

**SECTION – VI**  
**MASONRY WORK - CONCRETE BLOCK**

**1.0 GENERAL**

**1.1 Indian Standards**

Work shall be carried out to Indian Standards and Code of practices. In absence International standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference, guidance only. Any discrepancies / conflict noticed shall be directed to the Architect for his direction / approval. However, as a general rule more stringent specification shall take precedence.

- |    |         |  |
|----|---------|--|
| 1. | IS 269  | Specification for ordinary and low heat portland cement grade 33   |
| 2. | IS 383  | Specification for coarse and fine aggregates from natural sources for concrete.  |
| 3. | IS 456  | Code of Practice for plain and reinforced concrete.  |
| 4. | IS 2185 | Specification for concrete masonry units<br>Part – 1 Hollow and solid concrete blocks<br>Part – 2 Hollow and solid light weight concrete blocks<br>Part – 3 Autoclave Cellular (Aerated) concrete blocks   |
| 5. | IS 2572 | Code of Practice for construction of hollow concrete block masonry.  |
| 6. | IS 6041 | Code of practice for construction of autoclave cellular concrete block masonry   |
| 7. | IS 6441 | Method of test for autoclaved cellular concrete products<br>Part – 1 Determination of unit weight or bulk density and moisture content<br>Part – 2 Determination of drying shrinkage<br>Part – 4 Corrosion protection of steel reinforcement of steel reinforcement in autoclave cellular concrete<br>Part – 5 Determination of compressive strength<br>Part – 6 Strength, deformation and cracking of flexural members subject to bending short duration loading test<br>Part – 7 Strength, deformation and cracking of flexural members subjected for bending – sustained loading test |

Part – 8 Loading tests for flexural members in diagonal tension

Part – 9 Jointing of autoclaved cellular concrete elements

8. IS 8112 Specification for ordinary portland cement grade 43.

9. IS 9103 Specifications for admixtures for concrete.

1.2 Quality assurance

1.2.1 Contractor shall procure block from approved concrete block manufacturer.

1.2.2 Block manufacturer should have minimum five years experience in manufacturing of blocks.

1.2.3 Manufacturer shall give certificates that blocks manufactured are of specified minimum crushing strength conforming to IS and are fully cured.

1.2.4 Manufacturer shall confirm materials used and method of casting, required plants, equipments meets conform to IS.

1.3 Submittals

1.3.1 Submit product literature from manufacturer

1.3.2 Certificate of independent laboratory for compressive crushing strength.

1.3.3 Samples of

- Concrete blocks of each size and type
- Ties
- Joint fillers
- Reinforcing joint fillers

## **2.0 MATERIAL**

2.1 Cement

2.1.1 Cement used shall be ordinary Portland cement conforming to IS and shall be of grade 43 or 33.

2.1.2 It shall be received in bags of 50 kg or loose in tankers and each batch shall be accompanied with a test certificate of the factory. Also it shall be tested before use to ascertain its strength, setting time, etc. In case cement has been stored for over 3 months or for any reasons the stored cement shows signs of deterioration or contamination, it shall be tested as per the direction of the Architect prior to use in the works.

2.2 Aggregates

2.2.1 Aggregate shall conform to IS 383 requirements. Coarse aggregate shall be obtained from natural sources such as stone, gravel etc. crushed or uncrushed from approved quarries. Aggregate shall be hard, durable, and clean and free from adherent coatings. Grading shall be as indicated in IS 383. Fineness modules of the combined aggregates shall be between 3.6 and 4.

Coarse aggregates shall be free from harmful materials such as iron, pyrites, coal, mica, shale or similar laminated material, clay, alkali, soft fragments seashells, organic impurities etc. Impurities present within acceptable limits shall not adversely affects strength and durability.

2.2.2 Fine aggregates

Sand shall be hard, durable, clean and free from adherent coatings and organic matter and shall not contain any appreciable amount of clay. Sand shall not contain harmful impurities such as iron, pyrites, coal particles, lignite, mica shale or similar laminated material, alkali, and organic impurities in such form or quantities as to affect the strength or durability of concrete or mortar.

