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HINDUSTAN PETROLEUM CORPORATION LIMITED

GURU GOBIND SINGH REFINERY PRODUCTS EVACUATION PROJECT (GGSRPEP)

SPECIFICATIONS FOR MASONRY WORK

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1. SCOPE

This specification covers the material and workmanship requirements for the following masonry works in foundations, substructure, parts of super-structure, security wall, nibble soling for floors on grade, etc. as applicable. This specification also defines the materials and workmanship requirements for pointing and plaster.

- i. Brick masonry
- ii. Stone masonry
- iii. Precast concrete block masonry
- iv. Allied works

All masonry work shall be true to line and level as shown on drawings and shall be tightly built against structural members and bonded with dowels, inserts, etc-, as shown in drawings.

2. REFERENCE DOCUMENTS

2.1 Codes and standards

The Indian Standards and other referred standards (including all amendments and revisions) shall be considered as part of this Specification. In case any particular aspect of work is not covered specifically by these or any other relevant Indian Standard Specification, any other good engineering practice as may be specified by the company shall be followed:

Following Indian standards including all amendments and revisions shall be considered as part of this specification.

IS 269 Specification for 33 grade ordinary Portland cement

IS 456 Code of Practice for Plain & Reinforced Concrete

IS 1077 Specification for Common Burnt Clay Building Bricks

IS 1123 Specification for Method of- Identification of Natural Building Stones.

Specification for Method of Test For Determination of Water Absorption. Apparent Specific Gravity and Porosity of Natural Building Stones.

IS 1127 Recommendations for Dimensions and Workmanship of Natural Building Stones for Masonry Work

IS 1129 Recommendation for Dressing of Natural Building Stones.

IS 1200 Indian Standard for Method of Measurement of Building and Civil Engineering Works, (Part 3 - Brickwork: Part 4 - Stone

IS 1397 Indian Standard Specification for Kraft paper.

IS 1597(Parts 1 & 2) Code of Practice for Construction of Stone Masonry

IS 1661 Code of Practice for Application of Cement and Cement Lime Plaster Finishes

IS 1725 Specification for Soil Based Blocks used in General Building



Construction.

IS 1905 Indian Standard Code of Practice For Structural use of Reinforced Masonry.

IS 2116 Specification of Sand for Masonry Mortar.

IS 2180 Specification for Heavy duty burnt-clay building bricks. IS 2185 Concrete masonry Units

Part 1: Hollow and Solid concrete blocks

Part 2: Hollow and solid light weight concrete blocks. Part 3: Autoclaved cellular Aerated concrete blocks.

IS 2212 Code of Practice for Brick work

IS 2250 Code of Practice for Preparation and Use of Masonry Mortars.

IS 2386 Method of Test for Aggregates for Concrete :

Part 1: Particle size and shape.

Part 2: Estimation of deleterious materials and organic impurities. Part 3: Specific gravity, density, voids, absorption and bulking.

IS 2402 Code of practice for External Rendered Finishes.

IS 2572 Code of practice for Construction of hollow concrete block masonry

IS 2645 Specification for Integral Cement Water Proofing Compounds.

IS 2691 Indian Standard Specification for Burnt Clay Facing Bricks.

Methods of sampling and test (physical and chemical) for water used in industry.

IS 3316 Specification for Structural granite.

IS 3495(Parts 1 to 4) Methods of Tests of burnt Clay Building Bricks.

IS 3620 Specification for Laterite stone block for masonry.

IS 3696 Indian Standard Safety Code of Scaffolds and Ladders (Part 1 – Scaffold

Part 2 - Ladders)

IS 5454 Methods of Sampling of Clay Building Bricks

IS 6042 Code of Practice for Construction of lightweight concrete masonry.

IS 8112 43 grade ordinary Portland cement various applicable standards.



2.2 Other Standards / specifications

Specification for Concrete Work.

3. MATERIALS

3.1 General

Material to be used for masonry shall comply with the IS codes listed in section 2.

