

**THE BRIHAN-MUMBAI ELECTRIC
SUPPLY & TRANSPORT UNDERTAKING
(OF THE MUNICIPAL CORPORATION OF
GREATER MUMBAI)**



SPECIFICATION NO.023A0114

FOR

**1.1KV, STRANDED, ALUMINIUM
CONDUCTOR, XLPE INSULATED
ARMOURED CABLE**

Notice for revision of specification (summary sheet)

Attention of tenderers for – the tender is invited with following additions/ amendments made in specification

Sr.No.	Existing specification no.	Revised specification no.	Date of revision
1	023A0109	023A0114	22.04.2014

Sr.No.	Existing section/ clause No.	Description of existing clause	Revised Section/ Clause No.	Description of additions/amendments
1	Section 4 Clause 4.3	Description of size and quantity requirement	Section 4 Clause 4.3	Description of Item No.1 (4C/300 sq.mm cable) is modified with addition of non conducting water swellable tape over inner sheath
2	Section no- 5 clause no. 5.1.3	Type test requirement	Section no- 5 clause no. 5.1.3	Description changed in tabular format mentioning minimum type test requirement as per latest amendments available for IS:7098/part I
3	Section no- 5 clause no. 5.2	Conductor requirement	Section no- 5 clause no. 5.2	Description changed in tabular format including longitudinal water blocking arrangement for conductor
4	----	----	Section 5 Clause No.5.5.3	Specification of non conducting water swellable tape is added.
5	Section no- 5 clause no. 5.6	Armouring	Section 5 Clause 5.6.1	Description modified with minimum 90% armour coverage and armour strip size requirement
	----		Section 5 Clause 5.6.3	The rubberized cotton tape shall be applied to bind armour wires such that it shall not affect the electrical properties of the armour wires.
6	Section no- 5 clause no. 5.7	Outer sheath	Section no- 5 clause no. 5.7.3	Description of additional polyester strip for identification to be provided for 4C/300 sq.mm. cable is added
7	----	----	Annexure II	Details of sub vendors for critical items.

THE BRIHANMUMBAI ELECTRIC SUPPLY & TRANSPORT UNDERTAKING
(of the BRIHAN MUMBAI MAHANAGARPALIKA)

Specification No.023A0114

SECTION 1 : GENERAL

1.1 Tender document

- 1.1.1 This tender document shall be read and understood as a whole inclusive of all annexures, and every section or sub-section of this document shall be interpreted in proper context with other sections contained herein.
- 1.1.2 This specification covers supply of 1.1kV, Stranded, Aluminium conductor, XLPE Insulated Armoured cables.
- 1.1.3 All supply covered by this Specification shall be carried out in accordance with the "General Conditions of Contract".
- 1.1.4 Wherever the directions to the tenderers embodied herein conflict with those specified in the General Conditions of Contract, the former shall be binding in preference to the latter.

1.2 Standards

- 1.2.1 The cables shall be designed, manufactured and tested in accordance with the following National Standards.

IS:7098 Part-1 : 1988	Cross linked polyethylene (XLPE) insulated PVC sheathed cables for working voltages upto and including 1100 volts.
IS:5831 / 1984	PVC insulation & sheath of electric cables.
IS:10810 / 1984	Methods of test for cables.
IS:8130 / 2013	Conductors for insulated electric cables and flexible cords.
IS:3975 / 1999	Mild steel wires, formed wires and tapes for armouring of cables.
IS:10462 (Part 1)/ 1983	Fictitious calculation method for determination of dimensions of protective covering of cables.
IS:9938 / 1981	Recommended colours for PVC insulation for LF wires and cables.
IS:10418 / 1982	Specification for drums for electric cables.

- 1.2.2 Except as specified herein, cables shall comply with the latest published editions of International Standards Specifications (as amended to date), Or equivalent national standards.
- 1.2.3 Where Indian Standards Specification does not exist, the Relevant British Standard Specification shall be taken as standard.

- 1.2.4 If the cables offered are manufactured according to some other standard, it shall be clearly stated and a copy of the latest publication of the standard in English shall be forwarded with the offer.

1.3 Legislation

- 1.3.1 The whole of the cable shall comply in every respect with the provisions of relevant Government Legislation's and/or Rules and Regulations governing manufacture, installation, operation and maintenance of the cables.
- 1.3.2 Tenderers shall ensure that all safety measures are extensively provided in the cables against hazards to life and property and that the proper installation and use of the cable under no circumstances shall contravene any enactment's rules, laws and by-laws of the Government and the Local Authority.

1.4 Departure from Specification

- 1.4.1 If due to any reason, tenderers find it necessary to depart from the provisions of section of the specification, such departures shall be clearly stated and underlined giving full reasons.
- 1.4.2 If departures from the provisions of any section of this specification are not notified in writing, it will be presumed that tenderers will abide by this specification.
- 1.4.3 Any suggestion, comment, or advice to include in this document, additional provisions in respect of any special device or attachment necessary but not already specified herein, may be put forward by the tenderers giving full details of the special/additional features of the cables together with the justification for its inclusion.

1.5 Technical Data:

- 1.5.1 Tenderers shall give full specifications of the cable offered and shall supply technical literature and descriptive particulars together with cross sectional drawing of cable and illustrations to indicate the type and design of the cable.
- 1.5.2 Tenderers shall supply such technical data, characteristics and statistical information as required to supply comparative merits and performances of different types and designs of the cable and experience of other users of the cable.

1.6 Materials and Workmanship

- 1.6.1 The cables shall conform to the best engineering practice in design, usage of materials and fabrication so as to ensure reliability, economy and safe and convenient operation in the environment in which they are installed.
- 1.6.2 Manufacturers shall give details of the experience in the supply of similar cables. A list of important customers who have been supplied with similar cables with particulars of quantity, location and dates when supplied shall be furnished.

1.7 GUARANTEE

- 1.7.1 The cables shall be guaranteed against manufacturing and material defects for a period of 15 months from the date of acceptance or 12 months from the date of its installation, whichever occurs earlier.
- 1.7.2 In case of the cable which fails in the guarantee period, the successful tenderer shall have to replace the same free of cost.

1.8 Instructions for Erection / Installation:

- 1.8.1 Tenderers shall furnish the necessary instructions for erection / installation of the cable and shall also state precautions / provisions, if any, to be made for proper use afterwards.
- 1.8.2 Tenderers shall also state precautions / provisions for the proper use and maintenance of the cable after commissioning and supply detailed guidelines for the site operation and maintenance of the cable.

SECTION 2: DESCRIPTION OF THE POWER SYSTEM

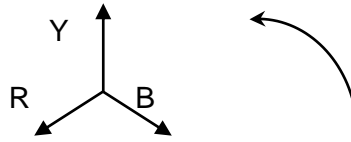
2.1 Grid

- 2.1.1 The Tata Power Company Ltd.(TPCL) and the Maharashtra State Electricity Generation Co. Ltd. (MSEGCL) have their generating stations located in different parts of Maharashtra State and form an interconnected transmission system in the Mumbai-Pune Region.
- 2.1.2 Power from this system is transmitted at 220/110kV through overhead conductors and underground cables amongst others to TPCL's five main receiving stations at Backbay, Carnac, Parel, Dharavi and Mahalaxmi situated in the island of Mumbai, where they have installed either delta/star or star/zigzag step down transformers with star point effectively earthed for making power available to their consumers at 110/33/22kV.

