Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants

1. Scope

1.1 This practice covers the dry preparation of soil samples as received from the field for particle-size analysis and the determination of the soil constants.

1.2 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:

D2217 Practice for Wet Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Significance and Use

3.1 This practice can be used to prepare samples for particle-size and plasticity tests where it is desired to determine test values on air-dried samples, or where it is known that air drying does not have an effect on test results relative to samples prepared in accordance with Practice D2217.

4. Apparatus

4.1 Balance, sensitive to 0.1 g.

4.2 Mortar and Rubber-Covered Pestle, suitable for breaking up the aggregations of soil particles.

4.3 Sieves—A series of sieves, of square mesh woven wire cloth, conforming to Specification E11. The sieves required are as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Diameter (mm)</th>
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<tbody>
<tr>
<td>4</td>
<td>4.75</td>
</tr>
<tr>
<td>10</td>
<td>2.00</td>
</tr>
<tr>
<td>40</td>
<td>425-µm</td>
</tr>
</tbody>
</table>

4.4 Sampler—A riffle sampler or sample splitter, for quartering the samples.

5. Sampling

5.1 Expose the soil sample as received from the field to the air at room temperature until dried thoroughly. Break up the aggregations thoroughly in the mortar with a rubber-covered pestle. Select a representative sample of the amount required to perform the desired tests by the method of quartering or by the use of a sampler. The amounts of material required to perform the individual tests are as follows:

5.1.1 Particle-Size Analysis—For the particle-size analysis, material passing a No. 10 (2.00-mm) sieve is required in amounts equal to 115 g of sandy soils and 65 g of either silt or clay soils.

5.1.2 Tests for Soil Constants—For the tests for soil constants, material passing the No. 40 (425-µm) sieve is required in total amount of 220 g, allocated as follows:

<table>
<thead>
<tr>
<th>Test</th>
<th>Grams</th>
</tr>
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<tbody>
<tr>
<td>Liquid limit</td>
<td>100</td>
</tr>
<tr>
<td>Plastic limit</td>
<td>15</td>
</tr>
<tr>
<td>Centrifuge moisture equivalent</td>
<td>10</td>
</tr>
<tr>
<td>Volumetric shrinkage</td>
<td>30</td>
</tr>
<tr>
<td>Check tests</td>
<td>65</td>
</tr>
</tbody>
</table>

6. Preparation of Test Sample

6.1 Select that portion of the air-dried sample selected for purpose of tests and record the mass as the mass of the total test sample uncorrected for hygroscopic moisture. Separate the test sample by sieving with a No. 10 (2.00-mm) sieve. Grind that fraction retained on the No. 10 sieve in a mortar with a rubber-covered pestle until the aggregations of soil particles are broken up into the separate grains. Then separate the ground soil into two fractions by sieving with a No. 10 sieve.

6.2 Wash that fraction retained after the second sieving free of all fine material, dry, and weigh. Record this mass as the
mass of coarse material. Sieve the coarse material, after being washed and dried, on the No. 4 (4.75-mm) sieve and record the mass retained on the No. 4 sieve.

7. Test Sample for Particle-Size Analysis

7.1 Thoroughly mix together the fractions passing the No. 10 (2.00-mm) sieve in both sieving operations, and by the method of quartering or the use of a sampler, select a portion weighing approximately 115 g for sandy soils and approximately 65 g for silt and clay soil for particle-size analysis.

8. Test Sample for Soil Constants

8.1 Separate the remaining portion of the material passing the No. 10 (2.00-mm) sieve into two parts by means of a No. 40 (425-µm) sieve. Discard the fraction retained on the No. 40 sieve. Use the fraction passing the No. 40 sieve for the determination of the soil constants.

9. Keywords

9.1 dry preparation; particle-size analysis; soil