STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-HV-2024

Specification Name : Technical Specification For HT Stay set including Clamp

| SAYANTANI DAS | MILAN MAITY | SANTOSH KUMAR PATRA | Susavan Biswas | KHAJAN BHARDWAJ | POURUSH GARG |
|------------------|----------------|------------------------|-------------------|--------------------|-----------------|
| Prepared by | Reviewed by | Reviewed by | Reviewed by | Approved by | Released by |
| TPCODL | TPNODL | TPWODL | TPSODL | TPCODL | TPCODL |
| 16-02-2023 | 16-02-2023 | 21-02-2023 | 21-02-2023 | 22-02-2023 | 23-02-2023 |

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Specification No: ENG-HV-2024

Specification Name: Technical Specification of HT Stay Set including Clamps

CONTENTS

- 1. SCOPE
- 2. APPLICABLE STANDARDS
- CLIMATIC CONDITIONS OF THE INSTALLATION 3.
- 4. GENERAL TECHNICAL REQUIREMENTS
- 5. **GENERAL CONSTRUCTIONS**
- 6. MARKING
- TESTS 7.
- 8. **TYPE TEST CERTIFICATES**
- 9. **PRE-DISPATCH INSPECTION**
- INSPECTION AFTER RECEIPT AT STORES 10.
- 11. **GUARANTEE**
- 12. PACKING
- 13. **TENDER SAMPLE**
- 14. QUALITY CONTROL
- 15. **TESTING FACILITIES**
- 16. MANUFACTURING ACTIVITIES
- SPARES, ACCESSORIES AND TOOLS 17.
- 18. DRAWINGS AND DOCUMENTS
- SCHEDULE "A" GUARANTEED TECHNICAL PARTICULARS 19.
- 20. SCHEDULE "B" DEVIATIONS



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Specification Name: Technical Specification of HT Stay Set including Clamps

1. SCOPE:

This specification covers the technical requirements of design, manufacture, test at manufacturer's works, packing & forwarding, supply and unloading at stores/ site and performance of HT Stay Set.

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 |
|---------|---|
| IS 4759 | Hot Dip Galvanizing For Fabrication |
| IS 1852 | Tolerance For Raw Material |
| IS 2062 | Manufactured from raw material as per IS 2062 grade E-250 quality 'A' |

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

| 1 | Maximum ambient temperature | 50 deg C |
|----|---|---|
| 2 | Max. Daily average ambient temp | 35 deg C |
| 3 | Min Ambient Temperature | 0 deg C |
| 4 | Maximum Humidity | 95% |
| 5 | Average Annual Rainfall | 150cm |
| 6 | Average No. of rainy days per annum | 120 |
| 7 | Altitude above MSL not exceeding | 1000m |
| 8 | Wind Pressure | 300 Km/hr |
| 9 | Earthquakes of an intensity in horizontal direction | equivalent to seismic acceleration of 0.3g |
| 10 | Earthquakes of an intensity in vertical direction | equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity) |

TPCODL/ TPNODL/ TPSODL/ TPWODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed upto 300 Kmph. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS:





Specification No: ENG-HV-2024

Specification Name: Technical Specification of HT Stay Set including Clamps

| SL. NO. | TECHNICAL PARTICULARS | DESIRED VALUE |
|------------|--|---|
| 1 | Manufacturer Name & Address | To be specified by Bidder |
| 2 | Referred IS | IS: 2062, IS: 2633, IS: 2629 |
| 3 | Dimensions | |
| 4 | Anchor Rod (20mm Dia): 1 No. | |
| a) | Dia of Rod | 20mm (+ 5%, - 3%) |
| b) | Overall length of Anchor rod | 1800mm (+ 0.5%) |
| c) | Inside Dia of Rounded Eye | 40mm (+ 3%) |
| d) | Length of threaded portion | 40mm (+ 11%, - 5%) |
| e) | Size of MS Nut & Bolt, Square MS Washers confirming to IS 1387 (1967) and IS 1363 (1967) | 20mm Sq. Washer 50X 50 X 1.6mm (2No.s) |
| 5 | Anchor Plate: 1 No. | |
| a) | Size of the MS Anchor plate | 300x300x8 mm |
| b) | Dia of the hole made at the centre of the plate | 22mm |
| 6. (A) | Turn Buckle | |
| (i) | Dia of the eye bolt | 20mm (+ 3%, - 2%) |
| (ii) | Length of the eye bolt | 450mm |
| (iii) | Length of the threaded portion of the bolt | 300mm |
| (vi) | Inner dia of the circular eye made at other end of the bolt. | 40mm |
| (B) | Bow with welded Channel | |
| (i) | Dia of the MS Rod used for bow | 20mm dia |
| (ii) | Overall length and height of the bow | 995mm 450mm |
| (iii) | Magnitude of the angle in radians by which bow is bended at the top | 10 R |
| (iv) | Length and size of the GI Channel welded at the order end of the bow | 200mm & 100x50x5 mm Channel |
| (v) | Number of holes made in the GI Channel | 3 |
| (vi) | Dia of the holes | 22mm (3Nos.) |
| 7 | Thimble: 1 No. | |
| a) | Thickness of the MS Sheet used for thimble | 1.5mm |
| b) | Size of thimble | 75x22x40mm |





Specification Name: Technical Specification of HT Stay Set including Clamps

| SL. NO. | TECHNICAL PARTICULARS | DESIRED VALUE |
|------------|---|---|
| 8 | Minimum strength of the welding provides on various components of Guy/Stay Sets (IS:823/1964) | 4900Kg. |
| 9 | Average weight of finished stay set | 14.523 kg (min) / 15.569 kg (Max) |
| 10 | Surface Finish of stay set | Hot Dip Galvanized |
| 11 | All Tolerance of the dimensions/weight | ± 5% |
| 12 | Hot-Dip Galvanized, Flat (50X8) GI Flat for Stay Clamp | |
| 1 | Relevant Standard | IS: 2062, IS: 2633, IS: 2629 |
| 2 | Grade of Steel | E 250 A |
| 3 | Minimum Tensile Strength | 410 N/mm2 |
| 4 | Yield Stress | 250 N/mm2 |
| 5 | Percentage Elongation (Min.) at Gauge Length | 23% |
| 6 | Bend Test (Internal Dia) | Min-2t |
| 7 | Mass of Zinc Coating | 705 gm/m2 |
| 8 | Zinc Coating Thickness | 100 micron (6 Dip) |
| 9 | Chemical composition | Grade: E 250 (As per IS: 2062) |
| 10 | Markings/Embossing | TPCODL/ TPNODL/ TPSODL/ TPWODL, Manufacture's trademark. |

5. GENERAL CONSTRUCTION:

5.1 ANCHOR ROD WITH MS CHANNEL

Overall length of rod should be 1800 mm made out of 20 mm diameter MS rod. One end of rod to be made into a round eye having an inner diameter of 40 mm. Other end fitted with MS channel $100 \times 50 \times 5$ mm; 200 mm long. Hot Dip galvanized as per IS 4759-1996.

5.2 EYE BOLT

Eye bolt to be made of 20 mm dia MS Rod having an overall length of 450 mm. One end of the rod to be threaded up to 300 mm length. The other end of the rod shall be rounded into a circular eye of 40 mm inner dia with proper and good quality welding. Eye Bolt being a threaded fastener be hot dip galvanized as per relevant IS : 1367 (part 13) – 1983.

DRAWINGS



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Specification No: ENG-HV-2024

Specification Name: Technical Specification of HT Stay Set including Clamps

HT Stay Set :



HT Stay Clamp for WPB Pole (50x8 mm):





Specification No: ENG-HV-2024

Specification Name: Technical Specification of HT Stay Set including Clamps

HT Stay Clamp for 150x150 RSJ Pole (50x8 mm):



HT Stay Clamp for 116x100 RSJ Pole (50x8 mm):



HT Stay Clamp for 9 mtr PSC Pole (50x8 mm):





Specification Name: Technical Specification of HT Stay Set including Clamps



Specific requirements as per Tender, are to be fulfilled at the time of detailed engineering.

6. MARKING:

Following distinct non-erasable embossing to be made on each HT Stay Set and clamp Supplied to TPCODL/ TPNODL/ TPSODL/ TPWODL under this Tender.

- a) Manufacturer Name/ Trade Mark
- b) Engraved Marking (Punching before galvanization)
- c) "TPCODL/ TPNODL/ TPSODL/ TPWODL"
- d) Year of manufacturing, Country of manufacturing

7. TESTS:

The bidder shall be required to submit complete set of the following test reports along with the offer:

7.1 ACCEPTANCE TESTS





Specification Name: Technical Specification of HT Stay Set including Clamps

- i) Visual examination, Verification of dimension and marking test.
- ii) Tensile Strength.
- iii) Galvanization (Uniformity) test.

7.2 ROUTINE TESTS

Same as Acceptance Test

7.3 TYPE TESTS

- i) Chemical Composition
- ii) Mechanical Properties
- iii) Test in respect of Hot Dip Galvanization i.e. thickness of zinc coating in microns

8. TYPE TEST CERTIFICATES:

The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at **CPRI / ERDA / Other Government Labs** as per relevant IS. Type tests should have been conducted in certified during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPCODL/ TPNODL/ TPSODL/ TPWODL.

9. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPCODL/ TPNODL/ TPSODL/ TPWODL. 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 grant free access to the places of manufacture to TPCODL/ TPNODL/ TPSODL/ TPWODL's representatives at all times 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) TPCODL/ TPNODL/ TPSODL/ TPWODL Invoice in duplicate
- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card



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- g) Delivery Challan
- h) Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORE:

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

11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the 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 Company up to a period of 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the supplier or from the "Security cum Performance Deposit" as the case may be.

Galvanization Guarantee- Quality of Hot Dip Galvanization should be guaranteed for any type of damage due to harsh climatic condition for 5 Years.

12. PACKING:

Supplier shall ensure that all material covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

13. TENDER SAMPLE:

Not Applicable

14. QUALITY CONTROL:

The bidder shall submit QAP 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.

15. TESTING FACILITIES:

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

16. MANUFACTURING FACILITIES:

The successful bidder shall 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.

17. SPARES, ACCESSORIES AND TOOLS

Not applicable.

18. DRAWINGS AND DOCUMENTS:

Following drawings and documents shall be submitted in line with the requirement of Tender specifications:

- a) Completely filled in Schedule "A" Guaranteed Technical Particulars & Schedule "B" Deviations
- b) Work Experience details
- c) Type test certificates.
- d) Drawing 1 set of Hard Copy & Soft copy PDF File containing complete information about manufacturing.

