

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-LV-3003

Specification Name : Accessories of LT AB cables (Insulated Messenger)

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| 13-01-2023 | 13-01-2023 | 16-01-2023 | 16-01-2023 | 17-01-2023 | 17-01-2023 |

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1. SCOPE

The Specification covers the design, manufacture, supply, testing preferably at manufacturer's works before supply and delivery of Accessories for anchoring, suspending & making connections to Aerial Bunched Cables with insulated neutral cum messenger rated 1100 volts. Aforesaid items shall include loading and unloading at anywhere in Odisha.

2. APPLICABLE STANDARDS

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International Standards and shall conform to the regulations of the local authorities:

| Ref. IS | Description |
|------------------------|---------------------------------|
| NFC 330-020 | Insulating piercing connector |
| NFC 330-021 | Junction Sleeve |
| NFC 33-209 IS 14255 | LV Aerial Bunched Cables |
| NFC 20-540 | Environment Testing for Outdoor |
| NFC 33-004 | Electrical Ageing Test |
| NFC 33-040 | Suspension Equipment |
| NFC 33-041 | Anchoring Devices |
| NFC 33-042 | Service Clamps |

3. CLIMATIC CONDITIONS OF THE INSTALLATION

| SL.NO. | CONDITIONS | VALUES |
|--------|--|--------|
| 1 | Max. altitude above sea level | 1200m |
| 2 | Max. Ambient Temperature | 50 °C |
| 3 | Max. Daily average ambient temp | 35 °C |
| 4 | Min Ambient Temp | 0 °C |
| 5 | Maximum temperature attainable by an object exposed to sun | 60 °C |
| 6 | Maximum Humidity | 95% |
| 7 | Minimum Humidity | 10% |
| 8 | Average No. of thunderstorm days per annum | 70 |
| 9 | Average Annual Rainfall | 150 cm |
| 10 | Average No. of rainy days per annum | 120 |

| | | |
|----|--|--|
| 11 | Thermal Resistivity of soil | 150 Deg. Cm/W |
| 12 | Wind Pressure | 126 kg/sq. m up to an elevation of 10 meter. |
| 14 | Earthquakes of intensity in horizontal direction | equivalent to seismic acceleration of 0.3g |
| 15 | Earthquakes of intensity in vertical direction | equivalent to seismic acceleration of 0.15g |
| 16 | Wind velocity | 300 km/hr. |

Environmentally, some of the regions, where the work will take place includes hilly areas, subject to high relative humidity, which can give rise to condensation. Atmosphere is generally laden with mild acid and dust due to industrial activities. Some places are in heavily industrial polluted areas. On occasions, the combination of humid, acidic and dust condensation may create pollution conditions for outdoor equipment's. Therefore, outdoor materials and equipment's shall be designed and protected for use exposed, heavily polluted, acidic, corrosive, tropical and humid atmosphere.

TPCODL/ TPNODL/ TPSODL/ TPWODL service area has heavy saline conditions the coast and high cyclonic intensity winds with speed up to 300km/h. The atmosphere is generally laden with mild acid, dust in suspension during the dry months and is subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS

4.1 CABLE DATA

The Accessories of LT XLPE Insulated Aerial Bunched Cables (ABC) with insulated messenger are specified below:

- Since ABC accessories are to be used with **insulated messenger**, their design should incorporate specific features to prevent damage to the insulation which meeting the required electrical, mechanical & thermal requirements.
- All mechanical, electrical & thermal ratings should meet or exceed 90% of the corresponding ratings of the cable, or the values specified herein, whichever are more stringent.
- The accessories should provide "Double Insulation" so that a single point failure of insulation will not result in the system tripping.

The ABC Accessories shall consist of the following:

| | | |
|---|--------------------------------|--|
| 1 | Insulation Piercing Connectors | For making tap-off/branch connectors/service (IPC) connector to an ABC line. |
|---|--------------------------------|--|

| | | |
|---|---|---|
| 2 | Anchoring Assembly (AA) | For fitting onto a pole for anchoring the end of a length of ABC, or for a major change in direction. |
| 3 | Suspension Assembly (SA) | For supporting a length of ABC at an intermediate pole in a length, with small angle of deviation |
| 4 | Service clamp (SC) | For anchor Insulated service lines (armored or unarmored) |
| 5 | Junction Sleeves | For Phases, messengers & Street lighting conductor. |
| 6 | Eye Hook/ Eye Bolt with necessary clamp fittings and nuts & bolts | For fixing of cable accessories |

4.2 INSULATION PIERCING CONNECTORS (IPC)

IPCs are designed to make a connection between the uncut main conductor and a branch cable conductor without having to strip either cable to expose the conductor instead the tightening action of the IPC will first pierce the Insulation, then make good electrical contact between the main end and branch conductor while simultaneously insulating and sealing the connection.

