

**North Eastern Electricity Supply Company of Odisha**  
**Limited**

**SECTION –IV (B)**

**TECHINICAL SPECIFICATIONS**  
**OF**

**LT XLPE AB CABLE**

**TENDER NOTICE NO- NESCO/DESI/21/11366**

**DATE:23.08.13**

***GROUP-B***

# TECHINICAL SPECIFICATIONS

## LT XLPE AB CABLE

### Part-I

#### 1. SCOPE:

This specification covers the design, manufacturing, testing, supply, delivery and performance requirements of LV overhead **ISI marked Aerial Bunched Cable (ABC)** of different sizes indicated in our Schedule of Requirements for use in the LV network of NESCO.

The materials offered shall have been successfully type tested and the design shall have been in satisfactory operation for a period of not less than two years on the date of bid opening. Compliance shall be demonstrated by submitting with the bid (i) authenticated copies of the type test reports and (ii) performance certificates from the users.

However where the bidder offers similar but not identical material but higher size to that which has been type tested, the difference shall be stated in Test Certificate Schedule. The purchaser shall adjudge whether to accept or reject the offered material and type test data presented.

The scope of supply includes the provision of type tests. Rates for type tests shall be given in the appropriate price schedule of the bidding document and shall be considered for evaluation. The purchaser reserves the right to waive type tests as indicated in the section on Quality Assurance, Inspection and Testing in this specification.

The Aerial Bunched Cable shall conform in all respects to highest standards of engineering, design, workmanship, this specification and the latest revisions of relevant standards at the time of offer and the Purchaser shall have the power to reject any work or material, which, in his judgment is not in full accordance therewith.

## 2. STANDARDS:

Except where modified by this specification, the Aerial Bunched Cable shall be designed, manufactured and tested in accordance with the latest editions of the following standards.

<b>IES/ISO</b>	<b>Indian Standard</b>	<b>Material</b>
IEC: 1089	IS: 398/1994	Round wire concentric lay Overhead electrical Stranded Conductors.
	IS: 398(Part-4)/1994	All Aluminum Alloy Conductors, Quality Management Systems.
ISO: 9000	IS: 8130/1984	Conductors for insulated Electric cables.
	IS: 10810/1984	Method of Tests for cables.
IEC: 502	IS:7098/1998	XLPE Insulated PVC. Sheathed power cables.
	IS:14255/1995	Aerial Bunched Cables for working voltage up to and including 1100 volts.

The Bidder may propose alternative standards, provided it is demonstrated that they give a degree of quality and performance equivalent to or better than the referenced standards. The purchaser shall adjudge whether to accept or reject any standards.

The Bidder shall furnish a copy of the alternative standard proposed along with his bid. If the alternative standard is in a language other than English, an English translation shall be submitted with the standard.

In case of conflict the order of the precedence shall be (1) IEC or ISO standards, (2) Indian Standards, (3) Other alternative standards. This list is not to be considered exhaustive and reference to a particular standard or recommendation in this specification does not relieve the Contractor or the necessity of providing the goods complying with other relevant standards or recommendation.

### 3.0 SERVICE CONDITIONS:

The service conditions shall be as follows:

- Maximum altitude above sea level 500m
- Maximum ambient air temperature 50<sup>0</sup>C
- Maximum daily average ambient air temperature 35<sup>0</sup>C
- Maximum ambient air temperature 5<sup>0</sup>C
- Maximum temperature attainable by an object exposed to sun 60<sup>0</sup>C
- Maximum yearly weighted average ambient temperature 32<sup>0</sup>C
- Maximum relative humidity 100%
- Average number of thunderstorm days per annum 70
- Average number of rainy days per annum 120
- Average annual rainfall 150cm
- Wind pressure as per IS:5613(Part-I/Sec.I) 1985

Wind Zones IS:5613 Part-I/Sec-I	Light	Medium	Heavy
Terrain Category	100 Kg/m <sup>2</sup>	150 Kg/m <sup>2</sup>	200 Kg/m <sup>2</sup>

Environmentally, the region where the work will take place includes coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden. On occasions, the combination of salt and condensation may create pollution conditions for outdoor insulators.