19. SCHEDULE- "A" GUARANTEED TECHNICAL PARTICULARS:

| SL. NO. | TECHNICAL PARTICULARS | TO BE FURNISHED BY THE BIDDER |
|------------|--|-------------------------------|
| 1 | Manufacturer Name & Address | |
| 2 | Referred IS | |
| 3 | Dimensions | |
| 4 | Anchor Rod (20mm Dia): 1 No. | |
| a) | Dia of Rod | |
| b) | Overall length of Anchor rod | |
| c) | Inside Dia of Rounded Eye | |
| d) | Length of threaded portion | |
| e) | Size of MS Nut & Bolt, Square MS Washers confirming to IS 1387 (1967) and IS 1363 (1967) | |
| 5 | Anchor Plate: 1 No. | |
| a) | Size of the MS Anchor plate | |





Specification No: ENG-HV-2024

Specification Name: Technical Specification of HT Stay Set including Clamps

| SL. NO. | TECHNICAL PARTICULARS | TO BE FURNISHED BY THE BIDDER |
|------------|---|-------------------------------|
| b) | Dia of the hole made at the centre of the plate | |
| 6. (A) | Turn Buckle | |
| (i) | Dia of the eye bolt | |
| (ii) | Length of the eye bolt | |
| (iii) | Length of the threaded portion of the bolt | |
| (vi) | Inner dia of the circular eye made at other end of the bolt. | |
| (B) | Bow with welded Channel | |
| (i) | Dia of the MS Rod used for bow | |
| (ii) | Overall length and height of the bow | |
| (iii) | Magnitude of the angle in radians by which bow is bended at the top | |
| (iv) | Length and size of the GI channel welded at the order end of the bow | |
| (v) | Number of holes made in the GI Channel | |
| (vi) | Dia of the holes | |
| 7 | Thimble: 1 No. | |
| a) | Thickness of the MS Sheet used for thimble | |
| b) | Size of thimble | |
| 8 | Minimum strength of the welding provides on various components of Guy/Stay Sets (IS:823/1964) | |
| 9 | Average weight of finished stay set | |
| 10 | Surface Finish of stay set | |
| 11 | All Tolerance of the dimensions/weight | |
| 12 | Hot-Dip Galvanized, Flat (50X8) GI Flat for Stay Clamp | |
| 1 | Relevant Standard | |
| 2 | Grade of Steel | |
| 3 | Minimum Tensile Strength | |
| 4 | Yield Stress | |
| 5 | Percentage Elongation (Min.) at Gauge Length | |
| 6 | Bend Test (Internal Dia) | |
| 7 | Mass of Zinc Coating | |
| 8 | Zinc Coating Thickness | |





Specification Name: Technical Specification of HT Stay Set including Clamps

| SL. NO. | TECHNICAL PARTICULARS | TO BE FURNISHED BY THE BIDDER |
|------------|-----------------------|-------------------------------|
| 9 | Chemical composition | |
| 10 | Markings/Embossing | |

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20. SCHEDULE "B" 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 |
|---------|------------|--|
| | | |
| | | |
| | | |
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| | | |
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| | | |
| | | |

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

Seal of the Company:

Signature

Designation

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-LV-3019

Specification Name : Technical Specification For LT Stay set including Clamp

| SAYANTANI DAS | MILAN MAITY | SANTOSH KUMAR PATRA | Susavan Biswas | KHAJAN BHARDWAJ | POURUSH GARG |
|------------------|----------------|------------------------|-------------------|--------------------|-----------------|
| Prepared by | Reviewed by | Reviewed by | Reviewed by | Approved by | Released by |
| TPCODL | TPNODL | TPWODL | TPSODL | TPCODL | TPCODL |
| 16-02-2023 | 16-02-2023 | 21-02-2023 | 21-02-2023 | 22-02-2023 | 23-02-2023 |

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Specification Name: Technical Specification of LT Stay Set including Clamps

CONTENTS

- 1. SCOPE
- 2. APPLICABLE STANDARDS
- 3. CLIMATIC CONDITIONS OF THE INSTALLATION
- 4. GENERAL TECHNICAL REQUIREMENTS
- 5. GENERAL CONSTRUCTIONS
- 6. MARKING
- 7. TESTS
- 8. TYPE TEST CERTIFICATES
- 9. PRE-DISPATCH INSPECTION
- 10. INSPECTION AFTER RECEIPT AT STORES
- **11.** GUARANTEE
- 12. PACKING
- 13. TENDER SAMPLE
- 14. QUALITY CONTROL
- **15.** TESTING FACILITIES
- 16. MANUFACTURING ACTIVITIES
- 17. SPARES, ACCESSORIES AND TOOLS
- **18.** DRAWINGS AND DOCUMENTS
- **19.** SCHEDULE "A" GUARANTEED TECHNICAL PARTICULARS
- 20. SCHEDULE "B" DEVIATIONS



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1. SCOPE:

This specification covers the technical requirements of design, manufacture, test at manufacturer's works, packing & forwarding, supply and unloading at stores/ site and performance of LT Stay Set.

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:

| IS Ref. | Description |
|---------|---|
| IS 4759 | Hot Dip Galvanizing For Fabrication |
| IS 1852 | Tolerance For Raw Material |
| IS 2062 | Manufactured from raw material as per IS 2062 grade E-250 quality 'A' |

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

| 1 | Maximum ambient temperature | 50 deg C |
|----|---|---|
| 2 | Max. Daily average ambient temp | 35 deg C |
| 3 | Min Ambient Temperature | 0 deg C |
| 4 | Maximum Humidity | 95% |
| 5 | Average Annual Rainfall | 150cm |
| 6 | Average No. of rainy days per annum | 120 |
| 7 | Altitude above MSL not exceeding | 1000m |
| 8 | Wind Speed | 300 Km/hr |
| 9 | Earthquakes of an intensity in horizontal direction | equivalent to seismic acceleration of 0.3g |
| 10 | Earthquakes of an intensity in vertical direction | equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity) |

TPCODL/ TPNODL/ TPSODL/ TPWODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed upto 300 Kmph. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months.



Specification Name: Technical Specification of LT Stay Set including Clamps

4. GENERAL TECHNICAL REQUIREMENTS:

| SL. NO. | TECHNICAL PARTICULARS | DESIRED VALUE | |
|------------|--|---|--|
| 1 | Manufacturer Name & Address | To be specified by Bidder | |
| 2 | Relevant Standard | IS: 2062, IS: 2633, IS: 2629 | |
| 3 | Dimensions | | |
| 4 | Anchor Rod (16mm Dia.): 1 No. | | |
| a) | Dia. of Rod | 16mm (+ 5%, - 3%) | |
| b) | Overall length of Anchor rod | 1800mm (+ 0.5%) | |
| c) | Inside Dia. of Rounded Eye | 40mm (+ 3%) | |
| d) | Length of threaded portion | 40mm (+ 11%, - 5%) | |
| e) | Size of MS Nut Bolt, Square MS Washers confirming lo IS 1387 (1967) and IS 1363 (1967) | 16mm Sq. Washer 40X40X1.6mm (2 No.s) | |
| 5 | Anchor Plate: 1 No. | | |
| a) | Size of the MS Anchor plate | 200x200x6 mm | |
| b) | Dia of the hole made at the centre of the plate | 18mm | |
| 6. (A) | Turn Buckle | | |
| (i) | Dia of the eye bolt | 16mm (+ 5%, - 3%) | |
| (ii) | Length of the eye bolt | 450mm | |
| (iii) | Length of the threaded portion of the bolt | 300mm | |
| (vi) | Inner dia of the circular eye made at other end of the bolt. | 40mm | |
| (B) | Bow with welded Angel | | |
| (i) | Dia of the MS Rod used for bow | 16mm dia | |
| (ii) | Overall length and height of the bow | 995mm 450mm | |
| (iii) | Magnitude of the angle in radians by which bow is bended at the top | 10 R | |
| (iv) | Length and size of the GI Angle welded at the order end of the bow | 180mm & & & & & & & & & & & & & & & & & & | |
| (v) | Number of holes made in the GI Angle | 3 | |
| (vi) | Dia of the holes | 18mm (3Nos.) | |
| 7 | Thimble: 1 No. | | |
| a) | Thickness of the MS Sheet used for thimble | 1.5mm | |
| b) | Size of thimble | 75x22x40mm | |
| 8 | Minimum strength of the welding provide on various components of Guy/Stay Sets (IS:823/1964) | 3100Kg. | |
| 9 | Average weight of finished stay set | 7.702 kg (min) / 8.445 kg (Max) | |
| 10 | Surface Finish of stay set | Hot Dip Galvanized | |
| 11 | All Tolerance of the dimensions/weight | ± 5% | |
| 12 | Hot-Dip Galvanized, Flat (50X6) GI Flat for Stay Clamp | | |
| 1 | Relevant Standard | IS: 2062, IS: 2633, IS: 2629 | |
| 2 | Grade of Steel | E 250 A | |





Specification No: ENG-LV-3019

Specification Name: Technical Specification of LT Stay Set including Clamps

| SL. NO. | TECHNICAL PARTICULARS | DESIRED VALUE | |
|------------|--|--|--|
| 3 | Minimum Tensile Strength | 410 N/mm2 | |
| 4 | Yield Stress | 250 N/mm2 | |
| 5 | Percentage Elongation (Min.) at Gauge Length | 23% | |
| 6 | Bend Test (Internal Dia) | Min-2t | |
| 7 | Mass of Zinc Coating | 705 gm/m2 | |
| 8 | Zinc Coating Thickness | 100 micron (6 Dip) | |
| 9 | Chemical composition | Grade: E 250 (As per IS: 2062) | |
| 10 | Markings/Embossing | TPCODL/ TPNODL/ TPSODL/ TPWODL, Manufacture's trademark. | |

5. GENERAL CONSTRUCTION:

5.1 ANCHOR ROD WITH MS ANGLE

Overall length of rod should be 1800 mm made out of 16 mm diameter MS rod. One end of rod to be made into a round eye having an inner diameter of 40 mm with best quality welding. Other end fitted with MS Angle 50 x 50 x 6 mm; 180 mm long. Hot Dip galvanized as per IS 4759-1996.

5.2 EYE-BOLT

Eye-bolt to be made of 16 mm dia MS Rod having an overall length of 450 mm. One end of the rod to be threaded up to 300 mm length. The other end of the rod shall be rounded into a circular eye of 40 mm inner dia with proper and good quality welding. Tension screw central part shall be one piece forging. Eye bolt being a threaded fastener be hot dip galvanized as per relevant IS : 1367 (part 13) – 1983.

6. MARKING:

Following distinct non-erasable embossing to be made on each LT Stay Set and clamp Supplied to TPCODL/ TPNODL/ TPSODL/ TPWODL under this Tender.

- a) Manufacturer Name/ Trade Mark
- b) Engraved Marking (Punching before galvanization)
- c) "TPCODL/ TPNODL/ TPSODL/ TPWODL"
- d) Year of manufacturing, Country of manufacturing

7. TESTS:

The bidder shall be required to submit complete set of the following test reports along with the offer:

Specification Name: Technical Specification of LT Stay Set including Clamps

7.1 ACCEPTANCE TESTS

- i) Visual examination, Verification of dimension and marking test.
- ii) Tensile Strength.
- iii) Galvanization (Uniformity) test.

7.2 ROUTINE TESTS

Same as Acceptance Test

7.3 TYPE TESTS

- i) Chemical Composition
- ii) Mechanical Properties
- iii) Test in respect of Hot Dip Galvanization i.e. thickness of zinc coating in microns

8. TYPE TEST CERTIFICATES:

The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at **CPRI / ERDA / Other Government Labs** as per relevant IS. Type tests should have been conducted during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPCODL/ TPNODL/ TPSODL/ TPWODL.

9. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPCODL/ TPNODL/ TPSODL/ TPWODL. 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 grant free access to the places of manufacture to TPCODL/ TPNODL/ TPSODL/ TPWODL's representatives at all times when the work is in progress. Inspection by the TPCODL/ TPNODL/ 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) TPCODL/ TPNODL/ TPSODL/ TPWODL Invoice in duplicate
- d) Packing list



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Specification Name: Technical Specification of LT Stay Set including Clamps

- e) Drawings & catalogue
- f) Guarantee / Warrantee card
- g) Delivery Challan
- h) Other Documents (as applicable).

10. INSPECTION AFTER RECEIPT AT STORE:

The material received at TPCODL/ TPNODL/ TPSODL/ TPWODL, Odisha 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 Engineering department.

11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the 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 Company up to a period of 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the supplier or from the "Security cum Performance Deposit" as the case may be.

Galvanization Guarantee- Quality of Hot Dip Galvanization should be guaranteed for any type of damage due to harsh climatic condition for 5 Years.

12. PACKING:

Supplier shall ensure that all material covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

13. TENDER SAMPLE:

Not Applicable

14. QUALITY CONTROL:

The bidder shall submit QAP indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during

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TPNØDL TPSØDL

Specification Name: Technical Specification of LT Stay Set including Clamps

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.

15. TESTING FACILITIES:

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

16. MANUFACTURING FACILITIES:

The successful bidder shall 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.

17. SPARES, ACCESSORIES AND TOOLS

Not applicable.

18. DRAWINGS AND DOCUMENTS:

Following drawings and documents shall be submitted in line with the requirement of Tender specifications:

- a) Completely filled in Schedule "A" Guaranteed Technical Particulars & Schedule "B" Deviations
- b) Work Experience details
- c) Type test certificates.
- d) Drawing 1 set of Hard Copy & Soft copy PDF File containing complete information about manufacturing.





Specification No: ENG-LV-3019

Specification Name: Technical Specification of LT Stay Set including Clamps

DRAWINGS

LT Stay Set :





Specification Name: Technical Specification of LT Stay Set including Clamps

LT Stay Clamp for 9 mtr PSC Pole (50x6 mm):







Specification Name: Technical Specification of LT Stay Set including Clamps

LT Stay Clamp for 8 mtr PSC Pole (50x6 mm):



Specific requirements as per Tender, are to be fulfilled at the time of detailed engineering.

