MP BIRLA GROUP

For advice, call

8010 55 00 00

MP BIRLA CEMENT

The Cement Se Ghar Tak Companion

A GUIDE TO CEMENT AND A DREAM HOME

Building your dream home is a very special event in your life. It is the culmination of hard work, planning and love. You'd want to make sure everything goes right.

And so, from us to you – this little offering.

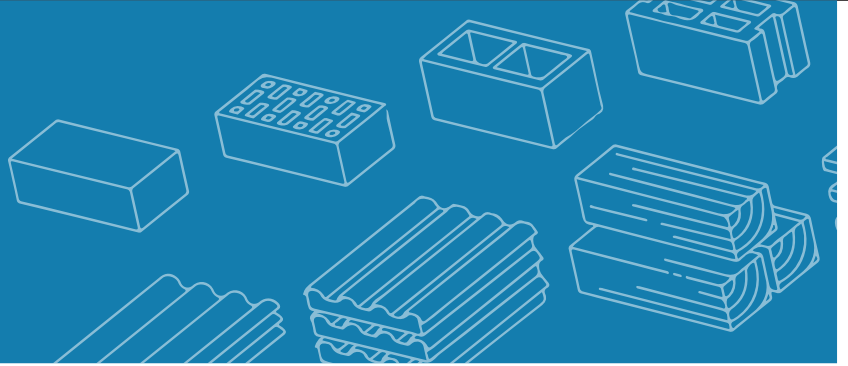
It will explain to you all the basics of building a house - cement se ghar tak. You will understand the terms, processes and decisions involved in building houses. So that you can make the best choices while building the perfect home.

And remember that we're right here for you, at every stage.

SECTION I

CEMENT

WHAT IS CEMENT?



You've heard the terms often – cement, mortar and concrete. But what exactly are they, and what's the difference?

Cement

Cement is a binder that binds other materials together to form a solid mass. It is made primarily from limestone, and a small amount of gypsum. When mixed with water, it can set and harden. But it is rarely used independently. Being a good binder, its value lies in combining with other materials.

Mortar

Mortar is the mixture of

- **cement**
- **sand (which is called fine aggregate)**
- **water.**

The resulting mixture is used for binding bricks or stones together. This is why you might have heard the term 'brick-and-mortar' building – it is the process of binding bricks together with mortar.

Concrete

Concrete is the mixture of

- **cement**
- **sand**
- **gravel or crushed stone (which is called coarse aggregate)**
- **water**

Aggregate
The addition of aggregate makes cement stronger. Fine aggregate (sand) makes it good for binding when mixed with water. Coarse aggregate (gravel or stone) allows it to do more than just bind materials together – it makes it a building material itself.

Steel Reinforcement
Concrete has the advantage of being resistant to compression. In order to also make it resistant to tension (stretching), steel bars/rods are added to the concrete mix, so that the resultant structure is reinforced properly, and resists any kind of pressure.

Whatever the material, and whatever its ultimate use, the most important factor is the cement. Choosing the right cement and using it correctly is the difference between a reliable construction and a sub-standard one.

What are the types of cement used?

While there are several varieties of cement, such as Sulphate-Resisting Cement, High Alumina Cement, Low Heat Cement, and more, the three most common ones are **Ordinary Portland Cement (OPC), Portland Pozzolana Cement (PPC)** and **Portland Slag Cement (PSC).**

OPC

Ordinary Portland Cement is made almost entirely from limestone. Addition of 5% gypsum is standard.

PPC

Portland Pozzolana Cement is a type of blended cement, and is manufactured with addition of fly ash, which is a by-product of thermol power plants.

PSC

Portland Slag Cement is another type of blended cement which is manufactured with addition of slag, a by-product of steel plant.

TYPES OF CEMENT

Choosing the right cement- Blended Cement or OPC?

Blended cement has its advantages over OPC:

- Requires less water
- Improved durability because of its finer texture, which prevents permeation
- Energy efficiency: 7% of pollution is estimated to be due to pure cement production. Blended cement reduces damage to environment
- Protects natural resources – a reduced proportion of cement means less strain on natural resources like limestone
- Overall environmental balance maintained, since the blending is done using by-products of existing industrial processes

How to check for quality:

SECTION II
BUILDING BASICS

MASONRY

What is masonry?

Masonry is defined as the process of building an establishment with stones or bricks, along with mortar.
There are two types of masonry:

- Stone Masonry
- Brick Masonry

Stone Masonry:

Stone masonry is the process of constructing a unit with stones bound together with mortar.

Brick Masonry:

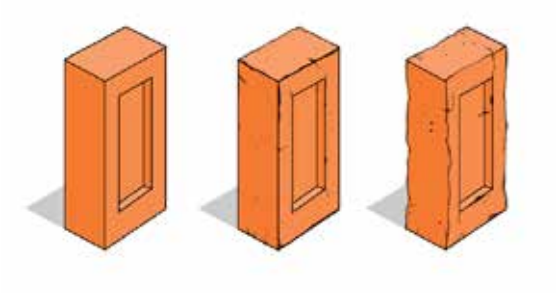
Brick masonry is the process of constructing a unit with bricks bound together with mortar.