Therefore, outdoor material shall be designed and protected for use in exposed, heavily polluted salty corrosive and humid coastal atmosphere.

### 4. SYSTEM CONDITIONS:

The materials shall be suitable for installation in supply systems of the following characteristics.

- Frequency 50Hz
- Nominal System Voltage 400/230V
- Maximum System Voltage LV System 440/250 V
- Minimum LV Voltage 370 V
- Power frequency one minute withstand (set & dry) 2KV
- Neutral Earthing arrangement LV System Solidly earthed

## Part-2: TECHNICAL

### 5.0 GENERAL/ TECHNICAL

The design of Aerial Bunched Cable offered shall comprise a compacted, standard, hard drawn H2 / H4 grade aluminum phase conductor as applicable under IS-8130 / 84 with cross linked polyethylene (XLPE) insulation 0.65 to 1.1. KV class, having of **carbon black content 2.5% ± 0.5%.**

The sizes and number of cores required are:

\*  $3 \times 50\text{mm}^2 + 1 \times 35\text{mm}^2 + 1 \times 16\text{mm}^2$  (catenaries type, will be called  $3 \times 50\text{mm}^2 + 1 \times 35\text{mm}^2$ )

The type of Bunched Cables shall be three phase and street lighting insulated bundled. All Aluminum Conductors combined with a neutral and catenaries (bare) which shall be of heat treated aluminum magnesium silicon alloy wires containing approximately 0.5% each of magnesium and silicon respectively. The catenaries must have an ultimate tensile stress of not less than that specified in the table of technical requirements.

The Bidder shall specify the standard to which this bundle shall be manufactured.

The conductor bundle offered shall be designed to meet the requirements set out in this specification taking note of safety factors pertaining to conductor or catenary tensioning and NESCO specification: General Technical Requirements for LV overhead lines.

However, a bid of Aerial Bunched Cables shall not be considered, unless it is accompanied by a list of all special tools and equipments necessary to complete the installation.

### 6.0 CONDUCTORS:

(a) The phase & street light conductors shall be of multi-stranded aluminum of compacted circular cross section. The aluminum shall comply with IS 8130:1984. The messenger conductor shall be of multi-stranded Aluminum Alloy conforming to IS 398 (Part 4) – 1994. In addition to meeting all requirement of relevant ISS the LT XLPE AB Cables supplied shall satisfy following general requirements.

#### FOR PHASE AND STREET LIGHT CONDUCTORS

Sl. No.	Specified Cross Sectional Area (mm <sup>2</sup> )	No. of Strands	Minimum Dia Of each strand in mm	Minimum. Over all dia. Of conducting part of the compacted conductor. (mm)	Maxm. D.C Resistance at 20 degree centigrade.( Ohm / Km)	Nominal Insulation thickness (mm)
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1	16	7	1.75	5.25	AS PER ISS / GTP	1.2
2	25	7	2.14	6.42		1.2
3	35	7	2.54	7.6		1.2
4	50	7	3.05	9.15		1.5
5	70	19	2.18	10.9		1.5
6	95	19	2.54	12.7		1.5

#### FOR MESSANGER CONDUCTORS

Sl. No.	Phase Conductor Size of the LT AB Cable in mm <sup>2</sup>	Specified Cross Sectional Area of the Messenger Conductor (mm <sup>2</sup> )	No. of Strands	Nominal dia Of each strand	Appx. Over all dia. Of conducting part of the compacted conductor. (mm)	Maxm. D.C Resistance of the messenger at 20 degree centigrade.( Ohm / Km)	Appx. Mass ( Kg / Km.) for the messenger
1	16	25	7	2.14	5.2	AS PER ISS/GTP	65
2	50	35	7	2.54	7.6		95
3	70	50	7	3.05	9.15		136
4	95	70	7	3.6	10.8		191.8

**6.0 (b)** The bidder must take required precaution to ensure that the average diameter of each strand of conductor shall be ascertained through physical measurement of dimensions of finished cables at ambient temperature during pre-dispatch inspection or / and verification at NESCO Store by consignee and the value so obtained shall have a tolerance limit with reference to the nominal diameter of each strand of conductor as stated in the tables above.

