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TECHNICAL SPECIFICATION FOR CIVIL WORKS
SPECIFICATIONS FOR CIVIL & ALLIED WORKS

CIVIL AND ALLIED WORKS

Materials shall be of the best-approved quality obtainable and they shall comply with the respective latest Indian Standard Specifications.

Samples of all materials shall be got approved before placing order and the approved sample shall be deposited with the Project consultants. In case of non-availability of materials in metric sizes, the nearest size in FPS units shall be provided with the prior approval of the Project consultants for which neither extra will be paid nor shall any rebate be recovered.

If directed, materials shall be tested in any approved Testing Laboratory and the test certificate in original shall be submitted to the Project consultants and, the entire charges connected with testing including charges for repeated tests if ordered, shall be borne by the Contractor.

The Contractors without any extra cost shall provide all equipment and facilities for carrying out field tests on materials.

It shall be obligatory for the Contractor to furnish certificates, if demanded by the Project consultants, from manufacturer or the material supplier that the work has been carried out by their material and as per their recommendations.

All materials supplied by the employer/ any other specialist firm shall be properly stored and the Contractor shall be responsible for its safe custody until they are required on the works and till the completion of work.

Unless otherwise shown on the Drawings or mentioned in the “Schedule of quantities” or special Specifications, the quality of materials, workmanship, dimensions etc. shall be as specified herein under.

1. All work shall conform to the description given for each of the items in addition to the bye laws of the Municipality / Corporation within whose jurisdiction the work is required to be carried out.

2. Rates quoted for all items shall include the following:

   a. All subsidiary fastenings, fittings and fixtures required in the completion of the items even though they may not have been specially described under particular item.

   b. All fittings fixed to the walls will have approved type of clamps and fixing shall be done as per the Project consultant’s instructions. Before proceeding with the work a sample shall be made and the Project consultant’s approval shall be obtained.

The rates quoted shall include for carrying out all items of work as per specifications even though not specially mentioned in the schedule item unless otherwise modified by schedule description or by written instructions of the Project consultants. Contractors’ special attention is drawn to the approved brand / manufacture for the various materials of the tender and their rates must be for one of these approved materials.

The rates quoted for all items in this schedule shall be applied to the work pertaining to that item in all floors whether specifically mentioned or not.

I. CEMENT:

Cement shall comply in every respect, with the requirements of the latest publication of IS 269 and unless otherwise specified ordinary Portland cement shall be used.

The weight of ordinary Portland cement shall be taken, as 1440 kg per cum (90 lbs. per cft) Cement shall
be measured by weight and in whole bags, an each undisturbed and sealed 50-kg bag being considered equivalent to 35 Ltrs in volume. Care should be taken to see that each bag contains full quantity of cement. When part bag is required cement shall be taken by weight or measured in measuring boxes.

No other make of cement but that approved by the Project consultants will be allowed on works and the source of supply shall not be changed without approval of the Project consultants in writing. Test certificates to show that cement is fully complying with the specifications shall be submitted to the Project consultants and notwithstanding this, the Project consultants may at their discretion, order that the cement brought on site and which they may consider damaged or of doubtful quality for any reason whatsoever, shall be again tested in an approved testing laboratory and fresh certificates of its soundness shall be produced. Cement ordered for retesting shall not be used for any work pending until result of retest is obtained.

Cement shall be stored in weather proof shed with raised wooden plank flooring to prevent deterioration by dampness or intrusion of foreign matter. It shall be stored in such a way as to allow the removal and use of cement in chronological order of receipt i.e. first received being first used. Cement deteriorated and / or clouded shall not be used on work but shall be removed at once from the site. However, the Project consultants shall determine allowing use of warehouse set cement.

Weekly record of cement received and consumed shall be maintained by the Contractor in an approved form and submitted to Project consultants.

2. FINE AGGREGATE:
Sand shall conform to IS: 383 and relevant portion of IS 515. It shall pass through a IS Sieve 4.75 mm (3/16 E S) test sieve, leaving a residue not more than 5%. It shall be from natural source or crushed stone screenings, if allowed, chemically inert, clean, sharp, hard, durable, well graded and free from dust, clay, Shale, large pebbles, salt, organic matter, loam, mica or other deleterious substance to acceptable limits. Sand shall not contain any trace of salt and it shall be tested and sand containing any trace of salt shall be rejected. The fine aggregate for concrete shall be graded within limits as specified in IS 383 and the Fineness Modules may range between 2.60 to 3.20.

The fine aggregate shall be stacked carefully on a clean hard dry surface so that it will not get mixed up with deleterious foreign materials. If such a surface is not available a platform or a thin layer of lean concrete shall be prepared.

3. COARSE AGGREGATE:
Shall consist of crushed or broken stone 95% of which shall be retained on 4.75 mm IS test Sieve. It shall be obtained from crushing Granite, Quartzite, Trap, Basalt or similar approved stones from approved quarry and shall conform to IS: 383 and IS: 515. Coarse aggregate shall be chemically inert when mixed with cement and shall be cubical in shape and free from soft, friable, thin, porous, laminated or flaky pieces. It shall be free from dust and any other foreign matter. Gravel/Shingle of desired grading may be permitted as a substitute in part or full in plain cement concrete if the Project consultants is otherwise satisfied about the quality of aggregate. For all RCC works the size of coarse aggregate shall be 20mm and down gauge.

4. REINFORCEMENT:
Reinforcement shall be of mild steel tested quality conforming to IS: 432-1996 and any other ISS applicable or deformed bar conforming to IS 1786 and IS 1139 or hard drawn steel wire fabric conforming to IS 1566:1967. All finished bars shall be free from cracks, surface flaws, Laminations, Jagged and imperfect edges.

5. WATER:
Water for mixing Cement / Lime/ Surkhi mortar or concrete shall not be salty or brackish and shall be clean, reasonably clear and free from objectionable quantities of silt and traces of oil, acid and injurious alkali, salt, organic matter that weaken the mortar or concrete or cause efflorescence or attack the steel in reinforced cement concrete. Water shall be obtained from sources approved by the Project...
consultants. Potable water is generally considered satisfactory for mixing and curing concrete, mortar, masonry etc. Where water other than main source is used this shall be tested in an approved testing laboratory to establish its suitability. All charges connected therewith shall be borne by the Contractors.

6. CEMENT MORTAR:
Cement mortar shall be of proportions specified for each type of work in the Schedule. It shall be composed of Portland cement and sand. The ingredients shall be accurately gauged by measure and shall be well and evenly mixed together in a mechanical pan mixture, care being taken not to add more water than is required. No mortar that has begun to set shall be used. River sand shall be used unless otherwise specified.

If hand mixing is allowed, then it shall be done on pucca water-proof platform. The gauged materials shall be put on the platform and mixed dry. Water will then be added and the whole mixed again until it is homogeneous and of uniform colour. Not more than one bag of cement shall be mixed at one time and which can be consumed within half an hour of its mixing.

7. MASONRY:

A) BLOCK WORK
Concrete blocks (hollow or solid) shall generally conform to IS: 2185. Blocks shall be regular in size and shape and shall be of specified strength. Blocks shall be properly cured before they are brought to site. Half or three quarter size blocks are to be used wherever required to make up length of wall and broken blocks shall not be used. The texture of the blocks shall be such that plaster will adhere to it. They shall be sound, free from cracks, honeycombing, broken edges and other flaws. They shall have plane rectangular faces with parallel sides and sharp straight angled edges. They shall have a fine, compact, uniform texture and thoroughly dried. The contractor shall supply samples for approval. Blocks supplied shall conform to approved samples.

DIMENSIONS
The size of hollow and solid blocks shall be as specified in the item of work. The maximum variation in dimensions shall not be more than +1.5mm in ht. and breadth and +/- 3mm in length. The blocks shall be 400 x 200 x 200mm, 400 x 200 x 150mm or 400 x 200 x 100mm as called for.

HANDLING AND STORAGE
The contractor is responsible for transporting hollow concrete blocks in such a manner that the units are adequately protected during transportation. The units shall be handled in a manner which will prevent soiling, chipping or damage of any kind. Broken, chipped or otherwise damaged units will be rejected and shall not be used in the work. The blocks shall be stored in next piles free from contact with ground which shall be located to avoid being disturbed or damage by construction activities.

SAMPLING
At least 3 blocks from a lot manufactured in a day or from 1000 blocks whichever is less, shall be tested for dimension and breaking strength. In case the test result is not upto the standards specified in IS: 2185 the entire lot shall be liable for rejection.
If solid concrete blocks are used in foundation, plinth or basement wall, the hollows must be filled up with cement concrete 1:3:6. In damp soils, the foundation and basement masonry shall be laid in richer mortar as directed by the engineer-in-charge. In addition, a damp proof course consisting of a 25mm layer of cement mortar 1:2 as an approved type of bituminous course shall be provided.

MORTAR
Cement mortar used for jointing and laying of blocks for hollow block masonry shall be as specified in the item of work or as directed by the engineer-in-charge.

PREPARATORY WORK
Wetting of blocks
The blocks need not be wetted before or during laying in the walls. In case the climatic conditions sc
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.

LAYING CONCRETE BLOCK MASONRY
Each block shall be set with bedding joints and vertical joints filled thoroughly. The wall shall be taken up truly plumb. All courses shall be laid truly horizontal and vertical joints truly vertical. Vertical joints in alternate courses shall come directly over the other. Thickness of the block courses shall be kept uniform.

Necessary tools comprising of wooden straight edge, mason’s spirit level, square, foot rule, plumb line and pins etc. shall be frequently and fully used by the masons to ensure that the walls are taken up true to plumb line and levels. Both the faces of walls of thickness greater than 20cms shall be kept in proper plans. All the connecting block masonry work shall be carried out at nearly one level and no portion of work shall be raised more than 1m above the rest of work. Any dislodged block shall be removed and reset in fresh mortar.

The construction of walls may be started either at the corners first, or started from one end and proceeding in the other direction. If the corners of the walls are built first, they shall be built four or five courses higher than the centre of the walls. As each course is prelad at the corner, it shall be checked for alignment, level and for being plumb to ensure truly straight and vertical walls. Each course in building be stepped back by half block and the horizontal spacing of the block shall be checked by placing a mason’s level diagonally across the corners of the block, the mason’s line shall be stretched from corner to corner for each course and the top outside edge of each block shall be laid to this line. Handling or gripping the block shall be such as to position the block properly with minimum adjustment. Mortar shall not be spread too far ahead of actual laying of the block that it tends to stiffen and lose its plasticity.

CLOSURE BLOCK
When installing the 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 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.

JOINTS
Horizontal (bedding) joints
Mortar shall be spread over the entire top surface of the block including front and rear shall as well as the webs to a uniform layer of 10mm thickness.

When filling in the wall between the corners Vertical (cross) joints for vertical joints, mortar shall be applied on the vertical edges of the front and rear shall of the blocks. The mortar shall be applied on the edges of the succeeding unit when it is standing vertically and then placing it horizontally well pressed against the previously laid unit so as to provide well compacted vertical joints. In the case of two cell blocks depression on either vertical side shall also be filled with mortar.

The thickness of both horizontal and vertical joint shall be not more than 10mm. All face shall be raked to a minimum depth of 10mm by raking tool except in the case of extruded joint construction as is laid when the mortar is still green so as to provide proper key to plaster or pointing to be done. Where pointing or plastering is not required to be done, the joints shall be struck flush and finished at the time of laying. The face of concrete block masonry shall be kept cleaned and all mortar droppings removed promptly.

Provision for doors and windows frames. A course of solid concrete block masonry shall be provided under doors and window openings or a 10cm thick pre-cast concrete sill-block under windows. The solid course shall extend for at least 20cm beyond the opening on either side. For jambs of doors and windows, either solid concrete blocks shall be provided or if hollow units are used, the hollows shall be filled with cement concrete 1:2:4.

All block work shall be plumb, square and properly bonded. The joints shall be broken. The thickness of the courses shall be uniform with courses horizontal. All connected work shall be carried out at nearly one level and no portion of the work shall be left more than one course lower than the adjacent work. Blocks shall be so laid that all joints are well filled with mortar. The thickness of joints shall not be less than 6mm and not more than 8mm. The face joints shall be raked to a minimum depth of 10mm by raking tools daily during the progress of work when the mortar is still green, so as to provide a proper key for the
plaster or pointing. When plastering or pointing is not required, the joints shall be struck flush. For pointec masonry or for masonry without plaster, smooth textured concrete blocks shall be used. The face of block work shall be kept clean at all times.
Where blocks are to be used for load bearing walls, the uppermost layer of the blocks supporting slab or other structural members, shall be solid or treated as directed by the Engineer.
Pre-cast concrete screen blocks or ‘jali’ work may be used for decorative purposes. The contractor shall furnish samples for approval.

