CABLING SYSTEM

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Engineering Department

WEST BENGAL STATE ELECTRICITY TRANSMISSION COMPANY LIMITED

পশ্চিমবঙ্গ রাজ্য বিদ্যুৎ সংবহন কোম্পানি লিমিটেড

(পশ্চিমবঙ্গ সরকারের একটি উদ্যোগ)

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TECHNICAL SPECIFICATION OF CABLING SYSTEM

1. SCOPE :

This specification covers design, manufacture, assembly, testing at manufacturer's works, supply, delivery of G.I. ladder type cable tray with G.I. nuts and bolts of M.S. Steel Support, supporting structures, and all other accessories required for laying of all L.T. power & control cables in the cable trays as well as laying of buried L.T. XLPE power cable as per this specification as well as submitted cable schedule to be furnished.

2. I) DEVIATION :

Normally the offer should be as per Technical Specification without any deviation.

II) MODIFICATION :

If any modification felt necessary to improve performance, efficiency and utility of equipment, the same must be mentioned in the 'Modification schedule' with reasons duly supported by documentary evidences and advantages. Such modifications suggested may or may not be accepted, but the same must be submitted along with Pre-Bid Queries. The modifications not mentioned in Schedule will not be considered.

3. CABLE TRAY AND ACCESSORIES :

The G.I. ladder type cable tray with G.I. nuts and bolts & adequate sizes below cable tray, M.S. supports, supporting structures & all other accessories required for laying of L.T. power & control cables shall be within the scope of the supply of successful bidder.

Width of cable tray and number of tray per trench should be designed by the contractor sub-station wise based on submitted cable schedule and approved switchyard cable trench drawing for each sub-station.

While deciding no. of cable tray and its width required for main cable trench and sub-trench for new sub-station, contractor has to consider both the existing number of bays of different voltage classes under the scope of this tender as well as future number of bays as stated below for selection of width of cable trench & no. of cable trays. Supply and installation of cable trays for future bays in each voltage class shall be within the scope of the successful bidder.

All the power & control cable shall be laid in proper dressed up fashion without overlapping of cables on trays. Minimum gap between two trays in vertical layer should be 250 mm and horizontal gap of 600 mm (minimum). Minimum thickness of cable tray should be 3 mm.

The contractor shall make his own estimate of L.T. power and control cable, cable accessories, cable trays, supporting structures and other materials required for successful commissioning of all the bays of each sub-station to be completed within the scope of this tender. However cable trays, supports, inserts, and all other accessories required for laying of all power & control cable for all the future bays as stipulated above shall be within the scope of supply as well as erection.

4. LAYING OF CABLES :

a) All the cables shall be laid on cable trays in accordance with submitted cable schedule and switchyard & control room approved cable trench drawing.
b) Cables shall be run with good workmanship and shall present a neat appearance. Overlapping of cables on trays shall not be permitted. Twisting & jointing shall not be permitted.
c) Cables in trays shall be laid and not pulled into. Where pulling is absolutely necessary, instead of using steel or metallic rope, manila or nylon rope is to be used. Cable shall be neatly laid without interlacing.
d) Sufficient length of cables shall be pulled into all equipment, control & relay panels and different junction boxes, marshalling kiosk etc. so that all the cores of a cable can be terminated in the terminal blocks in a neat fashion.
e) Termination of cables shall be done in such a fashion to avoid tension of individual conductors or terminals.
f) The radius of bends of any cable shall not be less than the minimum bending radius, as recommended by the cable manufacturers.
g) Each cable shall be identified at each end and in exposed runs on cable trays by attaching Aluminium tag with the number punched on it and securely attached to the cable conduit by not less than two turns of 20 SWG GI wire conforming to IS : 20. Cable tags shall be of rectangular shape for power cables and of circular shape for control cables. Cable tags shall be provided inside the switchgear, motor control cabinet, control & relay panel etc. wherever required for cable identification.
h) Location of cables laid directly underground shall be clearly indicated with cable marker made of galvanized iron plate.
i) Location of underground cable joints shall be indicated with cable marker with an additional inscription "Cable joint".
j) The marker shall project 150 mm above ground and shall be spaced at an interval of 30 Meters and at every change in direction. They shall be located on both sides of road & drain crossings.
k) The Cable termination from all class of CTs to CT JB shall be laid on Cable trays with sufficient Cable for further maintenance purpose. The cable tray shall be mounted with CT structure/extra structure if require as per site condition.
l) Power and control cable in the cable trench shall be laid in separate tires. Power cables shall be on the top tiers and control cables in the bottom tires.
m) 700 X 600 mm opening without any rack shall be provided below marshailing kiosk for cable entry.
n) Provision of necessary holes to be provided at oil pit wall of Transformer for placing of 2 nos. 100 mm dia. or more (as per requirement) HDPE conduit. Conduit shall run from trench to Marshailing Box of Transformer.
o) From Sub-trench to equipment, HDPE conduit of suitable size may be provided. However separate conduit shall be used for Power and Control cables. 40% space inside pipe shall be kept free.

5. CABLE TERMINATION, INSTALLATION AND CONNECTIONS :

a) Cable terminations and connection of cables shall be done in accordance with cable termination kit manufacturer's instruction, drawing and / or as directed by owner.
b) The work shall include all clamping, fittings, fixing, plumbing, soldering, drilling cutting, taping, heat shrinking (where applicable), connecting to cable terminal, shorting and grounding as required to complete the job.

c) The connecting terminals shall be covered with transparent insulating sleeve so as to prevent accidental contact with ground or adjacent terminals. The insulating sleeve shall be fire resistant and long enough to overpass the conductor insulation. Ferrules must be provided on each core of the control cable in order to facilitate identification
d) The equipment will be generally provided with undrilled gland plates for cables / conduit entry. The contractor shall be responsible for drilling of gland plates, painting & touching up.
e) Control & power cable cores entering control panel switchgear, MCCB / MCB / Junction boxes / BMK etc. shall be neatly bunched, clamped and tied with PVC perforated strap to keep them in position.
f) Spare cores shall be also tagged with cable number & coiled up inserting ferrule numbers at both end.
g) All cable entry points shall be sealed and made vermin and dust proof. Unused openings shall be effectively closed.
h) Double compression type nickel plated brass cable glands shall be provided by the contractor for all power & control cables. Rubber components used in cable glands shall be neoprene and of tested quality.
i) The power & control cable between Station auxiliary transformer / Earthing-cum-Station service transformer, Control room, DG set building / or fire fighting, pump house shall be laid underground. In addition, for lighting purpose also, cables can be laid underground in outdoor area.
j) Cable racks and supports shall be painted after installation with two coats of metal primer (comprising of red oxide and zinc chromate in a synthetic medium) followed by two finishing coats of Aluminium paint. The red oxide and zinc chromate shall conform to IS : 2704.
k) Power and control cables shall be securely fixed to the trays with self locking type nylon ties with de-interlocking facility at every 5 Meter interval for horizontal run. Vertical cable runs shall be secured with 25 mm and 2 mm thick aluminium strip clamps at every 2 Meter interval.
l) In case of 4 core L.T. power cable, adequate extra length shall be kept at a suitable point to enable two straight through joints to be made in case the cable develop fault at a later date. Bending radius shall be maintained as minimum 12D, where D is the overall diameter of cable.
m) All due care shall be taken during unreeling, laying and termination of cable to avoid damage due to twist, kinks, sharp bends etc.
n) Cable ends shall be kept sealed to prevent damage.
o) Metal screen and armour of the cable shall be bonded to the earthing system of the station, wherever cable shall pass through floor or through wall openings or other partitions, GI / PVC wall sleeves with bushes having a smooth internal surface shall be supplied.
p) The power cable shall not be bent below the bending radius of 12D and for control cable the minimum bending radius shall be 10D, where D is the overall diameter of cable.
q) The length of control cables for termination inside equipment enclosures shall be kept sufficiently so that changing in termination in terminal block can be done without splicing.
r) Spare cores shall be tagged with cable numbers and coiled up.
s) All cable entry points shall be sealed and made vermin and dust proof. Unused openings shall be effectively closed.
t) For underground / directly buried cables, the contractor's scope shall include excavation, preparation of sand bedding, soil cover, supply & installation of bricks or concrete as protection covers, back filling and ramming with supply & installation of route marker & joint markers.
u) Power cables for switchyard lighting shall be buried at a depth of 1000 mm from nearest cable trench up to Lighting Mast / tower with lighting fixure.

All the intending bidders are advised to assess the volume of supply and erection work prior to submission of bid by site visit of new as well as existing sub-stations.

6. CABLE TRAY SUPPORTING STRUCTURES :

Successful bidder shall supply and install all supporting structures, angles, straps, hangers, brackets, clamps, clips, nuts & bolts and all other required materials for the installation of cables and cable trays considering all the cables that are to be laid for successful commissioning of all the bays of different voltage classes for each sub-station under the scope of this tender as well as number of future bays that are to be considered as per the stipulation laid down in Cl. No. 3(i, ii & iii). Cabling system shall be complete in all respect for laying of all the cables of future bays without any necessity of supply as well as erection of any cable tray, supporting structure & other accessory in future when future bays shall be constructed Cable trays shall be suitably supported with structures or hangers at intervals not exceeding 1200 mm to prevent excessive stressing and deflection of the trays.

7. GUARANTEE :

Electrical & mechanical characteristics shall be guaranteed by the bidder. In case of failure of materials to meet the guarantee, WBSETCL shall have right to reject the material. Guaranteed Technical Particulars are to be submitted by successful bidder during detailed engineering alongwith submitted drawings/documents. However format for submission of GTP shall be handed over to intending bidders at the time of sale of tender documents.

8. CONTRACT DRAWING AND CATALOGUE :

8.1. In the event of placement of L.O.A. the Contractor has to submit six (6) copies of all the relevant drawings and Catalogue to the Chief Engineer, Engg. Deptt.,VidyutBhawan (9th floor), Salt Lake, Kolkata - 700 091for approval.

8.2. Ten (10) sets of approved drawings and ten (10) copies of Catalogue for each sub-station shall be submitted to the Chief Engineer, Engg. Deptt.,VidyutBhawan (9th floor), Salt Lake, Kolkata - 700 091for record and distribution to site.

9. TESTS AT MANUFACTURER'S WORKS AND TEST CERTIFICATES :

All routine tests of all accessories required for cabling system shall be carried out at the works of the manufacturer as per relevant Indian Standard.

All acceptance tests shall be carried out at the manufacturer's works on every lot offered for inspection in presence of representative of WBSETCL. Selection of samples for acceptance test as well as rejection and re-testing shall be guided by relevant IS.