



**a) LIQUID LIMIT TEST**

**IS: 2720 (Part 5) – 1985 (Reaffirmed-2006)**

**THEORY:**

The liquid limit is the moisture content at which the groove, formed by a standard tool into the sample of soil taken in the standard cup, closes for 10 mm on being given 25 blows in a standard manner. This is the limiting moisture content at which the cohesive soil passes from plastic state to liquid state.

**NEED AND SCOPE:**

Liquid limit is significant to know the stress history and general properties of the soil met with construction. From the results of liquid limit the compression index may be estimated. The compression index value will help us in settlement analysis. If the natural moisture content of soil is closer to liquid limit, the soil can be considered as soft. If the moisture content is lesser than liquid limit, the soil is brittle and stiffer.

**APPARATUS REQUIRED:**

1. Balance,
2. Cassagrande's Liquid limit device,
3. Grooving tool,
4. Mixing dishes,
5. Spatula,
6. Electrical Oven,
7. Squeeze Bottle

**PROCEDURE:**

1. Take 250 gm of oven-dried soil, passed thorough **425  $\mu\text{m}$  sieve**, into an evaporating dish. Add distilled water into the soil and mix it thoroughly to form uniform paste. (The paste should have a consistency that would require 30 to 35 drops of cup to cause closer of standard groove for sufficient length.)
2. Place a portion of the paste in the cup of Liquid Limit device and spread it with a few strokes of spatula.
3. Trim it to a depth of 1 cm at the point of maximum thickness and return excess of soil to the dish.
4. Using the grooving tool, cut a groove along the center line of soil pat in the cup, so that clean sharp groove of proper dimension (11 mm wide at top, 2 mm at bottom, and 8 mm deep) is formed.
5. Lift and drop the cup by turning crank at the rate of two revolutions per second until the two halves of soil cake come in contact with each other for a length of about 13 mm by flow only, and record the number of blows, N.
6. Take a representative portion of soil from the cup for moisture content determination.
7. Repeat the test with different moisture contents at least five more times for blows between 15 and 35.



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**OBSERVATIONS:**

Details of the sample:

Natural moisture content:

Room temperature:

Determination Number	1	2	3	4	5	6
Container number						
Weight of container ( $w_1$ )						
Weight of container + wet soil ( $w_2$ )						
Weight of container + dry soil ( $w_3$ )						
Weight of water ( $W_w = w_2 - w_3$ )						
Weight of dry soil ( $W_s = w_3 - w_1$ )						
<b>Moisture content (%) = <math>(W_w / W_s)</math></b>						
<b>No. of blows</b>						

**COMPUTATION / CALCULATION:**

Plot the relationship between water content (on y-axis) and number of blows (on x-axis) on semi-log graph. The curve obtained is called flow curve. The moisture content corresponding to 25 drops (blows) as read from the represents liquid limit. It is usually expressed to the nearest whole number.

Liquid limit,  $W_L =$  (At 25 blows, from semi log- graph of water content Vs. No. of blows)

Flow index,  $I_f = (W_2 - W_1) / \log(N_1 / N_2)$

= slope of the flow curve

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