#### 7.0 TOLERANCES:

The measurement of strand diameter of the finished AB Cable shall not be less 0.03mm for strands up to and including 3.00mm diameter. For strands above that size, measurement of strand diameter shall not be less than 1% of the nominal strand diameter.

For the purpose of checking compliance with the above requirement, the diameter shall be determined by two measurements at right angles taken at the same cross section. The physical measurement of strands shall be conducted after opening the strands of a finished AB Cable offered for inspection.

#### 8.0 SPLICES IN WIRES:

Splices in Wires shall generally comply with requirements of IEC 1089.

The aluminum alloy rods may be spliced by cold pressure but welding before drawing provided the manufacturer can guarantee that the splice can develop 90% of the tensile strength of the un

sliced rod. Wires which break during stranding may be sliced by cold pressure butt-welding provided that:

No two splices in the completed conductor occur within 15m of each other and no two splices in any individual wire are less than 150m apart.

The splice shall be done with high skilled workmanship. The finished splice shall be smooth and at no point shall the cross sectional area be less than that of the un sliced wire.

Splicing of the alloy wires on the stranding machine in order to utilize lengths of wires on reels shall not be permitted.

#### **9.0 STRANDING AND CORE LAY:**

The conductor cores shall be stranded and the direction of lay must be as defined in IEC: 1089.

#### **10.0 INSULATION:**

The Aerial Bunched Cables shall be insulated for a voltage class of 0.65/1.1 KV and shall be capable of operating permanently at 1.2KV.

The insulation wall thickness shall be determined in accordance with Table-4 (Clause-7.2 and Clause 7.3) of IS: 14255/1995.

The insulating material shall be black and suitable to resist ultra violet radiation, salt laden sprays, chemical pollution, ageing effects, abrasion and mechanical shocks and mechanical and electrical stress at temperature up to 90°C in normal operation and 250°C under short circuit conditions per IEC: 502/1994.

The carbon black content in the XLPE insulation shall be **2.5% ± 0.5%**

#### **11.0 PHASE IDENTIFICATION:**

The individual insulated conductors within a bundle shall be identified by means of longitudinal projections.

The three phase conductors shall be marked by one, two or three longitudinal projections, indicating the R,Y,B phases.respectively.

The projections shall have the following dimensions.

- The distance between the tips of two adjacent projections, where there is more than one, shall be between 1.0 and 1.5.
- The width of the projection at the base shall be 1.0mm; and
- The height of the projections shall be 0.5mm.

## **12.0 INSULATION MARKINGS:**

Each individual conductor comprising a bundle shall have the range of non-erasable distinct markings listed below legibly printed on the insulation surface at one meter intervals. The embossing should be very clear & easily visible to naked eye.

- ISI Mark, IS 14255-95, Manufacturer's B.I.S License No. legibly embossed on the  
insu  
lati  
on.
- Name of the Purchaser.
- DESI Programme.
- P.O No. & Date
- Manufacturer's trademark identification for example "UCXLPE50"
- Year of manufacture: last two digits are sufficient:
- Designation of conductor type
- Size: for example "3x50"
- Shape of conductor.
- Rated voltage class: 0.65/1.1KV
- Back up conductor identification: conductors with one, two and three projections shall be marked R, Y and B respectively. The conductor with no projection shall be marked N and
- The height of the printed lettering shall be not less than 20% of the overall diameter of the conductor

## **13.0 TWIST:**

The direction of lay of the conductors comprising the bundle shall be left-handed and the lay ration shall comply with IEC: 1089.



With a bare catenaries configuration the insulated phase cables together with the street lighting cores shall be twisted round the neutral catenaries to form the ABC. This cable bundle is then strung directly onto the distribution poles supported by the catenaries with standard approved hardware.

#### **14.0 CABLE DRUM LENGTH:**

The cable shall be supplied in 500m or 1000 m Drum Lengths as the case may be for different sizes of LT XLPE AB Cable.

