

ANNEXURE-15

07.00.05

TERMINAL BLOCKS

All terminal blocks shall be rail mounted/post mounted, cage clamp type with high quality non-flammable insulating material of melamine suitable for working temperature of 105 deg. C. The terminal blocks in field mounted junction boxes, temperature transmitters, instrument enclosures/racks, etc., shall be suitable for cage clamp connections. The terminal blocks in Control Equipment Room logic/termination/marshalling cubicles shall be suitable for post mounted cage clamp connection at the field input end. The exact type of terminal blocks to be provided by

the Bidder and the technical details of the same including width etc. shall be subject to Owner's approval.

All the terminal blocks shall be provided complete with all required accessories including assembly rail, locking pin and section, end brackets, partitions, small partitions, transparent covers, support brackets, distance sleeves, warning label, marking, etc.

The marking on terminal strips shall correspond to the terminal numbering on wiring diagrams. At least 20% spare unused terminals shall be provided everywhere including local junction boxes, instrument racks/enclosures, termination/marshalling cabinets, etc. All terminal blocks shall be numbered for identification and grouped according to the function. Engraved labels shall be provided on the terminal blocks.

For terminating each process actuated switches, drive actuators, control valves, Thermocouple, RTD, etc. in Local Junction Boxes, etc, refer tender Drg.

The terminal blocks shall be arranged with at least 100 mm clearance between two sets of terminal blocks and between terminal blocks and junction box walls.

7.00.06

INTERNAL PANELS/ SYSTEM CABINETS WIRING

Internal panel/cabinet wiring shall be of multi-stranded copper conductor with FRLS PVC insulation without shield and outer sheath meeting the requirements of VDE 0815.

All internal wires shall be provided with tag and identification nos. etched on tightly fitted ferrules at both ends. All wires directly connected to trip devices shall be distinguished by one additional red colour ferrule.

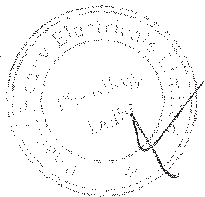
All external connection shall be made with one wire per termination point. Wires shall not be tapped or spliced between terminal points.

All floor slots of desk/panels/cabinets used for cable entrance shall be provided with removable gasketed gland plates and sealing material. Split type grommets shall be used for prefabricated cables.

All the special tools as may be required for solder less connections shall be provided by Bidder.

Wire sizes to be utilised for internal wiring.

- | | | |
|------|---|--|
| (i) | Current (4-20 mA), low voltage signals (48V);
Ammeter/Voltmeter circuit, control switches etc.
for electrical system. | 0.5 Sq.mm. |
| (ii) | Power supply and internal illumination. | 2.5Sq.mm. minimum (shall be as
per load requirement.) |



07.00.07

INSTRUMENTATION CABLE INSTALLATION AND ROUTING

All cables assigned to a particular duct/conduit shall be grouped and pulled in simultaneously using cable grips and suitable lubricants. Cables removed from one duct/conduit shall not be reused without approval of Owner.

Cables shall be segregated as per IEEE Std.-422. In vertically stacked trays, the higher voltage cable shall be in higher position and instrumentation cable shall be in bottom tier of the tray stack. The distance between instrumentation cables and those of other system shall be as follows:

From 11 kV/6.6 kV/3.3 kV tray system	-	914 mm
From 415V tray system	-	610 mm
From control cable tray system	-	305 mm

Cables shall terminate in the enclosure through cable glands. All cable glands shall be properly gasketed. Sealing (to prevent ingress of dust entry and propagation of fire) shall be provided for all floor slots used for cable entrance. Compression cable glands (double for armoured and single for other cables) shall be provided.

The cables emanating from redundant equipment/devices shall be routed through different paths. The above segregation of cables & wiring for redundant equipments/devices shall be in accordance with IEEE-Std-422.

07.00.08

CABLE LAYING AND ACCESSORIES

07.00.08.01

CABLE LAYING

1 Cables shall be laid strictly in line with cable schedule.

2 Identification tags for cables.

Indelible tags to be provided at all terminations, on both sides of wall or floor crossing, on each conduit/duct/pipe entry/exit, and at every 20 m in cable trench/tray.

3 Cable tray numbering and marking.

To be provided at every 10m and at each end of cable way & branch connection.

4 No jointing is permissible for instrumentation cables. For other cables jointing for more than 250 Meters run of cable shall be permitted.

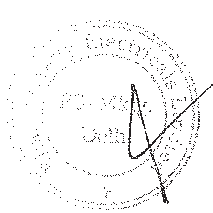
5 Buried cable protection

With concrete slabs; Route markers at every 20 Meters along the route & at every bend.

6 Road Crossings

Cables to pass through buried high density PE pipes encased in PCC. At least 300 mm clearance shall be provided between

- HT power & LT power cables,



Handwritten mark resembling a stylized 'L' or '7'.

- Spacing between cables of same voltage grade shall be in accordance with the derating criteria adopted for cable sizing.

a. All cable associated with the unit shall be segregated from cables of other Units.

- b Interplant cables of station auxiliaries and unit critical drives shall be segregated in such a way that not more than half of the drives are lost in case of single incident of fire.

All cables laid on trays shall be neatly dressed up & suitably clamped/tied to the tray. For cables in trefoil formation, trefoil clamps shall be provided.

Outside Building Area - to be laid necessarily inside GI conduit with support from cable tray/Trestle structure

While buried- in separate trench approx.1.6 meter depth, to be laid in 2" rodent proof HDPE conduits covered with sand, brick and soil along the pipe line route;

While crossing roads - to be laid in rodent proof HDPE conduits with sand filling at bottom and sand, soil filling at top with cement concrete;

While crossing canals/river- to be laid in rodent proof HDPE conduits within
hume pipe.

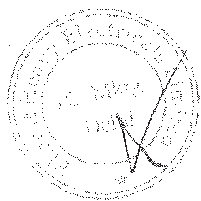
Out side Building Area- to be laid necessarily inside GI conduits with support from cable tray / Tressle structure.

Inside Building Area- to be laid necessarily inside GI conduits on separate cable sub-trays.

Bidder shall supply and install all cable accessories and fittings like Light Interface Units, Surge suppressors, Opto isolators, Interface Converters, Fibre Optic Card Cage, Fibre Optic Line Driver, Repeater / Modem (for Optical Fibre Cables), cable glands, grommets, lugs, termination kits etc. on as required basis.

Cables, which terminate in cabinets of draw out sections shall have sufficient cable coiled in the bottom of the cabinet to permit full withdrawal of draw out sections without disconnecting the cables. When prefabricated cables with factory connectors on both ends are longer than required, the excess cable shall be coiled in the bottom of one or both termination cabinets.

The Bidder shall be responsible for proper grounding of all equipment under this



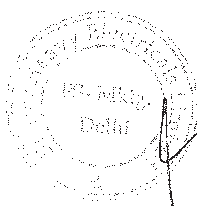
package. Further, proper termination of cable shields shall be verified and the grounding of the same shall be coordinated so as to achieve grounding of all instrumentation cable shields at same potential. This shall be completed prior to system tests.

The Bidder shall take full care while laying / installing cables as recommended by cable manufacturers regarding pulling tensions and cable bends. Cables damaged in any way during installation shall be replaced at the expense of the Bidder.

07.00.09

FIELD MOUNTED LOCAL JUNCTION BOXES

- | | | |
|--------|---------------------------------|---|
| (i) | No. of ways | 12/24/36/48/64/72/96/128 with 20% spares terminals. |
| (ii) | Material and Thickness | 4mm thick Fiberglass Reinforced Polyester (FRP). |
| (iii) | Type | Screwed at all four corners for door. Door gasket shall be of synthetic rubber. |
| (iv) | Mounting clamps and accessories | Suitable for mounting on walls, columns, structures etc. The brackets, bolts, nuts, screws, glands required for erection shall be of SS, included in Bidders scope of supply. |
| (v) | Type of terminal blocks | Rail mounted cage-clamp type suitable for conductor size upto 2.5 mm ² . A M6 earthing stud shall be provided. |
| (vi) | Protection Class | IP: 55 minimum for indoor & IP-65 minimum for outdoor applications. |
| (vii) | Grounding | To be provided. |
| (viii) | Color | RAL 7305. |



07.00.10

CONDUITS

Conduits shall be generally used for interconnecting cables from field instruments to Local JB's. All rigid conduits, couplings and elbows shall be hot dipped galvanised rigid mild steel in accordance with IS: 9537 Part-I (1980) and Part-II (1981). The conduit interior and exterior surfaces shall have continuous zinc coating with an overcoat of transparent enamel lacker or zinc chromate. Flexible conduit shall be heat resistant lead coated galvanized steel with water leak, fire and rust proof protected for the areas of Mills, Drum, Main Steam, RH steam Air Heaters and Furnace, BFPDT's.

And for remaining applications, water leak, fire and rust proof flexible GI conduits shall be provided. The temperature rating of flexible conduit shall be suitable for actual application.

All rigid conduit fittings shall conform to the requirements of IS: 2667, 1976.

Galvanized steel fitting shall be used with steel conduit. All flexible conduit fittings shall be liquid tight, galvanized steel. The end fittings shall be compatible with the flexible conduit supplied.

Conduit sealing, explosion proof, dust proof and other types of special fittings shall be provided as required by these specifications and shall be consistent with the area and equipment with which they are installed. Fittings installed outdoors and in damp locations shall be sealed and gasketed. Hazardous area fittings and conduits sealing shall conform with NEC requirements for the area classification.

Bidder shall provide double locknuts on all conduit terminations not provided with threaded hubs and couplings. Water tight conduit unions and rain tight conduit hubs shall be utilized for all the application which shall be exposed to weather. Moisture pockets shall be eliminated from conduits.

Conduits shall be securely fastened to all boxes and cabinets.

07.00.11

CABLE SUB-TRAY & SUPPORT

The cable sub-trays and the supporting system, to be generally used between Local/Group JB's and the main cable trays and the same shall be furnished and installed by the Bidder. It is the assembly of sections and associated fittings forming a rigid structural system used to support the cable from the equipment or instrument enclosure upto the main cable trays (trunk route).

The covers on the cable sub-trays shall be used for protection of cables in areas where damage may occur from falling objects, welding spark, corrosive environment, etc. & shall be electrically continuous and solidly grounded.