CENTLEC

Reg No 2003/011612/30

CD 20B/2021

SUPPLY AND DELIVERY OF POWER CABLES, PILOT CABLES AND ACCESSORIES

CONTENTS

1. INVITATION

CENTLEC (SOC) Ltd invites bids for the supply and delivery of Power and Pilot Cables and Accessories as detailed in the specification below for a period of thirty-six (36) months.

2. MINIMUM SUBMISSION REQUIREMENTS

Any omission of the listed items would render an automatic disqualification

2.1 Supply unique security personal identification number (PIN) and/or original TAX Clearance Certificate for TAX compliant status.

2.2 Supply municipal services (water, sanitation, rates and electricity) clearance certificate or Lease Agreement with a current Bill and rates clearances, or Current Bill of Account not owing more than 30 days or Lease Agreement in case the services are paid for by the Landlord, the lease agreement must be signed by the applicable stakeholders.

- 2.3.1 In an event that the Bidder utilizes prepaid services (e.g. water and or electricity) a valid municipal clearance certificate(s) must still be provided.
- 2.3.2 Bidders that are CENTLEC (SOC) Ltd customers are also expected to attach a valid electricity clearance certificate.

2.3 Submit proof of registration on the National Treasury Centralized Supplier's Database.

3. SCOPE OF WORK

This bid covers the manufacture and delivery of power and pilot cables and accessories as described in the specification and schedules. All equipment shall be suitable for use on the distribution systems of the Mangaung Metropolitan Municipality and CENTLEC the Regional Electrical Distributor.

4. SPECIAL CONDITIONS

4.1 Please note that CENTLEC reserves the right to appoint more than one bidder where applicable.

4.2 Any work outside of the current scope of work, identified by CENTLEC duly authorized persons can be quoted by the approved bidder.

4.3 Any amendments to the legal and procedural content of this bid shall be addressed in the SLA entered into by CENTLEC and successful bidder(s).

4.4 The successful bidder will be expected to enter into a Service Level Agreement with CENTLEC.

5. TECHNICAL SPECIFICATION

5.1 The meteorological conditions for Bloemfontein and the Central and Southern Free State region are:

1. Outdoor temperatures in degrees Celsius	Annual mean – 24.4; Maximum = 40; Minimum = -10
2. Average relative humidity	At 08h00 = 76%; at 14h00 = 33%; at 20h00 = 48% Minimum = 7% and Maximum = 98%
3. Thunder storm activity	Severe Thunderstorms

Table 1 – Climatological Data

The area is subject to severe lightning storms.

5.2 Nature of load

The load on the system will or may consist of static transformers, induction and synchronous motors, motor generators, rotary converters, motor converters, lighting, heating, electro-chemical work and arc-furnaces. Electrical networks comprises of underground cables, cables connected to overhead lines, all feeding substations and/or consumers.

5.3 Distribution System

The cables shall be suitable for service on the 33 000, 22 000, 11 000 volt and 400 volt, 3 phase, 50 Hz distribution systems of the Municipalities in the Central and Southern Free State region. The neutral point of the network is either directly earthed or through a resistor or reactor or a combination of both. The phase rotation of Bloemfontein is non-standard.

5.4 Full details of the equipment offered shall be submitted with bids.

With reference to cables the latest technical information on jointing and termination must be submitted. Where samples are required these must also be submitted.

5.5 Tests & Standards

All equipment shall be tested in accordance with:
SANS 1339: 2003, SANS 97: 2001, SABS 1507: 2002, SABS 1574: 2004, BSS 6480 or IEC 502, 540 and NRS 013, 028 & 053: 2007.
A document indicating that the equipment offered complies with SANS, IEC, BSS, NRS or other recognised standards, shall be annexed. Samples of the equipment offered shall be submitted on request.

5.6 Immediately after the works test, both ends of every length shall be sealed in an approved manner and shall remain sealed until delivery.

5.7 Drum lengths

Cable drums shall contain the maximum length of cable which length shall be given in the bid. Cable drums shall, however, not exceed the following dimensions and mass:

Drum diameter	:	2,5 m
Drum width	:	1,5 m
Drum mass	:	5,0 metric ton

5.8 Drum marking

Drums shall be clearly marked with the following information: Drum number, type of cable, size, number of cores and voltage rating. Marking plates shall be stapled to the drum and weather resistant as some cable drums are stored for years in the open. Computer printed paper marking material are not acceptable.

5.9 Cable marking

5.9.1. All PVC Cable outer sheaths to be clearly marked as follows;

a) At intervals of ± 600 mm with the “CENTLEC logo” by imprint or embossed. Printing (Paint markings will not be acceptable) and
b) Sequential length marking, with ink every 1 meter from the inside of the drum outwards.

5.9.2. All aluminum and copper conductors on each core shall be clearly marked as follows; at intervals of ± 600 mm with CENTLEC’s logo indent by imprint or embossing. The cables are as follows:

- Bare Copper Conductor
- Stranded Copper Conductor
- Hare
- Fox
- Wolf
- Low Voltage Cables
- Medium Voltage Conductors
- High Voltage Conductors
- Solid Copper Conductor

Example of CENTLEC’s logo:

5.10 Specification for impregnated paper insulated Medium Voltage cables

5.10.1. Standard specification

The cable must comply to and be tested according to SANS 97: 2001 Impregnated paper-insulated metal-sheathed cables for rated voltages 3,3/3,3 kV to 19/33 kV (table 19) and NRS 013:2007.

5.10.2. Construction of cable

The cable shall be paper insulated, lead sheathed, double steel tape armoured and served and be individually screened as specified in the schedules and shall be for general purpose duty on an earthed system. The outer covering shall be bedding between the lead sheath and the steel tape shall preferably be PVC bedding and this shall be stated in the bid.

5.10.3. Minimum standards

- 3 phase fault current (3 seconds) 18 kA
- Earth fault current 8 kA for 3 sec
- Rated voltage (kV) E - 11 kV, E0- 6,35 kV
- Impulse voltage (kV peak) 95 kV p
- Power frequency withstand voltage (1 minute) 28 kV
- Partial discharge 20 pC
- Maximum dielectric stress at rated voltage 5 kV/mm

5.10.4. Conductors

The conductors shall consist of either plain aluminium wires or alternatively plain annealed copper wires as stated in Schedule A.

5.10.5. Particulars

Bidders shall submit with their bids a manufacturer’s communication giving full particulars of the cable offered, and shall complete the Form of bid and Table 3 – Medium Voltage Cables annexed thereto.

5.10.6. Inspection and tests

During manufacture and prior to despatch the cable may, if required, be inspected at the manufacturer's works by the Engineer and the cable will be subjected to tests as specified in SABS 97 – 2001 as well as NRS 013:2007. And to such further tests which the Engineers may deem necessary. A "Functional" bending test shall be conducted on a sample of the cable.

5.11 Specification for XLPE cables

5.11.1. Standard specifications

The cable shall conform to the requirements of **SANS 1339: 2007** for Cross-linked polyethylene (XLPE) insulated cables for rated voltages 3,8 / 6,6 kV to 19/33 kV and **NRS 013:2007**

5.11.2. Construction of cable

Insulation	:	XLPE
Number of cores	:	Table 3 – Medium Voltage Cables
Type	:	Table 3 – Medium Voltage Cables
Screening	:	Individually screened as specified in schedules.
Conductor material	:	Shall be either aluminium or copper as specified in schedules.
Voltage rating	:	Table 3 – Medium Voltage Cables
Colour of outer PVC sheath	:	Table 3 – Medium Voltage Cables

5.12 Specification for PVC low voltage cables

5.12.1. Standard specification

The cable shall conform to SANS 1507: 2002 for Electric cables with extruded solid dielectric insulation for fixed installations -300/500 V to 1 900/3 300 V and SANS 1574: 2001 for Electric cables - Flexible cords and flexible cables.