19. SCHEDULE- "A" GUARANTEED TECHNICAL PARTICULARS:

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| SL. NO. | TECHNICAL PARTICULARS | DESIRED VALUE |
|------------|--|---------------|
| 1 | Manufacturer Name & Address | |
| 2 | Relevant Standard | |
| 3 | Dimensions | |
| 4 | Anchor Rod (16mm Dia.): 1 No. | |
| a) | Dia. of Rod | |
| b) | Overall length of Anchor rod | |
| c) | Inside Dia. of Rounded Eye | |
| d) | Length of threaded portion | |
| e) | Size of MS Nut Bolt, Square MS Washers confirming lo IS 1387 (1967) and IS 1363 (1967) | |
| 5 | Anchor Plate: 1 No. | |
| a) | Size of the MS Anchor plate | |
| b) | Dia of the hole made at the centre of the plate | |
| 6. (A) | Turn Buckle | |
| (i) | Dia of the eye bolt | |
| (ii) | Length of the eye bolt | |
| (iii) | Length of the threaded portion of the bolt | |
| (vi) | Inner dia of the circular eye made at other end of the bolt. | |
| (B) | Bow with welded angle | |





Specification No: ENG-LV-3019

Specification Name: Technical Specification of LT Stay Set including Clamps

| SL. NO. | TECHNICAL PARTICULARS | DESIRED VALUE |
|------------|--|---------------|
| (i) | Dia of the MS Rod used for bow | |
| (ii) | Overall length and height of the bow | |
| (iii) | Magnitude of the angle in radians by which bow is bended at the top | |
| (iv) | Length and size of the GI Angle welded at the order end of the bow | |
| (v) | Number of holes made in the GI angle | |
| (vi) | Dia of the holes | |
| 7 | Thimble: 1 No. | |
| a) | Thickness of the MS Sheet used for thimble | |
| b) | Size of thimble | |
| 8 | Minimum strength of the welding provide on various components of Guy/Stay Sets (IS:823/1964) | |
| 9 | Average weight of finished stay set | |
| 10 | Surface Finish of stay set | |
| 8 | Hot-Dip Galvanized, Flat (50X6) Gl Flat for Stay Clamp | |
| 1 | Relevant Standard | |
| 2 | Grade of Steel | |
| 3 | Minimum Tensile Strength | |
| 4 | Yield Stress | |
| 5 | Percentage Elongation (Min.) at Gauge Length | |
| 6 | Bend Test (Internal Dia) | |
| 7 | Mass of Zinc Coating | |
| 8 | Zinc Coating Thickness | |
| 9 | Chemical composition | |
| 10 | Markings/Embossing | |

20. SCHEDULE "B" DEVIATIONS:

(TO BE ENCLOSED WITH TECHNICAL BID)



Specification Name: Technical Specification of LT Stay Set including Clamps

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

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-EHV-1034

Specification Name : Technical Specification For V cross Arm 33 KV

| Prepared by | Reviewed by | Reviewed by | Reviewed by | Approved by | Released by |
|----------------|----------------|--------------|--------------------|-----------------|--------------|
| BARSHA BANDITA | DEEPAK BADATYA | K GOVINDARAJ | Ranjan Kumar Sahoo | KHAJAN BHARDWAJ | POURUSH GARG |
| TPCODL | TPNODL | TPWODL | TPSODL | TPCODL | TPCODL |
| 03-04-2023 | 17-04-2023 | 28-04-2023 | 29-04-2023 | 26-05-2023 | 22-06-2023 |

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Specification Name: Technical Specification For V cross arm 33KV

CONTENTS

- 1. SCOPE
- **2.** APPLICABLE STANDARDS
- 3. CLIMATIC CONDITIONS OF THE INSTALLATION
- 4. GENERAL TECHNICAL REQUIREMENTS
- 5. GENERAL CONSTRUCTIONS
- 6. MARKING
- 7. TESTS
- 8. TYPE TEST CERTIFICATES
- 9. PRE-DISPATCH INSPECTION
- **10.** INSPECTION AFTER RECEIPT AT STORES
- **11.** GUARANTEE
- 12. PACKING
- **13.** TENDER SAMPLE
- **14.** QUALITY CONTROL
- **15.** TESTING FACILITIES
- 16. MANUFACTURING ACTIVITIES
- **17.** SPARES, ACCESSORIES AND TOOLS
- 18. DRAWINGS AND DOCUMENTS
- 19. SCHEDULE "A" GUARANTEED TECHNICAL PARTICULARS
- **20.** SCHEDULE "B" DEVIATIONS

Technical Specification For V cross arm 33KV

Specification Name:

1. SCOPE:

This specification covers the design, manufacture, testing and supply of 33kV GI V Cross Arm to be used in Structures. Scope also includes transportation & unloading at store / site.

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:

| IS 2062 | Hot Rolled Medium and High Tensile Structural Steel |
|---------|---|
| IS 1852 | Rolling and Cutting Tolerances for Hot Rolled Steel products |
| IS 2633 | Methods for testing uniformity of coating of zinc coated articles |
| IS 4759 | Hot-dip zinc coatings on structural steel and other allied products |
| IS 6745 | Method for determination of mass of zinc coating on zinc coated iron and steel articles |

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

| SL.NO. | CONDTIONS | 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. Ccm/W |
| 12 | Wind Pressure | 126 kg/sq. m up to an elevation of 10 meter. |



Specification Name:

Technical Specification For V cross arm 33KV

| SL.NO. | CONDTIONS | VALUES |
|--------|--|---|
| 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. |

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TPCODL/TPNODL/TPSODL/ TPWODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed up to 300 Km ph. 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:

| SL. NO. | TECHNICAL PARTICULARS | DESIRED VALUE |
|---------|---|--|
| 1 | Materials | 100X50X5 mm Channel , 65X65X6 mm Angle |
| 2 | Galvanisation process | Hot-Dip Galvanized |
| 3 | Relevant Standard | IS: 2062, IS: 2633, IS: 2629, TPCO-OTH-010. |
| 4 | Make | SAIL, JINDAL, RINL & TATA (Billet with re rolling not allowed) |
| 5 | Weight of Cross Arm | 20 KG (Approx.) |
| 6 | Grade of Steel | E 250 A |
| 7 | Minimum Tensile Strength | 410 N/mm ² |
| 8 | Yield Stress | 250 N/mm ² |
| 9 | Percentage Elongation (Min.) at Gauge Length | 23% |
| 10 | Bend Test (Internal Dia) | Min-2t |
| 11 | Mass of Zinc Coating | Min 705 gm/m ² |
| 12 | Zinc Coating Thickness | Min 100 micron (6 Dip) |
| 13 | Chemical composition | Grade: E 250 A (As per IS: 2062) |
| 14 | Tolerance | As per IS 1852 latest amendment |

5. GENERAL CONSTRUCTION:

The Chemical composition and Physical properties of the finished material shall be as per the equivalent standards. Chemical Composition and Physical Properties shall conforming to IS: 2062. The approved makes are SAIL, JINDAL, RINL & TATA (Billet with re rolling not allowed).

Specification Name: Technical Specification For V cross arm 33KV

5.1 CHEMICAL COMPOSITION

Chemical composition for 250 A Grade

- a) C 0.23% Max
- b) Mn 1.5% Max
- c) S 0.045% Max
- d) P 0.045% Max
- e) SI 0.40% Max
- f) CE (Carbon Equivalent)- 0.42%

5.2 Galvanization:

All 33kV V Cross Arms shall be hot dip galvanized, are as following:

- a) All galvanizing shall be carried out by the hot dip process, in accordance with Specification IS 2629.
- b) The zinc coating (Min 705 gms per sq.mt / 100 Micron, 6 Dips) shall be smooth, continuous and uniform. It shall be free from acid spot and shall not scale, blister or be removable by handling or packing.
- c) There shall be no impurities in the zinc or additives to the galvanic bath which could have a detrimental effect on the durability of the zinc coating. Purity of zinc shall be Zn 99.95% or better.
- d) In the event of damage to the galvanizing the method used for repair shall be subject to the approval of the Engineer in Charge or that of his representative. Repair of galvanization at site will not be permitted in any situation.
- e) Partial immersion of the work shall not be permitted and the galvanizing tank must therefore be sufficiently large to permit galvanizing to be carried out by one immersion.
- f) After galvanizing no drilling or welding shall be performed on the galvanized parts. To avoid the formation of white rust galvanized materials shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization. The galvanized steel shall be subjected to test as per IS-2633.
- g) Quality of Hot Dip Galvanization should comply with IS 2629, ISO 1461 & should be guaranteed for any type of damage due to harsh climatic condition for 5 Years. These V Cross Arms are to be used in coastal areas of Odisha where climate is hot, humid & saline. These areas are prone to flood & frequent rainfall.



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6. MARKING:

Following distinct non-erasable embossing is to be made on each Channel and Angles to be supplied to TPCODL/TPWODL/TPNODL/TPSODL under this Tender.

a) Manufacturer Name/ Trade Mark

Engraved Marking (Punching before galvanization)

- a) "TPCODL/TPWODL/TPNODL/TPSODL"
- b) Year of manufacturing
- c) PO Number

7. TESTS:

The bidder shall be required to submit complete set of the following test reports along with the offer:

7.1 ACCEPTANCE TESTS

- i) Chemical Composition
- ii) Mechanical Properties
- iii) Dimension Test & Weight (kg/M) Visual Examination,
- iv) Test in respect of Hot Dip Galvanization i.e. Thickness of zinc coating in microns

7.2 ROUTINE TESTS

Same as Acceptance Test

7.3 TYPE TESTS

- i) Chemical Composition
- ii) Mechanical Properties
- iii) Test in respect of Hot Dip Galvanization i.e. thickness of zinc coating in microns

8. TYPE TEST CERTIFICATES:

The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at **CPRI/ERDA/Other Govt. Lab** as per relevant IS. However, TPCODL/ TPWODL/ TPNODL/ TPSODL. TATA-POWER reserves the right to allow any other NABL accredited/ Govt. lab report under exceptional circumstances after due diligence/ scrutiny by DISCOM. Type tests should have been conducted during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPCODL/ TPWODL/ TPSODL.

9. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPCODL/TPWODL/TPNODL/TPSODL. 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 grant free access to the places of manufacture to TPCODL/TPWODL/TPNODL/TPSODL's representatives at all times when the work is in progress. Inspection by the TPCODL/TPWODL/TPNODL/TPNODL/TPSODL 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/TPWODL/TPNODL/TPSODL.

Following documents shall be sent along with material.

- a) Test reports
- b) MDCC issued by TPCODL/TPWODL/TPNODL/TPSODL
- c) TPCODL/TPWODL/TPNODL/TPSODL 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 STORE:

The material received at TPCODL/TPWODL/TPNODL/TPSODL, Odisha 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 Engineering department.

11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the 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 Company up to a period of 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the supplier or from the "Security cum Performance Deposit" as the case may be.

Galvanization Guarantee- Quality of Hot Dip Galvanization should be guaranteed for any type of damage due to harsh climatic condition for 5 Years.

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12. PACKING:

Supplier shall ensure that all material covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

13. TENDER SAMPLE:

The Bidder shall provide 1 no. sample of the product. The product will be accepted only if it meets all specifications as defined in the document.

14. QUALITY CONTROL:

The bidder shall submit QAP 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.

15. TESTING FACILITIES:

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

16. MANUFACTURING FACILITIES:

The bidder shall get the approved drawing and GTP before start of manufacturing activity. The successful bidder will have to submit details of the offered design & components for approval as per specification. CAT-A/CAT-B is mandatory to start manufacturing.

17. SPARES, ACCESSORIES AND TOOLS

Not applicable.

18. DRAWINGS AND DOCUMENTS:

Following drawings and documents shall be submitted in line with the requirement of Tender specifications:

- a) Completely filled-in clause wise compliance of the specification
- b) Schedule "B" Deviations
- c) Work Experience details
- d) Type test certificates.
- e) Drawing 1 set of Hard Copy & Soft copy PDF File containing complete information about manufacturing.





Specification No: ENG-EHV-1034

Specification Name:

Technical Specification For V cross arm 33KV



OPTION1:- Arrangement in WPB Pole



OPTION2:- Arrangement in 9 Mtr. PSC Pole





Specification Name:

Technical Specification For V cross arm 33KV



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OPTION 3:- Arrangement in RSJ Pole



OPTION 4:- Arrangement in WPB Pole

Note:- The drawing is for tender purpose only and indicative in nature & will be finalized during detailed engineering


19. SCHEDULE- "A" GUARANTEED TECHNICAL PARTICULARS:

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Bidder to submit completely clause wise compliance of this specification.