When tested as per IS 2386 part I & II, fine aggregate shall not exceed permissible quantities of deleterious materials as given in IS 383 table1 “Limits of deleterious materials (Aggregate)”.

2.3 Water

2.3.1 Water used for mixing and curing shall be clean reasonably clear and free from objectionable quantities of self's, silts, alkalies, acids etc.

2.3.2 Water tested shall be in accordance with IS 3025. Maximum permissible limits of deleterious materials in water as given in IS 456.

2.4 Concrete block

Concrete blocks may be hollow (open or closed cavity) or solid and shall be referred to by its nominal dimension. The term nominal dimension includes the thickness of the mortar joint. Actual dimensions shall be 10 mm short of the nominal dimensions. Blocks shall be made in sizes and shapes to fit different construction needs. It includes stretcher, corner, double corner or pier, jambs, header, bullnose, partition block and concreted floor units. Nominal dimensions of concrete blocks shall be,

Length - 400, 500, or 600 mm

Height - 200 or 100 mm

Width - 100, 150, 200, 250, or 300 mm

Maximum variations in length shall be 5% in length and 3% in width and height.

Face shells and webs shall not be less than the values given in IS 2185 Part I – Table 1 “Minimum face shell and web thickness”.

2.4.2 Concrete shall be mixed in the mechanical mixer. Blocks shall be moulded, laid and compacted with automatic machines. No hand/manual compaction shall be permitted unless approved by the Architect in writing for special blocks. Care shall be taken to see that the mix is placed in layers and each layer thoroughly tamped until the whole mould is filled up. Blocks shall be protected until they are sufficiently hardened to permit handling without damage.

Blocks shall be cured in the curing yard by keeping them continuously moist for at least 14 days. Steam-cured blocks shall be preferred. Cured blocks shall be allowed to dry for a period of 4 weeks before being used. The blocks shall be allowed to complete their initial shrinkage before they are laid in the wall.

2.4.3 All blocks shall be sound and free of cracks or other defects. For exposed construction face or faces shall be free of chips, or other imperfections, and the overall dimensions of the blocks shall be in accordance to tolerance as specified.

- 2.4.4 Blocks shall be considered as per IS if requirements of conditions mentioned in 11.2 to 11.5 of IS 2185 (Part I) are satisfied.
1. The number of blocks with dimensions outside the tolerance limit and/or with visual defects, among those inspected shall not be more than two.
  2. Density and compressive strength shall be greater than or equal to the minimum limit specified in table 2 of IS 2185 (part I) "Physical requirements (Concrete blocks)".
  3. Drying shrinkage shall not exceed 0.1 percent.
  4. Water absorption shall not be more than 10 percent by mass.
- 2.5 Light weight blocks
- 2.5.1 Light weight cement concrete blocks as manufactured by M/s BILT or equivalent approved. Blocks are manufactured under patent and brand. Blocks sizes are
- a) 650 x 240 x 100 mm
  - b) 650 x 240 x 150 mm
  - c) 650 x 240 x 200 mm
- 2.5.2 Blocks should have minimum crushing strength 15 Kg/Sqcm for 100mm thick blocks and 30 Kg/Sqm for 150mm and 200mm thick blocks
- 2.5.3 Block shall be manufactured conforming to IS 2185 Part-III.
- 2.5.4 All blocks shall be sound and free of cracks or other defects. For exposed construction face or faces shall be free of chips, or other imperfections, and the overall dimensions of the blocks shall be in accordance to tolerance as specified.
- 2.6 Compressed Stabilized Earth Blocks (CSEB)
- 2.6.1 Compressed stabilized earth blocks (CSEB) are manufactured from approved soil mixed / stabilised with small amount of cement (upto 5%), sand and water.
- 2.6.2 The dry compressive strength of CSEB blocks after 28 days of curing varies from 5 to 9 MPa whereas wet compressive strength varies from 3 to 4 MPa (after 24 h. immersion)
- 2.6.3 The dry bending and shear strength after 28 days curing varies from 0.5 to 1 MPa and 0.4 to 0.6 MPa respectively.
- 2.6.4 The water absorption is 8 to 12% after 24 h. immersion whereas the bulk density of these blocks varies from 1800 to 2000 kg/m<sup>3</sup>.
- 2.7 Wired-cut Bricks
- 2.7.1 Bricks shall be sound, hard, well-burnt, uniform in size, shape and colour, homogeneous in texture, giving a metallic ringing sound, free from flaws, cracks, holes, lumps or grit and arises should be square, straight and sharply defined. They shall not break when struck against each other and dropped flat from a height of 1 m to the ground. They shall conform to IS 1077 giving classes of common burnt clay bricks.
- 2.7.2 Bricks shall be as specified and detailed in the BOQ. It shall have to be approved prior to procurement. Bricks shall be obtained from an approved source and shall be of uniform colour, size, and shape. Bricks shall have