5.12.2. Construction of cable

The construction of the cable shall be PVC/ PVC/ SWA/ PVC except for item 2p which shall be PVC only.

Voltage rating	:	600/1000 Volt
Conductor material as specified in the schedules.	:	Either aluminium or copper
Armouring	:	Steel wire
Colour of outer sheath	:	Black

5.13 Specification for control cables

5.13.1. 19 Core control cable (Supervisory) ;

The cable must be similar to Contronics Dekoron control cable type 1750.

This cable is without the Mylar aluminium shield.
Conductors: 19 cores x 1,5mm² of multiple strands of **numbered** copper wires.

Primary insulation	:	PVC
Outer jacket	:	PVC
Voltage rating	:	600/1000 volt

5.13.2. Seven (7) core control cable

Pilot cables shall be for control, protection, communication and telemetry purpose. The pilot cables shall be suitable for lying with power cables.

5.13.2.1 Basic specifications

Conductor	:	7 cores x 2,5mm² of multiple strands of **differently coloured** or **numbered** copper wires. Plain annealed copper class 2 Stranded to BS EN 60228.
Insulation	:	Thermosetting XLPE Type GP8 to BS 7655-1.3
Bedding	:	Compatible Polymeric Material (PVC)
Steel Wire Armour	:	Galvanized Steel Wire
Sheathing	:	PVC Type 9 to BS 7655-4.2

Manufactured to BS 5467

5.13.2.2 More detailed specifications

Number of Cores	:	7
Cross Sectional Area	:	2.5 mm²
Screened/Unscreened	:	Screened
Length	:	Standard drum length can be specified
Sheath Colour	:	Black
Screen Type	:	Galvanized Steel Braid
Maximum Operating Temperature	:	+90°C

Core Strands	:	7/0.67 mm
Sheath Material	:	Polyvinyl Chloride PVC
Voltage Rating	:	600/1000 V
Standards Met	:	BASEC
Minimum Operating Temperature	:	-15°C
Conductor Material	:	Annealed Copper

5.13.3. Twelve (12) core control cable

Pilot cables shall be for control, protection, communication and telemetry purpose. The pilot cables shall be suitable for lying with power cables.

5.13.3.1 Basic specifications

Conductor	:	12 cores x 2,5mm² of multiple strands of **numbered** copper wires. Plain annealed copper class 2 Stranded to BS EN 60228
Insulation	:	Thermosetting XLPE Type GP8 to BS 7655-1.3
Bedding	:	Compatible Polymeric Material (PVC)
Steel Wire Armour	:	Galvanized Steel Wire
Sheathing	:	PVC Type 9 to BS 7655-4.2

Manufactured to BS 5467

5.13.3.2 More detailed specifications

Number of Cores	:	12
Cross Sectional Area	:	2.5 mm²
Screened/Unscreened	:	Screened
Length	:	Standard drum length can be specified
Sheath Colour	:	Black
Screen Type	:	Galvanized Steel Braid
Maximum Operating Temperature	:	+90°C
Core Strands	:	7/0.67 mm
Sheath Material	:	Polyvinyl Chloride PVC
Voltage Rating	:	600/1000 V
Standards Met	:	BASEC

Minimum Operating Temperature	:	-15°C
Conductor Material	:	Annealed Copper

5.13.4. Nineteen (19) core control cable

Pilot cables shall be for control, protection, communication and telemetry purpose. The pilot cables shall be suitable for lying with power cables.

5.13.4.1 Basic specifications

Conductor	:	19 cores x 1,5mm² of multiple strands of **numbered** copper wires. Plain annealed copper class 2 Stranded to BS EN 60228
Insulation	:	Thermosetting XLPE Type GP8 to BS 7655-1.3
Bedding	:	Compatible Polymeric Material (PVC)
Steel Wire Armour	:	Galvanized Steel Wire
Sheathing	:	PVC Type 9 to BS 7655-4.2

Manufactured to BS 5467

5.13.4.2 More detailed specifications

Number of Cores	:	19
Cross Sectional Area	:	1.5 mm²
Screened/Unscreened	:	Screened
Length	:	Standard drum length can be specified
Sheath Colour	:	Black
Screen Type	:	Galvanized Steel Braid
Maximum Operating Temperature	:	+90°C
Core Strands	:	7/0.67 mm
Sheath Material	:	Polyvinyl Chloride PVC
Voltage Rating	:	600/1000 V
Standards Met	:	BASEC
Minimum Operating Temperature	:	-15°C
Conductor Material	:	Annealed Copper

5.13.5. Twenty seven (27) core control cable

Pilot cables shall be for control, protection, communication and telemetry purpose. The pilot cables shall be suitable for lying with power cables.

5.13.5.1 Basic specifications

Conductor	:	27 cores x 1,5mm² of multiple strands of **numbered** copper wires. Plain annealed copper class 2 Stranded to BS EN 60228
Insulation	:	Thermosetting XLPE Type GP8 to BS 7655-1.3
Bedding	:	Compatible Polymeric Material (PVC)
Steel Wire Armour	:	Galvanized Steel Wire
Sheathing	:	PVC Type 9 to BS 7655-4.2

Manufactured to BS 5467

5.13.5.2 More detailed specifications

Number of Cores	:	27
Cross Sectional Area	:	1.5 mm²
Screened/Unscreened	:	Screened
Length	:	Standard drum length can be specified
Sheath Colour	:	Black
Screen Type	:	Galvanized Steel Braid
Maximum Operating Temperature	:	+90°C
Core Strands	:	7/0.67 mm
Sheath Material	:	Polyvinyl Chloride PVC
Voltage Rating	:	600/1000 V
Standards Met	:	BASEC
Minimum Operating Temperature	:	-15°C
Conductor Material	:	Annealed Copper

5.13.6. 19 Pair twisted pair control cable (Pilots)

Pilot cables shall be for control, protection, communication and telemetering purpose. The pilot cables shall be suitable for lying with power cables.

The conductor cross-sectional area shall be not less than 1mm² and the material shall be copper complying with BS 6360 as applicable.

The insulation shall consist of a thermoplastic compound complying with either BS 6746 for PVC or BS 6234 compound type 03 for polythene.

The laid-up cables shall be screened, have a PVC bedding, steel wire armouring complying with BS 1442 and PVC serving of at least 2mm² radial thickness.

The cables shall be designed to withstand a test voltage of 5 kV AC for 15 minutes between conductors and between each conductor and all other conductors and the armour which shall be earthed.

The cores shall be laid up in twisted pairs and identified by a standard colour coding system. The lay of conductors forming a pair shall differ for adjacent pairs, and shall not exceed 200mm. In multilayer constructions the direction of lay for successive layers shall alternate.

Filters shall be non-hygroscopic material compatible with the conductor insulation. Polythene cables shall be provided with a suitable barrier tape before application of the PVC bedding.

Finished cables ends shall be sealed after completion of tests to prevent ingress of moisture.

