

## Compaction of Concrete

This process will be done after casting the concrete. The purpose of this process is:

1. Removing entrapped air.
  2. Increasing the density of concrete mixture.
  3. Increasing the bounding forces between the concrete contents, and the concrete with the steel reinforcement.
- ❖ Compaction of concrete for a long time causes segregation which lead to weakening concrete and formation of laitance on the surface of the concrete.

### Methods of compaction:

**1- Manual:** using steel rod, this method done for little jobs. It is usually used for wet mixes (mixes with wet consistency) and high workability.

**2- Mechanical method:** which is done using mechanical vibrators and it is suitable for dry mixes (Mechanical method does not used for wet mixes as they cause segregation).

### The advantages of using mechanical :

1. Increasing concrete strength.
2. Increasing density of concrete
3. Decreasing water absorption
4. Increasing cohesion and bond between concrete and reinforcement
5. Decreasing volumetric changes
6. Increasing resistance of concrete for weathering effects.

## Types of vibrators:

**1- Internal vibrators:** This is the most common vibrators and is applied at for 5 to 30 seconds, depending on the consistency of the mix.

This method classified as the best one because of its:

- a. Directly affecting.
- b. Easily moving from place to another.
- c. Have high velocities.



**2- External Vibrators:** which is established on the molds and shakes the concrete and the mold. So there is a loss in the effort. It's preferred to be used in:

- little thickness sections (like walls).
- producing precast concrete.



**3- Vibrating tables:** the molds are putted on its surface and there is a loss in the effort.



**4- Other vibrators:** like surface vibrators which is used for compacting mass concrete in dams.



## **Curing of Concrete**

Curing is the process of controlling the temperature and the moisture which is loss from concrete during cement hydration.

Concrete derives its strength by the hydration of cement particles. The hydration of cement is not a momentary action but a process continuing for long time.

More specifically the object of curing is to keep concrete saturated, until the originally water-filled space in the fresh cement paste has been filled by the products of hydration of cement.

It was found that, for continue the hydration the relative humidity inside the concrete has to be maintained not less than 80 percent. If the relative humidity of ambient air is at least that high, there will be little movement of water between the concrete and the ambient air. It is well known that the hydration of cement can take place only in water-filled capillaries. This is why loss of water by evaporation from the capillaries must be prevented.

The quality of concrete depends primarily on the gel/space ratio of the paste, greater hydration will lead to higher strength.

### **Method of Curing**

There are two major categories of curing, depending on the conditions in site and on the size, shape and position of the concrete member.

#### **1. Wet Curing:**

in this method the concrete should be immersed in water, so that the surface of the surface of the concrete is continuously in contact with water. The water used in curing should be the same as mixing water, sea water may lead to corrosion of reinforcement.



If the immersing method can't be done then the curing can be achieved by:

- ✓ Continuous spraying
- ✓ Covering the concrete with wet sand, sawdust or straw.
- ✓ Covering the concrete with periodically-wetted clean canvas or cotton mats.

## 2. Membrane Curing:

This method of curing relies on prevention the loss of water from concrete surface.

The curing spray should be applied after bleeding has stopped bringing water to the surface of the concrete but before the surface has dried out: the optimum time is the instant when the free water on the concrete surface has disappeared.

