

**THE BRIHAN - MUMBAI ELECTRIC SUPPLY & TRANSPORT UNDERTAKING
(OF THE BRIHANMUMBAI MAHANAGARPALIKA)**

**SPECIFICATION FOR EPOXY/POLYURATHANE BASED 11KV TERMINATION, 1.1kV
STRAIGHT/TEE JOINTING & 1.1kV CABLE LIVE END SEALING KIT**

SPECIFICATION NO: 17C0116

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EXHIBITS	1 ES/PI/A277 dated 19.07.1996	
	2 ES/PI/A278 Rev. 'c' dated 28.8.2015	
	3 ES/PL-A 388 Rev. 'G' dated 26.07.2015	
	4 ES/PL/A-495 dated 07.12.2015	

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, drawings, etc. 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 design, manufacture, testing before dispatch and Supply of Epoxy Polyurethane based jointing and cable live end sealing kits suitable for 1.1kV power cables and termination kits suitable for 11kV power cables.**
- 1.1.3 All work 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 Except as specified herein, 11kV termination, 1.1kV jointing and cable live end sealing kits shall comply with the requirements of the latest relevant INDIAN Standards Specifications (as amended to date).**
- 1.2.2 Where Indian Standard Specification does not exist, the relevant IEC or British Standard or relevant International Standards Specification shall be taken as standard.**
- 1.2.3 If 11kV termination, 1.1kV jointing and cable live end sealing kits 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 11kV termination, 1.1kV jointing and cable live end sealing kits shall comply in every respect with the provisions of relevant Government Legislations and/or Rules and Regulations governing manufacture, installation, operation and maintenance of the equipment.**
- 1.3.2 Tenderers shall ensure that all safety measures are extensively provided in 11kV termination, 1.1kV jointing and cable live end sealing kits against hazards to life and property and that the proper installation and use of the equipment under no circumstances shall contravene any enactments 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 equipment together with the justification for its inclusion.**

1.5 Technical Data

- 1.5.1 Tenderers shall give full specifications of 11kV termination, 1.1kV jointing and cable live end sealing kits offered and shall supply technical literature and descriptive particulars together with drawings and illustrations to indicate the type and design of 11kV termination, 1.1kV jointing and cable live end sealing kits offered, manufacturing features and details pertaining to installation, testing and commissioning.**
- 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 11kV termination, 1.1kV jointing and cable live end sealing kits. Also experience of other users.**

1.6 Materials and Workmanship

- 1.6.1 11kV termination, 1.1kV jointing and cable live end sealing kits shall conform to the best engineering practice in design, materials and construction so as to ensure reliability, economy and safe and convenient operation.**
- 1.6.2 Tenderers shall supply all incidental items necessary or usual for such 11kV termination, 1.1kV jointing and cable live end sealing kits for erection/installation purpose and correct working.**
- 1.6.3 Manufacturers shall give details of the experience in the supply of similar 11kV termination, 1.1kV jointing and cable live end sealing kits. A list of important customers who have been supplied with similar equipment with details of order executed shall be furnished. Details shall include rating of the equipment, quantity, purchase order reference etc.**

1.7 Guarantee

1.7.1 11kV Epoxy/polyurethane based termination kit installed shall be guaranteed at least for a period of 5 years against the defective design and materials from the date of installation of kit.

1.7.1.1 In case of failure of 11kV termination within guarantee period, the supplier shall submit the report of failure analysis of failed termination. Also tenderer shall replace it with 02 Nos. of 11kV PILC Cable terminations free of cost. An undertaking letter accepting the same shall be furnished by the manufacturer/distributor with the offer.

1.7.2 The offered 1.1kV straight / Tee jointing kits and 1.1kV Cable live end sealing kits shall be guaranteed against manufacturing and material defect for a period of 24 months from the date of acceptance or 18 months from the date of installation, whichever is earlier.

1.7.2.1 In case of failure of 1.1kV straight / Tee jointing kit and 1.1kV Cable live end sealing kit within the guarantee period, the supplier shall analyze the cause of failure and submit the report of failure analysis of failed 1.1kV straight / Tee joints or 1.1kV Cable live end sealing kits. Also Tenderer shall submit the undertaking letter stating that " In the event of failure of a straight joint within guarantee period, he/she shall replace it with two straight joints, free of cost and in case of failure of a Tee joint within guarantee period, he/she shall replace it with two nos. of straight joint and one Tee joint free of cost and in case of failure of 1.1kV Cable live end sealing kits within guarantee period, he/she shall replace it with two nos. of 1.1kV Cable live end sealing kits free of cost. An undertaking letter accepting the same shall be furnished by the manufacturer/authorized distributor with the offer.

1.7.3 In case if the tenderer is a authorized distributor/dealer, he/she shall submit the undertaking letter from the manufacturer stating that guarantee as mentioned in clause 1.7.1 & 1.7.2 above remains valid even if, the authorized agent / dealer is changed during the guaranteed period.

SECTION 2 : DESCRIPTION OF THE POWER SYSTEM

2.1 Grid

2.1.1 The Tata Power Company Ltd. (TPCL) and the Maharashtra State Electricity Board 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 Brihan Mumbai Mahanagarpalika (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.

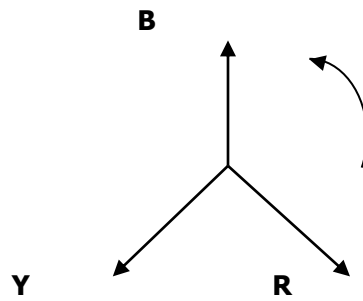
2.2.2 Bulk power at 110 / 33 / 22kV is transmitted from TPCL's five main receiving stations through effectively earthed underground cables to B.E.S.T.'s receiving substations situated at different localities in Mumbai where the B.E.S. & T. Undertaking has installed 110 / 33kV, 110 / 11kV, 33 / 11kV or 22 / 11kV, Star-z, star/star, delta/star power transformers of Vector group YNzn11, Ynyn0, 31 Dyn1 with neutral earthed with/without a resistance. Where the transformation is 110 / 11kV or 110 / 33kV, 22 / 11kV or 33 / 11kV, the star point 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 substations 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 5 to 7 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/415-240Volt delta/star transformers of vector group Dyn11 are installed. The star point of this transformer is solidly earthed and is also brought out to an insulated terminal for the 3 phase, 4 wire distribution system.