20. SCHEDULE "B" 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:

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

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

Seal of the Company:

Signature

Designation

TPSØDL

TP SOUTHERN ODISHA DISTRIBUITION LIMITED, BERHAMPUR

TECHNICAL SPECIFICATION

| Doc. Title | Technical Specification of F | Clamp for 11KV Line Poles | |
|--------------|------------------------------|---------------------------|-----------------------|
| Doc. No | ENG-HV-11KV F Clamp | | Eff. Date: 01/03/2021 |
| Rev. No | 00 | | Page 1 of 7 |
| Prepared by: | Reviewed by: | Approved By: | Issued By: |

CONTENTS

- **1.** SCOPE
- **2.** APPLICABLE STANDARDS
- 3. CLIMATIC CONDITIONS OF THE INSTALLATION
- 4. GENERAL TECHNICAL REQUIREMENTS
- 5. GENERAL CONSTRUCTIONS
- 6. MARKING
- 7. TESTS
- 8. TYPE TEST CERTIFICATES
- 9. PRE-DISPATCH INSPECTION
- **10.** INSPECTION AFTER RECEIPT AT STORES
- **11.** GUARANTEE
- 12. PACKING
- **13.** TENDER SAMPLE
- 14. QUALITY CONTROL
- **15.** MINIMUM TESTING FACILITIES
- **16.** MANUFACTURING ACTIVITIES
- **17.** SPARES, ACCESSORIES AND TOOLS
- **18.** DRAWINGS AND DOCUMENTS
- **19.** GUARANTEED TECHNICAL PARTICULARS
- 20. SCHEDULE OF DEVIATIONS

| | Initiator HOG (ENGINEERING) |
|--|-----------------------------|
|--|-----------------------------|

| TOCODI | TP SOUTH | IERN ODISHA DISTRIBUIT | ION LIMITED, BERHAMPUR |
|--------------|-------------------------|-------------------------------|------------------------|
| IPSOUL | TECHNICAL SPECIFICATION | | |
| Doc. Title | Technical Specification | of F Clamp for 11KV Line Pole | 25 |
| Doc. No | ENG-HV-029 | | Eff. Date: 01/03/2021 |
| Rev. No | 00 | | Page 2 of 7 |
| Prepared by: | Reviewed by: | Approved By: | Issued By: |

1.0 SCOPE

The scope of this document is to give design & constructional features, inspection, supply and transportation guidelines for 11KV F Clamp.

2.0 APPLICABLE STANDARDS

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with latest editions of the following standards/IEC and shall conform to the regulations of local statutory authorities.

- a) IS 2062:2011 For Hot rolled medium and high tensile structural steel- specification
- b) IS 1852-1985 For Rolling and cutting tolerances for hot rolled steel products
- c) IS 2629-1985 For Recommended practice for hot dip galvanized of iron and steel
- d) IS 4759-1996 For Hot dip zinc coatings on structural steel and other allied productsspecification
- e) IS 808-1989 Dimensions for Hot Rolled Steel Beam, Column, Channel and Angle Sections
- f) IS 2633-1986 Methods for testing of uniformity of coating of Zinc.

Note: Latest revision of all above stated IS shall be prevailed.

3.0 CLIMATIC CONDITIONS OF THE INSTALLATION

- a) Maximum altitude above sea level 100m
- b) Max. Ambient Temperature: 50 deg. C
- c) Max. Daily average ambient temp: 35 deg. C
- d) Min. Ambient Temperature: 0 deg. C
- e) Maximum Relative Humidity: 95%
- f) Average No. of thunderstorm days per annum:70
- g) Average Annual Rainfall: 1500 mm
- h) Average No. of rainy days per annum: 120
- i) Earthquakes of an intensity in horizontal direction equivalent to seismic acceleration of 0.3g.
- j) Earthquakes of an intensity in vertical direction equivalent to seismic acceleration of 0.15g
- k) Wind velocity: 300/hr, 200 km/hr and 160km/hr

Environmentally, some of the regions, where the work will take place includes coastal regions, subject to high relative humidity, which can give rise to condensation. On shore winds will frequently be salt laden. On occasions the combination of salt and condensation may create pollution conditions for outdoor insulators. Some places are in heavily industrial polluted areas. Therefore, Outdoor material and equipment shall be designed and protected for us in exposed, heavily polluted, salty corrosive and humid coastal atmosphere. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an

| Initiator | HOG (ENGINEERING) |
|-----------|-------------------|
|-----------|-------------------|



TP SOUTHERN ODISHA DISTRIBUITION LIMITED, BERHAMPUR

TECHNICAL SPECIFICATION

| Doc. Title | Technical Specification of F | Clamp for 11KV Line Poles | |
|--------------|------------------------------|---------------------------|-----------------------|
| Doc. No | ENG-HV-029 | | Eff. Date: 01/03/2021 |
| Rev. No | 00 | | Page 3 of 7 |
| Prepared by: | Reviewed by: | Approved By: | Issued By: |

acceleration of 0.1g.

4.0 GENERAL TECHNICAL REQUIREMENTS & CONSTRUCTIONS

| Sl.No. | Constructional Features | Specified |
|--------|-------------------------------------|-----------------|
| | Mechanical Properties | As per IS:2062 |
| | | Grade:A |
| 1 | Material used | MS Flat 50X8 mm |
| | | |
| | | |
| 2 | Overall height | 400 mm |
| 3 | Flange Width | 50 mm |
| 4 | Spacing of 2 nos of 18 mm holes for | 100mm |
| | fixing on pole top | |
| 5 | Galvanization | Hot dip |
| 6 | Drawing | enclosed |



5.0 MARKING

The unit shall be appropriately marked as **"PROPERTY OF TPSODL, BERHAMPUR"** and with the name of the vendor and year of manufacturing at suitable location.

6.0 TESTS

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All components shall also be type tested as per the relevant standards.

| | Initiator | | HOG (ENGINEERING) | |
|--|-----------|--|-------------------|--|
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| TOCODI | TP SOUTHER | N ODISHA DISTRIBUITION L | IMITED, BERHAMPUR |
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| IPSQUL | TECHNICAL SPECIFICATION | | |
| Doc. Title | Technical Specification of F | Clamp for 11KV Line Poles | |
| Doc. No | ENG-HV-029 | | Eff. Date: 01/03/2021 |
| Rev. No | 00 | | Page 4 of 7 |
| Prepared by: | Reviewed by: | Approved By: | Issued By: |
| | 1 | | 1 |

| | IS to be referred |
|---------------------|--------------------|
| Tests | |
| Visual test | As a routine test |
| Dimensional tests | As per the drawing |
| Tensile strength | IS 2062 |
| Bend test | IS 2062 |
| Impact test | IS 2062 |
| Hot dip galvanizing | IS 4759 : 1996 |

7.0 TYPE TEST CERTIFICATES

The bidder shall furnish the type test certificates of the V Cross Arm for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at NABL accredited labs as per the relevant standards. Type tests should have been conducted during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPSODL.

8.0 PRE-DISPATCH INSPECTION

Equipment shall be subjected to inspection by a duly authorized representative of TPSODL. 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 grant free access to the places of manufacture to TPSODL's representatives at all times when the work is in progress. Inspection by TPSODL 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 TPSODL.

Following documents shall be sent along with material.

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

9.0 INSPECTION AFTER RECEIPT AT STORES

The material received at TPSODL, Berhampur, Odisha 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

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TECHNICAL SPECIFICATION

| Doc. Title | Technical Specification of F | Clamp for 11KV Line Poles | |
|--------------|------------------------------|---------------------------|-----------------------|
| Doc. No | ENG-HV-029 | | Eff. Date: 01/03/2021 |
| Rev. No | 00 | | Page 5 of 7 |
| Prepared by: | Reviewed by: | Approved By: | Issued By: |

report shall be sent to Engineering and contracts department.

10.0 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 Company up to a period of at least 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract whichever is later. In the event any defect is found by the Company up to a period of 12 months from the date of commissioning or 24months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs.

11.0 PACKING

Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.

12.0 TENDER SAMPLE

Bidder shall submit the sample of material with the offer at TPSODL Engineering Dept.

13.0 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. TPSODL's engineer or its nominated representative shall have free access to the manufacturer's/subsupplier's works to carry out inspections.

14.0 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

15.0 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.

16.0 SPARES, ACCESSORIES AND TOOLS

Bidder shall provide a list of recommended spares with quantity and unit prices for 3 years of operation after commissioning. The bidder shall provide a list of complete set of accessories and tools required for erection & maintenance along with the installation procedure.

17.0 DRAWINGS AND DOCUMENTS

Following drawings & documents shall be prepared based on Purchaser's specifications and statutory requirements with complete BOM and shall be submitted with the bid:

| Initiator HOG (ENGINEERING) |
|-----------------------------|
|-----------------------------|

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| Т | D | S | 6 | D | |
|---|---|---|---|---|--|
| | | 2 | | | |

TECHNICAL SPECIFICATION

| Doc. Title | | Technical Specification of F | Technical Specification of F Clamp for 11KV Line Poles | | | | |
|--------------|---------|---|--|------------|------------------|--|--|
| Doc. No | | ENG-HV-029 | ENG-HV-029 | | | | |
| Rev. No | | 00 | Page 6 of 7 | | | | |
| Prepared by: | | Reviewed by: | Approved By: | Issue | Issued By: | | |
| | Sl. No. | Description | For Approval | For Review | Final Submission | | |
| | 1 | Technical Parameters | ✓ | | ✓ | | |
| 2 | | GA Drawing | ✓ | | ✓ | | |
| | 3 | Installation Instruction | | | ✓ | | |
| 4 | | Manuals, Catalogues & Drawings | | ~ | ~ | | |
| | 5 | Dimension drawing | | ✓ | ✓ | | |
| | 6 | QA & QC Plan | ✓ | ~ | ✓ | | |
| | 7 | Routine, Acceptance & Type Test Certificates | ✓ | ~ | ~ | | |

a) General description of the equipment and all components including brochures

- b) General arrangement drawings
- c) Type Test Certificates.
- d) Experience List
- e) Manufacturing schedule and test schedule.

After 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 (Compact Disk CD) of all the drawing, 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: Drawings/documents to be submitted after the award of the contract:

18.0 **GUARANTEED TECHNICAL PARTICULARS**

| Sl.no. | Particulars | Bidder's Offer |
|--------|------------------------|----------------|
| 1 | Grade of steel | |
| 2 | Steel standard | |
| 3 | Fabrication standard | |
| 4 | Dimensions | |
| 5 | Steel section utilized | |
| 6 | Steel tensile strength | |
| 7 | Working load | |



TP SOUTHERN ODISHA DISTRIBUITION LIMITED, BERHAMPUR

TECHNICAL SPECIFICATION

| Doc. Title | | Technical Specification | Technical Specification of F Clamp for 11KV Line Poles | | | |
|--------------|----|---|--|-----------------------|--|--|
| Doc. No | | ENG-HV-029 | | Eff. Date: 01/03/2021 | | |
| Rev. No | | 00 | | Page 7 of 7 | | |
| Prepared by: | | Reviewed by: | Approved By: | Issued By: | | |
| | 8 | Details of Galvanizing m Specification | nethods utilized and Standar | d/ | | |
| 9 W | | Weight of Cross Arm | | | | |
| | 10 | Whether Drawing has b | nether Drawing has been submitted with the Bid | | | |

19.0 SCHEDULE OF DEVIATIONS

All deviations from this specification shall be set out by the bidder, clause by clause in the below mentioned tabular format. Unless specifically mentioned in this schedule, the tender shall be deemed to confirm TPDDL's Specification.

| 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

| Initiator | | HOG (ENGINEERING) | | |
|--|--|-------------------|--|--|
| Description of TDOODL Net to be seen a desident in a main size of TDOODL | | | | |

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-EHV-1008

Specification Name : ENG-ELC-072- SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR-R1

| JYOTIPRAKASH MOHANTY | SHANTAPRIYA JENA | SATYA PRASAD NAYAK | Ranjan Kumar Sahoo | VARUN BHATNAGAR | VARUN BHATNAGAR |
|-------------------------|---------------------|-----------------------|-----------------------|--------------------|--------------------|
| Prepared by | Reviewed by | Reviewed by | Reviewed by | Approved by | Released by |
| TPWODL | TPNODL | TPCODL | TPSODL | TPWODL | TPWODL |
| 10-12-2022 | 10-12-2022 | 12-12-2022 | 12-12-2022 | 13-12-2022 | 13-12-2022 |

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TPSØDL

Specification No: ENG-EHV-1008

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

CONTENTS

- 1. SCOPE
- 2. APPLICABLE STANDARDS
- 3. CLIMATIC CONDITIONS OF THE INSTALLATION
- 4. GENERAL TECHNICAL REQUIREMENTS
- 5. GENERAL CONSTRUCTIONS
- 6. MARKING
- 7. TESTS
- 8. TYPE TEST CERTIFICATES
- 9. **PRE-DISPATCH INSPECTION**
- 10. INSPECTION AFTER RECEIPT AT STORES
- **GUARANTEE** 11.
- PACKING 12.
- 13. **TENDER SAMPLE**
- 14. QUALITY CONTROL
- 15. **TESTING FACILITIES**
- 16. MANUFACTURING ACTIVITIES
- 17. SPARES, ACCESSORIES AND TOOLS
- DRAWINGS AND DOCUMENTS 18.
- 19. SCHEDULE "A" GUARANTEED TECHNICAL PARTICULARS
- 20. SCHEDULE "B" DEVIATIONS



Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

1. SCOPE

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at site/store of Accessories for All Aluminum Alloy Stranded XLPE Covered Conductors for use on 33kV Distribution System.