2.2 Existing B.E.S.T. System

- 2.2.1 The B.E.S. & T. Undertaking, on behalf of the Brihan Mumbai Mahanagarपालिका (who are the licensees for the distribution of electric power within the City limits of Mumbai) receives power in bulk from the Tata Power Company Ltd. At 110/33/22kV, 3 Phase, 50 Hz.
- 2.2.2 Bulk power at 110/33/22kV is transmitted from TPCL's five main receiving stations through effectively earthed underground cables to BEST's receiving sub-stations situated at different localities in Mumbai where the BEST Undertaking has installed 110/33kV, 110/11kV, 22/11kV or 33/11kV, star – z, star/star, delta/star power transformers of vector group YNzn11, YNyn0, 31Dy1 with neutral earthed with / without a resistance. Where the transformation is 110/11kV or 110/33, 22/11kV or 33/11kV the starpoint of the transformers has been effectively earthed. The power transformers are provided with OLTC gear to regulate and maintain the 11kV voltage fairly constant.
- 2.2.3 Underground 11kV (effectively earthed) feeder cables radiate from the B.E.S. & T. Receiving Sub-stations to supply power to a large number of distribution substations and to certain consumer's substations. These feeders form a radial network under which each feeder supplies on an average 4 to 5 substations in series.
- 2.2.4 Power at 11kV is stepped down to 415/240V at the distribution substations where the various sizes of 11kV/415-240V delta/star transformers of vector group Dyn11 are installed. The star point of the transformer is solidly earthed and is also brought out to an insulated terminal for the 3 phases, 4 wire distribution system.
- 2.2.5 The 415/240V secondary distribution system comprises of a vast network of underground four core cables, suitably sectionalised by means of distribution pillars, to which service lines are teed off to supply power to medium and low voltage consumers.

2.2.6 The phase sequence of the 3 phases at the existing receiving sub-stations is in accordance with the International Standards as indicated below:



SECTION 3: PREVAILING SERVICE CONDITIONS

3.1 Climatological Data

3.1.1 The information given hereunder is based on data supplied by the Regional Meteorological Centre, Colaba, Mumbai – 400 001.

3.1.2 The information is based on the data collected over the years 1881 to 2007.

3.1.3 The table below gives the climatological data for the city of Mumbai.

a) Air Temperature in Shade

Highest temperature recorded	:	40.6 ⁰ C
Lowest temperature recorded	:	11.7 ⁰ C
24 hours daily average	:	26.0 ⁰ C

b)

Mean highest temperature in sun	:	62.2 ⁰
Highest temperature in sun	:	64.0 ⁰ C

c) Relative Humidity

Lowest mean RH	:	62%
Highest mean RH	:	85%

d) Rainfall

Mean no. of rainy days in a year	:	75.9 days.
Mean rainfall in a year	:	2146.5 mm
Maximum rainfall recorded in a year	:	3481.6 mm
Heaviest rainfall in a day recorded	:	575.6 mm

e) Wind

Mean daily wind speed – min. in a year	:	9.8 km/hr
Mean daily wind speed – max. in a year	:	18.7 km/hr
Highest wind speed in gust	:	103 km/hr on 17/06/2004

3.2 Geographical Data

3.2.1 MUMBAI City is situated on the western coast of India and is the second biggest city in the country. It has an excellent sea port and is on the world's main routes by sea and air. It is well connected with the hinterland by road and railways.

Area	:	61 sq. km.
Population	:	38,00,000
Longitude	:	72 40' E
Latitude	:	18 54' N
Height above MSL	:	11 Meters

3.3 Local Conditions

3.3.1 MUMBAI is a densely populated city with large commercial centers, engineering workshops and several varieties of large and small industries occupied in the manufacture of consumer goods and other commodities.

3.3.2 Although certain areas are still undeveloped, the city is divided into several zones such as residential, commercial, industrial etc. with a view to minimize nuisance and localize the civil activities as far as practicable. Still there are several mixed localities where such zoning has not been done and two or more types of activities are allowed to continue. By and large, the heavy industries are gradually shifting from the city, to suburbs.

3.3.3 The city originally comprised of five islands separated by small creeks which were, in later years filled in and reclaimed. The city now stands as one large island separated from the mainland by creek, the shores of which more or less demarcate the boundaries of the city and suburban limits.

3.3.4 Because of large areas of reclaimed land, the soil conditions and the sub-soil water levels in the different parts of the city vary widely.

3.3.5 The sub-soil water level varies with the time and height of the tides and lies between 0.5 meter to 4 meters below ground level in the densely populated areas. The water has considerable salt content.

3.3.6 During rains, flooding of the roads takes place and water level in certain low lying areas may go up to about 1 meter above ground level.

3.3.7 The chemical composition of soil obtained from typical samples is given below:

Appearance	<u>Sample No.1</u> A mixture of clay, Stones, some clinker & coal bits & other organic matter.	<u>Sample No.2</u> Mainly clay with a few small stones & a few bits of organic matter.
Moisture	2.00%	7.20%
<u>Analysis on dry soil</u>		
Organic matter	14.20%	3.00%
Combined Water	4.00%	3.60%
Carbon dioxide	NIL	3.70%
Total Water Solubles (100 gms. in 500 cc Water).	0.1075%	0.1855%
Reaction of water	pH Value	pH Value
Extract	7.5%	7.6%
<u>Analysis of water Solubles</u>		
Silicon SiO ₂	0.0100	0.0065
Lime CaO ²	0.0060	0.0104
Magnesia MgO	0.0101	0.0109
Sulphur Trioxide SO ₃	0.0065	0.0143
Sodium Oxide Na ₂ O	0.0149	0.0138
Chlorine Cl ₂	0.0340	0.0221
Di-Nitrogen Na ₂ O ₅	0.0040	0.0078
Pentoxide		

The above radicals are probably combined as follows:

Calcium Sulphate	CaSO ₄	0.0146	0.0253
Magnesium Chloride	MgCl ₂	0.0428	0.0257
Sodium Chloride	NaCl	0.0035	0.0049
Sodium Silicate	Na ₂ SiO ₃	0.0203	0.0132
Sodium Nitrate	NaNO ₃	0.0063	0.1040
Total Inorganic Salts		0.0875	0.0815
Water Soluble Organic matter		0.0200	0.1040
Total Water soluble Matter		0.1075	0.1855

The mean ground temperature may be taken as 30⁰ C and the thermal resistivity of soil $\rho = 120^{\circ} \text{C watt per cm}^3$.

3.4 Existing Practice

3.4.1 All the cables are laid direct in the ground except for small length laid in ducts, earthenware or R.C.C. pipes/DWC pipes inside the receiving stations, sub-stations and across carriage ways.

The cables are normally laid along footpaths according to standard alignments decided upon by the local authority to bring about uniformity and proper co-ordination between the underground services of different utilities such as gas mains, water mains, electric mains, telephone, etc. The minimum clearance between electric cables and the mains of other utilities when they run parallel to each other is generally 45 cms. but in certain cases electric cables have been laid almost touching the water mains or sewer due to congestion.

The city has suburban and main line electric rail traction system operating at 25kV AC/ 1500 volts D.C. which are subject to problem involving electrolytic corrosion and vibration.

The underground utility services are laid in close proximity of chemical corrosion and microbiological action at these places.

The standard depths below the surface of ground at which the cables are generally laid are as follows:

Type of Cables	Depth below Ground Level
33,000 / 22,000 Volt Cable	1,070 mm
11,000 Volt Cable	910 mm
1,100 Volt Cable	760 mm
Communication Cable	910 mm

3.4.2 Where the cables cross railway tracks, they are generally laid in R.C.C. pipes, the depth being such that clear minimum distance of 1,220 mm is left from the bottom of the sleepers to the top of pipes.