#### **15.0 TESTS:**

##### 15.1 General

Where not specified, all tests and test results shall conform to the requirements of IEC 502/1994 or IS 7098 (Part-I) 1998, IS 10810/1984, IS: 398(Part-IV) and IS: 14255/1955.

Unless expressly stated otherwise, the ambient temperature for routine tests as well as voltage tests shall be  $20 \pm 15^{\circ}\text{C}$  and for all other tests be  $20 \pm 15^{\circ}\text{C}$ .

The frequency of the alternating test voltage shall be 49 Hz to 51Hz. The voltage wave form should be sinusoidal.

##### 15.2 Type Tests

The test sample shall be 10m to 15m in length. All cores of the bundles shall be tested.

- Insulation resistance at ambient temperature.
- Insulation resistance at operating temperature.
- AC voltage test.

The insulation resistance test at ambient temperature shall be carried out in a water bath at ambient temperature.

The insulation resistance test at a operating temperature shall be conducted in a water bath at  $90^{\circ}\text{C}$ .

The longitudinal projections used for phase identification shall be ignored. The results of this test

shall be used to calculate the volume receptivity and the results conform to the requirements of IEC: 502/1994 or IS 10810 (Part-43).

The AC voltage test shall be carried out by applying 1.95KV ( $3U_0$ ) for four hours to the sample, which shall be submerged in a water bath at ambient temperature, having been steeped for a period not less than one hour. The test shall only be deemed to have been passed if no breakdown occurs.

Furthermore, the following non-electrical type tests shall also be carried out:

- Insulation wall thickness: the longitudinal projections used for phase 1 identifications shall be ignored as per IS 10810 (Part-6);
- Ageing test, consisting of an evaluation of the retention of the mechanical properties of the insulation after ageing.
- Wrapping test: as per IS 10810 (Part-3);
- Tests for bleeding and blooming of pigment as per IS 10810 (Part-9)
- Thermal expansion of insulation.
- Measurement of carbon black content as per IS 10810 (Part-32).
- Water absorption by the XLPE insulation, shrinking of the XLPE insulation.
- Tensile test: adhesion between conductor and insulation.

The adhesion test requires a tensile testing machine. A sample of at least 300mm length shall be selected and straightened out. The insulation shall be removed for a length of 150mm. The insulated end shall be held in the upper grip head and the bare conductor on the lower grip head. Tension shall be applied at a speed of 500mm/ min until the conductor first begins to slide within

the insulation. The test shall have been passed if the conductor and insulation combination can stand  $75\text{N/mm}^2$  without slippage occurring.

The neutral conductor/catenaries shall be type tested in accordance with the requirements of IS 398 (Part-IV) 1994.

### 15.3 **Routine Tests**

The following measurement or tests shall be carried out on all drums and coils of Bunched cable:

- Conductor resistance
- Voltage test.

The conductor to be tested for conductor resistance shall be stored for at least 12 hours in a room at particular constant temperature. If it cannot be established that the conductors have reached the room temperature, the test should be postponed for a period of further 12 hours. Alternatively, the test can be carried out on short sample after remaining one hour in a temperature controlled water bath. The test shall be carried out and the conversion factors used to convert the resistance value to a base of  $200^{\circ}\text{C}$  and one Km. The DC resistance of each conductor shall not exceed the appropriate maximum values specified in IEC:228/IS:6474.

The voltage test shall be conducted by applying to each core 3.5KV AC ( $2.5 U_0$  plus 2 KV) or 8.4 KV DC for 5 minutes with the specimen lying in a water bath at ambient temperature. The conductor shall pass the test if no electrical breakdown occurs.

### 15.4 **Acceptance Tests**

The following sample check, measurements and test shall be carried out in addition to the Acceptance Tests as per IS 14255 – 1955, IS : 398 ( Part – IV ) 1994, IS 8130 / 1984

- Measurement of insulation wall thickness;
- Measurement of diameter of each strand, overall outside dia & Cross Sectional Area of the conducting Part out of the finished product during pre-dispatch inspection.
- Thermal expansion test;
- Check of physical characteristics

- Tensile strength of individual wires of conductor.
- High Voltage Test on drums immersed in water(apply voltage 3.5 KV AC for 5 min)

These tests should be carried out on one length from each production batch of the same sample.

