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| **Course Code :** 5620363 | **Date of Testing:** 21.10.2010 |
| **No and Title of Test:** 4 (b) Determination of Specific Gravity of Soil Particles | |
| **Year and Section:** 3rd year – Section 5 | **Lab. Group:** 3 |
| **SURNAME, Other names of student:** | |

**4 (b) Determination of Specific Gravity of Soil Particles**

**Object of the Experiment:** To determine the specific gravity of the soil particles of medium-grained and coarse-grained soils.

**Apparatus:**



Figure 1 – Pycnometer

**Theory:**

The specific gravity of soil particles (Gs) is a material property, so it is a constant quantity. The value of the specific gravity of soil particles is found by dividing mass of solids by mass of equal volume of water and can be represented by the following formula ;

Gs = Ms / (Vsρw) = ρs / ρw

Where Ms : mass of solids

Vs : volume of solids

ρw : density of water

ρs : particle density

**Method of Test:**

1) Obtain 400-500 g of the air-dried sample by quartering or rifling. Break down any stones larger than 40 mm diameter until they become smaller then this diameter. Oven-dry the sample at 105-110 C.

2) Dry the pycnometer and weigh it to the nearest 0.5 g (M1).

3) Allow the soil to cool in the desiccator. Remove the cap of the pycnometer, and introduce 400-500 g of the soil into it. Weigh the pycnometer together with the cap and contents to the nearest 0.5 g (M2).

4) Add the water, at temperature + or – 2 o C of the average room temperature during the test, to the soil until the jar is about half full, and stir the mixture thoroughly with the glass rod to remove entrapped air. Then replace the cap, taking care that this is water-tight, and that it is always tightened to the same position (make locating marks on the cap and glass jar to aid this), making the volume of the pycnometer constant throughout the test. Fill the pycnometer with air by shaking the pycnometer, holding one finger over the hole in the cap. Then top up the pycnometer with water. Dry the pycnometer on the outside, and weigh it to the nearest 0.5 g (M3).

5) Empty the pycnometer, wash it out thoroughly, and fill it completely with water at room temperature until the surface of the water is flush with the hole in the cap. Dry the pycnometer on the outside and weigh it to the nearest 0.5 g (M4).

**Calculations:**

* For pycnometer 1

Mass of pycnometer empty (M1) = 114.2 g

Mass of pycnometer + soil (M2) = 155.63 g

Mass of pycnometer + soil + water (M3) (23ºC) = 659.12 g

Mass of pycnometer full of water (M4 ) (20ºC) = 629.42 g

Mass of pycnometer full of water (M4 ) (23ºC) = 629.074 g

Specific gravity of soil particles (Gs) (23ºC) = 3.63932 g

k(Gs) (23ºC) = (Gs) (20ºC) = 3.63688 g

* For pycnometer 2

Mass of pycnometer empty (M1) = 106.1 g

Mass of pycnometer + soil (M2) = 173.86 g

Mass of pycnometer + soil + water (M3) (23ºC) = 686.00 g

Mass of pycnometer full of water (M4) (20ºC) = 649.22 g

Mass of pycnometer full of water (M4 ) (23ºC) = 648.855 g

Specific gravity of soil particles (Gs) (23ºC) = 2.213494 g

k(Gs) (23ºC) = (Gs) (20ºC) = 2.211811 g

**Discussion of Results:**

The average value of specific gravities of two samples is 2.924. The specific gravity of sample 1 and sample 2 differs more than 1g. This means that there was a problem during the tests or the readings.

**Conclusion:**

We did this test to determine the specific gravities of the two soil samples; which differs from one sample to another. In this test we worked with two samples and we found two different values. Since the values we found differ a lot we should repeat the same test again to find the correct specific gravity of the soil.

**References**

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

