

7. **Insulating crepe paper tapes 20 mm x 5 m rolls tinned in cable oil** suitable for jointing of high voltage oil filled cables;
8. **Insulating crepe paper tapes 50 mm x 5 m rolls tinned in cable oil** suitable for jointing of high voltage paper insulated cables, tins to have re-sealable (soldered) lids;
9. **Varnished yellow terylene tapes 19 mm x 25 m rolls** suitable for jointing of high voltage paper insulated cables, to Thorne & Derrick (T&D) specification SP1713, or OEM approved and certified equivalent, to the Engineers approval;
10. **Semi-conductive crepe paper tapes 20 mm x 5 m rolls tinned in cable oil** suitable for jointing of high voltage paper insulated cables, tins to have re-sealable (soldered) lids;
11. **Insulating crepe paper tapes 20 mm x 5 m rolls tinned in jelly oil** suitable for jointing of high voltage paper insulated cables; tins have re-sealable (soldered) lids.
12. **Insulating crepe paper tapes 50 mm x 5 m rolls tinned in jelly oil** suitable for jointing of high voltage paper insulated cables; tins have re-sealable (soldered) lids.
13. **Insulating semi-conductive crepe paper tapes 19 mm x 5 m rolls tinned in jelly oil** suitable for jointing of high voltage paper insulated cables; tins have re-sealable (soldered) lids.
14. **Insulating paper rolls tinned in cable oil suitable for jointing of high voltage oil filled cables to BICC schedule E72762-7** depicted on the BICC sketch 31388 attached or OEM approved and certified equivalent.
- 15-16. **132kV insulated sheath type joints / termination for single core XLPE cable sized 2500 mm<sup>2</sup> of Aluminium conductor, corrugated Aluminium sheath**, complete with standard sets of connectors (CADWELD sets of weld connections for Aluminium and approved compression ferrules for Copper conductors), a silicone compound and glass fibre boxes to CBI - African Cables' drawing S1966-4 / S1925-4 attached or OEM approved and certified equivalent.
- 17-18. **132kV insulated sheath type joints / termination for single core XLPE cable sized 1600 mm<sup>2</sup> of Aluminium conductor, corrugated Aluminium sheath**, complete with standard sets of connectors (CADWELD sets of weld connections for Aluminium and approved compression ferrules for Copper conductors), a silicone compound, insulating barriers, and glass fibre boxes to CBI - African Cables' drawing S1964-4 / S1925-4 attached or OEM approved and certified equivalent.
19. **132kV insulated sheath type HSCT cable for single core XLPE cable sized 1600 mm<sup>2</sup> of Aluminium conductor, corrugated Aluminium sheath**, depicted on the CBI - African Cables' drawing F2MAM05E068HSWDS attached or OEM approved and certified equivalent, complete. See attached Returnable Schedule F.13(c). The cable offered shall be designed for High Stress.
20. **132kV insulated sheath type HSCT cable for single core XLPE cable sized 630 mm<sup>2</sup> of Aluminium conductor, corrugated Aluminium sheath**, depicted on the CBI - African Cables' drawing F2PA1630068HS attached or OEM approved and certified equivalent, complete. See attached Returnable Schedule F.13(c). The cable offered shall be designed for High Stress.

21. **132kV insulated sheath type HSCT cable for single core XLPE cable sized 1000 mm<sup>2</sup> of Copper conductor, corrugated Aluminium sheath**, depicted on the CBI - African Cables' Data Sheet 132kV HV XLPE COPPER HIGH STRESS attached or OEM approved and certified equivalent, complete. See attached Returnable Schedule F.13(c). The cable offered shall be designed for High Stress.
  - 22- **132kV insulated sheath type joints / termination for single core XLPE cable sized**
  23. **1000 mm<sup>2</sup> of Copper conductor, corrugated Aluminium sheath**, complete with standard sets of connectors (approved compression ferrules for Copper conductors), a silicone compound, insulating barriers, and glass fibre boxes to CBI - African Cables' drawing S1962-4 / S1925-4 attached or OEM approved and certified equivalent.
  - 24 **Compression Ferrule suitable for use in straight joints for 132kV XLPE 500mm<sup>2</sup> AL Cable.**
  - 25 **Compression Ferrule suitable for use in straight joints for 132kV XLPE 800mm<sup>2</sup> AL Cable.**
  - 26 **Compression Ferrule for suitable for use in straight joints 132kV XLPE 1000mm<sup>2</sup> Cu Cable.**
  - 27 - The **link disconnecting boxes** shall be adequately dimensioned to permit ready access to the links. The casing and lid of underground link disconnecting boxes shall be of robust construction, made of cast iron or stainless steel and shall be to approval. The lid shall be fixed with an adequate number of Allen key type bolts held. The gasket between the lid and the casing shall be of adequate dimensions to ensure a reliable seal. All link disconnecting boxes to be installed below ground shall be of the horizontal type with diving bell lids suitable for installation in shallow pits below ground level. The link disconnecting boxes shall comply with degree of protection IP68 for a 4 m head to SANS 60529. Provision shall be made for padlocking the lid.
  - 39
- Vandal proof type above-ground link disconnecting boxes (double door kiosk type) shall comprise an extra heavy duty powder coated to traffic grey 3mm stainless steel enclosure. 304 Stainless Steel bullet hinges and a 304 stainless steel 3 way lock to suite padlock All equipment required shall be included in the tender. The boxes shall have an IP4X rating to SANS 60529 and IK08 rating to SANS 62262.
- The link disconnecting boxes shall be supplied complete with all glands, earthing rods and other accessories and with the required length of bonding and connecting leads. The size, type and insulation of these leads shall be to approval.
- The glands to be supplied with the link disconnecting boxes shall be of the heat shrinkable type and to approval. Mechanical compression glands are not acceptable.
40. 19/33 kV PILC cable – 3-core 185 mm<sup>2</sup> Cu, See attached Returnable Schedule F.13(c)
  41. 19/33 kV PILC cable – 3-core 240 mm<sup>2</sup> Cu, See attached Returnable Schedule F.13(c)
  - 42 Joint: Heatshrink 33kV 3C PILC for cable size 185mm<sup>2</sup>-400mm<sup>2</sup> CU See attached Returnable Schedule F.13(c)
  - 43 Outdoor Heatshrink Termination: 33kV 3C PILC for cable size 120mm<sup>2</sup>-185mm<sup>2</sup> CU including shear off lugs and earthing kit.
  - 44 Outdoor Heatshrink Termination: 33kV 3C PILC for cable size 240mm<sup>2</sup>-500mm<sup>2</sup> CU including shear off lugs and earthing kit.
  - 45 Outdoor Heatshrink Termination: 33kV 1C PILC for cable size 240mm<sup>2</sup>-500mm<sup>2</sup> CU including shear off lugs and earthing kit.

- 46 - Oil, alcohol, and other materials provided under these items shall be suitable for use in  
47 cleaning high voltage cable apparatus in preparation for termination/jointing.
- 48.1 **Glass fiber joint boxes** shall be constructed in accordance with drawing SK.30807-2  
- (for 48.1). Other glass fiber joint boxes shall be constructed to the same shape and  
48.3 specification as shown in SK.30807-2 but shall be constructed so as to accommodate  
the larger sizes of cable indicated in the Price Schedule.
- 49 **132kV Oil 300mm<sup>2</sup> Cu sealing end:** see drawing E95239-D2. Oil-filled cable and  
accessories shall comply with NRS 077 and be type-tested in accordance with IEC  
60141-1.
- 50 **66kV Oil 300mm<sup>2</sup> Cu sealing end:** see drawing E9505058-D8. Oil-filled cable and  
accessories shall comply with NRS 077 and be type-tested in accordance with IEC  
60141-1.
- 51 **132kV Oil 300mm<sup>2</sup> Cu / Al joints:** see drawing E95343-D4. Oil-filled cable and  
accessories shall comply with NRS 077 and be type-tested in accordance with IEC  
60141-1.
- 52 Oil-filled cable and accessories shall comply with NRS 077 and be type-tested in  
accordance with IEC 60141-1.
- 53 - Oil-filled cable and accessories shall comply with NRS 077 and be type-tested in  
54 accordance with IEC 60141-1 and with the specifications shown in the table under  
section C.5.4 to comply with the salient power system network specifications.
- 55 19/33 kV XLPE cable – 1-core 240 mm<sup>2</sup> Al, See attached Returnable Schedule F.13(c).  
Product offered must be aluminium sheathed and comply with SANS 1339.
- 56 19/33 kV XLPE cable – 1-core 300 mm<sup>2</sup> Al, See attached Returnable Schedule F.13(c).  
Product offered must be aluminium sheathed and comply with SANS 1339.
- 57 19/33 kV XLPE cable – 1-core 400 mm<sup>2</sup> Al, See attached Returnable Schedule F.13(c).  
Product offered must be aluminium sheathed and comply with SANS 1339.
- 58 19/33 kV XLPE cable – 1-core 500 mm<sup>2</sup> Al, See attached Returnable Schedule F.13(c).  
Product offered must be aluminium sheathed and comply with SANS 1339.
- 59 19/33 kV XLPE cable – 1-core 630 mm<sup>2</sup> Al, See attached Returnable Schedule F.13(c).  
Product offered must be aluminium sheathed and comply with SANS 1339.
- 60 19/33 kV PILC cable – 3-core 240 mm<sup>2</sup> Cu, See attached Returnable Schedule F.13(c).  
Product offered must be steel-wire armoured and comply with SANS 97.
- 61 19/33 kV PILC cable – 3-core 300 mm<sup>2</sup> Cu, See attached Returnable Schedule F.13(c).  
Product offered must be steel-wire armoured and comply with SANS 97.
- 62 19/33 kV PILC cable – 3-core 400 mm<sup>2</sup> Cu, See attached Returnable Schedule F.13(c).  
Product offered must be steel-wire armoured and shall comply with the provisions as  
set out in SANS 97.
- 63 19/33 kV PILC cable – 3-core 500 mm<sup>2</sup> Cu, See attached Returnable Schedule F.13(c).  
Product offered must be steel-wire armoured and shall comply with the provisions as  
set out in SANS 97.

- 64 **Bunker-type link boxes:** The link disconnecting boxes shall be adequately dimensioned to permit ready access to the links. The casing and lid of underground link disconnecting boxes shall be of robust construction, made of cast iron or stainless steel and shall be to approval. The lid shall be fixed with an adequate number of Allen key type bolts held. The gasket between the lid and the casing shall be of adequate dimensions to ensure a reliable seal. All link disconnecting boxes to be installed below ground shall be of the horizontal type with diving bell lids suitable for installation in shallow pits below ground level. The link disconnecting boxes shall comply with degree of protection IP68 for a 4 m head to SANS 60529. Provision shall be made for padlocking the lid.
- The bunker type link boxes shall be constructed in accordance with ROCLA drawings EA09503A01 and CA09505E01.
- 65.1 Acrow props (struts) shall be a type of adjustable steel prop used for temporary support  
– and shoring in construction, maintenance, and repair applications, and shall be  
65.3 designed to provide a safe and stable means of supporting loads during various operations and must consists of an inner and outer tube with a welded top plate, nut and handle, and chain-less prop pin. The props must comply with SANS 10085-1:2024.
- 66 132kV XLPE cable – 1-core 500 mm<sup>2</sup> Al, See attached Returnable Schedule F.13(c). Product offered must be steel-wire armoured, designed for High Stress, and comply with SANS 60840 / NRS 077.
- 67 66kV XLPE cable – 1-core 500 mm<sup>2</sup> Al, See attached Returnable Schedule F.13(c). Product offered must be steel-wire armoured, designed for High Stress, and comply with SANS 60840 / NRS 077.
- 68 – **Glycerine-filled pressure gauges:** The pressure gauges are to be constructed with  
69 stainless steel cases and are to have a dial face size of 60mm. The gauges should be constructed so as to enable bottom entry and port size of ¼.inch The gauges must comply with the EN 837-1 and ASME B40.100 standards and be of accuracy class 1.6.
- 70 – **Pressure gauges with independent electrical switch contacts** shall have a case  
71 material of a stainless steel and have the switch contacts that are adjustable over the full extent of the scale range. The gauge shall be circular in shape and 4" in size. The gauges shall be of accuracy class 1.0 as per EN 837-1. The gauge shall comply with the EN 837-1, ASME B40.100 standards, and DIN 16085 or equivalent.
- 72 – **Digital pressure gauge** shall have a case material of Die-cast zinc with TPE protective  
73 rubber cap, an accuracy of 0.25 % of span in eight pressure measuring ranges and include the Instruments with case filling with compensating valve to vent case. The sampling rate shall be at least 100 measurements per second and the gauge shall feature a digital display to indicate pressure and buttons to navigate the interface and various measurements. The connection port shall be of size G ¼.
- 74 **FERRULE: Bi-metal compression type;** 300mm<sup>2</sup> – 500mm<sup>2</sup> Al / Cu. Ferrule suitable for connecting 300 mm<sup>2</sup> - 500 mm<sup>2</sup> Aluminium and copper conductor cables in the 132 kV or 66 kV XLPE type insulated sheath type straight joints and shall comply with NRS 028:2013.
- 75 **FERRULE: Bi-metal compression type;** 800mm<sup>2</sup> – 1000mm<sup>2</sup> Al / Cu. Ferrule suitable for connecting 800 mm<sup>2</sup> - 1000 mm<sup>2</sup> Aluminium and copper conductor cables in the 132 kV or 66kV XLPE type insulated sheath type straight joints and shall comply with NRS 028:2013
- 76 **66kV XLPE cable** – 1-core 800 mm<sup>2</sup> Al, See attached Returnable Schedule F.13(c). Product offered must be steel-wire armoured, designed for High Stress, and comply with

SANS 60840 / NRS 077.

- 77 **66 kV insulated sheath taped type joints for single core XLPE cable sized 800 mm<sup>2</sup> to 1000 mm<sup>2</sup> with Aluminium or Copper stranded conductor with corrugated Aluminium sheath** complete with standard sets of connectors (CADWELD sets of weld connections for Aluminium and approved compression ferrules for Copper conductors), insulating barriers, a silicone compound and glass fibre boxes to CBI - African Cables' drawing 20547 attached or OEM approved and certified equivalent.
- 78.1 Insulating joint barriers shall be sheath interrupting and shall be in accordance with NRS  
– 077. These barriers will be used in sheath-interrupting joints and thus the barriers shall  
78.3 be physically and electrically compatible with these types of joints. These barriers shall be compatible with both insulated sheath taped-type joints as well as the insulated sheath type joints.
- 79.1 Insulating joint barriers shall be sheath interrupting and shall be in accordance with NRS  
– 077. These barriers will be used in sheath-interrupting joints and thus the barriers shall  
79.3 be physically and electrically compatible with these types of joints. These barriers shall be compatible with both insulated sheath taped-type joints as well as the insulated sheath type joints.

### C.5.3 APPLICABLE STANDARDS

The following standard and other specifications or documents shall form part of this Specification. All items offered shall conform to these standards.

#### C.5.3.1 Electricity Association Technical Specifications:

- |                    |  |
|--------------------|--|
| Doc No. 09-4:1995  | 66 kV and 132 kV impregnated paper insulated oil-filled and gas-pressure type power cable systems  |
| Doc No. 09-19:1996 | Synthetic aromatic hydrocarbon insulating fluid for use in fluid-filled pressure-assisted cables up to 400 kV operating voltage. (Alkyl Benzene type C14 of BICC or T3788 of Dussek Oils classification or equivalent) |

#### C.5.3.2 Electricity Association Engineering Recommendation:

- |                    |                                       |
|--------------------|---------------------------------------|
| Doc No. C55/4:1995 | Insulated sheath power cable systems. |
|--------------------|---------------------------------------|

#### C.5.3.3 IEC 60055-1

- |                    |   |
|--------------------|---|
|                    | Paper-insulated metal-sheathed cables for rated voltages up to 18/30 kV (with copper or aluminium conductors and excluding gas pressure and oil-filled cables) – Part 1: Tests on cables and their accessories                                    |
| IEC 60071-1:1993   | Insulation co-ordination - Part 1 : Definitions, principles and rule.   |
| IEC 60071-2:1993   | Insulation co-ordination - Part 2 : Application guide.  |
| IEC 60141-1:1993   | Tests on oil-filled and gas pressured cables and their accessories.   |
| IEC 60811-1-1:2001 | Common test methods for insulating and sheathing materials of electric cables and optical cables - Part 1-1: Methods for general application - Measurement of thickness and overall dimensions - Tests for determining the mechanical properties. |
| IEC 60811-1-2:2000 | Common test methods for insulating and sheathing materials of electric cables - Part 1: Methods for general application - Section Two: Thermal ageing methods.  |
| IEC 60811-1-3:2001 | Common test methods for insulating and sheathing materials of electric cables and optical cables - Part 1-3: General application - Methods for determining the density - Water absorption tests - Shrinkage test.                                 |

IEC 60811-1-4:2001	Common test methods for insulating and sheathing materials of electric cables - Part 1: Methods for general application - Section Four: Test at low temperature
IEC 60811-2-1:2001	Common test methods for insulating and sheathing materials and optical cables - Part 2-1: Methods specific to elastomeric compounds - Ozone resistance, hot set and mineral oil immersion tests.
IEC 60811-3-1:2001	Common test methods for insulating and sheathing materials of electric cables - Part 3: Methods specific to PVC compounds - Section One: Pressure test at high temperature - Tests for resistance to cracking.
IEC 60811-3-2:2001	Common test methods for insulating and sheathing materials of electric cables - Part 3: Methods specific to PVC compounds - Section Two: Loss of mass test - Thermal stability test.
IEC 60811-4-1:2001	Common test methods for insulating and sheathing materials of electric cables - Part 4: Methods specific to polyethylene and polypropylene compounds - Section One: Resistance to environmental stress cracking - Wrapping test after thermal ageing in air - Measurement of the melt flow index.
IEC 60811-4-2:2001	Common test methods for insulating and sheathing materials of electric cables - Part 4: Methods specific to polyethylene and polypropylene compounds - Section Two: Elongation at break after pre-conditioning - Wrapping test after thermal ageing in air.
IEC 60141-1: 1993	Tests on oil-filled and gas-pressure cables and their accessories - Part 1: Oil-filled, paper or polypropylene paper laminate insulated, metal-sheathed cables and accessories for alternating voltages up to and including 500 kV
C.5.3.4 CENELEC HD 629.2	Test requirements on accessories for use on power cables of rated voltage from 3,6/6 (7,2) kV up to 20,8/36 (42) kV – Part 1: Cables with impregnated paper insulation.
EN 837-1	Bourdon tube pressure gauges
ASME B40.100	Pressure Gauges and Gauge Attachments
DIN 16085	Pressure gauges with electrical limit contact devices
C.5.3.5 SANS	
SANS 97	Electric cables – Impregnated paper-insulated metal-sheathed cables for rated voltages 3,3/3,3 kV up to 19/33 kV (excluding pressure assisted cables)
SANS 1339	Electric cables — Cross-linked polyethylene (XLPE) insulated cables for rated voltages 3,8/6,6 kV to 19/33 kV
SANS 10198	The selection, handling and installation of electric power cables of rating not exceeding 33 kV
SANS 61238-1	Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um – 36 kV) Part 1: Test methods and requirement.
SANS 935	Hot-dip (galvanized) zinc coatings on steel wire.
SANS 1332	Accessories for medium-voltage XLPE and impregnated paper insulated power cables (3,8/6,6 kV to 19/33 kV)
SANS 1411-1	Materials of insulated electric cables and flexible cords Part 1: Conductors
SANS 1411-2	Materials of insulated electric cables and flexible cords Part 2: Polyvinyl chloride (PVC)
SANS 1411-6	Materials of insulated electric cables and flexible cords Part 6: Armour

SANS 60502-4	Power cables with extruded insulation and their accessories for rated voltages from 1 kV ( $U_m = 1,2$ kV) up to 30 kV ( $U_m = 36$ kV) - Part 4: Test requirements on accessories for cables with rated voltages from 6 kV ( $U_m = 7,2$ kV) up to 30 kV ( $U_m = 36$ kV).
SANS 60529	Degrees of protection provided by enclosures (IP code).
SANS ISO 9001:2018	Quality management systems - Requirements
SANS 0198	All Parts The selection, handling and installation of electric power cables of rating not exceeding 33kV.
SANS 60840	Power Cables with Extruded Insulation and their Accessories for Rated Voltages above 30 kV ( $\mu[m] = 36$ kV) up to 150 kV ( $\mu[m] = 170$ kV) - Test Methods and Requirements
SANS 10085-1	The design, erection, inspection, use,modification and dismantling of steel accessscaffolding and working platforms
C.5.3.6 NRS 053	Accessories for medium-voltage power cables (3,8/6,6 kV to 19/33 kV).
NRS 028	Cable Lugs and Ferrules for Cu and Al Conductors preferred requirements for the application in the Electrical Supply Industry
NRS 075	Mechanical torque-shear connectors for medium voltage applications.
NRS 077	XLPE-insulated cables and accessories for systems with nominal voltage of 44 kV, 66 kV 88 kV and 132 kV.

C.5.3.7 Reference to a particular standard or recommendation in this Specification does not relieve the Manufacturer of the necessity of the contracted works complying with other relevant standards or recommendations.

C.5.3.8 The design features of all equipment shall be based on the SI system of units.

#### C.5.4 POWER SYSTEM DESIGN AND OPERATING CONDITIONS

The specified cable accessories and cable jointing materials are to be deployed and must be suitable for use on the City of Cape Town existing high voltage underground cable installations which form part of a number of 33, 66 and 132kV 3 phase/50 Hz interconnected networks.

These power system networks transmit electrical energy by means of overhead lines and underground cables to a number of switching stations at voltages of 132 kV, 66 kV and 33 kV between phases; the working voltage of any part of the transmission system will normally not exceed ten percent above these levels. The system may, however, operate continuously at this upper limit and all equipment shall be designed accordingly.

The neutral points of the 132 kV and the 66 kV systems are directly earthed at each point of transformation.

The 33 kV and the 11 kV systems are earthed either direct or through a resistor, having a value of 9,5  $\Omega$  and 4  $\Omega$  respectively, as the occasion demands.

The following table summarises the salient power system network specifications.

Item	Description	Particulars (33kV/66kV/132kV Joints)
1	General site altitude	Sea level
2	Soil temperature	
2.1	Minimum °C	5
2.2	Maximum °C	25
3	Thermal resistivity of soil °C.m/W	1,2

4	Nature of soil	Rocky/Ferrocete or Sand
5	Nominal depth of laying m	1,0
6	Nominal system voltage, $U_o$ (kV)	66 / 132
7	System highest voltage, $U_m$ (kV)	72,5 / 145
8	System frequency (Hz)	50
9	Earthing of system neutral	Solid
10	Maximum system symmetrical fault level (single and three phase) which the completed installation, conductor and metallic sheath must be capable of withstanding:	
10.1	Short circuit current kA.1s	25 / 31,5
10.2	Asymmetrical crest factor	2,5
	<b>FLUID FILLED CABLES</b>	
11	Maximum permissible conductor temperature (°C)	85
12	Type of sheath of fluid-filled cable	Corrugated Seamless Aluminium or Lead Alloy
13	Type of outer covering of cable	PVC
14	Maximum sheath standing voltage at rated current (V)	65
15	Maximum continuous generating hydraulic pressure (kPA gauge)	500
	<b>XLPE CABLES</b>	
16	Maximum permissible conductor temperature (°C)	90
17	Type of sheath of cable	Corrugated Seamless Aluminium or Lead Alloy
18	Type of outer covering of fluid-filled cable	HDPE
19	Maximum sheath standing voltage at rated current (V)	55
	<b>PILC CABLES</b>	
16	Maximum permissible conductor temperature (°C)	70
17	Type of sheath of cable	Corrugated Seamless Aluminium or Lead Alloy
18	Type of outer covering of fluid-filled cable	HDPE
19	Maximum sheath standing voltage at rated current (V)	54

### C.5.5 GENERAL REQUIREMENTS FOR JOINTS CONSTRUCTION

- C.5.5.1 Joint boxes of approved material and of the fully insulated type shall be provided for all joints. The joint boxes shall be capable of withstanding, without deformation, any pressure to which they may be subjected during the process of filling the joints (where applicable) and under working conditions.
- C.5.5.2 Where compound filled outer protection boxes for joint box protection are to be supplied, the protection box compound shall not soften at operating temperatures of up to 95 °C.
- C.5.5.3 Each 3 core joint shall be fitted with a valve pin which will restrict oil flow during the jointing process. The valve pin shall be designed so that it is easily removed on completion of each joint and easily replaced should it be required. Each joint shall be fitted with an oil draining device which can be removed or replaced at any time.
- C.5.5.4 Breeches pieces must be located so that the circulation of oil is promoted and areas of fluid stagnation are minimized.
- C.5.5.5 The joints shall be supplied with all necessary material and jointing instructions required for making the joints in their entirety. The equipment for each joint shall be packed in a separate case and 2



copies of packing lists, drawings and diagrams of the product delivered must be supplied (one in a box and one attached to delivery note) with a set of jointing instructions for each kit.

**For the purpose of evaluation tenderers must submit a set of jointing instructions for each joint kit tendered with the tender offer. Failure to provide within 5 working days of written request will render the offer non-responsive.**

C.5.5.6 Tenderers must submit technical details (assembly drawings) of the joints offered. Failure to submit these within 5 working days of written request will render the offer non-responsive.

#### **C.5.6 33kV OUTDOOR TERMINATIONS for PILC conductor - Specifications**

##### **C.5.6.1 General**

- The 33kV cable outdoor terminations shall be heat shrink terminations complying fully with the requirements of SANS 1332 for outdoor terminations, except where specifically required otherwise in terms of this specification.
- The 33kV cable outdoor terminations shall be of the following standard types and sizes:
  - Heat shrink outdoor termination; suitable for 120 mm<sup>2</sup> to 185 mm<sup>2</sup>, 3-core, screened 33 kV PILC cable. (Item 43 of Pricing Schedule C.4)
  - Heat shrink outdoor termination; suitable for 240 mm<sup>2</sup> to 500 mm<sup>2</sup>, 3-core, screened 33 kV PILC cable. (Item 44 of Pricing Schedule C.4)
  - Heat shrink outdoor termination; suitable for 240 mm<sup>2</sup> to 500 mm<sup>2</sup>, single-core, screened 33 kV PILC cable. (Item 45 of Pricing Schedule C.4)
- The 33kV cable outdoor terminations for PILC cable shall be suitable for use on 33 kV, 3-core and single core, aluminium or copper conductor, paper insulated, screened, lead sheathed, hessian bedded, galvanized double steel tape armoured, PVC served general purpose underground cables manufactured to Table 19 of SANS 97 (Wet Design) and compliant with SANS 1411, and for use on an earthed system.
- The 33kV cable outdoor terminations shall have been successfully type tested, including thermal short circuit test, in accordance with the requirements of SANS 1332.
- The 33kV cable outdoor terminations will be terminated on MV overhead lines and line hardware.
- The 33kV cable outdoor terminations shall be suitable for cable terminations with tail lengths of 1200mm, measured on the stripped and prepared cable from the base of the lug or connector barrel to the top of the lead sheath (or non-metallic sheath and bedding in the case of XLPE cable with non-metallic sheath).
- All materials, components and accessories forming part of the termination kit shall be appropriately sized for the tail lengths, core diameters and cable diameters of the specified cable. Heat shrink tubing shall include a positive length tolerance to allow for variation in cable tail length to meet particular site conditions. Tenderers shall detail the size and length per component in the detailed BOM included in Schedule F.13(c).
- Heat shrink tubing shall be of cross-linked polyolefin material. PVC heat shrink tubing shall not be acceptable. Shrinkage of heat shrink tubing in the longitudinal axis shall be less than 10% of the original unshrunk length.

- Anti-track tubing shall be adhesive-lined cross-linked polyolefin material and shall be designed and provided with additives to inhibit the development and progression of surface discharge tracking and erosion. Tenderers shall provide detail with their tender of the anti-tracking properties of the tubing and shall detail the tracking index in Schedule F.13(c).
- The 33kV cable outdoor terminations shall be supplied complete with all necessary tubing, materials, components and accessories as required to make a complete termination on the specified cable type, size and tail length, in accordance with the bill of materials of the type tested cable termination.
- Components shall include (but not be limited to) the following:
  - Heat shrink clear oil barrier tubing (Terminations for PILC cable).
  - Heat shrink conductive tubing for cable screen (Terminations for PILC cable).
  - Void filling stress relieving mastic / tape for screen cut.
  - Heat shrink stress control tubing.
  - Profiled wedge for cable crutch.
  - Void filling and profiling mastic / tape for breakout boot.
  - Heat shrink conductive breakout boot.
  - Void filling mastic / tape for lug barrel base.
  - Heat shrink high voltage anti-track tubing for complete tail length.
  - Heat shrink anti-track rain sheds.
  - Further binders and tapes as required.
  - Mechanical earthing kits.
  - Shear off Lugs
- The Tenderer shall include with his tender a detailed bill of materials for each termination (including the mechanical earthing kits, where specified), listing the part numbers and descriptions, sizes and lengths of all tubing, materials, components and accessories included in the tendered terminations.
- The Tenderer shall complete Schedule F.13 with full details of the accessories offered.
- The Tenderer shall provide with his tender a jointing instruction per cable termination type. Jointing instructions shall detail top-down measurements so as to maximise the length of the screened portion of the core tail and enable core crossings on the completed termination.
- Jointing instructions with top-down measurements shall in addition be packaged with each termination.
- Termination kits shall include a Jointer Identification Marker which shall comprise a non-metallic, non-conducting cable tie or similar strap that can be secured permanently around the cable outersheath adjacent to the finished termination. The strap shall be fitted with a heat shrink label identifying the accessory manufacturer and model no and shall have space for the jointer name and date of completion of the joint to be filled in. A further transparent heat shrink sleeve shall be

provided which shall cover the label completely and both shall be shrunk down over the cable tie / strap by the jointer and shall provide a watertight permanent marking once shrunk onto the strap and the strap secured to the cable outersheath.

- The Tenderer shall indicate in his tender details of the shelf life for the complete termination kits and the particular shelf life for any components of the termination kits that specifically limit the shelf life of the complete kit.
- Tenderers offering terminations differing from the specified requirements shall disclose full details of and motivation for the deviations from the specification, and acceptance of these will be subject to the Engineer's approval.

#### **C.5.6.2 Earthing**

- The 33kV cable outdoor terminations shall include mechanical earthing kits
- Mechanical earthing kits shall comply with the requirements of SANS 1332.
- The mechanical earthing kits for 33kV cable terminations shall be supplied complete with all necessary tubing, materials, components and accessories, in accordance with the bill of materials of the type tested cable termination. Components shall include (but not be limited to) the following:
  - Water blocked main earth braid.
  - Tinned copper mesh and constant force roll spring for connection to lead sheath (PILC cable).
  - Constant force roll spring for connection to DSTA armour (PILC cable)
  - Waterblocking sealant tape for cable outersheath.
  - Insulating heat shrink cover tubing.
  - Further components, binders and tapes as required.

#### **C.5.7 QUALITY, DESIGN AND EXECUTION**

C.5.7.1 All apparatus should comply with this Specification, no departure shall be implemented without the prior approval of the CCT Representative. If necessary, all the materials will be inspected by the Engineer at manufacturer's premises before dispatch..

#### **C.5.8 PACKING, SHIPPING AND TRANSPORT**

C.5.8.1 The Contractor shall be responsible for the packing, loading and transport of the equipment from the place of manufacture, whether this is at his own works or those of any supplier, to the City of Cape Town - Electricity Stores, Melck Street, Ndabeni, Cape Town, South Africa.

C.5.8.2 Any damage due to defective or insufficient packing shall be made good by the Contractor at his own expense and within reasonable time when called upon by the Municipality to do so. Two copies of complete packing lists showing the number, size, marks, mass, tender number, item number and contents of each package shall be posted to the Employer immediately after the material is dispatched. Shelf life of components must be indicated in packing lists.

C.5.8.4 Tenderers are to state the maximum delivery period for each item offered in the **(5) Pricing Schedule**.

#### **C.5.9 GENERAL PARTICULARS AND GUARANTEES**

C.5.9.1 The Contractor shall be responsible for any discrepancies, errors or omissions in the particulars and guarantees, whether or not such particulars and guarantees have been approved by the CCT Representative (Refer to Schedule F.11).

C.5.9.2 Tenderers shall state what guarantee would be offered to cover the possibility of failure of the stop joints within 12 months of installation.

C.5.9.3 The cause of the fault shall be determined by a joint inspection by the City of Cape Town's Representative and the Client Representative. All faults covered by the Contractor shall be rectified in a reasonable timeframe at the Contractor's cost. The manufacturers and places of manufacture, testing and inspection of the various portions of the Works shall be stated in Schedule F.11. Any changes shall be made with the written agreement of the Engineer and the Contractor shall ensure that the manufacturers and places of manufacture are acceptable to the Engineer.

**C.5.10 ACCREDITED DISTRIBUTORS**

C.5.10.1 Tenderer must be an accredited distributor of the product offered. Proof in form of a letter from the OEM (Original Equipment Manufacturer) must be submitted with tender submission or on request during evaluation of this tender.

**C.5.11 SAMPLES**

C.5.11.1 Samples of various items, such as paper tapes, may be requested from responsive tenderers for the purpose of tender evaluation. Samples must be delivered to CCT at the tenderer's cost.

C.5.11.2 CCT reserves the right to keep certain samples.

C.5.11.3 Should the tenderer require the samples to be returned, this will be for the tenderer's own cost.