The thickness of the insulation wall shall be measured on a piece removed from each end of the sample length. If either means or minimum values are not met, two further samples shall be removed at 0.5m from the end corresponding to the failed specimen. If these samples do not satisfy the mean and minimum thickness requirements, the test shall be deemed to have been failed.

The longitudinal projections used for phase identifications shall be ignored.

The thermal expansion test need only be carried out on one core.

In relation to the tensile test, the tensile strength of the aluminum wires before stranding and that of the finished conductor shall comply with IEC: 1089.

#### 15.5 Test on the Catenary (messenger) Conductor

Breaking load, elongation and resistance tests shall be completed on the aluminum alloy catenaries conductor in accordance with the requirements of IS:398 (Part-IV)/1994 or IEC:1089.

#### 15.6 Bending Test on a complete cable

This test shall be performed on a sample of completed cable. The sample shall be bent around a test mandrel at room temperature for at least one turn. It shall then be unwound and the process shall be repeated after turning the cable sample around its axis by 180°. This process shall be repeated twice more. There shall be no signs of breaking or cracking of the cable insulation during this test.

The diameter of the mandrel shall be:

$$10(D+d)$$

Where D = Actual diameter of the cable (mm)

d = Actual diameter of the conductor (mm)

### **15.7 Rejection and Retests**

Should any one of the test pieces first selected fail to pass the tests, two further samples from the same batch shall be selected for testing, one of which shall be from the length from which the original test sample was taken unless the length has been withdrawn by the supplier.

Should the test pieces from both of these additional samples satisfy the requirements of the tests, the batch represented by these samples shall be deemed to comply with the standard. Should the test pieces from either of the two additional samples fail, the batch represented shall be deemed to have failed.

### **16.0 COMPLIANCE WITH SPECIFICATION:**

The Aerial Bunched Cable shall comply in all respects with the requirements of this specification. However, any minor departure from the provisions of the specification shall be disclosed at the time of bidding in the Non-compliance Schedule of this document.

### **17.0 COMPLIANCE WITH REGULATIONS:**

All the cables shall comply in all respects with the Indian Regulations and Acts in force. The cables and connections shall be designed and arranged to minimize the risk of fire and any damage, which might be caused in the event of fire.

### **18.0 NON-CONFORMING PRODUCT :**

The Purchaser reserves the right for decisions regarding acceptance, modification or rejection of non-conforming items.

### **19.0 INSPECTION AND TESTING :**

The Purchaser or his authorized representative has free entry at all times, while work on the contract is being performed, to all parts of the manufacturer's works which concerns the processing of the cables ordered. The manufacturer shall afford the the purchaser or his authorized representatives without charge, all reasonable facilities to ensure that the cable being furnished is in accordance with these specifications.

The cables shall successfully pass all the routine tests & acceptance Tests referred to in the section on tests and those listed in the most recent edition of the standards given in the specification.

The Purchaser reserves the right to reject any of the cables if the test results do not comply with the values specified or with the date given in the Technical data schedule.

Type Test Certificates for the tests conducted earlier shall be submitted with the bid for evaluation. The requirements of additional type tests will be at the discretion of the Purchaser

The Purchaser shall witness routine tests .In order to facilitate this, the contractor shall give the purchaser of 15days notice that the material is ready for inspection & testing. The supplier shall extend all assistance to the representative of the Purchaser during his inspection & testing of samples at his works. The materials shall be dispatched only after approval of such Test Reports and issue of Dispatch clearance by the Purchaser. However the Purchaser reserves the right to retest the materials after delivery at any NABL Accredited Testing Laboratory in case of any disputes regarding size & quality of supplied materials at a later date during guarantee period. The cost of such retesting shall be borne by the supplier.

All costs in connection with the testing, including any necessary retesting shall be borne by the Contractor, who shall provide the Purchaser with all the test shall have the right to select the samples for test and shall also have the right to ensure that the testing apparatus is correct. Measuring apparatus for routine tests shall be calibrated at the expense of the contractor at an approved laboratory and shall be approved by the purchaser before testing.