| SL. NO. | DESCRIPTION | DESIRED VALUE | | |
|---------|--------------------------------|---|-------------------|----------------|
| 1 | IPC Type A | Main Size | Branch Size | Current Rating |
| | | Bidder to specify | Bidder to specify | 350 A |
| 2 | IPC Type B | Bidder to specify | Bidder to specify | 200 A |
| 3 | IPC Type C | Bidder to specify | Bidder to specify | 100 A |
| 4 | IPC Type D | Bidder to specify | Bidder to specify | 100 A |
| 5 | Rated Voltage | 0.415 kV - 0.433 kV | | |
| 6 | System Frequency | 50 Hz | | |
| 8 | Maximum Tightening Torque (Nm) | Not exceeding 20 Nm for conductor cross-sections up to 95 sq.mm. & 30 Nm for conductor cross- section over 95 sq.mm. and up to 150 sq.mm. | | |
| 9 | Insulation body | Weather, heat & UV resistant, flame retardant glass fiber reinforced black thermoplastic. | | |
| 10 | Contact Plates | Tinned copper | | |
| 11 | No. of contact bridges | Minimum 4 nos. | | |
| 12 | Coating on contact plates | Tinning on copper | | |
| 13 | Bolt | Material: Hot dip galvanized steel, minimum 8.8 grade Shape: Hex/semi-circular head square/round neck compatible with body design | | |
| 14 | Shear off nut | Material: non-corrosive metallic Shape: shear off portion of nut shall have hexagonal shape. Rest of the portion of long nut shall have circular shape. Circlip or ring shall be provided beneath the shear off nut to rest the tightening tool. | | |

| SL. NO. | DESCRIPTION | DESIRED VALUE |
|---------|---|---|
| 15 | Compression Plate/ Belleville spring washer | Material: Anti-corrosive metal Shape: Square/ Rectangular compression plate or Belleville spring washer compatible to upper body shall be provided beneath the nut |
| 16 | Seals and End caps | Material: Elastomer seals and end cap shall be provided. The IPC shall be free from grease / gel for water protection. Elastomer seals shall be Blue colors. |
| 17 | Voltage withstand with Water emersion in kV | 6kV in 1 Min |

4.3 ANCHORING ASSEMBLY

- The clamps should be designed to Anchor LT AB cable with insulated messenger. The clamp should consist of an Aluminum alloy corrosion resistant castled body, bail of stainless steel and self-adjusting plastic wedges which shall anchor/hold the messenger.
- No losable part in the process of clamping arrangement.
- The clamp should conform to the standard NFC 33041 and 33042 or equivalent I.S. if any.
- The clamp body should be made of corrosion resistant Aluminum alloy, bail should be of stainless steel and wedges should be weather and UV resistant polymer.
- Ultimate tensile strength of the clamp should not be less than 12 KN for 25-35 Sq.mm, 15 KN for 50-70 Sq.mm and shall not be less than 20 KN for 70-95 sq.mm sized insulated AB cable respectively.
- Slip load of the clamp should not be less than 80% of Ultimate tensile strength (UTS) of relevant messenger wire.

| | TECHNICAL PARTICULARS | DESIRED VALUE | | |
|---|------------------------------------|---|--|--|
| | | (25-35 mm ² Insulated Messenger Wire) | (50-70 mm ² Insulated Messenger Wire) | (70-95 mm ² Insulated Messenger Wire) |
| 1 | Name & Address of the Manufacturer | To be furnished by Bidder | | |
| 2 | Standard | NFC 33-041 | | |
| 3 | Range of messenger size | 25-35 mm ² Insulated Messenger Wire | 50-70mm ² Insulated Messenger Wire | 70-95mm ² Insulated Messenger Wire |
| 4 | Type of design | wedge type | | |
| 5 | Material of Clamp | Aluminium alloy corrosion resistant castled body, bail of stainless steel and self-adjusting plastic wedges | | |
| 6 | Dimensions (mm) | GA To be Provided | | |
| 7 | Approximate weight (Kg) | To be furnished by Bidder | | |
| 8 | Ultimate Tensile Strength (KN) | 12 | 15 | 20 |

| SL.NO | TECHNICAL PARTICULARS | DESIRED VALUE | | |
|-------|-----------------------|---|---|---|
| | | (25-35 mm ² Insulated Messenger Wire) | (50-70 mm ² Insulated Messenger Wire) | (70-95 mm ² Insulated Messenger Wire) |
| 9 | Slip | 80% of UTS of relevant messenger cable | | |
| 10 | Galvanization | All ferrous Part shall be Hot dip Galvanized as per IS 2633/2629 | | |
| 11 | Tolerance | +/-5% | | |
| 12 | Marking | TPCODL/ TPNODL/ TPSODL/ TPWODL, Manufacture's name or trademark, Year of Manufacturing. | | |

