**Annexure – ‘B’**

**Technical Specification of 11 KV Straight through jointing kits for different sizes XLPE/AB Cable**

* 1. Suitable upto11 KV 3x300 sq.mm.
  2. Suitable upto 11 KV 3x120+95 sq.mm.
  3. Suitable upto 11 KV 3x95+60 sq.mm

**1.00 SCOPE**

This specification covers design, manufacturing, testing, supply of ISI mark (IS-13573:2011) HT Cable Straight through Jointing kits with all accessories suitable for armoured, PVC/XLPE, Aluminum/Copper conductor cables.

The cable accessories shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation, in a manner acceptable to purchaser, who will interpret the meaning of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder’s supply irrespective of whether those are specifically brought out in these specifications and or the commercial order or not.

**2.00 APPLICATION**

The cable accessories shall be use on armoured, PVC/XLPE, HT, Aluminum/Copper conductor’s cables.

**3.00 SERVICE CONDITIONS**

The cable accessories to be supplied against this specification shall be suitable for continuous operation under the following tropical conditions.

**Environmental Conditions**

|  |  |  |  |
| --- | --- | --- | --- |
| a) | Maximum ambient temperature | | 500 C |
| b) | Maximum ambient temperature in shade | | 450 C |
| c) | Minimum temperature of air in shade | | 350 C |
| d) | Maximum daily average temperature | | 400 C |
| e) | Maximum yearly weighted average temperature | | 320 C |
| f) | Relative Humidity | | 10 to 95 % |
| g) | Maximum Annual rainfall | | 1450 mm |
| h) | Maximum wind pressure | | 150 Kg/m2 |
| i) | Maximum altitude above mean sea level | | 1000 meters |
| j) | Isoceraunic level | | 50 days/year |
| k) | Seismic level (Horizontal acceleration) | | 0.3 g |
| l) | Climate: | Moderately hot and humid tropical climate conducive to rust and fungus growth and polluted with industrial pollution | |

**4.00 APPLICABLE STANDARDS**

IS-13573 (Part-II):2011 - for working voltage from 3.3kV (UE) upto and including 11kV

(E) – Test requirements.

IS-13573(Part-III):2011 – for working voltage from 3.3kV (UE) upto and including 11kV (E) – Test methods.

IEC: 60502-04/ 2005 VDE 0278 – Standard for cable accessories. IEEE48 –for terminations of cable.

ESI-09-13 standards – for components used in the Kit

The specification given in this documents supersedes the relevant clauses of IS-13573:2011 (Part-I/II/III) wherever applicable.

* 1. **GENERAL TECHNICAL REQUIREMENT**

Material used for construction of a jointing kit shall perfectly match with the di-electric, chemical and physical characteristics of the associated cable. The material and design concepts shall incorporate a high degree of operating compatibility between the cable and joints.

The Straight through jointing kit shall be complete with all accessories, jointing material, insulating stress control and sealing material, armour, sealing tape etc. as well as an instruction booklet explaining the method of using the kit. In heat shrinkable kit, the joint shall include a heat shrinkable dual wall tubing which shall be insulating from inside and semi conductive from outside. Detailed sectional views of the assemblies shall be submitted along with the offer.

The straight through joints should be absolutely impervious to the entry of water. The manufacturer shall use the proven technologies and design to ensure a construction which will prevent entry of water or any other liquid inside the straight through joint and cable.

The Straight - through joints shall be suitable for Buried / Over Head application.

The heat shrinkable component shall be light in weight and shall be made of specially formulated cross linked polymeric material with excellent tracking & erosion resistance characteristic. Environmentally sealed system for splicing d ielectric shielded power cables.

The design of joint and termination shall be such that on completion of work, the cable can be charged immediately

The jointing kit shall have range taking feature. The Connector/ferrule used shall be range taking, Moisture entry into conductor shall be protected by providing special mastic

* 1. **Heat Shrinkable Straight through jointing kit for XLPE Cable.**

The heat shrinkable straight through joints shall have following function abilities.

* + 1. For encapsulation, environmental sealing set of heat shrink outer insulating tubes with hot melt adhesive coating are required to be provided.
    2. To Reduce stress over conductor, heat shrinkable stress control tube to be provided. The stress control tube has to be in electrical contact with the outer insulation screen of the cable. Impedance of the tube shall be constant up to an operating temperature and shall be within the

range 1x108 ohm-cm to 8x108 ohm-cm and with Relative permittivity shall be minimum 15. Voids filling and stress relief over crimped connector and cut point of the insulation screen to be provided with void filling and moisture sealing high permittivity yellow mastic and lubricant. The nested ends of the heat shrinkable tubing shall be provided with environmental sealing red mastic. Continuity of copper metallic screen of cable to be provided by Tinned copper mesh with 50% overlap. Mechanical protection of joint to be provided by rollable Metallic Strip Canister of suitable size and length for 3 core and by tinned copper mesh for 1 core cable

* + 1. For joining of main conductor cores suitable size of ferrules/mechanical connectors with range taking feature should be provided. The cross-sectional area(CSA)of the ferrule/mechanical connector shall not be less than CSA of the conductor of the cable. Length of the ferrule/connector shall be sufficient to allow adequate number of crimps/shear head type bolts, to limit temperature rise at the joint. For providing insulation over the conductor area maximum three layers of heat shrinkable insulating tube are to be provided. The thickness of the heat shrinkable tube after installation should not be less than 1.2 times the insulation thickness of the cable. For outer semiconductor screening of the joint suitable heat shrinkable dual wall tubes which are co-extruded are to be provided
    2. Earth Continuity between armour to be provided by tinned copper braid of adequate cross section. This is required for proper earthling of the joint. Also, to support armour wire support ring is to be provided. The material of support ring to be steel (G.I.) for 3 core Cable and Aluminium for 1 core cable

- Worm drive clip (jubilee/hose clips) for tightly securing the earthling braid is required to be provided in suitable size & quantity.

* + 1. For cleaning of cores, removing burrs on ferrules & rough insulation. sufficient quantity of cleaning solvent & aluminium oxide cloth is required to be provided.

**6.0 TESTS**

6.01 **TYPE TESTS**

The Jointing Kit offered, shall be fully type tested at NABL Lab as per the relevant standards. The applicable standards are indicated in Clause No.4.00. The tenderer shall furnish the type test reports along with the offer. Offer without Type test reports will not be considered.

**7.00 TYPE TEST SEQUENCE**

The type test shall be carried out as per the test sequence given in IS 13573/2011(Part – I, II & III)

**Acceptance & Routine Tests:**

All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the supplier in presence of purchaser’s representative.

The purchaser reserves the right to insist for witnessing the acceptance/routine testing of the bought out items.

**8.00 DEMONSTRATION & TRANING:**

The purchaser reserves the right to ask for demonstration of the equipment offered at the purchaser’s place. The Tenderer shall arrange for demonstration of installation of jointing

kits free of cost for giving training to purchaser’s representative to get acquainted with the jointing method. The jointing/termination kit along with required length of the kits to be used for demonstration purpose shall be specified the cable will be provided by the Purchaser.

**9.00 GUARANTEE**

The Kits shall be suitable for storage without deteriorating at a temperature up to 50degree Celsius under normal conditions of storage and shall have unlimited shelf storage life. The tenderer shall guarantee the installed cable accessories for a minimum period of not less than 05 years from the date of installation. The stores/materials found defective within the above guarantee period, shall be replaced by the supplier free of cost within one month of receipt of intimation.

* 1. **QUALITY CONTROL**

The purchaser has a right to send team of experienced Engineers for assessing the capability of the firm for manufacturing and testing of Cable jointing kit as per this specification. The purchaser representative should be given all assistances and cooperation for inspection and testing at the bidder’s work.

* 1. **QUALITY ASSURANCE PLAN**

The tendered shall invariably furnish QAP along with his offer, The QAP adopted by him in the process of manufacturing shall be consist of

* + 1. List of Plant and Machinery available at the manufacturers premises.
    2. List of Testing equipment’s available at the manufacturers premises with their calibration schedule.
    3. Organizational chart.
  1. **PACKING**

The Cable jointing kits shall be suitably packed to avoid damage or disturbance during transit or handling. Each Cable jointing kits may be suitably packed in the first instance to prevent ingress of moisture and dust and then placed in a cushioned carton of a suitable material to prevent damage due to shocks during transit. The lid of the cartoon may be suitably sealed. A suitable number of sealed cartons may be packed in a case of adequate strength with extra cushioning if considered necessary. The cases may then be properly sealed against accidental opening in transit.

The following information shall be furnished with the consignment:

* + - Name of consignee.
    - Details of consignment.
    - Destination.
    - Total Weight of consignment.
    - Sign showing upper / lower side of the crate.
    - Sign showing fragility of the material.
    - Handling and unpacking instructions.
    - Bill of Materials indicating contents of each component and spare materials.
    - Installation instructions including drawing or other information specific to the accessories.

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**12.00 TENDER SAMPLE**

Tenderers are required to submit one number of cable jointing sample of each offered type/item as per Technical Specification of tender documents, from any one of the factories on before the time and date stipulated for submission of offer, for evaluations. The sample shall be clearly mark with each type / item for each sample submitted a name of bidder