3.4.3 The number of cables in any one section of the trench of sub-stations or distribution pillars, any number up to 20 may be side by side or in special configuration. The spacing between cables may be 23 cms., 17 cms., or 11 cms., depending upon the number of cables and availability of spaces.

SECTION 4: REQUIREMENTS

4.1 Type

Stranded, Aluminium Conductor XLPE Insulated, Inner Sheath of extruded PVC, galvanized steel strip armoured and PVC sheathed cable generally conforming to IS:7098(part-1)/1988 (amended to date).

4.2 Installation in Vertical Situation

The cable shall also be suitable for installation in vertical situation.

4.3 Size and Quantities

The following sizes and quantities of 1.1kV, XLPE cables are required:

Item No.	Description	Qty. in Mtrs.
1.	Stranded Alu. Conductor, XLPE Insulated, Inner Sheath of Extruded PVC, with water swellable tape over inner sheath, Galvanized Steel strip armoured and PVC sheathed Cable for 1100 Volts confirming to IS:7098 (Part-I)/1988 as amended upto date and Confirming to Specification No.023A0114. Size: 4C x 300 sq.mm.	
2.	Stranded Alu. Conductor, XLPE Insulated, Inner Sheath of Extruded PVC, Galvanized Steel strip armoured and PVC sheathed Cable for 1100 Volts confirming to IS:7098 (Part-I)/1988 as amended upto date and Confirming to Specification No.023A0114. Size: 4C x 120 sq.mm.	
3.	--- do --- but Size : 4C x 70 sq.mm.	
4.	--- do --- but Size : 4C x 25 sq.mm.	
5.	--- do --- but Size : 2C x 50 sq.mm.	
6.	--- do --- but Size : 2C x 25 sq.mm.	
7.	--- do --- but Size : 3C x 95 sq.mm.	

4.4 Quantity Variation

The General Manager at his discretion may alter the above quantity by –25% or +25% after the contract is awarded and before delivery of material is completed.

SECTION 5: TECHNICAL SPECIFICATION

5.1 General

- 5.1.1 This specification covers requirement of 1.1kV, multicore stranded Aluminium conductor, XLPE (cross-linked polyethylene) insulated, PVC sheathed, galvanised steel strip armoured cable generally conforming to IS: 7098 (Part-I)/1988 amended to date for XLPE insulated cables.
- 5.1.2 All cables shall be suitably tropicalised and rated for the service conditions on site. The cables shall be liberally designed and manufactured from the best materials for satisfactory operation under onerous service conditions without causing any permanent injury or shortening of the life.
- 5.1.3 The tenderer who had supplied specified material in past to the Undertaking and carried out any changes in design.

AND

The tenderer who have not supplied the specified material to the Undertaking in the past i.e. New supplier shall submit Type test certificates with the offer, for the records of the purchaser.

The type test should have been conducted during the period not exceeding 5 years from the date of opening the bid. The minimum test certificate requirements are given below:

Sr.No.	Offered Cable	Minimum type test required
1	1.1 kV, 4C/300 sq.mm. Al. Cond. XLPE cable.	1.1kV, 4C/300 sq.mm. or above size, Cu. / Alu. Cond., XLPE insulated, PVC sheathed armoured cable
2	Up to 1.1 kV, 4C/120 sq.mm. Alu. Cond. XLPE cable.	1.1kV, 4C/120 sq.mm. or above size, Cu. / Alu. Cond., XLPE insulated, PVC sheathed armoured cable

5.1.4 Voltage Grade:

The cable shall be suitable for use on medium voltage three phase system where the voltage between conductor and earth does not exceed 650 volts (i.e. solidly earthed 1,100 volts system).

5.1.5 Short Circuit Level:

The maximum symmetrical short circuit level on the 415 Volts system will be 25 MVA. The cable insulation shall withstand the stresses and the resultant increase in temperature caused by the flow of short circuit currents. The cable armour shall be capable of carrying the system earth faults currents for 1 sec. without any damage to any component.

5.1.6 Method of Installation:

The cables shall be required to be laid partly underground, partly in duct and partly in air. The formation shall be generally horizontal side by side, touching.

5.2 Conductor:

Description	Size of Conductor	Minimum No. of Strands
<ul style="list-style-type: none"> - The conductors of the cable shall be stranded construction and composed of high conductivity H2/H4 grade Aluminium wires conforming to Clause 3 of S:8130/1984 - Conductor shall be shaped / circular - Conductor shall be uniform in size and shape - Longitudinal water-blocking arrangement (or water-tight construction or water barrier protection) shall be provided within the conductor. - As per manufacturer's procedures, 100% water-tight conductor shall be achieved. - Make and type of material to be used for water blocking arrangement shall also be stated in the annexure-I - All detailed constructional features shall be shown in the cross-sectional drawing. 	300 sq.mm	38
	120 sq.mm	20
	95 sq.mm.	15
	70 sq.mm	15
	50 sq.mm.	12
	25 sq.mm.	7

5.3 Insulation

The insulation shall be of XLPE (cross-linked Polyethylene) suitable for 90° C operation conforming to Clause 4 of IS: 7098 (Part-I)/1988 (amended to date) for XLPE cables. The thickness of insulation shall conform to Table-3 of IS: 7098 (Part-I)/1988 (amended to date) and shall be applied by extrusion process. The colour of XLPE insulation shall be Red, Yellow, Blue and Black for respective cores of cables.

5.4 Core Identification

The individual cores of cables shall be identified by different colouring of XLPE insulation in accordance with Clause 10 of IS: 7098 (Part-I)/1988 (amended to date) for XLPE cables.

5.5 Inner Sheath

5.5.1 The inner sheath over the laid up cores shall be of soft thermoplastic material applied by extrusion process. The inner sheath shall be so applied that its removal is easy and shall not damage the core insulation. If required all interstices shall be filled with polypropylene fillers.

5.5.2 The inner sheath shall be suitable for 90°C conductor temperature and conforming to Type ST2 of IS: 5831/1984 amended to date.

- 5.5.3** For 4C/300 sq. mm. cable, a layer of non-conducting water swellable tape shall be provided over inner sheath of cable.

The specification of non-conducting water swellable tape is as follows:

The thickness shall be approx. 0.3 mm and weight shall be approx. 118 gms /sqm.

Swell height shall be ≥ 12 mm in 1 min.

5.6 Armouring

- 5.6.1 The armouring shall be applied over the inner sheath and shall be of galvanized steel strips as specified in Clause 13 of IS:7098 (part-I)/1988 and IS:10462 (Part-I)/1983 for XLPE cables and armour strips shall be applied as closely as possible with armour coverage not less than 90% as per IS:7089/Part-I/1988. The armouring shall be suitable for carrying system fault current.

Size of Cable	Size of Armour Strip (width X thickness)
4C x 300 sq.mm	6.1 x 1.4 mm
4C x 120 sq.mm	4.0 x 0.8 mm
4C x 70 sq.mm	
4C x 25 sq.mm	
2C x 50 sq.mm	
2C x 25 sq.mm	
3C x 95 sq.mm	

- 5.6.2 Armour resistance shall be as per IS: 7098 (Part-I)/1988 Clause 13.5 Table-7 for XLPE cables.
- 5.6.3 The rubberized cotton tape shall be applied to bind armour wires such that it shall not affect the electrical properties of the armour wires.