smooth rectangular faces with sharp straight right angle edges. Maximum water absorption shall not be more than 12% of its dry weight on immersion in water for 24 hours. Minimum crushing strength shall be 75 Kg/Sq.cm if not specified in the BOQ.

- 2.7.3 Bricks of approved quality and quantity shall have to be procured by the contractor at the desired time. No delay or extra cost due to non-availability shall be accepted. The contractor is obliged to carry out the work as specified. It shall be the responsibility of the contractor to procure sufficient quantities of bricks and stack them at site or elsewhere to avoid delays.

2.8 Admixtures

Additives or admixtures may be added to the cement or concrete mix conforming to the following Indian Standard specifications.

1. IS 9103 Specifications for admixtures for concrete.
2. IS 3812 Specification for fly ash for use as pozzolana and admixture.
3. IS 2645 Specifications for integral water proofing compound.

Other additives or admixtures not being governed by Indian Standards shall be tested and checked that the same are not detrimental to durability. Any usage shall only be after the approval of the Architect.

2.9 Joint Fillers

Bituminous impregnated, premoulded joint filler board shall be of approved quality, manufacturer and conform to IS 1838 Part I.

2.10 Metal reinforcement

Expanded metal used shall comply IS 412.

2.11 Delivery / Storage

- 2.11.1 Load, unload deliver, store all concrete blocks with due care, at site to be free from damage, dirt, intrusion of foreign materials etc.

- 2.11.2 Store all concrete block units on raised solid platforms.

- 2.11.3 Protect block from any excess of weather conditions.

**3.0 SCOPE OF WORK**

Provide, construct with specified strength, quality concrete block masonry conforming to IS Code of Practices, approved method of statement by Architect, including providing levelling course PCC 1:3:6 to adjust with full size blocks, approved mix of mortar, construction and expansion joint fillers, metal reinforcement wherever required of type, size and shape, providing special bond adjusting blocks, reinforced patti (course runner) beams of concrete M 15 required double – legged scaffolds etc complete.

**4.0 WORKMANSHIP**

- 4.1 Concrete blocks shall not be wetted like brick masonry prior to use. In total dry climate top and sides may be slightly moistened to avoid absorption of water from mortar.

- 4.2 Concrete block work shall be laid in English bond. Joints shall not be bigger than 10 mm and will be perfectly horizontal and vertical. Joints shall be raked 10 mm deep while mortar is green.