Twisted pair pilot cable - general particulars - cable design parameters

	DESCRIPTION	**PARTICULARS**
i.	Standard to which cables Manufactured	**SABS 1507: 2002 & NRS 011: 2001**
ii.	Conductor material	Multi stranded Copper
iii.	Minimum conductor size	1,5mm²
iv.	Number of pairs	19
v.	Type of conductor insulation	PVC or polythene
vi.	Minimum thickness of conductor insulation	0,5mm
vii.	Mutual capacitance of pairs	48 max nF/km

viii. Minimum insulation resistance 5 meg ohms/km

ix. Maximum conductor resistance 20 ohms per km loop at 20ºC

x. Normal attenuation at:

(a)	300 Hz	0,4 max dB/km
(b)	1 000 Hz	0,6 max dB/km
(c)	2 000 Hz	0,8 max dB/km
(d)	2 400 Hz	0,9 max dB/km

xi. Power frequency withstand voltage 15 minutes

(a)	Between pairs	5 kV
(b)	Between conductors and armouring	5 kV

xii. Cross talk between pairs at 1 000 Hz better than 70 db when terminated with 600 ohm load at each end.

xiii. Minimum thickness of armour bedding 1,2mm

xiv. Type of armour Steel wire

xv. Type of serving PVC

xvi. Minimum thickness of serving 2,0mm

xvii. As laid serving test voltage 10 kV dc

5.13.7. Eight(8) core data cable

Data cables shall be for control, protection, communication and telemetry purpose.

5.13.7.1 Basic specifications

Conductor	:	Tinned annealed copper(Stranded :7wires of 0.2mm^2 for each core)
Insulation	:	Polyethylene (PE)
Twinning	:	Two insulated conductors are twisted together to form a pair

5.13.7.2 More detailed specifications

Number of Cores	:	8(Stranded :7wires of 0.2mm^2 for each core)
Cross Sectional Area	:	Stranded :7 wires of 0.2mm^2 for

		each core
Screened/Unscreened	:	Screened
Length	:	Standard drum length can be specified
Sheath Colour	:	Grey
Screen Type	:	Aluminium –Polyester(Mylar)
Maximum Operating Temperature	:	+70°C
Core Strands	:	8
Sheath Material	:	Polyvinyl Chloride PVC
Voltage Rating	:	110 V
Standards Met	:	
Minimum Operating Temperature	:	-15°C
Conductor Material	:	Tinned annealed copper

5.13.8. Fourty (40) pair indoor telephone cable

Indoor telephone cables shall be for communication and telemetry purposes.

5.13.8.1 Basic specifications

Conductor	:	Annealed copper
Insulation	:	Polyethylene (PE)
Twinning	:	Two insulated conductors are twisted together to form a pair
Steel Wire Armour	:	Not applicable
Sheathing	:	PVC

Manufactured to BS 5467

5.13.8.2 More detailed specifications

Number of Cores	:	80
Cross Sectional Area	:	0.5mm²
Screened/Unscreened	:	Screened
Length	:	Standard drum length can be specified
Sheath Colour	:	White

Screen Type	:	
Maximum Operating Temperature	:	+70°C
Core Strands	:	80 cores
Sheath Material	:	Polyvinyl Chloride PVC
Voltage Rating	:	110 V
Standards Met	:	
Minimum Operating Temperature	:	-15°C
Conductor Material	:	Tinned annealed copper

5.13.9. RG 213 Coaxial Cable

Coaxial cables shall be for communication and telemetry purposes.

5.13.9.1 Basic specifications

Conductor	:	Copper
Dielectric Type	:	Polyethylene (PE)
Dielectric diameter(mm)	:	7.24
Jacket material and colour		PVC black
Jacket diameter(mm)	:	10.29mm
Shield Diameter(mm)	:	7.98mm

5.13.9.2 More detailed specifications

Number of Strands (Inner Conductor) :		7
Diameter(mm)	:	2.29mm
Shielded/Unshielded	:	Shielded
Length	:	Standard drum length can be specified
Jacket Colour	:	Black
Shield Material	:	Copper Braid

Electrical Specifications by Frequency

Frequency 1

Frequency (MHz)	:	100
Attenuation ,dB/100m	:	6.89

Frequency 2

Frequency (MHz)	:	400
Attenuation ,dB/100m	:	15.75

Frequency 3

Frequency (MHz)	:	1000
Maximum Operating Frequency :MHz		1000

5.13.10. RG 58 Flexible Coaxial Cable

Coaxial cables shall be for communication and telemetry purposes.

5.13.10.1 Basic specifications

Conductor	:	Stranded Tin Copper
Dielectric Type	:	Polyethylene (PE)
Dielectric diameter(mm)	:	3.6mm
Outer diameter(mm)	:	4.95mm
Jacket material and colour		PVC black
Shield Material	:	Tinned Copper Braid

5.13.10.2 More detailed specifications

Number of Strands (Inner Conductor) :		Stranded 19 x 0.18mm
Outer diameter (mm)		4.95mm
Shielded/Unshielded	:	Shielded
Length	:	Standard drum length can be

specified

Jacket Colour	:	Black
Shield Material	:	Tinned Copper Braid
Maximum Operating Temperature	:	+70°C
Electrical Specifications by Frequency		
Frequency 1	:	
Frequency (MHz)	:	200
Attenuation ,dB/100m	:	23
Frequency 2		
Frequency (MHz)	:	400
Attenuation ,dB/100m	:	32
Frequency 3		
Frequency (MHz)	:	1000
Attenuation ,dB/100m	:	98

5.13.11. Technical specifications of overhead long span ADSS cable that must be used on 11, 33 and 132kV overhead structures

5.13.11.1 Optical fibres

Single Mode All Dielectric Self Supporting optical fibre cable (ADSS) is required.

These shall be mode fibres in accordance with ITU-T Recommendations G. 652, and IEC 60793-1, IEC 60793-2 and IEC 60794-2, unless otherwise specified. The required number of loose-buffered single mode fibres to be incorporated in the cable will be specified in Part 3.1.6. Each fibre shall be uniquely identified in an approved manner.

The cladding of the fibres shall comply with ITU-T recommendations G. 652 as specified. The fibres shall be capable of operating in both the 1 310 nm and 1 550 nm wavelengths, depending on specific link requirements. The attenuation and both the chromatic dispersion coefficient and polarisation mode dispersion (PMD) characteristics of the fibres will be specified in Part 5.13.11.6

5.13.11.2 Fibre carrier

The fibre carrier shall house the optical fibres and protect them from damage caused by large temperature variations as a result of moisture ingress and mechanical forces such as crushing, bending, twisting, tensile stress and Aeolian vibration. The detail requirements will be specified in Part 5.13.11.6

The fibre carrier design shall be such that no moisture shall be able to penetrate and come in contact with the fibres.

The fibre carrier shall be designed to minimise hydrogen absorption by the fibres.

5.13.11.3 Environmental, electrical and mechanical

The environmental, electrical and mechanical characteristics shall be specified in Part 5.13.11.6

When a cable is installed, no fibre shall be under any strain when the cable is subjected to operating conditions.

There shall be no fibre splices in any individual drum length of cable.

Full details of the cable construction shall be provided, including the details of the measures taken to minimise hydrogen absorption and water ingress to the fibres.

If mechanical stripping is recommended, then a suitable stripping device shall be specified.

The tenderer shall complete schedule B in Part 5.13.11.6, providing all the relevant technical particulars of the cables being offered.

5.13.11.4 Type tests

The cables shall successfully pass the following type tests: (Type testing of optic fibre cable may be waived if type test results of cable of the same type and similar rating are available and not older than five years.)

Copies of these type test reports shall be provided as part of the tender document.

5.13.11.4.1 Optical Tests

During manufacture, each fibre shall be tested as per ITU-T Recommendation G 652 both 1 300 nm and 1 550 nm range for attenuation. Measurement of the refractive index and dispersion characteristics shall be performed on a sampling to be done to prove the suitability of the manufacturing process. The results shall be supplied to the Engineer on request. The PMD design value, PMDsubQ, shall be as specified in Part 3.1.6, Schedule A with the probability of 0.0001 that this

value be exceeded for a numerical concatenation of 20 cables. (See IEC 60794-2 Ed 3, Annex A, Method 1).

During manufacture, or subsequent works testing, the entire length of each fibre shall be subjected to a proof test of at least 1% elongation for 1 s.

