

KARNATAKA POWER TRANSMISSION CORPORATION LIMITED

SECTION - CABLE ACCESSORIES

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1.0 SCOPE

This specification covers the design, material, construction features, manufacture, inspection and testing at the VENDOR's/his SUB-VENDOR's works and delivery to site of Cabling Accessories, Cable Trays, Conduits and Pipes, Junction/Marshalling boxes, Power Receptacles, Motor terminal adaptor boxes etc.

2.0 CODES AND STANDARDS

2.1 The design, construction, manufacture and performance of the equipment/components shall conform to latest applicable standards as on date of submission of the bid and comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment/components will be installed. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility.

2.2 The various accessories and conduits/pipes shall comply with the latest applicable standards as specified in Data Sheet-A. Where no standards are available the supply items shall be backed by test results, shall be of good quality and workmanship and any supply items which are bought out by the VENDOR shall be procured from approved manufacturers acceptable to the PURCHASER/ ENGINEER.

2.3 In case of conflict between the standards and this specification, this specification shall govern.

3.0 EQUIPMENT COVERED UNDER THIS SPECIFICATION

Following equipments are to be supplied/fabricated by the CONTRACTOR. Required types and quantities shall be as specified in Schedule of Prices Section-F.

3.1 Galvanised steel cable trays (ladder, perforated and solid types), cable tray covers and vertical raceway covers.

3.2 Cable glands and lugs.

3.3 Trefoil clamps.

3.4 GI rigid and flexible conduits and pipes.

3.5 Junctions boxes (JB) and marshalling boxes (MB).

- 3.6 Power receptacles.
- 3.7 Motor terminal adaptor boxes.
- 3.8 Local Push Button Stations.

4.0 CABLE TRAYS AND ACCESSORIES

- 4.1 Cable trays shall be of Galvanised Steel / Fibre Reinforced Plastic and of ladder / perforated / solid type, complete with all necessary coupler plates, elbows, tees, bends, reducers, stiffeners and other accessories and hardware as detailed in the relevant drawings. All hardware (i.e. bolts, nuts, screws, washers, etc.) shall be hot dip galvanised.
- 4.2 Cable trays shall conform to the requirements specified in TCE.M2-EL-CT-S-2021 - "Cable Trays - General Notes".
- 4.3 Each 2.5 metre section of all types of cable trays and all elbows, tees, crosses, etc. shall be provided with two side coupler plates and associated bolts, nuts and washers. The side coupler shall conform to drawing no. TCE-M2-EL-CT-S-2024 - "Connection details of Cable Tray Sections".

4.4 Covers for Cable Trays and Vertical Raceways

Cable tray covers conforming to details shown in drawing no. TCE-M2-EL-CT-S-2026 - "Typical Arrangement of Covering of Cable Trays" shall be provided for cable trays and vertical raceways. Covers for vertical raceways shall be in individual, easily removable sections to facilitate cable maintenance.

5.0 CABLE GLANDS

- 5.1 The CONTRACTOR shall quote for supply of double compression type cable glands. Cable glands shall be of robust construction, capable of clamping the cable and armour rigidly without injury to insulation and provide dust/leak proof termination. These cable glands shall be heavy duty brass casting, machine finished and tinned to avoid corrosion and oxidation. Rubber components used in cable glands shall be of neoprene and of tested quality. The maximum and minimum overall diameter and diameter under armour of the cable shall be furnished to the successful BIDDER. Cable sizes shall be marked on the cable glands for easy identification. Each gland shall comprise the following:

- (a) Gland body.
- (b) Nipple with cone for clamping armour and neoprene compression ring. Nipple shall have external threads.
- (c) Check nut and 2.3 to 3 mm thick neoprene washer.
- (d) Metallic compression ring having internal taper to match with armour wire diameter and outside diameter of cone.
- (e) Compression nut having internal threads to fix to the nipple body.
- (f) Compression nut with neoprene compression ring for outer sheath of cable. Such ring shall have a groove on the outer surface in order to obtain a firm grip on the cable and shall have wide range compression to suit varying sizes of cables.
- (g) Single seal cone grip (SSCG) compression glands shall be similar to double seal cone grip type glands except that the neoprene compression ring for the inner sheath of the cable is not provided.
- (h) Single seal (SS) compression glands for unarmoured cables shall be similar to item (g) above but without the cone and the clamping ring for armour.
- (i) Flame-proof (FP) glands shall be similar to double seal cone grip type glands described above except that construction shall be suitable for installation in hazardous areas and axial length of threads shall be in accordance with the standards specified in Data Sheet-A. Approval certificate of relevant authority on flame-proof apparatus shall be furnished.