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 | |
|------------------------|---|--|
| EN 50397-1:2006 | Covered Conductor Specification- Up to 33 kV | |
| EN 50397-2:2006 | Covered Conductor Accessories Specification- up to 33 kV | |
| | Covered conductors for overhead lines and the related accessories | |
| EN 50397-2 | for rated voltages above 1kV a.c. and not exceeding 36kV a.c. | |
| (MARCH 2010) | PART 2: Accessories for covered conductors: tests and | |
| | acceptance criteria | |
| IS 308-1006 (Part IV) | Specification for aluminum conductors for overhead distribution | |
| 10 000.1000 (1 art 10) | purpose | |
| EN 61229 1: 2002 | Compression and mechanical connectors for power cables for rated | |
| EN 01230-1. 2003 | voltages up to 36 kV Test methods and requirements | |
| | Electric Connectors - Connectors for Use Between Aluminum-To- | |
| ANCI 0140 4 -0044 | Aluminum and Aluminum-To-Copper Conductors Designed For | |
| ANSI 0119.4 :2011 | Normal Operation At Or Below 93 °C And Copper-To-Copper | |
| | Conductors Designed for Normal Operation at Or Below 100 °C | |

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

| SL.NO. | CONDTIONS | 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 |

Specification No: ENG-EHV-1008



TPNØDLSpecification Name:
SPECIFICATION FOR ACCESSORIES OF 33kV XLPE
COVERED CONDUCTOR

| 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.

4. GENERAL TECHNICAL REQUIREMENTS:

The Accessories of 33kV XLPE Covered Conductor are specified below and shall consist of the following:

| SI. No. | Technical Parameters | Desired Values |
|---------|---|---|
| 1 | Name of the manufacturer | To be furnished by bidder |
| 2 | Applicable Standard | EN 50397-2 |
| 3 | Range of Conductor size | 50 Sq.mm to 240 Sq.mm /as per covered conductor size |
| 4 | Installation (with/without disassembly) | Ready-to-use (without disassembly) |
| 5 | Type & grade | Heat treated aluminium Alloy for Body and Weather resistant Thermoplastic for wedge/crimping type |
| 6 | Operating/Rated voltage | 33kV/36kV |
| 7 | Mechanical Strength | To be furnished by the Bidder for each type of conductor |

4.1 TENSION ASSEMBLY-WEDGE TYPE (TA)/CRIMPING TYPE



Specification No: ENG-EHV-1008

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

| 8 | Dimensions (mm) | To be furnished by bidder |
|---|-----------------|---------------------------|
| 9 | Tension Load | To be furnished by bidder |

4.2 NON-METALLIC ALIGNMENT TIES

| SI. No. | Technical Parameters | Desired Values |
|---------|--------------------------|--|
| 1 | Name of the manufacturer | To be furnished by bidder |
| 2 | Applicable Standard | EN 50397-2 |
| 3 | Range of Conductor size | 50 Sq.mm to 240 Sq.mm /as per covered conductor size |
| 4 | Mounting | Can mount directly on cable without any accessories |
| 5 | Туре | Top Tie/side tie/helical tie |
| 6 | Material | UV Resistant Thermoplastic |
| 7 | Operating/Rated voltage | 33 kV/36kV |
| 8 | Dimensions (mm) | To be furnished by bidder |

4.3 MECHANICAL CONNECTOR WITH HEAT SHRINK SLEEVE

| SI. No. | Technical Parameters | Desired Values |
|---------|--|--|
| 1 | Name of the manufacturer | To be furnished by bidder |
| 2 | Applicable Standard | IEC 61238-1 |
| 3 | Range of Conductor size | For Phase conductor of diameter range 50- 240 sq.mm/as per covered conductor size |
| 4 | Installation | Crimping by shear head bolt compression |
| 5 | Type of connection required | Connection by compression pressure |
| 6 | Is any metallic part carrying potential in operation exposed during installation | No |
| 7 | Material | Aluminium Alloy For mechanical connector UV resistant polymer for heat shrink sleeve |
| 8 | Connector ID | Ø 14 mm to Ø 33 mm |

4.4 INSULATION PIERCING CONNECTOR

| SI. No. | Technical Parameters | Desired Values |
|---------|---|---|
| 1 | Name of the manufacturer | To be furnished by bidder |
| 2 | Applicable Standard | EN 50397-2 |
| 3 | Range of Conductor sizes accommodated for Main & Branch | Main : 50 - 240 sq.mm Tap : 50 - 240 sq.mm /as per covered conductor size |
| 4 | Operating/Rated voltage | 33 kV/36kV |
| 5 | Type of connection required | Insulation Piercing Type (Covered to Covered) |



Specification No: ENG-EHV-1008

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

| 6 | Is any metallic part carrying potential in operation exposed during installation | No |
|---------|--|----------------|
| 7 | Are end caps of branch cable a) Slide on type (b) Rigid | Slide on type |
| SI. No. | Technical Parameters | Desired Values |
| 8 | Are torque limiting shear heads provided to tightening bolts | Yes |
| 9 | Specified Torque | 18+1 5 Nm |
| J | Specilled Torque | |

4.5 MID SPAN JOINTS

| SI. No. | Technical Parameters | Desired Values |
|---------|---|--|
| 1 | Name of the manufacturer | To be furnished by bidder |
| 2 | Applicable Standard | EN 50483-4 |
| 3 | Type No & Size Range | For Phase conductor of 50 Sq.mm to 240 sq. mm/as per covered conductor size |
| 4 | Operating/Rated voltage | 33 kV/36kV |
| 5 | Type of connection required | Crimping type |
| 6 | Is any metallic part carrying potential in operation exposed during installation | No |
| 7 | Installation | Crimping by Hexagonal Compression |
| 8 | Guarantee | 24 months from the date of commissioning or 30 months from the date of last supplies made under the contract |

5. GENERAL CONSTRUCTIONS:

5.1 TENSION ASSEMBLY-WEDGE TYPE (TA)

For fitting onto a pole for tensioning at the beginning or end of a length of Covered Conductor, or for anchoring while a major change in direction. The Tension assembly consists of one wedge type Tension anchoring clamp and one Tracking protection IPC.

The following key criterion to be followed for the design of the same: -

- a) There shall be no losable part (except Tracking IPC) in the process of clamping arrangement.
- b) The clamp should consist of an Aluminum alloy corrosion resistant casted body and selfadjusting fully insulating type of mechanical and weather resisting thermoplastic wedges which shall anchor/hold the conductor.
- c) Locking mechanism should be wedge type self-locking. Wedges are to be made of high strength, climatic resistance Engineering Plastic with glass fiber.
- d) The fittings shall be able to withstand the specific minimum failure load (SMFL) and shall not damage the covering of cable. SMFL is the minimum failure load for clamp at which mechanical

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

failure will not take place.

- e) No tools shall be needed for fitting the Covered Conductor into the clamp.
- f) The Anchoring clamp shall have an IPC to avoid tracking phenomenon by maintaining the metallic clamp as well as the cable passing through it at equipotential.

5.2 NON-METALLIC ALIGNMENT TIES:

For supporting and aligning Covered Conductor at an intermediate pole in a length, with small angle of deviation. The Tie hold the Covered Conductor in its position on top of the pin insulator. Tie consists of an "Insulated Plastic" Type for Lin Alignment. The ties shall be designed suitably to hold the Covered Conductor in its position on top of the insulator. The Tie shall be made of Insulating Plastic materials (UV Resistant Thermoplastic) to ensure tracking resistance and to avoid any insulation damage to covered conductor due to abrasion while mechanical or wind induced vibration. Plastic coated metallic ties are not allowed.

5.3 MECHANICAL CONNECTOR WITH HEAT SHRINK SLEEVE:

It is used for main (Bare) to main (Covered Conductor) networking Connection. This connector is to ensure the electrical characteristics with in the required limits, while ensuring necessary insulation protection against tracking and water penetration on Covered Conductor. The body as well as the shear head screws of the mechanical connector should be made of aluminum alloy. It should have a centered bore with tapered edges and a moisture block barrier in the center of the tube. Heat shrink sleeve shall be rated for up to 36kV

5.4 INSULATION PIERCING CONNECTOR:

Insulation Piercing Connectors (IPC) are used for making Tee / Tap-off/ connections to a Covered Conductor. Insulation Piercing Connectors 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 and branch conductor while simultaneously insulating and sealing the connection. The connector bodies shall be made entirely of mechanical and weather resistant plastic insulation material made of weather & UV resistant reinforced polymer and no metallic part outside the housing is acceptable except for the tightening bolt or nuts.

Any metallic part that is exposed must be free from potential during or after connector installation.

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.

The min & max torque values should not exceed 27 N mtr for IPC for main conductor < 95 sq Property of TPCODL/TPNODL/TPSODL/TPWODL – Not to be reproduced without permission of TPCODL/TPNODL/TPSODL/TPWODL

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Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

mm, and 42 Nmtr for main conductor >95, but < 240 sq mm.

The contact teeth or blade of the connector is made of tinned copper with equivalent Cross Section with respect to % IACS to suit the max branch cable size declared. The shear bolt/nut shall be suitable for tightening with a hexagonal socket of 13 mm or 17mm.

The IPCs shall be water proof and the water tightness shall be ensured by appropriate elastomeric materials and not by grease, gel or paste alone. Grease can be applied to protect the contact blade alone and shall not be visible on the outer surface of the connector. Connector should not be dipped in grease.

Each IPC should be provided with a cap to seal the cut end of the Branch cable. It should be of a design that once the connector is installed, it should not be possible to remove the cap without dismantling the connector.

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 and should confirm to the long duration tests specified in this standard.

5.5 MID SPAN JOINTS:

Mid-span tension joints for jointing covered conductor over a span. The sleeves should be Pre-Insulated type. Sleeve should be made of Aluminum, insulated with an Anti-UV black thermoplastic tube hermetically sealed two ends with 2 flexible rings. Strip length, Hexagonal crimping die reference and size to be marked on the outer surface of plastic sleeve.

5.6 ARC PROTECTION DEVICES:

Arching Horn Assembly is an Arc protection device for power arc evacuation without insulator damage. The arching Horn Assembly protection device consists of:

- a) Two arcing horns with adjustable distance "L" directly mounted on the insulator terminals.
- b) A covered conductor with clamp on the horn side.
- c) An insulation piercing connector on the main cable side.

6. MARKING:

The following particulars shall be properly legible embossed/Printing on the accessories.