4.4 SUSPENSION CLAMP FOR INSULATED MESSENGER

- The clamp should be designed to hang LT AB cable with insulated messengers. The messengers should be fixed by an adjustable grip device. A movable link should allow longitudinal and transversal. The movement of the clamp body can accommodate small angle deviation of 30°.
- No losable part in the process of clamping arrangement.
- The clamp should conform to the standard NFC 33040 or equivalent I.S, if any.
- The clamp and the link made of Polymer should provide an additional insulation between the cable and the pole.
- The clamps and movable links should be made of weather and UV resistant glass fiber reinforced polymer.
- Clamps should be fixed with pole by eye hook / bracket/ eye bolt. Bracket should be made of corrosion resistant aluminum alloy.
- Ultimate tensile strength of the clamp should not be less than 16 KN for 70/95 Sq.mm & 50/70 Sq.mm and shall not be less than 12 KN for 25/50 sq.mm insulated neutral cum messenger respectively.

| SL.NO | TECHNICAL PARTICULARS | DESIRED VALUE |
|-------|------------------------------------|---|
| 1 | Name & Address of the Manufacturer | To be furnished by Bidder |
| 2 | Standard | NFC 33-040 |
| 3 | Range of conductor size | 25-50 mm ² Insulated Messenger Wire 50-70 mm ² Insulated Messenger Wire 70-95 mm ² Insulated Messenger Wire |
| 4 | Type of design | Bolt less |
| 5 | Material for clamp Body | Made of weather UV resistant glass fiber reinforced polymer |
| 6 | Colour of Non-metallic parts | Black |
| 7 | Ultimate tensile strength | Ultimate tensile strength of the clamp should not be less than 16 KN for 70/95 Sq.mm & 50/70 Sq.mm and shall not be less than 12 KN for 25/50 sq.mm insulated neutral cum messenger respectively. |
| 8 | Slip | There should not be any slippage up to 300 N |
| 9 | Tolerance | +/-5% |
| 10 | Marking | TPCODL/ TPNODL/ TPSODL/ TPWODL, Manufacture's name or trademark, Year of Manufacturing. |

4.5 SERVICE CLAMPS

- The clamps should be designed to anchor insulated service lines (armored or unarmored) with 2/4 conductors.
- The clamps should be made of weather and UV resistant polymer.
- No losable part in the process of clamping arrangement
- The clamp should conform to the standard NFC 33042 or equivalent I.S., if any.
- Breaking load of the clamp should not be less than 3 KN.

4.6 JUNCTION SLEEVE

- The sleeves should be pre-Insulated for phases, messengers and street lighting conductors.
- Sleeve should be made of Aluminum, insulated with an Anti-UV black thermoplastic tube hermetically sealed two ends with 2 flexible rings.
- Dia. reference, size and strip length are indicated on the sleeve itself.
- Sizes needed: 16 sq.mm to 150 sq.mm for Aluminum XLPE insulated cable.
- Reference standard: NFC 33021 or equivalent I.S. if any.

4.7 EYE HOOKS/ EYE BOLTS

- Eye hooks/ Eye Bolts should be designed as to hold suspension clamps and dead-end clamps and to be installed with the pole clamp.
- Eyehooks should be made up of forged Galvanized steel.
- The clamps corrosion resistance should conform to the standards I.S. 2629 & I.S.2633.
- Bolts and nuts should be made of hot dip Galvanized steel according to VDE 0210 and VDE 0212.
- Ultimate Tensile strength (UTs) of the clamp be 20 KN or higher.

| SL.NO | TECHNICAL PARTICULARS | DESIRED VALUE |
|-------|------------------------------------|---|
| 1 | Name & Address of the Manufacturer | To be furnished by Bidder |
| 2 | Application | To hold suspension clamp and Dead-End clamp with pole |
| 3 | Material | Mild Steel Grade E250 A, IS 2062 |
| 4 | Finish Material | Hot dip galvanized Steel (As per IS 2633 with latest amendment, |
| 5 | Type of Hook | Flat Eye Hook |
| 6 | Type of Design | Forged Eye Hook |
| 7 | Dimension | As per GA Drawing |
| 8 | Ultimate Tensile Strength, Min | 20 KN |
| 9 | General Tolerance | +/-5 % |
| 10 | Type of packing | 40 Pcs in Gunny Bags |
| 11 | Marking | TPCODL/ TPNODL/ TPSODL/ TPWODL, Manufacture's name or trademark, Year of Manufacturing. |