The Contractor shall be responsible for the proper testing of the materials supplied by sub-Contractor to the same extent as if the materials were completed or supplied by the contractor.

Any cost incurred by the Purchaser in connection with inspection or retesting as a result of failure of the equipment under test or damaged during transport or off loading shall be to the account of the Contractor.

The Contractor shall submit to the Purchaser three signed copies of the test Certificates, giving the results of the tests as required. No materials shall be dispatched until the Purchaser has received the test certificate and the contractor has been informed that they are acceptable.

The test certificate must show the actual values obtained from the tests, in the units used in this specification, and must merely confirm that the requirements have been met.

In the case of components for which specific type tests or routine tests are not given in this specification, the Contractor shall include a list of the tests normally required for these components. All materials used in the Contract shall withstand and shall be certified to have satisfactorily passed such tests.

No inspection or lack of inspection or passing by the Purchaser's representative of equipment or materials whether supplied by the Contractor or sub- Contractor, shall relieve the contractor from his liability to complete the contract works in accordance with contract or exonerate him from any of his guarantees.

#### **20.0 GUARANTEE:**

The contractor shall guarantee the following:

- Quality and strength of materials used.
- Satisfactory operation during the guarantee period of 24 months from the date of commissioning or 30 months from the date of receipt of the cables at NESCO's store whichever is earlier.
- Performance figures as supplied by the bidder in the technical data sheet.

#### **21.0 PACKING AND SHIPPING:**

The cable shall be wound on strong drums or reels capable of withstanding all normal transportation and handling.

Each length of cable shall be durably sealed before shipment to prevent ingress of moisture. The drums reels or coils shall be lagged or covered with suitable material to provide physical protection for the cable during transit or during storage and handling operations.

In the case of steel drums adequate precautions shall be taken to prevent damage being caused by direct contact between the cable sheath and the steel. These precautions shall be subject to the approval of the Purchaser

If wooden drums are used then the wood shall be treated to prevent deterioration from attack by termites and fungi.

Each drum or reel shall carry or be marked with following information:

- Individual serial number
- Standard ISI Mark, 14255-95, Manufacturer's B.I.S License No.
- Name of the Purchaser : NESCO / DESI Programme
- Employer's name
- Destination
- Purchase Order No. & Date
- Manufacturer's name
- Year of manufacture
- Cable size and type
- Length of conductor (meters)
- Net and Gross mass of conductor (Kg)
- All necessary slinging and stacking instructions
- Destination
- Contractor's name
- Name and address of contractor's agent in Orissa
- Country of origin

The direction of rolling as indicated by an arrow shall be marked on a flange.

## **22.0 STORAGE:**

The site selected for the storage of cable drums shall be well drained and preferably have a concrete/ firm surface which will prevent the drums sinking into the ground or being subjected to excess water thus causing flange rot.

All drums shall stand on battens, in the upright position and in such a manner to allow sufficient space between them for adequate air circulation. During storage the drums shall be rotated 90<sup>0</sup> every three months. In no instances shall be the drums be stored "flat" on their flanges or one on top of each other.



### **23.0 SHIPPING:**

The Contractor shall be responsible for the shipping of all cables, drums and reels supplied from abroad to the ports of entry and for the transport of all goods to various specified destinations including customs clearance, off loading, warehousing and insurance.

The Contractor shall inform himself fully as to all relevant transport facilities and requirements and loading gauges and ensure that the equipment as packed for transport shall conform to these limitations. The contractor shall also be responsible for verifying the access facilities specified.

The contractor shall be responsible for transportation of all the loads associated with the contract and shall take all reasonable steps to prevent damage of any highway or bridges by his vehicles by selecting routes, choosing proper vehicles for use and restricting and distributing loads to avoid the risk of damage. The Contractor shall immediately report to the Purchaser any claims made against the contractor arising out of alleged damage to a highway or bridge.

All items of equipments shall be securely clamped against movement to ensure safe transit from the manufacturer's facilities to the specified destinations.

