FAQ's

1. What is Durable Concrete?

Concrete durability can be achieved in a holistic way. In this context, there are a large number of materials in the market which facilitate durability in concrete. Apart from the materials, the construction processes have also undergone changes with a view to improving the durability of the finished structure.

The durability of concrete is defined as its ability to resist weathering action, chemical attack, abrasion, or any other process of deterioration. Durable concrete will retain its original form, quality, and serviceability when exposed to environment.

Concrete ingredients, their proportioning, interactions between them, placing and curing practices, and the service environment determine the ultimate durability and life of concrete.

For example: Sulfates and chlorides in seawater require the use of low permeability concrete to minimize steel corrosion and sulfate attack. A cement resistant to sulfate exposure is helpful. Proper concrete cover over reinforcing steel must be provided, and the water-cementitious ratio should not exceed 0.40.

2. What is High Performance Concrete?

In response to widespread cracking of concrete structures, the construction process moved towards the use of High Performance Concrete (HPC) mixes. High performance concrete is a concrete mixture, which possess high durability and high strength when compared to conventional concrete. This concrete contains one or more of cementious materials such as fly ash, Silica fume or ground granulated blast furnace slag and usually a super plasticizer.

High Performance Concrete was introduced in India initially for the reconstruction of the pre-stressed concrete dome of the Kaiga Atomic Power Project, followed for parts of the Reactors at Tarapur and Rajasthan. Subsequently, a number of bridges and flyovers have introduced HPC up to M75 grade in different parts of India.

3. What is Self Compacting Concrete?

SCC leaving the batching plant is in a semi-fluid state and is placed into the formwork without the use of vibrators. Due to its fluidity, SCC is able to find its way into the formwork and in between the reinforcement and gets self-compacted in the process. SCC is particularly useful for components of structures which are heavily reinforced. The fluidity is realized by modifying the normal mix components. In addition to cement, coarse and fine aggregates, water, special new generation polymer based admixtures are used to increase the fluidity of the concrete without increasing the water content.

4. Write a note on concrete with mineral admixtures?

From being a product made of three or four materials (cement, aggregates, water), today a typical durable concrete consists of six or more materials. The use of low water cement ratio enables a reduction in the volume and size of capillary voids in concrete; this alone is not sufficient to reduce the cement based content of concrete which is the source of micro-cracking from thermal shrinkage and drying shrinkage.

To reduce the cement based content, both the water content and cement content must be reduced as much as possible. Concrete mixes with fewer micro cracks can be produced by blending the cement with mineral admixtures either in the batching plant or in the cement plant. This enhances the service life of concrete structures in a cost-effective manner.

5. What are Fly Ash bricks?

Fly ash brick (FAB) is a building material, specifically masonry units, containing class C fly ash and water. Compressed at 28 MPa (272 atm) and cured for 24 hours in a 66 °C steam bath, then toughened with an air entrainment agent, the bricks last for more than 100 freeze-thaw cycles.

The finished product is a lighter Block - less than 40% the weight of conventional Bricks, while providing the similar strengths.

Advantages:

- It reduces dead load on structures due to light weight(2.6 kg, dimension: 230 mm X 110 mm X 70 mm).
- Same number of bricks will cover more area than clay bricks
- High fire Insulation
- Due to high strength, practically no breakage during transport and use.
- Due to uniform size of bricks mortar required for joints and plaster reduces almost by 50%.
- Due to lower water penetration seepageof water through bricks is considerably reduced.
- Gypsum plaster can be directly applied on these bricks without a backing coat of lime plaster.
- These bricks do not require soaking in water for 24 hours. Sprinkling of water before use is enough.

Disadvantages:

- Mechanical strength is low, but this can be rectified by adding marble waste or mortar between blocks.
- Limitation of size. Only modular size can be produced. Large size will have more breakages.

6. What are Concrete Masonry Blocks?

A concrete masonry unit (CMU) is a standard size rectangular block used in building construction.

Concrete blocks are made from cast concrete (e.g. Portland cament and aggregate, usually sand and fine gravel, for high-density blocks). Lower density blocks may use industrial wastes, such as fly ash or bottom ash, as an aggregate. Lightweight blocks can also be produced using autoclaved aerated concrete.

7. Write a note on Glass as construction materials?

Glass has become a very important material used in construction as we seen more and more buildings having a glass facade exterior. It is generally made from mixtures of sand and silicates, and is very brittle. Glass finds major usage in beautification of the structure and keeping temperatures regulated.

Insulated glazing (IG), more commonly known as double glazing, consists of two glass window panes separated by a vacuum or gas filled space to reduce heat transfer across a part of the building envelope.

Laminated glass is a type of safety glass that holds together when shattered. In the event of breaking, it is held in place by an interlayer, typically of polyvinyl butyral (PVB) or ethylene-vinyl acetate (EVA), between its two or more layers of glass.

