DETERMINATION OF DENSITY BY CORE CUTTER METHOD

1. Objective

The objective of this test is for determination of the in-place density of fine-grained natural or compacted soils free from aggregates using a core-cutter.

2. Apparatus required

2.1: Cylindrical Core-Cutter

2.2 Steel Dolley , with accuracy of 0.001g.

2.3 Steel Rammer , non-corrodible and air tight for moisture determination.

2.4 Balance, thermostatically controlled, capable of maintaining temperature of 105^0 to 110^0C.

2.5 Palette Knife , with accuracy of 0.001g.

2.6 Steel Rule , with accuracy of 0.001g.

2.7 Grafting Tool or Spade or Pick Axe , with accuracy of 0.001g.

2.8 Straight Edge , with accuracy of 0.001g.

2.9 Apparatus for Extracting Samples from the Cutter , with accuracy of 0.001g.

2.10 Apparatus for Determination of Water Content , with accuracy of 0.001g.

3. Reference

IS-2720 (Part-29):1975 "Methods of test for soils: Determination of dry density of soils in-place by the core cutter method".

4. Procedure:

4.1 Measure the inner dimension of the cutter nearest to 0.25 mm and calculate its volume (V_c).

4.2 Weigh the cutter to the nearest gram (W_c).

4.3 Level the soil layer to be tested. Place steel dolly on cutter and ram it into the soil layer until about 15 mm of the dolly protrudes above the surface.

4.4 Dug out the cutter from the surrounding soil, care being taken to allow some soil to project from the lower end of the cutter.

4.5 Trim the soil at the ends of the cutter by using straight edge.

4.6 Weigh the cutter with the soil core to the nearest gram (W_S).

4.7 Remove the soil core from the cutter and determine its water content (W).

5. Calculations :

5.1 The bulk density Y_b that is, the weight of the wet soil per cubic centimetre shall be calculated from the following formula:

$$Y_b = (W_s - W_c)/V_c$$

Where,
W_s = weight of soil and core-cutter in g
W_c = weight of core-cutter in g, and
V_c = volume of core-cutter in cm3.

5.2 The dry density Y_d, that is, the weight of the dry soil per cubic centimetre shall be calculated from the following formula:

$$Y_d = (100\ Y_b)/(100 + w)$$

Where,
Y_b = Bulk Density and
w = water content of the soil (percent) to two significant figures

6. REPORTING OF RESULTS :

6.1 The following values shall be reported::

Bulk Density of the Soil (Y_b) = g/cm^3
Water content in the Soil (w) = %
Dry Density of the Soil (Y_d)= $Y_b/(1+w/100)$ = g/cm^3