



# **SNS COLLEGE OF TECHNOLOGY**



**AN AUTONOMOUS INSTITUTION**

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**COIMBATORE**

## **DEPARTMENT OF CIVIL ENGINEERING**

**19CEB201 – CONSTRUCTION MATERIALS**

**II YEAR / III SEMESTER**

**Unit 1 : Stones – Bricks – Building Blocks**

**Topic 4 : Tests on Stones**



# Hardness Test

For determining the hardness of a stone, the test is carried out as follows:

- ✓ A cylinder of diameter 25mm and height 25mm is taken out from the sample of stone.
- ✓ It is weighed.
- ✓ The sample is placed in Dorry's testing machine and it is subjected to a pressure of 1250 gm.
- ✓ Annular steel disc machine is then rotated at a speed of 28 rpm.
- ✓ During the rotation of the disc, coarse sand of standard specification is sprinkled on the top of disc.
- ✓ After 1000 revolutions, specimen is taken out and weighed.
- ✓ The coefficient of hardness is found out from the following equation:

$$\text{Coefficient of hardness} = 20 - (\text{Loss of weight in gm}/3)$$



# Hardness Test





# Impact Test

The resistance of stones to impact is found by conducting tests in impacting the testing machine.

- ✓ A cylinder of diameter 25mm and height 25mm is taken out from the sample of stone.
- ✓ It is placed on the machine. And taken a 2kg stone sample at 24 hours put in the oven.
- ✓ Fill the cylinder cup in three-layer.
- ✓ Each layer 25 times compacted.
- ✓ Take the weight of the cylinder.
- ✓ Falling the hammer 15-time blow allowed to fall axially in a vertical direction over a specimen in an impact testing machine.
- ✓ The Hight of the first blow is 1cm, that of the second below 2cm, that of the third below 3cm.



# Impact Test

- ✓ Blow at which specimen breaks is noted. If it is nth blow, 'n' represents the toughness index of stone.

$$\text{Impact value} = w2 * 100 / W1$$

- Where, W1 = passing stone in a sieve before falling hammer
- w2 = after falling hammer wt. of stone

The recommended impact values for various works are:

**(a) for wearing course  $\geq$  30%**

**(b) for bituminous macadam  $\geq$  35%**

**(c) for water-bound macadam  $\geq$  40%**

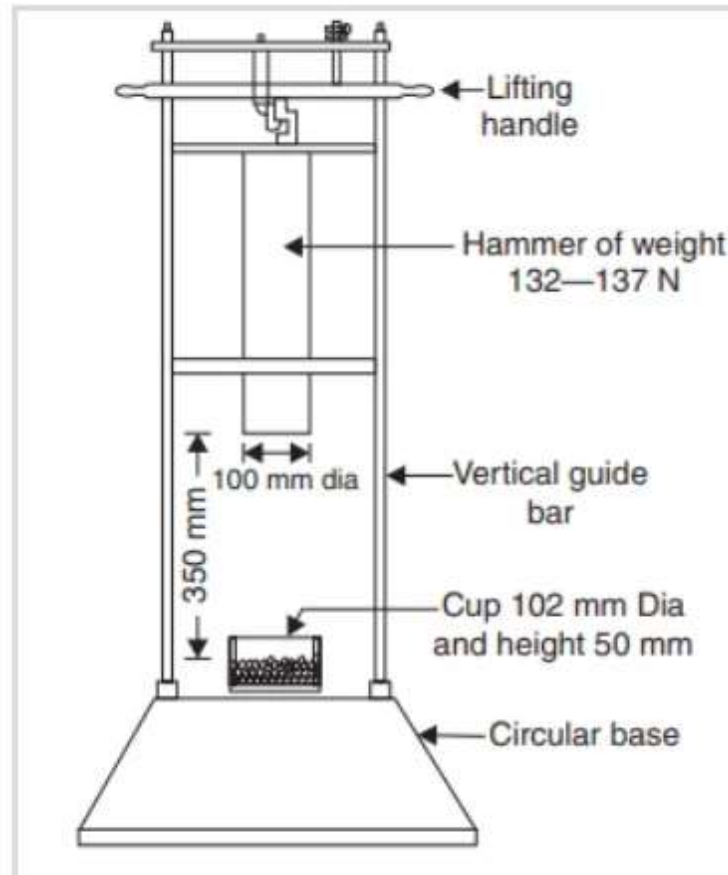


# Impact Test





# Impact Test





# Microscopic Test

- The sample of the test is subjected to microscopic examination.
- The sections of stones are taken and placed under the microscope to study the various properties such as
  - Average grain size
  - Existence of pores, fissures, veins and shakes
  - Mineral constituents
  - Nature of cementing material
  - Presence of any harmful substance
  - Texture of stones etc.





# Smith's Test

- This test is performed to find out the presence of soluble matter in a sample of stone.
- Few chips or pieces of stone are taken and they are placed in a glass tube.
- The tube is then filled with clear water.
- After about an hour, the tube is vigorously stirred or shaken.
- Presence of earthy matter will convert the clear water into dirty water.
- If water remains clear, stone will be durable and free from any soluble matter.



# Water Absorption Test

- With this test **cube specimen weighing about 50 grams** are Ready, and the test is carried out at the steps given below:
- Note the weight of dry specimens as **W1**.
- Place the specimen in water for **24 hours**.
- Take out the specimen, wipe out the surface with a piece of cloth, and weigh the specimen. Let its weight be **W2**.
- Suspend the specimen freely in weight and water it. Let its weight be **W3**.
- Place the specimen in boiling water for **5 hours**.
- Then take it out, wipe the surface with a cloth, and weigh it. Let this weight be **W4**.

Then,



# Water Absorption Test

- Percentage absorption by weight =  $(W_2 - W_1) / W_1 \times 100$  .....(1)
- Percentage absorption by volume =  $(W_2 - W_1) / (W_2 - W_3) \times 100$  .....(2)
- Percentage porosity by volume =  $(W_4 - W_1) / (W_2 - W_3) \times 100$  .....(3)
- Density =  $W_1 / (W_2 - W_1) \times 100$  .....(4)
- Specific Gravity =  $W_1 / (W_2 - W_3) \times 100$  .....(5)
- Saturation Coefficient = Water Absorption / Total Porosity =  $(W_2 - W_1) / (W_4 - W_1)$



*Thank You!!*