5.7 Outer Sheath

- 5.7.1 For XLPE cables, the outer sheath shall be PVC compound Type ST2 of IS: 5831/1984 and thickness shall be conforming to Table-8 of IS: 7098 (Part-I)/1988 (amended to date) and shall be applied by extrusion process over the insulation. The colour of outer sheath shall be YELLOW as per IS: 9938/1981.
- 5.7.2 The word "BEST – LV, Manufacturer's name, Year of manufacture" shall be embossed on the outer sheath by the letters of sizes not be less than 10mm x 10mm for 300 sq.mm. Cable, 7mm x 7mm for the cable of sizes from 50 sq.mm. to 120 sq.mm. and 5mm x 5mm for 25 sq.mm. Cable.

Entire length of cable should be embossed / punched progressively at every meter and the sequential marking shall start from zero meters from the inner end, so that, final position should indicate total drum length of cable.

- 5.7.3 For 4C x 300 sq.mm. cable, Additional Polyester strip for identification having manufacturer name and year of manufacture printed throughout the length at an interval of 1 mtr. shall be provided under/over armouring of cable.
- 5.7.4 The outer sheath shall be suitable for 90° C conductor temperature and conforming to type ST2 of IS: 5831/1984, amended to date.
- 5.8 The diameter over inner sheath and overall diameter shall not be more than those given in the following table:

Size of Cable	Diameter over Inner Sheath	Overall Diameter
4C x 300 sq.mm.	60 mm	69 mm
4C x 120 sq.mm.	40 mm	48 mm
4C x 70 sq.mm.	34 mm	42 mm
4C x 25 sq.mm.	22 mm	29 mm
2C x 50 sq.mm.	26 mm	30 mm
2C x 25 sq.mm.	20 mm	25 mm
3C x 95 sq.mm.	34 mm	42 mm

5.9 Sealing of Ends

- 5.9.1 The ends of the cable shall be suitably capped and sealed to avoid ingress of moisture. The cap shall bear the manufacturer's trade mark stamped thereon.
- 5.9.2 The ends of the cables shall also have stamped thereon letters 'A' and 'Z' to indicate running end of the cable.
- 5.9.3 When facing the cross section of the cable, the 'A' end and 'Z' end of the 1100Volt cables shall have the cores coloured Red, Yellow, Blue and Black in clock-wise and anti-clockwise directions respectively.
- 5.10 The tenderer shall indicate the source of supply of raw materials / components and forward the test certificates of raw materials / components incorporated.
- 5.11 The tenderer shall furnish detailed drawings and basic data assumed in the design.
- 5.12 Cost Data Sheet:

As and when required by Undertaking, the bidder shall submit the cost data sheets indicating the break up prices and quantity of each raw material and components along with the unit rates required for manufacturing 1 km length of the offered cable. The cost data sheet format is enclosed herewith.

FORMAT FOR COST DATA					
ITEM:Core /sq. mm. 11 KV, XLPE cable.					
Sr.No.	Particulars	Unit	Unit Rates (Rs.)	Qty. / Km	Amt.(Rs.)

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SECTION 6: SCHEDULE OF TESTS

6.1 Tests at Manufacturer's Works:

Type, Acceptance and Routine Tests shall be carried out at manufacturer's works in accordance with clause 15 of IS:7098 (Part-I)/1988 for XLPE cables and also in accordance with General Conditions of Contract.

6.2 Test Certificate:

While delivering each cable lot, the contractor shall furnish duly certified triplicate copies of the test certificates showing the results of tests mentioned above and the test results shall conform to the requirement laid down in the standard.

6.3 Additional Tests:

In addition to the tests specified above, the purchaser reserves the right of carrying out any inspection or tests at manufacturers works during all stages of manufacture of the cable as well as such inspection and tests as may be considered necessary after laying at site.

6.3.1 Sending sample of cable for thermal ageing in air test:

While acceptance of the cable Undertaking reserves a right to send sample piece of cable from one of the lots supplied by the supplier for carrying out Thermal ageing in Air test (as per IS:10810-Part-11 & IS: 694 Cl.16.6) to any of the Government approved laboratories in Mumbai for which testing charges shall be borne by the supplier.

6.4 Procedure for accepting 1.1kV, XLPE cables at our Material Testing & Standards (M.T.S.) Laboratory:

6.4.1 The number of cable drums received through one challan from Material Management Department shall be considered as one lot.

6.4.2 Acceptance of Lot:

6.4.2.1 Any two drums shall be selected at random from the lot by our M.T.S. department for carrying out acceptance test.

6.4.2.2 For acceptance test, 1.1 mtr. Length shall be cut from the two selected drums. Following tests shall be carried out for acceptance of lot.

- a) Physical appearance. Any abnormality like armour embedded in outer sheath etc. shall be checked.
- b) H.V. test per IS:7098 (Part-I)/1988, Clause 16.2 for XLPE cables.
- c) Armour resistance test as per Clause 15.4 of IS:7098 (Part-I)/1988, for XLPE cables.

- d) Oxidation/Tarnishing of core and armour.
 - e) Dimensional measurement:
 - i) Overall diameter (As per G.P.P.)
 - ii) Diameter over inner sheath. (As per G.P.P.)
 - iii) Thickness of outer sheath (As per G.P.P.)
 - iv) Thickness of inner sheath (As per G.P.P.)
 - v) Insulation thickness (As per G.P.P.)
 - vi) Number of strands (As per G.P.P.)
 - vii) Diameter of strands (Approx., As per G.P.P.)
 - viii) Armour thickness (As per G.P.P.)
 - ix) Armour width (As per G.P.P.)
 - f) Conductor resistance test (as per IS: 7098 (Part-I/1988 for XLPE cables): This test shall be carried out on full drum length, as per test method specified in IS: 10810(Part-5).
 - g) Tensile strength and elongation at break test for insulation and sheath.
- 6.4.2.3 If both the drums pass the test, then all drums in the lot will be held eligible for individual testing of cable drums as described in para.6.4.3 below. Individual drum shall be accepted or rejected depending upon the results of inspection / testing.
- 6.4.2.4 If, any one of the drum fails in any test other than oxidation/tarnishing of core and armour, entire lot shall be rejected. If, either or both of the drums fail in only oxidation/tarnishing of core and armour, further inspection shall be carried out as described in para.6.4.3. If found not in order, entire lot shall be rejected.
- 6.4.3 Acceptance of Individual Drum:**
- 6.4.3.1 If the two drums selected for acceptance of lot, pass the test, then individual drum will be inspected for acceptance or rejection.
- 6.4.3.2 For acceptance of individual drum, a piece of 0.6 mtr shall be cut from each drum and shall be inspected for oxidation / tarnishing of core and armour, compactness of armouring and condition of inner and outer sheath. If found satisfactory, the drum shall be accepted. In case of defects observed other than oxidation/tarnishing of core, the drum shall be rejected.
- 6.4.3.3 In case of oxidation/tarnishing of core and armour, a further cut shall be taken at 2 mtrs. length. Also a length of 0.6 mtr shall be cut from the other end of the cable. If the cable core and/or armour is found to be oxidised on either of the pieces, the drum shall be rejected. If found in order, the drum shall be accepted, subject to reduction of total length of cable cut for payment purpose.
- 6.4.3.4 Also, the Undertaking reserves the right to carry out other tests as per IS:7098 Part-I/1988 for XLPE cables, on any cable drum and if the cable drum fails in any of these tests, the whole lot shall be rejected.
- 6.4.3.5 Once the drum is rejected and it is required to be replaced by the firm, then resubmitted drum shall not have the same number with added

alphabet like A, B, C, D etc. with the same numerical as the rejected drum but it shall have a totally new number.

