

TECHNICAL SPECIFICATIONS

CIVIL WORKS

1.0 GENERAL :-

- 1.01 The specifications and mode of measurements for Civil and Plumbing works shall be in accordance with C.P.W.D. specifications 1996 Volumes I to VI.

Unless otherwise specified in the nomenclature of individual item or in the specifications, the entire work shall be carried out as per the C.P.W.D. specifications with upto date correction slips upto the date of opening of tender.

- 1.02 For the item not covered under CPWD Specifications mentioned above, the work shall be executed as per latest relevant standards/codes published by B.I.S. (formerly ISI) inclusive of all amendments issued thereto or revision thereof, if any, upto the date of opening of tenders.
- 1.03 In case of B.I.S. (formerly I.S.I) codes/specifications are not available, the decision of the Engineer based on acceptable sound engineering practice and local usage shall be final and binding on the contractor.
- 1.04 However, in the event of any discrepancy in the description of any item as given in the schedule of quantities or specifications appended with the tender and the specifications relating to the relevant item as per CPWD specifications mentioned above, or in drawings the former shall prevail.
- 1.05 In general the building floor to floor height is 3.5m unless specified otherwise in the drawing. The rates for different items of work shall be for up to 4.0 m floor to floor height at all levels, lifts, leads and depths of the building except where otherwise specified explicitly in the item of work or in special conditions appended with the tender. All works above the top most terrace (main) shall be paid under the level existing below (i.e. machine room, mumty etc)
- 1.06 The work shall be carried out in accordance with the architectural, structural, plumbing and electrical drawings etc. The drawings shall have to be properly co-related before executing the work. In case of any difference noticed between the drawings, final decision, in writing of the Engineer shall be obtained by the contractor. For items, where so required, samples shall be prepared before starting the particular items of work for prior approval of the Engineer and nothing extra shall be payable on this account.
- 1.07 All materials to be used on works shall bear I.S. certification mark unless specifically permitted otherwise in writing. In case I.S. marked materials are not available(not produced) ,

the materials used shall conform to I.S. code or CPWD specifications, as applicable in this contract.

In such cases the Engineer shall satisfy himself about the quality of such materials and give his approval in writing. Only articles classified as "First Quality" by the manufacturers shall be used unless otherwise specified. All materials shall be tested as per provisions of the Mandatory Tests in CPWD specifications and the relevant IS specifications. The Engineer may relax the condition regarding testing if the quantity of materials required for the work is small. Proper proof of procurement of materials from authentic manufacturers shall be provided by the contractor to the satisfaction of Engineer. Grade of cement used shall be 43 unless otherwise specified explicitly. The contractor shall get the Design Mix for RCC done by the labs approved by OWNER only. Reinforcement Steel used shall be of FE-415 unless otherwise specified.

- 1.08 In respect of the work of the sub-agencies deployed for doing work of electrification, air-conditioning, external services, other building work, horticulture work, etc. for this project and any other agencies simultaneously executing other works, the contractor shall afford necessary coordination and facilities for the same. The contractor shall leave such necessary holes, openings, etc. for laying / burrying in the work pipes, cables, conduits, clamps, boxes and hooks for fan clamps, etc. as may be required for the electric, sanitary air-conditioning, fire fighting, PA system, telephone system, C.C.T.V. system, etc. and nothing extra over the agreement rates shall be paid for the same.
- 1.09 Unless otherwise specified in the bill of quantities, the rates for all items of work shall be considered as inclusive of pumping out or bailing out water if required for which no extra payment will be made. This will include water encountered from any source such as rains, floods, subsoil water table being high or due to any other cause whatsoever.
- 1.10 Any cement slurry added over base surface (or) for continuation of concreting for bond is added its cost is deemed to have in built in the item unless otherwise/explicitly stated and nothing extra shall be payable or extra cement considered with consumption on this account.
- 1.11 The rate for all items in which the use of cement is involved is inclusive of charges for curing.
- 1.12 The contractor shall clear the site thoroughly of all scaffolding materials and rubbish etc. left out of his work and dress the site around the building to the satisfaction of the Engineer before the work is considered as complete.
- 1.13 Rates for plastering work (excluding washed grit finish on external wall surfaces) shall include for making grooves, bands etc. wherever required and nothing extra shall be paid for the same.
- 1.14 The rates quoted for all brick/concrete work shall be deemed to include making openings and making good these with the same specifications as shown in drawings and/or as directed. No extra payment shall be made to the contractor on this account.
- 1.15 Rates for all concrete/plaster work shall include for making drip course moulding, grooves etc. wherever required and nothing extra shall be paid for the same.

- 1.16 Rates for flooring work shall include for laying the flooring in strips / simple designs wherever required and nothing extra shall be paid for the same.
- 1.17 The drawing(s) attached with the tender documents are for the purpose of tender only, giving the tenderer a general idea of the nature and the extent of works to be executed. The rates quoted by the tenderer shall be deemed to be for the execution of works taking into account the "Design Aspect" of the items and in accordance with the "Construction Drawings" to be supplied to the Contractor during execution of the works.
- 1.18 The quoted rate shall be for finished items and shall be complete in all respects including the cost of all materials, labour, tools & plants, machinery etc., all taxes, duties, levies, octroi, royalty charges, statutory levies etc. applicable from time to time and any other item required but not mentioned here involved in the operations described above. The client/OWNER/Employer shall not be supplying any material, labour, plant etc. unless explicitly mentioned so.