5. GENERAL CONSTRUCTIONS/REQUIREMENTS

5.1 INSULATION PIERCING CONNECTORS (IPC)

- a. The housing shall be made entirely of mechanical and weather resistant plastic insulation material and no metallic part outside the housing is acceptable except for the tightening bolt.
- b. Any metallic part that is exposed must not be capable of carrying a potential during or after connector installation.
- c. Screws or nuts assigned for fitting with IPC (Insulating Piercing connector), must be fitted with torque limiting shear heads to prevent over tightening or under tightening (min & max torque values to be specified by Manufacturer).
- d. The IPC must perform piercing and connection on Main and Branch cable simultaneously.
- e. The IPCs shall be waterproof and the water tightness shall be ensured by appropriate elastomer materials and not by grease, gel or paste alone.
- f. Design of IPC should be such as to not cause damage to insulation of adjacent conductors due to vibration and relative movement during service.
- g. The connector shall have a rigid removable end cap which can be slide fitted onto the main connector body on either right or left by the installer (depending on site requirement) for sealing the cut end of the branch cable. Once the connector is fitted, it should not be possible to remove the cap without removing the connector.
- h. All the metallic parts of the connector should be corrosion resistant and there should not be any appreciable change in contact resistance & temperature after overloads & load cycling.
- i. The contact plates should be made of tinned copper.
- j. Elastomer seals and end cap shall be provided. The IPC shall be free from grease / gel for water protection. Elastomer seals shall be Blue colors.
- k. The Insulation material should be made of weather & UV resistant reinforced polymer.
- l. The outer metallic part should have potential free tightening bolts to allow safe installation on live lines.

The insulation piercing connectors shall be of the following type(s) depending on the applications.

| Type | Description | Application |
|----------|--|--|
| A | Insulation piercing multiple port (4 way) connector. | For providing service connection from ABC |
| B | Insulation Piercing Connector for networking | For main-to-main networking or branching of ABC to another ABC |
| C | Insulation Piercing Connector for Street Lighting | For street lighting/earthing connection from AB Cable |
| D | Bare Connector for Earthing/Neutral Connections | For Earthing connection from AB Cable |

Standard size ranges for Type A multiple tap insulation piercing connector for service connector shall be as follows:

| Type | Application | Method of Branch Connection | Main Cable Size Range (mm ²) | Branch Cable Size range (mm ²) |
|----------|---|-----------------------------|--|--|
| A | For service connections from Smaller size and Capacity AB Cable | dis-connectable | 25 - 95 | 4 x (2.5) 6 – 35 |
| | For service connections from Smaller size and Capacity AB Cable | dis-connectable | 50 - 150 | 4 x (2.5) 6 – 35 |

Standard size ranges for Type B insulation piercing connectors for main to main networking or branching of ABC shall be as follows:

| Type | Application | Main Cable Size Range (mm ²) | Branch Cable Size range (mm ²) |
|----------|---|--|--|
| B | For Main-to-Main network connections from smaller size and Capacity AB Cable | 16 - 95 | 16 - 95 |
| | For Main-to-Main network connections from smaller size and Capacity AB Cable | 25 - 150 | 25 - 150 |
| | For Main-to-Main network connections from smaller size and Capacity AB Cable / Charging of Distribution Box | 16 - 150 | 4 - 50 |
| | For Main-to-Main network connections connections from smaller size and Capacity AB Cable / Charging of Distribution Box | 16 – 95 | 4-35 |
| | For Main-to-Main network connections connections from smaller size and Capacity AB Cable / Charging of Distribution Box | 10 – 95 | 1.5 – 10 (16) |

Standard size range for Type C. insulation piercing connector for street lighting

| Type | Application | Main Cable Size Range (mm ²) | Branch Cable Size range (mm ²) |
|----------|---------------------------------|--|--|
| C | For Street Lighting connections | 10 - 95 | 1.5 – 10 |

Standard size range for Type D. Bare connector for Earthing

| Type | Application | Main Cable Size Range (mm ²) | Branch Cable Size range (mm ²) |
|----------|----------------------------------|--|--|
| D | For Earthing/Neutral Connections | 10 - 95 | 1.5 – 10 |

5.2 ANCHORING ASSEMBLY

Each Anchoring Assembly shall include.

a. One number tension bracket.:

The tension bracket shall be made from a single piece of Aluminum alloy suitable for attachment to a pole either by 20mm galvanized eye hook (s) or two stainless Steel straps of 20 x 0.7 mmx 0.75 m.