SECTION 7: DESPATCH INSTRUCTION

7.1 Packing and Marking for dispatch

- 7.1.1 All cables shall be securely packed and protected by the contractor. The contractor will be held responsible for the efficiency of the packing and protection to ensure safe transport from the manufacturers works to B.E.S. & T., Bijlee Bhavan, Kussara Stores / Dharavi Depot, Mumbai.
- 7.1.2 The cables shall be wound very securely and in an approved manner on non-returnable strong wooden drums **conforming to IS:10418 / 1982** which will have been treated previously with P.C.P. or with other fungicides to ensure long life of the drums in tropical climates and which shall be specifically suited for transport.
- 7.1.3 The drums shall be fitted with spindle plates. It should be ensured that screws holding the spindle plate to the planks shall not be fixed up off the joints of two planks. Drums may be made with nails provided that any nails which come through into the cable space shall be properly and efficiently clinched.
- 7.1.4 The drums shall be effectively lagged with stout close fitting battens so as to effectively prevent damage to the cable during transit or storage.
- 7.1.5 Both ends of the cable on each drum shall be easily accessible for testing and the inner end shall be brought out and the length of it shall be between 20 cms. to 30 cms. (through the drum face) in order to facilitate 'conductor resistance test' and shall be protected by a steel cover plate (or plates) rigidly fixed to the drum face with screws or nails.
- 7.1.6 The two cable ends shall be so fastened and secured to the drums that during the process of transit, rolling etc. the cable does not get loosened or displaced.
- 7.1.7 If the outer end is left inside the drum, the batten or battens which are necessary to be removed to obtain access to the ends, must be marked clearly with red paint.
- 7.1.8 An arrow shall be painted in indelible paint on both sides of the drum to indicate the direction in which the drum shall be rolled.
- 7.1.9 All drums shall be stenciled in indelible paint as follows:

ORDER No.

B. E. S.

&

T.

MUMBAI (INDIA)

- 7.1.10 The following information shall be painted on both sides of each drum and also be embossed on at least two metal labels on each side of the drum:

- i) Size and type of cable.
- ii) Number of cores.
- iii) Length
- iv) Drum Number.
- v) Gross Weight.
- vi) Net Weight.
- vii) Year of manufacture.
- viii) Name of manufacturer.
- ix) Trademark, if any.

The drum shall be marked with ISI certificate mark.

7.1.11 Each drum shall have clearly stenciled on it good paint "Not to be slung except by bar through the centre" and in addition to it, it should be marked "Store away from boilers".

7.1.11.1 Each drum flange shall be painted with Black colour.

7.1.12 The standard drum length shall be as under:-

Item No.	Size of the cable	Stranded Drum Length
1.	4C x 300 sq.mm	250 Meters.
2.	4C x 120 sq.mm	500Meters.
3.	4C x 70 sq.mm	
4.	4C x 25 sq.mm	
5.	2C x 50 sq.mm	
6.	2C x 25 sq.mm	
7.	3C x 95 sq.mm	

7.2.13 A tolerance not exceeding +/- 5% shall be permitted, on standard drum length.

7.2.14 Spindle hole diameter shall be 80 mm (min.).

SECTION 8: DRAWINGS & DOCUMENTS

Following documents shall be prepared based on the BEST specifications and statutory requirements and shall be submitted with the bid:

- a) Completely filled-in Guaranteed Technical Particulars in format specified by BEST in section 11 of specification.
- b) General description of the equipment and all components including brochures.
- c) Type test Certificates.
- d) Experience List.
- e) Cross sectional Diagram of the cable

Drawings/Documents to be submitted after the award of the contract:

Sr. No.	Description	For approval	For review information	Final Submission
1	Guaranteed Technical Particulars	√		√
2	Manual/Catalogues		√	
3	Cross sectional drawing		√	√
4	Fault level calculation for armour		√	√
5	Technical details and test certificate of XLPE compound		√	√
6	Armour coverage calculation		√	√
7	Installation instructions		√	√
8	Type test certificate	√	√	√
9	List and address of raw material suppliers and purchase details as per annexure I		√	√

All the documents shall be in English language.

The drawings shall be to scale and fully detailed. All important dimensions shall be given and the material of each component shall be indicated.

All the above mentioned drawings/documents are required to be submitted and get approved from the Divisional Engineer, Planning materials, within 15 days from the placement of purchase order.

SECTION 9: PRICES, DELIVERY & VALIDITY

9.1 Prices

- 9.1.1 Tenderers should quote the prices with IEEMA Price Variation without ceiling and free delivery by road transport to our Kussara Stores, Mazagaon, Mumbai/ Dharavi / Wadala-Anik Depot, including arrangement for unloading of the same and stacking them at the proper place. The prices shall include transit insurance, but shall be exclusive of Excise Duty, V.A.T/ C.S.T. and Octroi wherever applicable, the percentage of which should be clearly stated. The Ex-works prices shall be mentioned for the purpose of charging Excise Duty.
- 9.1.2 These goods are meant for use in generation/ distribution of electrical energy. Form 'C' is applicable and the tenderers should indicate the exact sales tax that will be charged against issue of Form 'C' by us.
- 9.1.3 It will be the responsibility of the manufacturer for safe transport of all sizes of cables including arrangement for unloading and keeping the same at proper place. The freight charges, insurance and unloading charges shall be clearly quoted in the Schedule of prices and delivery. The offers of tenderers, who quote only Ex-Works prices will be overlooked.

9.2 Delivery

- 9.2.1 The delivery of each item shall commence within 8 weeks from the date of receipt of our acceptance letter and be completed as mentioned below :-

Item	Sizes of Cable	Quantity to be supplied per month in Meters.
1	4C x 300 sq.mm.	
2	4C x 120 sq.mm.	
3	4C x 70 sq.mm.	
4	4C x 25 sq.mm.	
5	2C x 50 sq.mm.	
5	2C x 25 sq.mm.	
6	3C x 95 sq.mm.	

- 9.2.2 The delivery schedule given above is tentative and may be revised by us at our option. However, notice of minimum 30 to 40 days would be given for the change in delivery schedule. Therefore the tenderers shall specifically confirm that they would agree to our default schedule.
- 9.2.3 Before delivering each lot as specified above, successful tenderers shall offer these cable drums for inspection and testing at your works. In this connection you have to give an advance intimation of 15 days to our Divisional Engineer Planning (Materials), 3rd floor, Backbay Veej Bhavan, 149/150, Backbay Reclamation, Gen. J. Bhosale Marg, Mumbai – 400 021 who will arrange to depute engineers to your works for inspection and testing.

9.3 **Validity**

The offer should be valid upto _____ . The offers with lesser validity period may be overlooked.

SECTION 10: TERMS OF PAYMENT

These will be as under –

- 10.1 95% Payment within 30 days from the date of submission of the bills duly accompanied by a copy of our Stores Received Note to the Administrative Officer, Materials Management Department, BEST Bhavan, Mumbai - 400 001.

AND

- 10.2 Balance 5% payment after expiry of guarantee period i.e. 12 months from the date of installation but not later than 15 months from the date of acceptance of material.

NOTE:

1. KINDLY NOTE THAT THE OFFERS WITH ADVANCE PAYMENT CONDITIONS SUCH AS PAYMENT AGAINST DOCUMENTS THROUGH BANK, PAYMENT AGAINST DELIVERY, ETC. AND ALSO WITH LESSER VALIDITY PERIOD WILL BE OVERLOOKED.
2. OFFERS OF TENDERERS WHO DO NOT ACCEPT OUR COMMERCIAL CONDITIONS IN TOTO, WILL NOT BE CONSIDERED FOR RANKING.

SECTION 11: SCHEDULE OF GUARANTEED PERFORMANCE AND OTHER PARTICULARS (GPP) FOR 1.1KV STRANDED ALUMINIUM CONDUCTOR XLPE ARMoured CABLES.

