

FREQUENTLY ASKED QUESTIONS

There are many frequently asked questions pertaining to concrete and its applications. Listed below are the answers to some of these questions.

Question: What are the raw materials used for manufacture of Cement?

Answer: Calcareous (Lime stone obtained from mines) are Argillaceous materials (Clay, Bauxite) and Iron are the commonly used Raw materials in the manufacture of cement.

Question: What is the role of Gypsum in cement?

Answer: Gypsum is added to control the "Setting of cement". If not added, the cement will set immediately after mixing of water leaving no time for placing.

Question: What is setting of cement?

Answer: Setting is the stiffening of the cement paste after water is mixed. Broadly it refers to change of fluid to solid state.

Question: What do you mean by hardening?

Answer: Hardening is the gain of strength in cement. The process of continuous gain of strength is rapid upto 180 days and after that gradual upto next 5 years.

Question: Why should cement be "fine"?

Answer: The rate of hydration of cement depends on the fineness of cement and for a rapid development of strength high fineness is necessary.

Question: What's the difference between cement and concrete?

Answer: Cement (sometime referred to as Portland Cement or hydraulic cement) is one component of concrete. Cement is to concrete what flour is to a loaf of bread. Concrete is basically a mixture of 2 components: aggregates and paste. The paste, comprised of cement and water, binds the aggregates (sand and stone or gravel) into a rocklike mass as the paste hardens because of the chemical reaction of the cement and water. This reaction is called hydration.

Question: What is meant by "Soundness of cement"?

Answer: Cement may sometimes contain free lime, which may cause expansion; hence soundness test is conducted to see that even if uncombined lime is present in cement whether it is in prescribed limits. If it is within the prescribed limits then it is said to be sound and causes less expansion and cracks.

Question: What does 53, 43 & 33 grades indicate?

Answer: Grades 53, 43 and 33 indicate the compressive strength of cement in Newton's for one mm² area. i.e. 53 grade means a compressive strength of 53 N per mm² attained after a curing period of 28 days. Similarly 43 Grades and 33 Grades may be defined.

Question: Does the color of cement affect the strength?

Answer: The color of cement depends on the raw materials used. If the raw materials contain more iron, resulting cement will be darker. Color has no significance on any properties of cement. The strength of the cement is dependent on the correct proportion of raw material mix.

Question: What are the reasons for slow setting & quick setting of cement?

Answer: Slow setting in cement is due to salts and chemicals in water sand and aggregate. Cold weather, less cement, high percentage of impurities, adulterated cement and improper water cement ratio. Quick setting of cement is due to addition of low quantity of Gypsum, hot weather condition, high cement fineness.

Question: What makes concrete crack?

Answer: Concrete "shrinks" slightly as it hardens. A normal shrinkage rate is approximately 1/8" per 10 linear feet. This shrinkage is caused by loss of excess water from the mix. Obviously, the "wetter" the mix, the higher the shrinkage rate. Control joints should be placed in the concrete at intervals equal to 2.5 times (in feet) the thickness of the slab. For example, a slab 4" thick should have control joints every 10 feet.

Question: Why should fresh concrete be properly cured??

Answer: The surface of freshly placed concrete should be kept moist for at least 7 days. Contrary to popular belief, concrete should not be allowed to "dry out". If the concrete is allowed to "dry out" the ultimate

strength gain will be considerably less than its designed strength. Proper curing will also minimize the potential of cracking. The simplest method of moist curing is wetting the surface of the concrete, and then covering it with polyethylene.

Question: What causes scaling and surface shrinkages cracks?

Answer: These defects are generally a result of improper finishing of the concrete. As discussed earlier, the prime factor affecting concrete strength is water/cement ratio. If excess water is added to the surface of the concrete during placement and finishing, the water/cement ratio on the surface may be drastically increased. This condition greatly reduces the strength of the concrete on the surface. Unfortunately, this is where the wear takes place.

Question: I've heard the term slump pertaining to concrete. What is slump?

Answer: The term slump simply refers to the consistency of the concrete in a plastic state (prior to hardening). Slump is a measure of how wet or stiff the concrete is, obviously, the more water used in producing the concrete, the wetter (or higher) the slump will be. Again, excessive water causes a dramatic loss of strength. Applications exist where higher slump (wetter) concrete is necessary because of difficulty in placement or specification requirements. These higher slumps can be attained through the use of water reducing admixtures (chemical additives).

Question: How long does concrete continue to gain strength after it is placed?

Answer: Concrete's most rapid period of strength gain occurs in the first 7 days. The accepted time standard for measuring concrete strength is 28 days. However, concrete will continue to gain strength for long periods of time (months, even years!) As long as moisture is present to continue the chemical process of hydration.

Question: What is fly ash?

Answer: Fly ash is a by-product from coal fired electric power generating plants. The inorganic or inorganic constituents of the coal, such as clay, quartz and shale, fuse and chemically recombine during burning to produce various crystalline and glassy phases of fly ash. The fly ash is entrained in the flue gas and cools into spherical, usually hollow shaped particles. These particles are collected in electrostatic precipitators or bag houses and the gradation, or fineness, of the fly ash can be controlled by how and where the particles are collected. Fly ash reacts with the free lime generated by cement hydration to form cement-like compounds, which increase the strength and reduce the permeability of concrete.

Question: What is the setting time of Cement Concrete?

Answer: The Setting time of Cement is the time required by concrete to harden and set itself according to the framework in which it has been placed. The amount of time taken by concrete to set is 7 hours to 10 hours depending on the conditions under which the concrete is placed in the framework. But this does not mean that the framework may be removed after 7 hours. The initial setting of concrete does not impart enough strength for it to withstand its own self load so the framework should be removed only after 7 to 10 days of proper curing.

Question: Does the colour of cement have bearing on its strength?

Answer: No, the colour of cement does not affect the strength of cement in anyway. It just gives a proper finish to the concrete. There is a general misconception that the cement that is darker in colour has greater strength, this is not true and the cement that is lighter in colour not only has the same strength but also has a more pleasing finish than the cement that is darker in colour.

Question: Addition of fly ash in concrete is detrimental to its strength?

Answer: This is not true. In-fact the advantages of addition of fly ash are many, a few of which are listed below:

- It reduces the permeability of concrete thus helping in making the concrete structures waterproof.
- The addition of fly ash also helps in better bonding with the reinforcement.
- It also increases the density of concrete by reducing the air voids.
- It gives a pleasing appearance to the finished concrete.

Question: What effect does the water/cement ration have on the strength of concrete?

Answer: The water cement ratio is very important with regards to the strength of concrete. The strength of concrete is inversely proportional to the water cement ratio i.e. with the increase in water content the compressive strength of concrete decreases and vice versa.

Question: How to store cement?

Answer: Proper storage of cement shall permit easy access for inspection and identification. Cement should be stored in suitable weather, tight structures, to protect the cement from dampness. It should not be piled more than ten bags in a stack and should be arranged in heather and stretcher fashion as far as possible. While removing the bags for use "FIRST IN FIRST OUT" rule should be applied.

Question: What is the function of water in concrete?

Answer: It is with the water that cement undergoes the process of hydration to form a gel with binding property covering the aggregates uniformly on mixing. However, quantity of water for mixing has to be limited to achieve the required consistency, as excess water is deterrent to concrete. Potable water can be used for the same.