The tension bracket should be designed to ensure the Flexible rope cannot slip out at any angle.

b. One number wedge type tension clamp

Wedge type clamps shall be used for clamping the messenger. The clamp shall be capable of clamping an uncut messenger so that it can continue without break to the connecting point or next span. The clamp shall be fully insulating type of mechanical and weather resisting thermoplastic. No bolts or loose parts are allowed as part of the Clamping system. No tools shall be needed for fitting the messenger into the clamp. The clamp shall be self-tightening.

c. Flexible Rope for fixing tension clamp to bracket

The Anchoring assembly shall be supplied with a stainless-steel flexible rope to connect the Tension Clamp to the Tension Bracket. The rope should have sufficient flexibility to ease the torsional movement of the AB Cable System. The Rope should be pre-fitted with compression type end fittings to secure the tension clamp. A wear resistant moveable saddle should be loosely fitted on the Rope to prevent abrasion at the point of fitting into the tension bracket. The Rope should have sufficient mechanical strength to withstand the mechanical test for the complete assembly tests in this specification.

5.3 SUSPENSION CLAMP FOR INSULATED MESSENGER

Suspension Assemblies shall be supplied in sets to ensure compatibility of the materials against corrosion or wear of rotating/moving parts. Each Suspension Assembly shall consist of:

a. One number Suspension Bracket

The Suspension bracket shall be made from a single piece of Aluminium alloy suitable for attachment to a pole either by 20 mm galvanized steel bolt (s) or two stainless Steel straps of 20 x 0.7 mmx0.75m The Suspension Bracket shall be provided with an upper bulge to prevent the clamp from turning over on the Bracket for more than 45 mm from the horizontal or to within less than 60 mm from the pole / fixing structure. The Suspension Bracket should be so designed to ensure that the articulated link cannot slip out of it.

b. One number moveable (articulated) connecting link

Movable Links are used between the Suspension Bracket and Suspension Clamp to allow a degree of movement and flexibility between the two. The Movable link should be unlosable fitted to the Bracket and the Clamp.

c. One number Suspension Clamp

Suspension Clamps are used for locking the messenger of the ABC bundle and allowing the messenger to become dismounted from the fitting. The Suspension Clamp shall accommodate messenger wires from 16 sq.mm to 150 sq. mm. The Suspension Clamp shall be made fully of insulating type of mechanically strong and weather resistant Plastic. Bolts should not be used for clamping / locking the messenger in the clamp.

5.4 Stainless steel strap and buckles

The stainless-steel strap shall consist of

- a) Stainless steel strap of size 20mm ± 0.2 x 0.7mm ± 0.05 mm x 750 M and shall have tensile strength of 7.5KN min., elongation 30% Min, finish 2B, and the stainless-steel material shall be of high mechanical strength, corrosion and wear resistant as per ASTM SS 202.
- b) Tensile strength of strap is to be min 7.5KN to be tested on a loop with buckle. Minimum 2 Number of loops for mounting the bracket on pole to be allocated as per load requirement for dead-end and suspension clamp specified in this specification.
- c) Min two loops of 0.75 meter each with one buckle to be considered for attaching the brackets to the poles. For dead-end or suspension pole bracket a total of 1.5 meter of SS Strap and two buckle are required.
- d) The SS Strap should be engraved with the name of the Manufacturer, month and year of manufacturing and length at a distance of approx. 250 mm for traceability.
- e) The SS buckle to suit above strap shall be used to tension & fix it. It should have a slot width of not less than 20.5 mm x 1.5 mm
- f) The Buckle should be made from ASTM SS 304 of thickness not less than 1.2 mm.
- g) SS Strap must be supplied in 50-meter roll in plastic dispenser casing with indication of remaining length.
- h) Buckles should be supplied in plastic bags containing 100 pcs per bag.

6. MARKING

Each product shall be clearly identified with manufacturer name or trade mark, reference and capacity of the item and batch no. and suitable identification marking of the property "TPCODL/TPNODL/TPSODL/TPWODL".

The marking should be engraved/embossed.

7. TESTS

Along with the bid, the bidder must submit Type Test Reports on same fittings carried out within last 7 years from the date of opening of techno-commercial bid of the tender CPRI/ERDA/Any Govt Lab that is NABL accredited.

8. TYPE TESTS CERTIFICATE

8.1 Type Test

The following shall constitute Type Tests for IPC:

- a. Electrical Ageing Test
- b. Dielectric and Water Tightness Test.
- c. Mechanical Tightening Test
- d. Effect of Tightening on main Core
- e. Effect of Tightening on Branch core
- f. Over-current Test (if applicable)

The following shall be Type Test for Suspension Assembly (SA)

- a. Mechanical Test
- b. Voltage Test
- c. Climatic Aging Test
- d. Corrosion Test

The following shall be Type Tests for Anchoring Assemblies (AA)

- a. Mechanical Test
- b. Voltage Test
- c. Dynamic Test
- d. Climatic Aging Test
- e. Corrosion Test

8.2 Acceptance Tests

The following shall constitute Acceptance Tests for Insulation Piercing Connectors (IPC)

- a. Visual *
- b. Dimensional (as per SCD and overall dimensions submitted with Tender Offer) *
- c. Dielectric and Water Tightness Test. **
- d. Mechanical Tightening Test **
- e. Effect of Tightening on Main Core **
- f. Effect of Tightening on Branch Core **

The above tests are to be carried out as per sampling plan below. However, the electrical ageing test on IPC (market***) is to be done on only one connector of each type and size.

