

4. MOISTURE CONTENT TEST.
(IS : 2720 – PART – 2)

Object:

To determine the water content of a soil sample by oven drying method / sand bath method / Rapid moisture meter method.

Apparatus:

- 1) Non-corrodible airtight containers.
- 2) Heat resistant tray – 5 to 7 cm deep.
- 3) Rapid moisture meter and absorbent (calcium carbide).
- 4) Oven, balance and heater / stove etc.

Procedure:

(A) Oven drying method: Take about 30 to 50 gms of soil sample if it is fine grained and about 250 to 300 gms if it is coarse grained soil in to the container and weigh it (W1). Place the container in the oven and dry for 24 hours at temperature of 105⁰ to 110⁰C. Remove the container from the oven replace the lid and cool it, after cooling weigh the container along with lid (W2). Clean and dry the container and weigh it (W3).

Calculations:

$$\text{Water content, w \%} = \frac{(W1 - W2)}{(W2 - W3)} \times 100$$

(B) Sand bath method: Clean the container with lid or the tray, as the case may be dry and weigh (W1). Take the required quantity of the soil specimen in the container crumbled and placed loosely and weigh (W2). Add a few pieces of white paper if necessary. Place the container with the lid removed or the tray on the sand bath and heat the sand bath. Care shall be taken not to get the sand bath too hot. During heating, the specimen shall be turned frequently and thoroughly with the palette knife to assist the evaporation of water, care being taken to see that no soil is lost in the process. When drying is complete, remove the container from the sand bath, cool and weigh (W3).

Calculations:

$$\text{Water content, w \%} = \frac{(W2 - W3)}{(W3 - W1)} \times 100$$

Note: Avoid over heating, A convenient method of detecting overheating of the soil is by the use of small pieces of white paper mixed the soil. Overheating is indicated if the paper turns brown.

(C) Rapid Moisture Meter: Set up the balance, place sample in pan till the mark on the balance arm mass lines up with the index mark (taken approximately 6 grams of soil). Unclamp the clamping screw of the instrument sufficiently to move the U-clamp off the cup. Lift off the cup, check that cup and body are clean; otherwise clean it by using a brush. Hold the body horizontal and gently deposit one level scoopful of absorbent (calcium carbide) halfway inside the chamber. Then lay the chamber down without disturbing the absorbent charge. Transfer the soil weighed out as above from the pan to the cup. Holding cup and chamber approximately horizontal bring them together without disturbing sample or absorbent, bring the U-clamp round and clamp the cup tightly into place.

With gauge downwards (except when the steel balls are used) shake the moisture meter up and down vigorously for 5 seconds, then quickly turn it so that the gauge is upwards, give a tap to the body of the moisture meter to ensure that all the contents fall into the cup. Hold the rapid moisture meter downwards, again shake for 5 seconds then turn it with gauge upwards and tap. Hold for one minute and repeat this, when the needle comes to rest on the reading. The reading on the meter is the percentage of water content of the wet mass.

Calculations: From the water content (m) obtained on the wet mass basis as the reading on the rapid moisture meter, the water content (w) on the dry mass basis shall be calculated as follows:

$$w, \% = \frac{m}{(100 - m)} \times 100, \text{ percent.}$$

where, m = moisture content on the wet mass basis, obtained from rapid moisture meter.
w = moisture content on the dry mass basis