Each fibre shall be measured for continuity and length, while the cable is on a drum, prior to delivery. CENTLEC representative may require an inspector to be present when these final measurements are performed. This inspection shall not relieve the supplier of his responsibility for the satisfactory performance of the cable during subsequent testing at and thereafter to the end of the warranty period.

The macro-bend resistance shall be tested by a method specified in the relevant specification. During testing, the attenuation increase shall be less than the value specified in Schedule A in Part 5.13.11.6. For the G 652 fibre, 100 turns shall be placed on a 60 mm diameter mandrel.

The Supplier is required to submit sample test results with the tender to prove compliance. The sample test results are to be on fibre that is of the same design as the fibre that is to be supplied.

5.13.11.4.2 Mechanical Tests

i. Stress-strain test

A stress-strain test shall be performed to prove the capability of the cable under load conditions. The test shall be performed in accordance with annex B of IEC 61089, and the measuring techniques shall be as specified in IEC 60794-1-E1. The test shall be performed on samples of at least 10 m in length, and the end fittings shall be the system fittings, unless otherwise specified by the Engineer.

After the test there shall be no visual change to the cable. (Fibre strain shall be stress less than 0.05 % at 50 % of the ultimate tensile stress (UTS) of the cable). There shall be no permanent change in the fibre attenuation at 1 550 nm after the test.

ii. Tensile performance test

This test shall be performed using load conditions in accordance with annex B of IEC 61089, and the measuring techniques as specified in IEC 60794-1-E1. This test is intended to determine the optical unit's performance under tensile load.

There shall be no permanent change in the fibre attenuation at 1 550 nm, between the pre-test and post-test measurements, while the change in attenuation during the test shall be less than 0.05 dB/km from no load to 50 % of the UTS of the cable.

iii. Impact test

This test shall be performed by placing the end of a 20 mm diameter steel mandrel on the cable and dropping a 4 kg weight from a height of 100 mm onto the mandrel, repeated 20 times. There shall be no measurable permanent changes in optical attenuation at 1 500 nm while any temporary change in attenuation shall be less than 0.1 dB.

iv. Aeolian vibration test

The objective of this test is to assess the fatigue resistance of the cable under characteristic wind induced vibration. The test length of the cable shall be at least 100 m. The teat sample shall be subjected to a minimum of 107 vibration cycles, at the nearest resonant frequency produced by a 4.5 m/s wind. The peak-to-peak amplitude of the antinodes shall be maintained at a level equal to one third of the conductor diameter. A final optical test shall be performed at least 2 hours after the completion of the vibration test. The optical attenuation increase shall be less than 0.25 dB/km at 1 550 nm. Any significant damage to the components of the cable will constitute failure of the test.

v. Conductor creep test

The manufacturer shall submit records of a long-term (>1 000 h) elongation test, with extrapolation to 30 years of a cable sample tensioned at 25 % UTS. The test shall be conducted as in IEC 61395.

vi. Temperature cycle test

The temperature cycle test shall be performed by measuring the changes in optical attenuation when 5 successive temperature cycles of between -20˚C and +70˚C in a 10 hour period, are imposed on the fibre carrier.

While a temporary increase of 0.1 dB/km at 1 550 nm in optical attenuation will be permitted, any permanent change in fibre attenuation at a nominal temperature of 25˚C shall constitute a failure of the test.

vii. Water ingress test

The fibre carrier shall be tested for water ingress resistance in accordance with IEC 60794-1-F5.

5.13.11.5 Packaging, labelling and documentation

5.13.11.5.1 Packaging and Labelling

The cable shall be supplied tightly and uniformly wound onto wooden cable reels. The reel shall be of such construction that no damage to the cable will occur during shipping and handling.

A water resistant wrapping over the exposed surface shall protect the outer layer of the cable on the reel, to prevent ingress of moisture and dirt during shipping and handling.

Each end of the cable shall be properly sealed to prevent the ingress of moisture into the optical fibre unit during shipment or storage.

Each reel shall be labelled with at least one water resistant tag, containing the following minimum information:

i. Manufacturer's name
ii. Place of manufacture
iii. Cable size and number of fibres
iv. Cable shipped length (standard or specified)
v. Gross tare and net weight
vi. Drum number
vii. Order/Contract number
viii. Type of cable
ix. Destination
x. Unless the manufacturer guarantees that the drum or reel may be laid flat without damage to the cable, the warning "Not to be laid flat".
xi. Unless the manufacturer guarantees that the drum or reel may be rolled in either direction without damage to the cable, an arrow with the words "Roll this way" (to indicate the direction in which the drum or reel is to be rolled in order to prevent the cable from unwinding)

The ends of the cable shall be accessible for testing purposes.

5.13.11.5.2 Documentation

All documentation called for shall be provided in hard-covered ring files that can open flat on any page and shall comply with the following requirements:

i. All documentation, including type test reports, is to be supplied in an electronic format in English, subject to approval. All documentation shall be in standard A4
ii. Any drawings and descriptions included shall conform to the standard A4 size (295 mm × 210 mm). Drawings that must be folded in two directions are not acceptable. Larger drawings shall be folded in a single panel along the 210 mm axis; and
iii. Different sections of the documentation shall be separated by means of thumb-tag file separators.

The documentation to be supplied shall also include the following:

i. Index
ii. Cable type test reports
iii. Routine test reports
iv. Detail of cable design
v. Details of fibre numbering and colour coding

5.3.11.6 ADSS schedule

Schedule A: Requirements
Schedule B: Particulars of equipment to be supplied

No.	Description	Schedule A	Schedule B
1	No. of Fibres	12	
2	Type of Fibres	Single mode	
3	Mode Field Diameter ▪ At 1 310 nm ▪ At 1 550 nm	 9.2 +/- 0.4 µm 10.50 +/- 1.0 µm	
4	Cladding Diameter	125 µm +/- 1.0 µm	
5	Mode Field Concentricity Error	≤ 0.5 µm	
6	Cladding Non-circularity	≤ 1.0 %	
7	Cladding Configuration		
8	Attenuation Coefficient ▪ At 1 290-1 340 nm ▪ At 1 550 nm	 ≤ 0.4 dB/km ≤ 0.5 dB/km	
9	Chromatic Dispersion Coefficient ▪ At 1 310 nm ▪ At 1 550 nm	 ≤ 3.5 ps/nm.km ≤ 20 ps/nm.km	
10	Proof Test (1 second)	≥ 1%	
11	Polarisation Mode Dispersion (PMD)	≤ 0.5 ps/km$^{1/2}$	
12	Fibre Curl (ROC)	≥ 4.0 m	
13	Macrobend test on fibre at 1 550 nm	≤ 0.05 dB	
14	OPERATION ENVIRONMENT		
14.1	Pollution Level		
14.2	Max. Temperature		
14.3	Min. Temperature		
14.4	Max Wind Speed		
14.5	Route Altitude		
15	GENERAL		
15.1	Name of Manufacturer		
15.2	Place of Manufacture		
15.3	Manufacturer's Reference Number		
15.4	Standard to which ADSS complies	IEC 60794-1	
15.5	Type of Fibre Carrier		
15.6	Fibre Carrier Gel	Yes	
16	MECHANICAL CHARACTERISTICS		
16.1	Nominal cross-section of ADSS		

16.2	Maximum overall diameter of ADSS		
16.3	Maximum mass of ADSS		
16.4	Ultimate tensile strength (UTS) of ADSS		
16.5	Initial modulus of elasticity of ADSS		
16.6	Final modulus of elasticity		
16.7	Maximum drum length		

Table 2 – ADSS schedule

5.14 Specification for medium voltage cable joints and terminations

All cable joints and terminations of the heat shrinkable type shall comply with **NRS 053: 2008.** IEC 55/1, IEC 55/2, VDE 0278 Part 1 - 6, ESI 09 - 13 will be applicable for items not covered in the NRS spec. The prescribed performance tests to evaluate these accessories should be based on SABS IEC 61442: 1997 - Electric cables, Test methods for accessories for power cables with rated voltages from 6 kV (Um = 7,2 kV) up to 30 kV (Um = 36 kV). Copies of which should accompany the bid offered.