2.0 ALUMINIUM DOORS AND WINDOWS:

2.01 GENERAL:

2.01.1 Description:

This section covers the requirement for furnishing of all materials, labour accessories, tools and equipment for installation of anodized/powder coated aluminium glazing doors and windows including fabrication, fixing and fittings etc.

2.01.2 Codes and Standards:

The codes and standards generally applicable to the work of this section are listed herein under:

IS: 733 Wrought aluminium and aluminium alloy bars, rods and sections (for general engineering purpose).

IS: 1285 Wrought aluminium and aluminium alloy, extruded round tube and hollow sections (for general engineering purpose).

IS: 1362 Dimension for screw thread for general purpose.

IS: 1761 Transparent sheet glass for glazing and framing purposes.

IS: 1948 Aluminium doors, window and ventilators.

IS: 1949 Aluminium windows for industrial buildings.

IS:7088 Recommended practice for anodizing aluminium and its alloys.

The following clauses are intended to amplify the requirements of the references/documents listed above and the contractor shall comply with these clauses.

2.02 MATERIALS :

2.02.1 Aluminium alloy :

Aluminium alloy used in the manufacture of extruded door and window sections shall correspond to IS designation HE9-WP of IS:733. Aluminium alloy hollow section and coupling sections used shall conform to IS designation HV9-WP of IS:1285. They shall conform to dimensions shown in Fig. 5 to IS:1948 unless otherwise specified in the drawings.

2.02.2 Screw threads of machine screws used in the manufacture of aluminium doors, window and ventilators shall conform to IS: 1362. Other threads may be used if permitted by the Engineer.

2.02.3 Glass :

Glass used for glazing shall be float quality glass of approved quality manufactured by the firms included in the list of approved makes subject to approval of Engineer, and shall be of thickness specified in the item.

Glass shall be securely and safety crated for delivery, handling and storage. Cushions shall be provided at edges of glass to prevent damage. Glass faces shall be protected from scratches and abrasions. It shall be stored in a dry, well- ventilated location, carefully protected at all times from soiling, atmospheric condensation and other moisture.

2.03 **SAMPLES AND SHOP DRAWINGS :**

All aluminium doors, windows and ventilators shall be furnished by an approved manufacturer and shall be conforming to IS:1948. Before placing their order, the contractor shall submit shop drawings and samples for the approval of the Engineer. If required, the contractor shall also submit the necessary engineering calculations. Shop drawings shall clearly show all work including mechanical systems, the arrangement of components, the sequence and details of fabrications, assembly and erection. These drawings shall also give full size details, all dimensions and thickness anchoring devices and accessories.

2.04 **FABRICATION :**

2.04.1 **Frames :**

Frames of aluminium doors and windows shall be of profile and dimensions as shown in the drawings, Frames shall be square and flat, the corners of the frames being fabricated to a true right angle. Both the fixed and opening frames shall be fabricated out of sections which have been cut of length, mitered and welded at the corners. Where hollow sections are used with welded joints, argon-arc welding or flash-butt welding shall be employed (gas welding or blazing shall not be done). Sub - dividing bars of units shall be tenoted and revetted into the frame.

Fabricate aluminium frames to allow for clearances and shim spacing around perimeter of assemblies to enable installation into prepared openings. provide for thermal movement. Provide anchorage devices to securely and solidly attach the frame assembly in place. Accurately and rigidly fit together joints and corners, match components ensuring continuity of line and design. Ensure joints and connections are flush, hair-line and weather- proof. Provide drain routes and outlets to exterior for moisture entering joints and connections occurring within the frame construction.

2.04.2 **Shutters :**

Shutter thickness and dimensions of vertical stiles, head and sill shall be as shown in the drawings. Unless otherwise specified, the hinges shall be of anodized aluminium alloy and shall normally be of projecting type. Slot shall be cut in the fixed frame and the hinges inserted inside and may be riveted to the frame. The fins for hinges shall be of stainless steel of non magnetic type of aluminium alloy HR-30 anodized and shall be sealed with oil, wax of lanolin.

2.04.3 **Fittings :**

Handles, peg stays, tower bolts, lockings device, hinges and pivots, floor springs, automatic door operators shall be of the design and make approved by the Engineer. Door leaf shall be equipped with adjustable mechanism located in top rail near lock style that will provide for minor clear

adjustments after installation. Snap of (Clip on) anodized /powder coated aluminium beadings and glazing clips shall be provided as per design and size approved by the Engineer.

2.05 **Finish:**

- a) After fabrication, any fabrication oil, scratches and tool marks shall be removed leaving the surface free from discoloration, blemishes and defects. Aluminium surfaces shall first be given a medium matte finish by caustic soda etching or by mechanical methods. All aluminium glazing shall be anodized conforming to IS:7088 to the light fast shade approved by the Engineer. A thick layer of clean transparent lacquer based on methacrylates or cellulose butyrate shall be applied to all aluminium glazing to protect the surface during installation. The lacquer coating shall be removed after the installation is completed.
- b) The unit assemblies shall be anodized/powder coated finish. Anodizing shall be minimum 15 microns thick of mat texture, non-directional and non-specular. Anodized surfaces shall be suitably protected during transportation, storage and erection. Powder coating if specified shall be not less than 50 Micron.