- 4.3 Cut blocks shall not be used. Special solid precast blocks at site shall be cast well in advance to be used as spacers and to adjust breaking of vertical joints.
- 4.4 Cracks in block masonry are due to shrinkage or expansion of blocks or due to load settlement, thermal expansion or changes in moisture content in the structural members enclosing the block walls. The following measures are recommended to prevent formation of cracks.
- a. While curing, the block masonry should be lightly sprinkled with water and not made excessively wet.
  - b. Expansion joints shall be provided in walls exceeding 30 m in length.
  - c. Reinforcement should be provided in the bed joints in block work, one course above and one course below windows and above doors in order to distribute the shrinkage/ temperature stresses occurring at the corners of openings, more uniformly throughout the walls.
  - d. In framed structures, erection of partition and panel walls should be delayed to take care of deformations due to structural loads.
  - e. Partition walls should be suitably reinforced in lower courses to strengthen against excessive deflections of floor slabs and should be separated from the ceiling by a layer of resilient material. Joint shall be carried out in plaster or any other finish.
- 4.5 Where required damp proof course layer shall be laid as specified.
- 4.6 Exposed faces and corners of masonry damaged during construction shall be removed and repaired as acceptable to Architect.
- 4.7 Scaffolding:
- Scaffolding independent of block work i.e. Double legged scaffolding shall be provided. It should be tied to block work or structure at suitable intervals in both directions. Two rows of planks shall be provided all around. Planks shall be at least 50 mm thick and well-tied to scaffolding. Railing to the outside face shall be provided. While erecting scaffolding, the following points must be noted and closely followed :
1. Minimum number of holes in the horizontal direction.
  2. No holes near the skew backs of arches.
  3. Scaffolding must be sound and strong and easy to maintain.
  4. Holes left must be closed while finishing the plaster.
- 4.8 Raking back shall be carried out at an angle not steeper than 45 degrees in case all the block work is not raised together.
- 4.9 The block should be of full height and no cut pieces shall be allowed. PCC levelling course shall be laid to fill up the gap.
- 4.10 Concrete block masonry shall be anchored by 250x50x3mm thick GI metal strip fixed with GI screws into concrete at every 600mm c/c.
- 4.11 AAC block masonry
- 4.11.1 Laying of AAC block masonry shall be in accordance with the recommendations of IS 6041 of 1985 and IS 1905 of 1987. Proportion of jointing mortar shall be as per BOQ. The mortar shall not be spread so much

ahead of actual laying of the units and consistency shall be maintained at the point of laying.

- 4.11.2 The laying of block may be started either at the corners first or it may be started from one end and proceed to the other direction.
- 4.11.3 Before laying of blocks, all the four side of the wall shall be made wet. Proper spread of mortar in the joints between the blocks
- 4.11.4 The first course of the block masonry shall be laid with great care, making sure that it is properly aligned, leveled and plumbed for laying succeeding courses to obtain a straight and truly vertical wall
- 4.11.5 All the surfaces of the block which comes in contact with cement mortar are wet to have proper bonding
- 4.11.6 To maintain proper cement mortar filling at the sill level, height of masonry to be checked and distribute the same along the joints and if the gap is more same can be adjusted in the bedding mortar. Later the joint can be filled up with jute strips dipped in cement slurry for easy spread of mortar along the width of Block or can be packed with any other resilient material or lean mortar
- 4.11.7 The mortar joint shall be struck off flush with wall surface and when the mortar stiffening, it shall be compressed tightly.
- 4.11.8 Once the masonry erected the curing shall be minimum unlike brick masonry. The curing requires more at the joints.

## **5.0 MEASUREMENT**

AAC, Hollow or solid cement concrete block work shall be measured in square meter for the specified width (thickness of masonry).

## **6.0 RATES**

Rates for items shall include followings -

- a. Material and labour, for the completion of items as specified including any centering, shuttering, curing etc.
- b. Raking out of joints.
- c. Preparing the tops and sides.
- d. Forming and preparing expansion, contraction or construction joints as detailed above or specified in the BOQ or drawings.
- e. Making holes, openings, etc. for outlets, embedding down take pipes, etc. wherever necessary during construction, and finishing exposed surfaces as per instruction of the Architect.
- f. Curing and protection as specified.
- g. Making holes, openings, outlets, etc. embedding pipes, ends of beams, joists, slabs, trusses, sills, etc. whatever required during construction and neatly finishing the exposed surfaces and opening as per instructions of the Architect.
- h. Work at all height, leads, lifts etc.

\* \* \* \* \*