B) BRICK WORK

BRICKS
Bricks shall be Table moulded bricks, conforming to IS: 1077. Bricks shall be a uniform deep red or copper colour, thoroughly burnt without being vitrified, regular in shape and size. They shall have sharp and square sides and edges and parallel faces to ensure uniformity in the thickness and height of the courses of brickwork.
Bricks shall be free from cracks, chips, flaws, stones or lumps of any kind. They shall be sound, hard and homogenous in texture and shall have a minimum crushing strength of 50 kg per sq.cm.
The nominal size of the brick shall be 230mm x 115mm x 70mm (nominal) unless otherwise specified. The bricks shall be provided with frogs. The water absorption shall not be more than 20 (Twenty) percent by volume.

TESTING
Samples of Bricks taken at random from stacks/Trucks by the Project Manager shall be got tested for strength, water absorption, etc. at contractor’s expense.

SAMPLES
Samples of each type of brick taken at random from the load shall be deposited with the Project consultant for his approval before being used in the work. All subsequent deliveries shall be up to the standard of sample approved.

SOAKING OF BRICKS
All bricks shall be thoroughly soaked in clean water immediately before use. They shall be placed in specially prepared vats, tubs or tanks for not less than one hour. The Superintendent may amend this time after trials at site. After they have been soaked, the bricks shall be kept on wooden planks or brick platforms to avoid earth being smeared on them.

MORTAR MIXING
Mixing of mortar shall be done in a mechanical mixer. Hand mixing shall be resorted to only when specifically permitted by the project consultant. Cement and sand shall be mixed dry thoroughly and then water shall be added gradually. Wet mixing shall be continued till mortar of the consistency of a stiff paste and uniform colour is obtained. Only the quantity of mortar which can be used within thirty minutes of its mixing shall be prepared at a time.
Mortar shall be used as soon as possible after mixing and before it has begun to set and in any case within thirty minutes after the water is added to the dry mixture. Mortar left unused for more than thirty minutes after mixing shall be rejected and removed from the site of work.

LAYING
If bricks/blocks are of size such that the width of the header course does not come equal to the width of the stretcher course, the difference shall be made up during construction of brick work itself by the same mortar as used for construction of masonry to provide a plain vertical surface. The surface should also be scarified to receive plaster.
All junctions of walls and cross walls shall be carefully bonded into the main walls. The rate of laying masonry will be up to a height of 100cm per day if cement mortar is used. Greater heights may be built only if permitted by the project consultants.
During rains, the work shall be carefully covered to prevent mortar from being washed away, should any mortar or cement be washed away, the work shall be removed and rebuilt at the contractor’s expense.
CURING
All fresh brickwork shall be protected from the effects of sun, rain, etc., by suitable covering. All brick works shall be kept constantly moist on all the faces for at least 10 days.

SCAFFOLDING
Unless otherwise instructed by the project consultant, double scaffolding having two sets of vertical meta supports shall be provided for all building work. The supports shall be sound, strong and tied together with horizontal pieces over which scaffolding planks shall be fixed.
The contractor shall be responsible for providing and maintaining sufficiently strong metal scaffolding so as to withstand all loads likely to come upon it. Wooden scaffolding shall not be permitted.

8. PLASTER AND WALL FINISHES
The contractor shall furnish all materials, labour, scaffolding equipment, tools, plant & incidentals necessary and required for the completion of all plaster and wall finishes, subject to approval by project consultant.

GENERAL
Plaster as herein specified shall be applied to all internal and external surfaces where called for. Glazed tile dado, marble stone dado and other wall finishes shall be provided where indicated on drawings and schedule of finishes. Areas called for on drawings and typical shall be considered to apply to appropriate adjoining areas whether shown on same drawings or not and whether indicated or not.
All plaster work and other wall finishes shall be executed by skilled workmen in a workmanlike manner and shall be of the best workmanship and in strict accordance with the dimensions on drawings subject to the approval of the project consultant.

PLASTER WORK
The primary requirement of plasterwork shall be to provide absolutely watertight enclosure, dense, smooth and hard and devoid of any cracks on the interior and / or exterior. The contractor shall do all that is necessary to ensure that this objective is achieved. All plastering shall be finished to true plane, without any imperfections and shall be square with adjoining work and form proper foundation for finishing materials such as paint etc.
Masonry and concrete surfaces which call for applications of plaster shall be clean, free from efflorescence, damp and sufficiently rough and keyed to ensure proper bond, subject to the approval of the project consultants.
Wherever directed by the project consultant, all joints between concrete frames and masonry in filling shall be expressed by a groove cut in the plaster. The said groove shall coincide with the joints beneath as directed. Where grooves are not called for, the joints between concrete members and masonry in filling shall be covered by 24 gauge galvanised chicken mesh strips 400mm wide or as called for on drawings / documents which shall be in position before plastering.

CHASING & BREAKAGE
All chasing, installations of conduits, inserts boxes etc., shall be completed before any plastering or other wall finish is commenced on a surface. No chasing or cutting of plaster or other finish on a surface shall be permitted. Broken corners shall be cut back not less than 150mm on both sides and patched with Plaster of Paris as directed. All corners shall be rounded to a radius of 8mm or as directed by the project consultants.

SAMPLES
Samples of each type of plaster & other wall finish shall be prepared well in advance of undertaking the work for approval by the project consultants.

MATERIALS
CEMENT:
As specified above

WATER:
As specified above

SAND:
For internal plaster - washed fine sand.

PROPORTIONS
The materials used for plastering shall be proportioned by volume by means of gauge boxes.

PREPARATIONS OF SURFACES
The joints in all walls, both existing and freshly built shall be raked to a depth of 15mm, brush cleaned with wire brushes, dusted and thoroughly wetted before starting plastering work. Concrete surfaces to receive plaster shall be roughened by hacking over the entire surface so that the skin of the concrete is completely removed, as approved by the project consultants to ensure proper key for the plaster.

PLASTER TO WALLS
Plaster to internal faces of walls shall be 1.5mm thick comprising of one part cement and six parts of clear fine sand. The external surfaces of external wall shall have plaster of 10mm thickness comprising of one part of cement and 4 parts of clean fine sand to form base for vapour barrier.

MORTAR MIXING
Mortar shall be prepared as specified under "brick work". It shall be made in small quantities, as required and applied within 15 minutes of mixing.

APPLICATIONS
Plaster application shall be commenced only after the preparatory work is approved by the project consultant. Correct thickness of plaster shall be obtained by laying plaster screeds (gauges) at intervals of 1.5mtrs as directed. Mortar shall be firmly applied, well pressed into the joints, rubbed, and finished as approved by the project consultants to give a smooth and even surface.

CURING
Finished plaster shall be kept wet for at least 10 days after completion. In hot weather, walls exposed to such shall be screened with matting kept constantly wet by any other approved means.

CEILING PLASTER
Plaster to ceilings, soffits or stairs flight slabs and similar locations, where called for, shall be 12mm thick and comprise of one part cement and four parts of clean fine sand.

PLASTER MESH TO WALLS
Plaster mesh of 24 gauge, 12mm size shall be provided at junctions of brick masonry and concrete members, to be plastered and other locations 150mm on each sides of the junction in double fold or as called for, properly stretched and nailed, ensuring equal thickness of plaster on both sides of the mesh.

CEMENT MORTAR
Cement mortar shall be of proportion specified for each type of work. It shall be composed of Portland cement and sand. The ingredients shall be accurately gauged and shall be evenly mixed together in a mechanical mixer. Care should be taken to add more water than necessary. If hand mix is allowed it shall be done on pucca waterproof platform. The gauged materials shall be put on platform, and thoroughly mixed dry. Water shall then be added and the whole mixed thoroughly until the mix is homogenous and of uniform colour, quantity of mortar mixed should not be more than what can be consumed within half an hour of mixing.

Cement mortar mix are specified as 1:2, 1:3, 1:4, 1:5 etc. The first figure will mean one part of Portland cement by volume, the second figure will mean so many parts of sand by volume. For example, cement mortar 1:4 would mean one part of cement and four parts of sand.

Cement & sand must conform to relevant IS specification.
LIME FOR RENDERING
The wall shall be prepared out of best quality tat lime slaked at site with fresh water not less than one week or more than two weeks before use. All impurities, ashes, improperly burnt stuff shall be screened and picked out before slaking. Slaked lime shall be screened through to remove all un-slaked materials, stones etc., so that only a fine creamy paste is available for rendering. Slaking lime is diluted with just sufficient water to give a thick consistent liquid suitable for effective covering of base surface. Before the base coat sets the lime rendering is applied and finished smooth and the entire plastered surface is truly plane.

ROUGH CAST PLASTER

GENERAL
The specification for sand faced plaster shall also apply to rough cast plaster, subject to the following:

BASE COAT
The first coat of plaster shall be of cement mortar 1:4 mixed and applied according to the relevant provisions of IS 1661. The finished thickness shall be 12mm for brick masonry and concrete surfaces and 15mm for stone masonry. The plaster shall be laid by throwing the mortar by using a strong whipping action and pressing to form a good bond. The surface shall be roughened.

SECOND COAT
The second coat shall be the roughcast mixture consisting of aggregate which may vary in size from 5mm to 8mm and may consist of specially graded mixture mixed with fine sand and cement. The proportion of cement to sand to aggregate shall be 1:1.5:3. It shall be flung upon the first coat with large trowels to form an over protective coat. The second coat shall be applied while the first coat is still soft and plastic. The work shall generally conform to requirements IS 1661. The thickness of the coat shall be about 12mm.

FLOORING, SKIRTING, DADOING AND CLADDING

GENERAL
Before the operation for laying any floor is started, the surface of base concrete shall be thoroughly cleaned of all dirt, loose particles, caked mortar droppings, by scrubbing with coir or steel wire brushes. If so directed by the project consultants the surface shall be roughened by chipping or backing at close intervals. The surface shall then be cleaned with water and kept wet for 12 hours and surplus water shall be removed by mopping before the topping is laid.

GRANOLITHIC FLOORING

GENERAL
The flooring shall be of specified thickness and shall consist of 1:1.5:3 concrete base as specified and 12mm thick granolithic wearing coat. The granolithic flooring shall be laid in alternate panels. The size of panels shall be as decided by the project consultants.

LAYING OF 1:1.5:3 CONCRETE BASE
The 1:1.5:3 concrete base shall be of graded coarse aggregate of 20mm and down size, coarse sand & cement. The ingredients shall be thoroughly mixed with sufficient water to obtain the required plasticity. The free water on the surface of the base shall be removed and a coat of cement slurry of the consistency of thick cream shall be brushed on the surface. The prepared 1:1.5:3 concrete shall be laid immediately after mixing on the fresh grouted base. The concrete shall be spread evenly and leveled carefully. Low places shall be filled, humps removed and the whole surface again leveled. The layer shall be compacted by ramming and trowelled and allowed to set. The base shall be laid in alternate panels not exceeding 4 sqm area.

MIXING AND LAYING OF WEARING COAT
One part of cement in dry state shall be mixed with 1.5 parts by volume of well graded/crushed granite
chips of 6mm maximum size. The ingredients shall be then mixed with sufficient water as for ordinary concrete. The wearing coat shall be laid 12mm thick over 1:1.5:3 cement concrete base immediately after it has set compacted and leveled with a steel trowel. Just sufficient trowelling shall be made to give a level surface. The surface should not be over trowelled as excessive trowelling will bring the cement to the surface which shall be strictly avoided. When the initial set takes place further compaction by steel trowelling shall be done and final brushing shall be made before the topping becomes too hard.

CURING
As soon as the surface is hard enough, it shall be covered with sacking or sand and kept continuously wet for a period of at-least one week.

GRANITE & OTHER STONE WORKS
The slabs shall be of selected quality, hard sound, dense, homogenous in texture, free from cracks, decay, weathering and flaws and of thickness as specified. The top exposed faces should have been polished before bringing it to site.

The sizes of slabs shall be as called for in the drawings and shall be of 20 and 40mm thick. They shall be of colour as approved by the Project consultant. They shall have the top surface machine polished before being brought to site. All edges shall be machine cut to have the slabs to required correct sizes and the edges shall be ground smooth and even to full depth. A straight edge laid along the side of the slab shall be in full contact with it. All angles and edges of the slabs shall be true and square and free from chipping.