Cable through-joint kits and cable terminations must be able to withstand the phase to phase voltage (E) and phase to earth voltages (Eo) as specified for the medium voltage cables in the schedules.

All cable joints must be suitable for **the cable screen to be bonded across the joint** so that the resistance of the bond shall be not less than that of an equivalent length of cable screen. **See NRS 053: 2008 item 4.1.3.3**

All cable through-joint kits and cable termination kits must include full jointing or terminating instructions with each kit. The kits shall be complete with all materials necessary for joining or terminating including tongue shear lugs and ferrules and bonding material.
The termination and through joint material must be suitable for use with torque shear ferrules and lugs.

Cable terminals shall be designed to preclude the ingress of moisture and to restrict the internal and external voltage gradients to a safe value under both normal and polluted conditions of the external surface. Facilities shall be provided to insulate the sheath of the cable to restrict the flow of earth fault current. All materials employed in the construction of offered equipment shall not suffer harmful effect under direct sunlight. Drawings and illustrations as well as type test certificates must be submitted with this bid.

All containers must be labelled with the following information:

1) Name of Manufacturer
2) Item code or Catalogue number
3) Cable size and number of cores
4) System voltage
5) For indoor or outdoor use

No kits will be accepted where all the individual components are not appropriately marked with the manufacturers name, batch code, part number and size where applicable.

Heat shrinkable type indoor terminations shall have a tail length of at least 650mm. **Outdoor terminations shall make provision for a tail length of at least 1200mm.**

Training facilities: The Bidder must submit a letter of commitment for training and ability to provide training and/or demonstrations to personnel of CENTLEC's personal if so required. This must be for the duration of the contract.

5.15 Lugs and ferrules for copper and aluminium conductors

5.15.1. Lugs and ferrules shall be in accordance with National Rationalized Specification NRS 028: 1993 with sizes, barrel lengths and palm hole diameter as specified in the schedules.

5.15.2. Torque-shear ferrules shall comply fully with the requirements of NRS 075.

5.15.3. The palm of a lug shall be permanently marked on the non-contacting side with the manufacturers name and the cable size.

5.15.4. The ferrules shall be similarly marked on the outside of the barrel.

5.15.5. The open end of the barrel shall be slightly flared or reamed to ensure easy insertion of the conductor.

5.15.6. The outside edges on the ends of the large aluminium ferrules shall be machined off to ensure no sharp edges would damage the insulation material.

MEDIUM VOLTAGE CABLES

	DESCRIPTION OF MEDIUM VOLTAGE CABLES:									MANUFACTURER	STANDARDS	DELIVERY
Item 1	Conductor Size in mm²	Conductor material Stranded (Cu) or stranded (Al)	No. of cores	XLPE or PILAC	TYPE	SCREENING	VOLTAGE in kV		COLOUR OF OUTER SHEATH	MANUFACTURER OR BRAND NAME	RELEVANT STANDARDS: SABS, NRS, ECT.	DELIVERY PERIOD IN WEEKS
							E	Eo				
a	16	Copper	3	PILAC		Individually	11	6,35	Black			
b	35	Copper	3	PILAC		Individually	11	6,35	Black			
c	35	Copper	3	XLPE	A	Individually	11	6,35	Black			
d	70	Copper	3	XLPE	A	Individually	11	6,35	Black			
e	70	Copper	3	PILAC		Individually	11	6,35	Black			
f	70	Copper	3	XLPE		Individually	15	8,7	Orange			
g	70	Copper	3	PILAC		Individually	22	11,2	Orange			
h	70	Copper	3	XLPE	A	Individually	15	8,7	Orange			
i	95	Copper	3	PILAC		Individually	11	6,35	Black			
j	120	Copper	3	PILAC		Individually	11	6,35	Black			
k	120	Aluminium	3	PILAC		Individually	11	6,35	Yellow			
l	150	Copper	3	XLPE	A	Individually Screened	11	6,35	Black			
m	185	Copper	3	PILAC		Individually Screened	11	6,35	Black			
n	185	Aluminium	3	PILAC		Individually Screened	11	6,35	Yellow			

MEDIUM VOLTAGE CABLES

	DESCRIPTION OF MEDIUM VOLTAGE CABLES:									MANUFACTURER	STANDARDS	DELIVERY
Item 1	**Conductor Size in mm²**	**Conductor material Stranded copper (Cu) or stranded Aluminium (Al)**	**No. of cores**	**XLPE or PILAC**	**TYPE**	**SCREENING**	**VOLTAGE in kV**		**COLOUR OF OUTER SHEATH**	**MANUFACTURER OR BRAND NAME**	**RELEVANT STANDARDS: SABS, NRS, ETC.**	**DELIVERY PERIOD IN WEEKS**
							E	**Eo**				
o	185	Aluminium	3	PILAC		Individually Screened	**15**	**8,7**	**Orange**			
p	185	Aluminium	3	PILAC		Individually Screened	**22**	**11,2**	**Orange**			
q	185	Aluminium	3	XLPE	A	Individually Screened	11	6,35	Yellow			
r	185	Copper	3	XLPE	A	Individually	11	6,35	Black			
s	240	Copper	3	PILAC		Individually	11	6,35	Black			
t	240	Aluminium	3	PILAC		Individually	11	6,35	Yellow			
u	240	Copper	3	XLPE	A	Individually	11	6,35	Black			
v	300	Copper	3	PILAC		Individually	11	6,35	Black			
w	300	Aluminium	3	PILAC		Individually	11	6,35	Yellow			
x	300	Aluminium	3	XLPE	A	Individually	11	6,35	Black			
y	800	Aluminium	1	PILAC		Screened - 0,2mm thick	11	6,35	Black & Graphite			
z	800	Aluminium	1	XLPE	A2	Screened - 0,2mm thick	11	6,35	Black & Graphite			

MEDIUM VOLTAGE CABLES

	DESCRIPTION OF MEDIUM VOLTAGE CABLES:									MANUFACTURER	STANDARDS	DELIVERY
Item 1	Conductor Size in mm²	Conductor material Stranded copper (Cu) or stranded Aluminium (Al)	No. of cores	XLPE or PILAC	TYPE	SCREENING	VOLTAGE in kV		COLOUR OF OUTER SHEATH	MANUFACTURER OR BRAND NAME	RELEVANT STANDARDS: SABS, NRS, ETC.	DELIVERY PERIOD IN WEEKS
							E	Eo				
aa	630	Copper	1	XLPE	A2	Screened - 0,2mm thick	11	6,35	Black & Graphite covered			
ab	120	Aluminium	1	PILAC		Screened - 0,2mm thick	11	6,35	Black & Graphite			
ac	300	Copper	1	PILAC		Individually	33	19	Black			
ad	300	Copper	1	XLPE	A	Individually	33	19	Black			
ae	400	Aluminium	1	XLPE	A	Individually	33	19	Black			
af	500	Aluminium	1	PILAC		Individually	33	19	Black			
ag	500	Aluminium	1	XLPE	A	Individually	33	19	Black			

