

## **Chapter 6**

### **STONE WORK**

**6.0 Terminology**

**6.1 Stone Masonary**

**6.2 Hollow and Solid Concrete Blocks**

## 6. STONE WORK

### List of Relevant Bureau of Indian Standard codes to be followed

S. No.	IS. No.	Subject
1.	IS: 737	Wrought aluminium and aluminium alloy, steel and strip for general engineering purpose.
2.	IS: 1121-(Part1)	Methods of test for determinations of properties and strengths of natural building stones (Part 1-compressive strength).
3.	IS: 1122	Methods of test for determination of specific gravity of natural building stones.
4.	IS: 1123	Methods of identification of natural building stones.
5.	IS: 1124	Methods of test for determination of water absorption, apparent specific gravity and porosity of natural building stones.
6.	IS: 1125	Methods of test for determination of weathering of natural building stones.
7.	IS: 1126	Methods of test for determination of durability of natural building stones.
8.	IS: 1128	Lime stones (slab & tiles).
9.	IS: 1129	Recommendations for dressing of natural building stones.
10.	IS: 1200 (Part 4)	Methods of measurements of building and Civil engineering works: Part 4: Stonemasonry.
11.	IS: 1597 (Part 1)	Code of practice for construction of rubble stone masonry: Part 1: Rubble Stone masonry.
12.	IS: 1597(Part 2)	Code of practice for construction of ashlar stone masonry : Part 2 : Ashlar masonry
13.	IS: 1805	Glossary of terms relating to stones, quarrying and dressing.
14.	IS: 2185-(Part 1)	Concrete masonry units: Part 1 : Hollow and solid concrete blocks.
15.	IS: 2572	Code of Practice for construction of hollow concrete block masonry.
16.	IS: 3620	Laterite stone block for masonry.
17.	IS: 3622	Sand stone (slab & tiles)
18.	IS: 4101-(Part 1)	Code of practice for external facings and veneers: Part 1 Stone facing.
19.	IS: 4101-(Part 2)	Code of practice for external facings and veneers: Part 2: Cement concrete facing.

### 6.0 TERMINOLOGY

#### Ashlar

Stone masonry using dressed block of given dimensions having faces perpendicular to each other and laid in courses.

#### Bed Joint

The joint where one stone presses on another for example, a horizontal joint in a wall or radiating joint between the voussoirs or arch.

**Block****(a) Hollow (Open and dosed cavity) block**

A concrete masonry unit with any one of the external dimension greater than the corresponding dimension of a brick and having one or more large holes or cavities which either pass through the block (open cavity) or do effectively pass through the block (closed cavity) and having the solid material between 50% and 75% of the total volume of the block calculated from the overall dimensions.

**(b) Solid Block**

A concrete masonry unit with external dimensions greater than corresponding dimension of a brick and having solid material not less than 75% of the total volume of the block calculated from over all dimension.

**Bond**

An interlocking arrangement of structural units in a wall to ensure stability.

**Bond Stone (Through stone)**

Selected long stone used to hold a wall together transversely.

**Corbel**

Stone bonded well into the wall with part of it projecting out of the face of wall to form bearing surfaces.

**Cornice**

A horizontal moulded projection which crown or finishes either a wall, any horizontal division or wall, or any architectural feature.

**Cramp**

A small piece of metal or the hardest or toughest stone procurable sunk in mortices and fixed across joints as additional ties. The ends of metal are bent at right angles and stone cramps a dovetailed.

**Course**

A layer of stones in wall including the bed mortar

**Dowels**

Dowels are small sections of metal, stone pebbles bedded with mortar in corresponding mortice in bed or side joint or adjacent stones.

**Jamb**

The part of the wall at the side of an opening

**Joggle**

A key between the stones by providing a groove in one stone to take a corresponding concealed projection in the edges on the other stone .

**Natural Bed**

The planes of stratification that occurs in sedimentary rocks.

**Parapet**

A solid or pierced guard wall for flat stone terrace or balcony (or a bridge) or a

curb wall at the lower part of a pitched roof which is exposed to atmosphere on face back and top.