2.2.5 The 415/240V secondary distribution system comprises of a vast network of underground four core cables, suitably sectionalized by means of distribution pillars, to which service lines are teed off to supply power to low voltage consumers.

2.2.6 The phase sequence of the 3 phases at the existing receiving substations 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 °C
Lowest temperature recorded : 11.7 °C
24 hours' daily average : 26.0 °C

b) Mean highest temperature in sun : 62.2 °C
Highest temperature in sun : 64.0 °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 : 3,481.6 mm
Heaviest rainfall in a day recorded : 575.6 mm

e) Wind

Mean daily wind speed
Minimum in a year : 9.8 km/hr

Mean daily wind speed : 18.7 km/hr.
Maximum in a year

Highest wind speed in gust : 103.0 km/hr. on 17.06.2004

3.2 Geographical Data

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 industries such as cotton mills, chemical factories, 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 minimise nuisance and localise several mixed localities where such zoning has not been done, two or more types of activities are allowed to continue. By and large, the heavy industries are gradually shifting from the city.

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 1 meter to 4 meters below ground level in the densely populated areas. The water has considerable salt content.

3.3.6 During rains, the water level in certain low laying 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%
Analysis on dry soil		
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	0.1075%	0.1855%
Reaction of water	pH Value	pH Value
Extract	7.5%	7.6%
Analysis of water solubles		
Silicon SiO₂	0.0100	0.0065
Lime CaO²	0.0060	0.0104
Magnesia MgO	0.0101	0.0109
Sulphur Trioxide SO₃	0.0065	0.0143
Sodium Oxide Na₂ O	0.0149	0.0138
Chlorine Cl₂	0.0340	0.0221
Nitrogen Na₂ O₅	0.0040	0.0078
Pentoxide		

The above radicals are probably combined as follows:

Calcium Sulphate	CaSO₄	0.0146	0.0253
Magnesium Chloride	MgCl₂	0.0428	0.0257
Sodium Chloride	NaCl	0.0035	0.0049
Sodium Silicate	Na₂SiO₃	0.0203	0.0132
Sodium Nitrate	NaNO₃	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 30° 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 PVC/ DWC pipes inside the receiving stations, sub-stations and carriage ways.
- 3.4.2** 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.
- 3.4.3** The city has suburban and main line electric rail traction system operating partly on 25000 volts AC/1500 volts D.C. which are subject to problem involving electrolytic corrosion and vibration.
- 3.4.4** The underground utility services are laid in soil prone to chemical corrosion and microbiological action at these places.
- 3.4.5** 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

3.4.6 Where the cables cross railway tracks, they are laid through R.C.C./PVC/DWC 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.

3.4.7 The number of cables in any one section of the trench does not normally exceed four but in certain short sections where cables enter receiving stations, sub-stations or distribution pillars, any number upto 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: REQUIREMENT

4.1 Sizes and Quantities

4.1.1 The following sizes and quantities of Epoxy/Polyurethane based 11kV PILC Cable termination kits are required:-

Sr. No.	L.F. No.	Description	Quantity in Nos.
1.	29131	11kV, Epoxy/Polyurethane based termination kit suitable for 3C x 70 sq.mm PILC cable.	
2.	29132	11kV, Epoxy/Polyurethane based termination kit suitable for 3C x 300 sq.mm PILC cable.	

4.1.2 The following sizes and quantities of Epoxy / Polyurethane based 1.1kV straight jointing kits are required:-

Sr. No.	L.F. No.	Description	Quantity in Nos.
1.	29121	1.1kV, Epoxy/Polyurethane based straight jointing kit suitable for 4C x 300 sq.mm to 4C x 300 sq.mm HRPVC / XLPE insulated, strip armoured cable.	
2.	*	1.1kV, Epoxy/Polyurethane based straight jointing kit suitable for 4C x 120/ 70 sq.mm to 4C x 120/70 sq.mm (of any combination) aluminium conductor HRPVC/XLPE insulated, strip armoured cable.	
3.	*	1.1kV, Epoxy/Polyurethane based straight jointing kit suitable for 4C/2C X 25 sq. mm. with 4C/2C X 25 sq. mm. (of any combination) HRPVC / XLPE insulated, strip armoured cable.	

4.1.3 The following sizes and quantities of Epoxy / Polyurethane based 1.1kV Tee jointing kits are required:-

Sr. No.	L.F. No.	Description	Quantity in Nos.
1.	29116	1.1kV, Epoxy/Polyurethane based 'Tee' jointing kit suitable for 4C X 25 sq.mm. With 4C X 300 sq.mm. HRPVC / XLPE insulated, strip armoured Cable	

4.1.4 The following sizes and quantities of Epoxy / Polyurethane based 1.1kV cable live end sealing kits are required :-

Sr. No.	L.F. No.	Description	Quantity in Nos.
1.	*	1.1kV, Epoxy/Polyurethane based Cable live end sealing kits suitable for 1.1kV, 4C x 300 / 120 sq.mm HRPVC / XLPE insulated, strip armoured Cable	
2.	*	1.1kV, Epoxy/Polyurethane based Cable live end sealing kits suitable for 1.1kV, 4C x 70 / 25 sq.mm HRPVC / XLPE insulated, strip armoured Cable	

'*': New L.F.

