OBJECTIVE

To determine the free swell index of soils.

DEFINITION

Free swell or differential free swell, also termed as free swell index, is the increase in volume of soil without any external constraint when subjected to submergence in water

APPARATUS USED

i) IS Sieve of size 425µm
ii) Oven
iii) Balance, with an accuracy of 0.01g
iv) Graduated glass cylinder- 2 nos., each of 100ml capacity

PROCEDURE

i) Take two specimens of 10g each of pulverised soil passing through 425µm IS Sieve and oven-dry.

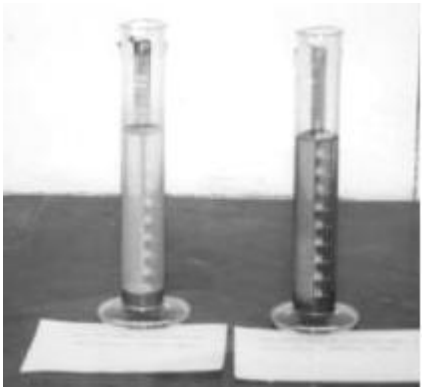
ii) Pour each soil specimen into a graduated glass cylinder of 100ml capacity.

iii) Pour distilled water in one and kerosene oil in the other cylinder upto 100ml mark.

iv) Remove entrapped air by gently shaking or stirring with a glass rod.

v) Allow the suspension to attain the state of equilibrium (for not less than 24hours).

vi) Final volume of soil in each of the cylinder should be read out.



Sample kept for free swell index

OBSERVATIONS AND CALCULATIONS

Determination No.	Measuring Cylinder No.		Reading After 24 hours		Free Swell Index, %
	Kerosene	Distilled Water	Kerosene	Distilled Water	

Calcuations:

$$\text{Free Swell Index, (\%)} = \frac{Vd - Vk}{Vk} \times 100$$

Vd = Volume of the soil specimen read from the graduated cylinder containing distilled water.

Vk = Volume of the soil specimen read from the graduated cylinder containing kerosene.

PRECAUTION

1)In the case of highly expansive soils such as Sodium Betonites. the sample size maybe 5 grams or alternatively a cylinder of 250ml capacity for 10 grams of sample may be used.

2) Pour the soil sample in both the graduated glass cylinder gently,so that no soil particle remains stuck to the wall of cylinder.
3) Sufficient time should be given to both the soil specimen to attain the final equilibrium position of volume without any further change in the soil volumes.This may take 24 hours or more.

REFERENCES

1) IS: 2720 (Part 40) 1977.

QUIZ

1) Why there is a need of drying the soil in the oven-dry before performing the experiment?

2) What makes Kerosene not to increase the volume of the soil? Can you suggest any other liquid used for such purpose?

3) What are the precautions to be taken for highly swelling soils?