(Must be filled in by the tenderer in the given format only)

The particulars given in this schedule will be binding upon the tenderer and must not be departed from without the written permission of General Manager.

Sr.No.	Particulars	As specified by Undertaking		As furnished by bidder	
		4C/300	4C/120	4C/300	4C/120
1.	Service Voltage	1100 Volts			
2.	Make of Cable	To be furnished by bidder			
3.	Type of Cable	A2XFY			
4.	IS or other standard specification to which cable is manufactured.	IS:7098(Part-I)/1988			
5.	Conductor				
	a) Material and its grade	H2/H4 Grade Aluminium			
	b) No. of conductors & size of each in sq.mm.	4C/300	4C/120		
	c) No. of strands in conductor	38 (min)	20 (min)		
	d) diameter of each strand of conductor - mm	To be furnished by bidder			
	d) Shape of conductors	To be furnished by bidder			
	e) Water blocking arrangement in conductor	Provided			
	f) Dia. over conductor in mm	To be furnished by bidder			
6	Core identification	As per Clause 10 of IS:7098 (Part-I)			
7	Insulation.				
	a) Material	XLPE as per Clause 4 of IS:7098 (Part-I)			
	b) Average thickness	1.8	1.2		
	c) Calculated dia. over insulation	To be furnished by bidder			
8	Minimum thermal resistivity of dielectric in electrical measure (i.e. difference in C between opposite faces of a cm. cube of the dielectric to cause transference of 1 Watt of heat).	350°C Cm/Watts.			
9	Water swellable tape over inner sheath				
	a) Thickness in mm	0.3 mm	N.A.		
	b) Approx weight in gms/sqm	118	N.A.		
	c) Swell height in 1 min.	≥12mm	N.A.		
	d) Make and grade	To be furnished by bidder	N.A.		
10	Thickness of inner sheath - mm.	0.7	0.5		
11	Material used for inner sheath.	PVC type ST2			

Sr.No.	Particulars	As specified by Undertaking		As furnished by bidder	
		4C/300	4C/120	4C/300	4C/120
12	Method of application of inner sheath.	Extrusion process			
13	Calculated dia. over inner sheath	60 (max.)	40 (max.)		
14	Additional polyester strip for identification over inner sheath (yes/No)	Yes	N.A.		
15	Armouring				
	a) Type	G.I. strip armour			
	b) Size (Width x Thickness) in mm	6.1 x 1.4	4.0 x 0.8		
	c) No. of armour strips	To be furnished by bidder			
	d) Armour lay angle	To be furnished by bidder			
	e) % armour coverage (min.)	As per IS:7098/Part-I			
	f) Armour resistance in Ω /Km.	0.755 (max)	2.11 (max)		
16	Thickness of outer sheath (min.)	To be furnished by bidder			
17	Material used for outer sheath.	PVC type ST2 Yellow in Color			
18	Overall diameter of cable – mm.	69	48		
19	Weight of aluminium in each length of 1000 mtrs. of cable – in Kg.	To be furnished by bidder			
20	Total length of cable for each drum in mtrs.	250 \pm 5%	500 \pm 5%		
21	Total weight of each drum length of cable in Kg.	To be furnished by bidder			
22	Total weight of each drum length of cable including drum – Kg.	To be furnished by bidder			
23	Size of each drum (Flange X Barrel X Traverse) in mm	To be furnished by bidder			
24	Spindle hole diameter in mm	80 (min.)			
25	Continuous safe current carrying capacity for the basic assumptions as per clause 2.1 of IS:3961 (Part-II)/1967 for insulation of 90 ^o C operation. a) in Air b) in Ground with three cables touching each other	To be furnished by bidder			
26	Max. permissible temperature rise of the conductor for continuous capacity.	To be furnished by bidder			
27	Current density.	To be furnished by bidder			
28	Short time overload capacity and duration.	To be furnished by bidder			
29	Short circuit rating in kA for 1 sec.	To be furnished by bidder			
30	Insulation resistance – Meg-Ohms/1000 mtrs. of finished cable at 20 ^o C.	To be furnished by bidder			
31	Conductor resistance –	To be furnished by bidder			

Sr.No.	Particulars	As specified by Undertaking		As furnished by bidder	
		4C/300	4C/120	4C/300	4C/120
	Ohms/1000 mtrs. of finished cable at 20° C.				
32	Conductor reactance – Ohms/1000 mtrs. of finished cable at 20° C.	To be furnished by bidder			
33	Inductive capacity Microfarads/1000 mtrs. of finished cable at 20° C.	To be furnished by bidder			
34	Weight of XLPE insulation in cable per 1000 mtr. in Kg.	To be furnished by bidder			
35	Weight of PVC in cable per 1000 mtr. in Kg.	To be furnished by bidder			
36	Whether the cable shall be wound on wooden drums.	Yes			
37	Whether wooden drums shall be treated with Pest Control Process (PCP)	Yes			
38	Whether each drum flange shall be painted with Black colour.	Yes			
39	No. of years the design of the cable offered is in service.	To be furnished by bidder			
40	Name of the firm and address from which cables shall be delivered.	To be furnished by bidder			

Signature of the Tenderer _____

Date: _____

Sr.No.	Particulars	As specified by Undertaking			As furnished by bidder		
		4C/70	4C/25	2C/50	4C/70	4C/25	2C/50
1.	Service Voltage	1100 Volts					
2.	Make of Cable	To be furnished by bidder					
3.	Type of Cable	A2XFY					
4.	IS or other standard specification to which cable is manufactured.	IS:7098(Part-I)/1988					
5.	Conductor						
	c) Material and its grade	H2/H4 Grade Aluminium					
	d) No. of conductors & size of each in sq.mm.	4C/70	4C/25	2C/50			
	c) No. of strands in conductor	15 (min)	7 (min)	12 (min.)			
	d) diameter of each strand of conductor – mm	To be furnished by bidder					
	d) Shape of conductors	To be furnished by bidder					
	e) Water blocking arrangement in conductor	Provided					
	f) Dia. over conductor in mm	To be furnished by bidder					
6	Core identification	As per Clause 10 of IS:7098 (Part-I)					
7	Insulation.						
	d) Material	XLPE as per Clause 4 of IS:7098 (Part-I)					
	e) Average thickness	1.1	0.9	1.0			
	f) Calculated dia. over insulation	To be furnished by bidder					
8	Minimum thermal resistivity of dielectric in electrical measure (i.e. difference in C between opposite faces of a cm. cube of the dielectric to cause transference of 1 Watt of heat).	350°C Cm/Watts.					
9	Water swellable tape over inner sheath						
	e) Thickness in mm	N.A.					
	f) Approx weight in gms/sqm	N.A.					
	g) Swell height in 1 min.	N.A.					
	h) Make and grade	N.A.					
10	Thickness of inner sheath - mm.	0.4	0.3	0.3			
11	Material used for inner sheath.	PVC type ST2					
12	Method of application of inner sheath.	Extrusion process					
13	Calculated dia. over inner sheath	34 (max.)	22 (max.)	26 (max.)			
14	Additional polyester strip for identification over inner sheath (yes/No)	N.A.					

Sr.No.	Particulars	As specified by Undertaking			As furnished by bidder		
		4C/70	4C/25	2C/50	4C/70	4C/25	2C/50
15	Armouring						
	g) Type	G.I. strip armour					
	h) Size (Width x Thickness)	4.0 x 0.8 mm					
	i) No. of armour strips	To be furnished by bidder					
	j) Armour lay angle	To be furnished by bidder					
	k) % armour coverage (min.)	As per IS:7098/Part-I					
	l) Armour resistance in Ω /Km.	2.59 (max)	3.78 (max)	4.07 (max.)			
16	Thickness of outer sheath (min.)	To be furnished by bidder					
17	Material used for outer sheath.	PVC type ST2 Yellow in Color					
18	Overall diameter of cable – mm.	42	29	30			
19	Weight of aluminium in each length of 1000 mtrs. of cable – in Kg.	To be furnished by bidder					
20	Total length of cable for each drum in mtrs.	500 \pm 5%					
21	Total weight of each drum length of cable in Kg.	To be furnished by bidder					
22	Total weight of each drum length of cable including drum – Kg.	To be furnished by bidder					
23	Size of each drum (Flange X Barrel X Traverse) in mm	To be furnished by bidder					
24	Spindle hole diameter in mm	80 (min.)					
25	Continuous safe current carrying capacity for the basic assumptions as per clause 2.1 of IS:3961 (Part-II)/1967 for insulation of 90 ^o C operation. a) in Air b) in Ground with three cables touching each other	To be furnished by bidder					
26	Max. permissible temperature rise of the conductor for continuous capacity.	To be furnished by bidder					
27	Current density.	To be furnished by bidder					
28	Short time overload capacity and duration.	To be furnished by bidder					
29	Short circuit rating in kA for 1 sec.	To be furnished by bidder					
30	Insulation resistance – Meg-Ohms/1000 mtrs. of finished cable at 20 ^o C.	To be furnished by bidder					
31	Conductor resistance – Ohms/1000 mtrs. of finished cable at 20 ^o C.	To be furnished by bidder					
32	Conductor reactance – Ohms/1000 mtrs. of finished cable at 20 ^o C.	To be furnished by bidder					

Sr.No.	Particulars	As specified by Undertaking			As furnished by bidder		
		4C/70	4C/25	2C/50	4C/70	4C/25	2C/50
33	Inductive capacity Microfarads/1000 mtrs. of finished cable at 20 ^o C.	To be furnished by bidder					
34	Weight of XLPE insulation in cable per 1000 mtr. in Kg.	To be furnished by bidder					
35	Weight of PVC in cable per 1000 mtr. in Kg.	To be furnished by bidder					
36	Whether the cable shall be wound on wooden drums.	Yes					
37	Whether wooden drums shall be treated with Pest Control Process (PCP)	Yes					
38	Whether each drum flange shall be painted with Black colour.	Yes					
39	No. of years the design of the cable offered is in service.	To be furnished by bidder					
40	Name of the firm and address from which cables shall be delivered.	To be furnished by bidder					

Signature of the Tenderer _____

Date: _____

Sr.No.	Particulars	As specified by Undertaking		As furnished by bidder	
		2C/25	3C/95	2C/25	3C/95
1.	Service Voltage	1100 Volts			
2.	Make of Cable	To be furnished by bidder			
3.	Type of Cable	A2XFY			
4.	IS or other standard specification to which cable is manufactured.	IS:7098(Part-I)/1988			
5.	Conductor				
	e) Material and its grade	H2/H4 Grade Aluminium			
	f) No. of conductors & size of each in sq.mm.	2C/25	3C/95		
	c) No. of strands in conductor	7 (min)	15 (min)		
	d) diameter of each strand of conductor - mm	To be furnished by bidder			
	d) Shape of conductors	To be furnished by bidder			
	e) Water blocking arrangement in conductor	Provided			
f) Dia. over conductor in mm	To be furnished by bidder				
6	Core identification	As per Clause 10 of IS:7098 (Part-I)			
7	Insulation.				
	g) Material	XLPE as per Clause 4 of IS:7098 (Part-I)			
	h) Average thickness	0.9	1.1		
i) Calculated dia. over insulation	To be furnished by bidder				
8	Minimum thermal resistivity of dielectric in electrical measure (i.e. difference in C between opposite faces of a cm. cube of the dielectric to cause transference of 1 Watt of heat).	350°C Cm/Watts.			
9	Water swellable tape over inner sheath				
	i) Thickness in mm	N.A.			
	j) Approx weight in gms/sqm	N.A.			
	k) Swell height in 1 min.	N.A.			
l) Make and grade	N.A.				
10	Thickness of inner sheath - mm.	0.3	0.4		
11	Material used for inner sheath.	PVC type ST2			
12	Method of application of inner sheath.	Extrusion process			
13	Calculated dia. over inner sheath	20 (max.)	34 (max.)		
14	Additional polyester strip for	N.A.			

Sr.No.	Particulars	As specified by Undertaking		As furnished by bidder	
		2C/25	3C/95	2C/25	3C/95
	identification over inner sheath (yes/No)				
15	Armouring				
	a) Type	G.I. strip armour			
	b) Size (Width x Thickness)	4.0 x 0.8 mm			
	c) No. of armour strips	To be furnished by bidder			
	d) Armour lay angle	To be furnished by bidder			
	e) % armour coverage (min.)	As per IS:7098/Part-I			
	f) Armour resistance in Ω /Km.	4.95 (max)	2.75 (max)		
16	Thickness of outer sheath (min.)	To be furnished by bidder			
17	Material used for outer sheath.	PVC type ST2 Yellow in Color			
18	Overall diameter of cable – mm.	25	42		
19	Weight of aluminium in each length of 1000 mtrs. of cable – in Kg.	To be furnished by bidder			
20	Total length of cable for each drum in mtrs.	500 \pm 5%			
21	Total weight of each drum length of cable in Kg.	To be furnished by bidder			
22	Total weight of each drum length of cable including drum – Kg.	To be furnished by bidder			
23	Size of each drum (Flange X Barrel X Traverse) in mm	To be furnished by bidder			
24	Spindle hole diameter in mm	80 (min.)			
25	Continuous safe current carrying capacity for the basic assumptions as per clause 2.1 of IS:3961 (Part-II)/1967 for insulation of 90 ^o C operation. a) in Air b) in Ground with three cables touching each other	To be furnished by bidder			
26	Max. permissible temperature rise of the conductor for continuous capacity.	To be furnished by bidder			
27	Current density.	To be furnished by bidder			
28	Short time overload capacity and duration.	To be furnished by bidder			
29	Short circuit rating in kA for 1 sec.	To be furnished by bidder			
30	Insulation resistance – Meg-Ohms/1000 mtrs. of finished cable at 20 ^o C.	To be furnished by bidder			
31	Conductor resistance – Ohms/1000 mtrs. of finished cable at 20 ^o C.	To be furnished by bidder			
32	Conductor reactance –	To be furnished by bidder			

Sr.No.	Particulars	As specified by Undertaking		As furnished by bidder	
		2C/25	3C/95	2C/25	3C/95
	Ohms/1000 mtrs. of finished cable at 20° C.				
33	Inductive capacity Microfarads/1000 mtrs. of finished cable at 20° C.	To be furnished by bidder			
34	Weight of XLPE insulation in cable per 1000 mtr. in Kg.	To be furnished by bidder			
35	Weight of PVC in cable per 1000 mtr. in Kg.	To be furnished by bidder			
36	Whether the cable shall be wound on wooden drums.	Yes			
37	Whether wooden drums shall be treated with Pest Control Process (PCP)	Yes			
38	Whether each drum flange shall be painted with Black colour.	Yes			
39	No. of years the design of the cable offered is in service.	To be furnished by bidder			
40	Name of the firm and address from which cables shall be delivered.	To be furnished by bidder			

Signature of the Tenderer _____

Date: _____

SECTION 12: SCHEDULE OF DEPARTURES FROM SPECIFICATION

Tenderer shall mention in this schedule all departures from the various sections of the specification. In the absence of any mention in this schedule, the sections of this specification shall be binding on the tenderers.