2.06 **Receiving and stacking :**

Fabricated aluminium frames and members shall be individually wrapped and delivered at site in crates. The contractors shall receive and unload the same at site with utmost care. The crates shall be opened and the materials carefully examined by the Engineer to detect any damage. Damaged materials shall be immediately removed from the site. Materials found to be acceptable on inspections shall be repacked in crates and stored safely in a vertical position above ground in a dry area. During the unpacking and repacking operations the contractor shall take all precautions to ensure that the protective coating of the fabricated materials is not damaged at all.

2.07 **Installation :**

- 2.07.1 Just prior to installation, the frames and members shall be unscratched and stacked on edge on level bearers and supported evenly. The contractor shall assemble the various components to form units as called for in the drawings. The assembled units shall be placed in correct final position in the openings and marks made at jambs, sills and heads against holes provided in the frames for anchoring. The frames shall sides of appropriate size shall be drilled at the marking with an electric drill to house the expansion bolts.
- 2.07.2 Expansions bolts shall be inserted in the holes, struck with a light hammer till the nut is forced into the anchor shell. The frames shall be set in the openings by using wooden wedged at supports and shall be plumbed in position. The wedged shall invariably be placed at the meeting points of glazing bars and frames. The frames shall installed straight, level, without distortion and anchored to the supports through cadmium-plated machine screws of required size threaded to expansion bolts.
- 2.07.3 Where aluminium comes into contact with concrete, brick work, stone masonry, plaster or dissimilar metals, it shall be coated with an approved insulation lacquer, paint or plastic tape to ensure that electro-chemical corrosion is avoided. Insulation material shall be trimmed off to a clean flush line on completion. Adjustments shall be lubricated. Operating parts shall be protected against accumulation of dirt and foreign matters.

2.08 **Glazing :**

- 2.08.1 The glass panes shall be of the type and thickness specified in the item. Their sizes shall be as shown in the drawings. The glass panes shall be of quality and make approved by the Engineer. They shall have properly squared corners and straight edges. Damaged or defective glass shall be replaced with new glass at no additional cost. Each piece of glass shall be delivered with factory labels intact, indicating glass type, quality and thickness. Labels shall not be removed until installation has been accepted.
- 2.08.2 Glazing gasket channels and beads of P.V.C. or rubber for all furnished by the door and window manufacturer to fit their frames. Setting block shall be of neoprene or rubber width and high enough to provide minimum edges clearance for glass. Protect glass from breakages immediately upon installation by applying suitable warning markings.

2.09 **Weather proofing :**

Frame at door perimeter shall be fitted with non-porous polymeric weather stripping and door bottom shall have an adjustable elastomeric weather-strip. Weather strips shall not bind or prevent door from closing easily and tightly with weather tight contact between metal.

Alternatively gaps between frames and supports as well as any gap in the various sections shall be raked out as directed and filled with mastic cement of approved make and colour to ensure complete water tightness. The mastic cement shall be of such colour and composition so that it would not stain the supports and shall receive paint without bleeding. Moreover, it shall not sag or run and shall not set hard or dry out under any weather conditions.

2.10 **Final cleaning:**

Protective coating and warning markings shall remain undisturbed until final acceptance. Immediately prior to final inspection, temporary protective covering or coating shall be removed and surfaces shall be washed with a suitable thinner and left in a finished condition having approved uniform appearance and free from all marks and blemishes. Wash and polish glass on both faces.

2.11 **Measurements:**

For fixed portion : Weight of Aluminium sections used in the fixed portion including Aluminium snap beadings shall be measured for payment.

For openable portion : Weight of Aluminium sections used in the openable shutters including fixing of fittings shall be measured for payment

For panelling : Area of panelling shall be measured.

For glazing :Area of glass including neoprene gaskets shall be measured.

3.00 CERAMIC TILE DADO

3.01 DESCRIPTION :

This section covers the requirements for furnishing of all materials, labour tools and equipment for completion of ceramic tile dado including preparation of surface under layer.

3.02 Applicable codes and standards:

The codes and standards generally applicable to the work of this section are listed hereinafter:

IS : 8112 Ordinary Portland cement (43 grade)

IS : 383 Coarse and fine aggregates from natural sources.

IS : 777 Glazed Earthenware tiles.

IS : 1489 Portland Pozzolona Cement.

IS : 8042 White Portland Cement.

3.03 SAMPLES:

The contractor shall furnish samples of ceramic tiles to the Engineer well before the commencement of dado work for his approval.

3.04 CERAMIC TILES :

The ceramic tile slabs shall be of the approved make colour, texture and sizes conforming to IS:777. the thickness of the tiles shall be as specified in the item. A tolerance of + or - 1mm in facial dimensions and + pr - 0.5mm shall be allowed in thickness of tiles. The tiles shall be of uniform colour and shade without crazing. they shall be true to size and shape and free from cracks, twists uneven and chipped edges and corners and other defects. The underside of the tiles shall be ribbed or some other formation so that the tiles adhere properly to the base. The tiles shall have the following properties:

3.05 SPECIFIC GRAVITY:

The mean specific gravity shall be 2.40 gm/cu.cm with a minimum of 2.3 gm/cu.cm

3.06 ABSORPTION OF WATER:

The mean water absorption shall be as per relevant IS standards.