**Quoin**

A quoin is the external angle of wall or building. The term is also applied to stone specially selected and neatly dressed for forming such angle.

**Random**

Random or irregular size and. shapes.

**Reveal**

The part of the jamb between the frame and the arris.

**Rubble Masonry**

Masonry built of stones either irregular in shapes as quarried or squared and only hammer dressed and having comparatively thick joints. As far as possible, stones for rubble masonry shall be angular.

**Skewback**

Sloping surface against which the springing of an arch rests.

**Spandrel**

Space between the haunches below the decking level.

**String Course**

A horizontal band, plain or moulded, usually projecting slightly from the face of wall.

**Surfacing or Dressing of Stones**

The stones are dressed to have different surfaces as indicated below.

**Template or Bed Block**

A block of stone or concrete bedded on a wall to & distribute the pressure from a concentrated load.

**Self Faced Surfaces**

Surfaces of stone slabs used for roofing, flooring, lintels etc. as obtained from quarry.

**Squared Back Surface**

Means the surface shall be dressed back at right angles to the face of the stone.

**Chisel Drafted Margin**

The dressing done with a drafting chisel in narrow strips of width generally 2 to 5 cm. Chisel drafted margin shall be punch dressed.

**Hammer Dressed Surface**

A hammer dressed stone shall have no sharp and irregular corners and shall have a comparatively even surface so as to fit well in masonry. Hammer dressed stone is also known as hammer faced, quarry faced and rustic faced. The bushing from the general wall face shall not be more than 40 mm on exposed face and 10 mm on faces to be plastered.

**Rock Faced Surface**

A rock faced stone shall have a minimum of 25 mm wide chisel drafted margin at the four edges, all the edges being in the same plane.

**Rough Tooled Surface**

A rough tooled surface shall have a series of bands, made by means of a plane chisel 4 to 5 cm wide, more or less parallel to tool marks all over the surface. These marks may be either horizontal, vertical or at an angle of 45° as directed. The edges and corners shall be square and true. The depth or gap between the surface and straight edge, held against the surface shall not be more than 3 mm (Rough tooled stones are used where fairly regular plane faces are required for masonry work).

**Punched Dressed Surface**

A rough surface is further dressed by means of a punch chisel to show series of parallel ridges. The depth of gap between the surface and a straight edge held against the surface shall not exceed 3 mm. Punched dressed stones are used where even surfaces are required.

**Close Picked Surface**

A punched stone is further dressed by means of point chisel so as to obtain a finer surface, ridges or chisel marks left over being very tiny. The depth of gap between the surface and a straight edge kept over the surface shall not exceed 1.5 mm.

**Fine Tooled Surface**

Close picked surface is further dressed so that all the projections are removed and fairly smooth surface is obtained. The surfaces shall have 3 to 4 lines per centimeter width depending on the degree of hardness of stone and degree of fineness required. This type of dressing is commonly adopted for ashlar work.

**Polished Surface**

Surfaces having a high gloss finish. Polishing of stones shall be done by rubbing them with suitable abrasive, wetting the surface where necessary with water. Alternatively polishing of stones shall be done by holding them firmly on the top of revolving table to which some abrasive material like sand or carborundum is fed. The final polishing shall be performed by rubber or felt, using oxide of lime (called by trade name as putty powder) as a polishing medium.

**Moulded**

Cut to profile of a moulding with punched dressed surfaces, unless otherwise specified.

**6.1 STONE MASONRY:****STONES FOR RUBBLE MASONRY:****Quality:**

All stones used for building purposes shall be strong hard and durable.

**Durability:**

The stone shall be free from defects like cavities, cracks, flaws, sand holes, veins, patches of soft or loose materials, etc. The percentage of water absorption (see IS: 1124 for the method of test) shall generally not exceed 5 percent. Generally the stone should not contain crypto crystalline silica or chert, mica or any other deleterious material like iron oxide, organic impurities etc.

**Size of stone:**

Normally stones used in rubble masonry should be small enough to be lifted and placed by hand. The length of the stone shall not exceed three times the height and the breadth on base shall not be greater than three-fourths of the thickness of wall nor less than 15cm. The height of stone for rubble masonry may be upto 30cm.

NOTE: The selection and grading of stones for rubble masonry work is largely done at site and the smaller stones are used in the hearting of the wall. Large-scale supply will be facilitated if, as far as possible, preferred sized for building stone are used as covered in IS:1127.

**TYPES OF RUBBLE MASONRY:****RANDOM RUBBLE:**

Uncoursed: This type of masonry is constructed of stones as they come from the quarry. The mason or waller selects blocks of all shapes and sizes, more or less at random, and places them in position to obtain a good bond, while restricting cutting of the stones to the removal of inconvenient corners with a scrabbling or spalling hammer.

Brought to courses: This walling is similar to uncoursed random rubble except that the work is roughly levelled up to courses at intervals varying from 30cm to 90cm in height according to the locality and the type of stone used. The course heights usually correspond with the heights of the quoin and jamb stones.

**SQUARED RUBBLE:**

Uncoursed: In this type, the stones are roughly squared as risers or jumpers and stretchers with varying heights, and are laid uncoursed.

Brought to courses: The stones are similar to those used for uncoursed rubble but the work is levelled up to courses of varying depth from 30cm to 90cm according to the locality and the type of stone used.

Coursed (first and second sort): Coursed walling is built in courses which may vary in height from 10 to 30 cm but the stones in any one course are roughly squared to the same height. The faces of the stones may be pitched to give a rock face appearance or may be dressed smooth. A variant of this type of walling may be formed by the introduction of pinnings, that is, smaller stones in the same courses, at intervals, producing a chequered effect.

### POLYGONAL RUBBLE WALLING:

Stone with no pronounced stratification is roughly hammer-pitched into irregular polygonal shapes, and bedded to show the face-joints running irregularly in all directions.

### GENERAL REQUIREMENTS FOR RUBBLE MASONRY:

#### DRESSING OF STONES:

The dressing of stone shall be as specified for individual types of masonry work and it shall also conform to the general requirements for dressing of stone covered in IS:1129. Other specific requirements are covered separately with respect to particular types of rubble stone work.

#### SCAFFOLDING:

Single scaffolding, except as mentioned hereafter having one set of vertical support shall be used and the other end of the horizontal scaffolding member shall rest in a hole provided in the masonry. The support shall be sound and strong tied together with horizontal pieces over which the scaffolding planks shall be fixed. The holes which provide resting space for horizontal members shall not be left in pillars less than one metre in width or immediately near the skew backs of arches. The holes left in the masonry work for supporting the scaffolding shall be filled and made good before plastering. The scaffolding shall be strong enough to withstand all loads likely to come upon it and shall meet the requirements specified in IS:2750.

For pillars less than one metre width or for first class masonry or for a building having more than two storeys, double scaffolding having two sets of vertical support shall be provided.

#### WATERING:

Stones shall be sufficiently wetted before laying to prevent absorption of water from mortar.

#### LAYING OF STONES:

The stone shall be laid so that the pressure is always perpendicular to the natural bed.

The courses (if any) shall be built perpendicular to the pressure which the masonry will bear. In case of battered walls, the base of stone and the plane of course (if any) shall be at right angles to the batter.

NOTE - In the case of a bridge pier having batter on both sides, the courses shall be horizontal.

In the case of coursed rubble masonry, if the heights of the courses vary the largest stone shall be placed in the lowest course, the thickness of courses shall also decrease gradually to the top.

Vertical joints shall be staggered as far as possible.

Bell shaped bond stones or headers shall not be used.

All necessary chases for joggles, dowels, and cramps should be formed in the stones before hand.

Sufficient transverse bonds shall be provided by the use of bond stone extended from the front to the back of the wall and from outside wall to the interior, of thick walls and in the latter case bond stones shall overlap each other in their arrangements.

At all angular junctions the stones at each alternate course shall be well bonded into the respective courses of the adjacent wall.