- a) Name & Trade mark of the manufacturer
- b) Product Code
- c) Batch Number
- d) The minimum and maximum cross section of Conductor for which the unit is suitable
- e) Month and Year of Manufacturer



Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

f) "TPWODL/ TPCODL/ TPNODL/ TPSODL" Name

TPNØDL

TPSØDL

7. TESTS

TPCØDL

TPWODL

A type test shall be performed on the accessories. All the Acceptance test, Type test and Routine test should be as per EN 50397-2 and latest amendment. The bidder shall be required to submit complete set of the following test reports along with the offer: -

7.1 ACCEPTANCE TESTS

i) Tension Assembly-Wedge Type (TA)

- a) Visual examination
- b) Dimension verification
- c) Tensile test at ambient temperature
- d) Check for permanent marking

ii) Non-Metallic Alignment Ties

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Failure Load Tests
- e) Slip Load Tests
- f) Lift / Side Load Tests

iii) Mechanical Connector with Heat Shrink Sleeve

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test
- e) Water Tightness test

iv) Insulation Piercing Connector

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test

v) Mid Span Joints

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test



Specification No: ENG-EHV-1008

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

vi) Arc Protection Devices

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Clamp Bolt Tightening Test
- e) Short Circuit test

7.2 ROUTINE TESTS

i) Tension Assembly-Wedge Type (TA)

- a) Visual examination
- b) Dimension verification

ii) Non-Metallic Alignment Ties

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Failure Load Tests
- e) Slip Load Tests
- f) Lift / Side Load Tests

iii) Mechanical Connector with Heat Shrink Sleeve

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test

iv) Insulation Piercing Connector

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test

v) Mid Span Joints

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test



Specification No: ENG-EHV-1008

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

vi) Arc Protection Devices

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Clamp Bolt Tightening Test

7.3 TYPE TESTS

i) Tension Assembly-Wedge Type (TA)

- g) Visual examination
- h) Dimension verification
- i) Tensile test at ambient temperature
- j) Tensile test at low temperature
- k) Tensile test at high temperature
- I) Corrosion test
- m) Climate ageing test
- n) Check for permanent marking

ii) Non-Metallic Alignment Ties

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Failure Load Tests
- e) Slip Load Tests
- f) Lift / Side Load Tests
- g) Thermal Tests under load
- h) Corrosion test
- i) Climate ageing test

iii) Mechanical Connector with Heat Shrink Sleeve

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test
- e) Water Tightness test
- f) Climatic Ageing Test
- g) Corrosion Test
- h) Electrical Ageing Test



Specification No: ENG-EHV-1008

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

iv) Insulation Piercing Connector

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test
- e) Water Tightness test
- f) Climatic Ageing Test
- g) Corrosion Test
- h) Electrical Ageing Test

v) Mid Span Joints

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test
- e) Water Tightness test
- f) Climatic Ageing Test
- g) Corrosion Test

vi) Arc Protection Devices

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Clamp Bolt Tightening Test
- e) Short Circuit test

8.TYPE TEST CERTIFICATES:

The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards and as per CEA guidelines. All the tests shall be conducted at CPRI / ERDA as per relevant IS/IEC standard. Type tests should have been conducted in certified Test laboratories during the period not exceeding 7years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to TPWODL/ TPCODL/ TPNODL/ TPSODL.

8. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPWODL/ TPCODL/ TPNODL/ TPSODL. 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 grant free access

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Specification No: ENG-EHV-1008

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

to the places of manufacture to TPWODL/ TPCODL/ TPNODL/ TPSODL's representatives at all times when the work is in progress. Inspection by the TPWODL/ TPCODL/ TPNODL/ TPSODL 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 TPWODL/ TPCODL/ TPNODL/ TPSODL.

Following documents shall be sent along with material.

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

9. INSPECTION AFTER RECEIPT AT STORES:

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

10. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the 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 Company up to a period of 24 months from the date of commissioning or 30 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Companywill be at liberty to get it replaced/rectified at supplier's risks and costs and recover all suchexpenses plus the Company's own charges (@ 20% of expenses incurred), from the supplier or from the "Security cum Performance Deposit" as the case may be.

The bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of guarantee period for any 'latent defects' if noticed by the company. The guarantee clause is applicable for all the items covered in this specification.

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Specification No: ENG-EHV-1008

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

11. 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 bidder shall provide instructions regarding handling and storage precautions to be taken at site.

12. TENDER SAMPLE:

Bidder shall submit the sample of material during submission of Bids.

13. 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.

14. TESTING FACILITIES:

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

15. 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.

16. SPARES, ACCESSORIES AND TOOLS

Not applicable.

17. DRAWINGS AND DOCUMENTS

Following drawings and documents shall be submitted in line with the requirement of Tender specifications:

- a) Completely filled in Schedule "A" Guaranteed Technical Particulars & Schedule "B" Deviations
- b) Work Experience details
- c) Type test certificates.
- d) Drawing 1 set of Hard Copy & Soft copy PDF File containing complete information about manufacturing.





Fig.1: - Tension Assembly (TA) with Anchoring clamp and one Tracking protection IPC



Fig.2: - Non-Metallic Alignment Tie



Fig.3:- Insulation Piercing Connector for Networking / Branching /Looping and Midspan

Joints





Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR



Fig.4: - Arc Protection Device

Note: - These are the Sample Drawing for tender purpose only.

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18. SCHEDULE- "A" GUARANTEED TECHNICAL PARTICULARS

| SI. No. | Technical Parameters | To Be Furnished By The Bidder |
|------------|---|-------------------------------|
| 1 | Name of the manufacturer | |
| 2 | Applicable Standard | |
| 3 | Range of Conductor size | |
| 4 | Installation (with/without disassembly) | |
| 5 | Type & grade | |
| 6 | Application | |
| 7 | Mechanical Strength | |
| 8 | Dimensions (mm) | |

TENSION ASSEMBLY-WEDGE TYPE (TA)

NON-METALLIC ALIGNMENT TIES

| SI. No. | Technical Parameters | To Be Furnished by The Bidder |
|------------|--------------------------|-------------------------------|
| 1 | Name of the manufacturer | |
| 2 | Applicable Standard | |
| 3 | Range of Conductor size | |
| 4 | Mounting | |
| 5 | Туре | |
| 6 | Material | |
| 7 | Application | |
| 8 | Dimensions (mm) | |



Specification No: ENG-EHV-1008

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

MECHANICAL CONNECTOR WITH HEAT SHRINK SLEEVE

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| SI. No. | Technical Parameters | To Be Furnished by The Bidder |
|------------|--|-------------------------------|
| 1 | Name of the manufacturer | |
| 2 | Applicable Standard | |
| 3 | Range of Conductor size | |
| 4 | Installation | |
| 5 | Type of connection required | |
| 6 | Is any metallic part carrying potential in operation exposed during installation | |
| 7 | Material | |
| 8 | Connector ID | |

INSULATION PIERCING CONNECTOR

| SI. No. | Technical Parameters | To Be Furnished by The Bidder |
|------------|--|-------------------------------|
| 1 | Name of the manufacturer | |
| 2 | Applicable Standard | |
| 3 | Range of Conductor sizes accommodated for Main & Branch | |
| 4 | Application | |
| 5 | Type of connection required | |
| 6 | Is any metallic part carrying potential in operation exposed during installation | |
| 7 | Are end caps of branch cable a) Slide on type (b) Rigid | |
| 8 | Are torque limiting shear heads provided to tightening bolts | |
| 9 | Specified Torque | |
| 10 | Torque for establishing connection between main and Tap (Nm) | |

MID SPAN JOINTS

| SI. No. | Technical Parameters | To Be Furnished by The Bidder |
|------------|--------------------------|-------------------------------|
| 1 | Name of the manufacturer | |
| 2 | Applicable Standard | |
| 3 | Type No & Size Range | |



Specification No: ENG-EHV-1008

Specification Name: SPECIFICATION FOR ACCESSORIES OF 33kV XLPE COVERED CONDUCTOR

| 4 | Application | |
|---|---|--|
| 5 | Type of connection required | |
| 6 | Is any metallic part carrying potential in operation exposed during installation | |
| 7 | Installation | |

19. SCHEDULE "B" 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

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-HV-2005

Specification Name : ENG-ELC-071- SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR- R1

| JYOTIPRAKASH MOHANTY | SHANTAPRIYA JENA | SATYA PRASAD NAYAK | Ranjan Kumar Sahoo | VARUN BHATNAGAR | VARUN BHATNAGAR |
|-------------------------|---------------------|-----------------------|-----------------------|--------------------|--------------------|
| Prepared by | Reviewed by | Reviewed by | Reviewed by | Approved by | Released by |
| TPWODL | TPNODL | TPCODL | TPSODL | TPWODL | TPWODL |
| 10-12-2022 | 10-12-2022 | 12-12-2022 | 12-12-2022 | 13-12-2022 | 13-12-2022 |

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Specification No: ENG-HV-2005

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Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

CONTENTS

- SCOPE 1.
- 2. APPLICABLE STANDARDS
- CLIMATIC CONDITIONS OF THE INSTALLATION 3.
- 4. GENERAL TECHNICAL REQUIREMENTS
- GENERAL CONSTRUCTIONS 5.
- 6. MARKING
- 7. TESTS
- 8. TYPE TEST CERTIFICATES
- 9. **PRE-DISPATCH INSPECTION**
- INSPECTION AFTER RECEIPT AT STORES 10.
- **GUARANTEE** 11.
- 12. PACKING
- 13. **TENDER SAMPLE**
- 14. QUALITY CONTROL
- 15. **TESTING FACILITIES**
- 16. MANUFACTURING ACTIVITIES
- SPARES, ACCESSORIES AND TOOLS 17.
- 18. DRAWINGS AND DOCUMENTS
- SCHEDULE "A" GUARANTEED TECHNICAL PARTICULARS 19.
- SCHEDULE "B" DEVIATIONS 20.

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TPNØDL TPSØDL

Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

1. SCOPE

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at site/store of Accessories for All Aluminum Alloy Stranded XLPE Covered Conductors for use on 11 kV Distribution System.

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 | |
|-----------------------|---|--|
| EN 50397-1:2006 | Covered Conductor Specification- Up to 33 kV | |
| EN 50397-2:2006 | Covered Conductor Accessories Specification- up to 33 kV | |
| | Covered conductors for overhead lines and the related accessories | |
| EN 50397-2 | for rated voltages above 1kV a.c. and not exceeding 36kV a.c. | |
| (MARCH 2010) | PART 2: Accessories for covered conductors: tests and | |
| | acceptance criteria | |
| IS 398-1996 (Part IV) | Specification for aluminum conductors for overhead distribution | |
| | purpose | |
| EN 61238-1: 2003 | Compression and mechanical connectors for power cables for rated | |
| LN 01230-1. 2003 | voltages up to 36 kV Test methods and requirements | |
| | Electric Connectors - Connectors for Use Between Aluminum-To- | |
| ANCI 0140 4 -0044 | Aluminum and Aluminum-To-Copper Conductors Designed for | |
| ANSI 0119.4 :2011 | Normal Operation at Or Below 93 °C and Copper-To-Copper | |
| | Conductors Designed for Normal Operation at Or Below 100 °C | |

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

| SL.NO. | CONDTIONS | VALUES |
|--------|---------------------------------|--------|
| 1 | Max. altitude above sea level | 1200m |
| 2 | Max. Ambient Temperature | 50 °C |
| 3 | Max. Daily average ambient temp | 35 ℃ |
| 4 | Min Ambient Temp | 0°C |

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Specification No: ENG-HV-2005

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Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

| 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.

