

ALDOT-50-83
METHOD FOR DETERMINING PARTICLE SIZE ANALYSIS OF SOILS
(SUBBASE AND BASE COURSE)

1. Scope

- 1.1. This method covers the procedure for the quantitative determination of the distribution of particle sizes in soils.

2. Applicable Documents

- 2.1. AASHTO T-87, Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
- 2.2. AASHTO T-248, Reducing Field Samples of Aggregate to Testing Size
- 2.3. AASHTO T-27, Sieve Analysis of Fine and Coarse Aggregates
- 2.4. AASHTO M-231, Weights and Balances used in Testing of Highway Materials
- 2.5. AASHTO M-92, Wire Cloth Sieves for Testing Purposes
- 2.6. Alabama Department of Transportation Standard Specifications (Section 820 through 825 and/or any Special Provisions that may apply).

3. Apparatus

- 3.1. Balances - The balances shall conform to AASHTO M-231, Class D for samples less than 2000 g and Class E for samples of 2000 g or more.
- 3.2. Oven - The oven shall be capable of maintaining a uniform temperature not to exceed 140°F (60°C). (To prevent the physical properties from changing.).
- 3.3. Sieves - Suitable sieve sizes shall be selected to furnish the information required by the specifications covering the material to be tested. (These sieves shall conform to the Standard Specifications for Sieves for Testing Purposes - AASHTO M-92.)
- 3.4. Bottle for Clay Content - This bottle should be round having a capacity of 500 ml and measuring approximately 6 in. (150 mm) in height.

4. Procedure

- 4.1. Reduce the sample to the correct size and weight in accordance with AASHTO T-248.
 - 4.1.1. Samples having 20% or more of coarse aggregate are reduced to 10 lb (5 kg.) Samples not having an appreciable amount of aggregate are reduced to a weight of 5 to 8 lb(2-4 kg)
- 4.2. Dry sample at a controlled temperature not to exceed 140°F (60°C.).

- 4.3. Pulverize the dried material with mortar and pestle, or other means, taking care not to reduce the particle sizes. Determine the particle sizes of the material in accordance with AASHTO T-27. Discard all material retained on the No. 8 (2.36 mm) sieve.
- 4.4. Halve all material passing the No. 8 (2.36 mm sieve), with one portion being used for the Atterberg tests and the other portion being used to test for silt, clay, total sand and sieve analysis on the sand.
- 4.5. Weigh out 200 g of material to be washed over the No. 200 (75 µm) mesh sieve for determining the total sand and for a sieve analysis on this sand. Record this weight as "A".
 - 4.5.1. Wash this material over a No. 200 (75 µm) mesh sieve until the water passing through this sieve appears to be clear and clean. Empty the washed material into a clean pan. Allow to settle and pour off excess water and dry. The dry weight of this material is recorded as "B".
 - 4.5.2. Calculate the percent materials passing the No. 200 (75 µm) sieve using the formula:

$$\frac{A-B}{A} \times 1000$$

- 4.6. Using the material recorded in 4.5 as the "A" weight, separate into series of sizes using such sieves as are necessary to determine compliance with the specification of the material under test.
 - 4.6.1. Calculate the percentage of material retained on each sieve by dividing the weight retained on each sieve by the original weight of material recorded as "A".
 - 4.6.2. Calculate the percentages passing each sieve by subtracting the retained percentage from 100 and record as percent passing.
- 4.7. Clay Content - Weigh out 50 g of material to use in determining the clay content. Place in a bottle as described in Article 3.4. Add (50 to 100 mm³) of 5% soda ash solution along with (2000 mm³) of water. Shake vigorously and finish filling bottle to 6 in.(150 mm) line. Allow to settle for eight (8) minutes. At the end of this time, syphon off the water to the 50 mm line, being careful not to disturb the settled material. This cycle is repeated until the end of the eight minute period, the liquid is clear enough to see the face of a watch when held behind the bottle. Empty the contents into a pan and allow to settle for eight minutes. Syphon off the water and dry the material. The material left is silt and sand.
 - 4.7.1. Weigh the dried material. Calculate the percent clay as follows:

$$\frac{\text{Original sample weight} - \text{Weight of dried sample} \times 100}{\text{Original weight of sample}}$$

Report as percent clay

Note: In addition to the procedure described under Article 4, some subgrade soils and crushed aggregate base may require that the sieve analysis and material passing the No. 200 (No. 75 μm) sieve be based on the total sample. When this is the requirement, calculate these percentages by multiplying the percent passing each sieve as required by the specification by the percent passing the No. 8 (2.36 mm) sieve.

Example: 60% passing the No. 8 (2.36 mm) sieve
 12% passing the No. 200 (75 μm) sieve
Calculation: 12% x 60% = 7.2 percent passing the No. 200(75 μm)
 sieve based on the total sample

5. Reporting

5.1. Report all test results on form BMT-30.