Where there is a break in masonry work the masonry shall be raked in sufficiently long steps for facilitating joining of old and new work. The stepping of the raking shall not be more than 45 degrees with the horizontal. Masonry construction with too thin faces, tied up with occasional through stones or filled up with dry packing or small size aggregates shall be strictly prohibited.

The walls and pillars shall be carried up truly plumb or to specified batter.

Storey rods showing the heights of all doors and windows and other necessary information should be used at the time of construction of masonry.

#### FIXING OF FRAMES:

Where door or window frames of timber are fixed in the openings, the fixing shall be done generally with hold-fasts of adequate size and strength, securely embedded in the stone work preferably in chases filled up by cement concrete. Iron holdfasts shall be given a protective coat of bitumen to avoid rusting. Wood work faces in contact with stone work shall be treated with wood preservatives to prevent attack from insects and termites. The frames shall preferably be fixed simultaneously as the masonry work proceeds, as this construction will ensure proper bond without gaps between the masonry and the frames.

#### BEARING OF FLOORS, ROOFS AND JOINTS:

It is not desirable to embed any structural timber in stone work as it is liable to be affected by dry rot. The ends of timber joists shall preferably rest on corbels or brackets but when built into a wall these shall be treated with preservative and in addition, space shall be left around them for free circulation of air. The ends of beams carrying heavy loads and of trusses shall be supported on templates of concrete or stone. Bed blocks should be set true to level and bedded in the same mortar as that used for walling. The ends of the steel beams or trusses embedded in masonry shall be built in with space all round for repainting or shall be protected



with a thick bituminous coat or shall be encased in rich concrete of mix 1:2:4. The end shall be generally supported on templates of plain or RCC of mix 1:2:4 or stone.

NOTE - In case of timber ground floor, the ends of the open-spaced joists supporting the floor boards should be nailed to wall plated on top of 12.5cm walling, built either as an offset to wall or as a separate sleeper wall.

#### JOINTING AND POINTING:

All joints shall be full of mortar. Pointing shall be avoided as far as possible, but where unavoidable it shall be carried out as the work proceeds using the same mortar as for bedding. If carried out by raking out the joint later on after hardening, specially prepared mortars shall be used. The maximum thickness of joints shall be 20mm for random rubble and 10mm for square rubble.

#### CURING:

Green work shall be protected from rain by suitable covering. Masonry work and cement of composite mortar shall be kept constantly moist on all the faces for a minimum period of seven days. The top of the masonry work shall be left flooded with water, with the close of the day. Watering shall be done carefully so as not to disturb or wash out green mortar and use of perforated rose spout may be suitable. In the case of lime mortar, curing should commence two days after the laying of masonry and shall continue for seven days.

#### CONSTRUCTION OF STONE MASONRY:

##### RANDOM MASONRY (UNCOURSED AND BROUGHT TO COURSE):

##### Dressing:

Stone shall be hammer-dressed on the face, the sides and the beds to enable it to come in proximity with the neighbouring stone. The bushing on the face shall not be more than 4cm on an exposed face.

##### Insertion of Chips:

Chips and spalls of stones shall be used wherever necessary to avoid thick mortar beds or joints and it shall also be ensured that no hollow spaces are left anywhere in the masonry. The chips shall not be used below hearting stones to bring these up to the level of face stones. The use of chips shall be restricted to the filling of interstices between the adjacent stones in hearting and these shall not exceed 20 percent of the quantity of a stone masonry.

##### Hearding stones:

The hearting or interior filling of a wall face shall consist of rubble stones not less than 15cm in any direction, carefully laid, hammered down with a wooden mallet into position and solidly bedded in mortar. The hearting should be laid nearly level with facing and backing.

**Bond stones:**

Though bond stones shall be provided in walls up to 60cm thick and in case of walls above 60cm thickness, a set of two or more bond stones overlapping each other by least 15cm shall be provided in a line from face to back. In case of highly absorbent types of stones (porous lime stone and sand stone etc) the bond stone shall extend about two-third into the wall, as through stones in such cases may give rise to damp penetration and, therefore, for all thickness of such walls a set of two or more bond stones overlapping each other by a least 15cm shall be provided. Each bond stone or a set of bond stones shall be provided for every 0.5sqm of the wall surfaces.