Water used for mixing and curing shall be clean and free from injurious amount of oils, acids, alkalis, salts, sugar, organic materials or other substances that may be deleterious for the masonry or concrete surfaces. Permissible limits for solids tested according to IS 3025 shall be as given in Table 1 of IS 456.

3.2 Sand for Masonry and for Plaster

Sand or fine aggregate shall consist of natural sand, crushed stone sand or crushed gravel sand or a combination of any of these. Sand shall be hard, durable, clean and free from adherent coatings and organic matter and shall not contain the amount of clay, silt and fine dust more than specified as given in the table below.

Deleterious Material

Sand shall not contain any harmful impurities such as iron, pyrites, alkalis, slates, coals or other organic impurities, mica, shale or similar laminated materials, soft fragments, sea shale in such form or in such quantities as to adversely affect the hardening, strength or durability of the mortar. The maximum quantities of clay, fine silt, fine dust and organic impurities in sand shall not exceed the following limits:

Clay, fine silt and fine dust, in natural sand or crushed gravel sand and crushed stone when determined in accordance with IS 2386	Not more than 5% by mass
Mica	Not more than 2% by mass
pyrites when determined in accordance with IS 2386 (part 2)	Colour of the liquid shall be lighter than the standard solution prepared as per section 6.2.2 of IS 2386 (part 2)

Grading of sand for use in masonry mortar shall conform to IS 2116.

Grading of sand for use in plaster shall conform to IS 1542.

Sand or fine aggregate shall be tested for organic impurities, particle size, silt content and bulking in accordance with IS 2386 Part I, II and III.

3.3 Brick

Bricks for masonry works shall conform to IS 1077 and shall be of class 7.5 with minimum



compressive strength of 7.5N/mm². Specific requirement for any other class of bricks shall be as shown on drawings. Physical requirements, quality, dimensions, tolerances, etc., of common burnt clay building bricks shall conform to the requirements of IS 1077.

Bricks shall be hand-molded or machine molded and shall be made from suitable soils. The bricks shall have smooth rectangular faces with sharp corners and shall be well burnt, sound, hard, tough and uniform in colour. These shall be free from cracks, chips, flaws, stones or lumps of any kind.

A clear metallic ringing sound shall be emitted when two bricks are struck together. After 24 hours immersion in cold water, water absorption by weight shall not exceed 20% of the dry weight of the brick. They shall not break when thrown on ground on their flat surface from a height of 1.6 metre, in saturated condition.

The tolerance permitted in the accepted size of bricks shall be plus or minus 3mm in any dimension. Only bricks of one standard size shall be used in one work unless specifically permitted by the COMPANY. Each brick shall have the manufacturer's identification mark or initial mark clearly in the frog.

All bricks proposed to be used shall conform to the approved samples in all respects. Any brick found not up to the specification shall be removed from the site immediately at the CONTRACTOR's cost.

3.4 Stone

All Stones used for masonry works shall conform to the requirements of IS 1123, IS 1127, and IS 1129. Stones shall be of approved quality, hard, dense, strong, sound, durable, clean and uniform in colour.

They shall also be free from veins, adherent coatings, injurious amount of alkalis, vegetable matters and other deleterious substances such as iron pyrites, coal, lignite, mica, sea shells, etc. Unless otherwise approved, stones from one single quarry shall be used for any one work.

The strength of stones should be adequate to carry the imposed load. The minimum crushing strength of building stones shall be 20 N/mm² unless higher minimum strength is specified in any particular case. The percentage of water absorption, when tested in accordance with IS 1124, shall not exceed 5%.

Stones used shall normally be small enough to be lifted and placed by hand. The length of the stone shall not exceed 3 times the height. Width of stone on base shall not be less than 150mm and in no case exceed 3/4th thickness of the wall. Height of the stone shall not be more than 300mm.

3.5 Cement

Unless otherwise specified, cement used for cement-sand mortar shall be Grade 33 OPC conforming to IS 269.