### **24.0 HAZARDOUS SUBSTANCES:**

The Contractor shall submit safety data sheets for all hazardous substance used with the equipment. The contractor shall give an assurance that there are no other substances classified as hazardous in the equipment supplied. He shall also take responsibility for the disposal of such hazardous substances that may be found for any injuries resulting from those substances.

### **25.0 SUBMITTALS:**

The following shall be required in duplicate along with the bid:

- Completed technical data sheets;
- Descriptive literature giving full technical details of equipment offered.
- Outline dimension drawing for each type of conductor, for each bundle showing the conductor strand, composition and the bundle twist;
- Type test certificates, where available, and sample routine test reports;
- Detailed reference list of customers already using equipment offered during the last five years with particular emphasis on units of similar design and rating;
- Performance reports from the customers for the supplied LT XLPE AB Cables.

- Details of manufacturer's quality assurance standards and programme and ISO 9000 series or equivalent national certificates;
- Deviations from this specification to be submitted as per Non-Compliance. Only deviations approved in writing before award of contract shall be accepted;
- List of recommended spare parts for five years of operation with prices and spare parts catalogue with price list for future requirements.
- Any other documents to establish qualifying & credibility requirements as specified in this Tender Document.

**26.0 PERMANENT EMBOSSING:**

All materials supplied under the DESI shall bear distinct mark of "NESCO, DESI", and Purchase Order No. & Date "by way of embossing /enamel painting etc. including other information mentioned in GTP. This should be clearly visible to naked eye.

**27.0 COMPLETENESS OF CONTRACT:**

The Contractor without extra cost, although not specifically mentioned herein, but necessary or usual for similar equipment and their efficient performance shall provide all fittings and accessories. The Bid shall clearly indicate if any additional equipment or parts would be necessary to give complete offer and if so, the details and prices shall be included in the bids.

**General Manager (P&C)**  
NESCO, Balasore, Odisha

**GUARANTEED TECHNICAL PARTICULARS FOR 3X50+1X35+1X16 MM<sup>2</sup> LT XLPE AB CABLE.**

Sl No	Description	Specified	Bidder's Offer
1	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV	
2	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS 8130/84 / XLPE insulation ( IS	
3	Material of Neutral Catenary	Aluminum alloy as per IS 398 Pt - IV	
4	Voltage Class	0.65/1.1 KV	
	No. of Strands of Phase Conductor	7	
5	No. of strands/ Average /Minimum Strand Dia. In mm. (Finished Phase conductor.)	7/3.05	
6	Approximate Overall Dia. Of compacted phase conductor after removal of insulation.(in mm.)	9.15	
7	No. Of Strands / Average Strand Dia. In mm. ( Neutral	7/2.54	
8	Minimum Overall Dia. Of compacted Bare Neutral	7.62	
9	No. Of Strands / Average strand dia. / Nomunal cross sectional area of conducting part In No / mm <sup>2</sup> .	7 / 1.75 / 16mm <sup>2</sup>	
10	Minimum average thickness of insulation of phase Cond. (mm)	1.5	
11	Minimum thickness of insulation of Phase Cond. At any point (mm )	1.25	
12	Minimum thickness of insulation at any point in street light conductor (mm)	0.98	
13	Maximum DC resistance of Phase conductor at 20 °C	0.64	
14	Maximum DC resistance of street light conductor Ω / Km	1.91	
15	Maximum DC resistance of neutral cond. Ω / Km	0.986	
16	Ultimate tensile strength of neutral conductor (KN)	14	
17	Maximum temperature (Continuous)	90°C for phase and 75 °C for neutral	
18	Embossing on insulation at each one meter interval	Distinct Non-erasable ISI Mark, IS 14255-95, Manufacturer's B.I.S License No., Name of the Purchaser, Name of the manufacturer, Size of cable, voltage Grade along with sequential marking of	
19	Cable drum length	500 / 1000m	
20	Volume Resistivity of insulation at 27°C	1X10 <sup>13</sup> Ω - cm min.	
21	Volume Resistivity of insulation at 70°C	1X10 <sup>11</sup> Ω - cm min.	

Signature of the bidder :  
 Name :  
 Date :  
 Seal :