**Quion Stone:**

Quion stone shall not be less than 0.03 cum in volume.

**Plum Stone:**

Plum stones at about 90cm interval shall be provided.

**Laying:**

The masonry shall be laid with or without courses as the case may be as per general requirement. The quions shall be laid header and stretcher alternatively. Every stone shall be carefully fitted to the adjacent stone so as to form neat and close joint. Face stone shall extend and bond well in the back. These shall be arranged to break joints, as much as possible, and to avoid long vertical lines of joints.

**SQUARE RUBBLE - COURSED RUBBLE (FIRST SORT):****Dressing:**

Face stone shall be hammer-dressed on all beds and joints so as to give them approximately rectangular shape. These shall be square on all joints and beds. The bed joints shall be chisel drafted for at least 8cm back from the face and for the side joints at least 4cm. No portion of the dressed surface shall show a depth of gap more than 6mm from a straight edge placed on it. The remaining unexposed portion of the stone shall not project beyond the surface of bed and side joints. The requirements regarding bushing shall be same as for random rubble masonry.

**Hearting Stones:**

The hearting or the interior filling of the wall shall consist of flat bedded stone carefully laid on their proper beds in mortar. The use of chips shall be restricted to the filling of interstices between the adjacent stones in hearting and these shall not exceed 10 percent of the quantity of masonry. While using chips it shall be ensured that no hollow spaces are left anywhere in the masonry.

**Bond Stones:**

The requirements regarding through or bond stone shall be same as for random rubble masonry but these shall be provided at 1.5m to 1.8m apart clear in every course.

**Quion Stone:**

The quions which shall be of the same height as the course in which these occur, shall not be less than 45cm in any direction.

**Face Stone:**

Face stone shall tail into the work for not less than their heights and at least one thirds of the stones shall tail into the work for a length not less than twice their height. These should be laid headers and stretchers alternately.

**Laying:**

All courses shall be laid truly, horizontal and all vertical joints shall be truly vertical. The quoin stones shall be laid stretchers and headers alternatively and shall be laid square on their beds, which shall be rough chisel dressed to a depth of at least 10cm.

**3.4.3 SQUARE RUBBLE COURSED RUBBLE (SECOND SORT):**

All requirements are the same as for coursed rubble masonry (first sort) except that no portion of dressed surface of joints shall show a depth of gap more than one cm from a straight edge placed on it and use of chips shall not exceed 15 percent of quantity of the stone masonry.

**SQUARE RUBBLE - UNCOURSED RUBBLE:**

All requirements are the same as for coursed rubble masonry (first sort) except that stones (risers of jumpers and stretchers), which are of varying heights are laid uncoursed and in general, the risers shall not be more than 25cm in height and stretchers shall not exceed two-thirds the height of the adjoining risers.

**SQUARE RUBBLE - BROUGHT TO COURSES:**

All requirements are the same as for square rubble uncoursed except that the work is levelled up to courses of varying depth from 30cm to 90cm and the courses usually correspond with the quion or jamb stone.

**POLYGONAL RUBBLE WALLING:**

All requirements are the same as for course rubble masonry (first sort) except that masonry is not laid in courses and more or less regular polygon shaped stones are used instead of square rubble.

## 6.2 HOLLOW AND SOLID CONCRETE BLOCKS

### 6.2.1 Scope

This section covers the requirements for hollow and solid concrete block masonry work in walls, partitions, parapets and any such work covered in general building work.

Hollow and solid concrete blocks – Shall conform to the requirements of IS: 2185. Specification for hollow and solid concrete blocks except with regard to the mix of cement concrete and sizes of aggregates which shall be as indicated. Hollow blocks shall be sound, free from cracks, broken edges, honey combing and other defects that would interfere with the proper placing of block or impair the strength or performance of construction.