4.2 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** *The word 'kit' referred hereunder shall mean straight through joint, Tee joint or termination as the case may be.*
- 5.1.2** *The maximum symmetrical short circuit level on the 11kV system will be 250 MVA and for 415 Volts system will be 25MVA. The cable jointing/termination kits installed in electricity distribution system shall perform its function without distress under normal loading, cyclic loading, mechanical impact and electrical stresses developed during fault conditions and the resultant increase in temperature caused by the flow of short circuit currents. It shall be capable of carrying without damage, the system earth faults currents.*
- 5.1.3** *The procedure of cable jointing/termination shall be simple, easy to install and require less time for charging, thereby restoring the electric supply faster.*
- 5.1.4** *The cable joints/terminations should have good electrical and thermal characteristic and shall provide proper mechanical protection, moisture imperviousness.*
- 5.1.5** *The material to be used shall be capable of resisting degradation during the service life of the cable system.*
- 5.1.6** *The tenderer shall furnish the complete list of components describing functioning/use of each component of the kit along with the offer.*
- 5.1.7** *The successful tenderer/s shall give demonstration of at least one no. of 11kV Epoxy/polyurethane based termination, one no. of 1.1kV straight joint , Tee joint and 1.1kV cable live end sealing kit (Applicable to item/s for which P.O. is placed) on free of cost basis at site. Also, the tenderer shall submit the undertaking letter for rendering technical and supervisory assistance for making joints/terminations at site for at least 03 nos. of each item (for which P.O. is placed) on free of cost basis, at a short notice.*
- 5.1.8** *If required, the successful tenderer shall give training to jointers, supervisors of user departments.*
- 5.1.9** *The tenderer shall submit the list of power utilities / public undertaking / private organization to whom they have supplied the said kit.*
- 5.1.10** *Only manufacturer and authorized distributor should quote.*
- 5.1.11** *The successful tenderer shall have to supply additional ferrules/lugs (minimum 5 nos. of ferrules / lugs per item, per lot) for testing purpose.*
- 5.1.12** *All the kit contents shall be sufficient (in dimensions/quantity) for making of epoxy/polyurethane based 1.1kV straight / Tee joints , 1.1kV cable live end sealing kits and 11kV PILC cable terminations.*

5.2 Following Indian and International standards shall be followed for 11kV termination, 1.1kV straight / Tee joint and 1.1kV cable pot heading kit.

(A)Indian standards	
IS 8438:1987 (first revision)	Moulds of cast resin based straight through joints for cables for voltages upto and including 1100 Volts (first revision)
IS 10877:1984	Moulds suitable for cast resin based indoor terminations for cables for voltages 3.3kV and above and upto and including 11kV
IS 10333:1982	Epoxy resin systems for cast resin insulated power and control cable joints and terminations, upto and including 11 kV
IS 692:1994	Paper insulated lead-sheathed cables for rated voltages upto and including 33 kV (third revision)
IS 1554 (Part 1): 1988	PVC insulated (heavy duty) electric cables: For working voltages upto and including 1100V (Amended upto date)
IS 7098 (Part 1):1988	Cross-linked polyethylene insulated thermoplastic sheathed cables - Specification: For working voltages up to and including 1100V (Amended up to date)
IS 8308:1993	Compression type tubular in-line connectors for aluminium conductors of insulated cables (Amended up to date)
IS 8309:1993	Compression type tubular terminal ends for aluminium conductors of insulated cables
IS 1255:1983	Code of practice for installation and maintenance of power cables upto and including 33 kV rating(second revision)
IS 10810: 1984	Method of Test for cables (Amended up to date)
IS 13573(Part) :2011	Type test certificate for 1.1kV Jointing.
(B)International standards	
Engineering Recommendation C-81	Type tests for joints for 600/1000 volts CNE Cable Systems. (Amended up to date)
VDE0278	Type test certificate for 11kV PILC cable termination.

5.3 Mould

5.3.1 The mould shall be of transparent/translucent plastic (**high impact polystyrene - HIP**) of thickness **1.5 mm - 1.8 mm**. It shall be in two halves with suitable flanges for bonding them together.

5.3.2 The Mould for 1.1kV straight joints shall generally conform to IS-8438/1987 **amended to date**.

5.3.3 Dimensions of moulds for different types of joints shall be as per the drawing given below. The quantity of the compound shall be sufficient to fill the mould completely.

Sr. No.	Description of Termination / Joint / Pothead kit	Drawing No.
1.	Epoxy / Polyurethane based termination kit suitable for 11kV, 3C x 70 sq. mm. PILC cable	Fig.2 , size EHH6 of Table 2 & 4, Clause No. 3.2 of IS : 10877 – 1984
2.	Epoxy / Polyurethane based termination kit suitable for 11kV, 3C x 300 sq. mm. PILC cable	Fig.2 , size EHH8 of Table 2 & 4, Clause No. 3.2 of IS : 10877 – 1984
3.	Epoxy / Polyurethane based straight joint suitable for 1.1kV, 4C X 300 sq. mm. with 4C X 300 sq. mm. aluminium conductor, HRPVC / XLPE insulated, strip armoured Cable.	ES/PI/A278 Rev: C dtd. 28.08.15
4.	Epoxy / Polyurethane based straight joint suitable for 1.1kV, 4C x 120 / 70 sq. mm. with 4C x 120 / 70 sq. mm. (of any combination), aluminium conductor, HRPVC / XLPE insulated, strip armoured Cable.	ES/PI/A278 Rev: C dtd. 28.08.15

