Terms & Conditions

1. Rate should be inclusive of labour material, tools and all taxes and duties etc. complete.

2. Make/brand of material/approved vendor - Fosroc, Choksi, Chemicals, Pidilite, SIKA and same brand primer.

3. Payment will be made for actual quantity executed at site as per approved drawing and as per technical specification.

4. Rate should be inclusive of Cost of Silica sand.

5. All works to be carried out as per approved drawing of HAL and technical specification given by HAL.

6. Delivery challan will be addressed to M/s. Engineering Projects (I) Ltd, HAL site Office.

7. The addressee for invoice shall be Engineering Projects (I) Ltd, HAL factory area, Pkg. – II & III. Ojhar Nasik.

8. MTC to be produce and all relevant documents shall comply as per technical specification.

9. Insurance and PF will be arranged by company.

10. Completion period 90 days from date of issue of Work Order. In unlikely event of delay in completion due to non–performance, work will be terminated and shall be executed at risk and cost.

Technical Specification-

Copies are enclosed.
accordance with the recommendation of the, Manufacturer to have the slab fully dewatered. The suction mat shall extend 100 mm beyond the edge of the filter pad on all sides. The pads shall extend to within 100 mm of the edges of concrete slab, and the mats shall cover entire slab. Before connecting the hose on the suction mat to the vacuum pump, the edges of the mat shall be smoothed to enable, an airtight seal to be created. A vacuum shall then be applied to the mat. After a minute the gauge on the vacuum pump should indicate a minimum vacuum of 0.70 atmospheres (240.0 in Hg) and if not, the mat must be checked for leakage. For concrete that dewatered readily the vacuum should then be maintained at 0.70-0.80 atmosphere (240.0-25.5 in Hg). For concrete which dewatered less efficiently (eg. Air entrained concrete) the vacuum shall then be reduced to 0.50-0.60 atmospheres (15.0-18.0 in Hg). After approximately 10 minutes the vacuum can then be increased to 0.80 atmospheres.

The vacuum shall be maintained for at least 3 minutes per 25 mm of concrete thickness at 0.80 atmospheres. (Where aggregate hardeners are specified, sufficient moisture shall be maintained to meet Manufacturer’s requirements). The suction mats and filter pads shall then be removed and move to the next section in a leapfrog manner. The vacuum dewatering can be stopped when light footprints only are left in the concrete when stepped upon. A suitable suction time can also be checked with a Proctor-apparatus, which should show 1.5-2 Kg / sq cm. Upon removal of the suction mats and filter pads the concrete shall be power floated with out delay until all imprints from the vacuum process are removed. If crusting occurs, the floating operation must be delayed till the concrete carries the machine.

The higher speed is recommended for the floating operation. The passes with the floating disc should be made in the junction of two mats in order to avoid risk of cracking.

The waiting time after the floating operation depends on concrete temperature and humidity and varies from 10 minutes to 2 hours.

The trowelling operation cannot take place before the concrete has hardened enough to carry the machine i.e., the trowelling blades will not leave any marks on the concrete. Repeated trowelling, with intervals between the passes, which are adapted to the setting of the concrete, greatly improves the surface characteristics. The surface will be more wear resistant and less dusty.

At least two passes are recommended for floors, which are not to be covered.

Vacuum dewatered concrete should be cured like any quality concrete in order to achieve a good final result. Use curing compounds, plastic sheets or wet burlap.

The contractor has the responsibility for achieving the quality of concrete specified by controlling the concrete mixes, placing, vacuum process, finishing and curing. The concrete technician in charge must be present at the site when work is in progress.

The contractor shall be responsible for mix adjustments, performing necessary tests, correcting deficiencies and trouble shooting in general.

The contractor shall be required to maintain control charts showing individual test results for aggregate graduation, slump, air content and compressive strength.

Joints in Concrete floor (using sealing compound)

General
Joints shall be of the types and dimensions as indicated and shall be located as indicated.

Dummy Joints
The dummy joints shall be 5 mm wide and shall extend vertically from the surface of the slab to a depth equal to 1/3 to 1/4 of the thickness of the slab. The joint may be formed by depressing into the soft but compacted concrete a high tensile mild steel. 'Tee' or flat bar of depth not less than the required depth of the joint plus 25 mm. The bar used for forming the groove shall be coated with soft seal or other suitable lubricant and have built in handles rigidly fixed to facilitate its removal without spalling or crumbling the edges. When the steel bar is removed, joints shall be nearly reformed immediately with proper tools and with mortar/fine material from the slab itself. No additional cement mortar shall be used. Alternatively the
slot may be formed by sawing the concrete with a joint cutting machine (diamond cutter) of approved design within 6 hours of placing under moderate climatic conditions and when the concrete has sufficiently hardened. Under extreme cold conditions, this period may be suitably increased based on experience. In all cases, except where cutting is done with saw, the joint edges shall be bull nosed. Care shall be taken that the edges of the joints are not damaged. The edge shall not stand proud of the concrete slabs.

Construction Joints
The construction joints shall be 10mm wide and straight and vertical though the full thickness of the slab. The vertical edge of the concrete on the side of the joint shall be treated with a coat of lime, wash or bituminous paint before the adjacent bay is concreted. A groove 2.5 cm deep and 1 cm wide shall be formed at the top surface of the joint to receive the sealing compound. The groove shall be formed in the same manner as that for a dummy joint. The edges of the groove shall be bull nosed and not stand proud of the concrete surface.

Expansion Joints
The expansion joints shall be straight and shall extend through the full thickness of the slab and shall be of the shape and dimensions shown on the drawings. The slab edges adjacent to the joint shall be formed truly vertical. The joints shall be filled with a 2 cm thick filler board. Cold applied joint sealant (polysulphide or polyurethane) of approved make with minimum ten years of performance guarantee will be used as joint sealant. The guarantee should be taken in writing from the contractor before the approval of joint sealants. The technical specifications of the cold applied joint sealants (irrespective of whether polysulphide or polyurethane) should meet the requirements mentioned in BS-5212, BS4254 and EN-14187-2003 (for hydrolysis/water resistance test). In addition, the Movement Accommodation Factor (MAF) of the sealant should be minimum ± 30 %.

The groove to receive the sealing compound may be formed by cutting the extra filler board to the required depth.

Sealing of Joints
All joints shall be sealed as soon as practicable after 28 days of placing of the slabs. The joints shall be finished flush with the finished concrete surface if the sealing of joints is done in summer and 3mm below the finished concrete surface, if the sealing of joints is done in winter. After the sealing compound has hardened, the excess sealing compound, if any, adhering to the slab outside the joints shall be removed by scraping or otherwise and the surface left clean. The pavement shall be opened to traffic only after the completion of joint sealing over the entire pavement.

Cleaning of Joints
All foreign materials in the joints shall be removed with pneumatic blower. The joints shall, thereafter, be cleaned with a coir brush. Fine particles clinging to the concrete faces shall be removed with the help of an air compressor only to avoid damage to the edges. The joints shall be cleaned and surface dried before the application of primer.

Application of Primer
The cleaned joint shall be primed with a 20-25mm side painter's brush, while painting, light pressure shall be applied so that the primer penetrates into the pores of concrete. The primer shall be applied twice on one side (i.e, by forward and reverse movement of brush). The primer shall be applied in the thinnest possible complete film and then left for some time till the primer feels "tacky" soon after the primer is applied, the joint is covered with 10-15 cm wide paper strips so that no dust is deposited on the primer.

Sealant joints
Only cold applied Polysulphide or Polyurethane joint sealant of approved make will be used in rigid pavements. The criteria for selection of the joint sealant will depend on the minimum performance guarantee of ten years offered by the firm. This performance-based selection would accrue better cost

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effective results rather than using a joint sealant without any guarantee. The technical specifications of the cold applied joint sealants (irrespective of whether polysulphide or polyurethane) should meet all the requirements mentioned in BS-5212, BS 4254 and EN-141875-2003(for hydrolysis/water resistance test). In addition; the movement accommodation factor (MAF) of the sealant should be minimum ± 30%.

While the joints shall be sealed flush with the adjacent pavement surface in summer, in winter they shall be filled to a depth of 3-4mm below the surface. This procedure will reduce the possibility of ingress of grit and other foreign matter into the sealing compound as well as dislodging of the hardened sealing compound under traffic.

Joints in pavement concrete, (using polysulphide polyurethane material)

General

Joint shall be of the types and dimensions specified and be located in all as directed by Gamson Engineer. The edges of the groove/joints shall be bull nosed & not stand proud of the concrete surface.

Dummy Joints

The size of joints shall be as indicated/ specified.

The joint shall be formed using mechanical equipment (diamond cutter) within 6 hour of placing of concrete under moderate climatic conditions and when the concrete has sufficiently hardened. Cutting or sawing by a sawing mounted at movable frame and driven mechanically will also be permitted as a method for making the joint. Care shall be taken that the edge of the joints are not damaged.

In case of sudden rain or storm, the work can be concluded at the dummy joint but the latter will then be formed into a construction joint.

Construction Joints

Construction joints shall also be provided at places where concreting is stopped due to unforeseen circumstances. The size of joints shall be as specified and as shown on drawings.

Construction joints shall be straight and vertical through the full thickness of the slab. The vertical edge of the concrete of the side of the joint shall be treated with a coat of lime wash or bituminous paint before the adjacent bay is concreted. A groove of dimension as specified in contract shall be formed. The groove shall be formed in the same manner as that for a dummy joint.

Expansion Joints

The expansion joints shall consist of a joint filler board as detailed in the drawing. The depth of the non extruding filler pad Ooint filler board) shall be cut by 25mm from top to prepare the joint.

Joints shall be straight and shall extend through the full thickness of the slab and shall be of the shape and dimensions shown on the drawings. The slab edge adjacent to the joint shall be formed truly vertical. The joints shall be filled with approved joint filler as per clause 20.B.7.10.4.

Before the provision of expansion joint, the face of the already laid concrete slab shall be painted with the approved primer at the rate of 2.6 liters per 10 square metres. The expansion pad shall be properly cut to shape. Bond breaker tape shall be applied on the top face of the pad before inserting the dosed cell backup rod. It shall then be placed in position abutting the painted face of the already laid concrete slab. The adjacent slab shall then be concreted. The faces of the pad against which the new concrete slab is to be laid shall also be painted with the approved primer before laying the concrete. While concreting a neat groove as per drawing shall be formed on top of the pad taking care that the edges are absolutely straight and that the groove so made does not get filled with any material like concrete, mortar and other rubbish.

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The groove to receive the sealant may be formed by cutting the excess filler board material to the required depth.

Expansion joints shall be provided both longitudinally and transverse direction at spacing as shown on drawing or as directed by Engineer-in-Charge.

Procedure Of Joint Filling With Polysulphide / Polyurethane Sealant
The technical specifications of the cold applied joint sealants (irrespective of whether polysulphide or polyurethane) should meet all the requirements mentioned in BS-5212, BS 4254 and EN-141875-2003 (for hydrolysis/water resistance test). In addition, the Movement Accommodation Factor (MAF) of the sealant should be minimum: t: 30 %. The criteria for selection of the joint sealant of approved make will be a minimum performance guarantee of ten years offered by the firm. This performance-based selection would accrue better cost effective results rather than using a joint sealant without any guarantee. Contractor shall not procure the materials required for joint filling unless the samples are approved by the GE and a ten years of guarantee is given in writing by the contractor. The primer and sealant shall be tested by GE from a reputed testing laboratory who has the NABL accreditations like Indian Rubber Manufacturer’s Research Association’s Laboratory / CRR/IIIT/NIT/SEMT Wing, CME Pune before approval. The test certificate shall be obtained for every 5MT of material incorporated in the work.

Joint Preparation
Before commencing joint sealing operations, the following shall be ensured:
(a) The groove extends fully across the bay between consecutive longitudinal joints in the case of transverse joints and is continuous in the case of longitudinal joints.
(b) No concrete and foreign matter shall be left in the groove.
(c) In case of expansion joint, the filled materials is exposed to the full length of the joint and expansion joint filler is tightly packed.
(d) Joint surface must be dry, free from dust, coating, bituminous mastics, concrete curing agencies, mould release agents, oil, grease and loose particles.
(e) All joints shall be thoroughly cleaned out by compressed air and sanding with emery paper or other approved means and shall be approved by Engineer-in-Charge before they are sealed.
(f) The cleaned and prepared joints shall be primed on the sides of the joints up to the depth where sealing component is to be provided and filled with approved sealant.
(g) Wipe out oil and grease by solvent soaked cloth (such as Xylene, Toluene or Acetone or Gardoclean).
(h) Before sealing, insert a bond breaker tape and bond breaker (closed cell polyethylene frame rod) caulked tightly into the base of the sealing groove to prevent the sealant from adhering to the base of slot. Width of bond breaker (backup rod) shall be 20 to 25% more than the joint so that there is no seepage of sealant through joints edges.

Fixing/Masking Tape
Fix masking tape to prevent edges of joints becoming dirty due to spillage of sealant at the time of pouring.

Application Of Primer
(i) Suitable primer shall be first applied to the vertical faces of the concrete joint before pouring cold applied sealant conforming to specifications given at clause 20.B.7.11.5.1, in order to improve the adhesive qualities of the product. Primer as specified by manufacturers shall be applied to the joint vertical surfaces and allowed to dry for 30 minutes to 2 hours depending on the climatic condition. The surfaces shall be primed twice @0.075 litre (minimum) primer per square metre.
(ii) If the primer film has become completely tack free, the surface must be re-primed before applying the sealant.
(iii) If the primed areas are left unsealed overnight the primer film must be removed by grit blasting or grinding and the joints interfaces shall be re-primed.

Mixing

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Mixing and application of sealant will be through mechanical means to avoid any human error. The mixed product shall be used immediately as per manufacturer’s instructions within its pot life i.e. within 30 minute. The mixed sealant should be kept for a few minutes to allow air to escape before commencement of jointing filling.

Application or Pouring of Sealant
Mixed sealant shall be applied by mechanical means (machine application) based on the manufacturer’s instructions and shall be executed by his approved and trained applicator. Application temperature of sealant should be in between 5 to 45 degree Celsius (or as per manufacturer's instructions). It should be filled to a level 2 to 3mm below the top of the pavement leaving a recess to protect the sealant from damage. To prevent accidental spillage of sealant on the top surface and to give a neat finish masking tape should be applied on front edges of joint in such a manner that the material will not be spilled on the exposed surface of the concrete. Any excess filler on the surface of the pavement shall be removed immediately and the pavement surface cleaned. All necessary precautions as per the manufacturer's recommendations shall be taken. The sealant should be immediately tooled either with stainless steel or wooden spatula of the size of the joint to give a smooth finish before it begins to set. Masking tape shall be removed immediately after the sealant has been tooled. The sealant should be allowed to cure as per manufacturer's instructions during which period no traffic should be allowed on the pavement.

The test certificate shall be obtained for every 5 MT of material incorporated in the work.

Some Miscellaneous Aspects
(i) The sealant are sensitive to temperature while in storage as well as during mixing. Temperatures for all phase of handling of the sealing compounds viz mixing, placing and curing conditions must be in accordance with manufacturer’s recommendations.
(ii) All safety precautions during handling and application of these sealants as prescribed by the manufacturers shall also be strictly adhered to.

Precautions
(a) Some people are sensitive to resins, hardeners, vapour etc. Therefore it is advisable to use hand gloves/ goggles and suitable protective clothing.
(b) Avoid application below 10DCTemperature.
(c) Avoid application on damp or Moist surfaces.
(d) Do not expose primer to naked flames or other sources of ignition.
(e) Materials to be kept in no smoking area.
(f) Containers should be tightly sealed when not in use.
(g) In the event of fire, extinguish with carbon dioxide or foam.
(h) Should accident skin contact occurs, remove immediately with a resin removing cream, followed by soap and water. Do not use solvent.
(i) In case of contact with eyes, rinse immediately with plenty of clean water and seek medical advise.
(j) Use only in well ventilated areas.
(k) All consumables (masking tape, empty cartridges etc) should be removed and disposed off safely.

13.17 Epoxy Polyurethane Flooring

Scope of work:
The scope work is laying of self leveling epoxy flooring generally consists of following steps
- Surface Preparation
- Epoxy Primer -
- Epoxy Underlay
- Epoxy Polyurethane Self leveling Coat
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<th>No.</th>
<th>Item Description</th>
<th>Supplier/Brand</th>
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<tr>
<td>24</td>
<td>Plywood/Shuttering plywood</td>
<td>Century, Kit ply, Green ply</td>
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<td>25</td>
<td>Paints/Distemper</td>
<td>Asian Paints, Berger, Jenson Nicholson, ICI</td>
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<td>26</td>
<td>Laminate</td>
<td>Fevicol, Unicoal, Vamicoal</td>
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<td>Shakti Met Door, Ahlada Engineers Pvt. Ltd., Radiant Engineering</td>
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<td>28</td>
<td>Flush Door</td>
<td>Indian Plywood, Kit ply, Green ply</td>
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<td>29</td>
<td>Laminates</td>
<td>Kitlam, Greenlam, Sun gloss, Feather touch</td>
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<td>White cement</td>
<td>JK, Birla</td>
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<td>Shalitex Board</td>
<td>Shalimar Industries</td>
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<td>Endura, Aeon, Besser</td>
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<td>Cast iron pipes and CI fittings</td>
<td>Kesoram, Electro steel(,IS 210, IS 1536, IS 1538)</td>
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<td>37</td>
<td>Cast iron gate valves</td>
<td>Kirloskar, Kilburn, Sarkar(IS 780)</td>
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<td>38</td>
<td>Gun metal valves</td>
<td>Leader, Zoloto, Sant (IS 778, IS 5352)</td>
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<td>G.I. pipes</td>
<td>Tata, GST, Zenith, Jindal(IS 1239)</td>
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<td>40</td>
<td>GI fittings</td>
<td>&quot;R&quot; or &quot;X&quot; brand</td>
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<td>41</td>
<td>Brass float valve</td>
<td>IS marked(IS 1703)</td>
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<td>42</td>
<td>CP brass bib cocks, stop cocks, pillar cocks</td>
<td>ISI Marked, Jaquar, ESSCO, MARC (IS 8931, IS 781, IS 1711)</td>
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<tr>
<td>43</td>
<td>CP brass shower</td>
<td>ISI Marked, Jaquar, ESSCO, MARC</td>
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<td>44</td>
<td>Hume pipes NP2</td>
<td>IS 458</td>
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<td>Wash basins</td>
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<td>Auto flush system for urinal</td>
<td>AOS system, ROBO auto flush system</td>
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<td>Pump sets</td>
<td>Kirloskar, Crompton greaves, CRI, Texmo</td>
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<td>non return valves, foot valves</td>
<td>Kalapakam, Leader, Zoloto, Sant</td>
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<td>56</td>
<td>UV resistant polyethylene film(silipaulin sheet)</td>
<td>Supreme industries limited, or approved equivalent</td>
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<tr>
<td>57</td>
<td>Stud Anchors, chemical adhesives for rebar fixing</td>
<td>HILTI, FISHER, or any approved</td>
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