### 6.2.2 Applicable codes

The provisions of the following Indian Standard Specification shall form a part of this specification to the extent they have been referred to and are applicable with:

IS : 269	Specifications for ordinary rapid hardening and low heat Portland cement.
IS: 2116	Specifications for sand for masonry mortar
IS: 2250	Code of Practice for preparation and use of masonry mortars
IS: 2185	Specifications for concrete masonry units
(Part - 1)	
IS: 2572	Code of Practice for construction of hollow concrete block masonry
IS: 1905	Code of Practice for structural safety of buildings - masonry walls

### 6.2.3 Dimensions and Tolerances

Concrete masonry building units shall be made in sizes and shapes to fit different construction needs. They include stretcher, corner, double corner or pier, jamb, header, bull nose, and partition block, and concrete floor units.

Concrete Block-hollow (open or closed cavity) or solid shall referred to by its nominal dimensions.

The nominal dimensions of concrete block shall be, as follows:

**Length:** 400, 500 or 600 mm

**Height:** 200 or 100 mm

**Width:** 50, 75, 100, 150, 200, 250 or 300 mm

In addition, block shall be manufactured in half lengths of 200, 250 or 300 mm to correspond to the full lengths.

The maximum variation in the length of the units shall be not more than  $\pm 5$  mm and maximum variation in height and width of unit, not more than  $\pm 3$  mm.

## 6.2.4 Classification

### 6.2.4.1 Hollow (Open and closed cavity) Concrete Blocks

The hollow (open and closed cavity) concrete blocks shall conform to the following three grades:

- a) Grade 'A': These are used as load bearing units and shall have a minimum block density of 1500 kg/m<sup>3</sup>. These shall be manufactured for minimum average compressive strengths of 3.5, 4.5, 5.5 and 7.0 N/mm<sup>2</sup> respectively at 28 days
- b) Grade 'B': These are also used as load bearing units and shall have a block density less than 1500 kg/m<sup>3</sup> but not less than 1000 kg/m<sup>3</sup>. These shall be manufactured for minimum average compressive strengths of 2.0, 3.0 and 5.0 N/mm<sup>2</sup> respectively at 28 days.
- c) Grade 'C': These are used as non-load bearing units and shall have a block density less than 1500 kg/m<sup>3</sup> but not less than 1000 kg/m<sup>3</sup>. These shall be manufactured for minimum average compressive strength of 1.5 N/mm<sup>2</sup> at 28 days.
- d) Grade 'D': The solid concrete blocks are used as load bearing units and shall have a block density not less than 1800 kg/m<sup>3</sup>. These shall be manufactured for minimum average compressive strengths of 4.0 and 5.0 N/mm<sup>2</sup> respectively.
- e) Physical Requirements
- f) Compressive Strength: The average crushing strength of eight blocks, when determined in accordance with IS: 2185 shall be not less than as per the standard.

**Drying Shrinkage:** The drying shrinkage of the blocks (average of three blocks), when unrestrained, shall be determined in accordance with IS: 2185 and shall not exceed 0.1 per cent.

**Moisture Movement:** The moisture movement (average of three blocks), when determined in the manner described in IS: 2185, shall not exceed 0.09 per cent.

**Water Absorption:** The water absorption (average of three blocks), when determined in the manner described in IS: 2185 shall be not more than 10 per cent by mass.

Face shells and webs shall increase in thickness from the bottom to the top of the unit. Depending upon the core moulds used, the face shells and webs shall be flared and tapered or straight tapered, the former providing a wider surface for mortar. The thickness of the face shell and web shell be not less than the valued given in Table below.

**Table 3: Minimum Face Shell and Web Thickness**

<b>Nominal Blocks Width</b>	<b>Face shell Thickness, Min.</b>	<b>Thickness of Web, Min.</b>	<b>Total Web Thickness per Course in any 200 mm length of Walling Min.</b>
(1)	(2)	(3)	(4)
100 or less	25	25	25
Over 100 to 150	25	25	30
Over 150 to 200	30	25	30
Over 200	35	30	38

Subject to the tolerances specified and the provisions of the face masonry units shall be flat and rectangular, opposite face shall be parallel, and all arises shall be square. The bedding surfaces shall be at right angles to faces of the blocks.