Sr. No.	Description of Termination / Joint / Pothead kit	Drawing No.
5.	<i>Epoxy / Polyurethane based straight joint suitable for 1.1kV, 4C / 2C X 25 sq. mm. with 4C / 2C X 25 sq. mm. (of any combination), aluminium conductor, HRPVC / XLPE insulated, strip armoured Cable.</i>	<i>ES/PI/A278 Rev: C dtd. 28.08.15</i>
6.	Epoxy / Polyurethane based Tee joint suitable for 1.1kV, 4C X 25 sq.mm. with 4C x 300 sq. mm. aluminium conductor, HRPVC / XLPE insulated, strip armoured Cable.	ES/PI/A277 dtd. 19.07.1996
7.	<i>Epoxy/Polyurethane based 1.1kV Cable live end sealing kits suitable for 1.1kV, 4C x 300 / 120 sq. mm Al. cond. HRPVC / XLPE insulated, strip armoured Cable</i>	<i>ES/PI/A495 dtd. 07.12.15</i>
8.	<i>Epoxy/Polyurethane based 1.1kV Cable live end sealing kits suitable for 1.1kV, 4C x 70 / 4C x 25 sq. mm HRPVC / XLPE insulated, strip armoured Cable</i>	<i>ES/PI/A495 dtd. 07.12.15</i>

The detailed dimension, shape of empty mould for 11kV PILC cable termination, 1.1kV HRPVC / XLPE insulated strip armoured Cable straight/Tee joint and cable live end sealing kits shall be as per drawing specified in above table.

5.4 Kit Contents :

5.4.1 The Epoxy / Polyurethane based termination kits suitable for 11kV PILC cable of different sizes as mentioned in clause No. 4.1.1 of specification.

The contents of each kit shall include the following components:

Sr. No.	Material	Quantity For	
		3C x 300 sq. mm	3C x 70 sq. mm.
1.	Aluminium Lugs (Compression Type)	03 Nos.	03 Nos.
2.	Epoxy / Polyurethane Resin (Type: HV)	2.4 Kgs. (Min.)	1.1Kgs. (Min.)
3.	Hardner (Sufficient quantity proportionate to resin part)	400 gms. (Min.)	190 gms. (Min.)
4.	High Impact Polystyrene Mould (As per clause No. 3.1)	1 Set	1 Set
5.	Mould Adhesive	50 ml (Min.)	50 ml (Min.)
6.	Epoxy Putty (Total quantity of resin & hardner)	400 gms.	300 gms.
7.	Oil Barrier Tape (Fibre Glass Tape)	15 Meters	15 Meters
8.	Core Spacer / Seperator	01 No.	01 No.
9.	Tinned Copper Flat Braid for earthing arrangement with flat copper lug at one end (Minimum Cross Sectional Area: 35 mm² & Minimum Length – 1.5 Meter)	01 No.	01 No.
10.	Cleaning Tissues (6ml.)	04 Packets.	04 Packets.
11.	Cleaning Cloth	2 Nos.	2 Nos.
12.	Identification Tag	1 No.	1 No.
13.	Spatula / Stirrer for mixing compound	1 No.	1 No.
14.	PVC Adhesive Tape (R, Y, B)	1 Mtr. of each colour	1 Mtr. of each colour

Sr. No.	Material	Quantity For	
		3C x 300 sq. mm	3C x 70 sq. mm.
15.	Non Adhesive PVC Tape	5.0 Meters	5.0 Meters
16.	Plumbing metal	300 gms	300 gms
17.	Plumbing flux	1 bottle	1 bottle
18.	Mould holding clips of 75mm length	4 nos.	4 nos.
19.	Instruction Sheet / Installation Manual	01 No.	01 No.
20.	List of kit contents / Packing list	01 No.	01 No.

5.4.2 The Epoxy / Polyurethane based 1.1kV straight jointing kits are required for jointing of 1.1kV , 4 core , aluminium Conductor, HRPVC / XLPE insulated, strip armoured cable of different sizes as mentioned in clause No. 4.1.2 of specification.

The contents of each kit shall include the following components

Sr. No.	Material	Quantity For		
		4C x 300 sq. mm. with 4C x 300 sq. mm.	4C x 120/70 sq. mm. with 4C x 120/70 sq. mm. (any combination)	4C/2C x 25 sq. mm. with 4C/2C x 25 sq. mm. (any combination)
1.	Aluminium Inline ferrules (Compression Type)	04 Nos.	04 Nos.	04 Nos.
2.	Adhesive PVC Tape (Red, Yellow, Blue, Black) Minimum Thickness 0.125 mm Minimum Width : 18 mm.	05 Mtrs. of each colour	02 Mtrs. of each colour	01 Mtr. of each colour

Sr. No.	Material	Quantity For		
		4C x 300 sq. mm. with 4C x 300 sq. mm.	4C x 120/70 sq. mm. with 4C x 120/70 sq. mm. (any combination)	4C/2C x 25 sq. mm. with 4C/2C x 25 sq. mm. (any combination)
3.	Epoxy / Polyurethane Resin (Type: LV)	10.5 Kgs. (Min.)	3.5 kgs. (Min.)	1.3 Kgs. (Min.)
4.	Hardner (Sufficient quantity proportionate to resin part)	1.44 Kgs (Min.)	500 gms.	160 gms. (Min.)
5.	High Impact Polystyrene Mould (As per clause No. 3.1)	1 Set	1 Set	1 Set
6.	Mould Adhesive	50 ml	50 ml	50 ml
7.	Mould Holding Clips of 300mm	06 Nos.	04 Nos.	03 Nos.
8.	Epoxy Putty (Total quantity of resin & hardner)	600 gms.	400 gms.	300 gms.
9.	Core Spacer	02 Nos.	02 Nos.	02 Nos.
10.	S.S. Hose Clips	04 Nos.	02 Nos.	02 Nos.
11.	Aluminium Supporting Ring / Backup Ring (Split type) (Minimum Thickness : 1mm)	02 Nos. of (Width : 50 mm & Diameter : 58 mm)	02 Nos. of (Width : 40 mm & Diameter : 38 mm)	02 Nos. of (Width : 40 mm & Diameter : 21 mm)
12.	Tinned Copper Flat Braid for earthing arrangement (Minimum cross sectional area & minimum Length to be provided is specified in Parenthesis).	01 No. (35 mm²) (950 mm)	01 No. (25 mm²) (700 mm)	01 No. (16 mm²) (450 mm)