A bed of cement mortar 1:4 shall be laid and properly levelled to an average thickness of 20mm and the surface should be kept slightly rough to form a satisfactory key for the slabs. Neat cement paste of honey like consistency shall be spread over mortar bed over such an area so that the paste will not harden before laying slabs. Slabs shall be soaked in water for 15 minutes and allowed to dry. The slabs shall then be fixed as per approved pattern with thin coat of cement paste on back of each slab. They will be tapped with a wooden mallet till it is properly bedded in level with adjoining slabs. Joints shall not be more than 1.5mm wide. The surplus cement grout that may have come out of the joints has to be wiped off gently and joints cleaned. Joints shall then be flush pointed with cement based polymer grouts to match the shade of the slab. The flooring shall be cured for 14 days. Then it shall be polished according to IS: 1443, except that (1) First polishing with coarse grade carborandum shall not be done. (2) Cement slurry with or without pigment shall not be applied before polishing.

VITRIFIED/ CERAMIC TILE FLOORING & DADOING
Before the operation for laying or cladding any floor/ wall is started, the surface of base concrete shall be thoroughly cleaned of all dirt, loose particles, mortar droppings, by scrubbing with coil or steel wire brushes. If so directed by the Professional Team the surface shall be roughened by chipping or hacking at close intervals. The surface shall then be cleaned with water and kept wet for 12 hours and surplus water shall be removed by mopping before the topping is laid.

Homogenous Vitrified tiles from an approved manufacturer conforming to European standards EN: 176/179 and IS 777 for Ceramic tiles shall be of specified size and thickness and colour. Coves, internal and external angles, corners, beams, etc., shall be used as per the direction by the professional team. Under layer of 12 to 15mm average thickness of cement mortar 1:4 proportion shall be laid. Tiles shall be well soaked in water, washed, cleaned and set in cement mortar and each tile being gently tapped with a wooden mallet till it is properly bedded in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern. To attain best results 3mm tile spacers to be used for flooring and cladding works. After the tiles have been laid, surplus epoxy grout shall be cleaned off. The joints shall be cleaned off the grey cement grout with a wire brush or trowel to a depth of 5mm and all dust and loose mortar removed. Joints shall then be flush pointed with cement based polymer grouts to match the colour of the tile. The floor/dado shall then be kept wet for 14 days. After curing, the surface shall be washed with mild hydrochloric acid and clean water. The finished floor/dado shall not sound hollow when tapped with a wooden mallet. The works will include the cost of under layer...
of cement mortar. The masking tape shall be put before putting the epoxy grout & the grout shall be thoroughly cleaned immediately.

Tiling Work
The type, quality, size, thickness and colour of tiles for flooring, skirting and dados shall be of the best quality as described and approved by the Professional Team. The Contractor shall provide the Professional Team with samples for approval and only approved tiles, skirtings and dados shall be brought on to the Site.

Before laying tiles sub-surfaces shall be thoroughly cleaned and washed of all loose materials, dirt, lalitance and the like and then well wetted without forming water pools on the surface.

Tiles shall be laid on Cement mortar bedding 12mm thick in the proportions of one part of cement, two parts lime and six parts sand.

Tiles shall be laid on mortar beds one after another, each tile being gently tapped with a wooden mallet until properly bedded and level with adjoining tiles. Joints shall be perfectly straight and uniform in thickness. Tiles shall be laid perfectly level unless otherwise specified or directed by the Professional Team. After laying joints of tiles shall be finished with epoxy based polymer grouts to match the colour of the tile.

Floor tiles laid adjoining walls shall project at least 12mm under plaster or render, skirtings or dados. Hall tiles and cut pieces shall be avoided as far as possible.

After laying flooring shall be allowed to cure undisturbed for 7 (seven) days. Construction traffic and labour movement shall not be allowed on the floor for at least 14 (fourteen) days after laying tiles. Following curing each and every tile shall be lightly tapped with a small wooden mallet. Should this give a hollow sound such tiles, together with any cracked or broken tiles, shall be removed and replaced with new tiles to proper lines and levels.

For skirting and dado vertical surfaces shall be thoroughly cleaned and wetted and evenly and uniformly covered with a 12mm thick coat of cement mortar (1:2).

Backs of tiles for skirtings and dados shall be covered with a thin layer of neat cement paste and tiles gently tapped against the wall with a wooden mallet. Work shall be done from the bottom of the surface proceeding upwards. Joints shall be as close as possible and the work shall be truly vertical and flush. To attain best results 3mm tile spacers to be used for flooring and cladding works. Corners and junctions shall be finished true with external and inner corner PVC beads of colour matching to the tiles. At the tops of dado work border tile/ granite borders, if specified, shall be provided.

Works to include flooring, skirtings & dado work and shall be inclusive of forming angles, corner pieces and approved borders.

Tile Grouts: grout to match the tile colours. Water absorption of these grouts should be less than 5% and comprehensive strength of min 3500 psi. The linear shrinkage should be less than 0.1%. The grout should be non-staining with fortifier and colourfast pigments. The masking tape shall be put before putting the epoxy grout & the grout shall be thoroughly cleaned immediately.

Corner Beadings: External round/ convex and internal concave PVC corner beads to match the colour of the tiles. PVC Inner Corner Tile Beading and External Round edge Tile Beading of nominal thickness 1.2mm of Colours matching the tile colours & depths of, 9.5 and 10.5mm made out of PVCU and PVC co-extrusion equivalent to BS 5750 as protector for inner corners and external edges, for all vertical and horizontal edges. The size shall be minimum length 2.5m. Joints are not permitted.

Tile Spacers: 3mm spacers made of PVC as per as per manufactures specifications with size of 30 x 30 x 3mm
Pre-polished counters for wash basins

Providing and fixing Granite running counter for a depth 600mm & 300mm front fascia finished with Granite, wash basin counter to be fixed with necessary frame work as per detailed drawing. The counter top shall have 20mm thick granite of approved shade supported on 25 x 25mm 4mm thick MS powder coated box section fixed to adjoining masonry wall/_partitions as per the detailed drawings. The counter shall be supported on 20mm thick marine grade plywood using 25 x 25 x 4mm thick MS powder coated brackets supports at regular intervals as per the detailed drawings. The counter top granite shall be properly edge polished to shape as per the detail drawings. The counter shall have 4" high 20mm thick granite back splash band with chamfered edges fixed over partitions/masonry/RCC with cut-out to accommodate switches and sockets with edges properly machine polished.

The provision shall be made in granite for fixing below counter wash basin with edges half bull nosed as per the detailed drawings. The Counter also includes 200mm high 20mm thick granite fascia fixed over the 19mm thick ply with edge details as per the detailed drawing. The underside of the counter marine plywood surface shall be laminated with 1mm thick laminate of approved shade with PVC edge tipping as per the detailed drawings.

Marble and Granite Flooring, Dado & Skirting

The type, quality and thickness of marble and granite slabs for flooring, skirting and dados shall be of the best quality as described and approved by the Project Manager or his representative and shall be hard, dense, uniform, homogenous in texture, have even crystallising grains and be free from cracks and other defects. The Contractor shall provide the Project Manager or his representative with samples for approval and only approved slabs shall be brought on to the Site. The slabs shall be machine polished, flamèd or honed as mentioned in the drawings at the factory prior to being brought to the Site. All edges shall be machine cut to have the slabs to required correct sizes and the edges shall be ground smooth and ever to full depth. A straight edge laid along the side of the slab shall be in full contact with it. All angles and edges of the slabs shall be true and square and free from chipping. Bull nosing, grooves & chamfering of edges for staircases & skirting, etc., shall be as indicated in the detailed drawings.

Flaming on polished granite to achieve the required undulated flame finish shall be done using the thermal torch. The ignited torch shall be held at 45 degrees to the granite slab plane with requisite temperature using combination of Oxygen and LPG gases in presence of continuous water jet for immediate cooling. The pressure of the gasses required, depends on the level, intensity and pattern of flaming as approved by the Project consultant.

Granite Slabs for Lift flooring shall have suitable Epoxy underlays & adhesives as per the detailed drawings & manufacturers specifications.

Before laying sub-surfaces shall be thoroughly cleaned and washed of all loose materials, dirt, laitance and the like and then well wetted without forming water pools on the surface.

Slabs shall be laid in cement slurry over a cement mortar bed approximately 18mm thick (one part of cement, and six parts sand) evenly spread over sub-surfaces.

Slabs shall be gently tapped with a wooden mallet until properly bedded and level with adjoining slabs. Joints not exceeding 1mm wide shall be perfectly straight and uniform in thickness. Slabs shall be laid perfectly level unless otherwise specified or directed by the Project Manager or his representative. After laying joints shall be finished with white cement.

The work shall include admixtures & grouts such as 511 IMPREGNATOR (Sealer) & LATICRETE 111 & 4237 all as manufacturers specifications & drawings.
Slabs laid adjoining walls shall project at least 12mm under plaster or render, skirting or dados.

After laying flooring shall be allowed to cure undisturbed for 10 (ten) days. Design traffic shall not be allowed on the floor for at least 14 (fourteen) days after laying slabs. Following curing slabs shall be lightly tapped with a small wooden mallet. Should this give a hollow sound such slabs, together with any cracked or broken slabs, shall be removed and replaced with new slabs to proper lines and levels.

The above procedure shall be followed again after slabs are polished. To ensure that such replaced slabs match those laid earlier the Contractor shall order sufficient extra slabs to meet this requirement.

After joints have developed sufficient strength floors shall be machine polished to the desired finish to the satisfaction of the Project Manager or his representative. Sufficient quantities of water shall always be used during polishing to prevent scratching.

For skirting and dado vertical surfaces shall be thoroughly cleaned and wetted and evenly and uniformly covered with approximately a 12mm thick coat of cement mortar (1:4).

Backs of cut slabs for skirting and dados shall be covered with a thin layer of neat cement paste and tiles gently tapped against the wall with a wooden mallet. Joints shall be as close as possible and the work shall be truly vertical and flush. At the top of dado work borders, if specified, shall be provided.

Once work has set skirting and dados shall be hand polished with Carborundum stone to produce a high glossy finish. Corners and junctions shall be finished true.

The work for flooring, skirting and dado work shall be inclusive of forming angles, corner pieces and approved borders.

**Urinal Partitions**

The Urinal Partitions shall be 19mm thick, double side polished Granite slabs in between Urinals. Top, side and all visible surfaces shall be polished & rounded off and fixed In CM 1:4 to walls with necessary MS clip sections / cement mortar in niche and joints shall be epoxy based polymer grout of approved make with in the as per detail drawings& approved by Project consultants.

**IPS Flooring**

**General**

The flooring shall be of specified thickness and shall consist of 1:2:4 concrete base/ M15 concrete as specified in the Bill of Quantities and 12mm thick wearing coat. The granolithic flooring shall be laid in alternate panels. The size of panels shall be as decided by the Project Managers.

**Laying of 1:2:4/ M15 Concrete Base**

The 1:2:4/ M15 concrete base shall be of graded course aggregate of 20mm and down size, 10mm course sand & cement. The ingredients shall be thoroughly mixed with sufficient water to obtain the required plasticity. The floor shall be completed with 1:1 cement sand mortar 12mm thick and cement slurry 2.2kg/sqm including Glass divider strips 45/50x4mm thick set in the flooring including necessary levelling, setting, etc.

The free water on the surface of the base shall be removed and a coat of cement slurry of the consistency of thick cream shall be brushed on the surface.

The prepared 1:2:4/ M15 concrete shall be laid immediately after mixing on the fresh grouted base. The concrete shall be spread evenly and leveled carefully. Low places shall be filled, humps removed and the whole surface again leveled. The layer shall be compacted by ramming and trowelled and allowed to set.
Mixing and Laying Of Wearing Coat
One part of cement in dry state shall be mixed with 1.5 parts by volume of well graded/crushed granite chips of 6mm maximum size. The ingredients shall be then mixed with sufficient water as for ordinary concrete. The wearing coat shall be laid 12mm thick over 1:2:4 cement concrete base immediately after it has set compacted and levelled with a steel trowel. Just sufficient trawelling shall be made to give a level surface. The surface should not be over trawelled, as excessive trawelling will bring the cement to the surface, which shall be strictly avoided. When the initial set takes place further compaction by steel trawelling shall be done and final brushing shall be made before the topping becomes too hard.