5.2 Required quantity of cable glands shall be supplied where these are not already provided by the equipment suppliers. Separate unit rates shall be furnished for supply of cable glands suitable for various sizes of cables involved.

6.0 CABLE LUGS

6.1 The CONTRACTOR shall quote unit rates for supply of various types and sizes of cable lugs for the PURCHASER's cables.

Equipment supplied by the PURCHASER will normally be provided with suitable cable lugs for power cable connections. The current rating of the lugs shall be same as that of the respective cables. However, where these lugs are not provided the CONTRACTOR shall supply them to suit PURCHASER's cables. Cable lugs shall be of tinned copper, solderless crimping type of reputed make conforming to relevant standards suitable for aluminium or copper conductor cable connections.

7.0 TREFOIL CLAMPS

The CONTRACTOR shall supply trefoil clamps suitable for supporting the single core power cables of 3-phase A.C. circuits in trefoil formation. The trefoil clamps shall have a base and two cable clamping pieces hinged to the base and conform to the details shown in drawing No. TCE.M2-EL-CT-S-2006. The sizes of trefoil clamps required shall be suitable for the type of cable sizes indicated in Schedule of Prices Section F.

8.0 CONDUITS AND PIPES WITH ACCESSORIES

8.1 The CONTRACTOR shall supply galvanised steel/coated conduits, galvanised mild steel pipes and flexible conduits required for the cabling work. The sizes of conduits and pipes required are indicated in Schedule of Prices Section F.

8.2 The conduits/pipes/flexible conduits and all the other accessories shall conform to the following:

- (a) Conduits shall be seamed by welding and shall be hot dip galvanised both inside and outside. Conduits and fittings shall be as per relevant standards.
- (b) Pipes shall be of heavy duty type as per relevant standards and shall be hot dip galvanised both inside and outside.
- (c) Flexible conduits shall be made with bright, cold rolled, annealed and galvanised mild steel strips. Flexible conduits and adaptors shall be as per relevant standards.

8.3 Alternatively, Bidder to quote Flo-coat tubes in place of Hot dipped galvanised conduits.

9.0 POWER RECEPTACLE WITH INTERLOCKED SWITCH

- 9.1 The receptacle shall be industrial heavy duty type with switch suitable for 3-phase A.C. supply with 3-pin and earth connections. The receptacle shall have ratings of 32 amps and 63 amps. The socket and switch shall have suitable interlock facility for safety. The receptacle, switch and the galvanised box fabricated from 16 SWG sheet steel housing the above shall conform to relevant standards. The box shall be suitable for wall or column mounting.
- 9.2 The receptacle shall be provided with a matching plug. The receptacle and switch shall be mounted flush with the front cover plate of the box and the unit shall be complete with gasket, cable glands, cable lugs and earthing terminal with washers and nuts suitable for PURCHASER's 25 x 6 mm G.S. flat earthing conductor.
- 9.3 Cable glands and lugs provided shall be suitable for incoming and outgoing armoured power cables of sizes 3C, 25 mm² and 3C, ___ mm² for units rated 32 amps and 63 amps respectively.

10.0 TERMINAL BLOCKS

- 10.1 The CONTRACTOR shall supply terminal blocks wherever required by the PURCHASER, at the unit rates quoted by him. Terminal blocks shall be complete with all accessories like mounting channels and plates, marking rags and clamps, protective covers, etc.
- 10.2 The terminal blocks shall be of ELMEX or equivalent make. All the terminal blocks shall be rated for 650V, 15A and shall be with disconnecting/shorting link.

11.0 JUNCTION BOXES WITH TERMINALS (JB)

- 11.1 Junction Boxes shall be hot dip galvanised, of outdoor/weather-proof construction (IP-55) and provided with gasketed front door hinged at one end and fixed with captive screws at the other end. The terminals shall be suitable for terminating 2 nos. 2.5 mm² stranded copper conductors on each side. At-least two terminals in each box shall be suitable for terminating 4 mm² conductors. All terminals blocks shall be rated for 1100V and 15A, unless otherwise specified in project drawings. These shall be of clip on type. All the terminals shall be complete with insulated barriers, terminal studs, washers, nuts, locknuts, identification strips, etc.

- 11.2 The terminal blocks shall be of ELMEX or equivalent make.
- 11.3 Minimum size (H x W x D) and number of 15 amps terminals and details of knockouts for cable/conduit entry for each junction box shall be as described in Schedule of Prices Section F.

12.0 MOTOR TERMINAL ADAPTOR BOXES

- 12.1 The CONTRACTOR shall supply motor terminal adaptor box, wherever required suitable for the number and size of the power cable(s) proposed. The adaptor box will have to be mounted separately on the pedestal. When mounted on the motor, the box shall be adequately sized with necessary lead extension needed to properly terminate the cable(s) considering the obstruction of foundation, etc. When mounted separately, the box shall be provided with suitably sized busbars and supports to receive the required number/size of cables.
- 12.2 The box shall be dust and vermin-proof not less than IP-55 (IP-65 or IP-66 in case of Flame proof terminal box) made of 2.5 mm thick sheet steel, complete with cable glands, cable lugs and fixing hardware. Necessary clearances shall be maintained between live parts and earth. The colour of the paint shall have the same colour shade as the motor.
- 12.3 The CONTRACTOR shall furnish unit rates for supply of these boxes based on the cable sizes terminated in the adaptor boxes.

13.0 LOCAL PUSH BUTTON STATIONS

- 13.1 The Local Push Button Stations shall be metal enclosed, weather-proof, dust and vermin-proof, suitable for mounting on wall or steel structures. The enclosure shall be die-cast aluminium or sheet steel of 2 mm thickness and provide a degree of protection of not less than IP55 (IP-65 or IP-66 in case of Flame proof terminal box). The enclosure shall be painted with one coat of epoxy primer and two coats of light grey epoxy paint.
- 13.2 The Open/Close/Start push buttons shall be of momentary contact push to actuate type and stop push buttons shall be stay-put type with mushroom knob. All push buttons shall be fitted with two (2) normally open and two (2) normally closed contacts rated for 415V, 10A.
- 13.3 The following types of push button stations shall be supplied.

Type-A: With three push buttons for control of reversible motors.

Type-B: With two push buttons for control of non-reversible motors.

Type-C: With one push button for "Stop" operation.

13.4 The push button stations shall be complete with inscription plates, earthing terminals, gland plates and cable glands.

DATA SHEET - C

DATA TO BE FURNISHED BY THE VENDOR

AFTER AWARD OF CONTRACT

1.0 FOR REVIEW/APPROVAL

1.1 The VENDOR shall furnish the following drawings within ----- weeks/months from the date of placement of order for different types and sizes of cable glands, lugs, junction/marshalling boxes and local push button stations.

1.1.1 Dimensioned drawings showing plan, elevations and adequate number of sectional views to clarify the general

arrangement of the equipment to be supplied and its sub-items.

1.1.2 Views showing fixing centres and dimensions of fixing holes/bolts etc.

1.1.3 Type and routine test certificates for cable glands, lugs, conduits and pipes and terminal blocks shall be furnished by the VENDOR. The type test certificates shall be forwarded within ----- weeks/months from the receipt of order and the routine test certificates shall be furnished for the PURCHASER's approval 2 weeks before the date of despatch. Where the equipment does not conform to any standard, results of any tests carried out on the equipment shall be furnished.

1.2 Information regarding weight, material of various parts, painting/galvanising, reference to purchase order, quantity of each item, the PURCHASER's name and project title shall also be indicated on all the drawings.

2.0 **FOR INFORMATION**

2.1 Specified number of copies of the approved test certificates/results shall be furnished to the PURCHASER within ----- weeks/month from the date of despatch of the equipment.

DATA SHEET A2

1 CABLE TRAYS	1.1 HOT DIP GALVANISING	IS: 2629		
2 CABLE GLANDS	2.1 BRASS GLANDS FOR PVC CABLES	IS: 12943	BS:	IEC
	2.2 FLAME-PROOF ENCLOSURES OF ELECTRICAL APPARATUS	IS: 2148	BS:4683	
3 LUGS	3.1 COMPRESSION TYPE TUBULAR TERMINAL ENDS	IS:8309	BS:4683	IEC

4 CONDUITS AND PIPES	4.1 RIGID STEEL CONDUITS	IS:9537	BS:	
	4.2 RIGID NON-METALLIC CONDUITS	IS:9537	BS:	
	4.3 ACCESSORIES FOR RIGID STEEL CONDUITS	IS:3837	BS:	
	4.4 FITTINGS FOR RIGID STEEL CONDUITS	IS:2667	BS:	
	4.5 FITTINGS FOR RIGID NON-METALLIC CONDUITS	IS:3419	BS:	
	4.6 FLEXIBLE STEEL CONDUITS	IS:3480	BS:	
	4.7 FLEXIBLE NON-METALLIC CONDUITS	IS:6946	BS:	
	4.8 ADAPTORS FOR FLEXIBLE STEEL CONDUITS	IS:4649	BS:	
	4.9 MILD STEEL TUBES	IS:1239	BS:	
5 POWER RECEPTACLES	5.1 PLUGS AND SOCKETS	IS:1293	BS:	IEC
	5.2 SWITCHES AND DISCONNECTORS	IS:13947	BS:	IEC
	5.3 BOXES FOR ENCLOSURE OF ELECTRICAL ACCESSORIES	IS:5133	BS:	IEC

DATASHEET B (TO BE FILLED BY THE BIDDER)

1.0 **CABLE GLANDS**

1.1 **COMPRESSION GLANDS**

(a) Manufacturer's Name

(b) Material

(c) Type

(d) Dimensioned drawings, catalogues, literature enclosed YES/NO

1.2 **FLAME-PROOF GLANDS**

- (a) Manufacturer's Name
- (b) Material
- (c) Type
- (d) Standard to which conforms
- (e) Dimensioned drawings, catalogues, literature enclosed YES/NO
- (f) Approval certificate of relevant authority enclosed YES/NO

2.0 **CABLE LUGS**

- 2.1 Manufacturer's Name
- 2.2 Material
- 2.3 Current Rating
- 2.4 Dimensioned drawings, literature enclosed YES/NO
- 2.5 Applicable standard

3.0 **SINGLE CORE CABLE CLAMPS**

- (a) Manufacturer's Name
- (b) Material
- (c) Whether all bolts, nuts and washers supplied

4.0 **CONDUITS/PIPES**

Metallic
Non-Metallic
Rigid/Flexible

- (a) Manufacturer's Name
- (b) Material

- (c) Applicable standards
- (d) Range of sizes and wall thicknesses
- (e) Standard length in metres
- (f) Couplings included YES/NO
- (g) Dimensioned drawings catalogues, literature enclosed YES/NO

5.0 **JUNCTION/MARSHALLING BOXES**

- (a) Manufacturer's Name
- (b) Material and gauge
- (c) Overall dimensions
- (d) Dimensioned drawings and views showing internal arrangement, cover details and mounting arrangement enclosed YES/NO
- (e) Name, type and current rating of terminal blocks

6.0 **PUSH BUTTON STATIONS**

- (a) Manufacturer's Name
- (b) Metal Enclosure
 - i) Die-cast aluminium/sheet metal of 2mm thickness
 - ii) Degree of Protection
 - iii) Painting, inscription label, earthing terminals as specified YES/NO
- (c) Gland Plate and Cable Glands provided YES/NO
- (d) Facility for fixing on YES/NO

wall/structure provided

(e) No. of contacts

i) Normally Open

ii) Normally Closed

(f) Contact Rating

i) At 415V AC A

ii) At 110V AC A

iii) At 220V DC A

(g) Terminal blocks with identification nos. provided for external connections. YES/NO

7.0 **CABLE TRAYS**

(a) Manufacturer's Name

(b) Thickness of sheet steel used for tray fabrication mm

(c) Trays are Galvanised YES/NO

(d) Other requirements as per Specification YES/NO

8.0 **POWER RECEPTACLES**

(a) Manufacturer's Name

(b) Catalogue Enclosed YES/NO

9.0 **MOTOR TERMINAL / ADOPTER BOXES**

(a) Manufacturer's Name

(b) Material & Gauge

(c) Overall dimensions

- | | | |
|-----|---|--------|
| (d) | Dimensional drawings & views showing internal arrangement, cover details and mounting arrangements enclosed | YES/NO |
| (e) | Current rating of terminals | |
| (f) | Clearances: | |
| | Phase to Phase | |
| | Phase to Earth | |
| (g) | Partitions provided between phases (for HT Motors only) | YES/NO |