3.07 WEAR RESISTANCE:

The average wear by abrasion shall not exceed 3.5mm and wear on any individual specimen shall not exceed 4.0 mm.

3.08 CEMENT :

Ordinary cement shall be either ordinary Portland Cement conforming to IS:8112 or Portland Pozzolona Cement conforming to IS:1489. White cement shall be white Portland Cement conforming to IS: 8042. Cement shall be fresh when delivered to the site.

3.09 FINE AGGREGATE :

Fine aggregate shall be clear pit sand or other approved sand conforming to IS:383. It shall be free from injurious amounts of soft and flaky particles and free from vegetable, organic, clayey matter, loom, mice, salts and other deleterious substances.

- 3.10 **WATER :**
Water used for both mixing and curing shall be fresh, clean, free from oil, salt, acid, alkali or other chemicals and deleterious matter conforming to IS : 456 :1978
- 3.11 **PREPARATION OF SURFACES :**
The joints shall be raked out to a depth of at least 15-mm in masonry wall, preferably when the masonry is being done. In case of concrete walls the surface shall be hacked and roughened with wire brushes. The surface shall be cleaned thoroughly, washed with and keep wet before skirting is commenced.
- 3.12 **LAYING :**
Unless specified otherwise in the item, 12-mm thick cement mortar shall be applied and allowed to harden. The plaster/base shall be roughened with wire brushes or by scratching diagonal at closed intervals. The tiles should be soaked in water washed clean, and a coat of cement slurry applied liberally at the back of tiles and set in the bedding mortar. The tiles shall be tamped and corrected to proper plane and lines. The tiles shall be set in required pattern and jointed. The joints shall be as fine as possible. Top of dado shall be truly horizontal and joints truly vertical except where otherwise indicated. Dado shall not be fixed. These shall be cut/sawn to the required size and their edge rubbed smooth.
- 3.13 **CURING AND FINISHING :**
The joints shall be cleared off the cement grout with wire brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush jointed with white cement mixed with pigment required to match the shade of the tiles. The dado shall be kept wet and finished clean. The finished work shall not sound hollow when trapped with wooden mallet.
- 3.14 **MEASUREMENTS :**
Length and breadth shall be measured correct to a centimeter. Height shall be measured correct to a centimeter in the case of dado and 5 mm in case of riser and skirting. The area shall be calculated in SqM, correct to two places of decimal. Length and height shall be measured along the finished face of skirting or dado including curves where specials such as coves, internal and external angles and beads are used. Where cornices are used the area of dado shall be measured excluding the cornices.
- Nothing extra will be paid for cutting (sawn) the tiles to sizes.
- 3.15 **RATE :**
The rate includes the cost of all materials & labour involved in all the operations described above. the specials like covers, internal & external angles, beads & cornices, where required, shall be measured & paid for separately.

4.0 VITRIFIED PORCELAIN TILES IN FLOORING, SKIRTING AND DADO

4.01 The tiles shall be of approved make, colour, texture and sizes with shine finish grade 'A'. The thickness of the tiles shall be 8.6mm and 9.9mm for sizes 300x300mm and 600x600mm respectively.

The tiles should satisfy the various tests on the parameters given below, when tested according to the codes specified against each. It may be noted that the standards for the parameters and the tests are European.

SL. NO.	SPECIFICATIONS	TEST METHOD	EUROPEAN STANDARD EN-176 REQD.	VALUE
1.0	Deviation in length (a) Polished (b) Unpolished (sized)	EN 98 EN 98	+ or - 0.5% + or - 0.5%	
2.0	Deviation in thickness	EN 98	+ or - 5.0%	
3.0	Edge Straightness (Wedging)	EN 98	+ or - 0.5%	
4.0	Water Absorption (Unpolished)	EN 99	< or = 0.5%	
5.0	Scratch hardness (Unpolished) in Moh's Scale	EN 101	> or = 6.0	
6.0	Thermal Shock	EN 104	10 cycles	
7.0	Chemical Resistance	EN 106	Should not show visible alteration	
8.0	Warpage	EN 98	+ or - 0.50%	
9.0	Breaking Strength	EN 100	300 kg/sq.cm	
10.0	Frost Resistance	EN 202	Frost proof	
11.0	Density	DIN 1082	> or = 2.0 gm/cc	

4.02 Cement

Ordinary cement shall be either ordinary Portland Cement conforming to IS:8112 or Portland Pozzolona Cement conforming to IS:1489. Cement shall be fresh when delivered to the site.

4.03 Fine Aggregate

Fine aggregate shall be clear pit sand or other approved sand conforming to IS:383. It shall be free injurious amounts of soft and flaky particles and free from vegetable, organic, clayey matter, loom, mice, salts and other deleterious substances.

4.04 **Water**

Water used for both mixing and curing shall be fresh, clean, free from oil, salt, acid, alkali or other chemicals and deleterious matter.