FLOOR HARDNERS
Where specified in the drawings, floor hardeners, approved by the Project Manager or his representative, shall be supplied and incorporated into surface finishes in accordance with the manufacturer's recommendations.

CURING
As soon as the surface is hard enough, it shall be covered with sacking or sand and kept continuously wet for a period of at-least one week.

SCREED FLOORING
General
The flooring shall be of specified thickness and shall consist of 1:2:4 concrete base as specified and 12mm thick wearing coat. The screed flooring shall be laid in alternate panels. The size of panels shall be as decided by the Project Managers.

Laying of 1:2:4 Concrete Base
The 1:2:4 concrete base shall be of graded course aggregate of 20mm and down size, 10mm course sand & cement. The ingredients shall be thoroughly mixed with sufficient water to obtain the required plasticity.

The free water on the surface of the base shall be removed and a coat of cement slurry of the consistency of thick cream shall be brushed on the surface.

The prepared 1:2:4 concrete shall be laid immediately after mixing on the fresh grouted base. The concrete shall be spread evenly and leveled carefully. Low places shall be filled, humps removed and the whole surface again leveled. The layer shall be compacted by ramming and trawelled and allowec to set.

Providing & laying screed concrete of following thickness with power trawelled smooth finish screec concrete flooring using M20 Grade Ready Mix / Manual concrete with 20mm and 10mm down size aggregates to line and level as per the finalized b/t 1 works. The screed concrete floor has to be laid in panels of Maximum size 3 mtrs x 3 mtrs by the alternative bay method. The construction joint shall be cut using diamond bit wheel for a width of 3 to 4mm and a depth of 30mm within 20 to 30 hours of concreting, no delay shall be acceptable. On curing and drying of the concrete the construction joints have to be filled with Nitoseal 280 or equivalent as per manufactures specification, The rate to include necessary Base cleaning, chipping of loose mortar /concrete, water wash of the mother slab/ existing concrete surface to the satisfaction of Project consultant / PMC/Consultant with consolidation, levelling power trawelling smooth finishing and curing etc., complete with lead and lift to all levels as directed by the Consultants/project consultants / engineer in charge in line with the technical specification.

CURING
As soon as the surface is hard enough, it shall be covered with sacking or sand and kept continuously wet for a period of at-least one week.
VACCUM DEWATERED CONCRETING AND FLOORING

Preparation
The surface to receive flooring shall be clean, free from dirt and free from foreign material.
Any undulations or mortar remaining on the floor shall be trimmed.
Base course shall be trimmed.
The base shall be cleaned and watered before laying the floor.
Work includes at all depths and heights.
The finished surface shall be kept wet for a maximum period of one week.

Concreting (General)
Concreting shall have a concrete base of M20 of specified thickness.
Flooring shall have hardtop on the concrete base.
Flooring shall be laid in strips, the size of which is mentioned on the drawings.

Materials

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>Portland</td>
</tr>
<tr>
<td>Sand</td>
<td>River sand</td>
</tr>
<tr>
<td>Aggregate</td>
<td>Max. Size 10 to 20mm</td>
</tr>
<tr>
<td>Water</td>
<td>Potable</td>
</tr>
<tr>
<td>Nito hardener (Optional)</td>
<td>@ 3kg/sqm</td>
</tr>
<tr>
<td>Poly Sulphide sealant</td>
<td>At all control joints of size 10mmx6mm at every 200 sqm area</td>
</tr>
</tbody>
</table>

Execution
Mix cement, sand and aggregates in proportion 1:1.5:3 thoroughly with water to get an appropriate consistency.
Prepared concrete shall be laid immediately after mixing.
The base shall be free from water and other foreign materials, dust and dirt.
A coat of cement slurry of the consistency of thick cream shall be brushed on the surface of the base course.
The concrete shall then be spread over this base evenly and leveled carefully.
Low areas shall be filled with concrete and humps removed. De-vacuumisation shall be done for removing the voids.
The whole concrete surface shall be leveled, compacted by ramming and trowelling.
Prepared surface shall be allowed to set.

Hardener screed:
Hardtop to be prepared as per the specifications with Nito hardener and one part of dry cement.
The hardtop shall be provided over concrete base immediately after it is set, compacted and leveled with a steel trowel.
The surface shall be trowelled to bring the hardener coat to a leveled surface.
Excessive trowelling shall be avoided.
After the initial set, further compaction shall be done by steel trowelling.

Final brushing where required (to achieve desired surface finish) shall be made before the floor top becomes too hard.

Curing

Curing shall commence as soon as the surface is hard enough to receive the water.
The surface shall be covered with sacks or sand and shall be kept continuously wet for a period of at least one week.

STAINLESS STEEL RAILING FOR DOUBLE HEIGHT AREA

Fabricating, Supplying and Fixing in position Stainless steel Staircase Handrail of 200mm high +(150-200) mm with Top hand rail of 50mm dia Hollow SS pipe of 16 gauge to be welded to 19mm wide 8mm thick brushed finish ss flat to shape and size as railing to the verticals made of 50x6 mm SS flats with 8mm spacer welded to SS brackets pipe which is connected with verticals 10mm dia SS pipe bent to profile and placed as per the detail architectural drawing and verticals are connected by 50mm wide 10mm thick brushed finish ss flat vertical supports to be grouted on to the slab. Verticals should be fixed to the concrete slabs with 75mm x 75mm, 10mm SS plate anchored with 4 Nos. of 10mm dia 75mm long SS brush finished Expansion bolts as per the detail drawings. The rate to include 10mm thick laminated glass panels in between the vertical steel pipes, the glass to be fixed for every 1200mm distance.

All SS sections shall be 304 grade with brush finish as per the project consultants and Site in charge approval.

The Contractor to submit the shop drawing of the same including the fabrication details, calculations and stability report. The work to start only on written approval of the same by the Project consultants. They also includes necessary scaffolding / centering and lead lift as per the site conditions.

MS STAIRCASE RAILING

Fabricating, Supplying and fixing in position Staircase hand rail of 50mm dia hollow MS pipe of 16 gauge. fixed to 25mm dia MS pipe. Bent to profile and welded to M.S insert plates of 100MM x 100MM, 6MM thick. anchored in the wall with 4 nos. of 10mm dia, 75mm long expansion bolts, etc., complete, as per architectural drawings. All MS sections to be finishes as per Project consultants / Site in charge instructions. All MS sections to be finished with one coat of primer and 3 coat of Auto coat spray paint as per the detailed drawing the rate should include necessary scaffolding and supports and welding etc complete.

MS STAIRCASE RAILING

Fabricating, Supplying and Fixing in position MS Staircase Handrail with Top hand rail of 50mm dia Hollow MS pipe of 16 gauge to be welded to the verticals made of 40mm dia MS tube (sealed with SS cap) with a connector 12mm dia MS rod bent to profile as per the detail architectural drawing. Balusters should be fixed to the concrete slabs with 60mm x 60mm, 8mm plate anchored with 4 Nos. of 8mm dia 75mm long Expansion bolts as per the detail drawings. The Mid-rails shall consist of 2 Nos 40X25mm MS square tube welded to balusters with a connector of 20mm MS square rod as per detailed drawings. 25mm wide, 6mm thk MS vertical are welded in between the Mid-rails as per detailed drawings. All MS sections to be finished with Auto coat paint as per Project consultants / Site in charge instructions.
SS RAMP RAILING

Fabricating, Supplying and Fixing in position Stainless Steel Disabled ramp railing of 1000mm high with Top hand rail of 50mm dia Hollow SS pipe of 16 gauge to be welded as railing to the verticals made of 50mm dia SS tubular sections as per the detail architectural drawing and 1 no 30 mm dia SS pipe as mid rails placed as per the detail Architectural drawings. Verticals should be fixed to the concrete slabs with 200mm x 150mm, 6mm thick SS plate anchored with 4 Nos. of 10mm dia 75mm long Expansion bolts with 70mm dia SS capping at the top as per the detail drawings. All SS sections to be finishes as per Project consultants / Site in charge instructions. All SS sections to be of grade 304.

STAINLESS STEEL HANDRAIL WITHOUT GLASS

Fabricating, Supplying and fixing in position SS Staircase Handrail with Top hand rail of 50mm dia Hollow SS pipe of to be welded as railing connected to the verticals through 8mm connector plate with 2mm SS flat base plate below the hand rail. The Verticals shall be made of frame work of 2 Nos. 50X6 mm SS flat with 8mm spacer plate and rounded edges finish placed at 1000mm c/c as balusters as per the detail architectural drawing. Mid rails shall be 3 Nos 20mm dia SS rods connecting the verticals. Balusters should be fixed to the concrete slabs with 150mm x 100mm, 6mm SS plate anchored with 4 Nos. of 10mm dia 75mm long Expansion bolts as per the detail drawings. All SS sections will be finish as per Project consultants / Site in charge instructions. All sections to be of grade 304. The Contractor to submit the shop drawing of the same including the fabrication details, calculations and stability report. The work to start only on written approval of the same by the Project consultants.

SS SINGLE PIPE RAIL

Fabricating, Supplying and Fixing in position SS single pipe wall rail of 50mm dia hollow SS pipe of 16 gauge, fixed to 12mm dia SS rod bent to profile and welded to insert plates of 100X100X 6mm thick anchored in the wall with 4 nos. of 10mm dia, 75mm long expansion bolts, etc., complete, as per architectural drawings. All SS sections to be finished with Auto coat paint as per Project consultants / Site in charge instructions. All sections to be of grade 304.

Glazier’s Work

All glass for Railings etc., shall be as specified in the drawings and free from air bubbles, specks and scratches of other defects. All glass shall be cut to fit the sashes or other members as required. All glass shall be properly bedded, securely fixed and finished as indicated on the drawings. Beading finished as specified shall be provided for fixing the glass. No glazing shall be complete until all the stains and marks have been removed from the surface of glass.

Tolerances

Tolerance on nominal width and height shall be +3mm or -0mm and that on thickness shall be +/- 1.2mm. The thickness of the members shall be uniform throughout with a variation not exceeding +/- 0.8mm when measured at two end points.
TECHNICAL SPECIFICATIONS FOR INTERIOR & ALLIED WORKS
INTERIOR AND ALLIED WORKS

PLYWOOD / FLEXIBLE PLYWOOD:
Plywood of 4/6/9/12/19mm thick layered flat pressed teak wood bonded (Garjan type) with BWP type using only phenol formaldehyde synthetic resin confirming IS code 303. All plywood shall be of (Boiling Waterproof type) as approved by the Project consultants. All exposed plywood edged shall have maple wood lipping of 10mm thick unless otherwise specified. When decorative plywood is used for panelling, the same shall be of matching grains. All Plywood shall be treated for Termite, Borer proofing and painted with fire retardant paint.

PARTICLE / MDF / HDF BOARDS
Particle/ MDF/ HDF boards of 6 / 9 / 12 / 18 / 25 / 32mm thick particle board of approved make confirming to E1 – Emission Class as European Standards BS EN 13986 or as American Standards ANSI A208.2 – 1994 manufactured without using any formaldehyde resins or if not possible Phenol formaldehyde based resins shall be used with edges to have PVC lipping unless otherwise specified.

GRANITE:
Shall be of selected quality, hard, dense and homogeneous texture, free from cracks, decay, weathering, and flaws. Stone slabs shall be of uniform colour and as approved by the Project consultants. They shall be machine cut and machine polished where specified and shall conform to the required sizes. Thickness shall be as specified in the respective items.

TIMBER - TEAK WOOD
The Teak wood should be of best quality available in India. It should be well seasoned and free from gap, knots, wraps, cracks, and other defects. All woodwork shall be planed and neatly, truly finished to the exact dimensions. All joints shall be neat and strong, truly finished to the exact dimensions shown in the drawings. All joints shall be neat and strong, truly and accurately fitted and glued before being fitted together. All screws used in woodwork shall be of steel nettle fold make.

SALWOOD
The salwood used shall be Gumsal. It should be well seasoned and free from gap, knots, wraps, cracks, and other defects. All woodwork shall be planed and neatly truly finished to the exact dimensions. All joints shall be neat and strong, truly finished to the exact dimensions shown in the drawing. All joints shall be neat and strong and, truly and accurately fitted and glued before being fitted together. All screws used in the woodwork shall be of steel nettle fold make. All salwood sections shall be treated for Termite / Borer proofing.

DRAWER SLIDING CHANNELS:
The drawer channels being used shall be of telescopic type to the size as per the manufacturer’s specifications adhering to detail drawings. The makes used here shall be of Blum/ Hettich/ Hafele or approved equivalent make. All the samples to be approved by Project consultants prior to procurement.

ALUMINIUM TUBE SECTIONS/ FRAMEWORK:
The aluminium tube sections shall be of Jindal/ Bhoruka/ Hindalco make of size 50 x 50/ 25mm or 50.8 x 50.8/ 24.4mm x 16SWG (1.626mm thick and consider the tolerance range of 1.60~1.65mm) with heavy duty 3mm thick Aluminium cleats and steel screws. The aluminium tube sections shall be plain anodised for thickness of 15microns as per anodising specifications.

WHEEL CASTORS:
The makes used shall be of Renolle / Classis or Nicholson. Project consultant’s approval shall be taken before procuring / installing these castors.

ADHESIVES:
The adhesives used shall be Fevicol, Jivanjoy and Aralidate or approved equivalent make.

GLASS/ MIRROR:
The glass/ Mirror used shall be Saint Gobain, Modi float or Ashai glass. Tinted, Toughened if specified

VEENEER:

ACADEMY OF SCIENCES
Bangalore
660 080

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The veneer used shall be of 4.6mm thickness with minimum of 4mm thick BWP (Boiling Waterproof type) plywood backing of approved make. The designs will be selected and approved by the Project consultants.

**LAMINATE SHEETS:**
All laminate sheets will be of 1.5mm thick of approved make for all External Surfaces, 1.0mm for all internal surfaces and 0.8mm for Post formed tabletops. The shades will be selected and approved by the Project consultants.

**HINGES:**
These shall be of Dorma/ Hager/ Union/ IR/ Blum/ Hettich or Equivalent make. All the samples to be approved by Project consultants prior to procurement.

**SCREWS:**
All screws shall be of steel screws of nettle fold (GKW) make or approved equivalent. In case of non-availability of approved make of screws, the alternate makes shall be used only on receipt of written approval from the Project consultants.

**LOCK:**
Locks shall be as approved by the project consultants. These shall be brush finished stainless steel conforming to IS-2000 with handles conforming to IS 0992 of Dorma/ D-line/ IR/ Hager/ Union/ Hettich or equivalent make.

**DOOR CLOSER & FLOOR SPRINGS:**
Door Closures/ Floor Springs used shall be of Dorma/ IR/ Union make or equivalent make. Project consultant’s approval shall be taken before procuring / installing these Door Closers/ Springs.

**ALL OTHER HARDWARE FITTINGS:**
These shall be as specified in the BOQ conforming to the respective BIS applicable and shall be approved by Project consultants.

**PROCEDURE OF WORK:**
The contractor shall arrange the operations that have been agreed to by the Project consultants /Employer. He shall adhere to the schedule presented by him and agreed by the project consultants, and shall complete all works allotted to him in time, giving best workmanship to the entire satisfaction of the Project consultants.

**BUILT IN-JOINERY**
Where joinery work is specified to be built-in, it shall be the responsibility of the contractor to ensure that the joinery works are set in plumb and true in line and shall not be damaged or displaced by subsequent operations.

**PROTECTION OF WORKS**
The contractor shall be responsible for the temporary doors and closing in of opening necessary for the protection of the work during progress. He shall also provide and maintain any other temporary covering that required for the protection of finished / unfinished woodwork that may be damaged during the progress of the work if left unprotected.

**MAKE GOOD DEFECTIVE WORK.**
The contractor shall be responsible for any shrinkage or warping or any other defects, which may appear in any joinery work. All defective or damaged work shall be taken and repaired or repainted to the satisfaction of the Project consultants without any extra charges.

**FURNITURE**
All furniture shall be in accordance with the drawings and the sample piece as approved by the project consultants. The contractor shall first prepare a sample piece and the same shall be got approved by the Project consultants. The contractor will be expected to do all the modifications of the sample for which no claim will be entertained. Glue used shall be of superior synthetic quality such as Fevicol /Araldite.
TECHNICAL SPECIFICATIONS FOR GYPSUM/CALCIUM SILICATE CEILING WORKS
MODULAR FALSE CEILING
Materials shall be of the best-approved quality obtainable and they shall comply with the respective latest Standard Specifications.

Samples of all materials shall be got approved before placing order and the approved sample shall be deposited with the Project consultants, which will be displayed at site as a control sample.

In case of non-availability of materials in metric sizes, the nearest size in FPS units shall be provided with the prior approval of the Project consultants for which neither extra will be paid nor any rebate shall be recovered.

If directed, materials shall be tested in any approved Testing Laboratory and the test certificate in original shall be submitted to the Project consultants and, the entire charges connected with testing including charges for repeated tests if ordered, shall be borne by the Contractor.

The Contractor without any extra cost shall provide all equipment and facilities for carrying out field tests on materials if asked by the Project consultants.

It shall be obligatory for the Contractor to furnish certificates, if demanded by the Project consultants, from manufacturer or the material supplier that the work has been carried out by their material and as per their recommendations and specifications.

The rates quoted for all items in this schedule shall be applied to the work pertaining to that item in all floors whether specifically mentioned or not.

HYDRATED CALCIUM SILICATE & FIBRE MODULAR FALSE CEILING SYSTEM
TILES
Modular false ceiling tiles shall be of the following material composition and specification as recommended make.

Size of the boards : 600 x 600 x 15mm
Edge Style : Tegular suitable for 24 OR 15mm T grids
NRC : In the range of 0.10 - 0.50
Fire performance : Class O/ Class 1 as per BS 476
Relative humidity : In the range of 100%
Light Reflectance : Greater than - 85 %
Colour : White or to shade as approved by Project consultants.
Material Composition: Hydrated Calcium Silicate with reinforcing fibres and natural fibres with-ou-
formaldehyde and other harmful toxic ingredients.

SUSPENSION SYSTEM AND PROCEDURE OF WORKS
Supply and installation of suspension grid system with main Tee and cross Tees to provide a stable suspension system for quick laying of acoustic ceiling tiles of nominal size 600 mm x 600 x 19/ 15 mm. The width of flange of all Tees shall be 15 mm as per the manufacturers’ specification.

The Tees shall be double webbed with bake enameled fascia cap and all other exposed surfaces galvanised or suitably treated against corrosion. Free ends of tees shall be mounted with quick release high tensile spring steel clips to provide a plug-in positive-lock for easy removal without tools.

Suspension points shall not exceed centre-to-centre distance of 1200 - 1250 mm and shall be professionally executed with twin 4-mm GI suspension rods and adjustable suspension clip of spring steel. The entire grid system shall be designed to bear a distributed load of minimum 18 kg/sqm.
NOTES:
The rate quoted for any of the Modular false ceiling system shall include providing necessary cut-outs for all light fixtures (all sizes), AC diffusers, AC dampers, AC linear grilles, smoke detectors, speakers etc., and any other openings to be made in the false ceiling as directed by the Project consultants.

There will not be separate measurements for the vertical drops upto 600mm high, double level ceiling, vaulted ceiling, curved ceiling, inclined ceiling and indirect lighting made in Modular false ceiling works.

There will not be additional rates/ measurements for the above cut-outs to be provided in the ceiling.

Deductions will be made for the areas where tiles are not installed due to fixing of Light fixtures and AC diffusers. (Only the suspension system cost will be paid for these areas)
Cut tiles will not be considered or measured as full tiles for the measurements. As such the payment shall be made on actual laid areas immaterial of cut or full tiles.
Deductions for columns areas in false ceiling shall be made based on the final dimension of columns after cladding/ panelling.
There will not be any additional rates/ measurements for the making the machine made painted Teqlar edge for all the cut tiles to be laid in the ceiling.

The quantities indicated in the BOQ are excluding the attic stock. The order placement quantity shall be inclusive of adequate quantity for attic stock as/ if required.
Please note false ceiling support system shall be suspended from the true RCC ceiling irrespective of height between false ceiling and true RCC ceiling. In case double height ceiling, if the height between false ceiling and true RCC ceiling is not adequate to support the false ceiling system from the true RCC ceiling, the intermediate MS powder coated box section framework shall be created and the false ceiling suspenders are to hung and supported from the MS powder coated framework. There will not be additional costs paid towards the same for fabrication with material and erection of it at site with necessary anchor bolts as required for the MS powder coated framework.

GYPSUM FALSE CEILING WORKS
GENERAL
Design of grid layout shall be produced with co-ordinating suspension points in tandem with other service duct / cable tray layouts. The grid layout is to be superimposed on the ceiling service ducting / cabling layout and got approved from the Project consultants.

SUSPENSION SYSTEM & MATERIAL
The false ceiling shall include providing and fixing GI perimeter channels of size 0.55 mm. Thk. having one flange of 20 mm and another flange of 30 mm and web of 27 mm along the perimeter of the ceiling screw fixed to brick wall/ partition with help of nylon sleeves and screws, at 610 mm centers. The suspended GI intermediate channels of size 45 mm, 0.9mm thk with two flanges of 15 mm each from the soffit at 1220 mm centers with ceiling angles with ceiling angle of width 25mm x 10mm x 0.55mm thk fixec to soffit with GI cleat and steel expansion fasteners. Ceiling section of 0.55 mm thk having web of 51.5 mm and two flanges of 26 mm each with lips of 10.5mm are then fixed to the intermediate channels with help of connecting clips and in direction perpendicular to the intermediate channel with centers. The 12.5 mm tapered edge gypboard (Confirming to IS-2095-1982) is then screw fixed to ceiling section with 25 mm drywall screws at 230mm centers.
Screw fixing is done mechanically either with screwdriver or drilling machine with suitable attachment.
FINISHING
The boards are to be joined and finished so as to have a flush look which includes finishing the tapered and square edges of the board with joining compound, fibre tape and two coats of primer suitable for Gypboard (As per the recommendations / practice of India gypsum or equivalent) This includes providing
the surface of false ceiling to be painted with approved quality of Plastic emulsion paint. The false ceiling surfaces shall be prepared to the satisfaction of the Project consultant, and shall be applied with two coats of primer, two coats of putty and touch up putty if required to achieve smooth finish. The surface shall be painted with two coats of premium silk emulsion paint of approved make to the satisfaction of Project consultants.

NOTES

1) There will not be separate measurements for the vertical drops upto 2'-0" high, double level ceiling, vaulted ceiling, curved ceiling and indirect lighting made in Gypsum board.

2) False ceiling rate quoted shall include providing necessary cut-outs for fixing Light fixtures (Inclusive of all sizes), AC diffuser, AC dampers, AC linear grilles for (supply and return air), smoke detectors, speakers etc., as directed by the Project consultants. (No additional rates will be given for the cut-outs)
TECHNICAL SPECIFICATIONS FOR WOODEN DOORS
TIMBER DOORS

TIMBER DOORS, WINDOWS & VENTILATORS
Doors shall be in accordance with the drawings in every detail and all joiner's work shall be accurately set out, framed and finished in a proper workman like manner.

Frames of doors shutter styles and rails shall be of best solid wood of quality specified in the schedule of quantities. The scantlings shall be accurately planed smooth. Rebates, rounding and mouldings shall be made as shown on the drawings. Patching or plugging of any kind shall not be allowed.

Joints shall be simple, neat and strong. Framed joints shall be coated with suitable adhesive like glue or synthetic resin approved by the Employer/Project Manager or his representative before the frames are put together. All mortise and tenon joints shall fit in fully and accurately without wedging or filling. The joints shall be pinned with hard wood or bamboo pins of 10mm to 12mm dia or rust resisting star shaped metal pins of 8mm diameter. All portions of timber abutting against or embedded in masonry or concrete shall be treated against termites by giving a coat of an approved wood preservative, for which no extra cost will be paid. Putty shall not be used to cover any defects. Unless otherwise specified, all door frames shall have four holdfasts. Holdfasts shall be provided to the ventilators if directed. Holdfasts shall be M.S. flats bent to shape with fish tail and shall be fixed to frame with sufficient number of screws as directed. When door/window frames are to be fixed to RCC column or RCC wall, holdfasts shall be substituted by suitable arrangements such as coach screws, rawl bolts/grip bolts etc., to secure frames to RCC column or RCC wall as directed by the Project Managers. The frame shall be fixed only after getting the approval of the clerk of works/Project Manager or his representative.

PANELED SHUTTERS
Panels shall be of pattern and size as shown in the drawings or as directed by the Project Managers. Solid wood panels shall be in one piece wherever possible. Where two or more pieces are permitted, they shall be of equal width. Panels shall be framed into grooves made in styles and rails to the full depth of groove. Partly paneled and partly glazed shutter shall be similar to paneled shutters except that such parts as are directed shall be glazed as specified, styles and rails shall be rebated 12mm to receive glass. Sash bars shall be moulded and rebated and mitered on sides to receive the glass which shall be fixed with putty and beading.

The fixing of hardware shall be done in the best workmanlike manner and in accordance with the manufacture's specifications. The contractor shall be held responsible for working of all moving parts dependant on the proper fixing.

FLUSH DOOR SHUTTERS
Flush shutters shall be solid core (Blockboard Type Core) construction of kiln seasoned timber, faced with high quality water proof ply or decorative type as specified. They shall be Phenol formaldehyde resin bound. They will have teakwood lipping around as specified with full width machine pressed along with core. The shutter should generally conform to IS:2202 part I.
TECHNICAL SPECIFICATIONS FOR PAINTING WORKS
PAINTING AND DECORATING

Scope
This Specification describes the general requirements of painting and decorating on internal and external surfaces, woodwork and metalwork and varnishing and polishing to be executed on projects and as per paint manufacturers specification / Guide lines / process application.

Applicable Codes
IS 75 Specification for raw and refined linseed oil
IS 345 Specification for transparent liquid wood filler
IS 348 Specification for French polish
IS 427 Specification for distemper – dry colour
IS 428 Specification for distemper – oil emulsion colour
IS 533 Specification for gum spirit of turpentine
IS 1477 Code of Practice for painting of ferrous metals in buildings – Parts I and II (Pre-treatment and Painting)
IS 2338 Code of Practice for finishing of wood and wood-based materials – Parts I and II (Operation and workmanship and Schedule)
IS 2395 Code of Practice for painting concrete, masonry and plaster surfaces
IS 2932 Specification for enamel synthetic exterior undercoating and finishing
IS 2933 Specification for enamel exterior undercoating and finishing
IS 3140 Code of Practice for painting asbestos cement building products
IS 3537 Specification for ready-mixed paint, finishing, interior, for general purposes to IS colours
IS 3631 Specification for ready-mixed paint for finishing interior, alkyd and non-alkyd for general purposes to IS colours
IS 4597 Code of Practice for finishing of wood and wood-based products with nitro-cellulose and cold-catalysed materials
IS 5410 Specification for coloured cement paints
IS 6005 Code of Practice for phosphating iron and steel
IS 6278 Code of Practice for whitewashing and colour washing

GENERAL
The specification covers various types of painting and finishing of all surfaces throughout the part of the building. The number of coats required in various situations and also the type of finish required for plastic emulsion paint as specified in the schedule of quantities and specifications. Before the commencement of the work, the contractor will provide sample panels of painting at his own cost for the approval of the project consultants to enable him to keep an accurate check on the materials supplied and final shade to be painted. It is however the responsibility of the contractor to provide and any deviations shall have to be rectified by the contractor at his own cost.

Contractor shall protect not only his own work at all times but also all the adjacent work and materials by suitable covering, protection or other methods acceptable to the project consultants during progress of painting. It is the responsibility of the contractor upon completion of painting work to remove all paint and varnish spots from floors, walls, glass panes and other surfaces and restore them to original conditions. The work generally to be touched up shall be attended to after all other workmen have left. All accumulates material, rubbish etc., has to be cleared and the premises left in clean, orderly and acceptable conditions.

Contractor shall provide scaffolding wherever necessary erected on double supports tied together by horizontals, no Bawllies, bamboos or planks shall rest on or touch the surface that is being painted. Contractor is deemed to have considered the following while tendering no extra claim on account of these will be entertained.

Supplying the paint and other materials required of approved colour and brand.

• Preparing the surfaces to be painted.
• Providing and erecting scaffolding and removing the same after completion of the work.
• Lifting of material to any height and painting at all levels.
• Application of paint as per the specification and to manufacture instructions.
• Curing, protecting the painted surface, adjacent work and thoroughly cleaning of the premises.

PAINTING AND LIME WASHING

General
Paint, lime wash and colour wash shall, except for white wash, be factory made, delivered to Site in manufacturers’ sealed drums in colours approved by the Project Manager or his representative and conform to the relevant Standards.
Paints shall be such as to be capable of withstanding the effects of weather and the atmosphere and the results of wood decay and metal corrosion and shall have good spreading coverage, be easy to apply, form a thin uniform film upon application, not crack when dry and have hard and durable surfaces.

Lime Wash
Materials for lime wash shall be freshly burnt fat lime of good quality free from un-burnt stone and other foreign matter dissolved in sufficient quantities of water (4 to 5 litres per kg. of lime), stirred thoroughly and strained through a clean coarse cloth. Clean gum or fevicol dissolved in hot water shall then be added in the proportion of 2 gm of gum arabic per litre of lime to prevent lime wash being removed when rubbed.

Surfaces shall be prepared by removing all mortar droppings and other deleterious foreign matter and thoroughly cleaned with wire or fibre brushes to the approval of the Project Manager or his representative. Holes and/or depressions shall be stopped with mortar and cured prior to lime washing.

Lime wash shall be applied by brush, the first stroke being from the top downwards, the second from the bottom upwards over the first stroke and similarly with strokes from right and left over the first stroke before they dry. This application forms one coat and each coat shall be allowed to dry and shall be subject to inspection by the Project Manager or his representative before the next coat is applied. When dry surfaces shall not show signs of cracking and present a smooth and uniform finish free from brush marks, not easily removed when rubbed. Patchy or streaky work will be rejected and shall be re-executed at the Contractor's own expense.

Doors, windows, floors, fittings, fixtures and the like shall be protected from splashes, splashing and droppings, if any, being removed and surfaces thoroughly cleaned to the satisfaction of the Project Manager or his representative.

Oil Bound Distemper
Washable oil bound distemper shall conform to IS 428 and be of approved make and shade and shall be applied only in dry weather with a broad stiff brush in long parallel strokes.
Primed coats shall be applied to completely dry surfaces as recommended by the manufacturers of patent distempers and approved by the Project Manager or his representative and allowed to dry thoroughly before the next coat is applied.*
Surfaces shall be cleaned and all cracks, holes and surface defects repaired with gypsum and allowed to set hard. All irregularities shall be removed by sand papering smooth and wiped clean and surfaces so prepared shall be completely dry and free from dust before distempering is commenced. In the case of newly plastered surfaces special care shall be taken to ensure that they are completely dry before any application is attempted.
Existing, previously distempered surfaces shall be cleaned of grease, dirt, dust and other deleterious matter and cracks, holes and surface defects repaired with plaster of Paris, allowed to set hard, sand papered smooth and wiped clean. Flaking from previous coatings, if any, shall be thoroughly removed.

Plastic Emulsion Paint
Plastic emulsion paint shall be of approved make, colour and shade to the satisfaction of the Project Manager or his representative and applied as per manufactures process / specifications / guide lines. Plastic emulsion paint shall be diluted by the addition of a quantity of water equivalent to half the volume
of the paint to be applied. The paint and water shall be thoroughly mixed and then strained through cloth.
Priming coats shall be applied to surfaces by brush and allowed to dry properly, holes and depressions being filled with putty prepared with whitening and plastic emulsion paint and rubbed smooth and dry and touched up with plastic emulsion paint.
Subsequent coats, diluted by the addition of a quantity of water equivalent to about 15% to 20% of the volume of paint to be applied shall be applied to surfaces by brush and allowed to dry thoroughly so that no brush marks shall be seen.
Surfaces shall be cleaned and all cracks, holes and surface defects repaired with gypsum and allowed to set hard. All irregularities shall be removed by sand papering smooth and wiped clean and surfaces so prepared shall be completely dry and free from dust before painting is commenced. In the case of newly plastered surfaces special care shall be taken to ensure that they are completely dry before any application is attempted.
Preparation of surfaces, the application of priming coats, undercoats and the two finishing coats shall be done strictly in accordance with the manufacturer’s recommendations and to the satisfaction of the Project Manager or his representative.

Waterproof Cement Paint
Waterproof cement paint shall be “Super Snowcem” or other equal and approved of approved colour and shade to the satisfaction of the Project Manager or his representative brought to site in original airtight containers with seals intact.
Dry cement paint shall be thoroughly mixed with clean fresh water to produce paint of the required consistency to the satisfaction of the Project Manager or his representative and strained through a paint strainer. Paint shall be constantly stirred during application and applied within the specified or recommended time, hardened or damaged paint not being allowed to be used.
Paint shall be applied by brush, each coat being properly cured and inspected and approved by the Project Manager or his representative before the application of each subsequent coat.
Absorbent surfaces shall be thoroughly wetted so as to provide even absorption. In dry weather freshly painted surfaces shall be kept damp for at least two days and protected from direct sunlight.
Surfaces shall be free from dirt, dust, grease and other deleterious matter and thoroughly cleaned by brushing and washing down with clean water.
Existing lime wash and/or water bound distemper shall be thoroughly removed by washing, brushing and if necessary, accumulated coats of oil paint removed by brushing and/or scraping and washing to obtain clean and even surfaces.
Roughcast and pebbledash surfaces shall be thoroughly brushed and washed to remove dust, dirt, grease and other deleterious matter.

Enamel Painting
General
Enamel paint shall conform to the relevant Standards and be of the specified make, colours and shades as approved by the Project Manager or his representative. Materials shall be obtained directly from approved manufacturers and brought to Site in manufacturers’ sealed drums and tins for inspection by the Project Manager or his representative.

Paint for undercoats and finishing coats shall be ready mixed. Mixing by the Contractor shall not be allowed except with the prior written permission of the Project Manager or his representative, in which case preparation of the ingredients and the control of quality shall be in strict conformity with the manufacturers’ recommendations and the relevant Standards and Codes of Practice.

Materials shall be properly stored and protected when not in use with the lids of containers kept tightly closed. Paint in open containers during painting operations shall be covered with a thin layer of
turpentine to prevent the formation of skin on the surface. If required by the Project Manager or his representative, paint supplied by the Contractor shall be quality tested in an approved laboratory as described in IS 101. Rejected paint shall be removed immediately from site.

Application
Unless otherwise specified, paint shall be applied by brush. Brushes of appropriate size shall be either round or oval shaped and shall be maintained carefully throughout the work so as to be pliable and free from loose bristles. All brushes, rollers, implements and the like used for painting shall be cleaned of all foreign matter prior to beginning different operations.

Contents of drums and tins shall be well stirred before use and constantly during operations with a small, clean and smooth stick to prevent sedimentation at the bottom of containers. Painting shall be carried out, as far as possible, in dry, warm weather.

Primer coats shall be applied as soon as surfaces have been cleaned and before the deterioration of surfaces by rust and/or contamination by dust, dirt or any other deleterious material. Sufficient time shall be allowed for one coat of paint to dry before the next is applied.

Painted surfaces shall be protected from sun, rain, condensation, contamination or other surface damage until they are completely dry. “Wet Paint” boards being placed where necessary. Surface preparation, the application of priming coats, undercoats and finishing coats shall be carried out as specified below or as recommended by the manufacturer.

New plaster shall be carefully rubbed smooth and thoroughly cleaned with fresh water to leave dry and smooth surfaces free from dirt. Surfaces shall not be primed or painted until they are completely dry and hard and have been approved by the Project Manager or his representative.

Steel surfaces shall be degreased using proprietary brand solvent cleaners approved by the Project Manager or his representative or mineral turpentine or petroleum and other petroleum solvents, such as trichloroethylene or other equal and approved alkali solutions or detergents.

De-rusting of steel surfaces shall be done by manual scraping using wire brushes, fine steel-wool, sand paper and the like, mechanically by sand blasting, shot blasting or by flame cleaning or chemical cleaning by methods approved by the Project Manager or his representative.

Enamel paint shall not be applied to woodwork that is not well seasoned. Surfaces of woodwork to be painted shall be thoroughly dry, clean and smooth and prepared by using coarse and medium grade sandpaper with finished surfaces free from scratches.

Before applying primers to surfaces of woodwork knotting shall be done with two coats of varnish made by dissolving Shellac in methylated spirits of wine or as directed by the Project consultant.