3.6 Lime

Hydrated lime used for masonry mortar shall conform to IS 712. Hydrated lime shall be supplied in suitable containers such as jute bags lined with polythene or high density polythene woven bags lined with polythene or craft paper bags preferably containing 50 kg. of dry lime.



3.7 Water

Water used for masonry work shall be clean and free from injurious amounts of deleterious materials. Potable water are generally considered satisfactory for mortar making and curing in masonry work.

4. MORTAR

4.1 Cement Mortar

Mortar for brick work shall be prepared in accordance with IS:2250.

4.1.1 Proportioning

Cement bag weighing 50 kg shall be taken as 0.035 cubic metre. Other ingredients in specified proportion shall be measured by volume using gauge boxes of suitable capacity. Sand shall be measured on the basis of its dry volume.

Unless otherwise specified on drawings, the cement-sand mix proportion (by volume) for the mortar shall be as follows

Brick masonry less than one brick thick	1:4
Brick masonry equal to and more than one brick thick	1:6
Stone masonry	1:6
Concrete block masonry	1:6

The minimum compressive strength of masonry mortar shall be as follows:

1:4 Mortar	7.5 N/mm ² .
1:6 Mortar	3 N/mm ² .

4.1.2 Mixing

The mixing of mortar shall be done in mechanical mixers operated by power or manually as decided by the Engineer. The Engineer may however, permit hand mixing at his discretion taking into account the nature, magnitude and location of the work and practicability of the use of mechanical mixers or where item involving small quantities are to be done or if in his opinion the use of mechanical mixers is not feasible.

In cases, where mechanical mixers are not to be used, the Contractor shall take permission of the Engineer in writing before the commencement of the work.

4.1.3 Mechanical Mixing

Cement and sand in the specified proportions shall be mixed dry thoroughly in a mixer. Water shall then be added gradually and wet mixing continued for at least three minutes. Only the required quantity of water shall be added which will produce mortar of workable consistency. Only the quantity of mortar which can be used within 30 minutes of its mixing shall



be prepared at a time. Mixer shall be cleaned with water each time before suspending the work.

4.1.4 Hand Mixing

The measured quantity of sand shall be leveled on a clean water tight platform and cement bags emptied on top. The cement and sand heap shall be thoroughly mixed dry by being turned over and over, backwards and forwards, several times till the mixture is of a uniform colour. The quantity of dry mix, which can be used within 30 minutes, shall then be mixed in a masonry trough with just sufficient quantity of water to bring the mortar to a stiff paste of necessary working consistency.

4.1.5 Precautions

Mortar shall be used as soon as possible after mixing and before it begins to set, and in any case within half an hour after the water is added to the dry mixture.

4.2 Cement Lime Sand Mortar

Cement-lime-sand mortar for masonry works shall be prepared in accordance with IS 2250. The proportioning of mix shall be as shown in drawings.

Lime putty shall be obtained by adding hydrated lime to water in a tank and stirring it to the consistency of cream and allowing it to stand not more than 2 days. The putty shall be allowed to mature but not allowed to dry out till it is used.

Sand shall be measured on the basis of its dry volume. In case of damp sand, its quantity shall be suitably increased to allow for bulkage⁵⁴ as per IS 2386 (part 3)

Cement, lime putty/dry hydrated lime and sand shall be taken in specified proportions. Lime putty and sand shall be ground in a mortar mill before mixing the same with cement. In case where factory made dry hydrated lime powder is used, prior grinding of lime and sand in a mortar mill is not necessary. In that case the mixing may be done in one single operation in the mechanical mixer.

In case of small works, where the COMPANY permits hand mixing, in view of mortar mill and mechanical mixer not being feasible, cement and sand shall be mixed in clean watertight masonry platforms or troughs. Milk of lime prepared by mixing water and lime putty, shall be added to mixture of cement and sand. Then the mixture shall be hoed back and forth for about 10 minutes with addition of milk of lime, care being taken to add this milk of lime to the extent required for giving the mortar the consistency of a stiff paste.