In case of random failure/defect, double the sample lot is to be drawn and there should be no failure/defect exceeding half the permissible defects (rounded down) shown in the chart.

| Lot Size | For tests marked* | | For tests marked** | |
|-------------|--------------------------------|-----------------------------|--------------------|-----------------------------|
| | Sample Size | Maximum Permissible defects | Sample Size | Maximum Permissible defects |
| Up to 100 | 2 | nil | 2 | nil |
| 101 to 1000 | 6 | nil | 4 | nil |
| >1001 | 0.01% subject to min. 6 pieces | 0.1% of pieces checked | 4 | nil |

The following shall constitute acceptance tests for Anchor Assemblies:

- Visual *
- Dimensional (as per SCD and overall dimensions submitted with Tender Offer) *
- Mechanical Test on Bracket**
- Mechanical Test on Clamp **
- Voltage Test *

The following shall constitute acceptance tests for Suspension Assemblies:

- Visual *
- Dimensional (as per SCD and overall dimensions submitted with Tender Offer) *
- Mechanical Test on Bracket**
- Mechanical Test on Clamp **
- Voltage Test *

The above tests (for AA & SA) are to be carried out as per sampling plan below. In case of random failure/defect, double the sample lot is to be drawn and there should be no failure/defect exceeding half the permissible defects (rounded down) shown in the chart.

| Lot Size | For tests marked* | | For tests marked** | |
|----------------|-------------------|---------------------------------|--------------------|-----------------------------|
| | Sample Size | Maximum Permissible defects | Sample Size | Maximum Permissible defects |
| Up to 100 | 2 | nil | 1 | nil |
| 101 to 1000 | 5 | 1 | 2 | nil |
| 501-2500 | 10 | 2 | 2 | nil |
| 2501 and above | 10+ 0.2% | 2+ 10% pf addl. Sample quantity | 4 | 1 |

8.3 Routine Tests:

Supplier shall provide a control plan, which will be implemented on each item. Routine test reports should be submitted by the manufacturer with inspection call.

9. PRE-DISPATCH INSPECTION

The Material shall be subject to inspection by a duly authorized representative of the TPCODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall always grant free access to the places of manufacture to TPCODL/ TPNODL/ TPSODL/ TPWODL's representatives when the work is in progress. Inspection by the TPCODL/ TPNODL/ TPSODL/ TPWODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL/ TPNODL/ TPSODL/ TPWODL. Following documents shall be sent along with material

- a. Test reports
- b. MDCC issued by TPCODL/ TPNODL/ TPSODL/ TPWODL
- c. Invoice in duplicate
- d. Packing list
- e. Drawings & catalogue
- f. Guarantee / Warrantee card
- g. Delivery Challan
- h. Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORES

The material received at TPCODL/ TPNODL/ TPSODL/ TPWODL store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering department.

11. GUARANTEE

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of at least 24 months from the date of commissioning or 36 months from the date of last supplies made under the contract whichever is later, (the time scale of 24/36 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum Performance Deposit" as the case

may be. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.

Guarantee clause is applicable for all the items covered under this specification.

12. PACKING

Supplier shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport and be packed in such a manner so as to protect the equipment from damage in transit. The material used for packing shall be environmentally friendly.

The packings of the fittings should carry the following information: -

- a. Manufacturer's name and trade-mark
- b. Name of the purchaser
- c. Batch No., date, month and year of manufacture
- d. Any other markings agreed to between the manufacturer and the Purchaser.
- e. Installation instruction should be included in packaging.

13. TENDER SAMPLE

Bidder shall submit the sample of material with the offer (in case of first supply to TPCODL/TPNODL/TPSODL/TPWODL).

14. QUALITY CONTROL

The bidder shall submit with the offer Quality Assurance Plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections. **The bidder shall ensure that the material supplied is as per the Guaranteed Technical Particulars as specified in the specifications. All bidders should preferably be ISO-9001 certified. The ABC accessories should be of proven design with minimum 2 years record of satisfactory operation with a major utility. Order copies and Performance Certificates should be enclosed with the offer.**

15. MINIMUM TESTING FACILITIES

Bidder shall have adequate in-house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

16. MANUFACTURING ACTIVITIES

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

17. SPARES, ACCESSORIES AND TOOLS

Not applicable.