4. GENERAL TECHNICAL REQUIREMENTS:

The Accessories of 11 kV XLPE Covered Conductor are specified below and shall consist of the following:

| SI. No. | Technical Parameters | Desired Values |
|------------|---|--|
| 1 | Name of the manufacturer | To be furnished by bidder |
| 2 | Applicable Standard | EN 50397-2 |
| 3 | Range of Conductor size | 50 Sq.mm to 240 Sq.mm/as per covered conductor size |
| 4 | Installation (with/without disassembly) | Ready-to-use (without disassembly) |
| 5 | Type & grade | Heat treated aluminium Alloy for Body and Weather resistant Thermoplastic for wedge/ crimping type |
| 6 | Operating/Rated voltage | 11 kV/12kV |

4.1 TENSION ASSEMBLY-WEDGE TYPE (TA)/ CRIMPING TYPE

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Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

| SI. No. | Technical Parameters | Desired Values |
|------------|----------------------|---|
| 7 | Mechanical Strength | 80% of the breaking load of the Conductor |
| 8 | Dimensions (mm) | To be furnished by bidder |
| 9 | Tension Load | To be furnished by bidder |

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4.2 NON-METALLIC ALIGNMENT TIES

| SI. No. | Technical Parameters | Desired Values |
|------------|--------------------------|--|
| 1 | Name of the manufacturer | To be furnished by bidder |
| 2 | Applicable Standard | EN 50397-2 |
| 3 | Range of Conductor size | 50 Sq.mm to 240 Sq.mm /as per covered conductor size |
| 4 | Mounting | Can mount directly on cable without any accessories |
| 5 | Туре | Top Tie/side tie/Helical tie |
| 6 | Material | UV Resistant Thermoplastic |
| 7 | Operating/Rated voltage | 11 kV/12kV |
| 8 | Dimensions (mm) | To be furnished by bidder |

4.3 MECHANICAL CONNECTOR WITH HEAT SHRINK SLEEVE

| SI. No. | Technical Parameters | Desired Values |
|------------|--|--|
| 1 | Name of the manufacturer | To be furnished by bidder |
| 2 | Applicable Standard | IEC 61238-1 |
| 3 | Range of Conductor size | For Phase conductor of diameter range 50-240 sq.mm/as per covered conductor size |
| 4 | Installation | Crimping by shear head bolt compression |
| 5 | Type of connection required | Connection by compression pressure |
| 6 | Is any metallic part carrying potential in operation exposed during installation | No |
| 7 | Material | Aluminium Alloy For mechanical connector UV resistant polymer for heat shrink sleeve |
| 8 | Connector ID | Ø 14 mm to Ø 33 mm |



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Specification No: ENG-HV-2005

Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

4.4 INSULATION PIERCING CONNECTOR

| SI. No. | Technical Parameters | Desired Values |
|------------|--|---|
| 1 | Name of the manufacturer | To be furnished by bidder |
| 2 | Applicable Standard | EN 50397-2 |
| 3 | Range of Conductor sizes accommodated for Main & Branch | Main : 50 - 240 sq.mm Tap : 50 - 240 sq.mm /as per covered conductor size |
| 4 | Operating/Rated voltage | 11 kV/12kV |
| 5 | Type of connection required | Insulation Piercing Type (Covered to Covered) |
| 6 | Is any metallic part carrying potential in operation exposed during installation | No |
| 7 | Are end caps of branch cable a) Slide on type (b) Rigid | Slide on type |
| 8 | Are torque limiting shear heads provided to tightening bolts | Yes |
| 9 | Specified Torque | 18±1.5 Nm |
| 10 | Torque for establishing connection between main and Tap (Nm) | Within 70% of Min. Torque specified |

4.5 MID SPAN JOINTS

| SI. No. | Technical Parameters | Desired Values |
|------------|---|---|
| 1 | Name of the manufacturer | To be furnished by bidder |
| 2 | Applicable Standard | EN 50483-4 |
| 3 | Type No & Size Range | For Phase conductor of 50 Sq.mm to 240 sq.mm /as per covered conductor size |
| 4 | Operating/Rated voltage | 11 kV/12kV |
| 5 | Type of connection required | Crimping type |
| 6 | Is any metallic part carrying potential in operation exposed duringinstallation | Νο |
| 7 | Installation | Crimping by Hexagonal Compression |



Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

5. GENERAL CONSTRUCTIONS:

5.1 TENSION ASSEMBLY-WEDGE TYPE (TA)

For fitting onto a pole for tensioning at the beginning or end of a length of Covered Conductor, or for anchoring while a major change in direction. The Tension assembly consists of one wedge type Tension anchoring clamp and one Tracking protection IPC.

The following key criterion to be followed for the design of the same: -

- a) There shall be no losable part (except Tracking IPC) in the process of clamping arrangement.
- b) The clamp should consist of an Aluminum alloy corrosion resistant casted body and selfadjusting fully insulating type of mechanical and weather resisting thermoplastic wedges which shall anchor/hold the conductor.
- c) Locking mechanism should be wedge type self-locking. Wedges are to be made of high strength, climatic resistance Engineering Plastic with glass fiber.
- d) The fittings shall be able to withstand the specific minimum failure load (SMFL) and shall not damage the covering of cable. SMFL is the minimum failure load for clamp at which mechanical failure will not take place.
- e) No tools shall be needed for fitting the Covered Conductor into the clamp.
- f) The Anchoring clamp shall have an IPC to avoid tracking phenomenon by maintaining the metallic clamp as well as the cable passing through it at equipotential.

5.2 NON-METALLIC ALIGNMENT TIES:

For supporting and aligning Covered Conductor at an intermediate pole in a length, with small angle of deviation. The Tie hold the Covered Conductor in its position on top of the pin insulator. Tie consists of an "Insulated Plastic" Type for Lin Alignment. The ties shall be designed suitably to hold the Covered Conductor in its position on top of the insulator. The Tie shall be made of Insulating Plastic materials (UV Resistant Thermoplastic) to ensure tracking resistance and to avoid any insulation damage to covered conductor due to abrasion while mechanical or wind induced vibration. Plastic coated metallic ties are not allowed.

5.3 MECHANICAL CONNECTOR WITH HEAT SHRINK SLEEVE:

It is used for main (Bare) to main (Covered Conductor) networking Connection. This connector is to ensure the electrical characteristics with in the required limits, while ensuring necessary insulation protection against tracking and water penetration on Covered Conductor. The body as well as the shear head screws of the mechanical connector should be made of aluminum alloy. It should have a centered bore with tapered edges and a moisture block barrier in the center of the tube. Heat shrink sleeve shall be rated for up to 12kV

Specification No: ENG-HV-2005

TPCØDL TPWØDL TPNØDL TPSØDL

Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

5.4 INSULATION PIERCING CONNECTOR:

Insulation Piercing Connectors (IPC) are used for making Tee / Tap-off/ connections to a Covered Conductor. Insulation Piercing Connectors 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 and branch conductor while simultaneously insulating and sealing the connection. The connector bodies shall be made entirely of mechanical and weather resistant plastic insulation material made of weather & UV resistant reinforced polymer and no metallic part outside the housing is acceptable except for the tightening bolt or nuts.

Any metallic part that is exposed must be free from potential during or after connector installation.

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.

The min & max torque values should not exceed 27 N mtr for IPC for main conductor < 95 sq mm, and 42 Nmtr for main conductor >95, but < 240 sq mm.

The contact teeth or blade of the connector is made of tinned copper with equivalent Cross Section with respect to % IACS to suit the max branch cable size declared. The shear bolt/nut shall be suitable for tightening with a hexagonal socket of 13 mm or 17mm.

The IPCs shall be water proof and the water tightness shall be ensured by appropriate elastomeric materials and not by grease, gel or paste alone. Grease can be applied to protect the contact blade alone and shall not be visible on the outer surface of the connector. Connector should not be dipped in grease.

Each IPC should be provided with a cap to seal the cut end of the Branch cable. It should be of a design that once the connector is installed, it should not be possible to remove the cap without dismantling the connector.

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 and should confirm to the long duration tests specified in this standard.

5.5 MID SPAN JOINTS:

Mid-span tension joints for jointing covered conductor over a span. The sleeves should be Pre-Insulated type. Sleeve should be made of Aluminum, insulated with an Anti-UV black thermoplastic tube hermetically sealed two ends with 2 flexible rings. Strip length, Hexagonal crimping die reference and size to be marked on the outer surface of plastic sleeve.

5.6 ARC PROTECTION DEVICES:

Arching Horn Assembly is an Arc protection device for power arc evacuation without insulator damage. The arching Horn Assembly protection device consists of:

- a) Two arcing horns with adjustable distance "L" directly mounted on the insulator terminals.
- b) A covered conductor with clamp on the horn side.

Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

c) An insulation piercing connector on the main cable side.

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6. MARKING:

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The following particulars shall be properly legible embossed/Printing on the accessories.

- a) Name & Trade mark of the manufacturer
- b) Product Code
- c) Batch Number
- d) The minimum and maximum cross section of Conductor for which the unit is suitable
- e) Month and Year of Manufacturer
- f) "TPWODL/ TPCODL/ TPNODL/ TPSODL" Name

7. TESTS

A type test shall be performed on the accessories. All the Acceptance test, Type test and Routine test should be as per EN 50397-2 and latest amendment. The bidder shall be required to submit complete set of the following test reports along with the offer: -

7.1 ACCEPTANCE TESTS

i) Tension Assembly-Wedge Type (TA)

- a) Visual examination
- b) Dimension verification
- c) Tensile test at ambient temperature
- d) Check for permanent marking

ii) Non-Metallic Alignment Ties

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Failure Load Tests
- e) Slip Load Tests
- f) Lift / Side Load Tests

iii) Mechanical Connector with Heat Shrink Sleeve

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test
- e) Water Tightness test

Specification No: ENG-HV-2005

TPCØDL TPWØDL

TPNØDL TPSØDL

Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

iv) Insulation Piercing Connector

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test

v) Mid Span Joints

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test

vi) Arc Protection Devices

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Clamp Bolt Tightening Test
- e) Short Circuit test

7.2 ROUTINE TESTS

i) Tension Assembly-Wedge Type (TA)

- a) Visual examination
- b) Dimension verification

ii) Non-Metallic Alignment Ties

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Failure Load Tests
- e) Slip Load Tests
- f) Lift / Side Load Tests

iii) Mechanical Connector with Heat Shrink Sleeve

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test
Specification No: ENG-HV-2005

TPCØDL TPWØDL

TPNØDL TPSØDL

Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test

v) Mid Span Joints

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test

vi) Arc Protection Devices

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Clamp Bolt Tightening Test

7.3 TYPE TESTS

- i) Tension Assembly-Wedge Type (TA)
- g) Visual examination
- h) Dimension verification
- i) Tensile test at ambient temperature
- j) Tensile test at low temperature
- k) Tensile test at high temperature
- I) Corrosion test
- m) Climate ageing test
- n) Check for permanent marking

ii) Non-Metallic Alignment Ties

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Failure Load Tests
- e) Slip Load Tests
- f) Lift / Side Load Tests
- g) Thermal Tests under load
- h) Corrosion test

Specification No: ENG-HV-2005

TPNØDL TPSØDL

Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

i) Climate ageing test

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iii) Mechanical Connector with Heat Shrink Sleeve

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test
- e) Water Tightness test
- f) Climatic Ageing Test
- g) Corrosion Test
- h) Electrical Ageing Test

iv) Insulation Piercing Connector

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test
- e) Water Tightness test
- f) Climatic Ageing Test
- g) Corrosion Test
- h) Electrical Ageing Test

v) Mid Span Joints

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Mechanical Test
- e) Water Tightness test
- f) Climatic Ageing Test
- g) Corrosion Test

vi) Arc Protection Devices

- a) Visual examination
- b) Dimension verification
- c) Check for permanent marking
- d) Clamp Bolt Tightening Test
- e) Short Circuit test

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Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

8. TYPE TEST CERTIFICATES:

The Bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI / ERDA as per relevant IS/ IEC standard and as per CEA guidelines. Type tests should have been conducted in certified Test laboratories during the period not exceeding **7 years** from the date of opening the bid. In the event of any discrepancy in the test reports, i.e., any test report not acceptable, same shall becarried out without any cost implication to TPWODL/ TPCODL/ TPNODL/ TPSODL.

9. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPWODL/ TPCODL/ TPNODL/ TPSODL. 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 grant free access to the places of manufacture to TPWODL/ TPCODL/ TPNODL/ TPSODL's representatives at all times when the work is in progress. Inspection by the TPWODL/ TPCODL/ TPNODL/ T

Following documents shall be sent along with material.

- a) Test reports
- b) MDCC issued by TPWODL/ TPCODL/ TPNODL/ TPSODL
- 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 TPWODL/ TPCODL/ TPNODL/ TPSODL, Odisha store will be inspected for acceptance and shallbe liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department.

11. GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same,

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Specification No: ENG-HV-2005

Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

as an integrated product delivered under this contract. In the event any defect is found by the Company up to a period of 24 months from the date of commissioning or 30 months from the date of last supplies made under the contract, whichever is earlier, supplier shall

be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the supplier or from the "Security cum Performance Deposit" as the case may be.

The bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of guarantee period for any 'latent defects' if noticed by the company.

The guarantee clause is applicable for all the items covered in 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 bidder shall provide instructions regarding handling and storage precautions to be taken at site.

13. TENDER SAMPLE:

Bidder shall submit the sample of material during submission of Bids.

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.

15. 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.

