

## What is Concrete?

Concrete is a mixture of the following constituents- fine aggregates, coarse aggregates, water, and cement or lime. Admixtures like calcium chloride are also added sometimes in the concrete to modify its properties like setting time, strength, etc.



What is Concrete

Fine aggregates also called as sand are the particles below size 4.75 mm and greater than 0.2 mm that are obtained from river deposits.

Coarse aggregates include crushed stones, stone boulders, gravels, etc.

Both fine aggregates and coarse aggregates are inert materials while the other two materials- water and cement are active materials.

Cement is generally used as main binding agent in concrete. Many types of cement are also available in the market, which may be used as per the need.

Lime can also be used in place of cement. However, it is not much preferred in recent times.

### Properties of Concrete:

The influential properties that are important from the construction point of view are as below

- The compressive strength of concrete is quite high
- It is not corroded easily
- It hardens as time passes after it has achieved sufficient strength after placing.
- Though concrete is weak in tension, steel can be placed at the parts where the tensile load is to be resisted. Besides, its coefficient of thermal expansion is similar to that of steel. Hence, unnecessary stresses are avoided.

- It can resist abrasion too owing to its hard surface.
- Fire resisting construction can be done too with the help of cement concrete.
- It is quite economical as compared to steel construction.

#### **Cement Concrete- Popular as a Construction Material:**

Following are some of the important factors owing to which cement concrete is widely accepted as construction material universally:

- It is possible to mould the concrete in any shape when placed in the forms that help in the construction of a durable structural member.
- The properties of the concrete can be controlled with the help of admixtures and using a different type of cement.
- The preparation of concrete can be mechanized completely- as in the case of RMC that ensures accuracy, uniformity, and timely deliverance of the concrete.
- Even placing of concrete can be mechanized.

#### **Site Mix Concrete Vs Ready Mix Concrete**

##### **What is Site Mix Concrete:**



Site Mix Concrete



The concrete that is batched and mixed at the site itself is called site mix concrete.

Site mix concrete is also called on-site concrete.

Read More: [WHAT IS A CONCRETE PUMP? HOW IT'S BETTER THAN NORMAL PLACING](#)

### **Method of Making Site Mix Concrete:**

On-site concrete can be prepared in the following two manners:

#### **1. Hand-mixed Concrete:**



Hand Mixed Concrete

For small quantities of concrete, hand mixing can be done.

Cement is first poured on a clean, dry, hard, and impermeable surface.

Sand is mixed with the cement first by shovel until uniform mix is visible.

Aggregates are then added to this mixture and the whole mixture is mixed until the aggregates look scattered uniformly.

Then after, in the middle of the heap water is poured as per the requirement specified.

The mass of concrete is then mixed to obtain a workable mix.

10 % of additional cement is also added to compensate for the possibility of inadequate mixing.

## Site Mix Concrete Vs Ready Mix Concrete

### **Machine Mixed Concrete:**

Two types of mixers are used on site-

#### 1. **Continuous Mixers:**

When the large and continuous flow of concrete is required, then continuous mixers are employed.

The feeding of raw materials to the mixer is mostly automatic in this case. Also, the materials are continuously supplied in the mixer through screw feeders.

However, proper supervision is necessary.

#### 2. **Batch Mixers:**

The concrete is produced batch by batch between time intervals. A large drum is used to mix the materials in batch mixers.

The batch mixers can either be of pan type or drum type.

Materials are added into the hopper and they are mixed by series of blades or baffles present inside the drum.

#### 3. **Drum mixers are further available in three types:**

#### 4. **Tilting Mixer:**



Tilting Mixer Machine for Concrete

In Tilting Drum type of mixers, the drum is kept in a tilted position and the materials are fed while the drum is kept rotating. The mixed concrete is discharged after the desired number of revolutions of the drum. The drum is tilted in opposite direction to discharge the materials present in it.

Tilting mixers are more effective than the non-tilted ones.

##### **5. Non-tilting Mixer:**



Non Tilting Type Concrete Mixer

The drum is kept vertical. To discharge the concrete, a chute is inclined to the drum which is oriented to horizontal and the concrete falls on it with the help of a lever.

A little bit of segregation also happens while using a non-tilting mixer.

6. Reversing/Forced Action Type:





Reverse Drum Type Concrete Mixer

This mixer produces concrete in single batches. The whole drum rotates either about the vertical or horizontal axis.

The raw materials are loaded through a chute at one end while they are discharged via chute from the opposite end of the drum.

Available size of Mixers

- 85 T, 100 T, 140 T, and 200 T
- 200 NT, 280 NT, 375 NT, 500 NT, and 1000 NT
- 200 R, 280 R, 375 R, 500 R, and 1000 R

The number represents the nominal mix capacity of the mixer while the letters T, NT, and R represents tilting, non-tilting, and reverse type respectively.