The mortar thus prepared shall be used as soon as possible after mixing and in any case within one hour the cement is mixed wet. Mixture of lime putty and sand can be kept for a period of 72 hours, provided it is kept damp with wet sacks or by suitable means approved by the COMPANY and not allowed to dry.

Mortar not formed as per specifications or laying unused after the periods specified above or found partly set or dried or otherwise spoilt shall be rejected and removed from site of work at CONTRACTOR's cost.

Unless otherwise specified in drawings, the mortar used for masonry work shall be of



proportion 1 cement: 1 lime: 6 graded sand.

5. BRICK MASONRY

5.1 General

Bricks used in masonry shall be common burnt clay bricks conforming to IS 1077 or IS 2180. Common burnt clay bricks shall be classified on the basis of average compressive strength as given in Table 1.

Table 1- Classes of Common Burnt Clay Bricks

Class Designation	Average Compressive Strength Not Less Than, N/mm ²
50	50.0
35	35.0
30	30.0
25	25.0
20	20.0
17.5	17.5
15	15.0
12.5	12.5
10	10.0
7.5	7.5
5	5.0
3.5	3.5

Wherever the construction site is within a radius of 100 kms from a coal/ lignite based thermal power plant, fly ash shall be used in manufacturing bricks as per MOE&F – see Appendix 1.

5.2 General Quality

Bricks shall be hand moulded or machine moulded and shall be made from suitable soils. They shall be free from cracks and flaws and nodules of free lime. The bricks shall have smooth rectangular faces with sharp corners and shall be uniform in colour and shall emit ringing sound when struck simply.

5.3 Dimensions



The standard modular or non modular size of common building bricks shall be as follows:

Type Of Brick	Length	Width	Height
Modular Brick	190 mm x	90 mm x	90 mm
Modular Tile Brick	190 mm x	90 mm x	40 mm
Non Modular Brick	230 mm x	115 mm x	70 mm
Non Modular Tile Brick	230 mm x	115 mm x	40 mm

5.4 Sampling and Test

5.4.1 Sampling

Sampling of bricks shall be in accordance with IS:5454.

5.4.2 Dimensional Tolerances

The dimensions of bricks when tested in accordance with IS:1077 shall be within the limits specified therein.

5.4.3 Compressive Strength

The bricks, when tested in accordance with the procedure laid down in IS:3495 Part I shall have a minimum average compressive strength for various classes as given in Table 3. The compressive strength of any individual brick tested shall not fall below the minimum average compressive strength specified for the corresponding class of brick.

5.4.4 Water Absorption

The average water absorption of bricks when tested in accordance with the procedure laid down in IS:3495 Part 2 shall not be more than 20% by weight up to Class 12.5 and 15% by weight for higher classes.

5.4.5 Efflorescence

The rating of efflorescence of bricks when tested in accordance with the procedure laid down in IS:3495 Part 3. Appendix D shall be not more than "moderate" up to Class 12.5 and "slight" for higher classes. All efflorescence shall be removed on the affected surfaces with a solution of muriatic acid in water washed fully with clear water and allowed to dry thoroughly.

5.5 Burnt Clay Brick Work

Brickwork shall generally conform to IS 2212.

5.5.1 Classification

The brickwork shall be classified according to the class designation of bricks used.

5.5.2 Mortar

Brickwork shall be constructed in cement mortar 1:5 or as specified (also see section 5.5.13). Lime shall not be used where reinforcement is provided in brickwork.



5.5.3 Soaking of Bricks

Bricks shall be soaked in water such that water just penetrates the whole depth of the bricks. The soaked bricks shall be removed from water early enough to be skin-dry when lying. Alternatively bricks may be adequately soaked in stacks by profusely spraying with clean water at regular intervals for a period not less than six hours. Soaked bricks shall be stacked on a clean place where they are not spoiled by dirt, earth and the like.