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17. SPARES, ACCESSORIES AND TOOLS

Not applicable.

18. DRAWINGS AND DOCUMENTS

Following drawings and documents shall be submitted in line with the requirement of Tender specifications:

- a) Completely filled in Schedule "A" Guaranteed Technical Particulars & Schedule "B" Deviations
- b) Work Experience details
- c) Type test certificates.
- d) Drawing 1 set of Hard Copy & Soft copy PDF File containing complete information about manufacturing.



Fig.1: - Tension Assembly (TA) with Anchoring clamp and one Tracking protection IPC



Fig.2: - Non-Metallic Alignment Tie





Fig.3: - Insulation Piercing Connector for Networking / Branching /Looping and MidspanJoints



Fig.4:- Arc Protection Device

Note:- These are the Sample Drawing for tender purpose only.

19. SCHEDULE- "A" GUARANTEED TECHNICAL PARTICULARS

| SI. No. | Technical Parameters | To Be Furnished By The Bidder |
|------------|---|-------------------------------|
| 1 | Name of the manufacturer | |
| 2 | Applicable Standard | |
| 3 | Range of Conductor size | |
| 4 | Installation (with/without disassembly) | |
| 5 | Type & grade | |
| 6 | Application | |
| 7 | Mechanical Strength | |
| 8 | Dimensions (mm) | |
| 9 | Tension Load | |

TENSION ASSEMBLY-WEDGE TYPE (TA)



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Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

NON-METALLIC ALIGNMENT TIES

| SI. No. | Technical Parameters | To Be Furnished By The Bidder |
|------------|--------------------------|-------------------------------|
| 1 | Name of the manufacturer | |
| 2 | Applicable Standard | |
| 3 | Range of Conductor size | |
| 4 | Mounting | |
| 5 | Туре | |
| 6 | Material | |
| 7 | Application | |
| 8 | Dimensions (mm) | |

MECHANICAL CONNECTOR WITH HEAT SHRINK SLEEVE

| SI. No. | Technical Parameters | To Be Furnished By The Bidder |
|------------|---|-------------------------------|
| 1 | Name of the manufacturer | |
| 2 | Applicable Standard | |
| 3 | Range of Conductor size | |
| 4 | Installation | |
| 5 | Type of connection required | |
| 6 | Is any metallic part carrying potential in operation exposed during installation | |
| 7 | Material | |
| 8 | Connector ID | |

INSULATION PIERCING CONNECTOR

| SI. No. | Technical Parameters | To Be Furnished By The Bidder |
|------------|--|-------------------------------|
| 1 | Name of the manufacturer | |
| 2 | Applicable Standard | |
| 3 | Range of Conductor sizes accommodated for Main & Branch | |
| 4 | Application | |
| 5 | Type of connection required | |
| 6 | Is any metallic part carrying potential in operation exposed during installation | |
| 7 | Are end caps of branch cable a) Slide on type (b) Rigid | |
| 8 | Are torque limiting shear heads provided to tightening bolts | |
| 9 | Specified Torque | |
| 10 | Torque for establishing connection between main and Tap (Nm) | |



Specification No: ENG-HV-2005 TPNØDL Specification Name:

Specification Name: SPECIFICATION FOR ACCESSORIES OF 11kV XLPE COVERED CONDUCTOR

MID SPAN JOINTS

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| SI. No. | Technical Parameters | To Be Furnished By The Bidder |
|------------|---|-------------------------------|
| 1 | Name of the manufacturer | |
| 2 | Applicable Standard | |
| 3 | Type No & Size Range | |
| 4 | Application | |
| 5 | Type of connection required | |
| 6 | Is any metallic part carrying potential in operation exposed during installation | |
| 7 | Installation | |

20. SCHEDULE "B" 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

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-LV-3003

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

| JYOTIPRAKASH MOHANTY | SATYA PRASAD NAYAK | Vijender Goyal | SHANTAPRIYA JENA | ANUP JAWASE | VARUN BHATNAGAR |
|-------------------------|-----------------------|-------------------|---------------------|----------------|--------------------|
| Prepared by | Reviewed by | Reviewed by | Reviewed by | Approved by | Released by |
| TPWODL | TPCODL | TPSODL | TPNODL | TPWODL | TPWODL |
| 13-01-2023 | 13-01-2023 | 16-01-2023 | 16-01-2023 | 17-01-2023 | 17-01-2023 |

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TPSØDL

Specification No: ENG-LV-3003

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

CONTENTS

- 1. SCOPE
- 2. APPLICABLE STANDARDS
- 3. CLIMATIC CONDITIONS OF THE INSTALLATION
- 4. GENERAL TECHNICAL REQUIREMENTS
- 5. GENERAL CONSTRUCTIONS/REQUIREMENTS
- 6. MARKING
- 7. TESTS
- 8. TYPE TEST CERTIFICATES
- 9. **PRE-DISPATCH INSPECTION**
- **10.** INSPECTION AFTER RECEIPT AT STORES
- 11. GUARANTEE
- PACKING 12.
- **13.** TENDER SAMPLE
- 14. QUALITY CONTROL
- 15. MINIMUM TESTING FACILITIES
- 16. MANUFACTURING ACTIVITIES
- 17. SPARES, ACCESSORIES AND TOOLS
- 18. DRAWINGS AND DOCUMENTS
- **19.** GUARANTEED TECHNICAL PARTICULARS
- **20.** SCHEDULE OF DEVIATIONS

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

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. | CONDTIONS | 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 |

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Specification No: ENG-LV-3003



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

| 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.

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4. GENERAL TECHNICAL REQUIREMENTS

4.1 CABLE DATA

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

- a. 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.
- b. 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.
- c. 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 | Inculation Dioroing Connectors | For making tap-off/branch connectors/service |
|---|--------------------------------|--|
| 1 | Insulation Flercing Connectors | (IPC) connector to an ABC line. |

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| 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 | | Main Size | Branch Size | Current Rating | |
| | пстуред | 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. | | | |

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Specification Name:

Specification for Accessories of LT AB cables (Insulated Messenger)

| 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

- a. 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.
- b. No losable part in the process of clamping arrangement.

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- c. The clamp should conform to the standard NFC 33041 and 33042 or equivalent I.S. if any.
- d. 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.
- e. 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.
- f. Slip load of the clamp should not be less than 80% of Ultimate tensile strength (UTS) of relevant messenger wire.

| | | DESIRED VALUE | | |
|---|---------------------------------------|---------------------------|------------------------|----------------------|
| | | (25-35 mm ² | (50-70 mm ² | (70-95 mm² |
| | TECHNICAL PARTICULARS | Insulated | Insulated | Insulated |
| | | Messenger | Messenger | Messenger |
| | | Wire) | Wire) | Wire) |
| 1 | Name & Address of the Manufacturer | To be furnished by Bidder | | |
| 2 | Standard | NFC 33-041 | | |
| | | 25-35 mm ² | 50-70mm ² | 70-95mm ² |
| 3 | Range of messenger size | Insulated | Insulated | Insulated |
| | | Messenger Wire | Messenger Wire | Messenger Wire |
| 4 | Type of design | wedge type | | |
| 5 | Material of Clamp | Aluminium alloy c | orrosion resistant c | astled body, bail |
| | - | of stainless steel a | nd self-adjusting pl | astic 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 |

Specification No: ENG-LV-3003

Specification Name:

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Specification for Accessories of LT AB cables (Insulated Messenger)

| | | DESIRED VALUE | | |
|-------|-----------------------|---|---|---|
| SL.NO | TECHNICAL PARTICULARS | (25-35 mm ² Insulated Messenger Wire) | (50-70 mm² Insulated Messenger Wire) | (70-95 mm² 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

- a. 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°.
- b. No losable part in the process of clamping arrangement.
- c. The clamp should conform to the standard NFC 33040 or equivalent I.S, if any.
- d. The clamp and the link made of Polymer should provide an additional insulation between the cable and the pole.
- e. The clamps and movable links should be made of weather and UV resistant glass fiber reinforced polymer.
- f. Clamps should be fixed with pole by eye hook / bracket/ eye bolt. Bracket should be made of corrosion resistant aluminum alloy.
- g. 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 than12 KN for 25/50 sq.mm insulated neutral cum messenger respectively.





Specification Name:

Specification for Accessories of LT AB cables (Insulated Messenger)

| 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 than12 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. |

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4.5 SERVICE CLAMPS

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

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

4.6 JUNCTION SLEEVE

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

4.7 EYE HOOKS/ EYE BOLTS

- a. Eye hooks/ Eye Bolts should be designed as to hold suspension clamps and dead-end clamps and to be installed with the pole clamp.
- b. Eyehooks should be made up of forged Galvanized steel.
- c. The clamps corrosion resistance should conform to the standards I.S. 2629 & I.S.2633.
- d. Bolts and nuts should be made of hot dip Galvanized steel according to VDE 0210 and VDE 0212.
- e. 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 hol clamp | | 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. |

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

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.
- I. 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.

| Туре | Description | Application |
|------|--|--|
| Α | Insulation piercing multiple port (4 way) connector. | For providing service connection from ABC |
| В | Insulation Piercing Connector for networking | For main-to-main networking or branching of ABC to another ABC |
| С | 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 |

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

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

| Туре | 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 CapacityAB Cable | dis- connectable | 25 - 95 | 4 x (2.5) 6 – 35 |
| | For service connections from Smaller size and CapacityAB 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:

| Туре | Application | Main Cable Size Range (mm ²) | Branch Cable Size range (mm ²) |
|------|---|---|---|
| | 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 |
| В | 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

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

Standard size range for Type D, Bare connector for Earthing

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

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

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 unlosely 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.

TPNØDL TPSØDL

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

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.





TPSØDL

TPNØDL

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

8. TYPE TESTS CERTIFICATE

8.1Type 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 ageingtest 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.

Specification No: ENG-LV-3003

Specification Name:



TPCØDL

TPSØDL

TPNØDL

Specification for Accessories of LT AB cables (Insulated Messenger)

| | For tests marked* | | For tests marked** | |
|----------------|-----------------------------------|-----------------------------------|--------------------|-------------------------------|
| Lot Size | Sample Size | Maximum Permissible defects | Sample Size | Maximum Permissibledefects |
| Up to100 | 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:

- a. Visual *
- b. Dimensional (as per SCD and overall dimensions submitted with Tender Offer) *
- c. Mechanical Test on Bracket**
- d. Mechanical Test on Clamp **
- e. Voltage Test *

The following shall constitute acceptance tests for Suspension Assemblies:

- a. Visual *
- b. Dimensional (as per SCD and overall dimensions submitted with Tender Offer) *
- c. Mechanical Test on Bracket**
- d. Mechanical Test on Clamp **
- e. 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.

| | For tests marked* | | For tests marked** | |
|----------------|-------------------|---------------------------------------|--------------------|-----------------------------------|
| Lot Size | 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 |

TPNØDL TPSØDL

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

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 TPDCOL. 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 shallnot 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 forrejection, 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

TPNØDL TPSØDL

Specification No: ENG-LV-3003

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

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.



TPSØDL

TPNØDL

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

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 statutoryrequirements with complete BOM and shall be submitted with the bid:

- a. Completely filled in Technical Particulars.
- b. General description of the equipment and all components including brochures.
- c. Type test Certificates
- d. 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 | \checkmark | | |
| 2 | Manual/Catalogues/drawings for all components. | | \checkmark | |
| 3 | Technical details and test certificates. | | \checkmark | \checkmark |
| 4 | Installation Instructions | | \checkmark | \checkmark |
| 5 | Transport/shipping dimension drawing | | \checkmark | \checkmark |
| 6 | QA & QC Plan | \checkmark | \checkmark | |
| 7 | Routine, Acceptance and Type test Certificates | \checkmark | \checkmark | \checkmark |

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

Specification No: ENG-LV-3003

Specification Name:

TPSØDL

TPNØDL

Specification for Accessories of LT AB cables (Insulated Messenger)



FIG.3: - INSULATING PIERCING CONNECTOR



FIG.4: -EYE HOOK WITH POLE FIXING CLAMP



TPNØDL TPSØDL

Specification No: ENG-LV-3003

Specification Name:

Specification for Accessories of LT AB cables (Insulated Messenger)



FIG.5: -SERVICE CLAMPS

19. GUARANTEED TECHNICAL PARTICULARS

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





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

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:

TPCØDL

TPWØDL

Signature

Designation