Table 3 – MEDIUM VOLTAGE CABLES

LOW VOLTAGE DISTRIBUTION CABLES

	DESCRIPTION OF LOW VOLTAGE CABLES:						MANUFACTURER	STANDARDS	DELIVERY
Item 2	Conductor Size in mm²	No. of cores	Conductor material Stranded copper (Cu) or stranded Aluminium (Al)	INSULATION AND ARMOURING	VOLTAGE		MANUFACTURER OR BRAND NAME	RELEVANT STANDARDS: SABS, NRS, ETC.	DELIVERY PERIOD IN WEEKS
					E	E o			
a	10	2	Stranded Copper	PVC PVC SWA PVC	1 000	600			
b	10	3	Stranded Copper	PVC PVC SWA PVC	1 000	600			
c	10	4	Stranded Copper	PVC PVC SWA PVC	1 000	600			
d	16	2	Stranded Copper	PVC PVC SWA PVC	1 000	600			
e	16	4	Stranded Copper	PVC PVC SWA PVC	1 000	600			
f	25	4	Stranded Copper	PVC PVC SWA PVC	1 000	600			
g	35	4	Stranded Copper	PVC PVC SWA PVC	1 000	600			
h	70	4	Stranded Copper	PVC PVC SWA PVC	1 000	600			
i	95	4	Stranded Copper	PVC SWA PVC	1000	600			
j	120	4	Solid Aluminium	PVC PVC SWA PVC	1 000	600			
k	120	4	Stranded Copper	PVC PVC SWA PVC	1 000	600			
l	185	4	Solid Aluminium	PVC PVC SWA PVC	1 000	600			
m	185	4	Stranded Copper	PVC PVC SWA PVC	1 000	600			

LOW VOLTAGE DISTRIBUTION CABLES

	DESCRIPTION OF LOW VOLTAGE CABLES:						MANUFACTURER	STANDARDS	DELIVERY
Item 2	Conductor Size in mm²	No. of cores	Conductor material Stranded copper (Cu) or stranded Aluminium (Al)	INSULATION AND ARMOURING	VOLTAGE		MANUFACTURER OR BRAND NAME	RELEVANT STANDARDS: SABS, NRS, ETC.	DELIVERY PERIOD IN WEEKS
					E	E o			
n	300	4	Solid Aluminium	PVC PVC SWA PVC	1 000	600			
o	300	4	Stranded Aluminium	PVC PVC SWA PVC	1 000	600			
p	300	4	Stranded Copper	PVC PVC SWA PVC	1 000	600			
q	300	1	Stranded Copper	PVC	1 000	600			

Table 4 – LOW VOLTAGE DISTRIBUTION CABLES

LOW VOLTAGE CONTROL CABLES

	DESCRIPTION OF LOW VOLTAGE CABLES:						MANUFACTURER	STANDARDS	DELIVERY
Item 3A	Conductor Size in mm²	No. of cores	Conductor material Stranded copper (Cu) or stranded Aluminium (Al)	INSULATION AND ARMOURING	VOLTAGE		MANUFACTURER OR BRAND NAME	RELEVANT STANDARDS: SABS, NRS, ETC.	DELIVERY PERIOD IN WEEKS
					E	E o			
a	1,5	19	See detailed specification - item 5.13.1	PVC PVC Separately numbered 1-19	1 000	600			
b	1,5	19	See detail specification - item 5.13.4	PVC PVC SWA PVC Separately numbered 1-19	1 000	600			
c	1.5	27	See detail specification - item 5.13.5	PVC PVC SWA PVC Separately numbered 1-27	1 000	600			
d	1.5	19 pair	See detail specification - item 5.13.6	PVC PVC SWA PVC colour coded or numbered	1 000	600			
e	2,5	2	Stranded Copper	PVC PVC SWA PVC	1 000	600			
f	2,5	4	Stranded Copper	PVC PVC SWA PVC	1 000	600			
g	2,5	7	See detailed specification - item 5.13.2	PVC PVC SWA PVC differently coloured or numbered	1 000	600			
h	2,5	12	See detailed specification - item 5.13.3	PVC PVC SWA PVC Separately numbered 1–12	1 000	600			
i	4	2	Stranded Copper	PVC PVC SWA PVC colours (red and black)	1 000	600			
j	4	4	Stranded Copper	PVC PVC SWA PVC colours (red, yellow, blue and black)	1 000	600			
k	1,5	19	See detailed specification - item 5.13.1	PVC PVC Separately numbered 1-19	1 000	600			

Table 5 – LOW VOLTAGE CONTROL CABLES

DATA COMMUNICATION CABLES

	DESCRIPTION OF DATA COMMUNICATION CABLES:						MANUFACTURER	STANDARDS	DELIVERY
Item 3 B	Conductor Size in mm²	No. of cores	Conductor material Stranded copper (Cu) or stranded Aluminium (Al)	INSULATION AND ARMOURING	VOLTAGE		MANUFACTURER OR BRAND NAME	RELEVANT STANDARDS: SABS, NRS, ETC.	DELIVERY PERIOD IN WEEKS
					E	E o			
a	0.2	8 core	See detailed specification - item 5.13.7	Polyethylene	110V	63.5V			
b	0.5	80 cores (40 pair)	See detailed specification - item 5.13.8	Polyethylene	110V	63.5V			
c	2.29	1	See detailed specification - item 5.13.9	Polyethylene					
d		1	See detail specification - item 5.13.10	Polyethylene					
e		12	See detail specification - item 5.13.11 with table at 5.13.11.6						

Table 6 – DATA COMMUNICATION CABLES

MEDIUM VOLTAGE CABLE TERMINATIONS AND JOINTS

Item 4	DESCRIPTION OF ITEM	MANUFACTURER	ITEM CODE	STANDARDS	DELIVERY
		Name of Manufacturer or brand name	**Product number or code**	**Tested & comply to:**	**Delivery period in weeks**
a	**THROUGH JOINTS - XLPE -** Heat shrink type **16mm² - 35mm² Cu x 3, 11kV XLPE SWA PVC -** Through joint for 3 Core XLPE SWA PVC sheathed individually screened 11/6,35 kV cable with 16 - 35mm² stranded copper conductors with earthing sock and CFS clamps, complete with torque-shear ferrules.				
b	**70mm² Cu x 3, 15kV XLPE SWA PVC -**Through joint for 3 Core XLPE SWA PVC sheathed individually screened 15/8.7 kV cable with 70mm² stranded copper conductors with earthing sock and CFS clamps, complete with torque-shear ferrules.				
c	**150mm² Cu x 3, 11kV XLPE SWA PVC -**Through joint for 3 Core XLPE SWA PVC sheathed individually screened 11/6,35 kV cable with 150mm² stranded copper conductors with earthing sock and CFS clamps, complete with torque-shear ferrules.				
d	**240mm² Cu x 3, 11kV XLPE SWA PVC -**Through joint for 3 Core XLPE SWA PVC sheathed individually screened 11/6,35 kV cable with 240mm² stranded copper conductors with earthing sock and CFS clamps, complete with torque-shear ferrules.				
e	**630mm² Cu, 11kV XLPE SWA PVC -**Through joint for S/Core XLPE SWA PVC sheathed individually screened 11/6,35 kV cable with 630mm² stranded copper conductors with earthing sock and CFS clamps, complete with torque-shear ferrules.				

f	**70mm² Cu x 3, 11kV PILAC DSTA to XLPE SWA -** Transition joint for a screened 3 Core **70mm²** PILAC DSTA to a screened XLPE SWA cable with earthing sock and CFS clamps, complete with torque-shear ferrules.				
g	**150mm² Cu x 3, 11kV PILAC DSTA to XLPE SWA -** Transition joint for a screened 3 Core **150mm²** PILAC DSTA to a screened XLPE SWA cable with earthing sock and CFS clamps, complete with torque-shear ferrules.				
h	**185mm² Cu x 3, 11kV PILAC DSTA to XLPE SWA -** Transition joint for a screened 3 Core **185mm²** PILAC DSTA to a screened XLPE SWA cable with earthing sock and CFS clamps, complete with torque-shear ferrules.				
i	**240mm² Cu x 3, 11kV PILAC DSTA to XLPE SWA -** Transition joint for a screened 3 Core **240mm²** PILAC DSTA to a screened XLPE SWA cable with earthing sock and CFS clamps, complete with torque-shear ferrules.				
j	**300mm² Cu x 3, 11kV PILAC DSTA to XLPE SWA -** Transition joint for a screened 3 Core **300mm²** PILAC DSTA to a screened XLPE SWA cable with earthing sock and CFS clamps, complete with torque-shear ferrules.				

Table 7 – THROUGH JOINTS – XLPE - HEAT SHRINK TYPE

Item 5	DESCRIPTION OF ITEM	MANUFACTURER	ITEM CODE	STANDARDS	DELIVERY
		Name of Manufacturer or brand name	Product number or code	Tested & comply to:	Delivery period in weeks
a	**TERMINATIONS - INDOOR PILAC** **16mm² Cu x 3, 11kV PILAC PVC -** Indoor termination for terminating 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable with for **16mm²** stranded copper conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				
b	**35mm² Cu x 3, 11kV PILAC PVC -** Indoor termination for terminating 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable for **35mm²** stranded copper conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				
c	**70mm² Cu x 3, 11kV PILAC PVC -** Indoor termination for terminating 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable for **70mm²** stranded copper conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				
d	**185mm² AL x 3, 11kV PILAC PVC -** Indoor termination for terminating 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable for **185mm²** stranded aluminium conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				
e	**240mm² AL x 3, 11kV PILAC PVC - Indoor termination** for 3 Core **paper** insulated, lead covered, steel tape armour, PVC sheathed, individually screened, **11/6,35 kV cable with 240mm² stranded aluminium** conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				

f	**240mm² Cu x 3, 11kV PILAC PVC - Indoor termination** for 3 Core **paper** insulated, lead covered, steel tape armour, PVC sheathed, individually screened, **11/6,35 kV cable with 240mm² stranded copper** conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				
g	**300mm² AL x 3, 11kV PILAC PVC - Indoor termination** for 3 Core **paper** insulated, lead covered, steel tape armour, PVC sheathed, individually screened, **11/6,35 kV cable with 300mm² stranded aluminium** conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				
h	**300mm² Cu x 3, 11kV PILAC PVC - Indoor termination** for 3 Core **paper** insulated, lead covered, steel tape armour, PVC sheathed, individually screened, **11/6,35 kV cable with 300mm² stranded copper** conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				
i	**TERMINATIONS - INDOOR XLPE** **70mm² Cu x 3, 11kV XLPE PVC -** Indoor termination for terminating 3 Core **XLPE** Individually screened, single wire armour, 11/6,35 kV cable for **70mm²** stranded copper conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				
j	**185mm² Cu x 3, 11kV XLPE PVC -** Indoor termination for terminating 3 Core **XLPE** Individually screened, single wire armour, 11/6,35 kV cable for **185mm²** stranded copper conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				
k	**240mm² Cu x 3, 11kV XLPE PVC -** Indoor termination for terminating 3 Core **XLPE** Individually screened, single wire armour, 11/6,35 kV cable for **240mm²** stranded copper conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.				

l	**TERMINATIONS -OUTDOOR XLPE** **70mm² Cu x 3, 15kV XLPE PVC -** Outdoor termination for terminating 3 Core **XLPE** Individually screened, single wire armour, 15/8,7 kV cable for **70mm²** stranded copper with 1200mm tails, complete, including earthing kit and torque-shear lugs.				
m	**185mm² Cu x 3, 15kV XLPE PVC -** Outdoor termination for terminating 3 Core **XLPE** Individually screened, single wire armour, 15/8,7 kV cable for **150mm²** stranded copper with 1200mm tails, complete, including earthing kit and torque-shear lugs.				
n	**240mm² Cu x 3, 15kV XLPE PVC -** Outdoor termination for terminating 3 Core **XLPE** Individually screened, single wire armour, 15/8,7 kV cable for **240mm²** stranded copper with 1200mm tails, complete, including earthing kit and torque-shear lugs.				
o	**630mm² Cu, 11kV XLPE SWA PVC -** Outdoor termination for S/Core XLPE SWA PVC sheathed individually screened 11/6,35 kV cable with 630mm² stranded copper conductor complete with 70mm² braided earth strap, CFS clamps , complete with torque-shear lugs and instructions. **(Raychem type preferred)**				
p	**TERMINATIONS - OUTDOOR PILAC** **35mm² Cu x 3, 11kV PILAC PVC -** Outdoor termination for terminating 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable for **16 - 35mm²** stranded copper conductors with 1200mm tails, complete, including earthing kit and torque-shear lugs.				
q	**70mm² Cu x 3, 11kV PILAC PVC -** Outdoor termination for terminating 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6.35 kV cable for **70mm²- 95mm²** stranded copper conductors with 1200mm tails, complete, including earthing kit and torque-shear lugs.				

r	**70mm² Cu x 3, 15kV PILAC PVC -** Outdoor termination for terminating 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 15/8.7 kV cable for **70mm²** stranded copper conductors with 1200mm tails, complete, including earthing kit and torque-shear lugs.				
s	**185mm² AL x 3, 15kV PILAC PVC -** Outdoor termination for terminating 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 15/8.7 kV cable for **185mm²** stranded aluminium conductors with 1200mm tails, complete, including earthing kit and torque-shear lugs.				
t	**240mm² AL x 3, 11kV PILAC PVC -** Outdoor termination for 3 Core **paper** insulated, lead covered, steel tape armour, PVC sheathed, individually screened, 11/6,35 kV cable with **240mm²** stranded aluminium conductors with 1200mm tails, complete, including earthing kit and torque-shear lugs.				
u	**240mm² Cu x 3, 11kV PILAC PVC -** Outdoor termination for 3 Core **paper** insulated, lead covered, steel tape armour, PVC sheathed, individually screened, **11/6,35 kV cable with 240mm² stranded copper** conductors with 1200mm tails, complete, including earthing kit and torque-shear lugs.				
v	**300mm² Cu x 3, 11kV PILAC PVC –** Outdoor termination for 3 Core **paper** insulated, lead covered, steel tape armour, PVC sheathed, individually screened, **11/6,35 kV cable with 300mm² stranded copper** conductors with 1200mm tails, complete, including earthing kit and torque-shear lugs.				

Table 8 – TERMINATIONS – INDOOR & OUTDOOR FOR PILAC & XLPE

Item 6	DESCRIPTION OF ITEM	MANUFACTURER	ITEM CODE	STANDARDS	DELIVERY
		Name of Manufacturer or brand name	Product number or code	Tested & comply to:	Delivery period in weeks
a	**THROUGH JOINTS - PILC -** Heat shrink type **16mm² Cu x 3, 11kV PILAC PVC -** Through joint for 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable with for **16mm²** stranded copper conductors with earthing sock and CFS clamps, complete with torque-shear ferrules				
b	**35mm² Cu x 3, 11kV PILAC PVC -** Through joint for 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable with for **35mm²** stranded copper conductors with earthing sock and CFS clamps, complete with torque-shear ferrules.				
c	**70mm² Cu x 3, 11kV PILAC PVC -** Through joint for 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable with for **70mm²** stranded copper conductors with earthing sock and CFS clamps, complete with torque-shear ferrules .				
d	**185mm² Al x 3, 11kV PILAC PVC -** Through joint for 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable with for **185mm²** stranded aluminium conductors with earthing sock and CFS clamps, complete with torque-shear ferrules.				
e	**240mm² Cu x 3, 11kV PILAC PVC -** Through joint for 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable with for **240mm²** stranded copper conductors with earthing sock and CFS clamps, complete with torque-shear ferrules				
f	**300mm² Al x 3, 11kV PILAC PVC -** Through joint for 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable with for **300mm²** stranded aluminium conductors with earthing sock and CFS clamps, complete with torque-shear ferrules.				