18. DRAWINGS AND DOCUMENTS

Following documents shall be prepared based on TPCODL/ TPNODL/ TPSODL/ TPWODL specifications and statutory requirements with complete BOM and shall be submitted with the bid:

- Completely filled in Technical Particulars.
- General description of the equipment and all components including brochures.
- Type test Certificates
- Experience List.

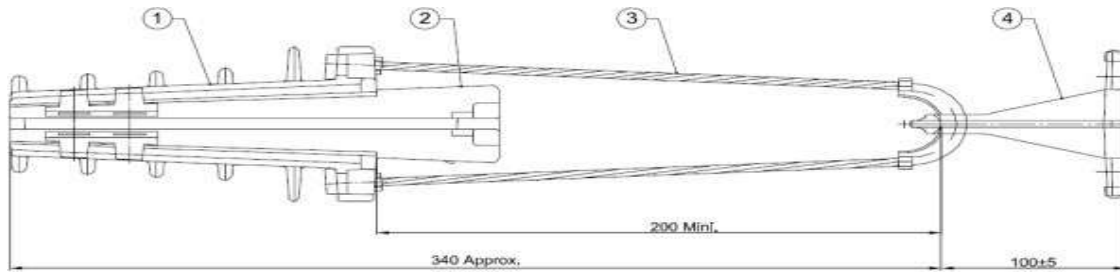
After the approval of the contract, four (4) copies of the drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy of all the drawing, GTP, test certificates shall be submitted after the final approval of the same to the purchaser.

Following Drawings/Documents shall be submitted after the award of the contract.

| S. No | Description | For Approval | For Review Information | Final Submission |
|-------|--|--------------|------------------------|------------------|
| 1 | Technical Parameters | √ | | √ |
| 2 | Manual/Catalogues/drawings for all components. | | √ | |
| 3 | Technical details and test certificates. | | √ | √ |
| 4 | Installation Instructions | | √ | √ |
| 5 | Transport/shipping dimension drawing | | √ | √ |
| 6 | QA & QC Plan | √ | √ | √ |
| 7 | Routine, Acceptance and Type test Certificates | √ | √ | √ |

All the Documents and Drawings shall be in English Language.

Instruction Manuals: Bidder shall furnish two (2) soft copies (CD) and four (4) hard copies of nicely bound manual (in English Language) covering erection and maintenance instructions and all relevant information pertaining to the main equipment as well as auxiliary devices.

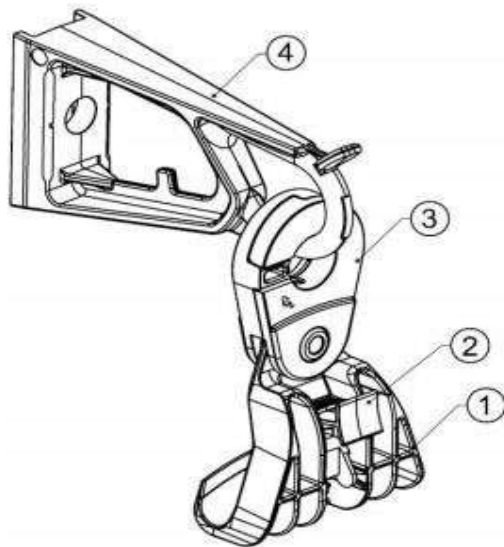


DETAILED DRAWING TO BE PROVIDED

| Sl.no | Description | Qty | UoM |
|-------|-------------|-----|-----|
| 1 | Body | 1 | Nos |
| 2 | wedge | 1 | Nos |
| 3 | Assembly | 1 | Nos |
| 4 | Bracket | 1 | Nos |

FIG.1: - ANCHOR CLAMP ASSEMBLY

DETAILED DRAWING TO BE PROVIDED



| Sl.no | Description | Qty | UoM |
|-------|---------------|-----|-----|
| 1 | Clamp Body | 1 | Nos |
| 2 | Closing lever | 1 | Nos |
| 3 | Mobile Link | 1 | Set |
| 4 | Bracket | 1 | Nos |

FIG.2: -SUSPENSION CLAMP ASSEMBLY

TPC⚡**ODL**
TPW⚡**ODL**

TPN⚡**ODL**
TPS⚡**ODL**

Specification No: [ENG-LV-3003](#)

Specification Name:

Specification for Accessories of LT AB cables
(Insulated Messenger)

