T 112

CLAY LUMPS AND FRIABLE PARTICLES IN AGGREGATES FOP FOR AASHTO T 112

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Scope

This Method of test describes a procedure for determining the percentage of clay lumps and friable particles in natural aggregates.

For Fine Aggregate, the percentage of clay lumps and friable particles is reported based on testing a single fraction of the material coarser than the No. 16 sieve. For Coarse Aggregate, the percentage of clay lumps and friable particles is reported as the weighted average of individual size fractions based on the overall grading of the material under test.

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Significance

The results of this test may be used in determining compliance with specifications for aggregates used in Portland Cement Concrete and Hot Mix Asphalt.

Specifications, such as AASHTO M 6 and M 80 for Portland Cement Concrete, typically state the maximum acceptable percentage of clay lumps and friable particles.

For Superpave Hot Mix Asphalt, this test is considered to be source specific rather than a consensus property. The individual governing agency is responsible for setting maximum allowable limits for deleterious materials described as clay lumps and friable particles.

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Apparatus

- **Balance:** Conforming to requirements of M 231, of sufficient capacity and readable to 0.1% of the sample mass.
- **Containers:** Rust-resistant containers of sufficient shape and size to allow spreading the sample in a thin layer.
- **Sieves:** Conforming to AASHTO M 92.
- **Oven:** Capable of maintaining 230 ±9° F, providing free circulation of air.

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Sampling

The samples used for this test shall be obtained and reduced to testing size according to AASHTO T 2 and T 248 respectively.

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Sample Preparation

Aggregates for testing shall consist of the material remaining after completion of the AASHTO T 11 procedure, “Materials Finer than No. 200 Sieve in Mineral Aggregate by Washing.”

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After the T 11 (washing) procedure, the sample shall be dried to constant mass at a temperature of 230 ±9° F.

For Coarse Aggregate, the sample shall be separated into sizes with minimum mass of each size fraction conforming to Table 1.

Table 1

Size of Test Fraction	Minimum Mass of Fraction, g
No. 4 to 3/8”	1000
3/8” to 3/4”	2000
3/4” to 1½”	3000
Over 1½”	5000

Samples of Fine Aggregate (-#4) shall consist of that portion coarser than a No. 16 sieve and shall have a mass of at least 25 g.

Procedure

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1. Determine the mass of the test fraction(s) to 0.1% of sample mass.

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2. Spread sample fractions in pans in a thin layer and cover with distilled water. Soak the material for 24 ±4 hours.

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3. Roll and squeeze the particles between thumb and forefinger to try to break the particles into smaller sizes; but do not use the fingernail or press particles against a hard surface.

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Table 2

Size of Particles in Test Fraction	Sieve Size for Wet Sieving of Particles
Fine Aggregate (Plus No. 16)	No. 20
No. 4 to 3/8”	No 8
3/8” to 3/4”	No. 4
3/4” to 1½”	No. 4
Over 1½”	No. 4

12 4. After all clay lumps and friable particles have been broken up, select the appropriate sieve specified in Table 2 for wet sieving. Wet sieve by passing water over the sample while manually agitating the sieve until all undersize material is removed.

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14 5. Carefully remove the retained samples from the sieve and dry to substantially constant mass at a temperature of 230 ±9° F.

6. Allow sample to cool, and determine mass of each fraction to the nearest 0.1% of sample mass.

15 **Calculation**

Calculate the percentage of clay lumps and friable particles in each size fraction to the nearest 0.1% according to the following formula:

$$P = \frac{M - R}{M} \times 100$$

where:

P = percent of clay lumps and friable particles
M = mass of test fraction before test
R = mass of particles retained on designated sieve after wet sieving

16 **Report**

- Report on standard agency forms to the nearest 1%.
- For Coarse Aggregate, the percent of clay lumps and friable particles shall be a weighted average according to the grading of the original sample prior to separation.

Tips! 17

- Don’t forget to perform the AASHTO T 11 procedure prior to testing.
- In breaking up clay lumps and friable particles, don’t use fingernail or press particles against hard surfaces
- Consult Table 2 for correct sieve size for wet sieving after breaking up clay lumps

REVIEW QUESTIONS

1. Before conducting the clay lumps and friable particles test, what procedure must first be performed?

2. According to this FOP, what is the minimum amount of fine aggregate actually tested?

3. How are the clay lumps and friable particles broken up?

4. After breaking up the particles, what is the next step in the procedure? How is it performed?

5. How is the percent clay lumps and friable particles reported for coarse aggregate?

PERFORMANCE EXAM CHECKLIST

CLAY LUMPS AND FRIABLE PARTICLES IN AGGREGATES FOP FOR AASHTO T 112

Participant Name:_____ Exam Date:_____

Procedure

Sampling and Sample Preparation

1. A representative sample of appropriate mass obtained by T 2 and T 248? _____
2. Sample washed by T 11, then dried to constant mass at 230 ±9° F? _____
3. Fine aggregate sample mass at least 25 g? _____
4. Coarse aggregate separated into fractions, masses according to Table 1? _____

Procedure and Calculation

1. Mass of test fractions determined to 0.1% of sample mass? _____
2. Samples spread in thin layer, covered with distilled water for 24 ±4 hours? _____
3. Particles tested by rolling and squeezing between thumb and forefinger, but without use of fingernail or pressing against hard surface? _____
4. Correct sieve selected for wet sieving according to Table 2? _____
5. Wet sieved by passing water over samples while manually shaking sieve? _____
6. Fractions dried to constant mass at 230 ±9° F? _____
7. Fractions cooled and masses determined to 0.1% of sample mass? _____
8. Percent clay lumps and friable particles correctly calculated for each fraction? _____
9. Weighted percent clay lumps and friable particles correctly calculated for coarse aggregate sample based on aggregate grading? _____

Report

1. Standard agency forms? _____
2. Clay lumps and friable particles reported to nearest 1% _____
3. For coarse aggregate, weighted percentage according to sample grading? _____

Comments: First attempt: (Pass/Fail) ___ Second attempt: (Pass/Fail) ___

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Signature of Examiner_____.