4.05 **Preparation of Surfaces**

The joints shall be raked out to a depth of at least 15 mm in masonry wall. In case of concrete walls the surface shall be hacked and roughened with wire brushes. The surface shall be cleaned thoroughly, washed with and kept wet before skirting is commenced.

4.06 **Laying**

Unless specified otherwise in the item, 12 mm thick plaster of cement mortar in case of skirting or dado and 20 mm thick base of cement mortar in case of flooring shall be applied and allowed to harden. The plaster/base shall be with wire brushes or by scratching diagonal at closed intervals. The tiles should be washed clean, and a coat of cement slurry applied liberally at the back of tiles and set in the bedding mortar. The tiles shall be tamped and corrected to proper plane and lines. The tiles shall be set in required pattern and jointed. The joints shall be as fine as possible. Top of skirting and dado shall be truly horizontal and joints truly vertical except where otherwise indicated. Skirting and dado shall rest on the top of flooring. Where full size tiles cannot be fixed these shall be cut (sawn) to the required size and their edges rubbed smooth.

4.07 **Curing and Finishing**

The joints shall be cleaned off the grey cement grout with wire/coir brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be filled with silicon sealant or equivalent jointing material as per manufacturer's specifications. The work shall then be kept wet for 48-72 hours.

4.08 **Measurements**

Length and breadth shall be measured correct to a centimeter. Height shall be measured correct to a centimeter in the case of dado and 5 mm in case of riser and skirting. The area shall be calculated in SqM, correct to two places of decimal. Length and height shall be measured along the finished face of skirting or dado including curves where specials such as coves, internal and external angles and beads are used. Where cornices are used the area of dado shall be measured excluding the cornices. Nothing extra will be paid for cutting (sawn) the tiles to sizes.

In addition to payment for areas of flooring skirting and dado, specials such as coves, internal and external angles and beads shall be measured separately and paid for running metres. Cornices shall also be similarly measured for payment in running metres.

4.09 **Rates**

The rates shall include the cost of all material and labour involved in all the operations described above. The specials such as coves, internal and external angles and beading shall be

measured and paid for separately. The rate shall not include cost of cornices which shall be measured and paid for in running metres separately.

5.00**APP MODIFIED BITUMEN WATER PROOFING**

The vital physical and chemical parameters of the membrane shall be as under: - Minimum Joint strength in longitudinal and transverse direction at 23Degree Celsius as 600/375N/5cm. Minimum Tear strength in longitudinal and transverse direction as 150/150N. Softening point of membrane not less than 150 Degree Celsius. Cold flexibility shall be up to -2 Degree Celsius when tested in accordance with ASTM, D-5147. The laying of membrane shall be got done through the authorized application of the manufacturer of membrane.

Waterproofing treatment of roofs shall be executed through approved specialist agency only, using polymer modified membrane. Vertical / upturn at parapet, skirting includes cost of GI chicken wire netting including necessary extensions and overlaps. Openings for lights, grilles, other fixtures and inspection doors shall be framed to receive the respective fixtures in ceilings – horizontal or vertical faces – as required. The contractor shall submit layout & detail shop drawings for approval.

6.00 PLUMBING & SANITARY INSTALLATIONS

6.01 Wall Caps

Wall caps shall be provided on all walls, floors, columns etc. wherever supply and disposal pipes pass through them. These wall caps shall be chromium plated brass snugly fittings and shall be large enough to cover the puncture properly and shall conform to IS: 4291.

6.02 Pipes, Hangers, Brackets, etc.

Sturdy hangers, brackets and caddles of approved design shall be installed to support all pipe lengths, which are not embedded over their entire runs. The hangers and brackets shall be of adjustable heights and painted with red oxide primer, and two coats of enamel paint of approved make and shade. Clamps, coils and saddles shall be provided to hold pipes with suitable gaskets of approved quality. The brackets and hangers shall be designed to carry the weights of pipes safely. Wherever required pipes may run along ceiling level in suitable gradient and supported on structural clamps. Spacing for clamps for such pipes shall be as follows:

	Vertical	Horizontal
G.I. Pipes	300 cms	240 cms
H.C.I. Pipes	180 cms	120 cms

6.03 Pipe sleeve

Adequate number of sleeves (pipe inserts) of Cast Iron or Mild Steel shall be provided where pipes cross through concrete, masonry and similar work. The pipe inserts shall be provided with removable timber plugs to keep foreign matter out till installation of the services pipe cross the sleeve. The diameter of sleeve should be one size higher than the proposed dia or as instructed by the Engineer.

6.04 Floor trap inlet

Bath room traps and connections shall ensure free and silent flow of discharging water. Where specified, contractor shall have a special type G.I. / M.S. inlet hopper without or with one, two or three inlet sockets to receive the waste pipe. Joint between waste and hopper inlet socket shall be lead caulked/welded/threaded. Hopper shall connected to a C.I. P or S trap with at least 50mm water seal. Floor trap inlet hoppers and traps shall be set in cement concrete 1:2:4 blocks without any extra cost.

6.05 C.P. gratings

Floor trap and urinal trap shall be provided with 110mm square or round C.P. /stainless steel grating, with rim of approved design and shape. Minimum thickness shall be 3 mm.

6.06 Hot Water Supply

The chase will be closed in cement mortar 1:2 (1 cement : 2 coarse sand). Pipes shall be clamped to the wall inside the chase.