Toughened or tempered glass is a type of safety glass processed by controlled thermal or chemical treatments to increase its strength compared with normal glass. Tempering puts the outer surfaces into compression and the inner surfaces into tension. Such stresses cause the glass, when broken, to crumble into small granular chunks instead of splintering into jagged shards as plate glass (a.k.a. annealed glass) creates. The granular chunks are less likely to cause injury.

Annealed glass is the most common glass used in windows. Annealed glass is also known as a standard sheet of float glass. Annealing is actually a process of slowly cooling glass to relieve internal stresses after it is formed.

Glass is generally stored vertically on its edge, in dry conditions. Whether storage is on the short or the long edge is dependent on size, substance, availability of space, etc.

Factors to consider when storing glass on its edge

The glass should not be in contact with any substance that is harder than itself, e.g. concrete, stone, ferrous metals or broken glass. This will minimise the risk of damage and breakage, and can be implemented by cladding all supporting structures with timber, felt, rubber or plastic material. Care should be taken to ensure that all nails and screws are countersunk below the surface likely to come into contact with the glass. Always ensure supporting bearers are clean.

Angle of inclination of the glass:

Transportable racks, barrows, trolleys and still ages: 5° - 6°

If the angle is increased above 6°, it will tend to put extra weight on the back sheets and make sheet separation more difficult to achieve.

The following is a list of recommended practices for the storage of glass on sites:

- Glass deliveries should be coordinated to minimize on-site storage durations. Subcontractors should work with the general contractor or builder to select on-site under roof storage locations that avoid direct rain and water runoff, work areas of other trades, areas of high traffic, and to minimize material movement and handling.
- Individual sheets or cases of glass and pre-glazed materials should be secured, blocked, and braced to prevent falls.

Glass – Storage at Site:

- Blocks or supports should ensure that the bottom edge of materials will be kept well above potential sources of water.
- Storage of glass against walls should be avoided unless it can be deter-mined that the wall is suitably sound for the task, eg single sheets of glass that still can be suitably secured.
- Storage area should provide secure, temporary covering that prevents direct water flow but ensures ventillation and stops condensation build-up on the glass.
- Ensure that stored materials are not exposed to activities of other trades such as welding, painting and insulating.
- Daily Inspection

8. Write a note on Metal as construction materials?

Metal such as steel and aluminum alloys are used in taller structures and are used as structural frameworks for these skyscrapers. Its advantages are strength and flexibility while its prime enemy is corrosion.

Steel Grids:

Incorporation of steel frames made construction of skyscrapers possible. Here, vertical columns and horizontal I-beams form a grid. This supports

other elements of the building that are attached to the grid. It is used to better withstand stress of the structure. Bolts and fasteners are used to connect beams to columns. I-beams in the centre are usually wider and so more resistant to bending moments. Wide sheet of steel is used to cover the top of the frame. As for the floor surface, precast concrete is a popular option. Due to steel softening with high temperatures, fire resistant elements are usually incorporated.

Metal Roofs:

Metal roofs can be fabricated from galvanised steel or a mixture of zinc, aluminium and silicon-coated steel. Stainless steel, lead and copper can also used. The main advantage of such roofs is their durability. Metal usually gets epoxy- or ceramic-coated in order to prevent the roof from rust and damage caused by water.

Reinforced Concrete:

Steel is used in Reinforced Cement Concrete. Rebars are usually made from twisted strands with anchoring ridges.

Fixing & Fasteners:

Fixings and fasteners are often made from stainless steel. They are widely used in automotive, aerospace and other manufacturing industries. They are crucial for stability and safety of construction and civil engineering in general. There are many different types of fixings and fasteners for specific types of constructions.

Aluminium:

- Cladding on Façade

Aluminium can be cladded on the Façade as Aluminium Composite Panels (ACP) or Sheet Aluminium Cladding with required framework/supports that can be of Steel or aluminium.

- As part of Structural Glazing

Mullions and Transoms of Structural Glazing are made of Aluminium.

- Doors and Windows

Steel Doors and Aluminium Doors are often used in Construction. Specially for Fire Protection, durability, sound proof doors, etc.

9. Write a note on Plastics as construction materials?

A widely used substance, it is a synthetic or semi-synthetic organic condensation or polymerization product that can be molded in various forms and differs in heat tolerance, hardness, and resiliency. It is cost effective and owing to qualities like ease of manufacturing, versatility, and imperviousness to water, is extensively used as a building material.

Following are the areas of application:

- Façade Cladding
- Indoor usage – Wall Cladding, Electrical and Lighting Fixtures
- Furniture
- Storage Spaces
- Poly carbonate sheets can also be used as roofing material.