

3.2 VACUUM CONCRETE

High water-cement ratio is harmful to the quality of concrete and low water-cement ratio does not give sufficient workability. In concreting thin sections like slab and walls a fluid mix with water-cement ratio of 0.5 to 0.65 is required to facilitate the placing and compaction. Such a mix will have relatively low strength and poor abrasion resistance.

Vacuum-treated concrete provides a good bond with the underlying concrete. The vacuum treatment has been found to considerably reduce the time of final finishing of floor and stripping of wall forms. The strength of concrete and its resistance to wear and abrasion increases and total shrinkage is reduced.

Vacuum treatment can be effectively used in the resurfacing and repair of road pavements, Vacuum concrete has been extensively used for factory production of plain and reinforced concrete units. It is also used in construction of horizontal and sloping concrete slabs, such as floor slabs, road and airpavements, thin load-bearing and partition walls. In such situations, the vacuum treatment of concrete, involving the removal of excess water and air by using suction can be helpful. The process, when properly applied, produces concrete of good quality. It also permits removal of formwork at an early age to be used in other repetitive work. The equipment consists of a vacuum pump, water separator and filtering mat. The duration of treatment depends upon the water-cement ratio and the quantity of water to be removed. It generally ranges from 1 to 15 minutes for slabs varying in thickness from 25 mm to 125mm.

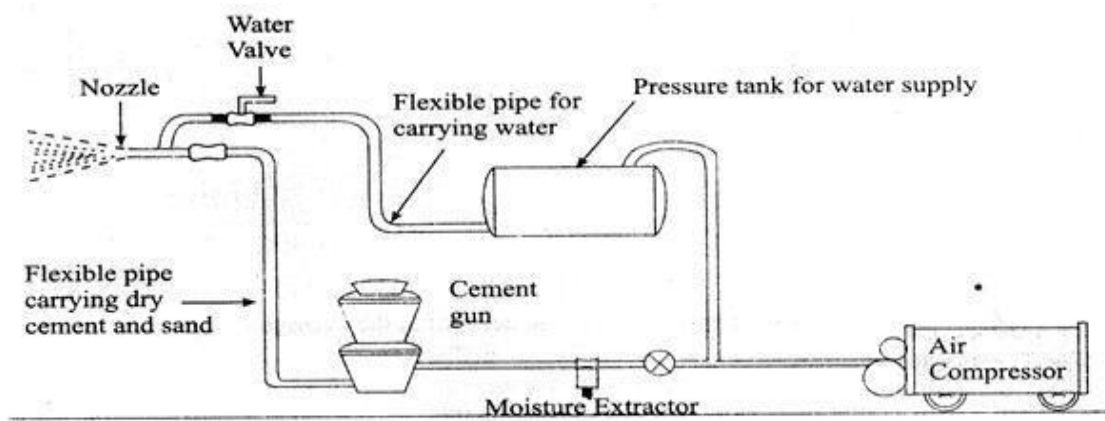
The vacuum treatment is not very effective for water-cement ratios below 0.4.

The vibration of concrete before vacuum treatment can assist the process.

The application of vibration simultaneously with vacuum treatment after initial vibration is very defective. Vibration beyond 90 s may damage the structure of concrete and hence the vibrations should be stopped beyond this period and only vacuum needs to be applied for the remaining duration of the treatment.

3.4.1 GUNITE

Gunite is referred as air blown mortar and concrete, gunned concrete, spraycrete, sprayed concrete, shotcrete, pneumatically applied mortar or concrete. It is a mortar or concrete conveyed through a hose and pneumatically projected at high velocity onto a surface. The jet force impacting on the surface compacts the material. Generally a dry mixture is used. The material is capable of supporting itself without sloughing or sagging even for vertical as well as overhead applications.



General arrangement of apparatus in gunite system.

Gunite is best adopted from the quality and cost point to thin lightly reinforced sections. Gunite is also advantageous to shoot certain heavy structural members in new construction and to bond columns, girders or walls to existing construction. Gunite should not be used for spirally reinforced columns or pilings.

Uses

- (a) Refractory linings in furnace walls, stacks and boilers.
- (b) Coatings over masonry, concrete, rock and steel.
- (c) Encasement of structural steel for reinforcing and fireproofing.
- (d) Repairs of deteriorated concrete in structures like dams, tunnels, reservoir linings, water front structures.