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| **Course Code :** 5620363 | **Date of Testing:** 05.11.2010 |
| **No and Title of Test:** 6 (b) Determination of Particle Size Distribution of Medium – And Coarse – Grained Soils | |
| **Year and Section:** 3rd year – Section 4 | **Lab. Group:** 3 |
| **SURNAME, Other names of student:** | |

**Determination of Particle Size Distribution of Medium – And Coarse – Grained Soils**

**Object of the Experiment:** The object of the experiment is to determine quantitatively the particle size distribution in a soil from coarser to finer sand size.

**Apparatus:**

**Theory:**

A sieve analysis is a procedure used to determine the particle size distribution (also called gradation) of a granular soil.

A sieve analysis can be performed on any type of non-organic or organic granular materials including sands, crushed rock, clays, granite, feldspars, coal, soil, a wide range of manufactured powders, grain and seeds, down to a minimum size depending on the exact method.

A typical sieve analysis involves a nested column of sieves with different mesh sizes. Each lower sieve in the column has smaller openings than the one above.

**Method of Test:**

1. Using the sample divider, reduce the oven-dried sample to an amount given in the

following table, and weigh this to 0.1 % of its total mass.

Max. Size of material Minimum mass of sample

forming more than 10 % to be taken for sieving

of sample

(mm) (kg)

63 50

40 15

20 2

10 0.5

5 0.2

2.5 and finer 0.1

1. Rub the material with the rubber pestle in the mortar to make sure that only individual particles are retained on each sieve.
2. Assemble the sieves in order of size with the largest sieve at the top and the receiver at

the bottom. Put the material on the top sieve, place the cover, and insert in the mechanical sieve shaker. Clamp the sieves tightly and run the motor for a minimum period of 10 minutes. If a mechanical shaker is not available, carry out the sieving by hand, preferably using each sieve separately and making sure that the material rolls in irregular motion over the sieve. If it is likely that the material retained or any sieve exceeds the maximum sieve load given in the last column of the data sheet, sieve the material in parts.

1. Transfer the material retained on each sieve to an evaporating dish and weigh.

**Calculations:**

Total mass = 2258.40 g

Cumulative percent retained (%) = cumulative mass retained / total mass \* 100

Cumulative percent passing (%) = 100% - cumulative percent retained

For 37.5 mm: Cumulative percent retained (%) = 120.80/2258.06 \* 100 = 5.35 %

For 19.0 mm: Cumulative percent retained (%) = 157.66/2258.06 \* 100 = 6.98 %

For 9.5 mm: Cumulative percent retained (%) = 320.03/2258.06 \* 100 = 14.17 %

For 4.75 mm: Cumulative percent retained (%) = 963.13/2258.06 \* 100 = 42.65 %

For 2.0 mm: Cumulative percent retained (%) = 1291.63/2258.06 \* 100 = 57.20 %

For 600 μm: Cumulative percent retained (%) = 2003.29/2258.06 \* 100 = 88.72 %

For 212 μm: Cumulative percent retained (%) = 2227.69/2258.06 \* 100 = 98.66 %

For 75 μm: Cumulative percent retained (%) = 2253.31/2258.06 \* 100 = 99.79 %

**Reporting of Results:**

Dry sieving is used while determining the particle distribution of the soil.

**Discussion of Results:**

Human factor is very effective in this test because while shaking some particles may be poured or be stuck in the sieves. For instance, initially we record the total mass of our dry sample as 2258.40 g, but at the end of the experiment we saw that this value is decreased by 2258.40 - 2258.06 = 0.34. Since 0.34 is a very small error and can be neglected when comparing to the total mass value, we can say that reducing human factors is necessary to get more accurate results.

**Conclusion:**

In the sieve analysis experiment we determined the particle size distribution of coarse-grained soils by weighing the particles that remains above each sieve. We tabulate the results that we have recorded during the test and draw a percent finer vs. particle size graph on the semi-logarithmic chart.

**References**

Mirata T. (1980) , Laboratory Instructions for Soil Mechanics Students, METU Press, Ankara (reprinted in 2009)