Plastered surfaces: Priming coats shall consist of equal parts of white and red lead mixed in boiled linseed oil to the required consistency applied uniformly over surfaces to be painted. When dry, all cracks, holes and other such defects shall be filled with a mixture of one part of white lead and 3 parts of ordinary putty. Surfaces shall then be rubbed with sandpaper and dusted clean and an undercoat thinly applied so that plastered surfaces are saturated.

Steel surfaces: Priming coats shall consist of red lead conforming to IS 102 applied uniformly over surfaces to be painted. On old or previously painted surfaces and new surfaces already primed with red lead, surfaces shall be thoroughly cleaned and primed with red lead on exposed surfaces as necessary or over whole surfaces as directed by the Project Manager or his representative.

Woodwork surfaces: Priming coats shall consist of red lead, white lead, raw and boiled linseed oil and patent dryers applied uniformly over surfaces to be painted. When dry, small holes, cracks, open joints and other minor defects shall be stopped with putty made from whitening mixed to proper consistency with raw linseed oil and white lead to facilitate hardening of putty. Surfaces shall then be lightly rubbed down smooth with sandpaper and dusted clean.

Finishing coats: Unless otherwise specified, finishing of all surfaces shall consist of two coats of synthetic enamel paint of approved type, colour and shade. The second coat of paint shall give a flat, semi-
glossy or glossy finish as specified or as directed by the Project Manager or his representative and shall present on even appearance and show no brush marks. Stipple finishes, if directed by the Project Manager or his representative, shall be provided at no extra cost.

Textured Paint
Textured Paint to external faces wherever called for shall be carried out by specialist agencies approved by the Project consultant. The Textured Paint materials shall be prepared and used in accordance with the recommendations of the manufacturer. Preparation of surface, brushing, removal of dust, etc. shall be carried out as described earlier. Mixing and application shall be strictly as per the manufacturer's instructions. The finished surface shall be subject to the approval of the Project consultant.

Melamine Polish
A pad of woolen cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with the polish and rubbed hard on the surface on a series of overlapping circles applying the polish sparingly but uniformly over the entire area to give an even surface. A trace of linseed oil on the face of the pad may be added which shall facilitate this operation. The surface shall be allowed to dry and one more coat shall be applied and shall be left for drying. After drying the French polish, two coats of melamine polish shall be sprayed. The finished surfaces shall present a uniform texture and high gloss.

Works deemed included for Painting, Polishing and Varnishing Work
The Contractor's work for painting, polishing and varnishing work shall include:
- Provision of all materials, labour and equipment required to execute the work as specified.
- Provision of scaffolding (single/double) including erection and removal.
- Preparation of surfaces.
- Application of the specified number of coats of approved paint, polish or varnish, including priming coat and where proper, even surfaces or shades are not obtained the application of extra coat(s) as directed.
- And to the final approval of the Project Manager or his representative.
- Application of additional priming or other preparatory coat(s) to obtain thoroughly saturated surfaces and filling with putty as required and/or directed.
- Painting of smooth and/or rough surfaces, such as precast concrete pads, rough cast plaster, sanc faced plaster and the like.

Curing cement paint as directed for a minimum of 7 days.

Protection of doors, windows, floors, furniture and fittings, including ironmongery and metalwork from splashing and droppings, including cleaning surfaces as directed.

Repair of cracks, developing in plaster prior to or after final painting, by filling with suitable putty and painting surfaces again as directed to give even surfaces to the satisfaction of the Project Manager or his representative. Neeru surfaces damaged due to any reason before painting shall be redone by using blaster of Paris as directed.
Cleaning of all surfaces after painting, polishing and varnishing.

WATER BASED POLYURETHANE COATING
All as per manufacturers' guidelines / specifications.
All unevenness is rubbed down to smoothness with sandpaper and the surface shall be well dusted. The pores in the wood shall be filled up with filler made of a paste of whitening in water or methylated spirit.

APPLICATION OF WATER BASED POLYURETHANE
A pad of woolen cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with the polish and rubbed hard on the surface on a series of overlapping circles applying the polish sparingly but uniformly over the entire area to give an even surface. A trace of linseed oil on the face of the pad may be added which shall facilitate this operation. The surface shall be allowed to dry and one more coat shall be applied and shall be left for drying. After drying the French polish, two coats of Water based polyurethane shall be sprayed. The finished surfaces shall present a uniform texture and high gloss.

WAX POLISH
Wax polish shall either be prepared on site or obtained ready made from the market. Polish made on site shall be prepared from a mixture of pure bees wax free from paraffin or stearine adulterates, linseed oil, turpentine oil and varnish in the proportion of 2:1.5:1.1:5. by weight. Bees wax and boiled linseed oil shall be heated over a slow fire, when the wax is completely dissolved the mixture shall be cooled till it is just warm and turpentine oil and varnish added to it in the required proportion and the entire mixture is well stirred.

Surface shall be cleaned. All unevenness shall be rubbed down with sandpaper and well dusted. Holes and indentation of the surface will be filled with putty made of whiting and linseed oil. Surface shall be given a coat /filler of 2.25 KGS. of whiting in 1.5 litres of methylated spirit. When it dries surface shall again be rubbed down perfectly smooth with sandpaper and wiped clean.

APPLICATION OF BEE WAX /WAX POLISH
The polish shall be applied evenly with a clean soft pad of cotton in such a way that the surface is completely and fully covered. The surface is then rubbed continuously for half an hour. After well rubbing in one coat of wax polish, the waxwork shall be covered with dust proof sheet (cloth for preventing dust falling on the work). Subsequent coat shall be applied after the surface is quite dry and shall be rubbed off with soft flannel until the surface has assumed an uniform gloss and is dry showing no sign off sickness. The final polish depends largely on the amount of rubbing which shall be continuous and with uniform pressure, with frequent changes in the direction.
MS DOORS USING PRESSED METAL FRAME

MS doors using pressed metal frame of specified size made of 16G MS sheets pressed to shape, shutter frame of specified size made of 16G MS sheets pressed to shape. Panels made of 16G MS sheets on both sides of the shutter frames to give a thickness of 40 mm. Stiffeners to be made of 16G MS sheets. Hinges/pivots and MS handles powder coated to be heavy duty 125 mm size. Two lower bolts of length 450 mm, 20 mm dia with holdfasts are to be embedded in CC 1:2:4 to walls. One coat of zinc chromate to all members to be applied.

For joints, following principle to be observed.
At joints the weakness of pieces must be minimum as far as possible.
To place each abutting surface in a joint as neatly as possible, perpendicular to pressure.
To form and fit accurately every pair of surface that come in contact.

For external work the joints shall be coated with white or red lead before the members are put together. For internal work where the joints are not likely to be affected by moisture the joints are not likely to be affected by moisture the joints shall glued. The members are then put together and jowls for correct size shall be drilled before inserting screws.

Driving of screws with hammer is prohibited. Screws shall be dipped in oil before being inserted in wood. The heads of nails or screws shall be sunk and puttied. The type, gauge and length of screws and nails subject to approval of the Project Manager or his representative.
The joints shall be pinned with hard wood or bamboo pins 10 to 15 mm diameter after the frames are put together, pressed in position by means of a press. Woodwork shall not be painted, oiled or otherwise treated before each and every member has been approved or selected or signed by Project Manager or his representative. All portion of timber built into or abutting against or embedded in masonry or concrete or buried in ground shall be painted with boiling coal tar, or solignum or approved quality wood primer.
The frames shall be fixed with iron holdfast well screwed and not nails and frame shall be fixed in proper position as per drawing or as per instruction of Project Manager or his representative. Holdfast shall not be paid separately. The door frame vertical end should be properly protected and well fixed. Generally, silts are not provided. The frames vertical members shall be buried in floor 38 mm deep for which nothing extra shall be paid will not be considered in measurements for out to out of the frames. Where silts are to be provided the measurement for 38 mm deep buried vertical members will not be paid for. The frames shall be kept in position during construction against warping and shall be well protected from damage during construction due to sun, heat, fire, wear and tear, against construction materials, scaffolding damages rubbing of gamelas at the time of BK work, plaster and RCC casting operations or falling materials. The flush doors shall be of solid balten core and of approved quality from reputed firm. There should be a proper arrangement for fixing mortise lock or alldrop and there should not be loose. The frame shall be provided with 6 nos. of holdfasts made from MS flats 30 x 5 x 200 mm long.

The measurement shall be in sq.m. and shall be taken out to out of the frame. The painting or polishing shall be done as specified in the schedule of quantities. When specified or shown on drawing, vision panels or louvers shall be provided as per details and paid separately. The measurement shall be out & out including frames and shutters (when closed). Overlap of shutters will not be measured.

ROLLING SHUTTER

Rolling shutter of approved quality, make & type, 18 gauge (MS solid laths or grill) with all the accessories such as top cover (in or out), handles, bearings, springs, axles, locking arrangement guide rails, iron pulleys, push & pull arrangements should be purchased from reputed firm and provided and fixed with holding down bolts with PCC 1:3:6 as specified i.e., outside or inside or below lintel or between jambs of the opening. The shutter can be either push and pull type or operated with special type of reduction/bevel gear arrangement operated with mechanical device.
The payment of lath or push and pull type or operated with mechanical device or grill type will be separately on sqm basis. The spring shall be best Indian make and manufactured from tested high tensile steel wire to balance the shutter in all positions. Spring pipe shaft shall be supported on strong mild steel or CI brackets. Both the side guides and bottom rail shall be jointless and single piece of pressed steel. Powder coated 65micron thick of approved RAL Shade.

The top cover of shaft, spring, etc., shall be of same materials as that of lath and no extra payment shall be made for this. The side guides fixed with plates, welded to guides shall be properly fixed with screws, bolts, and concealed in plaster. The operation of shutter should be easy and smooth. The measurement will be in sqm. The width shall be measured as width of the shutter including portion hidden in the guide channels and height shall be measured as the length of the shutter from the bottom of the locking plate to the bottom of lintel. There shall be no additional payment for the cover (450mm ht). The rate includes GI micron powder coating of required shade.

MS GRILL
These shall be made from MS section as per the Project consultants details. The item includes fixing with screws or necessary anchor bolts and flats to fix the railing rigid in position. The members shall be welded together and all the welded joints shall be filed to make smooth joints. The rate includes two coats of enamel paint of required shade and primer coat of red oxide. Measurement will be as specified in the Bill of Quantities.

TOLERANCES
Tolerance on nominal width and height shall be +3mm or -0mm and that on thickness shall be +/- 1.2mm. The thickness of the shutter shall be uniform throughout with a variation not exceeding +/- 0.8mm when measured at two points.
TECHNICAL SPECIFICATIONS FOR BLINDS
Materials shall be of the best-approved quality obtainable and they shall comply with the respective latest Standard Specifications.

Samples of all materials shall be got approved before placing order and the approved sample shall be deposited with the Architects, which will be displayed at site as a control sample.

In case of non-availability of materials in metric sizes, the nearest size in FPS units shall be provided with the prior approval of the Architects for which neither extra will be paid nor any rebate shall be recovered.

If directed, materials shall be tested in any approved Testing Laboratory and the test certificate in original shall be submitted to the Architects and, the entire charges connected with testing including charges for repeated tests if ordered, shall be borne by the Contractor.

The Contractor without any extra cost shall provide all equipment and facilities for carrying out field tests on materials if asked by the Architects.

It shall be obligatory for the Contractor to furnish certificates, if demanded by the Architects, from manufacturer or the material supplier that the work has been carried out by their material and as per their recommendations and specifications.

The rates quoted for all items in this schedule shall be applied to the work pertaining to that item in all floors whether specifically mentioned or not.

**BLINDS**

**General**
The type of blinds selected shall be free of sharp edges, burrs or other defects. The written approval shall be taken from the Architects on the approved specifications of the blinds prior to fabrication.

**VERTICAL BLINDS**

**Head Rail**
The size of track for head rail shall be in the range of 40~50mm in width and 25~35mm in height. The track shall be with an average wall thickness of 1.1 ~ 1.27mm and made of powder coated aluminium alloy 6063-T5. The powder coating shall be to 50 micron to the shade as approved by the Architects.

**Carrier**
Each vane shall be supported by a low friction thermoplastic carrier, which traverses on rolling acetyl wheels, with each carrier containing a friction clutch mechanism to prevent damages to vanes or the carrier in case of overload. All the above assembly shall be as per the manufacturers specifications.

**Control Unit**
Pulling a steel plate/ metal link chain loop shall be provided for rotation of vanes. A tilt rod shall be passing through each carrier and imparting rotation to each carrier worm and spur gear to each carrier hook in unison. The assembly shall have smooth mechanical rotation by means of
providing a large sprocket wheel in the moulded acetyl control unit as per the manufacturers specifications. The control unit shall allow the first vane to hang only 3 ~ 4mm from the window jamb offering tight window coverage by vanes and minimal light leakage.

Spacing of vanes for any opening shall be achieved by nylon spacer shims, which lock into the body of the carrier to provide a continuous linkage. Blinds shall also be optionally fabricated with spacer clips to allow visually uniform spacing between each vane as per manufacturers specifications.

Traversing shall be by means of a continuous nylon traverse cord attached to the master carrier and traversing over acetyl pulley wheels supported in acetyl end caps. Blinds may traverse left to right, right to left, or may be of a split draw, centered or otherwise as specified. Tension shall be maintained on this cord by a weight in a plastic housing as per manufacturers specifications.

Vanes shall be selected from respective Manufacturers selection binders based on the specifications. Cloth vanes shall be provided with sewn hems top and bottom and shall contain a polymer spleen to be hung from carrier books by means of a punched hole in top of vanes.

**ROLLER BLINDS**

**Top Section**
Extruded aluminium of size 57mm x 12mm bar with 1.25 mm thick., it can either be anodised or powder coated for corrosion resistance. Top section is mounted to the wall by means of clip-on adaptor, made out of spring steel.

**Fabric Pipe**
Extruded aluminium tube with groove and size 32.5 mm or 38mm dia and 1.25 mm thickness, anodised or powder coated for corrosion resistance. The operating mechanism is fitted to the fabric pipe and then the fabric is inserted into the groove of the fabric pipe.

**Load Bar**
Extruded aluminium tube with groove and of size 22 mm dia and 1.5 mm thick, either anodised or powder coated for corrosion resistance. Bottom end of the fabric is inserted to the load bar for avoiding wrinkles and to hold the screen against wind pressure.

**Clutch Mechanism**
Clutch shall be wrap spring design with high strength-fibreglass reinforced plastic, assembly and high carbon steel springs to transmit motion from driving to driver members of clutch mechanism. Clutch shall operate by directionally with the use of an endless beaded chain mechanism shall be crash proof, prevent slippage and shall raise and lower smoothly to any desired height. Clutch shall never need adjustment.

**Idler Mechanism**
Idler shall be of high strength fibreglass reinforced plastic, consisting of an outside sleeve and centre shaft. Sleeve shall provide bearing surface for roller tube and rotate freely on centre shaft, providing smooth, quiet and long wearing operation.

**Installation of Brackets**
Brackets shall be of atomised steel powder-coated to give superior finish. Bracket shall accommodate overhead, side or face mounting with clutch assembly on either end of the roller.

**Bottom Weight**
Bottom of the blind shall be provided with aluminium tube powder coated in a colour matching to the fabric. The fabric shall be enclosed in the suitably created pocket along with the tube. The tube shall be closed from sides with end caps to give a neat look.

**INTERMEDIATE SUPPORT BRACKETS**
It is mandatory that intermediate support brackets shall be fixed for blinds over 1200mm wide with maximum spacing of 900mm as per the manufacturers specifications.

**EXTENSION BRACKETS**
Optional extension brackets shall be made available as/if required as per site conditions.

**SIZE LIMITATIONS**
Maximum width – not greater than 3mtr
Maximum drop – not greater than 5mtr

**FABRICATION, EXECUTION, INSTALLATION AND CLEANING OF BLINDS**

**Fabrication**
Prior to fabrication, verify actual opening dimensions by on site measurements to make sure blind dimensions to be fitted within specified tolerance as per the manufacturers specifications. The fabricated blinds to fill opening from head to sill and jamb-to-jamb. The clearance between blind-to-blind shall be 4mm minimum with located blind divisions at mullions as per the detail drawings.

**Execution**
Verification of the work area in which the blinds will be installed is free of conditions that interfere with blinds installation and operations.

**Installation**
Installation of blinds shall be in accordance with manufacturer's approved installation procedures. If required additional intermediate support brackets and extension brackets shall be installed to avoid deflection in head rail. Install blinds with adequate clearance to permit smooth operation of blinds and any sash operators. Hold blinds 4mm clear from each side of window opening on inside mount-unless other clearance is indicated. • •

**Cleaning**
Vacuum blind surfaces with dust brush attachment on the vacuum nozzle open By-Pass valve or nozzle to reduce air velocity if necessary to avoid damaging cloth surfaces. Do not use steam, hot water, bleach or an abrasive or solvent base cleaners.

**TYPE OF BLINDS**

**Antibacterial and Fungicide Roller Blinds**
The Antibacterial and Fungicide Roller Blinds with Polyester fabric (100% polyester with
antibacterial and fungicide finishing for hygenic and cleanliness) fabric of following specifications:

Thickness of fabric: In the range of 0.3 ~ 0.7mm
100% Polyester with antibacterial and fungicide finishing
Flame retardent according to DIN 4102/B1
Antibacterial and fungicide finishing for a variety of different bacteria and fungi tested according to DIN 53931 and SN 195920
Free of formaldehyde
Aluminium anodised "L" angle to be fixed with 3M make double sides tape to External glazing Mullion on both sides of the blinds as required to avoid seepage of light from the edges/joints.
Bottom weights: Bottom of the blind shall be provided with aluminium tube powder coated to shade matching to the fabric.
The fabric shall be enclosed in the suitably created pocket along with the tube.
The tube shall be closed from sides with end caps to give a neat look.
Mechanism: Clutch driven roller mechanism with stopper and load bar in powder-coated Aluminium.
Weight of fabric: 250~300GSM
Fire classification: B1/DIN 402-2
Bacterial Classification: DIN 53931
Guarantee for the Blinds including mechanism and fabric: Five years

Note:

Guarantee for Blinds: Five years for mechanism and fabric.

Fabric sample shall be approved by the Architects.
<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>BRANDS/PRODUCERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VITRIFIED TILES</td>
<td>RAK / Johnson / Kajaria / Somany / Bellissimo / Pavigres Or as per Finishing schedule</td>
</tr>
<tr>
<td>WATER PROOFING COMPOUND</td>
<td>Ardex / Roffe / Fosroc / Pidilite / BASF</td>
</tr>
<tr>
<td>CEMENT (WHITE)</td>
<td>JK White / Birla Super white</td>
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<tr>
<td>CEMENT (GREY)</td>
<td>ACC / Birla Super / Ultra-tech</td>
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<tr>
<td>REINFORCEMENT STEEL</td>
<td>TATA / SAIL / JSW</td>
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<tr>
<td>STRUCTURAL STEEL</td>
<td>TATA / SAIL / VISL / JSW</td>
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<tr>
<td>PVC SPACERS / CORNER BEADINGS</td>
<td>Arpitha Exports / BOSS</td>
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<tr>
<td>CEMENT BASED POLYMER / EPOXY GROUT</td>
<td>Ardex Endura / Laticrete / BASF / Kerakoll</td>
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<td>PLYWOODS</td>
<td>Somani ply / Kitply / Archid / Century ply</td>
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<tr>
<td>MDF / HDF – EXTERNAL GRADE (HMR)</td>
<td>Action Tesa / Asis / Dura Tuff / Nuwood</td>
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<tr>
<td>ALUMINIUM SECTIONS</td>
<td>Jindal / Bhoruka / Hindalco</td>
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<tr>
<td>STAINLESS STEEL HINGES</td>
<td>Assa Abloy / Dorma / Geze / Hettich / Hafele Or as per finishing schedule</td>
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<tr>
<td>LOCKS</td>
<td>Dorma / IR / Geze / Hettich / Blum / Assa Abloy / Hafele Or as per finishing schedule</td>
</tr>
<tr>
<td>DOOR CLOSURES / FLOOR SPRINGS</td>
<td>Dorma / IR / Geze / Hafele / Assa Abloy or as per finishing schedule</td>
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<tr>
<td>LAMINATE</td>
<td>Century Laminating Co Ltd (Merino) / Formica / Sundek / Archid Century Mica or as per finishing schedule</td>
</tr>
<tr>
<td>FLUSH DOORS</td>
<td>Somani ply / Kutty / Century / Archid or approved equivalent</td>
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<tr>
<td>SCREWS</td>
<td>Nettle fold (GKW) / Patta make</td>
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<tr>
<td>ETCHING, FROSTING FILM / VINYL SHEETS / GRAPHICS</td>
<td>3M / Avery / Dermison</td>
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<tr>
<td>VENEER</td>
<td>Uniply / Durian / Timex / Archid / Green ply / Century Plyboards (I) Ltd or as per finishing schedule</td>
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<tr>
<td>HANDLES</td>
<td>Dorma / Geze / Blum / Hettich / Hafele / Assa Abloy or as per finishing schedule</td>
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<tr>
<td>GLASS / MIRROR</td>
<td>Saint Gobain / Ashai</td>
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<tr>
<td>LACQUERED GLASS</td>
<td>Saint Gobain / Form 5 / Vishwas Safety glass</td>
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<tr>
<td>IMPORTED FABRIC</td>
<td>Designtex</td>
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<tr>
<td>INDIAN FABRIC</td>
<td>Reliance / Vimal / Mayur</td>
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<tr>
<td>PAINTS</td>
<td>ICI Dulux / Berger / Nerolac / Asian / J&amp;N / SKK / Jotun</td>
</tr>
</tbody>
</table>
AUTOCOAT PAINT : ICI – Duco/ Asian/ Berger
ACRYLIC PUTTY FOR ALL PAINTING WORKS : RJ London
TEXTURE PAINTS : Asian/ Zolatone/ Oikos/ Spectrum/ SK/ Jotun
ADHESIVES : Fevicol, Jivanjor and Araldite
WHEEL CASTORS : Renolle / Classis / Nicholson
SLIDING CHANNELS : Blum/ Hettich/ Haffeke
POWDER COATING PAINT/ VAPOUR CURE POWDER : MRF/ Marpol/ Berger/ Akzonbel
GRG, PLAIN GYPSUM BOARD, DURALINE SUSPENSION SYM : Saint Gobain Gyproc India Ltd / USG Boral
GYP PLASTER (PUNNING) : Saint Gobain Gyproc India Ltd / USG Boral
ACOUSTIC PANNELS/ SOUND SOAK PANEL : APS/ Anutone/ Buzziskin/ Echo panel
GYPSUM BOARD PARTITION FRAME WORK, ALL : Saint Gobain Gyproc India Ltd / USG Boral
RELATED PARTITION ACCESSORIES & FALSE CEILING SUSPENSION SYSTEM : Inside spaces/ CATEX SPECIALITIES BUILDING / Flanx / Gradus
PVC SPACERS/ CORNER BEADINGS : ICA/Asian/ Aquavathane/ Pidilite/ Berger
WATER BASED POLYURETHANE COAT : Asper finishing schedule / Somany / Kajaria / RAK / H & R Johnson Bellissimo / Pavigres
CERAMIC TILES : CS Group/ Gradus/ Falanx
INTERFACE TRIMS : Whitemark
CERAMIC WRITING BOARD : Sevax/ Hilti/ 3m/Mccoy
ACOUSTIC/FIRE SEALANT : Dorma/ Geze/ Hafele/ Assa abloy
GLASS MANETS FITTINGS : Roffee/ Fosroc/ Ardex Endura/ BASF
SELF LEVELLING COMPOUND : Signum/ Shakti Met/ MPP shreddor (Bangalore Door tech)
STEEL FIRE DOORS : Hilux - Ramco Industries Ltd / USG
CALCIUM SILICATE BOARD, SUSPENSION SYM : Du-pont Corian/ LG/ Hanex
IMPORTED ACRYLIC SOLID SURFACES : "Mayaramanoff / Arte / muraspe Durafor/ Muraspec/ Vescom as per finishing schedule"
IMPORTED WALL PAPER : Hilti/Fischer
ANCHOR FASTENERS/PVC & METAL PLUGS : Aerocon/ Cecon/ Siporex as per IS 2185 part 3 of class 50
AUTOCLAVED AERATED BLOCK : Hettich/ Blum/ Haffeke
STAINLESS STEEL HINGES (STORAGE) : Rehau
PVC EDGE LIPPING : Shera
CEMENT FIBER BOARD : Interface/ Milliken or approved equivalent
CARPET : Vista/ Louverline
BLINDS :
Wherever applicable only BIS approved first class materials are to be used in other cases where BIS specifications/ certifications are not available the superior range quality are to be used and all the products got approved by the Project consultants.