CLASSIFICATION OF BRICKS

Bricks may be categorised by classification or by type

By Classification

- **First Class bricks**, usually red or copper in colour, with sharp, well-defined edges. Usually used in the construction of buildings.
- **Second Class bricks,** characterized by a smooth surface, fine cracks and mild distortions. Usually used in the construction walls of single-storey houses.
- **Third Class bricks,** with softer, rougher surfaces, and irregular and blunt edges. Usually used in the construction of huts and sheds.



By Type

Burnt Clay Bricks

- Made using moulds in clay; not visually appealing
- They require the application of plaster
- Can withstand extreme heat, and are therefore involved in construction processes

Sand Lime Bricks

- These bricks are made by mixing hydrated lime **(slaked lime)** and sand
- They are smooth, gray, and are visually pleasing
- Used for load-bearing construction projects

Engineering Bricks

- These bricks are thicker and stronger
- They have the lowest risk of water absorption
- Engineering bricks are used in civil construction projects

Concrete Bricks

- These bricks are pressed in the mould and treated by steam
- They are made under lower pressure steam
- Concrete bricks are generally used for facades, fences, basement walls, foundation walls, etc

A note about artificial sand

Artificial sand-making refers to crushing stone for construction. This type of sand can also serve the function of natural sand, and in fact is a better substitute to river sand.

It can be used for all types of construction work, such as concreting, plastering, etc. Artificial sand enhances the strength of the concrete.

Most importantly, using artificial sand prevents the depletion of natural sand, and is therefore environment-friendly.

REINFORCEMENT

A building or a structure is usually divided into two parts:

Sub-structure
Structure below the ground, which transfers the load of the building to the earth around it.

Super-structure
Structure above the ground, which serves the purpose of its intended use.

Plinth
Plinth is the portion of the structure between the surface of the surrounding ground and surface of the floor, immediately above the ground. The level of the floor is known as the **plinth level**.

Reinforcement in the sub-structure
FOOTING: It is the most important part of a sub-structure, as it bears the entire load of the establishment. Structures with improper footings may develop cracks.

Reinforcement in the super-structure
COLUMN: It is the most important aspect of the super-structure. A column is required to support beams or arches, from which it receives all the load.

BEAM: Comes second to columns in terms of importance. These are horizontally placed, and transfer their weight onto the columns supporting them. Beams can carry vertical gravitational forces.

SLAB: Slabs are large blocks, placed on the beams, and are used to construct floors and ceilings. Slabs are the first points in the transfer of load. They transfer to the beams, which transfer to the columns.

These are all built with concrete, or sometimes with steel-enforced concrete. The importance of choosing the best quality of cement, and therefore concrete, can be easily seen in the universal role it plays in structuring a house.

SHUTTERING

Apart from using bricks or stones in the building process, we can also use concrete as a building material. As outlined in the first section, concrete has the advantage of being solid enough when hardened, due to the presence of coarse aggregate.

The standard process of building with concrete is called shuttering, or formwork.

What is shuttering or formwork?

It is the process of creating concrete blocks using a mould.

- A hollow structure is created in the form of the desired unit
- This hollowness is then filled with concrete
- Once the concrete hardens, the enclosing structure is removed and the concrete unit is in place

Precautions

- **Cleaning and treatment of formwork:** The interior of the form should be cleaned before concrete is poured
- **Strength and accuracy**: The mould should be strong enough to hold the entire concrete in, and the size should be match the intended dimensions exactly
- **Leakage:** The shutter should be free of any leakage

SECTION III

PREPARING THE MATERIALS

CONCRETE MIXING

How can we make good quality concrete?

Instrument: A Gauge Box, or Measurement Box, should be used for proper measurement of all the ingredients of the concrete.

Water Cement Ratio: For general practice, the water-to-cement ratio should be in between 0.4 and 0.55.

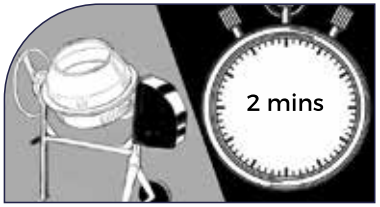
Workability: A test known as the Slump Test measures the consistency of the concrete mix, i.e how much and how fast the concrete 'slumps' when mixed.

Concrete Mixing:

To produce uniform and consistent concrete, thorough mixing of the ingredients is important. This can be done in two ways:

Machine Mixing: The ingredients require 2 minutes to get mixed in a machine.

Hand Mixing: Hand mixing requires 10 % more cement. Thus machine mixing is preferred to hand mixing.



TRANSPORTING, PLACING AND COMPACTING OF CONCRETE

Transporting of concrete:

Once the concrete is mixed, it should be transported to the final site before it starts to set.

Placing of Concrete :

Once on site, the concrete should be placed in its position before it starts to set.

