

Compressive Strength of Concrete

COMPRESSIVE STRENGTH

- **Compressive strength** is the capacity of a material or structure to **withstand axially directed pushing forces**.
- When the limit of compressive strength is reached, brittle materials are crushed.
- The compressive strength is used to determine the **hardness** of cubical and cylindrical specimens of concrete.

COMPRESSIVE STRENGTH

- The strength of concrete specimen depends upon cement, aggregate, bond, w/c ratio, curing temperature, and size of specimen.
- The cube specimen is of the size 15 x 15 x 15 cm. If the largest nominal size of the aggregate does not exceed 20 mm, 10 cm size cubes may also be used as an alternative.
- Cylindrical test specimens have a length equal to twice the diameter. They are 15 cm in diameter and 30 cm long.

COMPACTION

- compaction of the concrete with neither segregation nor excessive laitance.
- The concrete is filled into the mould in layers approximately 5 cm deep.

Compacting by Hand

- For cubical specimens, in no case should the concrete be subject to less than 35 strokes per layer for 15 cm or 25 strokes per layer for 10 cm cubes.
- For cylindrical specimens, the number of strokes are not less than thirty per layer.

TEST PROCEDURE

Scope:

- The test method covers determination of compressive strength of cubic concrete specimens.
- It consists of applying a compressive axial load to molded cubes at a rate which is within a prescribed range until failure occurs.
- The compressive strength is calculated by dividing the maximum load attained during the test by the cross sectional area of the specimen.

APPARATUS

- 1- Weighing device.
- 2- Tools and containers for mixing.
- 3- Tamper (16mm dia & 600mm height)
- 4- Testing machine.
- 5- Three cubes (150 mm side)

PROCEDURE

- Prepare a concrete mix with the proportions suggested Such as: 1: 2: 4 with $w/c = 0.55$ by mechanical mixer.
- Prepare three testing cubes; make sure that they are clean and greased or oiled thinly.
- Metal molds should be sealed to their base plates to prevent loss of water.

PROCEDURE

- Fill the cubes in three layers, tamping each layer with (35) strokes using a tamper.
- Fill the molds completely, smooth off the tops evenly, and clean up any concrete outside the cubes.
- Leave the specimens in the curing room for 24 hours.

PROCEDURE

- After that open the molds and immerse the concrete cubes in a water basin for 7 days or 28 days.
- Before testing, ensure that all testing machine bearing surfaces are wiped clean.
- Carefully center the cube on the lower platen and ensure that the load will be applied to two opposite cast faces of the cube.

PROCEDURE

- Without shock, apply and increase the load continuously at a nominal rate within the range of (0.2 N/mm².s to 0.4 N/mm².s) until no greater load can be sustained.



COMPRESSIVE TEST

BEFORE LOADING



AFTER LOADING



COMPRESSIVE TEST

Compressive strength= (P/A) (N/mm²)

Where

P =Applied load (N)

A=Area of the specimen (mm²)