

A. Lecturer:

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Masonry Units

A masonry unit is concrete block, glass block, tile, stone, clay brick, those conforming to the requirements specified in the applicable standards.

A **hollow masonry unit** is a masonry unit whose net cross-sectional area in every plane parallel to the bearing surface is less than 75% of the gross cross-sectional area in the same plane. A **solid masonry unit** is a masonry unit whose net cross-sectional area in every plane parallel to the bearing surface is 75% or more of the gross cross-sectional area in the same plane.

Masonry Concrete Blocks:

A masonry concrete block is nowadays replacing bricks in many masonry constructions especially in many multistory buildings. They are extensively used for construction of *load bearing wall* structures and in *partition walls* in reinforced concrete frame works.



Concrete blocks are manufactured and used in three types:

1. Solid Concrete Block.



2. Hollow Concrete Block.



3. Light weight Block.



The quality of concrete blocks used in masonry walls is specified within applicable ASTM standards, **ASTM C 55**.

Concrete blocks are usually **made large in size** so that the block work is **faster and consume less cement in joints than the brick works.**

Concrete masonry units are manufactured in three classes, based on their density: **lightweight units**, **medium-weight units**, and **normal-weight units**, with dry unit weights as shown in Table.

Mass Classifications and Allowable Maximum Water Absorption
of Concrete Masonry Units

Weight Classification	Unit Mass kg/m ³	Maximum Water Absorption kg/m ³ (Average of 3 units)
Lightweight	Less than 1680	288
Medium weight	1680 - 2000	240
Normal weight	2000 or more	208

Well-graded sand, gravel, and crushed stone are used to manufacture normal-weight units. Lightweight aggregates such as pumice, scoria, cinders, expanded clay, and expanded shale are used to manufacture lightweight units.



Lightweight units have higher thermal and fire resistance properties and lower sound resistance than normal weight units.

Advantage of concrete blocks over bricks:

1. One concrete block 400x200x200 mm can replace 8 bricks. Thus, resulting in consideration reduction in cement mortar and speed.
2. Using hollow concrete blocks instead of solid clay bricks in wall construction, leads to reduction in dead load on beams, and foundation, etc., that have been considered in structural design.
3. Cheaper than bricks in overall cost (a very great advantage of blocks).

Disadvantage of concrete Blocks:

- i. Shrinkage (Volume change in all cementitious members) due to movement of moisture which is absent in bricks.
- ii. As blocks are much larger in size than bricks, and foundation movement will cause blocks work to **crack more than the brickwork**. Hence the first important point to remember in block work is that the mortar strength should not be high and it **should not be more than the strength of the blocks**. When the mortar strength is high, the cracks will be few and very large, but with **weak mortar**, they will be small and distributed.
- iii. In construction of blocks, we should use only blocks which have been **cured properly for at least 14 days** and **dried for 2weeks**. All the initial shrinkages should have taken place by them.
- iv. Ordinary unreinforced block work in walls is very weak for resisting lateral loads that are caused due to expansion of roof or due to earthquake and cyclones. Otherwise we have to introduce reinforcements to take care of these lateral loads.

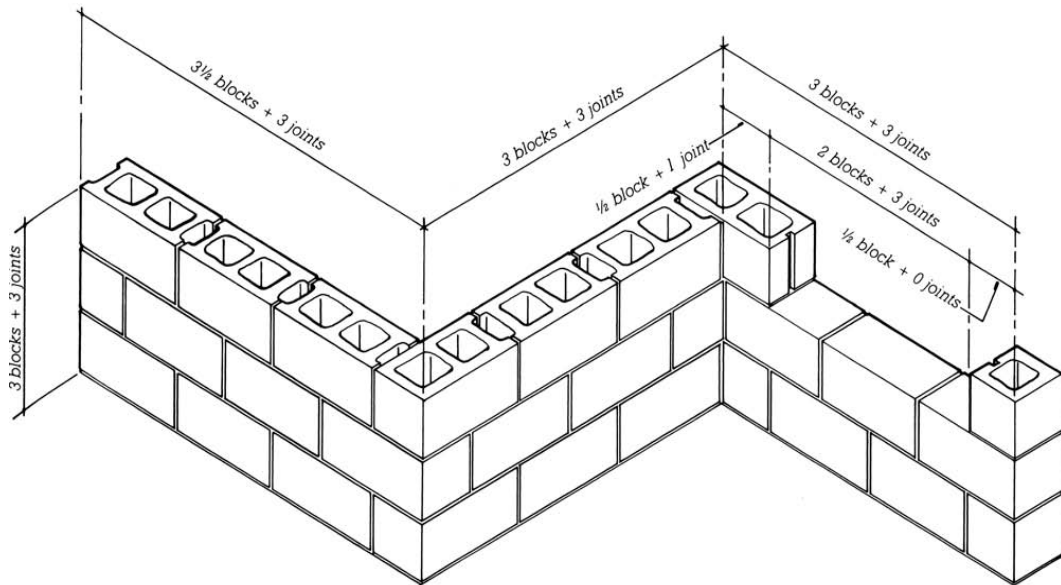
Manufacturing of Concrete Blocks:

The concrete mix for concrete blocks shall not be richer than **one part of cement to six parts of volume of combined aggregate**. Lean (mortar) mixes up to **1:8** also commonly used.

Coarse aggregate of size 6 to 12 mm is generally used. 60 % fine aggregate, 40% coarse aggregate is the mix recommended. They can be made by hand or machine, cured for 14 days and dried for a period of 2 weeks before being used in the work. Freshly made and uncured concrete blocks should not be allowed in the work.



It is more economical and produces better results if the designer lays out buildings of concrete masonry in dimensional units that correspond to the module of the block



Testing of Blocks:

The usual tests prescribed for concrete blocks are as follows:

1. Appearance: must be free from cracks and other defects.
2. Dimensions: the dimensions should conform to the tolerance of ± 3 mm or ± 5 mm in length and ± 3 in height and width.
3. Block density.
4. Compressive strength: a batch of 3 blocks is chosen at random.
5. Water absorption.
6. Dry shrinkage.
7. Moisture content.
8. Soundness.