Compacting of concrete :

Compaction means the removal of trapped air from the concrete mix, so as to increase its density and strength. Concrete compaction is done through vibration.

CURING

What is curing?

Curing is the process of preventing moisture loss from concrete.

Necessity of curing:

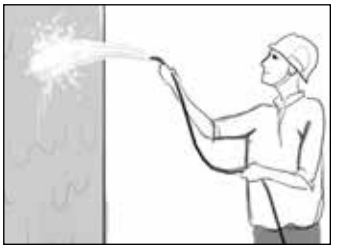
The process of curing leads to increased durability and strength.

Some common methods of curing:

Ponding and immersion: A layer of waterproof paper, canvas, or plastic sheets (curing sheets) can be applied on the freshly laid, moist concrete. This layer of paper must be allowed to rest on the concrete structure for 24 hours

Remove it after 24 hours, and fill it up with water for flat surface; wrapping up for vertical member and curing to continue for 7 to 10 days

Saturated wet coverings: Sheets, saturated with water, can be applied on concrete after it has hardened. The wet layer of cloth needs to stay moist throughout the process



SECTION IV

GHAR

PLASTERING

What is plastering?

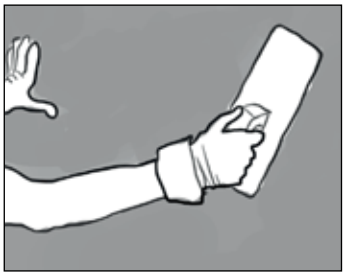
Plastering is the process of covering rough surfaces of walls, columns, ceilings and other building components with a thin coat of plastic mortar.

Objective of plastering:

- Protection from the elements
- Protection from vermin
- For a smooth, dirt-free surface

How to apply cement plaster on walls?

- **STEP-1** Clean all joints and walls with a wire brush
- **STEP-2** Fix dots on the walls, in order to get uniform thickness throughout the wall surface
- **STEP-3** Apply the first coat, and level the surface by means of flat wooden floats and wooden straight edges. Don't let the first coat dry
- **STEP-4** Apply finishing coat, and keep it moist for 7 days



FLOORING

What is flooring?

A floor provides a level surface that is capable of supporting weight.

A floor should possess the following qualities:

- Adequate strength and stability
- Adequate fire resistance
- Sound insulation
- Damp resistance
- Thermal insulation

Some commonly used types of flooring:

- Flag stone flooring: Flag stone is any laminated sandstone that is 2cm-4cm in thickness. This type of flooring is also known as paving
- Cement concrete flooring: This type of flooring is cheap, durable and easy to construct
- Mosaic flooring: This type of flooring is done from pieces of broken china, marble, glass or other such materials
- Tiled flooring: Square or rectangular in shape, tiled flooring is usually done with potter clay
- Marble flooring: Marble slabs are laid over the base concrete, and gradually levelled, in order to make marble floors

ESTIMATE

These are some guiding figures for you to understand the general break-up of house-building costs. Minor variations are to be expected, but this is a general rule of thumb.

PERCENTAGE OF TOTAL COST FOR A SINGLE-STOREY BUILDING

Excavation & Foundation Concrete	3%
Brickwork up to Plinth	5%
Superstructure Brickwork	25%
Roofing	20%
Flooring	6%
Woodwork (Doors & Windows)	15%
Internal Finishing	6%
External Finishing	3%
Water Supply	4%
Sanitary Installations	8%
Electrification	5%
Total	**100%**

ORDINARY TYPE OF BUILDING:

Materials	
Cement	13%
Steel	10%
Timber	12%
Other Building materials	25%
Total	**60%**
Labour	
Excavation	1%
Masons	25%
Carpenters	12%
Others	2%
Total	**40%**

BUILD YOUR DREAM KEEP IT GREEN

Homes the world over are being built keeping environmental concerns in mind. Increasingly, people are opting for cleaner and greener ways of living. Your choices can make for green construction, right from resource-preservation to thermal insulation and durability.

Using thermally efficient blocks for an extension improves the green credentials of a house.

Blended cement, as mentioned earlier, facilitates the conservation of energy and natural resources.

Choosing perforated or hollow bricks significantly reduces energy consumption and pollution, as well as provides better insulation.

Using artificial sand reduces depletion of natural resources.

World bodies like LEEDS and NAHB are noted for accreditation of green buildings, and are valuable sources for further inputs. India has its own accreditation body - GRIHA.

While this book is intended to familiarise you with the basics of building, cement se ghar tak, there are several ways in which our expertise can enhance your project, and add value to your dream home.

For further guidance and assistance, we're just a call away.

Mazboot ghar ke liye sahi cement aur sahi salah

For advice, call

8010 55 00 00

MP BIRLA CEMENT

Cement se ghar tak

Customer Support & Services (CSS) Cell

1. **Choosing the right cement**
2. **Construction expertise**
3. **Cost calculation**

Birla Corporation Limited

Corporate Office:

1, Shakespeare Sarani, A.C. Market (2nd Floor)

Kolkata – 700 071

Phone: 033 6603 3300/01/02