Note: The period of soaking shall be found at site by a field test. The bricks shall be soaked in water for different periods and then broken to find the extent of water penetration. The least period that corresponds to complete soaking will be the one that shall be allowed for in construction work.

5.5.4 Laying

Bricks shall be laid in English Bond unless otherwise specified.

Half or cut bricks shall not be used except as closers to complete the bond. Closers in such cases, shall

be cut to the required size and used near the ends of the wall. Header bond shall be used preferably in all courses in curved plan for ensuring better alignment.

Note:

Header bond shall also be used in foundation footings unless the thickness of walls (width of footing) makes the use of headers impracticable. Where the thickness of footing is uniform for a number of courses, the top course of footing shall be headers. All loose materials, dirt and set lumps of mortar which may be lying over the surface on which brick work is to be freshly started, shall be removed with a wire brush and the surface wetted. Bricks shall be laid on a full bed of mortar. When laying, each brick shall be properly bedded and set in position by gently pressing with the handle of a trowel. Its inside face shall be buttered with mortar before the next brick is laid and pressed against it. Joints shall be filled and packed with mortar such that no hollow space is left. Walls shall be taken up truly in plumb or true to the required batter where specified. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. Vertical joints in alternate courses shall come directly one over the other. Quoin, jambs and other angles shall be properly plumbed as the work proceeds.

A set of tools comprising of wooden straight edge, masonic spirit levels, square, one meter rule line and plumb shall be kept at the site of work for checking during the progress of work. Each set of tools shall suffice for three masons. All quoins shall be accurately constructed and the height of brick courses shall be kept uniform. This will be checked using a graduated wooden straight edge or a story rod indicating height of each course including thickness of joints. The position of damp proof course, window sills, bottom of lintels, top of the wall etc. along the height of the wall shall be marked on the graduated straight edge or story rod. Acute and obtuse quoins shall be bonded, where practicable in the same way as square quoins.

Obtuse quoins shall be formed with squint showing three quarters brick on one face and quarter brick on the other. The brick work shall be built in uniform layers. No part of the wall during its



construction shall rise more than one metre above the general construction level. Parts of wall left at different levels shall be raked back at an angle of 45 degrees or less with the horizontal. Tothing shall not be permitted as an alternative to raking back. For half brick partition to be keyed into main walls, indents shall be left in the main walls. Block work shall not be carried out in more than a height of 1200 mm in any one day unless otherwise permitted by relevant Indian standards.

All pipe fittings and specials, spouts, hold fasts and other fixtures which are required to be built into the walls shall be embedded, as specified in their correct position as the work proceeds unless otherwise directed by the Engineer. Top courses of all plinths, parapets, steps and top of walls below floor and roof slabs shall be laid with brick on edge, unless specified otherwise. Brick on edge laid in the top courses at corner of walls shall be properly

radiated and keyed into position to form cut corners. Where bricks cannot be cut into the required shape to form cut corners, cement concrete 1:2:4 (1 cement:2 coarse sand: 4 graded stone aggregate 20 mm nominal size) equal to thickness of course shall be provided in lieu of cut bricks. Bricks shall be laid with the frog up. However, when the top course is exposed, bricks shall be laid with the frog down. For the bricks to be laid with frog down, the frog shall be filled with mortar before placing the brick in position.

In case of walls, one brick thick and under, one face shall be kept even and in proper plane, while the other face may be slightly rough. In case of walls more than one brick thick, both the faces shall be kept even and in proper plane. Pipe sleeves shall be provided for taking service lines without excessive cutting of completed work. Such sleeves in external walls shall be sloped down outward so as to avoid passage of water inside. Top of the brick work in coping and sills in external walls shall be slightly tilted. Where brick coping and cills are projecting beyond the face of the wall, drip course / throating shall be provided where indicated. Care shall be taken during construction that edges of jambs, sills and projections are not damaged in case of rain. New built work shall be covered with jute bags or tarpaulins so as to prevent the mortar from being washed away. Damage, if any, shall be made good to the satisfaction of the Engineer. In retaining walls and the like, where water is likely to accumulate, weep holes, 50 to 75 mm square shall be provided at 2 m vertically and horizontally unless otherwise specified. The lowest weep hole shall be at about 30 cm above the ground level. All weep holes shall be surrounded by loose stones and shall have sufficient fall to drain out the water quickly.