### Site Mix Concrete Vs Ready Mix Concrete

**Procedure for Mixing Site Mix Concrete:**

Materials are prepared for one bag of cement and loaded in the mixer.

In mixers, first of all, half of the coarse aggregates are added and then half the amount of sand. Cement is added afterwards. Then after, the remaining half amount of coarse and fine aggregates

is added in sequence. This is done to prevent the cement from getting spilt or blown away due to windy weather.

About 25 % of the water is added in the drum before adding the materials so that the drum becomes wet and cement does not stick to the inner walls and blades of the drum. The remaining 75 % of water is added in the drum immediately after adding the materials in the drum.

If admixtures as if plasticizers or super plasticizers are to be added then the same procedure as above is done except litre water from the 75 % of water is kept aside in which the admixture is mixed and added to the drum.

### **Mixing Time:**

Normally, the speed of the mixers is kept 15-20 revolutions per minute. About 20-30 rpm gives a proper mix in a well-designed mixer.

If the outturn of the drum is increased, then the quality of the concrete produced is affected. If the mixer is kept running for a longer time, it becomes uneconomical.

Also, not much strength is increased when the mixing time is increased beyond 2 minutes.

Mixing time also depends on the capacity of the mixer. It varies between 1.5 to 2.5 minutes.

The efficiency of the concrete mixer depends on various factors like the shape of the drum, number of blades, length, depth, and inclination of the drum, space between drum and blades, speed of rotation, etc.

Read More: [15+ TYPES OF ADMIXTURES USED IN CONCRETE](#)

## **Site Mix Concrete Vs Ready Mix Concrete**

### **What is Ready Mix Concrete:**



Ready Mix Concrete (RMC)



Ready mix concrete, abbreviated as RMC, is manufactured in either a batching plant or a factory where the constituents of concrete are batched as per the proportion mentioned and mixed together.

Then, this mixed concrete ready for placing is transported to the site of work through transit mixers mounted on the trucks.

The very first ready mix concrete was developed as early as 1930 itself, however, it gained popularity after 1960. The first RMC plant in India started in 1992 in Pune. Nowadays, ready mix concrete is widely used.

The concrete is delivered to the site in the form of freshly mixed concrete that is still in the plastic state (i.e. Unhardened state). No other treatment to the concrete is required after it is delivered to the site; it can be placed directly in the formwork.

RMC is bought and sold in terms of the volume calculated in cubic metres.

#### **Plant Location of RMC:**

Some of the factors to be considered while selecting the location of the central mixing plant are discussed below:

##### **1. Site Selection:**

It is crucial to select a proper site for the plant.

Mostly outskirts of metropolitan cities are preferred as concrete can be supplied to multiple sites that are going on in the city.

##### **2. Initial Cost:**

Installation and production cost of the RMC plant is high. Therefore, careful budget planning is required before the erection of the RMC plant.

##### **3. Transportation:**

It should be kept in mind while selecting the location of the plant that concrete once produced needs to be transported to the site of use.

Hence, the site should not be located too far away. Besides the cost of transport, other demerits also crawl up if the site is located too far. Handling of concrete also becomes difficult. Moreover, the setting of concrete also becomes an issue.

##### **4. Equipment:**

The central plant needs equipment for batching concrete and for mixing.

Quality-assessed equipment should be selected.

### **Advantages of RMC:**

- Centralised concrete batching plant is established from where the concrete can be easily supplied to several sites.
- As the constituents are batched and mixed with precision, a better quality of concrete is produced.
- Also, the consistency in the quality of concrete can be maintained precisely.
- With a better quality of concrete, construction speed is increased and maintenance costs are reduced too.
- It can solve the problem of mixing concrete in the narrow roads. The plant can be located in the remote industrial areas and the concrete ready to be placed is delivered to the site of place.
- The space consumed by the materials stored on the site is liberated.
- Hiring or procurement of the machinery for concrete preparation is not required in the case of RMC.
- The noise and dust pollution at the site of work is reduced, as concrete mixers are mostly noisy.
- The labour engaged in the production of the concrete is also eliminated.
- Basic materials are not much wasted in the plant as compared to the site.
- Modern construction techniques can be easily implemented while using RMC.
- For mass concreting and construction work at narrow sites, RMC is quite useful.

### **Disadvantages of RMC:**

- It should be ensured first that the basic road and access roads to the site are not blocked.
- Traveling time from the plant to the site is crucial in the case of RMC. Batching of materials is done at the central plant. However, the mixing is carried out while the truck is in transport. If the time is not properly calculated and managed, then the concrete would not be appropriately mixed when it reaches the site.
- More careful planning is required as compared to on-site concrete as the mixed concrete ready for placement arrives at site and delay in placement may result in concrete starting to harden before placement.
- If there is traffic on the route, the setting of concrete may occur. The unpredictable nature of traffic may prove to be a problem during the transport of RMC.