample	Minimum Mass of Test Sample, g
4.75 to 9.5 mm (No. 4 to 3/8 in)	1,000
9.5 to 19.0 mm (3/8 to 3/4 in)	2,000
19.0 to 37.5 mm (3/4 to 1 1/2 in)	3,000
Over 37.5 mm (1 1/2 in)	5,000

d.5. If the grading of the original sample provides less than 5 percent of any of the sizes indicated in **d.4.**, do not test that size.

d.6. In the case of aggregate which is composed of substantial amounts of both fine and coarse aggregate sizes, the material shall be separated into two sizes at the 4.75 mm (No. 4) sieve, and the samples of fine and coarse aggregate shall be prepared in accordance with **d.3.** and **d.4.** Any aggregate containing 50 percent or more material retained on the 4.75 mm (No. 4) sieve is considered to be coarse aggregate^a.

NOTE a: In most cases, only the plus 4.75 mm (No. 4) fraction of coarse aggregate needs to be evaluated by this test method 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 mass of the test sample in **f.** when calculating the percent of clay lumps and friable particles.

e. TEST PROCEDURE

e.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 the particle 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 and 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 Table 5.16.07-2.

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.

e.2. Remove the retained particles carefully from the sieve, dry to substantially constant mass at a temperature $110 \pm 5^{\circ}\text{C}$ ($230 \pm 9^{\circ}\text{F}$), allow to cool, and weigh to the accuracy specified for the balance in AASHTO M 231.

Table 5.16.07-2
Size of Sieve for Removing
Residue of Clay Lumps and Friable Particles

Sizes of Particles Making Up Test Sample	Sieve Size for Removing Clay Lumps and Friable Particles
Fine Aggregate [retained on 1.18 mm (No. 16)]	850 μm (No. 20)
4.75 to 9.5 mm (No. 4 to 3/8 in)	2.36 mm (No. 8)
9.5 to 19.0 mm (3/8 to 3/4 in)	4.75 mm (No. 4)
19.0 to 37.5 mm (3/4 to 1 1/2 in)	4.75 mm (No. 4)
Over 37.5 mm (1 1/2 in)	4.75 mm (No. 4)

f. CALCULATIONS

f.1. Compute the percentage of clay lumps and friable particles by the following formula:

$$P = \frac{100 (W - R)}{W}$$

where:

P = percent of clay lump and friable particles

W = mass of test sample (for fine aggregate the mass of the portion coarser than the 1.18 mm (No. 16) sieve as described in **d.3.**), and

R = mass of particles retained on designated sieve, as determined in accordance to **e.2.**

f.2. For coarse aggregate, the percent of clay lumps and friable particles shall be an average base 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. For the purpose of calculating the weighted average when the sample contains 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.