Blocks with special faces shall manufactured and supplied as directed by Engineer-in-Charge.

### **6.2.5 Materials**

#### **Masonry Units:**

Hollow concrete blocks used as masonry units shall conform to IS:2185. Grade A and B units shall be used in load bearing structures and Grade C in non-load bearing structures. The Contractor shall submit samples and have these tested and submit the test results for approval prior to the commencement of work.

#### **Cement:**

Cement for mortar shall conform to IS: 269 generally.

#### **Sand:**

Sand shall conform to IS: 2116

#### **Water:**

Water shall conform to the requirements given in C. 3.2.5 of IS: 2116

#### **Mortar:**

Mortar shall be composed of cement and sand unless otherwise specified in the Bill of quantities.

All mortar shall be prepared in accordance with IS: 2250 and shall have a slump of 75 mm when tested as per IS: 1199.

### 6.2.6 Preparatory work

6.2.6.1 The blocks need not be wetted before or during laying in the walls. In case the climatic conditions so require, the top and the sides of the blocks may only be slightly moistened so as to prevent absorption of water from the mortar and ensure the development of the required bond with the mortar.

#### 6.2.6.2 Wetting of Blocks

Blocks need not be wetted before or during laying in the walls. In case the climate conditions so require, the top and the slides of the blocks may only be slightly moistened so as to prevent absorption of water from the mortar and ensure the development of the required bond with the mortar.

### 6.2.7 Laying

6.2.7.1 Only skilled and experienced masons shall be employed for laying the block masonry. The first course shall be laid with great care, making sure that it is properly aligned, leveled and plumped, as this will assist the mason in laying in succeeding courses to obtain straight and truly vertical wall.

6.2.7.2 Before laying the first course, the alignment of the wall shall be marked on the footings. A string shall be stretched tightly along the faces of the two corner blocks and the intermediate blocks adjusted to be in the same line. Then each of the intermediate blocks shall be laid over a bed of mortar. After every three or four blocks have been laid, their correct level, alignment and vertically shall be checked.

6.2.7.3 The construction of walls may be started either at the corners first or from one end proceeding in the other direction. If the corners are built first, they shall be four or five courses higher than the center of the wall. The blocks at corners shall be checked for true alignment, level and being in plumb. A storey rod, course pole and masons level shall be used to check the top of masonry in each course.

6.2.7.4 All the mortar joints shall be 10 mm thick. Mortar shall not be spread too far ahead of the actual laying of the block. After laying each block, the excess mortar extruding from the joints shall be cut off with the trowel and thrown back on the mortar board to be re-worked into fresh mortar. Dead mortar that has been picked up from the scaffold or from the floor shall not be used.

6.2.7.5 Blocks shall be laid in mortar, as indicated and thoroughly bedded in mortar, spread over the entire top surface of the previous course of blocks to a uniform layer of not less than 10 mm and not more than 12 mm in thickness.

6.2.7.6 All courses shall be laid truly horizontal and all vertical joints made truly vertical. Blocks shall break joints with those above and below for not less than quarter of their length. Precast half length closers (and not cut from full size blocks) shall be used. For battered faces, bedding shall be at right angles to the face unless otherwise directed. Care shall be taken during construction to see that edges of blocks are not damaged.

**6.2.8 Special provisions:****6.2.8.1 Closure blocks**

When installing closure block, all edges of the opening and all four vertical edges of the closure block shall be buttered with mortar. The closure block shall be carefully block shall be buttered with mortar. The closure block shall be carefully lowered into place if any of the mortar falls out leaving an open joint, the closure block shall be removed, fresh mortar applied and the operation repeated.

**6.2.8.2 Sills**

A course of solid concrete block masonry or 100 mm thick precast concrete sill blocks extending 200 mm beyond the end of opening shall be provided under door, window and ventilator openings.