Sr. No.	Material	Quantity For		
		4C x 300 sq. mm. with 4C x 300 sq. mm.	4C x 120/70 sq. mm. with 4C x 120/70 sq. mm. (any combination)	4C/2C x 25 sq. mm. with 4C/2C x 25 sq. mm. (any combination)
13.	Aloxite tape (120 grit) Minimum Length- 0.5 mtr.	01 Piece	01 Piece	01 Piece
14.	Identification Tag	1 No.	1 No.	1 No.
15.	Cleaning Tissues (6ml.)	04 Packets.	04 Packets.	03 Packets.
16.	Cleaning Cloth	2 Nos.	2 Nos.	1 No.
17.	Spatula / Stirrer for mixing compound	1 No.	1 No.	1 No.
18.	Instruction Sheet / Installation Manual	01 No.	01 No.	01 No.

5.4.3 The Epoxy / Polyurethane based 1.1kV Tee jointing kits are required for tee jointing of 1.1kV, 4C x 25 sq. mm. cable with 1.1kV, 4C x 300 sq. mm. aluminium Conductor HRPVC / XLPE insulated, strip armoured cable as mentioned in clause No. 4.1.3 of specification.

The contents of each kit shall include the following components :

Sr. No.	Material	Quantity For
		4C x 25 sq.mm. with 4C x 300 sq.mm.
1.	Adhesive PVC Tape (Red, Yellow, Blue, Black) Minimum Thickness 0.125 mm Minimum Width: 18 mm.	10 Mtrs. of each colour
2.	Epoxy / Polyurethane Resin (Type: LV)	11.1 Kgs. (Min.) (3 buckets each of 3.7 Kgs.)
3.	Hardner (Sufficient quantity proportionate to resin part)	1.8 Kgs. (Min.) (3 bottles each of 600 gms.)

Sr. No.	Material	Quantity For
		4C x 25 sq.mm. with 4C x 300 sq.mm.
4.	High Impact Polystyrene Mould (As per clause No. 3.1)	1 Set
5.	Mould Adhesive	1 Bottle
6.	Mould Holding Clips	10 Nos.
7.	Epoxy Putty (Total quantity of resin & hardner)	600 gms.
8.	Core Spacer (As per drawing)	03 Nos.
9.	S.S. Hose Clips	05 Nos.
10.	Aluminium Supporting Ring / Backup Ring (Split type) (Minimum Thickness : 1mm)	02 Nos. of (Width:50 mm & Diameter : 58 mm and 01 No. of (Width:40 mm & Diameter :21 mm)
11.	Tinned Copper Flat Braid for earthing arrangement (Minimum cross sectional area & Minimum Length to be provided is specified in Parenthesis).	01 No. (35mm²) (1500 mm)
12.	Aloxite tape (120 grit) Minimum Length - 0.5 Meter.	01 Piece
13.	Cleaning Tissues (6ml.)	06 Packets
14.	Cleaning Cloth	4 Nos.
15.	Identification Tag	1 No.
16.	Spatula / Stirrer for mixing compound	1 No.
17.	Instruction Sheet / Installation Manual	01 No.

5.4.4 The Epoxy / Polyurethane based 1.1kV Cable live end sealing kits are required for sealing / pot heading of 1.1kV 4 core , aluminium Conductor HRPVC/XLPE insulated, strip armoured cable of different sizes as mentioned in clause No. 4.1.4 of specification.

The contents of each kit shall include the following components

Sr. No.	Material	Quantity For	
		4C x 300 sq.mm/ 4C x 120 sq.mm	4C x 70 sq.mm. / 4C x 25 sq.mm.
1.	Adhesive PVC Tape Minimum Thickness: 0.125 mm Minimum Width : 18 mm.	10 Mtrs.	08 Mtrs.
2.	Epoxy / Polyurethane Resin (Type: LV)	2.3 kgs. (Min.)	0.6 kgs. (Min.)
3.	Hardner (Sufficient quantity proportionate to resin part)	0.4 kgs. (Min.)	0.1 kgs. (Min.)
4.	High Impact Polystyrene Mould (As per clause No. 3.1)	1 Set	1 Set
5.	Mould Adhesive	1 Bottle	1 Bottle
6.	Epoxy Putty (Total quantity of resin & hardner)	300 gms.	200 gms.
7.	Core Spacer	01 No.	01 No.
8.	Cleaning Tissues (6ml.)	04 Packets.	04 Packets.
9.	Cleaning Cloth	2 Nos.	2 Nos.
10.	Non Adhesive PVC Tape	5.0 Meters	5.0 Meters
11.	Aloxite tape	01 No.	01 No.
12.	Instruction Sheet / Installation Manual	01 No.	01 No.
13.	List of kit contents / Packing list	01 No.	01 No.

5.5 Epoxy / Polyurethane compounds:

5.5.1 The cast resin system shall generally conform to IS-10333/1982 and be of the types as given below:

- i) For L.V. (1.1kV) St. joint and 'Tee' joint resin system shall be 'Type L.V.' as per clause 2.1 (a) of IS:10333/1982 **amended to date.**
- ii) For H.V. (11kV) termination kit cast resin system shall be 'Type H.V.' as per clause 2.1 (b) of IS: 10333/1982 **amended to date.**

NOTE: Tenderer may give Polyurethane casting resin system confirming to IS-10333/1982 as a substitute for epoxy resin system.

5.5.2 The cast resin system shall consist of :

- i) Casting resin
- ii) Hardner
- iii) Additive

The Components as well as their mixture shall not be harmful while being handled.

5.5.3 Additive: This shall be non-conducting and shall be supplied ready-mixed with the resin. The quantity of additive in ready/mixed resin shall not exceed 55% by weight of the mixture.

5.5.4 The particle size of the additive shall not be more than the size passing through 250 mesh.

5.5.5 The proportion of resin (mixed with additive) to hardner by weight shall be clearly mentioned on the containers of both resin and hardner. Corresponding to one container of resin (mixed with additive) only one container containing proper proportion of hardner shall be supplied.

5.5.6 The tenderer shall mention shelf life for Epoxy/Polyurethane based cast resin system of 11kV, PILC cable termination / 1.1kV, straight / Tee joint and 1.1kV, Cable live end sealing kits. However, it should be minimum 18 months for Epoxy/Polyurethane based cast resin system from the date of delivery of each lot under normal storage conditions at ambient temperature prevalent in Mumbai. The certificate of shelf life shall be submitted along with the offer. The jointing procedure should be quick, simple and absolutely reliable.

5.5.6.1 Please note that the detailed dimensions and shape of empty mould for 11kV, PILC Cable termination, 1.1kV Straight joints of all sizes and 1.1kV cable live end sealing kits shall be as per drawings specified in clause no. 5.3.3 above.

5.5.6.2 Please note that the minimum weight and volume of epoxy / polyurethane based resin and hardener to be supplied in 11kV cable termination kit, 1.1kV straight jointing kits and 1.1kV, cable live end sealing kits shall be sufficient to fill up the mould. The properties of

epoxy / polyurethane resin and hardner of cast resin system shall be as specified in Section-8 of specification i.e. Guaranteed Technical Particulars

5.5.7 Container of epoxy/polyurethane compound

5.5.7.1 *The epoxy / polyurethane resin of cast resin system shall be packed in air tight metal Tins/plastic bottles of suitable sizes. Also hardner of cast resin system shall be packed in air tight plastic bottles of suitable sizes*, subject to minimum one container of 200 ml capacity. Number of containers (containing Hardner) to be supplied with each jointing kits shall not **exceed five**. There should be sufficient space in the metal Tins / plastic bottles (containing casting resin) to facilitate mixing of resin with the hardner.

5.5.7.2 Each casting resin container (Plastic bottle) shall be marked with information as below:

- 1. Manufacturer's name & Trade mark**
- 2. Type of cast resin system : (Epoxy/Polyurethane)**
- 3. Content of bottle : Resin / Hardner**
- 4. Batch No.**
- 5. Weight of content in Kgs.**
- 6. Volume of content in cc**
- 7. Procedure for mixing of compound**
- 8. Type HV or LV**
- 9. Date of packing**
- 10. Date of expiry**

The information regarding date of expiry & date of packing shall be printed on container with indelible ink instead of sticker provided on container.

5.6 Aluminium ferrules/lugs:

5.6.1 The aluminium ferrules / lugs supplied in the kit shall be as per IS:8308/93 amended to date and IS:8309/93 amended to date respectively. Hardness of the material used shall be between 18 – 21 Vickers Hardness Number (VHN). ***In case of Epoxy/Polyurethane based 1.1kV straight jointing kits, aluminium inline ferrules (Compression Type) suitable for different sizes of cables are to be provided as per drawing No.ES/PL-A388 Rev. 'G' dtd. 26.07.2015.***

5.7 Accessories:

5.7.1 The quantity of mould adhesive shall be supplied **(as specified in kit contents)**.

5.7.2 General purpose putty: as per BEST's Specification. No. MTS / Std- 14/0302 of July '84 shall be supplied along with each of kit. The quantity of general purpose putty to be provided shall be as mentioned in kit contents of Epoxy/ Polyurethane based 1.1kV

straight /Tee jointing kits, 11kV PILC cable termination kits and **1.1kV Cable live end sealing kits.**

5.7.3 Spacers 5 mm thick and made of epoxy with suitable number of ways shall be provided.

Spacers shall generally confirm Fig 1 of IS 8438-1987 and as per drg. No. **ES/PL-A388 Rev.'G' dtd. 26.07.2015.**

5.7.4 Binding wires of 2mm dia. and 2m length shall be provided.

5.7.5 *For identification purpose, a suitable name plate made of aluminium sheet (Thickness : 01 mm , Size:- Width: 50 mm, Length: 70 mm) shall be provided at either end of the completed 1.1kV straight / Tee joint (as specified in kit contents) and in case of 11kV termination, same shall be provided below the crutch region. Nameplate shall be suitably packed in polyethylene bag/aluminium foil pouch (with sealing arrangement at one end) and shall be provided for each jointing kit/termination kit on which following information shall be engraved. Also holes shall be provided at four corners of identification tag for fixing the tag.*

Make -----, Brand-----

P.O.no./date -----, Lot no.----- Supply month/year -----.

5.7.6 *The above mentioned kit contents of epoxy/polyurethane based 11kV termination kits and 1.1kV straight/tee jointing kits & 1.1kV cable pot heading kits are specified for general guidance. However tenderer / supplier shall include necessary components in the 11kV termination kits for improving performance & proper termination of 11kV PILC cables. Also tenderer / supplier shall include necessary components in the 1.1kV cable jointing / pot heading kits for improving performance and thorough jointing / pot heading of 1.1kV cables thereby restoring continuity of the cable parts giving same performance as that of cable. The tenderer shall give full justification for inclusion of necessary components in the jointing / termination kit in the SECTION 07: SCHEDULE OF DEPARTURES FROM SPECIFICATION.*

5.8 *The tenderer shall furnish complete list of components describing functioning of each component along with the offer. Various tapes, wires listed above shall be supplied in standard lengths, sizes etc.*

5.9 *All these components shall have adequate dimensions and also electrical, chemical, mechanical and physical properties, generally as per prevailing/applicable standards amended to-date, to ensure reliability of joints and terminations to be installed.*

5.10 Tests:

5.10.1 Temperature rise.

5.10.2 The exothermal temperature rise of mixed compound shall preferably be less than 40°C above ambient.

5.10.3 Hardening time for the mixed compound when tested as per clause 11.4.3 of IS - 10333/1982 shall not exceed 75 min. The minimum time for hardening shall not be less than 30 min.

5.10.4 Water absorb test as per IS:10333/1982.

5.10.5 Dielectric test as per IS:10333/1982.

5.10.6 The aluminium inline ferrules/lugs supplied along with 11kV/1.1KV epoxy/polyurethane jointing and termination kits shall be tested in the Undertaking's laboratory in accordance with IS 8308: 1993 and IS 8309:1993 amended to date respectively. Also VHN test shall be carried out on aluminium ferrules/lugs to confirm hardness.

5.10.7 *Test shall generally conform to IS-10333/1982 amended to date.*

5.11 Acceptance criteria

5.11.1 **Initially, tenderer shall deliver 1 no. of 11/1.1kV Epoxy/Polyurethane termination, jointing & cable live end sealing kit of every item for which the successful tenderer has received Purchase Order to our Kussara Stores, Mazgaon, Mumbai 400 010 as a proto-type for approval of the Undertaking's accepting authority within 3 weeks from date of receipt of Purchase Order.**

5.11.2 PROTO INSPECTION / TESTING OF JOINTING & TERMINATION KITS / KIT COMPONENTS:

5.11.2.1 **Over and above the various requirements specified in this specification, physical inspection of proto-type of 11/1.1kV Epoxy/Polyurethane termination, jointing & cable live end sealing kit delivered by successful tenderer/s shall be carried out by the Undertaking's accepting authority to ascertain component's quality, quantity, and dimensions supplied as per Undertaking's specification, proper marking/labeling for component identification and ensuring adequate packing.**

- 5.11.2.2** The aluminium inline ferrules/lugs supplied along with 11/1.1kV Epoxy/Polyurethane jointing, termination shall be tested in the Undertaking's laboratory in accordance with IS 8308: 1993 and IS 8309:1993 amended to date respectively. Also VHN test shall be carried out on aluminium ferrules/lugs to confirm hardness.
- 5.11.2.3** In case of rejection of prototype at our end, the manufacturer shall attend/rectify defects/shortfalls within 10 days from the date of receipt of rejection memo, failing which the delayed period will be reckoned for counting L.D. charges.
- 5.11.3** After the approval of proto-type of 11/1.1kV Epoxy/Polyurethane termination, jointing & cable live end sealing kit, the successful tenderer shall deliver the 1ST Lot within 4 weeks from date of approval of proto type and remaining kits as per our schedule. However the Undertaking reserves the right of revising the delivery schedule & also intimating the required quantity to be delivered.
- 5.11.4** For acceptance of lot/s of 11/1.1kV Epoxy/Polyurethane termination, jointing & cable live end sealing kit, supplied by vender/s, physical inspection / testing of random samples selected from lot/s shall be carried out to ascertain material properties, component's quality, quantity, and dimensions supplied as per Undertaking's specification and as per prototype accepted earlier. Any lot is liable for rejection during lot inspection by the Undertaking if test results are not satisfactory and there are deviations from our specification or jointing and termination kits offered are found to be incomplete. In such cases, the manufacturer has to offer fresh lot for re inspection.
- 5.11.5 Additional Tests/Inspection:**
- 5.11.5.1** Purchaser reserves the right of carrying out any inspection and testing at the manufacturer's works/laboratory during all the stages of manufacture.
- 5.11.5.2** Purchaser also reserves the right to select complete jointing/termination kit and/or some of the components from the kits, at random from the supply made and subject them for testing at government recognized laboratories as per relevant standards applicable, for confirmation of material properties and ensuring reliability of jointing/termination kits. If the same fails in the testing, whole lot would be rejected.

5.12 DISPATCH INSTRUCTIONS

5.12.1 Routine Test Certificates:

Certificates regarding routine tests carried out in India, by the supplier on randomly selected Epoxy/Polyurethane termination, jointing & cable live end sealing kit shall be furnished along with the lot offered for the records of the purchaser.

5.12.2 Packing of the kit and marking of kit components:

5.12.2.1 Each component shall be supplied in separately sealed package. All components together shall form complete jointing/ termination kit.

5.12.2.2 For the purpose of identification, each component shall bear legible description such as name of the component, supplier's name, component serial number, batch reference etc. The description should be screen-printed onto the components.

5.12.2.3 Adhesive coated components shall have means to prevent the coated surfaces from adhering to each other. Individual components and complete kit packing shall be designed to protect against ingress of moisture and mechanical damage.

5.12.2.4 *Components of kit contents shall be packed in cartons and shall bear legible kit description. Packing cartons shall be sufficiently strong to withstand damage during transport, storage and handling*

5.12.2.5 Each kit shall be stenciled with size, make, delivery date & expiry date.

5.12.2.6 Instruction manual and bill of material strictly as per kit contents indicating component dimensions and quantity supplied with the kit. The dimensions specified for cable preparation before jointing / terminating of 11kV PILC/1.1kV HRPVC/XLPE cable in manufacturer's instruction manual shall be as per contents supplied in jointing/termination kit.

5.12.2.7 Instruction manual shall clearly bring out detailed procedure in steps for cable preparation and joint/termination installation with the help of necessary drawings.

5.13 Delivery

5.13.1 The successful tenderer/s shall be required to supply material as per delivery schedule.

- 5.13.2** The delivery schedule for 6 months will be given at a time.
- 5.13.3** The delivery schedule will be based on the estimated monthly requirement and the quantity of each delivery will be the quantity estimated for each month.
- 5.13.4** The successful tenderer/s shall supply in each lot, one spare resin compound tin and one hardner bottle having same weight and volume as those supplied in the jointing kit for testing purpose.
- 5.13.5** *The successful tenderer/s shall have to supply additional ferrules / lugs (1% of the total quantity of ferrules/lugs supplied per item, per lot of straight jointing/11kV termination kits or minimum 5 nos. of ferrules / lugs per item, per lot whichever is higher) for testing purpose.*
- 5.13.6** The successful tenderer/s shall also supply in each lot one spare plastic putty (600 gm.) for testing purpose.

SECTION 6 : PERFORMANCE TEST & CERTIFICATES

6.1 Type Test

6.1.1 Type Test Certificate for 11kV Epoxy *polyurethane* based termination and 1.1kV Epoxy straight / tee jointing kits & Pot heading kits

6.1.1.1 *The Tenderer who had supplied specified material in the past to the Undertaking and carried out any changes in design*

AND

The tenderer who has not supplied specified material in the past to the Undertaking i.e. New suppliers of epoxy/polyurethane based 11kV termination kits and 1.1 kV straight / tee jointing kits & 1.1kV Pot heading kits which are offered by the tenderer, shall submit type test certificates from NABL accredited laboratory as per IS/IEC specified in clause no.5.2 of this specification along with the offer in respect of offered epoxy/polyurethane based 11kV termination and 1.1kV straight / tee jointing kits & 1.1kV Pot heading kits for the records of purchaser.

6.1.1.2 *For 11kV Epoxy /polyurethane based termination of 11kV PILC cables, Type tests shall be generally carried out in accordance with relevant part of VDE0278 standard amended to-date or any relevant Indian Standard/ International Standard amended to-date , whichever is applicable.*

6.1.1.3 *For Epoxy /polyurethane based 1.1 kV straight / tee jointing kits & 1.1kV Pot heading kits, type tests shall be carried out in accordance with IS 13573 (Part 1):2011 / UK Engineering recommendations C-81 or any other equivalent Indian / International standard amended to date (whichever is applicable) covering the performance requirement and test on 1.1 kV cable joints and accessories.*

6.1.1.4 *These type test certificates for Epoxy/polyurethane based 11kV termination and 1.1 kV straight / tee jointing kits & 1.1kV Pot heading kits shall be preferably in respect of testing carried during last 5 years period from the date of opening of the tender.*

6.1.2 Type Test Certificate for cast resin system and other vital components of Epoxy/polyurethane based 11kV termination and 1.1kV straight / tee jointing kits & 1.1kV Pot heading kits.

6.1.2.1 The Tenderer who had supplied specified material in the past to the Undertaking and carried out changes in design

AND

The tenderer who has not supplied specified material in the past to the Undertaking i.e. New suppliers of Epoxy/polyurethane based 11kV termination and 1.1kV straight / tee jointing kits & 1.1kV Pot heading kits which are offered by the tenderer, shall submit type test certificates for vital components, to confirm their important properties as per requirement of this specification along with the offer for the records of purchaser.

6.1.2.2 For epoxy/polyurethane based cast resin system , type tests shall be carried out in accordance with IS 10333:1982 amended upto date or relevant International Standards amended upto date, whichever is applicable.

6.1.2.3 Type test certificate shall be for test carried out at NABL accredited laboratory like CPRI or at any other government recognized laboratories in line relevant Indian Standard/ International Standard amended to-date , whichever is applicable

6.1.3 Tenderer shall submit test certificates for Vickers Hardness Number (VHN) alongwith tender documents for aluminium ferrule and lug.

6.1.4 The undertaking reserves the right to ask for any other certificates which is deemed fit for technical evaluation during the process of the tender.

6.1.5 Tenderer shall submit routine tests certificate carried out by the manufacturer along with tender offer.

6.1.6 Tenderer shall submit test certificates for individual components of offered 11kV terminations, 1.1kV straight/Tee jointing kits & potheading kits.

SECTION 7 : SCHEDULE OF DEPARTURES FROM SPECIFICATION

SPECIFICATION NO: 17C0116

Tenderer/s shall mention in this schedule all the departures from the various clauses/sections of this specification If any. In absence of any mention in this schedule, compliance with this specification is taken for granted and shall be binding on tenderer/s.

<i>Sr No</i>	<i>Ref. to Clause/Section No. of Specification</i>	<i>Departures & Remarks on departures</i>

**SEAL & SIGNATURE
OF THE TENDERER _____**

DATE : _____

SECTION 8: GUARANTEED TECHNICAL PARTICULARS OF EPOXY / POLYURATHANE BASED CAST RESIN SYSTEM FOR 11KV TERMINATION KITS AND 1.1 KV STRAIGHT/TEE JOINTING KITS & 1.1 KV CABLE POTHEADING KITS

Sr. No.	Description of component/ Items	Conforming to Indian / International Standard	Unit	Undertaking's Requirement		Offered By Manufacturers/Authorised Dealers	
	Property			Required Value for Type LV	Required Value for Type HV	Required Value for Type LV	Required Value for Type HV
I	Requirements of freshly mixed casting resin						
1	Maximum Temperature		°C	40 ° C above ambient	40 ° C above ambient		
2	Time to reach max. temperature (Min)	IS – 10333:1982	Minutes	60	60		
3	Gel Time (Min)		Minutes	20 - 30	20 – 30		
4	Hardening Time		Minutes	30 -75	30 -75		
II	Requirements of Cured resin						
1	Compressive strength (Min.)	IS – 10333:1982	N /mm²	05	05		
2	Comparative Tracking Index(Min.)	IS – 10333:1982	V	200	200		
3	Impact Strength (Un notched)	IS – 10333:1982	kJ /m²	5	5		
4	Weight Loss (Max.)	IS – 10333:1982	%	2.5	2.5		
5	Water Absorption (Max.)	IS – 10333:1982	mg	50	50		
6	Dielectric Strength (Min.) at 27°C	IS – 10333:1982	kV/mm	08	15		
7	Volume Resistivity(Min.)	IS – 10333:1982	Ohm. cm	1 x 10¹²	1 x 10¹²		

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