6.07 Making Connections

Contractor shall connect the new sewer line to the existing manhole by cutting the walls, benching and restoring them to the original condition. A new channel shall be cut in the benching of the existing manholes for the new connection. Contractor shall remove all sewage and water if encountered in making the connection without additional cost.

6.08 Water Heater

Water heater shall be automatic pressure type water heater (with pressure release valve) with heavy gauge copper container duly tinned, thermostats, indicator lamp and glass wool insulator. the water heaters shall be fitted with pressure release valve, non-return valve and inlet and outlet stop valves as required. Water heaters to conform to IS:2082.

6.09 FULLWAY BALL VALVE

The valves shall be of full-bore type and of quality approved by the Engineer. The body and ball shall be of copper alloy and stem seat shall be of Teflon.

6.10 COMPOSITE PIPES: Composite pipes shall be used in the internal water supply if specified in the Bill of Quantities. These may required to be connected to the existing/ new GI pipes.

7.00 FIRE FIGHTING SYSTEM

HAND APPLIANCES

1.0 SCOPE OF WORK

1.1 Work under the section shall consist of furnishing all labour, material, appliances and equipments necessary and required to install fire extinguishing hand appliances.

1.2 Without restricting to the generality of the foregoing the work shall consist of the following:

Installation of fully charged and tested fire extinguishing hand appliances CO2, Foam, Dry chemical powder type as required by these specifications and drawings.

2.0 GENERAL REQUIREMENTS

2.1 Fire extinguishers shall conform to the following Indian Standard Specifications and shall be with ISI approved stamp as revised and amended upto date: -

- | | |
|--------------------|----------------|
| a) Water gas type | I.S. 940 |
| b) Dry powder type | I.S. 2171-1962 |
| c) Mechanical Foam | I.S. 10204 |
| d) ABC | I.S. 13849 |

2.2 Fire extinguishers shall be installed as per Indian Standard "Code of practice for selection, installation and maintenance of portable first aid appliances "I.S. 2190-1962".

2.3 Hand appliances shall be installed in readily accessible locations with the appliance brackets fixed to wall by suitable anchor fasteners.

2.4 Each appliance shall be provided with an inspection card indicating the date of inspection, testing, change of charge and other relevant data.

2.5 All appliances shall be fixed in a true workman like manner truly vertical and at correct locations.

8.00 LIST OF APPROVED MAKES : CIVIL WORKS

Sl.No.	MATERIALS	MANUFACTURERS
1.	Doors & Windows fixtures/ Fittings:	Everite, Hardima, Earl Bihari
2.	Door Closer / Floor spring :	Doorking, Everite, Hardwyn
3.	Aluminium Sections. :	Indal , Bhoruka, Hindalco, Jindal
4.	Clear Glass/ Clear Float Glass / Toughened Glass :	Modi(GG),AIS(Tata), Saint Gobain(SG)
5.	Laminates :	Formica, Decolam, Century, Marino, National, Green Ply
6.	Synthetic Enamel Paints :	Lewis Berger Asian paints , ICI paints Kansai Nerolac
7.	Oil Bound Distemper :	Asian paints,Lewis Berger , Kansai Nerolac ICI paints
8.	Cement Paint :	Snowcem Plus, Berger (Durocem Extra), Nerolac (Nerocem with titanium),.
9.	Plastic Emulsion Paint :	ICI, Asian, Lewis Berger
10.	Other Paints/Primers :	ICI Dulux, Asian, Berger, Nerolac
11.	Cement :	(OPC 43 & 53 grade conforming to BIS-8112) ACC,Grasim,JK, Ambuja (from lot not more than 1 month old)
12.	Reinforcement Steel :	TMT steel conforming to BIS-1786 with appropriate Test certificates.
13.	Glass Mosaic Tiles :	Italica, Bisazza. Pallidio
14.	M.S. Pipe :	Jindal Hisar, Prakash-Surya, BST, Kalinga
15.	Polysulphide sealant. :	Pidilite, Fosroc, Choksey, Degussa, Chematal Rai
16.	Polycarbonate Sheets :	GE Plastics or approved equivalent
17.	Metal Fire Check Doors :	Navair, Shakti-met, Godrej, Pacific Fire Control, Promat
18.	Gypsum Board System :	India Gypsum, Laffarge, Boral
19.	Wall putty :	Birla ,JK or equivalent

Sl.No.	MATERIALS	MANUFACTURERS
20.	Sunken Portion Treatment	: Choksey, Roffe, Krytone,Sika
21.	Admixtures for concrete.	: Cico, Jubliant Organosys, Roffe, Pidilite
22.	Epoxy Paint.	: Nerolac, Shalimar or approved equivalent.
23.	Ceramic Tiles	: Johnson, Somany, Kajaria, Spartek, Nitco, Orient,Euro
24.	Pre-Laminated Particle Board	: Novopan, Greenlam, Kitlam, Bhutan Board.
25.	Flush Door Shutters.	: Century, Kitply, Novapan, Green Ply
26.	Silicon Treatment	: GE-Silicon, Pidilite, Choksey, Wacker, Forsoc
27.	Glazed Tiles	: Bell, Somany, Johnson, Kajaria, Cera.,Euro
28.	PVC Water Stops	: Supreme, Fixopan or approved equivalent
29.	White Cement.	: Birla White, J.K.
30.	Powder Coating Material Pure Polyester.	: Berger, Goodlass Nerolac or equivalent
31.	Masking Tapes	: Suncontrol , Wonder Polymer or equivalent
32.	Stainless Steel Screws For Fabrication and fixing of Windows.:	Kundan , Puja , Atul.
33.	Proposed Treatment on MS Brackets.	:Galvanised Brackets As per IS:4759-1996 610 gms./sqm. (microns) 80-90
34.	Dash Fasteners./Anchor bolts	: Hilti, Fischer, Bosch.
35.	Stainless Steel Bolts, Washers and Nuts.	: Kundan, Puja, Atul.
36.	Stainless Steel Pressure Plate Screws.	: Kundan, Puja, Atul.
37.	Stainless Steel Friction Stay.	: Securistyle, Earl Bihari.

Sl.No.	MATERIALS	MANUFACTURERS
38.	E.P.D.M. Gaskets.	Anand Reddiplex, Enviro Seals
39.	Weather Silicon.	Dow Corning, Wacker, GE
40.	Structural Silicon at butt joints	- Do -
41.	PVC continous fillet for periphery packing of Glazings /Structural glazings.:	Roop, Anand, Forex Plastic.
42.	Floor Springs.	Doorking, Opel.
43.	Aluminium Cleat arrangement for Glazings.	Deco or approved equivalent
44.	Water proofing / Injection Grouting	Overseas Water Proofing Corporation or approved equivalent
45.	6mm thick Reflective Glass	Glaverbel, Glavermas, Saint Gobain.
46.	Door Locks.	ACME, Godrej, Harrison
47.	Door Seal – Woolpile Weather Strip	Anand -Reddiplex.
48.	Aluminium Grill	Decogrille and approved Equivalent
49.	Vitrified Tiles:	Restile (Granamite- Atena), Naveen, Bell-Ceramics, Kajaria, Somani,Euro
50.	Carpets	Hollitex, Standard, Mohawk
51.	Aluminium Cladding sheets	Alstrong , Alpolic, Alucobond, or equivalent
52.	Aluminium Die-cast handles & two point locking kit	Giesse, Securistyle, Alu-alpha
53.	Stainless steel D-handles	D-line, Giesse, Dorma
54.	Woollen Fabric for Auditorium	ESSMA, Raymonds
55.	Stainless Steel Pipes/Flats	304 Grade

Sl.No.	MATERIALS	MANUFACTURERS
56.	Structural Steel	: Conforming to BIS 2062 and approval of source by HSCC to be. accompanied with test certificates for relevant lot
57.	Antistatic Epoxy Floor	: Fosrock, Beck, Famaflor, STP, Degussa, Pidilite
58.	SBS bitumen based Self adhesive membrane Material	: Grace-Bituthene CP1.5, Texsa-Texself 1.5
59.	Acoustic Mineral Fibre	: USG-Radar, Armstrong, 21 st Century, Acostyle
60.	APP modified Bitumen water proofing membrane	: Lloyds, STP, Bitumat
61.	PVC Flooring	: LG, Responsive or approved equivalent
62.	Hand made ceramic tiles	: Raja Tiles, Saraswathi or equivalent
63.	Curtain wall	: Specialised Agency to be Approved by Engineer
64.	Fire Panic bar	: Briton, Monarch, Von-Duprin
65.	Ply board	: Greenply, Kitply, Century
66.	PVC Doors	: Rajshri or approved equivalent

Note : Wherever makes have not been specified for certain items or equivalent makes referred, the same shall be as per BIS and as per approval of HSCC

9.00 LIST OF APPROVED MAKES : PLUMBING WORKS

S.No.	Materials	Relevant IS Code	Manufacturers
1.	Vitreous China Sanitary ware	2556	Hindustan Sanitary ware, Cera, Parryware, Neycer
2.	White Glazed Fire Clay Sink	771	Sanfire, Cera, Neycer, Hindware.
3.	Stainless Steel Sink		AMC, Orient, Nirali, Suhag, Jayna, Commander
4.	Plastic seat cover of W.C	2548	Commander, Bestolite, Diplomat, Jaquar, Sona
5.	Geyser		Spherehot, Racold, Batliboi, Venus, Voltas, Usha Lexus
6.	C.P. Fittings Mixer/Pillar taps Washers, C.P. brass accessories	1795 4291/4827	Parko, Kingston, Aquaplust, Ceramix Nova or equivalent
7.	Centrifugally /Sand cast iron pipes & fittings	3989/1729	R.I.F., j.NECO, B.C., B.I.C., ISP, SKF
8.	G.I. Pipes	1239 Part I	Jindal-Hissar, Tata, Prakash-Surya B.S.T., SAIL, Bansal
9.	G.I. Fittings	1239 Part I	Unik, K.S., Zoloto
10.	Gunmetal Valves	778	Zoloto, Leader, Sant, Kilburn
11.	Brass stop & Bib Cock	781	Zoloto, Sant, L&K, Jaquar
12.	Ball valve with floats	1703	Zoloto, Leader, Sant, Jayco
13.	Stoneware pipes & Gully Traps	651	BIS Marked pipes
14.	R.C.C. pipes	458	BIS Marked pipes
15.	C.I. Manhole Covers	1726	RIF, NECO, B.C. , B.I.C.
16.	Water Tank		Sintex, Polycon, or equivalent
17.	Mirror		Golden, Atul, Modi guard (GG) Saint Globin
18.	Hand drier		Kopal, Automat, Euronics
19.	PVC flusing cistern		Commander, Parryware, Duralite
20.	Insulation of Hot water pipes		Vidoflex insulation, Superlon insulation or equivalent

S.No.	Materials	Relevant ISI Code	Manufacturers
21.	PVC Rain Water Pipes.		Supreme, Prince, Finolex. Oriplast,Kisan
22.	C.I. pipes Class LA and fittings.		Keso-spun, supra, Electrosteel.
23.	Sluice valve / NRV		Kirloskar, IVC, Kilburn, Zoloto Castle, CIM
24.	Water supply pumps	:	KIRLOSKAR, CROMPTON, KSB, MAX FLOW
25.	Submersible pumps	:	KIRLOSKAR, KSB, Mather & Platt or equivalent
26.	UPVC/HDPE pipes & fittings	;	Finolex , Prince, Supreme,Kiteck
27.	Chlorinator	:	ALFA, USA, Ion exchange, Sigma DH Combine Inc.
28.	HDPE Solution tank	:	WATCON, ION EXCHANGE, or equivalent
29.	C.P Flush Valves	:	Jaquar, DOCOL(Germany) marketed by GEM, Ideal Orient
30.	C.P Angle Valves(Ball valve type)	:	ITAP: Italy, Bugatti, Italy
31.	Infrared Sensor operated Faucets	:	Jaquar, AOS-Robo , Euronics,U-tec
32.	Gratings, Strainers, Cleanouts etc	:	Neer Brand (Sage Metals) or Equivalent
33.	Level controller	:	Femac or equivalent
34.	Drainage Pumps	:	Grundfos, KSB , Salmson Kirloskar
35.	Package Sewage Treatment Plant	:	Akar impex, Watcon, Geo Miler & Co ,Ion-Exchange, JSC Unitherm
36.	Decorative bath room fittings	:	Jaquar (Florentine range), Marc (equivalent) Aquabaths (equivalent)
37.	R.O System	:	Ion Exchange, Watcon, Fontus Akar-Impex, JSC Unitherm
38.	PE-AL-PE	:	Kitec, Jindal

39 HDPE pipes and fittings : Oriplast, Polyfab

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10.00 LIST OF APPROVED MAKES : FIRE FIGTING WORKS

S.No.	Material	Relevant ISI Code	Brand/ Manufacturers
1.	G.I./M.S. Heavy class pipe	1239/3589	Jindal-Hissar, Tata, Prakash -Surya, B.S.T., SAIL
2.	Gate Air Valve		Leader, Zoloto, Sant, SBI, Seeko
3.	Butterfly valves	13095	Audco, Keystone, Intervolve, C & R, Zoloto, Castle
4.	Portable Fire Extinguisher	2171	Minimax, Safex, Nitin, Firex, Ceasefire, Newage
5.	First aid Fire hose reels	884	Minimax, Safex, Firex, Newage
6.	Fire hose pipes	636	Newage, Safex, Jayshree, Jyoti
7.	Fire Hydrant valves	5290	Minimax, Newage, Getech, Safex, Ceasefire, Vijay, Agnice
8.	Sprinkler Heads		
a)	Pendent type		Spray safe, HD, Reliable, Grinnel
b)	Side wall type		Spray safe, Reliable
c)	Sprinkler Side wall extended through		Spray safe, HD, Reliable, Fire Protec. Co.
9.	Sluice and non return/ check valve foot valve strainer		Kirloskar, I.V.C., Kilburn, Zoloto, Leader
10.	Rubber hose 12/20mm dia		Dunlop, Good year, Jyoti
11.	Reinforced rubber lined/canvas		Newage, Jayshree, CRC
12.	Standby battery lead acid		Exide, Standard, Amco
13.	PVC Insulated Copper Conductor.		Finolex, Plaza, National
14.	Recessed/concealed type		Spraysafe., Reliable
15.	Horizontal centrifugal pumps		Kirloskar, Mather & Platt, Greaves Cotton, Max-Flow
16.	Diesel engine		Kirloskar Cummins, Ashok Leyland
17.	Electric motors		Kirloskar, GEC, Siemens, NGEF, ABB Crompton
18.	Electrical switch gear & starters		As per Electrical Works
19.	Cables		As per Electrical Works
20.	Flow meter		Scientific Equipment (P) Ltd. Hyderabad or equivalent

S.No.	Material	Relevant ISI Code	Brand/ Manufacturers
21.	Suction strainer		Leader or equivalent
22.	Vibration eliminator connectors		Resistoflex, or equivalent
23.	Single phase preventor		L & T, GEC, SIEMENS
24.	Electrical Pumps		Kirloskar, KSB, Siemens
25.	Submersible Pumps		Kirloskar, KSB, Siemens
26.	Fire Pumps		Kirloskar, Beacon, Mather & Platt

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