**6.2.8.3 Wall crossings**

When two walls meet or intersect shall be bonded or tied securely. When both the walls are laid at a time, true masonry bond between at least 50 % of units shall be ensured. When they are laid separately, pockets with 200 mm maximum vertical spacing shall be left in the wall which is laid first.

**6.2.9 Curing**

Green work shall be protected from rain by suitable covering masonry work, as it progresses shall face for at least 14 days after completion. Proper watering cans with nozzles shall be used for the purpose.

**6.2.10 Scaffolding**

Double scaffolding sufficiently strong to withstand all the likely loads to come upon it and having two sets of vertical supports shall be provided. Where two sets of supports are not possible the inner end of the horizontal scaffolding pole shall rest in a hole provided in the wall. Such pole shall rest in a hole provided in the wall. Such holes however shall not be allowed in pillars under one meter in width or immediately near the skew backs of arches. Such holes shall be filled immediately after removal of scaffolding with 1:4:8 concrete.

**6.2.11 Provisions for Door and Window Frames**

A course of solid concrete block masonry shall be provided under door and window openings (or a 10 cm thick precast concrete sill block under windows). The solid course shall extend for at least 20 cm beyond the opening on either side. For jambs of very large doors and windows either solid units are used, or the hollows shall be filled in with concrete of mix 1:3:6 using 12.5 mm nominal size aggregates.

**6.2.12 Provisions for Roof**

The course immediately below the roof slab shall be built with solid blocks. The top of the roof course shall be finished smooth with a layer of cement and coarse sand mortar 1:3, 10 mm thick and covered with a thick coat of white wash or crude oil, to ensure free movement of slab.



**6.2.13 Intersecting Walls**

When two walls meet or intersect and the courses are to be laid up at the same time, a true masonry bond between at least 50% of the units at the intersection is necessary. When such intersecting walls are laid up separately, pockets with 20 mm maximum vertical spacing shall be left in the first wall laid. The corresponding course of the second wall shall be built into these pockets.

**6.2.14 Piers**

The top course of block in the pier shall be built in solid blocks. Hollow concrete block shall not be used for isolated piers, unless their hollows are specified to be filled with cement concrete.

Fixtures, fittings, etc. shall be built into the masonry in cement and coarse sand mortar 1:3 while laying the blocks where possible. Hold fasts shall be built into the joints of the masonry during laying.

Holes, chases, sleeves, openings, etc. of the required size and shape shall be formed in the masonry with special blocks while laying, for fixing pipes, service lines, passage of water etc. After service lines, pipes etc. are fixed, voids left, if any, shall be filled up with cement concrete 1:3:6 (cement : 3 coarse sand : 6 stone aggregate 20 mm nominal size) and neatly finished.

**6.2.15 Finishes**

Rendering shall not be done to the walls when walls are wet. Joints for plastering or pointing a specified shall be raked to a depth of 12 mm.

Joints on internal faces, unless otherwise indicated, shall be raked for plastering. If the internal faces of masonry are not to be plastered the joints shall be finished flush as the work proceeds pointed flush where so indicated.

**6.2.16 Measurements and payment**

The quoted rate shall be per cum of masonry, the thickness bedding specified.

Measurement shall be based on the actual quantities at the site limited however by the Drawings and directions of the Engineer.

The quoted rate shall cover the supply of all materials, labour, tools, plant and equipment, scaffolding and temporary works and all other incidental work required to complete the work in accordance with the above specifications.

No deductions shall be made for openings less than 01. Sqm in area. The quoted rate is deemed to include all such work including fine, projections, etc. shown in the Drawings.

For single storeyed buildings, the hollow of blocks in foundation and basement masonry shall be filled up with sand and only to the foundation course shall be of solid blocks. But for two or more storeyed buildings, solid concrete blocks shall be used in foundation courses, plinth, and basement walls, unless otherwise indicated. If hollow blocks are used, their hollows shall be filled up with cement concrete 1:3:6 using 12.5 mm nominal size aggregates.