Sr.No.	Reference to section No. of specification	Departures

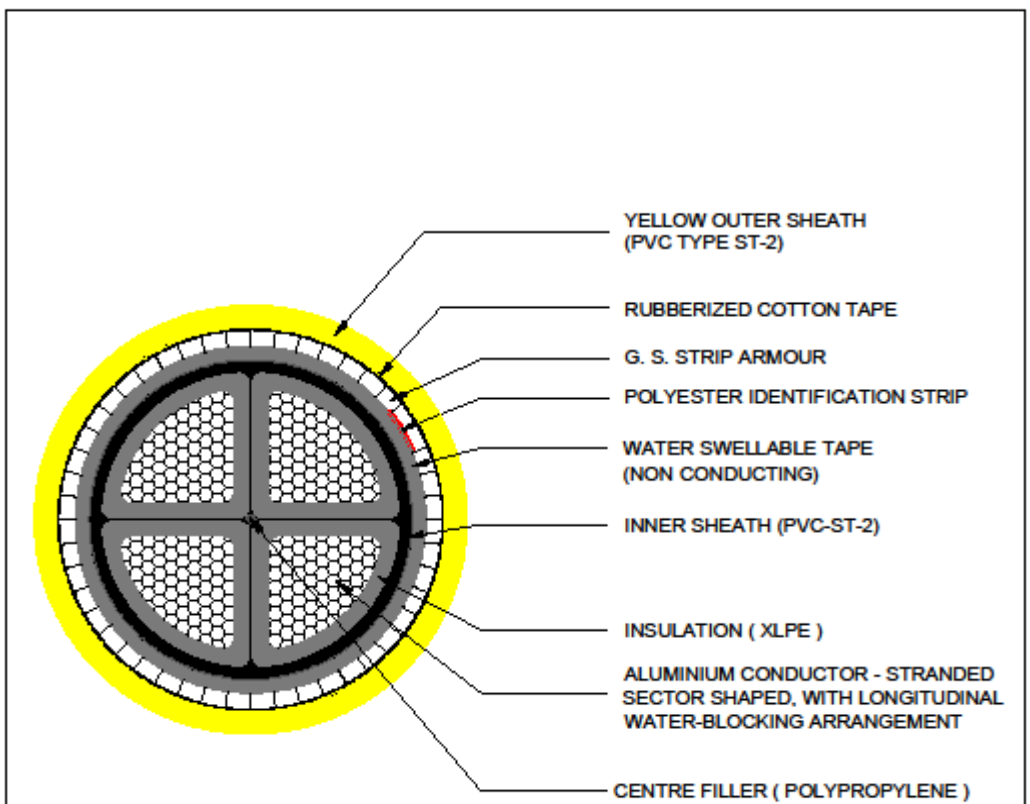
Date : _____

Signature of the
Tenderer _____

Annexure – I**Details of sub-vendors for critical items**

Tenderer shall submit details of sub-vendors for the critical items listed below, which can be verified at any stage after award of the contract.

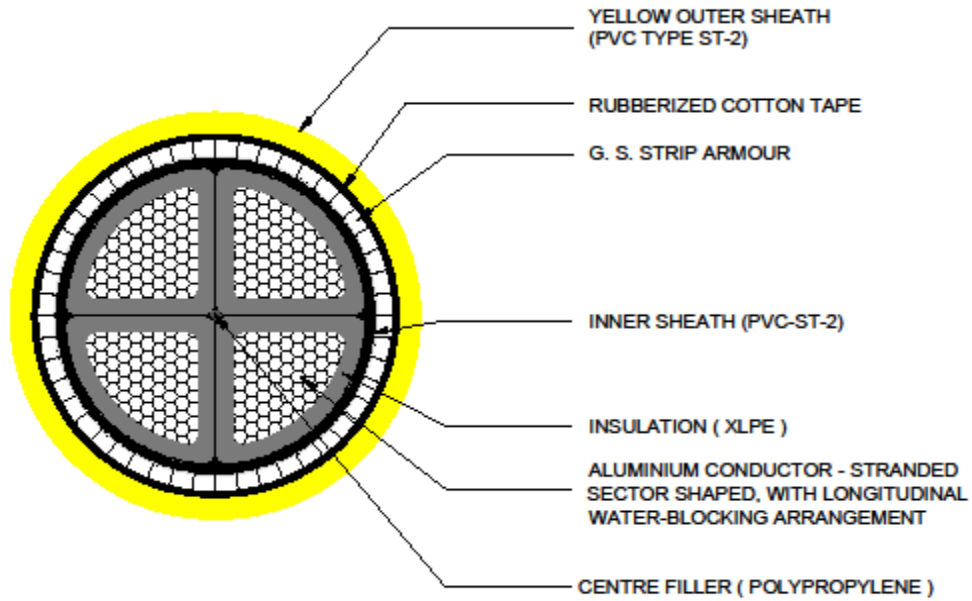
Sr.No.	Description of material	Details of sub-vendor
1	XLPE compound	
2	Conductor water-blocking tapes/ yarn/ powder	
3	Water swellable tapes	
4	E.C. Grade Aluminium rod	
5	Aluminium Alloy	
6	G.S. Wires/ strips	
7	PVC compound	
8	PVC Resin	
9	P.P. Fillers	



निमोजन (नेटवर्क) विभाग
बृहन्मुंबई विद्युत पुरवठा व परिवहन उपक्रम
 कंपनी फॉर फॉन
 (पुरवठा इकाई १४१, १५० वॉल्यूमे)
 कर्मचारी व पुरवठा व परिवहन विभाग, मुंबई-४०००१९.

**CABLE CROSS SECTION VIEW OF 1.1 KV
 MULTICORE XLPE ARMoured CABLE
 WITH WATER SWELLABLE TAPE**

आदेशक Mrs.A.A.NOHTE	वर्ग-अधिकारी	नक्शा क्रमांक : ES/PLA-490							
परिचय आदेशक	उपस्थान अधिकारी/ आदेशक	दिनांक	क्र.	विवरण	कारिकांक	परिचय आदेशक	मुद्रण आदेशक	वर्ग-अधिकारी	सह-अधिकारी/अभिप्रेत
मुद्रण आदेशक	विभागीय अधिकारी/निर्देशक		A						
			B						
			C						
मकाना> H.T.S.	दिनांक : 11.04.14								



निमोअन (नेटवर्क) विमान

बृहन्मुंबई विद्युत पुरवठा व परिवहन उपक्रम

कॉर्पोरेशन ऑफ महाराष्ट्र
 (पुणेचे क्रमांक १२१,१५० कंपनी)
 मलका गणपतनगर रोडचे कार्यालय, मुंबई-४०००१६.

**CABLE CROSS SECTION VIEW OF 1.1 KV
 MULTICORE XLPE ARMoured CABLE
 WITHOUT WATER SWELLABLE TAPE**

आदेशक Mr.A.A.NOHTE	वर्ग - अधिकारी	नकाशा क्रमांक : ES/PLA-491						
प्रकल्प अधिकारी	आयुक्तक अधिकारी/अधिकारी	क्र.	दिनांक	कार्यक्रम	परिचय आदेशक	पुस्तक आदेशक	सं- आदेशक	सह-अधीक्षक/ अधीक्षक
मुख्य अधिकारी	विद्युत वितरण निर्देशक	अ						
अनुमोदक N.T.S.	दिनांक : 11.04.14	ब						
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