5.5.5 Joints

The thickness of all types of joints including brick wall joints and cross joints shall be such that four courses and three joints taken consecutively shall measure as follows:

390 mm, in case of modular bricks conforming to IS:1077.

310 mm, in case of non-modular bricks

Note:

Specified thickness of joints shall be 10 mm.

5.5.6 Finishing of Joints

The face of brick work may be finished flush or by pointing. In flush finishing either the face joints of the mortar shall be worked out while still green to give a finished surface flush with the face of the brick work



or the joints shall be squarely raked out to a depth of 10 mm while the mortar is still green for subsequent plastering. The faces of brick work shall be cleaned with wire brushes so as to remove any splashes of mortar.

5.5.7 Openings

Openings shall be square with the jambs vertical and formed with the uncut faces of blocks using temporary framing installed for this purpose. The jamb walling shall be built up against framework all around as the work proceeds.

5.5.8 Intersecting Walls and Partitions

Walls and partitions shall be bonded or tied to one another at angles and junctions, unless movement joints are indicated. Wherever ties are used, they shall consist of 3x20 mm galvanized steel plate fully embedded in the horizontal mortar joints at vertical spacing not exceeding 600 mm. The ends of ties shall project a minimum of 75 mm into each wall partition.

5.5.9 Penetrations

Penetrations for services through both external and internal walls shall be properly sealed against fire and gas.

5.5.10 Fixings

Where fixing blocks, anchors, accessories, wall ties, etc are specified, they shall be built into the walls or partitions and solidly bedded in mortar. Fixings, which are not built in shall be drilled to the block work. Expanded bolt fixings shall only be drilled into solid blocks or blocks having their cavities filled solid.

5.5.11 Curing

The brick work shall be constantly kept moist on all faces for a minimum period of seven days. Brick work done during the day shall be suitably marked with the date on which the work is done to monitor the curing period.

5.5.12 Scaffolding

Scaffolding shall be strong enough to withstand all dead, live and impact loads which are likely to come on them. Scaffolding shall be provided to allow easy approach to every part of the work. Only double scaffolding shall be used. Single scaffolding shall be used only when specifically permitted in writing by Engineer In Charge.

- **Single Scaffolding**

In single scaffolding, one end of the put-log/pole shall rest in the hole provided in the header course of rick masonry. Not more than one header for each put-log/pole shall be left out. Such holes shall not be allowed in the case of pillars, brick work less than one metre in length between the openings or near the skewbacks of arches or immediately under or near the structural member supported by the walls. The holes for put logs/poles shall be made good with brick work and wall finishing as specified.



• Double Scaffolding

Where the brick work or tile work is to be exposed and not to be finished with plastering etc. double scaffolding having two independent supports; clear of the work, shall be provided.

5.5.13 Half Brick Work

Brick work in half brick walls shall be constructed in the same manner as described in Clause 5.5.4 except that the bricks shall be laid in stretcher bond. These walls shall be constructed in cement mortar. 1:4. Lime mortar shall not be used. When the half brick work is to be reinforced two MS bars of 6 mm diameter shall be embedded in every third course. OR 75 mm thick RCC M15 beams with 2 numbers 8 mm dia high strength deformed bars shall be provided at a vertical spacing of 1 metre. The reinforcement shall be securely anchored at the end of the wall. The free ends of reinforcement shall be keyed into the mortar of the main work to which the half brick work is joined. Laps in reinforcement if any shall not be less than 30 cm. Depending on the dimensions of the wall, 200 mm x 115 mm RCC mullions at every 3 metres and at corners shall be provided with reinforcement of 4 numbers 8 mm diameter high strength deformed bars. The steel in the horizontal beams in such cases will run through these mullions. These partition walls shall be constructed in two stages. In the first stage, brick work with binders shall be constructed leaving gaps equal to and at the locations of the mullions. In the second stage mullions shall be constructed.

5.5.14 Acceptance Criteria

The acceptable deviations for brick work shall be as follows:

Deviation from position shown on plan of any brick work shall not exceed 12.5 mm.

Relative displacement between load bearing wall in adjacent stories shall not exceed 6 mm. Brick / Block work shall be built into the following tolerances:

Tolerance on Line

Length up to and including 5 m 610 mm

Length over 5 m, up to and including 10 m 615 mm Length over 10 m 620 mm

Tolerance on Height and Level

Height up to and including 3 m 65 mm

Height over 3 m, up to and including 6 m 615 mm Height over 6 m 620 mm

Tolerance in Plumb

Height up to 4 m 10 mm

Tolerance in Straightness

Deviation from line shall not be more than 5 mm

Deviation from the specified thickness of all joints shall not exceed one-fifth of specified thickness.



5.5.15 REINFORCED BRICKWORK

Where specified, brick walls less than one brick thick shall be provided with 2 numbers 6 mm dia. M.S. reinforcement bars at every fourth course embedded inside the joint. The free ends of reinforcement shall be keyed into the mortar joint of main brick work. Round bars shall be properly lapped, and joints staggered. For brick walls equal to or more than one brick thick, reinforcement shall be as specified in drawings. Bars shall be lapped with dowels left in R.C. columns, beams or welded to steel stanchions. Other requirements shall be as applicable for un-reinforced brickwork.

5.5.16 HONEYCOMB BRICKWORK

Honeycomb brickwork shall be done with wire cut bricks of specified class and size in specified mortar as per drawings. The thickness of honeycomb brickwork shall be that of half brick unless otherwise specified. The openings shall be equal and alternate with half brick laid with a bearing of 20mm on either side. The honeycomb work shall present a uniform pattern. All joints shall be struck flush to give an even surface. Upon completion of masonry installation, all exposed brickwork shall be cleaned of all mortar droppings. As the cleaning progresses, all masonry work shall be examined and all imperfect joints, nail holes, cracks, etc., carefully pointed and filled with mortar where required and the horizontal ratings left tooled and clean. The brickwork shall be cured and protected as specified under clause 5.5.11

5.5.17 CAVITY WALL

One or both leaves of a cavity wall may be of brick (the other being of concrete or other material). The two leaves of the cavity wall shall be tied by means of specially made wall ties spaced at not more than four brick lengths apart horizontally and not more than five brick courses vertically and staggered. Additional ties shall be used near opening. There shall be at least five ties per square meter of surface area of the wall. Ties shall be sloped away from the inner leaf of the cavity wall. Ties shall be of hot dip galvanized/non-ferrous metal/stainless steel suitably twisted at the middle to prevent water flowing along it or round bars bent to oval shape and twisted in the middle. Small openings shall be left in the exterior leaf approximately 2 meters apart at the start of masonry so as to facilitate hand cleaning out by means of a rake. These holes should be closed at the end of construction of the wall after doing the necessary cleaning at the cavity. During construction of cavity wall, mortar droppings are quite likely to fall into the cavity and get lodged over ties and become a constant source of transmittance of moisture. For preventing this, a wooden batten should be kept over ties during the construction of wall to catch any mortar droppings.

The batten should be lifted up every time when the next row of ties is reached and the process repeated as the construction of wall proceeds. The inner surface of outer leaf of the wall should not encourage splash of dripping water that may penetrate through the outer leaf and thus transmit dampness to the inner leaf. To avoid this, projections from outer leaf extending in the cavity should not be allowed. The mix proportion and joint thickness for the mortar shall be as specified in drawings.

6. RUBBLE MASONRY

Uncoursed Rubble Stone Masonry

6.1 Stone



The stone shall be obtained from quarries approved by the Engineer and shall conform to IS:1597 Part I. Stone shall be hard, sound, durable and free from weathering decay and defects like cavities, cracks, flaws, sand holes, veins, patches of loose or soft materials and other similar defects that may adversely affect its strength and appearances. As far as possible, stone shall be of uniform colour, quality or texture. Generally stone shall not contain crypts crystalline silica or chart, mica and other deleterious materials like iron oxide, organic impurities etc. Stone with round surface shall not be used. For Basalt stone the minimum compressive strength shall be 400 kg/cm² and the percentage of water absorption shall not exceed 5%.

6.2 Size of Stone

Unless otherwise indicated, the length of stones shall not exceed three times the height and the breadth or base shall not be greater than three fourth the thickness of wall or not less than 150 mm. The height of stone may be up to 300 mm. Stones having sharp corners or round surfaces shall, however, not be used.

6.3 Dressing

Each stone shall be hammer dressed on the face, the sides and the bed. Hammer dressing shall enable the stones to be laid close to neighbouring stone such that the brushing in the face shall not project more than 40 mm on the exposed face and 10 mm on the face to be plastered.

6.4 Laying

All stones shall be wetted before use. Each stone shall be placed close to the stones already laid so that the thickness of the mortar joints at the face is not more than 20 mm. Face stones shall be arranged suitably to stagger the vertical joints and long vertical joints shall be avoided. Chips or sprawls of stones may be used for filling of interstices between the adjacent stones in heartening and these shall not exceed 20% of the quantity of stone masonry. No hollow space shall be left anywhere in the masonry. The masonry work in wall shall be carried up true to plumb. Before commencing the masonry work the foundation trenches shall be leveled right through and bottom of the same watered and well rammed down. The trenches shall be kept free of water while masonry work is in progress.

6.5 Bond Stones

Bond or through stones running right through the thickness of walls shall be provided in walls up to 600 mm thick and in case of walls above 600 mm thickness a set of two or more bond stones overlapping each other by at least 150 mm shall be provided in a line from face of the wall to the back. At least one bond stone or a set of bond stones shall be provided for every 0.5 sq m of the area of wall surface.

6.6 Quoin and Jamb Stone

The quoin and jamb stones shall be of selected stones neatly dressed with hammer or chisel to form the required angle. Quoin stones shall not be less than 0.01 cu. meter in volume. Height of quoins and jamb stones shall not be less than 150 mm. Quoins shall be laid header and stretcher alternatively.

6.7 Curing

Curing shall be done till the mortar used in masonry is sufficiently set. Masonry work in cement



mortar of 1:5 shall be kept constantly moist on all faces for a minimum period of seven days.

6.8 Protection

Green work shall be protected from rain by a suitable covering. The work shall also be suitably protected from damage, mortar dropping and rain during construction.

7. CEMENT POINTING

The joints of masonry shall be raked at least 12 mm deep for burnt clay bricks and 6 mm deep for concrete block whilst the mortar is green and not later than 48 hours of time of lying. The dust shall then be brushed out of the joints and the wall, washed with water.

The mortar shall be of specified mix. Mortar shall be filled into joints and well pressed with special steel trowels. The joints shall not be touched again after it has once begun to set. The joints of the pointed work shall be neat. The lines shall be regular and uniform in breadth and the joints shall be raised, flat, sunk or "V" as may be directed. No false joints shall be allowed. The work shall be kept wet for a week after the pointing is complete. Whenever colored pointing has to be done, the colouring pigment of the colour required shall be added to cement in such proportion as recommended by the manufacturer and as approved by the Engineer.

8 Damp-Proof Course

Unless otherwise specified, damp-proof course shall be minimum 40 mm thick cement concrete of grade 1:11/2:3 by weight using 10 mm and down graded coarse aggregate, with admixture of a water-proofing compound as approved by the COMPANY. The percentage of admixture shall be as per manufacturer's specification but not less than 2% by weight of cement. The top surface shall be double check and cured by pending for seven days.