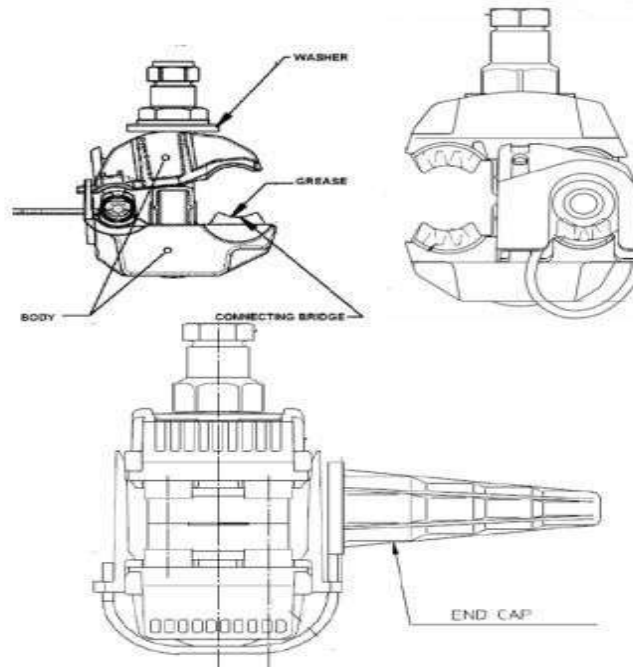


FIG.3: - INSULATING PIERCING CONNECTOR

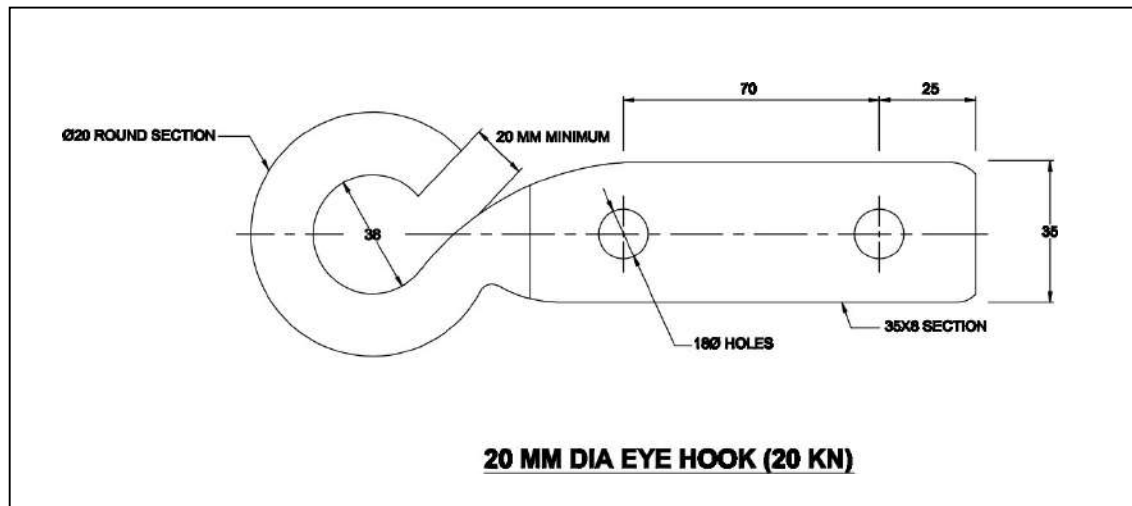


FIG.4: - EYE HOOK WITH POLE FIXING CLAMP

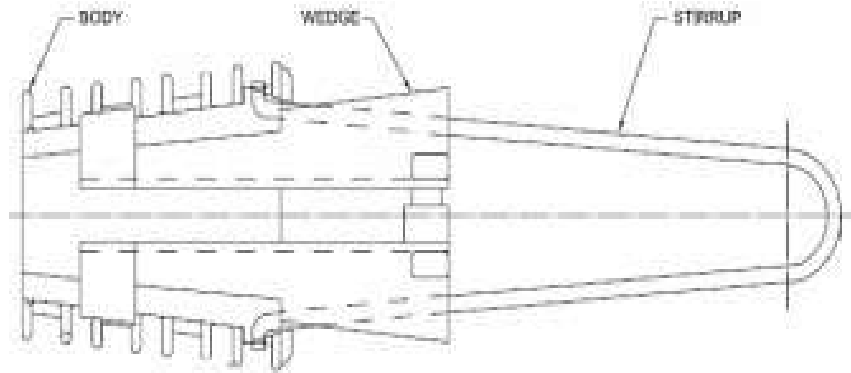


FIG.5: -SERVICE CLAMPS

19. GUARANTEED TECHNICAL PARTICULARS

The GTP is to be furnished by the Bidder as mentioned in clause 4 & clause 5.

20. SCHEDULE OF DEVIATIONS

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

| SL. No | Clause No. | Details of deviation with justifications |
|--------|------------|--|
| | | |

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation