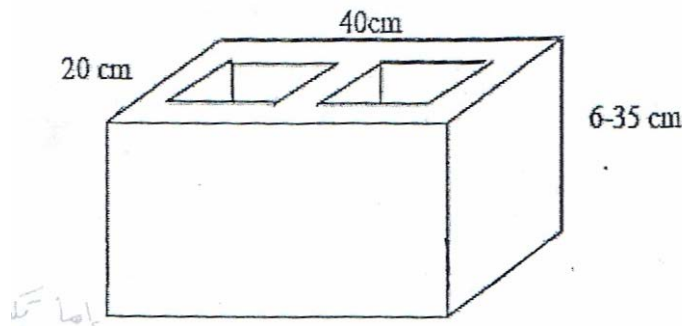


Concrete bricks

These bricks are manufactured from a mixture of Portland cement and aggregate for use in brick masonry. Typical aggregate include sand, gravel, crushed stone and blast furnace slag. Mix proportion varies from 1:2:4 to 1:8:16 according to the required bearing capacity. These bricks are often made hollow for economical purposes and to reduce the weight of the brick. the dimensions of the brick are as follow:



Concrete blocks can either be

- Hollow or Solid
- Load Bearing or Non-load Bearing
- Light weight or Dense

Raw material

1- Cement: the cement used in the manufacture of the blocks shall be normal Portland cement or rapid hardening Portland cement.

2. Aggregate: the aggregate used in the manufacture of blocks shall consist of naturally occurring sand, gravel or stone, crushed or uncrushed or a combination of there. It shall be hard. strong, durable, clean and free from adherent coatings and shall not contain excessive quantities of flat

or elongate particles. It shall not be of a type that is liable to suffer from the action of frost.

The aggregate shall not contain harmful material in sufficient quantity to affect adversely the strength or durability of the concrete. Mica, shale or similar laminated materials or soft particles shall not be present in such a form or in such quantity as to affect adversely the concrete. Aggregate shall all pass through a 3/4 in. When the aggregate contains fine aggregate, the fine aggregate shall not contain more than 10 per cent. of material passing a No. 100 test sieve.

Manufacture process

After the preparation of all the raw materials, one batch of different materials is put into the large mixer. The mixing procedure starts, all the materials are blended together by big blades in the mixer and water is added to the mixture. The function of water is to hydrate cement. In this procedure the materials must be completely blended to guarantee the consistency of the mixture; which is now called concrete. In the block business, concrete is not prepared wet or too dry. Water content is controlled precisely between a certain ranges.

After that the concrete is transferred to a block forming machine by belt, and dumped into the block forming mold on pallets. Then the concrete is compressed and vibrated into certain forms; stripped from the mold but still on pallets and delivered to be loaded on racks. Now the product is called green block. The green block is not hard yet as cement needs time to become hard. The block forming machine is ready for another cycle. As this process is very important too for the strength and form of the block, much attention must be paid the procedure. Materials

must be fed evenly, and completely. The vibration time and force must be controlled properly to guarantee the height and strength of the block.

After green block is stacked on the rack, they are transferred to the kilns. There they are kept on the rack for about 24 hours to become hard (curing) enough for handling. In the kiln, temperatures and humidity needs to be kept for the fast curing of the block.

After they stay in the kiln for about one day, the green blocks become hard enough (finished products) for handling. They are transferred out to be removed from racks and then removed from pallets. After that, the blocks are transferred for stacking into cubes on wood or plastic pallets, packaging and removal by forklift to the yard for further curing.

Uses:

Concrete bricks are widely used for construction purposes especially in areas where soils are not suitable for manufacture of clay bricks and may be used in the construction of bricks panels for light weight structures and multistory formed structures.

Properties of concrete blocks:

- a) The using of these bricks save time and effort as brick are light in weight and big in size.
- b) These bricks give good bonding with plastering materials used in their construction.
- c) These bricks have accurate size and shape.
- d) These bricks can produced with various bearing capacity according to the cement content used in their production.

- e) The weight of bricks can be controlled by varying the size of openings.

Lime

Lime is a general term for calcium-containing inorganic materials, in which carbonates, oxides and hydroxides predominate. Strictly speaking, lime is calcium oxide or calcium hydroxide. The word “lime” originates with its earliest use as building mortar and has the sense of “sticking or adhering”.

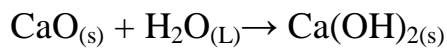
These materials are still used in large quantities as building and engineering materials. Lime industries and the use of many of the resulting products date from prehistoric periods in both the Old World and the New World. uses of lime exploit its ability to react with carbon dioxide to regenerate calcium carbonate. When lime is mixed with water and sand, the result is mortar, which is used in construction to secure bricks, blocks, and stones together.

Until the invention of Portland cement, lime was used as the chief cementing material in the building construction both for mortar and plasters. Most of the ancient palaces, forts, temples, monuments, etc., have been built with lime. Though Portland cement has almost replaced lime, but still at places, where lime is available locally and during the period of shortage of ordinary Portland cement lime provides a cheap and alternative to cement. Usually, lime in free state is not found in nature.

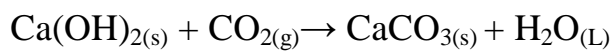
The raw material for the manufacture of lime (CaO) is calcium carbonate which is obtained by the calcination of lime stone. Lime can also be obtained by the calcinations of shell, coral, chalk and other

calcareous substances. Lime is obtained by burning limestone at a temperature of about 900°C.

At room temperature, the reaction of lime with carbon dioxide is very slow. It is speeded by mixing lime with water. When lime is mixed with water, it forms calcium hydroxide, called slaked lime.



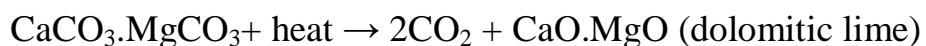
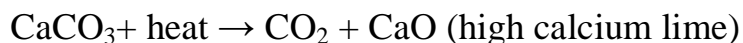
The reaction of calcium hydroxide with carbon dioxide is faster, producing a mortar that hardens more quickly.



Manufacture of lime

Lime is the high-temperature product of the calcination of limestone. Although limestone deposits are found in every state, only a small portion is pure enough for industrial lime manufacturing. To be classified as limestone, the rock must contain at least 50 percent calcium carbonate. When the rock contains 30 to 45 percent magnesium carbonate, it is referred to as dolomite, or dolomitic limestone. Lime can also be produced from aragonite, chalk, coral, marble, and sea shells.

Lime is manufactured in various kinds of kilns by one of the following reactions:



The basic processes in the production of lime are:

- 1- Quarrying raw limestone;

- 2- Preparing limestone for the kilns by crushing and sizing;
- 3- Calcining limestone;
- 4- Processing the lime further by hydrating.
- 5- miscellaneous transfer, storage, and handling operations.

Limestone enters a primary crusher to break the rock. Depending on the size of the feed stone required, limestone may go through a secondary or tertiary crusher to further reduce its size.

The stone is then screened into various sizes ranging from several inches to dust-sized particles. The sized stone is then washed. After that the lime stone is processed and charged into a kiln where it undergoes a thermal decomposition reaction with the resultant production of calcium oxides and carbon dioxide. This product commonly called burned lime or quick lime.

While there are multiple kiln types in use, **A rotary kiln** consists of a rotating cylinder that sits horizontal on an incline. Limestone is fed into the upper or back end of the kiln, while fuel and combustion air are fired into the lower “front end” of the kiln. The limestone is heated as it moves down the kiln toward the lower end. As the preheated limestone moves through the kiln, it is “calcined” into lime. The next most common type of kiln is the **vertical or shaft, kiln**. This kiln can be described as an upright heavy steel cylinder lined with refractory material. The limestone is charged at the top and is calcined as it descends slowly to discharge at the bottom of the kiln. A primary advantage of vertical kilns over rotary kilns is higher average fuel efficiency. The lime is discharged from the kiln into a cooler where it is used to preheat the combustion air. Lime can either be sold as is or crushed to make hydrated lime.

Quicklime leaving the calcining zone is cooled by direct contact with “cooling air” then processed in size and stored, transported or further processed.

Hydrated lime is made by adding water to crushed or ground quicklime and thoroughly mixing the quicklime and the water. Milk of lime can be produced either by slaking quicklime with an excess of water or by mixing hydrated lime with water.

