Particle-Size Analysis of Soils
D 422 - 63 (Re-approved 1990)
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Scope

This test method covers the quantitative determination of the distribution of particle sizes in soils. The distribution of particle sizes larger than 75 μm (retained on the No. 200 sieve) is determined by sieving, while distribution of particles sizes smaller then 75 μm is determined by a sedimentation process using a hydrometer to secure the necessary data.

Apparatus

Balance - A balance sensitive to 0.01g.
Sieves - A series of sieves, of square mesh woven wire cloth.
Sampler - A riffle samples or sample splitter, for quartering the sample.

Test Sample

The sizes of the sample shall depend on the maximum size of the particles according to the following schedule:

<table>
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<th>Nominal Diameter of Largest Particles in. (mm)</th>
<th>Approximate Minimum Mass of Portion G</th>
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<tr>
<td>3/8(9.5)</td>
<td>500</td>
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<tr>
<td>¾(19.0)</td>
<td>1000</td>
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<tr>
<td>1 (25.4)</td>
<td>2000</td>
</tr>
<tr>
<td>1 1/2(38.1)</td>
<td>3000</td>
</tr>
<tr>
<td>2(50.8)</td>
<td>4000</td>
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<tr>
<td>3(76.2)</td>
<td>5000</td>
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Procedure

1. Clean each sieve to remove any soil left over from previous tests. Use the soft brush on the finer mesh sieve and the wire brush on the coarser mesh sieve. Take care not to damage the mesh.
2. Measure and record the mass of each sieve including the bottom pan.
3. Remove the appropriate size sample from the riffle splitter.
4. Weigh and record the mass of the sample selected for testing.
5. Assemble the sieves so that the coarsest is at the top the finest is on the bottom followed by the pan.
6. Place the sample on to the top sieve taking care not to lose any of the mass and place the lid securely on top.
7. Place the set of sieves in the sieve shaker and adjust the clamps to secure the sieves.
8. Set the shaker on high and set the timer to five minutes.
9. Remove the sieves from the sieve shaker.
10. To insure that all the particles passed though the appropriate sieve, tap each sieve over a sheet of paper, starting with the top sieve. Put any material that falls on to the paper into the next sieve and repeat the process with the next sieve.
11. Measure and record the mass of each sieve.
12. Sum the mass of the material retained on each sieve to verify that there has been no change in the total mass of the sample.

**Calculations**

Calculate the mass passing each sieve.

Plot the percent passing values on the Grain Size Analysis Chart provided.

Calculate the uniformity coefficient, $C_u$, as follows:

$$C_u = \frac{D_{60}}{D_{10}}$$

and the coefficient of curvature $C_c$,

$$C_c = \frac{D_{30}^2}{D_{10} \times D_{60}}$$

where:

$D_{60} =$ grain size that 60% of the particles are smaller than,
$D_{30} =$ grain size that 30% of the particles are smaller than, and
$D_{10} =$ grain size that 10% of the particles are smaller than.

**Report**

1. Maximum size of particles
2. Plot of percent passing each sieve
3. Description of sand and gravel particles
4. Dispersion device used and length of dispersion period.
Grain Size Analysis Data Sheet

Name:          Date:          
Section No.:  Group No.:     
Total Sample Mass: 

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Description of soil: