TENDER DOCUMENT

TENDER No.: EPI/WRO/CON/662A/0063

CONSTRUCTION OF BALANCE WORK FOR MAIN ENTRANCE GATE, BOUNDARY WALL AND LANDSCAPING (WITH STONE CLADDING) AT PROPOSED NEW NIT CAMPUS AT VILLAGE RAKHI BHARENGA, RAIPUR CHHATTISGARH.

FOR

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (CHATTISGARH)

VOLUME II

TECHNICAL SPECIFICATIONS

EXECUTING AGENCY

ENGINEERING PROJECTS (INDIA) LIMITED
(A GOVT. OF INDIA ENTERPRISE)
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MUMBAI -400021
PH: 022 22049230
Technical Specification for DSR Items

GENERAL

The work in general shall be carried out as per latest CPWD specifications New Delhi for Civil Works (updated with correction slips issued up to last date of submission of tender) and latest CPWD specification New Delhi for electrical works (updated with correction slips issued up to last date of submission of tender) unless otherwise specified in the nomenclature of the individual item or in the particular specifications of concerned items of works.

For items not covered under latest CPWD specification, for (Civil Works) / latest CPWD specification for Electrical Works and in particular specification or nomenclature of the individual item as above, the work shall be done as per latest relevant BIS codes of practice.

In case specification are not covered under above para the work shall be carried out as per the provisions of technical specification given in tender.

In case of non-availability of any specification in the above paras or any overlapping provisions, non-clarity on any issue, applicability of particular provision out of above, shall be decided by Engineer-in-Charge whose decision shall be final & binding on the contractor.

The electrical works shall be executed only through licensed electrician and the agency shall have to submit the valid license of electricians before starting the work.

It will be the sole responsibility of contractor to obtain all statutory approvals/compliance required for construction / implementation of the project including right of way Forest clearance and completion clearance from the all relevant statutory bodies for plumbing, sewerage, sanitary and PHE work, fire department for fire protection, fire fighting, fire fighting installation, electrical & HVAC works etc. and for all other services as included in the scope of contract etc. from the concerned department as required within the stipulated time frame. Liaison work on behalf of EPI / owner with the local bodies will also have to be done by the contractor. Nothing extra shall be payable to contractor on this account.

The contractor shall erect MS sheet fencing along the periphery of the site as per drawing of EPI with proper colour as directed by the Engineer-in-Charge and name / logo, safety slogan etc. written at appropriate places within ten days of issue of LOI. The contractor shall be responsible for daily cleaning of this fencing with water etc. to keep the fencing in neat & clean condition at all times. The damaged fencing should be replaced immediately by the contractor. The cost of MS sheet fencing, its maintenance etc. is deemed to be included in the quoted rates. The contractor shall engage sufficient number of security guards at his cost to ensure controlled entry to site and not to allow unauthorized personnel at site.

The tenderers shall make necessary safety arrangements at site including as mentioned in GCC and indemnify EPI and client against any consequence of accident at site.

EPI is awarding this Contract on behalf of NIT Raipur. In case M/s. EPI cease to be an agency for the project, the right and responsibility etc. of EPI in the Contract shall get transferred to National Institute of Technology Raipur or their nominated agency shall operate this Contract.
Thermo Mechanically Treated bars conforming to IS:1786, Fe 500 grade as required, from approved manufacturers viz SAIL/RINL/TISCO shall be used. In case of non availability of steel of these makes, TMT bars of other manufacturers as per IS 1786, Fe 500 grade as required, may be allowed to be used with the prior approval of Engineer-in-charge. In case TMT bars from manufacturer other than SAIL/RINL/TISCO is allowed to be used, a deduction of Rs. 2 (two) per Kg shall be made from the bills of the contractor. The other provisions of clause 45.2 of G.C.C. remain unchanged.

Ordinary Portland Cement (OPC) as per IS:8112 shall be used on the works. The Portland Pozzolona Cement (PPC) as per IS:1489-1991 may be used. However discount @ Rs. 30/bag shall be applicable. The other provisions of clause 45.1 of GCC remain unchanged.

Flooring works shall be executed as per the approved drawings / design & specifications. The pattern shown in the tender drawings, if any, can be modified as per the site requirements by Engineer-in-Charge within the proportions of the flooring materials to be provided and nothing extra whatsoever shall be payable over and above the rate quoted.

The water proofing for the terraces, underground tanks / toilet floor etc. shall be got executed only through the authorized applicators of the manufacturers and the guarantee for the same shall be in the name of EPI / owner for a period of ten years after the expiry of defect period liability on the prescribed format given in the GCC.

Plumbing & Sanitary work to be executed by licensed plumber and the plumbing scheme / drawing to be got approved from statutory authorities through the appointed licensed plumber without any extra cost. The agency shall have to submit the valid license of plumbers before starting the work.

SCI pipes for sanitary and GI pipes for water supply if fixed in RCC members like columns, beams etc. shall be fixed with scrub plugs.

The contractor shall be responsible for all protection of sanitary, water supply, electrical fittings & fixture against pilferage, breakage during period of installation until the completion of work and handed over to EPI.

Welding wherever required in the work like in grill, railing etc shall be done in full length of the contact area and grinding shall be done properly to get an even surface. SFRC covers for manholes etc, if provided, shall have name of owner / client and year of manufacturer as engraved.

The electrical works shall be executed only through licensed electrician and the agency shall have to submit the valid license of electricians before starting the work.

It will be the sole responsibility of contractor to obtain all statutory approvals/compliance required for construction / implementation of the project including right of way Forest clearance and completion clearance from the all relevant statutory bodies for plumbing, sewerage, sanitary and PHE work, fire department for fire protection, fire fighting, fire fighting installation, electrical & HVAC works etc. and for all other services as included in the scope of contract etc. from the concerned department as required within the stipulated time frame. Liaison work on behalf of EPI / owner with the local bodies will also have to be done by the contractor. Nothing extra shall be payable to contractor on this account.

The contractor shall erect MS sheet fencing along the periphery of the site as per drawing of EPI with proper colour as directed by the Engineer-in-Charge and name / logo, safety slogan etc. written at appropriate places within ten days of issue of LOI. The contractor shall be responsible for daily cleaning of this fencing with water etc. to keep the fencing in neat & clean condition at all times. The damaged fencing should be replaced immediately by the contractor. The cost of MS sheet fencing, its maintenance etc. is deemed to be included in the quoted rates. The contractor shall
engage sufficient number of security guards at his cost to ensure controlled entry to site and not to allow unauthorized personnel at site.

The tenderers shall make necessary safety arrangements at site including as mentioned in GCC and indemnify EPI against any consequence of accident at site.

EPI is awarding this Contract on behalf of NIT Raipur. In case M/s. EPI cease to be an agency for the project, the right and responsibility etc. of EPI in the Contract shall get transferred to National Institute of Technology Raipur or their nominated agency shall operate this Contract.

CONCRETING

The concreting shall be machine mixed with equipment as approved by Engineer-in-Charge. The contractor may opt to use Ready Mixed Concrete of repute after obtaining prior written approval from the Engineer-in-Charge.

The contractor shall provide construction joints only at the specified positions and as per BIS codes and the concreting for columns shall be floor to beam height in one lifts, and in case the concreting is to be done in two lifts the minimum height of first lift of columns shall be 2.4 meters.

The stone aggregate and sand of required zone shall be from the quarries as approved by Engineer-in-Charge. The samples of the materials shall be got approved along with the mix design.

Plasticizers of the required specification and make shall only be permitted as per approved mix design. The cost of plasticizers / additives is deemed to be included in the rates of concrete & nothing extra shall be payable on this account.

Ready mix concrete brought from outside sources or produced at site shall have minimum quantity of cement as specified in BIS specifications and as per approved design mix.

The Contractor shall provide all cut outs in RCC work in Co-ordination with other agencies and as per instructions of Engineer-in-Charge and nothing extra shall be payable. In case the same is not provided by the Contractor the same shall be got done at their risk & cost.

BRICK WORK

The bricks should be minimum class designation 75 conforming to IS 1077: 1992.

The brick work for all external walls should be done from outside. The rigid scaffolding of MS pipe and the supports shall be sound and strong, with horizontal MS pipes. The contractor shall be responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come upon it. Due care shall be taken by the contractor to ensure the execution of brick masonry walls in plumbs from outside. The Contractor shall arrange sufficient quantity of scaffolding for this purpose so as to complete the project within stipulated time.

All brick works shall be with the bricks of specified grade & source as approved by Engineer-in-Charge and no efflorescence due to salt peter shall be allowed. The contractor shall have to give proper treatment in any such case and nothing extra shall be payable and the rates quoted shall be all inclusive.
CENTERING & SHUTTERING

Centering & shuttering works for columns shall be made out of laminated shuttering plywood of minimum 12 mm thickness as per BIS, with angle iron frame. The centering, shuttering and staging system shall be got approved from the Engineer-in-Charge.

The shuttering used for beam shall be of laminated shuttering plywood as per BIS. The support system shall be integrated with the slab. For slabs in case plywood shutters is not used, welded steel plates will be allowed to be placed in uniform pattern. The thickness of plates and pattern to be got approved from the Engineer-in-Charge.

All joints in the shuttering i.e. plate to plate etc. shall have to be sealed with adhesive / foam, to ensure water tightness of the form work.

All shuttering work for Architect features shall be with fiber glass moulds and the rate quoted by the contractor in the schedule of rate shall be inclusive of same.

All shuttering joints in the slab, beams and lintels etc. shall be treated with tape of required width to make it water tight and the rates quoted for centering shuttering work shall be all inclusive and nothing extra whatsoever shall be payable over and above the quoted price.

The shuttering shall be tightened by using runners, tie rods and bracings. No Ghughoo / welded system shall be allowed. Support shall be adequate and proper.
FOR NON DSR Items

ALUMINIUM COMPOSITE PANEL WORK

11 Scope of Work

The work shall include providing 4mm thick Aluminium composite panel (0.5mm PVDF coated Aluminium skin on top & bottom plus 3mm thick polyethylene core) cladding of approved shade of required profile to Brick/ Concrete wall/ MS frame, canopy, parapet, coping, bends, pergola or any type architectural feature wherever required as shown in drawing, either segmental curved or straight in plan wherever specified with extruded aluminium sections, angle cleats, weather sealants, stainless steel screws, rivets, fasteners, Galvanised brackets (Galvanising to be done conforming to IS:4759-1 996 upto 610 gms. per sqm, 80-90 micron thickness), drilling and fixing the cladding to either masonry/ reinforced cement concrete/ MS structural frame work including making grooves of required size applying non staining weather sealant, backer rod, all necessary accessories etc. complete in all respects as per details, all as shown on the “Good for Construction” drawings or as specified or as directed by the Engineer-in-Charge and also as per the specifications, standards and codes as given herein under, complete in all respects to give the quality of finished work as desired by and to the entire satisfaction of the Engineer.

Note: The contractor shall submit fabrication drawings for approval of the Project Manager. (MS frame work for this work shall be measured and paid separately) The fabrication work shall start only after approval of the fabrication drawings. Any change required in the fabrication drawings shall be carried out at no extra cost.

The work shall be carried out by an experienced specialist Sub-Contractor who shall be appointed only after prior approval of the Engineer-in-Charge.

12 Materials

12.1 Aluminium

Aluminium shall conform to IS: 733, designation HE9-WP or HV9-WP alloy. Aluminium shall be of superior quality extruded sections made by Indian Aluminium Co. or Hindustan Aluminium or Jindal or an approved equivalent manufacturer, of a gauge suitable for the work, anodised or powder coated to desired shade/colour, as specified.

13 Handling and Storing Materials

13.1 Aluminium Work Fabrication and Components

All self-finished work shall be wrapped, taped or protected in an approved manner with non-absorbent coverings.

These shall be delivered to a programme to reduce or eliminate site storage.
Coverings shall be removed just sufficient to enable jointing and assembling and shall be replaced thereafter.

14 Workmanship

14.1 General

ACP Work shall be undertaken in accordance with sound engineering practice and as follows:

(a) ACP work shall be done as much as possible in the properly equipped workshop.

(b) Site work shall be restricted to fixing and other operations that cannot be undertaken in the workshop.

(c) Burrs, sharp edges and angles, coarse file marks, excess weld metal and similar imperfections shall be removed.

(d) Work shall not be permitted to corrode or otherwise deteriorate between fabrication and final treatment/fixing.

(e) ACP work shall be fixed in the Works in a manner that prevents corrosion due to contact with incompatible metals and other materials.

1.5 Sealants

Structural grade and weathering grade silicon sealant "Dow Corning" or "GE Silicon" or equivalent of approved colour and make shall be used as specified, as per the design requirement.

1.6 Isolation

Where aluminium comes into contact with masonry, brick work, plaster or dissimilar metals, it shall be coated with an insulating coat of lacquer, paint or tape to ensure that electro chemical corrosion is avoided. The Contractor shall submit his proposal for the approval by the Engineer-in-Charge before related materials are ordered.

Any disfigurement, discoloration or imperfection whatsoever due to any reason shall not be accepted and the Contractor shall either remedy the same or redo the work at no extra cost. The decision of the Engineer-in-Charge as to whether any work either in whole or in part is acceptable or not shall be final and binding on the Contractor.

1.7 Cleaning and Completion

This area of aluminium work shall be retained as a sample of the finished work, wherein the effects of weather, movement and other conditions shall be reviewed over a period not exceeding one month and the effects if found leading to unsatisfactory work, shall be remedied by the Contractor, until a satisfactory sample of finished work is accepted. All other work shall thereafter be completed to the same standard and quality as approved.
Scaffolding
Scaffolding shall be erected for all painting work. Ladders shall only be used in exceptional circumstances where permitted by the Engineer-in-Charge. Care shall be taken to avoid any damage to floors and walls.

1.8 Measurements
Aluminium composite work shall be paid by area basis(sqm.) 19 Rate

The rate shall include the cost of materials, labour involved in all the operations described above. The cost for providing sealants shall not be paid separately.

2 PAINTING AND POLISHING

2.1 Scope of Work
The finishing works shall include providing plastering, painting, sealing coats and decoration to internal and external surfaces of the building, all as shown in the drawings and as specified or as directed by the Engineer-in-Charge.

2.2 Applicable Specifications
All work shall generally be carried out as per CPWD Specifications 96 Part 13 - Finishing except as modified hereunder:

23 Materials

a) General

i. All materials shall be obtained only from approved shade, texture, finish of approved manufacturers of building paints; ICI, Berger, Jenson and Nicholson, Nerolac, Asian Paints and Goodlass Nerolac.

ii. Paint containers shall not exceed 5 litres capacity.

iii. All paints and other materials shall be delivered in sealed containers bearing information as per statutory requirements. The Contractor shall in addition furnish a letter with each consignment from the manufacturer giving the following data:

(a) Manufacturer's name or recognised trade Mark.

(b) The appropriate title and specification number.

(c) Whether priming, undercoat or finishing coat.

(d) Lead free, if required.

(e) Whether for interior or exterior use.

(f) The colour reference.

(g) The method of application.

(h) The batch number and date of manufacture.

iv) For containers of materials other than paints the above data shall be provided to the extent that it is appropriate.

v) No paint shall be used after a period of 6 months from the date of manufacture.
or the expiry period given by the manufacturer. If this period is exceeded, the paint shall be removed forthwith from the site by the Contractor and nothing extra shall be paid on this account.

vi) Only such number of containers as are required for immediate use shall be opened.

vii) All brushes, paint rollers, spraying equipment, kettles etc., used in carrying out the work shall be clean and dry. They shall be thoroughly re-cleaned before being used for a different type or class of material.

viii) Cutting in shall be neatly and accurately performed.

ix) No painting shall be done during inclement weather conditions, in dusty atmosphere or when it is raining or when the temperature is less than 10°C or when the humidity is high.

x) Sequence shall be properly planned such that finished work is not spoiled by subsequent preparatory works.

xi) Flood coat shall be provided for preservatives.

xii) Successive coats of undercoat shall have different tints.

xiii) Paint shall be applied only to properly prepared, clean, sound and dry surfaces.

xiv) Each coat of paint shall be thoroughly dry before the next coat is applied and the surfaces of primers and undercoats shall be lightly rubbed down and dusted off.

xv) Coats of paint shall be applied at proper intervals to secure maximum adhesion. Where two hard gloss finishing coats are scheduled, the second coat shall be applied within 48 hours.

xvi) The method of application by brush, roller or spray shall be decided by the Engineer-in-Charge.

b) Paints from one manufacturer

Materials for the priming coat, putty undercoats and finishing coats of paint for any one system shall be obtained from the same manufacturer.

c) Paints, Primers, Distempers and Textured

i) Synthetic enamel shall be approved make and shade.

ii) Priming paints for steel work shall be red lead priming paint, conforming to IS:102 or red oxide zinc chrome priming paint conforming to IS:2074.

iii) Distempering with oil bound washable distemper of approved brand and manufacture to give an even shade New work (two or more coats) over and including priming coat with cement primer.

iv) Plaster of Paris Putty of 2 mm thickness over plastered surface to prepare the surface even and smooth complete

d) Filler with Plaster of Paris

Interior plaster shall be filled, made even and smooth with Plaster of Paris, anhydrous gypsum, conforming to IS:2547.

e) French spirit polish

French polish shall conform to IS:348. It shall be prepared by dissolving pure shellac (conforming to IS:347) in methylated spirits. Also refer clause 13.50.1 of CPWD Specifications 96.

f) Colours

Paints for the work shall match the colours specified/ approved by the Engineer-in-Charge. Blending of paints or tinting shall not be permitted.
The Contractor shall assume that multi-colour schemes of decoration will be adopted in which changes of colour will occur only at internal or external angles of wall and ceilings. Nothing extra shall be payable for use of more than one colour of paint in one area/surface.

**g) Samples**

Samples for testing may be taken from the sealed containers, spray gun containers or from the workmen's kettles on the works. In addition the Engineer at his discretion may require sealed containers to be set aside for subsequent testing.

Any work found to be done with unsatisfactory materials or not done in an acceptable manner shall be rejected. Such works shall be made good by the Contractor at no extra cost, to the entire satisfaction of the Engineer.

If any paint that is delivered to site is found to be defective or unsatisfactory its use shall be suspended and the manufacturer and the Engineer notified immediately.

**h) Storage and Handling**

Inflammable materials like thinners etc. shall be stored separately. An adequate number of fire extinguishers of suitable type shall be kept in ready to use condition in the store.

**i) Surface preparation**

**Iron and steelwork**

(a) Bare iron and steelwork including sheeting and pipes shall be thoroughly prepared by removing all dirt, rust and loose mill scale to the entire satisfaction of the Engineer-in-Charge.

(b) Preparation shall include the use of chipping hammers, scrapers, power tools with mechanical wire brushes and Carborundum grinding discs. The use of mechanical chisels and other impact tools may exceptionally be ordered if in the opinion of the Engineer-in-Charge their use is necessary.

(c) All rivets, welds, angles, joints and openings shall be properly cleaned.

(d) All tools shall be operated in such a manner that no sharp ridges or burrs are left and no cuts made in the steel.

(e) Dust and other loose material shall be removed after cleaning. Oil and grease shall be removed with white spirit.

(f) The priming coat shall be applied before any contamination or rusting occurs.

(g) All surfaces shall be washed with mineral spirits to remove any dirt or grease before applying paint. Where rust or scale is present, it shall be wire brushed and cleaned with emery paper.

(h) Steelwork shall be given one shop coat of primer before delivery to site. In case this gets damaged in transit the damaged areas shall be cleaned off, wire brushed, and spot primed immediately after delivery. A second coat of primer shall be applied at site after erection.

**j) Precautions**

(a) Old brushes, if they are to be used with emulsion paints, should be completely dried of turpentine or oil paints by washing in warm soap water.
Brushes should be quickly washed in water immediately after use and kept immersed in water in break periods to prevent the paint from hardening on the brush.

(b) In the preparation of surfaces for plastic emulsion painting, no oil base putties shall be used in filling cracks, holes, etc.

(c) Splashes on floors etc. shall be cleaned out without delay and definitely everyday, as they will be difficult to remove after hardening.

(d) Washing of surfaces treated with emulsion paints shall not be done within 3 to 4 weeks of application.

k) Preparation of paint
   i) Mixing:
      (a) All liquid paints shall be thoroughly stirred using mechanical stirrers with a minimum speed of 650rpm to a uniform consistency when containers are opened and before being transferred to paint kettles.
      (b) Paste paints shall be beaten up thoroughly as directed by the manufacturer prior to thinning.

ii) Thinning
      (a) Thinning for oil paints shall not normally be permitted. In exceptional circumstances, the Engineer-in-Charge may permit thinning with up to 5% of white spirit by volume or a thinner as recommended by the paint manufacturer to maintain the paint in a working consistency.
      (b) PVA emulsion paints shall be thinned with potable water for the first coat only depending on the porosity of the surface to be painted. In any case, the quantity of water shall not exceed 50% by volume. Subsequent coats shall not be thinned.

iii) Straining
      Any paint showing bittiness in application shall be strained through fine gauze.
      (a) Addition of other materials
          With the exception of the thinners given in (b) above, no other materials shall be added to the paints.
      (b) Mixing of different paints together
          Mixing of different paints together shall not be permitted.

l) Protection
   (a) All ironmongery, finger plates, power points, lighting fixtures, grills, diffusers, fixtures of other services, machinery, plant and equipment, flooring, glazing etc. shall be protected using PVC sheets weighing 1000g/sqm and masking tapes. Flooring, wherever laid, even though it may not have been polished shall be protected likewise.
   (b) Masking tapes shall be used.
   (c) Covering for protection shall be left in position upto completion, to the satisfaction of the Engineer.

m) Method of Application
i) Brush painting

a. Paint shall be applied so that the finished surface is free from brush marks.
b. All areas or parts shall be laid off correctly.

c. All paint edges shall be good, sharp and true to line.

ii) Primers

d. Priming coats shall be applied by brush to give a coat of adequate thickness with no misses and to satisfy the porosity of the surface. The priming shall be well worked into the surface, joints, angles and other places where moisture is likely to collect.

e. Steelwork surfaces shall be primed immediately after cleaning. Priming coats applied off-site that have suffered from exposure on the site or in transit shall be touched up or re-primed as necessary before undercoating.

f. Where there is a doubt as to the adequacy of the primer to fully satisfy the porosity of the surface, the Engineer-in-Charge shall be informed and his directions taken.

iii) Undercoats

e. Undercoats shall be applied evenly over the whole surface to give a solid film, care being taken to avoid uneven thickness of paint at edges and angles.

iv) Finishing coats

g. Finishing coats shall be applied evenly over the whole surface to give a solid film free from brush marks, sags, runs, peeling or other defects.

h. Finished work shall be uniform, of approved colour, smooth and free from runs, sags, defective brushing and clogging. Edges of paint adjoining other materials or colours shall be sharp and clean, to correct lines and levels without overlapping.

v) Protection

All finished work shall be protected upto completion and handing over.

n) Cleaning

All areas shall be left in a neat, clean and tidy condition after the painting work is over.

o) Scaffolding

Scaffolding shall be erected for all painting work. Ladders shall only be used in exceptional circumstances where permitted by the Engineer-in-Charge. Care shall be taken to avoid any damage to floors and walls.

p) Measurements

i) Painting shall be measured as per clause 13.25.6, 13.33.6 of CPWD Specifications 96.

ii) Painting in small widths and girths, cornices etc., shall also be measured in general painting. Painting for all floor levels and all heights shall be measured under the same item.

q) Rate

The rate shall include the cost of materials, labour involved in all the operations.
described above. The cost for primer work shall be paid separately.

24 **Acrylic Emulsion Paint**

24.1 **Materials**

Emulsion paint of approved brand and manufacture shall be used. The primer where used as on new work shall be primer as described in the item. These shall be of the same manufacture as emulsion paint. The acrylic emulsion paint be diluted with prescribed thinner in a manner recommended by the manufacturer. Only sufficient quantity of paint required for day's work shall be prepared.

The paint and primer shall be brought by the contractor in sealed tins in sufficient quantities at a time to suffice for a fortnight's work, and the same shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empty tins shall not be removed from the site of work, till this item of work has been completed and passed by the Engineer-in-Charge.

24.2 **Preparation of the Surface**

For new work the surface shall be thoroughly cleaned of dust. The surface shall be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made of plaster of paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

In the case of old work, all loose pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease dirt etc.

The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the paint shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

24.3 **Application**

**Priming Coat**

The priming coat shall be with primer, as required in the description of the item. The application of the primer shall be as described in 13.30.2.2.

Acrylic emulsion paint is not recommended to be applied, within six months of the completion of wall plaster. However, newly plastered surfaces if required to be painted before a period of six months shall be given a coat of alkali resistant priming paint conforming to IS : 109 and allowed to dry for at least 48 hours before distempering is commenced.

For old work no primer coat is necessary.

24.4 **Acrylic emulsion Coat**

For new work, after the primer coat has dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the paint, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing. One coat of paint properly diluted with thinner (or other liquid as stipulated by the manufacturer) shall be applied with brushes in horizontal strokes followed immediately by vertical ones which together constitute one coat.
The subsequent coats shall be applied in the same way. Two or more coats of
distemper as are found necessary shall be applied over the primer coat to obtain an
even shade.

A time interval of at least 24 hours shall be allowed between successive coats to
permit proper drying of the preceding coat.

For old work the paint shall be applied over the prepared surface in the same manner
as in new work. One or more coats of paint as are found necessary shall be applied
to obtain an even and uniform shade.

15 cm double bristled painting brushes shall be used. After each days work, brushes
shall be thoroughly washed in hot water with soap solution and hung down to dry.
Old brushes which are dirty and caked with paint shall not be used on the work.

The specifications in respect of scaffolding, protective measures and measurements
shall be as described under 13.25.

245 Rate

The rate shall include the cost of all labour and materials involved in all the above
operations (including priming coat) described above.

3 Stainless Steel Work

3.1 Scope of Work
The work shall include providing and fixing of handrail and other things
necessary to complete the work as specified and shown in the drawings complete in
all respect to give the quality of finished work as desired by and to the entire
satisfaction of the Engineer.

3.2 Approvals
The sample of the material shall be submitted to the Engineer for approval before
fabrication of the work.

3.3 Material
Handrail, railing, Q partition and any other stainless steel work, shall be made of
welded cold drawn solution annealed and pickled; stainless steel tubes grade 304 as
per ASTM-A 249-95a. Outer diameter of the tube will be as specified and shown in
the drawing. Thickness of wall will be 1.65mm. Finish of the tubes will be
matt/buff as specified.
Material shall confirm to mechanical test of tensile strength, yield strength, elongation, hardness, flanges, flattening, heat analysis, reverse bending etc.

Chemical composition in % will be as follows:

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<th>Si</th>
<th>Mn</th>
<th>P</th>
<th>S</th>
<th>Ni</th>
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3.4 Installation
G.I. sleeve of 40mm dia will be grouted in the steps / landing of staircases or railing as specified and shown in the drawing. Stainless steel baluster will be bolted to the sleeve and lead jointed. Wherever required, ends of the handrail tube to be capped. Assembly is to be true in line and upright as per requirement.

Work shall include providing and fixing stainless steel works as specified and required as per relevant drawing. The whole work shall be finished absolutely clean, true in line and lengths and in workman like manner. Approval for specific items shall be obtained in advance from the Engineer.

Installation will be done to suit the site conditions and as shown in the drawings. All necessary screws, nuts, bolts, welding, threading, chasing, cutting, supporting and making them good shall be done as required.

3.5 Measurements
Metal Work shall be measured in kgs unless indicated otherwise in the Schedule of Quantities. The actual dimensions including any embedded portion shall be taken and the weight calculated in kgs to the nearest second place of decimal using the standard coefficients for converting the area/length of the member to weight.

All wastage and variations are deemed inclusive in the item rate quoted by the Contractor and nothing extra is admissible on this account. Payment will be made only for the measured quantity of metal work incorporated in the work. Lugs of the inserts shall also be measured under the item of Inserts.

3.6 Rate
The rate quoted shall include the cost of materials and labour involved in all the operations described above.
4 POP Work

POP punning

Providing and applying plaster of Paris (super fine quality) punning with minimum thickness of 6mm and finish the surface smooth in line and level including scraping and hacking the existing finished surfaces, scaffolding etc. complete as per drawing.

POP cornice

Providing and making decorative plaster of Paris (super fine quality) cornice (cast in situ), moulding, flutings etc in the required profile and smooth in line and level to the entire satisfaction of Project Manager complete as per design and drawing.
# LIST OF APPROVED MAKES / BRANDS FOR CIVIL WORKS

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CEMENT (ORDINARY PORTLAND / PORTLAND POZZOLANA)</td>
<td>ACC / GRASIM / AMBUJA / BIRLA / ULTRA TECH. / LAFARGE</td>
</tr>
<tr>
<td>2</td>
<td>TMT / TOR STEEL</td>
<td>SAIL / TISCO / RINL</td>
</tr>
<tr>
<td>3</td>
<td>STRUCTURAL STEEL</td>
<td>SAIL / TISCO / RINL / VIZAG</td>
</tr>
<tr>
<td>4</td>
<td>PRECAST CC TILES</td>
<td>HINDUSTAN TILES / NIMCO PREFAB / NITCO / KONKRETE</td>
</tr>
<tr>
<td>5</td>
<td>CERAMIC TILES</td>
<td>NITCO / ORIENT / SOMANY / KAJARIA / ANGEL / JOHNSON / NAVEEN / EVRO</td>
</tr>
<tr>
<td>6</td>
<td>VITRIFIED TILES</td>
<td>NITCO / ORIENT / SOMANY / KAJARIA / JOHANSOON / NAVEEN / EURO</td>
</tr>
<tr>
<td>7</td>
<td>RCC PIPES</td>
<td>AKSHAY / KK / HINDUSTAN / PRAGATI</td>
</tr>
<tr>
<td>8</td>
<td>MANHOLE COVERS (SFRC)</td>
<td>KK / HINDUSTAN</td>
</tr>
<tr>
<td>9</td>
<td>KERB STONE (PRECAST CC)</td>
<td>NIMCO PREFAB / SUBHASH FERRO CONCRETE / HINDUSTAN TILES</td>
</tr>
<tr>
<td>10</td>
<td>CHAINLINK WIREMESH</td>
<td>MITTAL / SHAKTI – WELD MESH</td>
</tr>
<tr>
<td>11</td>
<td>PVC PIPES / FITTINGS</td>
<td>SUPREME / PRAKASH / ORI PLAST / FINOLEX / PRINCE</td>
</tr>
<tr>
<td>12</td>
<td>FLOAT GLASS AND MIRROR</td>
<td>MODIGUARD / ASAHI / SAINT GOBAIN / GUARDIAN</td>
</tr>
<tr>
<td>13</td>
<td>WATER-PROOFING COMPOUND</td>
<td>CICO / CHEMISTIK / FOSROC/MBT / DEGUSSA / CONCARE</td>
</tr>
<tr>
<td>14</td>
<td>CEMENT / CONCRETE ADHESIVES</td>
<td>CICO / CHEMISTIK / FOSROC/MBT / DEGUSSA / FOSROC / SIKA / ARALDOTE</td>
</tr>
<tr>
<td>15</td>
<td>DISTEMPER-DRY/ OIL BOUND/PAINT</td>
<td>ICI / ASIAN / BERGER / NEROLAC</td>
</tr>
<tr>
<td>16</td>
<td>ALUMINIUM SECTIONS FOR DOORS / WINDOWS</td>
<td>HINDALCO / JINDAL / INDAL / BANCO</td>
</tr>
<tr>
<td>17</td>
<td>FLOOR HARDNER</td>
<td>CHEMISTIK / FOSROC / SIKA</td>
</tr>
<tr>
<td>17</td>
<td>CEMENT PAINT</td>
<td>SNOWCEM / ICI/NEROLAC / BERGER / ASIAN</td>
</tr>
</tbody>
</table>
18. PRIMER FOR STEEL : ICI / ASIAN / BERGER / NEROLAC
19. SYNTHETIC ENAMEL PAINT : ICI / ASIAN / BERGER / NEROLAC
20. PLASTIC EMULSION : ICI / ASIAN / BERGER / NEROLAC
21. WATERPROOF PLY & BOARD : DURO / GREENPLY / CENTURY / KITPLY
22. FLUSH DOOR SHUTTER : KITPLY / SWASTIK / DURO / GURJAN / UNNPLY / SITAPUR
23. ROLLING SHUTTER : DIANA / RAYMUS / RAMA
25. BITUMINOUS SEALENT : STP / LLOYD
26. PVC DOOR SHUTTER : RAJSHRI / SINTEX
27. PVC TANK : SINTEX / ELECTROPLAST / STAR / LOTUS
28. WC/WASH BASIN : CERA / PARRYWARE / HINDUSTAN
29. C.P. FITTINGS : PARKO / HINDUSTAN / SEIKO / ORIENT / JAQUAR
30. S.C.I. PIPES : RIF / NICCO / BENGAL IRON / IISCO
32. WHITE CEMENT : BIRLA WHITE / JK WHITE
33. OXIDIZED ALUMINIUM FITTINGS : EBCO / DOOR LINE
34. GYPSUM FALSE CEILING : INDIA GYPSUM / BORAL
35. FUSION BONDED EPOXY COATINGS : TO BE APPROVED BY ENGINEER IN-CHARGE
36. (FBEC)
37. IRONMONGERY : AS PER ARCHITECTURAL DRAWINGS / BOQ & SUBJECT TO PRIOR APPROVAL FROM ENGINEER IN-CHARGE
38. HYDRAULIC DOOR CLOSER : HARDWYN / TRIUM / EGL / EVERITE
39. FLOOR SPRING : HARDWYN / GARNISH / TRIUM / OMEGA / EVERITE
41. UNPLASTICISED PVC : ORIPLAST / ONPLAST / SUPREME
42. ANCHOR FASTENERS : HILTI / FISCHER
45. WATER HEATER (GEYSER) : TO BE APPROVED BY ENGINEER IN-CHARGE
46. WATER PURIFIER : TO BE APPROVED BY ENGINEER IN-CHARGE
47. STEAM – AERATED CONCRETE BLOCK. : SIPOREX / BILTACH OR ITS EQUIVALENT TO BE APPROVED BY ENGINEER IN-CHARGE
48. POLY CARBONATE SHEETS : LEXAN OR ITS EQUIVALENT TO BE APPROVED BY ENGINEER IN-CHARGE
51. PE-AL-PE PIPE : KITEC OR EQUIVALENT TO BE APPROVED BY ENGINEER-IN-CHARGE.
# LIST OF APPROVED MAKES / BRANDS
## SANITARY AND PLUMBING WORKS

<table>
<thead>
<tr>
<th>SL. NO.</th>
<th>MATERIALS</th>
<th>MAKES / BRANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vitreous china and fire clay</td>
<td>Hindustan/Neycer/ Parryware/Cera</td>
</tr>
<tr>
<td>2.</td>
<td>Plastic w.c. seats</td>
<td>Commander/ Diplomat/Admiral</td>
</tr>
<tr>
<td>3.</td>
<td>Stainless steel sinks</td>
<td>Prestige/A.M.C./Jayna/Kingston/ Neelkanth</td>
</tr>
<tr>
<td>4.</td>
<td>C.P. fittings &amp; accessories &amp; flush valves</td>
<td>Gem/Parko/Jaquar/ Kingston</td>
</tr>
<tr>
<td>5.</td>
<td>C.P. Waste, Spreaders, urinal</td>
<td>Orient/Parko/Jaquar</td>
</tr>
<tr>
<td>6.</td>
<td>Liquid soap dispenser</td>
<td>Chilly/Euronics</td>
</tr>
<tr>
<td>7.</td>
<td>Sensor operated auto flushing system urinals</td>
<td>AOS systems / Angash / Euronics</td>
</tr>
<tr>
<td>8.</td>
<td>Water heater</td>
<td>Racold/Venus/Kingston</td>
</tr>
<tr>
<td>9.</td>
<td>Soil, waste &amp; rain water pipes &amp; fittings</td>
<td>Neco/B.C./Rif/Hepco</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrosteel/ Kesoram/iisco</td>
</tr>
<tr>
<td></td>
<td>a) Cast iron pipes (is:3989)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Centrifugally cast spun cast iron pipes (is:1536)</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>RCC pipes</td>
<td>Indian hume pipe/ Pragati</td>
</tr>
<tr>
<td>11.</td>
<td>G.I. Pipes</td>
<td>Tata/Jindal hissar / Prakash surya</td>
</tr>
<tr>
<td>12.</td>
<td>G.I. fittings malleable cast iron</td>
<td>R/KS / Unik</td>
</tr>
<tr>
<td>13.</td>
<td>Gun metal valves (fullway, check and globe valves)</td>
<td>Zoloto / Leader / Sant</td>
</tr>
<tr>
<td></td>
<td>Product</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>14.</td>
<td>C.I Valves (fullway, check and globe valves)</td>
<td>Kirloskar / Sant / Castle</td>
</tr>
<tr>
<td>15.</td>
<td>Water meters</td>
<td>Capstan/Kranti/Anand</td>
</tr>
<tr>
<td>16.</td>
<td>Ball cocks</td>
<td>GPA/Sant/L&amp;K</td>
</tr>
<tr>
<td>17.</td>
<td>Stoneware pipes &amp; gully traps</td>
<td>Perfect/Burn/RK</td>
</tr>
<tr>
<td>18.</td>
<td>C.I. manholes covers and frames</td>
<td>Neco / R.I.F / B.C</td>
</tr>
<tr>
<td>19.</td>
<td>Horizontal centrifugal / monoblock pumps</td>
<td>Kirloskar/ Hbd-bombay</td>
</tr>
<tr>
<td>20.</td>
<td>Electric motors</td>
<td>Kirloskar/GEC/Siemens</td>
</tr>
<tr>
<td>21.</td>
<td>Electrical switchgear &amp; starters</td>
<td>Siemens/L&amp;T/English</td>
</tr>
<tr>
<td>22.</td>
<td>Electrical panel</td>
<td>Electric / GE</td>
</tr>
<tr>
<td>23.</td>
<td>Cables</td>
<td>Sprint/Adelco</td>
</tr>
<tr>
<td>24.</td>
<td>Liquid level controllers</td>
<td>National/Grandlay/Rajnigandha/Ekta</td>
</tr>
<tr>
<td>25.</td>
<td>Filtration plant/</td>
<td>Ion exchange / Thermax / Softening plant</td>
</tr>
<tr>
<td>26.</td>
<td>Chlorine dosing system</td>
<td>Toshcon / Chloromax</td>
</tr>
<tr>
<td>27.</td>
<td>Sfrc manhole covers</td>
<td>KK / S k precast concrete</td>
</tr>
<tr>
<td>28.</td>
<td>UPVC pipes/ fittings</td>
<td>Supreme/ Prince / Finolex</td>
</tr>
<tr>
<td>29.</td>
<td>Mirror</td>
<td>Atul / Modi float/Golden fish</td>
</tr>
</tbody>
</table>
# LIST OF APPROVED MAKES / BRANDS OF ELECTRICAL ITEMS

<table>
<thead>
<tr>
<th>S.No</th>
<th>Item</th>
<th>Makes / Brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Steel Conduit</td>
<td>BEC / AKG / PRECISION / ATUL</td>
</tr>
<tr>
<td>2</td>
<td>PVC Conduit</td>
<td>BEC / AKG / PRECISION / ATUL</td>
</tr>
<tr>
<td>3</td>
<td>PVC Insulated CU. Conductor FRLS Wires/Cables</td>
<td>Skytone / RR Kabel / NICCO / L&amp;T / Havells / National / Ecko / KET / Findex / Delton</td>
</tr>
<tr>
<td>4</td>
<td>Modular Type Switches and Socket Outlet - 6/16 A</td>
<td>Clipsal / Legrand / Anchor / Crabtree (Havell's) / Wipro / MK.</td>
</tr>
<tr>
<td>5</td>
<td>Step Type Electronic Regulators</td>
<td>Clipsal / Legrand / Anchor / WI PRO</td>
</tr>
<tr>
<td>6</td>
<td>Single Phase Industrial Type Socket Outlet</td>
<td>Legrand / Siemens / GE / ABB</td>
</tr>
<tr>
<td>7</td>
<td>LT Panel / M.V. Cubicles Boards</td>
<td>L&amp;T/Siemens/Schneider / Triclite / Milestone / Madhu Electrical/Advance Control</td>
</tr>
<tr>
<td>8</td>
<td>Air Circuit Breaker</td>
<td>Siemens / ABB / Schneider (M&amp;G) / L&amp;T</td>
</tr>
<tr>
<td>9</td>
<td>MCB, MCB DB (Pre-wired type)</td>
<td>ABB / Legrand / Siemens</td>
</tr>
<tr>
<td>10</td>
<td>MCCB</td>
<td>Siemens / ABB / Schneider (M&amp;G) / L&amp;T (DSIN) / SENTRON</td>
</tr>
<tr>
<td>11</td>
<td>Protection Relays</td>
<td>L&amp;T/Areva/ABB/Siemens</td>
</tr>
<tr>
<td>12</td>
<td>Fuse Disconnector Switch/ SFU/Fuse</td>
<td>L&amp;T/Siemens/ABB</td>
</tr>
<tr>
<td>13</td>
<td>Ammeters, Voltmeters, CT's</td>
<td>Enercon / AE / IMP</td>
</tr>
<tr>
<td>14</td>
<td>Thimbles / Lugs</td>
<td>Dowells / Jainsons</td>
</tr>
<tr>
<td>15</td>
<td>Cables Gland</td>
<td>Comet / NMI / Jainsons</td>
</tr>
<tr>
<td>16</td>
<td>M.S. Cable Tray</td>
<td>Stelco / Steelways / Slotco / Pilco / Patny</td>
</tr>
<tr>
<td>17</td>
<td>PVC Insulated PVC Sheathed AL. Conductor 1.1 KV Grade Armoured Cable</td>
<td>Skytone / Universal / Gloster / Asian / Havells / CCI</td>
</tr>
<tr>
<td>18</td>
<td>Rising Mains</td>
<td>Triclite / L&amp;T / Zeta / C &amp; S</td>
</tr>
<tr>
<td>S.No</td>
<td>Item</td>
<td>Makes / Brands</td>
</tr>
<tr>
<td>------</td>
<td>------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>20</td>
<td>Acoustic Enclosure</td>
<td>Jakson / Sudhir / Super Nova / Reliable / Equivalent</td>
</tr>
<tr>
<td>21</td>
<td>Anti Vibration Mountings</td>
<td>Dunlop / Resistoflex</td>
</tr>
<tr>
<td>22</td>
<td>Response Indicator</td>
<td>Minimax / Agni</td>
</tr>
<tr>
<td>23</td>
<td>Exit Signs</td>
<td>Hilite / Legrand</td>
</tr>
<tr>
<td>24</td>
<td>Light Fittings</td>
<td>Philips / Bajaj / Crompton / Wipro</td>
</tr>
<tr>
<td>25</td>
<td>Ceiling fans</td>
<td>Orient / Crompton / Khaitan / Polar / Usha</td>
</tr>
<tr>
<td>26</td>
<td>Exhaust fans</td>
<td>Areva / Crompton / Kaitan / Almonard</td>
</tr>
<tr>
<td>27</td>
<td>Poles</td>
<td>Reputed (As per IS and subject to approval from Engineer – in – Charge)</td>
</tr>
<tr>
<td>28</td>
<td>Motor</td>
<td>Siemens / ABB / BB / Crompton</td>
</tr>
<tr>
<td>29</td>
<td>Data and Voice Networking Cable</td>
<td>AMP / Systimax</td>
</tr>
<tr>
<td>30</td>
<td>Patch Panel</td>
<td>AMP / Systimax</td>
</tr>
<tr>
<td>31</td>
<td>Information Outlets</td>
<td>AMP / Systimax</td>
</tr>
<tr>
<td>32</td>
<td>Patch Cords</td>
<td>AMP / Systimax</td>
</tr>
<tr>
<td>33</td>
<td>Pipes</td>
<td>Jindal Hissar / Tata / BST</td>
</tr>
<tr>
<td>34</td>
<td>Polymeric Corrosion (Protection Tape 4 MM X 500 MM Wide)</td>
<td>Pypkote / Equiv.</td>
</tr>
<tr>
<td>35</td>
<td>Fire Hose</td>
<td>Firechief / Newage / Vijay</td>
</tr>
<tr>
<td>36</td>
<td>Sluice &amp; Non-Return Valves</td>
<td>Kirloskar/Zoloto/Leader/Crescent</td>
</tr>
<tr>
<td>37</td>
<td>Terrace Pumps (Electric and Diesel Driven)</td>
<td>Kirloskar / Beacon / KSB / M&amp;P</td>
</tr>
<tr>
<td>38</td>
<td>Pumping Set</td>
<td>Kirloskar / Beacon / KSB / M&amp;P</td>
</tr>
<tr>
<td>S.No</td>
<td>Item</td>
<td>Makes / Brands</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>39</td>
<td>Butterfly Valves</td>
<td>Audio / Crescent / Fouress</td>
</tr>
<tr>
<td>40</td>
<td>Single Headed Hyderant Valves, Four Way Fire Brigade Inlet</td>
<td>Minimax / New age / Steelage / Tyco</td>
</tr>
<tr>
<td>41</td>
<td>Branch Pipe</td>
<td>New age / Steelage / Minimax</td>
</tr>
<tr>
<td>42</td>
<td>Pressure Gauges</td>
<td>Manometer / H Guru / GIC / AN Instrument</td>
</tr>
<tr>
<td>43</td>
<td>Pressure Switch</td>
<td>Indfoss / Switcher / Vexma Trafag</td>
</tr>
<tr>
<td>44</td>
<td>First aid Hose Reel Drum</td>
<td>Newage / Minimax / Vijay</td>
</tr>
<tr>
<td>45</td>
<td>20MM Dia Rubber Pipe for Hose Reel</td>
<td>Steelage / Dunlop newage</td>
</tr>
<tr>
<td>46</td>
<td>Starters</td>
<td>Group Schneider / L&amp;T / BCH / SIEMENS</td>
</tr>
<tr>
<td>47</td>
<td>Flow Switches</td>
<td>TRAC / Levecon / Switchgear</td>
</tr>
<tr>
<td>48</td>
<td>Fire Extinguishers</td>
<td>Minimax / Excel / Newage / Vijay / Cease fire / Superax / Safex</td>
</tr>
</tbody>
</table>
# LIST OF APPROVED MAKES / BRANDS
## FOR
### FIRE PROTECTION WORKS & LIFT

<table>
<thead>
<tr>
<th>SL. NO.</th>
<th>MATERIALS</th>
<th>MAKES / BRANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Gun metal valves</td>
<td>Leader / Sant / Zoloto.</td>
</tr>
<tr>
<td>4.</td>
<td>Pipe for hose reel</td>
<td>Padmini / Maruti.</td>
</tr>
<tr>
<td>6.</td>
<td>Pressure switch.</td>
<td>Indfoss / Switzer</td>
</tr>
<tr>
<td>12.</td>
<td>Fasteners</td>
<td>Hilti / Fischer.</td>
</tr>
<tr>
<td>14.</td>
<td>Ball Valves</td>
<td>RB ( Italy ) / Bugatti / Zoloto / Cim.</td>
</tr>
<tr>
<td>15.</td>
<td>Butterfly Valve</td>
<td>Audco / C &amp; R / Danfoss / AIP.</td>
</tr>
<tr>
<td>16.</td>
<td>Fire Extinguishers</td>
<td>Minimax / Firequip / Lifeguard.</td>
</tr>
<tr>
<td>17.</td>
<td>RRL Hose</td>
<td>Newage Premier Extra / Padmini Aqua Dura.</td>
</tr>
</tbody>
</table>

**ELECTRICAL**

1. Power Cables.  
   As given in Electrical works

2. Conduit ERW (ISI marked).  
   BEC / AKG.

3. Contactors & Overload Relays.  
   L&T / Siemens / GE Power.

4. Voltmeter/Ammeter.  
   L&T / AE / MP.

5. CT/PT Transformer.  
   AE / Kappa / C & S.

6. S.F. Unit.  
   L&T / Siemens / GE

7. Cable Trays.  
   Slotco / Pilco/ PATNY

8. Indicating Lamps  
   L & T / Siemens / GE Power.

9. Electrical Pump Panels  
   Risha / Automatic Controls.

**FIRE ALARM & P A SYSTEMS**

1. PVC insulated copper cables  
   (armoured or otherwise).  
   As given in Electrical works

2. PVC insulated copper wire.  
   As given in Electrical works

3. Fire Alarm Panel  
   Honeywall( Notcher) BOSCH / Simplex / Tyco

4. Speaker Box  
   GAC.

5. Manual Call Box  
   Bosch / Honeywall (Notifier) Tyco / Simplex

6. Amplifier, LMT & Speaker  
   Philips / Ahuja. / Bosch

7. Conduit ERW (ISI marked).  
   BEC / AKG / ATUL.

8. Detectors  
   Honeywall (notifier) / Simplex / Bosch / Edwards

**LIFT**

1. Passenger Lift  
   OTIS / KONE / THYSSEN KRUPP / SCHINDLER / JHONSON