3.1 SELF COMPACTING CONCRETE

Self-compacting concrete has no vibration is required for the concrete, which can flow around obstructions, reinforcement and fill the formwork completely under its own self weight.

Advantages of SCC

- SCC offers good strength equally with the other concrete
- No strength reduction due to improper compaction
- Repairs and finishing of concrete is not necessary
- Good workability and durability
- Reducing time, cost, man power etc.

Classification of SCC

- Powder type SCC
- Viscosity modifying admixture type SCC
- Combination modifying admixture type SCC

Requirements of SCC

- Filling ability

Filling ability of SCC is defined as the ability, to flow into and fill completely all space within the formwork, under its own weight.

- Passing ability

It is the ability of SCC to flow through the congested reinforcements without segregation and bleeding.

- Segregation resistance

The ability of SCC to remain homogeneous in composition during transport and placing.

Manufacturing of SCC

Step 1: Materials requirement

Step 2: Mixing

Step 3: Placing

Step 4: Curing

I. Materials for SCC

a) Cement

OPC with 43 or 53 grades may be used.

b) Aggregates

Aggregate of size 10mm to 20mm are preferred.

c) Mineral admixtures

The mineral admixtures are either inert filters or reactive in nature. Inert filters include Quartz powder and limestone. Reactive mineral include the GGBFS.

d) Water

Ordinary portable water

e) Air entraining agent – To improve the workability

f) Viscosity modifying agents – To improve the stability

g) Retarders – To control the setting.

II. Mixing

Any suitable method for mixing the raw materials for SCC can be used.

III. Placing

- ✓ The vertical free fall distance should not be more than 2m.
- ✓ The height of pour lifts should not be more than 0.3m.
- ✓ The permissible distance of horizontal flow from the point of discharge should be within 10m.

IV. Curing

In SCC the concrete dry faster than the ordinary concrete and hence quick drying may cause plastic shrinkage. Hence, initial curing should be started as quick as possible to reduce the shrinkage crakes.

Mix design of SCC

1. Determination of desired air content.
2. Determination of coarse aggregate
3. Determination of fine aggregate
4. Design of paste composition
5. Determination of maximum water to powder ratio
6. Determination to super – plasticizer dosage in mortar
7. Assessment of properties by standard tests.

Tests for SCC

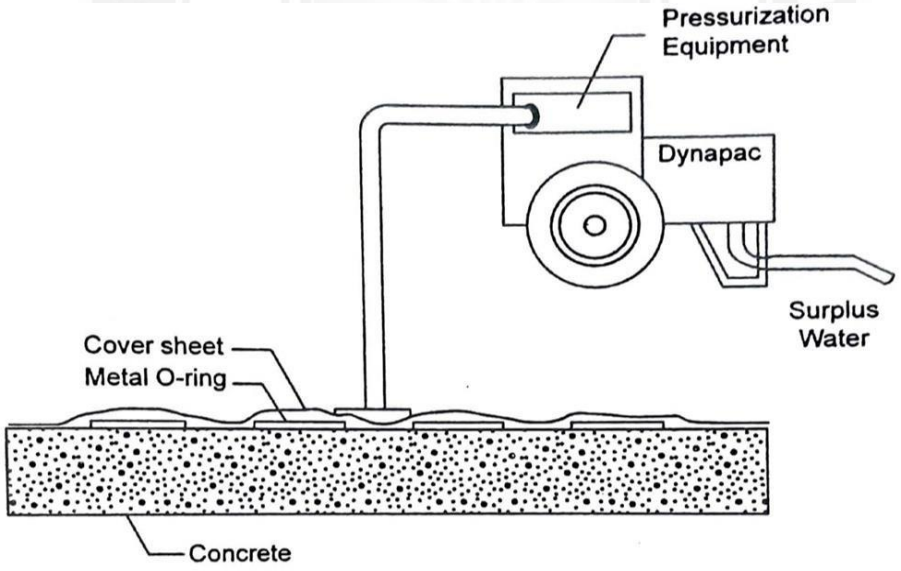
Property	Test
Flowability	Slump Flow Test L-Box Test Orimet Test
Passing ability	J-Ring Test
Filling ability	V-Funnel Test U-Box Test Fill of (or Kajima) Test
Workability	Orimet Test
Segregation Resistivity	GTM screen Stability Test

5.2.1 VACUUM CONCRETE

- Vacuum concrete is the special type of concrete in which the excess water is removed for improving concrete strength
- Water is removed by use of vacuum mats connected to a vacuum pump.

Procedure of vacuum concrete

The vacuum is applied through porous mats connected to a vacuum pump. A vacuum mat consists of a plywood backing with a vacuum chamber formed out of expanded metal and faced with e fine gauge and fabric covering. Each mat is fitted with a valve controlled outlet for connection to a vacuum pump. The final water cement ratio before setting is thus reduced vacuum concrete has a higher strength and also density a lower permeability and a greater durability.



Vacuum concreting

Advantages of vacuum concrete

- The final strength of concrete is increased by about 25%.
- The permeability of concrete is sufficiently decreased.
- Vacuum concrete stiffens very rapidly so that that form – works can be removed within 30 minutes. Of casting even on columns of 20ft. High.
- The bond strength of vacuum concrete is about 20% higher.

- The density of vacuum concrete is higher.

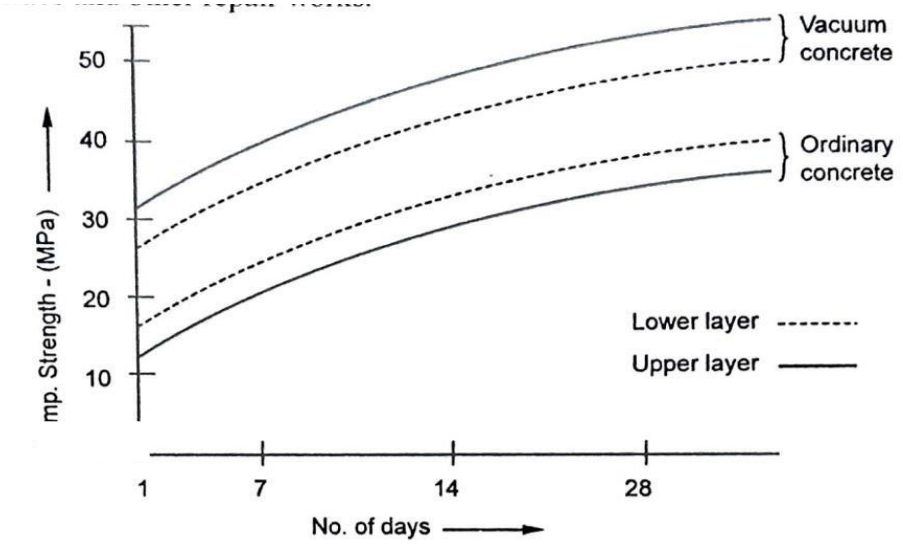


Fig. 5.3. Strength Comparison of Vacuum concrete with Ordinary Concrete