

SECTION – IX
FLOORING AND CLADDING / DADO WORK

1.0 GENERAL

1.1 INDIAN STANDARDS

The Indian Standards to be followed are

1. IS 269 Specification for ordinary and low heat Portland cement.
2. IS 383 Specification for Coarse and fine aggregates from natural sources for concrete.
3. IS 8042 Specification for white Portland cement
4. IS 8112 Specification for 43 grade ordinary Portland cement
5. IS 12118 Specifications for two parts polysulphide based sealants: Part 1 General requirements.
6. IS 15622 Specification for pressed ceramic tiles

1.2 Quality Assurance

1.2.1 Stones received shall be from approved quarries and of approved lot.

1.2.2 Tiles manufacturer shall confirm that material is as per specification and within acceptable tolerances. Tiles shall be of one production run, of consistent quality, appearance and physical properties.

1.2.3 The contractor shall procure mortar, adhesive, grout etc. of approved quality design and standard and he will not change source of supply without written permission and with revised samples being approved.

1.3 Submittals.

1.3.1 The contractor shall submit manufacturer's each product data sheet covering technical literature and test certificates of independent laboratories.

1.3.2 The contractor shall submit comparative statement showing what is specified and what is proposed by him.

1.3.3 The contractor shall prepare shop drawings for layouts based on architectural concept drawings. Drawings shall include

- ☐ Detail plan with material & sizes of each element including joint widths.
- ☐ Pattern to full scale with assembly details at each location for each type.
- ☐ Details shall show expansion, contraction, control and isolation joints in substrate and finished surfaces.
- ☐ Method of fixing.

1.3.4 Samples

- a) Contractor shall submit samples of 300x300 stone minimum 4 nos. each to establish range of variation expected.
- b) Full size tile samples 3 nos. each with colour, design as specified with manufacturer's catalogue.

- c) Also special shade, shop samples if any for tiles and stone shall be submitted
- d) Grouting material proposed with technical literature.
- e) Sealants if proposed to be used.
- f) Edging, expansion etc special strips to be used.

1.4 Mockups

Prepare and install mockups for floor and wall as per drawings. Mockups may be part of completed work if undistributed.

1.5 Delivery, Storage and Handling

1.5.1 Material received at site shall be with original packing and labeled. It shall be intact till issued for use of site.

1.5.2 Store all material on elevated platform under cover at dry location and safe from damage.

2.0 MATERIAL

2.1 Cement

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

2.2 White cement

White cement conforming to IS 8042 shall be as manufactured by JK or equivalent approved by Architect.

2.3 Lime

2.3.1 Lime shall conform to IS 712. Field slaking shall be done as per IS 1635 code of practice for field slaking of lime and preparation of putty.

2.3.2 Lime shall be filled in bags and stored safely in weather- proof sheds. It shall not be stacked against the walls of the shed. It should be used as soon as possible.

2.4 Sand

Sand shall conform to IS 1542 specification for sand for plaster. For white or coloured renderings, only quartz or silica sand shall be used. For textured finishes produced by treatment of freshly applied final or finishing coat with a tool coarser, particles used shall be screened through 3.35 mm IS sieve or 2.36 mm IS sieve. For torn texture a slightly larger portion of material coarser than 4.75 mm IS sieve shall be used.

2.5 Water

2.5.1 Water used for mixing and curing shall be clean, reasonably clear and free from objectionable quantities of silt, oils, alkalis, acids, salts so as not to weaken mortar.

2.5.2 Water tested shall be in accordance with IS 3025. Maximum permissible limits of deleterious materials in water shall be as given in IS 456 in table "Permissible Limits for Solids (in water).

2.6 Pigments

Coloured cement may be either ready-mixed material or may be obtained by mixing pigments and cement at site. The pigments to be mixed with cement

shall conform to Appendix "A" of IS 2114 code of practice for laying in-situ Terrazzo Floor Finish.

2.7 Vitrified / Ceramic tiles

Tiles shall be of specified size and make or equivalent. Tiles shall be free from cracks, crazes, spots, chipped edges and corners. Variation in size shall be limited to + 1.5mm. Thickness shall be as specified in Bills of Quantities, but in no case shall they be less than 8 mm for Ceramic tiles and 10mm for Vitrified tiles.

2.8 Stone for flooring

The kota or other stone used shall be as approved by the Architect and shall be hard, sound, free from cracks, cavities, holes, patches of injurious veins, weathered portions, flaws, etc. For fair representation, 4 Nos. of 300 x 300 mm sized pieces shall be submitted for approval. Material received shall conform to the said approval group of 4 stones and no other type shall be accepted. Colour, grain, vein, etc. must conform to the approved sample only. Size and thickness shall be as specified. The stone may be ordered in various sizes to suit the pattern selected by the Architect. Required pattern matching of stone shall be carried out by the contractor while cutting the stone.

2.9 Adhesives

Tiles adhesive shall be cement based and shall conform to IS and/or international standards. These shall be as recommended by the tile manufacturer and as approved by the Architect.

2.10 Grouts

Readymade approved grouts as specified shall be used. Unsanded grout shall be upto 3mm joints and sanded grouts wide joints. Grouts may be

- ☐ Standard cement grout
- ☐ Polymer modified grout
- ☐ Chemical resistant
- ☐ Water cleanable
- ☐ Epoxy grout

2.11 Sealants

Sealants shall conform to Indian or International Standards and shall be as specified and approved by the Architect.

Polysulphide, silicon, urethane, and chemical resistant etc one part or multi part section shall be of approved manufacturer and shall be used as per direction of manufacturer.

It shall be stored in dry, ventilated store within specified temperature range. Use shall be well within its shelf life.

2.12 Cleaner

A neutral cleaner capable of removing oil and residue without harming stone, tile, grout surfaces as recommended by manufacturer of tile, grout shall be used.

3.0 SCOPE OF WORK

Providing and laying of various floor finishes as per specification including

- ☐ Preparing shop drawings if any
- ☐ Preparing surfaces and gradients if any
- ☐ Laying of tiles/stones in pattern if any
- ☐ Providing spacers / dividers if any
- ☐ Cleaning and grouting joints
- ☐ Polishing with machine/hand
- ☐ Curing
- ☐ Cleaning
- ☐ Protecting it till handing over

4.0 WORKMANSHIP

4.1 Examination

Examination substrate areas and conditions to verify for compliance with requirements for installation to execute the work within tolerances and making sure that it is not detrimental to any other conditions affecting performance, verify as under.

- a) Substrate is firm, dry, clean and free of oil, waxy films, curing compounds.
- b) Substrate is flat within tolerance
- c) Anchors, recessed frames, electrical, mechanical, plumbing etc. work located within or behind are completed.
- d) Joints and cracks are coordinated with joint locations.

4.2 Preparation

4.2.1 Floors

- a) Hardened structural slab shall be thoroughly wire brushed, hacked with mechanical scabber to remove all scum (including curing compound if any), laitance of cement mortar to expose coarse aggregate, soap, wax, oil etc in compatible with bedding material.
- b) Remove protrusions, bumps, ridged.
- c) Fill cracks, holes with compatible leveling and patching cement-based compound as approved and cure.
- d) Dry lay stone and tiles for colour variation blending and approval of pattern by the Architect. Identify each tile with corresponding number from shop drawing.
- e) Coat exposed faces of stone or tile where required to prevent staining surfaces by grout or otherwise while being installed.
- f) Prepare all expansion, construction, control and isolation joint to correct line and level.
- g) Any specific requirement by manufacturer

4.2.2 Walls

- a) Cured plastered surfaces shall be thoroughly cleaned to remove wax, oil or other injurious material.

- b) Remove small protrusions from surfaces and variation not more than 4mm when checked with 3M straight metal.
- c) Fill small cracks, holes etc. with compitable edge material for leveling.
- d) Sort out tiles / stone for colour blending and pattern to approval of Architect. Identify each tile with number in shop drawing layout.
- e) Coat exposed faces of stone or tile where it is required to prevent staining of surfaces by grout or otherwise while being installed.
- f) Prepare all expansion, construction, control and isolation joint to correct line and level.
- g) Any specific requirement by manufacturer.

4.3 Mixing mortar, adhesive and grout

- a) Mix mortars in mechanical mixer with specified approved materials in proportion specified by Architect / manufacturer of tile (as approved by Architect).
- b) Store mortar in non-porous platform and use within specified time.
- c) Mixing equipment, mixer speed, mixing containers, mixing time shall be as specified.

4.4 Installation

- a) Installation shall be as per recommendation of Code of practice or as per manufacturer's recommendation or as approved.
- b) Extend the work to cover completely without interruptions unless otherwise indicated. Further work into recesses, under or behind equipments, fixtures etc. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignment.
- c) Perform cutting, drilling without marking visible surfaces, carefully grind edges of abutting trim, finish or built-in items for straight aligned joints. Fit closely to electrical outlets, piping, fixtures and other penetrations such as plates, collars, covers etc.
- d) Locate expansion, control, contraction and isolation joint as indicated in approved shop drawing during installation. Saw cutting of joint after installation must be avoided.
- e) Prepare joint and apply sealant as per instruction of sealant manufacturer.
- f) Joint widths of stone and tiles shall not vary more than 1.6mm or one fourth of natural joint width, whichever is less.
- g) Areas where floor shall be stone and Ceramic tile shall be fixed with adhesive shall be screeded to correct line and level and of required thickness with clean cement concrete mix in ratio 1:2:4 (1 cement : 2 sand : 4 aggregate). It shall be well compacted leveled and graded to achieve accurate slopes if any with 3 M long metal edge screed shall be well compacted and shall be cured kept ready to receive tiles / stone with adhesive.

4.5 Movement Joints

4.5.1 Movement joints in Tile / Stone flooring are mandatory and shall be provided as per details and instructions of Architect / PM. General guidelines are as under:

- a) For interior flooring locations, these joints are provided @ every 6m - 7.5m in each direction.
- b) For exterior locations or interior flooring direct exposure to sunlight / moisture, these joints are provided @ 2.5m to 3.5m in each direction.
- c) These joints shall be provided at where tile / stone flooring abuts restraining surfaces like perimeter walls, dissimilar floors, curbs, columns, pipes, ceilings and where changes occur in backing materials, but not at drain strainers.
- d) All structural expansion, control, construction, cold and seismic joints should continue through the floor work, including such joints at vertical surfaces.
- e) Joints through floor work directly over structural joints must never be narrower than the structural joint.
- f) Cold joints which are formed primarily between slab pours where the size of concrete slabs may be too large to be poured at one time. The remainder of the slab would be poured at a later time, forming a cold joint between the two sections. These joints should also be taken care of at the time of installation of floor above them.

4.5.2 Expansion joints

- a) At exterior locations the width of vertical and horizontal expansion joints shall be minimum 10mm.
- b) For interior locations for quarry tiles and paver tiles the joint width should be minimum 6mm. For ceramic / vitrified / mosaic tiles on floor and walls it is preferred as not less than 6mm but never less than 3.1mm.

4.5.3 Surface preparation for joint fillings

- a) The tile / stone edges to which the sealant will bond must be clean and dry. Sanding or grinding of these edges is recommended to obtain optimum sealant bond.
- b) Primer on tile edges shall be as per recommendations of the sealant manufacturer.

4.5.4 Sealants

- a) Sealants for joint filling shall be compatible with the tiles / stones. Suitable sealant includes silicone, urethane and polysulfide. Urethane sealants are recommended for exterior vertical tile surfaces. Sealants in traffic areas require a shore A hardness of 35 or greater.
- b) Silicon sealants may be used on both exterior and interior vertical tile surfaces. Single component, mildew-resistant with fungicide for sealing interior joints in tiles in showers and around tubs, sinks and plumbing fixtures.

- c) Suitable sealant types are
 - Type S – Single component sealant
 - Type M – Multicomponent sealant
 - Grade P – Sealants for joints on horizontal surfaces
 - Grade NS – Non sagging sealants for joints in vertical surfaces
 - Class 25 and 12-1/2 – Identifies sealants which can withstand increase and decrease of $\pm 25\%$ or $\pm 12.5\%$ of joint width.
 - Type T – Sealants in joints subjected to pedestrian and vehicular traffic.
 - Type NT – Sealants for Non-traffic exposures.
 - Type M & G – Sealants that will remain adhered to mortar (M) and Glass (G).
- d) Backup strips shall be a flexible and compressible type of closed-cell foam polyethylene, butyl rubber or open cell and closed cell polyurethane, rounded at surface to contact sealant and as per recommendations of sealant manufacturer. It must be fit neatly into the joint without compacting and to such a height to allow a sealant depth of $\frac{1}{2}$ the width of the joint. Sealant must not bond to the backup material.

4.5.5 Installation

- a) Movement joints in tiles / stones should be located over all cold joints and saw-cut control joints.
- b) Joints in tile / stone and setting materials shall never be less than the width of saw-cut control joint width.
- c) To ensure that the location of joints in tile/stone work align with existing joints in substrate, joints in tile / stone work should be constructed during installation of mortar beds and /or tile / stone, rather than saw-cutting joints after installation.
- d) Movement joint cavities should be kept open and free from dirt, debris, grout, mortar and setting materials.
- e) While installing tile / stonework, suitable and compatible compressible backup strip or removable wooden strip should be set in place of joint and backup after mortar has cured.
- g) Compatible and suitable sealant should be installed after tile / stonework and grout are dry, as per recommendations of sealant manufacturer.
- h) Saw-tooth joints affect the performance of sealant and caulking materials and are not recommended unless used with a crack isolation membrane.

- 4.5.6 In case of existing flooring to be replaced with new flooring material (with prior approval from Architect / PM), necessary surface preparation, including removing debris, making leveled (match with other existing surfaces) surface, patch work etc.

5.0 TYPES OF FLOORING AND INSTALLATION

5.1 Kota stone flooring

5.1.1 Stone

5.1.1.1 Machine cut Kota stone slabs used shall be of specified thickness. Colour shall be uniform and the slabs free from all defects. Stone used at site shall be machine-cut.

5.1.1.2 In machine-cut edge tiles, edges shall be protected from any damage in transit. No breakage shall be permitted. All edges shall be sharp, perfectly rectangular and all tiles otherwise shall be rejected outright. Edges shall be pencil-rounded and polished for exposed corners and faces.

5.1.2 Bedding

It is provided with specified thickness cement sand mortar bed. This gives workability and helps achieve dead accurate levels. Cement sand mortar in a ratio of 1:6 (1 cement : 6 sand) shall be provided for bedding.

Surface shall be wetted and cleaned thoroughly. Mortar shall be spread uniformly, tamped and levelled with a 3 m straight edge. The bed shall be keyed prior to finishing of the day's work. Thickness shall be as specified but at no point the bed shall be less than 10 mm.

5.1.3 Laying of Kota stone

A thick cement slurry / paste or equivalent ready-made slurry bond coat of approved manufacturer shall be spread over the bedding and cleaned Kota stone shall be laid over this grouted area. Grouting shall be such that the area is covered within 15-20 minutes. Joints shall be as thin as possible and limited to 1-2 mm at the maximum.

Laying shall start after due consideration is given to following points and approved by the Architect.

- 1) Datum levels of floors in rooms, adjacent rooms, passages, etc.
- 2) Stones in openings and doors are equally placed.
- 3) Passage may be laid first to achieve evenness in doors.
- 4) Stones in room shall be symmetrical and equal cut tiles shall be around the edges.
- 5) In case of differently coloured stones in passages and rooms are used, a dividing strip shall be provided and changeover of colour shall be under the shutter.
- 6) In case there is any other architectural or structural feature, the same shall be considered and the pattern adjusted accordingly.
- 7) Stones may be allowed to go under plaster or dado about 10 mm.

5.1.4 After the stones are laid, surplus slurry from the joints shall be cleaned. The following day the joints shall again be cleaned, washed and wire brushed.

Grouting of joints shall be carried out with unsanded readymade grouts. Grout shall be worked into joint. Excessive grouts shall be cleaned off.

5.1.5 The floor shall be kept wet for a period of 7 days. No traffic shall be allowed on the bedding and bedded tiles for at least 2 days.

5.1.6 Polishing

Polishing and grinding shall be done only after 14 days. Machine cutting or grinding shall be carried out. At first the grinding shall be with rough stone and grinding shall be uniform. It shall be cleaned with water. All pinholes and opened out joints shall be grouted with cement grouts. It shall be cured for a period of 7 days by keeping it moist.

Second coat cutting/grinding shall be done with carborundum stone of grade 120. The same procedure as for the first coat shall be repeated till curing is completed.

The final cutting/grinding shall be with a fine stone of 220- 350 grade and shall be done with ample water.

Oxalic acid powder shall be spread 33 gm/sq m, fitted with hessian bobs and polished by machine. The floor shall then be washed, cleaned and dried with a soft cloth or linen.

In case of wax polishing, wax polish shall be applied to the surface. It shall be rubbed with machine. Then clean saw- dust shall be spread over the floor and rubbed with polishing machine. This will remove wax, leaving a glossy surface underneath.

5.2 Granite Stone floor

5.2.1.1 Machine cut stone slabs shall be of specified thickness. Colour shall be uniform and the slabs free from all defects. Stone used at site shall be machine-cut (Hand-cut permitted if approved or specified in the BOQ.)

5.2.1.2 In machine-cut tiles, edges shall be protected from any damage in transit. No breakage shall be permitted. All edges shall be sharp, perfectly rectangular. Edges shall be pencil- rounded and polished for exposed corners and faces.

5.2.2 Laying of stone

Cleaned stone shall be laid over IPS Screeding using approved quality compatible Adhesive of thickness as required and directed by approved manufacturer / Architect.

Joints shall be as thin as possible and limited to 1-2 mm at the maximum.

Laying shall start after due consideration is given to following points and approved by the Architect.

- 1) Datum levels of floors in rooms, adjacent rooms, passages, etc.
- 2) Stones in openings and doors are equally placed.
- 3) Passage may be laid first to achieve evenness in doors.
- 4) Stones in room shall be symmetrical and equal cut tiles shall be around the edges.
- 5) In case of differently coloured stones in passages and rooms, a dividing strip shall be provided and changeover of colour shall be under the shutter.
- 6) In case there is any other architectural or structural feature, the same shall be considered and the pattern adjusted accordingly.
- 7) Stones may be allowed to go under plaster or dado about 10 mm.

5.2.3 After the stones are laid, surplus cement slurry from the joints shall be cleaned. The following day the joints shall again be cleaned, washed and wire brushed.

Grouting of joints shall be carried out with unsanded readymade grouts gray cement that matches the colour of stones. Grout shall be worked into joint. Excessive grouts shall be cleaned off.

5.2.4 The floor shall be kept wet for a period of 7 days. No traffic shall be allowed on the bedding and bedded tiles for at least 2 days.

5.2.5 The following additional points should be taken into consideration while laying

- 1) If no specific pattern is given by the Architect, layout of the area shall be done based on points stated in clause 4.0 here above. Further it shall be noted that dry laying shall be carried out and approval got from the Architect prior to fixing in both cases.
- 2) Veins of stone must match.
- 3) Colour and shade differences should be adjusted to create an uniform appearance and hence dry laying shall be approved by the Architect prior to actual laying.
- 4) All closing pieces/cut pieces, etc. shall be as per drawing.
- 5) The flooring shall be protected till the site is handed over to the Employer.
- 6) Acid washing after polishing shall not be carried out.
- 7) If specified in BOQ and drawing, dividing strips shall be of brass or as specified or as approved.

5.3 Vitrified / Ceramic tiles floor

5.3.1 Approved Vitrified / Ceramic tiles shall be laid over cement sand mortar bed. Cement sand mortar in a ratio of 1:6 (1 cement : 6 sand) shall be provided for bedding. Tiles shall be laid in accordance to IS specifications and instructions of manufacturer.

5.3.2 Floor to receive tiles shall be wire brushed cleaned, wetted and mopped. Cement mortar shall be spread over the area uniformly and compacted with 2-3 metre straight edge to achieve dead uniform levels. Surface shall be allowed to harden but in plastic state a thick cement paste by using cement @ 4.5 kg/sq m shall be worked into the bedding. Cement paste or approved tile adhesive shall be applied to the area only where immediate laying of tiles is carried out. Wetted tiles shall be cleaned and fixed in the thick cement pasted bedding. Tiles shall be positioned by tapping with wooden hammer and level checked with straight edge 2-3-metre-long. Joints shall be as specified or as thin as possible. Points to be noted prior to start are as under

- 1) Layout of the tiles is checked and approved by the Architect.
 - 2) End cut tiles are more than half.
 - 3) Floor and wall tiles are in the same line.
 - 4) Change of tiles is below the door shutter.
 - 5) Dividing strip is provided if shown in drawing.

- 6) Cutouts of floor drains are in line with the tiles. Tiles around cutouts are greater than 50 mm or half the tile whichever is greater.
- 7) Joints shall be cleaned thoroughly and grouted with approved unsanded readymade grout or as directed by the Architect. Grout shall be a thick paste and tooled into joints and area of the tile cleaned with a damp cloth. Grouting shall be cured by wet curing for 7 days.
- 8) After 24 hours of grouting, tiles shall be cleaned with water and after 7 to 10 days or prior to handing over, tiles shall be washed with mild acid. Care shall be taken that grout does not develop any stain mark.
- 9) All expansion joints shall be carried out right through and finished by sealing with silicon sealant.

5.4 Vitrified / ceramic tile (wall/dado)

5.4.1 Approved Vitrified / ceramic tiles of size design and shape shall be used.

Tiles shall be fixed over plastered surfaces with fully buttering cement slurry.

5.4.2 Dado tiles shall be fixed as under -

- 1) Sufficiently hardened backing/undercoat must be damp.
- 2) Tiles shall be buttered with grey/white or pigmented cement paste on the back side as directed.
- 3) Tiles shall be fixed on the undercoat and tamped with wooden mallet or rubber mallet to achieve full adhesion to the undercoat. Edges shall be tamped to secure line and level.
- 4) Care shall be taken to achieve pattern of laying with respect to floor or ceiling.
- 5) Tiles shall be mopped with wet cloth to remove grout coming out from joints.

5.4.3 Jointing

- 1) Joints shall be cleaned thoroughly and grouted with unsanded readymade grout as directed by the Architect. Grout shall be a thick paste and tooled into joints and area of the tile cleaned with a damp cloth. Grouting shall be cured by wet curing for 7 days.
- 2) After 24 hours of grouting, tiles shall be cleaned with water and after 7 to 10 days or prior to handing over, tiles shall be washed with mild acid. Care shall be taken that grout does not develop any stain mark.
- 3) All expansion joints shall be carried out right through and finished by sealing with silicon sealant.

5.4.4 The work shall be measured in sq m for flooring and running metre for skirting, tread and riser. Length shall be measured from the finished face of skirting, dado or wall plaster. Depth shall be measured from outer line of nosing to the finished face of riser or in the case of the edge tiles of the landing or wide steps, to the rear edge of the stair trade tile. The rest of the paving in landing or wide steps shall be measured under similar flooring.

5.4.5 The rate shall include the cost of all materials and labour involved in all the operations described above. Nothing extra shall be paid for cutting the standard tiles to suit the size of treads.

- 5.5 Indian patent stone
- 5.5.1 Cement concrete floor in a ratio of 1:2:4 (1 cement : 2 sand : 4 aggregate) of 40 to 75 mm thickness shall be laid in panels.
- The concrete surface finish may be monolithically laid with structural slab or laid over hardened structural slab. For convenience and to protect final finish in the period of construction, laying of concrete over-hardened structural slab shall be preferred.
- 5.5.2
- a) Hardened structural slab shall be thoroughly wire-brushed, hacked with mechanical scabber to remove all scum, laitance of cement mortar and allowed to expose coarse aggregate. Surface shall be wetted and cleaned thoroughly.
 - b) Concrete shall be laid in panels. Panels shall be such as to minimize shrinkage and curling. Their length to breadth ratio shall be 1.5 : 1. It is advisable to keep the maximum length of each panel as 2.0 m and area of the panel shall not be more than 2 Sqm.
Panels shall be formed by providing shuttering of timber or steel angles to dead accurate level. They shall be rigid and watertight.
 - c) In case dividing strips are to be provided, the same shall be fixed to dead accurate level and concrete poured into them (spaced at 2m but not required to be in alternate bays).
- 5.5.3
- a) The concrete mix used shall be as stiff as possible. When mix is held in hand it shall form a ball but when released will crumble by itself.
 - b) All excess water from the surface shall be mopped up keeping surface just wet.
 - c) Thick cement paste/slurry shall be brushed into the surface just prior to laying of the concrete. It must be noted that slurry shall not be brushed over area where concrete laying is likely to be delayed.
 - d) Concrete laid shall be vibrated and rammed as required. It shall be leveled with 3 m straight edge.
 - e) Surface shall be well troweled and rubbed smooth to the satisfaction of the PM.
 - f) No additional dry cement or cement mortar shall be sprinkled on the stiffened concrete surface to achieve smoothness.
 - g) Concrete shall be kept moist for 14 days.
 - h) Edges of panels shall be well-compacted to minimise lifting and curling.
- 5.5.4 IPS-laid monolithic with structural concrete shall be carried out as under
- a) Floor concrete slab shall be allowed to stiffen enough but still be in a plastic stage.
 - b) Mix shall be laid in position and well-compacted with wooden float and leveled with 3 m straight edge.
 - c) After the surface has become slightly hard, steel troweling shall be carried out to achieve a smooth, leveled surface.
 - d) No additional dry cement or cement mortar shall be sprinkled on the stiffened concrete surface at any stage.

- e) The concrete shall be wet cured for 14 days.
- 5.5.5 Measurement shall be in square metre for specified thickness and for specified mix.
- 5.6 Vacuum Dewatered Flooring
- 5.6.1 General:
- a) To achieve best quality, well vibrated, well compacted concrete, which is basically a mechanical method to have zero slump concrete with an optimum water-cement ratio.
 - b) All process equipment shall be TREMIX or equivalent approved. System shall have a demonstrated performing success of at least 3 years. Required certificates shall be submitted to Architect.
 - c) The concrete poured shall be as per mix given in Brief Item Description. All specifications shall be followed for preparation and laying of concrete.
 - d) Panels shall be as specified and as per recommendations of manufacturer of equipment.
 - e) Cutting grooves in concrete structurally required to allow expansion of joint about 1/3rd depth of concrete and 12mm wide, filling grooves with pour quality bitumen sealant of approved make, power floating and broom finishing or finishing smooth as specified / instructed, cleaning, curing surface etc.
- 5.6.2 Equipment:
- Equipment specifications of Tremix System are as under.
- a) Poker vibrator with high frequency 335 hz (20 000vibr/min) dia. 1 to 1 1/2".
 - b) Surface vibrator type double beam spacing 12".
 - c) Preferably one-piece beam in full length exceeding bay width within 8" to 24". beam should easily be adjusted to absolute straightens and controlled every morning before placing of concrete starts.
 - d) Suction mat type RM 60.100% tight plastic material weight 650 gram/m2. Width same as bay size and length 20' for capacity and flexibility.
 - e) Filter pad type RD 12 weight 600 g/m2, width 4' length = bay width - minus 8".
 - f) Vacuum Pump P 4001 B with 10 HP engine and specially designed pump unit with heavy duty chrome and housing and sealing. Adjustable vacuum by valve on top of tank for ease of operation with different mix designs.
 - g) Skim floater type G900/G700 with disc which allows direct floating of dewatered concrete. Weight maximum 90kg (200 pounds) for 40" W. disc.) Finishing is done with G900, using blades only and is normally done with 30minutes intervals between passes.
 - h) The above equipment specified should be used for the production of quality concrete floors according to the TREMIX or equivalent approved system. Interchangeability of equipment is not recommended.

6.0 STEPS, CLADDING / SKIRTING

6.1 Material for dado, steps, risers shall be as specified in clause 2.0 above.

6.1.1 Surface preparation shall be same as for flooring for each type. Cladding / skirting work shall be done over plastered concrete/masonry surfaces and gyp board partitions. It shall be combed for creating a key and better adhesion with skirting material.

In case of steps, bedding shall be laid exactly as flooring and all operations described therein shall be carried out.

6.1.2 External and Internal facings shall be fixed with adequate provision for expansion and compression joints.

The contractor shall supply and fix all necessary supports, anchor slots, anchor cramps and dowels required for the satisfactory completion of all vertical granite or any other stone cladding work. Fastener/clamps etc. will be made from suitable non-ferrous metal. They shall be in such shape and dimension that they are adequate to carry the loads to be imposed upon them.

Fixing of wall cladding with stone shall be done through experienced masons only. All stones shall be fixed to wall in perfect plumb and level as per design. To keep the stone in position use of gypsum shall be done and all back cavity after fixing of clamps, dowels etc. shall be grouted with non shrinking grout. Height of cladding shall be raised in a day which is self supporting.

Joints and surfaces shall be cleaned thoroughly by using coir stringer wire brush. Then joints shall be grouted with approved ready-made grout or matching colour grout as directed. Surfaces shall be allowed to cure for 7 days.

Notwithstanding the above stipulation, the contractor shall be entirely responsible for the sufficiency of fixings.

All anchors and other fixing shall be concealed when the work is completed.

Great care shall be taken to protect delivered stones from dripping and staining during the course of work.

6.1.3 Skirting or dado tiles shall be fixed as under –

- 1) Sufficiently hardened backing/undercoat must be damp.
- 2) Tiles shall be buttered with grey/white or pigmented cement paste on the back side as directed.
- 3) Tiles shall be fixed on the undercoat and tamped with wooden mallet or rubber mallet to achieve full adhesion to the undercoat. Edges shall be tamped to secure line and level.
- 4) Care shall be taken to achieve pattern of laying with respect to floor or ceiling.
- 5) Tiles shall be mopped with wet cloth to remove grout coming out from joints.

6.1.4 Jointing

- 1) Joints shall be cleaned thoroughly and grouted with unsanded readymade grout as directed by the Architect. Grout shall be a thick

paste and tooled into joints and area of the tile cleaned with a damp cloth. Grouting shall be cured by wet curing for 7 days.

- 2) After 24 hours of grouting, tiles shall be cleaned with water and after 7 to 10 days or prior to handing over, tiles shall be washed with mild acid. Care shall be taken that grout does not develop any stain mark.
- 3) All expansion joints shall be carried out right through and finished by sealing with silicon sealant.

6.1.5 Polishing and cleaning shall be as described in type of tile referred above, except that the operation shall be manual.

6.1.6 Measurements shall be in running meters for skirting, steps, risers for specified width. Dado shall be measured in square meters.

Rates shall include material and labour required to complete the item as specified and approved by the Architect. It shall include dividing strips, treating expansion joints, sealing corners and edges around fittings and fixtures, etc. all completed as approved by the Architect.

7.0 STONE COPINGS, JAMBS, SOFFITS ETC.

7.1 Stone used for copings, jambs, soffits etc. shall be of specified variety. It shall be hard, sound and uniform in colour and texture and free from defects like cavities, cracks, sand holes, flaws, injurious veins, patches of loose or soft materials etc. percentage of water absorption shall not exceed 5 percent when tested in accordance with IS 1124. Samples shall be got approved prior to ordering of stone.

7.2 Dressing

All exposed plane surfaces and sides shall be chisel dressed such that dressed surface shall not vary by more than 1 mm at any point from a 600 mm long straight edge placed against it. All visible angles and edges shall be free from chippings and polished as specified or as directed by the PM. The surface to be buried in masonry shall be rough chisel dressed. Copings, jambs, soffits shall be finished to the shape as shown in drawings. Stone shall be cut as per the pattern shown in the drawing. Thickness of stone shall be as specified, with a tolerance of 2mm.

7.3 Laying and fixing shall be done with approved grade and cement slurry, in the manner shown in the drawing and as directed by the PM. Fixing of stone shall be done with adjoining work in grooves, rebates etc. as shown in drawing. They shall also be secured to the backing masonry / concrete work by means of stainless steel / Gum metal / G.I. pin dowels, cramps etc. as detailed in drawing or as directed by the PM.

7.4 All joints shall be pointed in approved matching colour readymade grout as specified in BOQ. Joints shall be as detailed in drawing.

Minimum depth of pointing shall be 10 mm may be with gray cement or with addition of pigment to match the shade of stone or in colour as specified. Type of pointing may be sunk in, raised or flush as specified and detailed in drawing.

7.5 Green work shall be protected from rains by suitably covering the same. Masonry shall be kept constantly moist for a period of 7 days.

- 7.6 Double legged steel scaffold (or as approved) shall be adopted. Scaffolding shall be strong and well anchored with building.
- 8.0 SANDWICHED CUDDAPPAH PLATFORM WITH GRANITE STONE TOP**
- 8.1 Machine cut machine polished kota stone slabs used shall be of thickness as per drawing, colour shall be uniform and the slabs free from all defects.
- 8.2 Slabs shall be either machine cut at factory in required sizes or cut by m/c at site. In all cases no damaged stone shall be used in the work.
- 8.3 Vertical stones and stones of shelves shall be machine polished on both faces and all exposed edges while the top slab shall be polished on one side i.e. underside while top surface shall be kept rough for better adhesion with Granite stone top.
- 8.4 All edges shall be sharp, perfectly rectangular and the exposed edges shall be pencil rounded and polished as shown in drawing or as specified by the PM.
- 8.5 Assembly of toilet counter shall be done as per detail drawing or as directed by the PM.
- 8.6 Vertical pieces shall be in perfect plumb on all sides while horizontal slab shall be in perfect level.
- 8.7 All joints and in fill layer shall be filled with cement sand mortar of mix (1:4) 1 cement : 4 sand and properly cured.
- 8.8 Granite stone top used shall be of approved quality and shade. Thickness shall be as shown in drawing or as directed by the PM and all slabs shall be machine cut mirror polished.
- 8.9 All slabs preferable shall be from same mines and to ensure uniformity of colour and quality.
- 8.10 Cutting and polishing shall be by machine only either at factory. No damaged piece shall be used.
- 8.11 All edges shall be sharp, perfectly rectangular and the exposed edges shall be pencil rounded and polished.
- 8.12 Granite stone top shall be laid over cement mortar bed mix in ratio of (1:4) 1 cement : 4 sand. Prior to laying of mortar bed, the top of kota stone base shall be scrapped clean and washed thoroughly.
- 8.13 Mortar bed shall be laid and neat cement slurry with cement paste shall be spread over the mortar bed and clear granite / marble slab shall be laid and fixed to perfect level over it.
- 8.14 Joints shall be as thin as possible and limited to 1-2 mm maximum. The joints shall be wiped off for excess cement slurry and cleaned prior to grouting with matching coloured cement grout.
- 8.15 Granite stone fascia patti shall be fixed by using anchors and cement slurry with cement paste.
- 8.16 Work shall be protected and cured for at least 7 days. The timber props on braces shall be left in place as per instruction / recommendations of adhesive manufacturer.
- 8.17 The sink of specified size and make shall be fixed by cutting of kota stone base and the joints on top with granite / marble shall be filled with silicon sealant of approved make and colour.

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