Table 9 – THROUGH JOINTS – PILC - HEAT SHRINK TYPE

Item 7	DESCRIPTION OF ITEM	MANUFACTURER	ITEM CODE	STANDARDS	DELIVERY
		Name of Manufacturer or brand name	Product number or code	Tested & comply to:	Delivery period in weeks
a	**JOINTS - SINGLE CORE** **Joint 800mm², 11kV, PILAC S/Core Unarmoured -** Underground through joint kit for a 11/6.35kV, 800mm² Aluminium, single core, screened **paper** insulated, lead alloy covered, unarmoured, graphite covered PE sheathed cable (SANS 97 - Tbl) Complete with 70mm² braided earth sock, CFS clamps, complete with torque-shear ferrules and instructions. **(Raychem type preferred)**				
b	**630mm² Cu, 11kV XLPE SWA PVC -** Underground through joint kit for S/Core XLPE SWA PVC sheathed individually screened 11/6,35 kV cable with 630mm² stranded copper conductor complete with 70mm² braided earth strap, CFS clamps , complete with torque-shear lugs and instructions. **(Raychem type preferred)**				
c	**Joint 500mm², 33kV, PILAC S/Core Unarmoured -** Underground through joint kit for a 33/19kV, 500mm² Aluminium, single core, screened **paper** insulated, lead alloy covered, unarmoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS, complete with torque-shear ferrules and instructions. **(Raychem type preferred)**				
d	**Joint 500mm², 33kV, XLPE S/Core Armoured -** Underground through joint kit for a 33/19kV, 500mm² Aluminium, single core, screened XLPE insulated, Armoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS clamps, complete with torque-shear ferrules and instructions. **(Raychem type preferred)**				

e	**Joint 400mm², 33kV, XLPE S/Core Armoured -** Underground through joint kit for a 33/19kV, 400mm² Aluminium, single core, screened XLPE insulated, Armoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS clamps, complete with torque-shear ferrules and instructions. **(Raychem type preferred)**				
f	**Joint 300mm², 33kV, XLPE S/Core Armoured -** Underground through joint kit for a 33/19kV, 300mm² Copper, single core, screened XLPE insulated, Armoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS clamps, complete with torque-shear ferrules and instructions. **(Raychem type preferred)**				
g	**Joint 300mm², 33kV, PILAC S/Core Unarmoured -** Underground through joint kit for a 33/19kV, 300mm² Copper, single core, screened **paper** insulated, lead alloy covered, unarmoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS clamps, complete with torque-shear ferrules and instructions. **(Raychem type preferred)**				
h	**Joint 240mm², 33kV, XLPE S/Core Armoured -** Underground through joint kit for a 33/19kV, 240mm² Aluminium, single core, screened XLPE insulated, Armoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS clamps, complete with torque-shear ferrules and instructions. (Raychem type preferred)				
i	**Joint 240mm², 33kV, PILAC S/Core Unarmoured -** Underground through joint kit for a 33/19kV, 240mm² Copper, single core, screened **paper** insulated, lead alloy covered, unarmoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS clamps, complete with torque-shear ferrules and instructions. **(Raychem type preferred)**				

j	**TERMINATION KITS - SINGLE CORE** **Termination 800mm², 11kV, PILAC S/Core Unarmoured** - Outdoor termination kit for a 11/6.35kV, 800mm² aluminium, single core screened paper insulated, lead alloy covered, un-armoured, graphite covered Poly Ethylene sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth strap, CFS clamps , complete with torque-shear ferrules and instructions. **(Raychem type preferred)**				
k	**Termination 630mm², 11kV, PILAC S/Core Unarmoured** - Outdoor termination kit for a 11/6.35kV, 630mm² copper, single core screened paper insulated, lead alloy covered, un-armoured, graphite covered Poly Ethylene sheathed cable (SANS 97 - Tbl) Complete with 95mm² braided earth strap, CFS clamps, complete with torque-shear lugs and instructions. **(Raychem type preferred)**				
l	**Termination 500mm², 33kV PILAC S/Core Unarmoured** - Outdoor termination kit for a 33/19kV, 500mm² aluminium, single core screened paper insulated, lead alloy covered, un-armoured, graphite covered Poly Ethylene sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth strap, CFS clamps, complete with torque-shear lugs and instructions. **(Raychem type preferred)**				
m	**Termination 500mm², 33kV, XLPE S/Core Armoured -** Outdoor kit for a 33/19kV, 500mm² Aluminium, single core, screened XLPE insulated, Armoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS , complete with torque-shear lugs and instructions. **(Raychem type preferred)**				
n	**Termination 400mm², 33kV, XLPE S/Core Armoured -** Outdoor kit for a 33/19kV, 400mm² Aluminium, single core, screened XLPE insulated, Armoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS , complete with torque-shear lugs and instructions. **(Raychem type preferred)**				

o	**Termination 300mm², 33kV, XLPE S/Core Armoured -** Outdoor kit for a 33/19kV, 300mm² Aluminium, single core, screened XLPE insulated, Armoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS , complete with torque-shear lugs and instructions. **(Raychem type preferred)**				
p	**Termination 300mm², 11kV, PILAC S/Core Unarmoured** - Outdoor termination kit for a 11/6.35kV, 300mm² copper, single core screened paper insulated, lead alloy covered, un-armoured, graphite covered Poly Ethylene sheathed cable (SANS 97 - Tbl) Complete with 70mm² braided earth strap, CFS clamps, complete with torque-shear lugs and instructions. **(Raychem type preferred)**				
q	**Termination 240mm², 33kV, XLPE S/Core Armoured -** Outdoor kit for a 33/19kV, 240mm² Aluminium, single core, screened XLPE insulated, Armoured, graphite covered PE sheathed cable (SANS 97 - Tbl 12) Complete with 70mm² braided earth sock, CFS , complete with torque-shear lugs and instructions. **(Raychem type preferred)**				
r	**Termination 240mm², 11kV, PILAC S/Core Unarmoured** - Outdoor termination kit for a 11/6.35kV, 240mm² copper, single core screened paper insulated, lead alloy covered, un-armoured, graphite covered Poly Ethylene sheathed cable (SANS 97 - Tbl) Complete with 70mm² braided earth strap, CFS clamps, complete with torque-shear lugs and instructions. **(Raychem type preferred)**				

Table 10 – THROUGH JOINTS & TERMINATIONS - SINGLE CORE CABLES - HEAT SHRINK TYPE

ITEM	DESCRIPTION OF LV CABLE ACCESSORIES			MANUFACTURER	ITEM CODE	STANDARDS	DELIVERY
	Conductor size in mm²	No. of cores	Conductor material	Name of Manufacturer or brand name	Series number or type	Tested & comply to:	Delivery period in weeks
8	**SPLICING KITS / JOINTS FOR ARMOURED LV CABLES - For the following 1000/600V PVC SWA PVC cables (heat shrink or resin types)**						
a	**10**	**4**	Stranded copper				
b	**16**	**4**	Stranded copper				
c	**35**	**4**	Stranded copper				
d	**70**	**4**	Stranded copper				
e	**120**	**4**	Solid aluminium				
f	**185**	**4**	Solid aluminium				
g	**300**	**4**	Stranded or solid aluminium				
h	**6**	**2**	Stranded copper				

Table 11 – SPLICING KITS / JOINTS FOR ARMOURED LV CABLES

ITEM	DESCRIPTION OF LV CABLE ACCESSORIES			MANUFACTURER	ITEM CODE	STANDARDS	DELIVERY
	Conductor size in mm²	No. of cores	Conductor material	Name of Manufacturer or brand name	Series number or type	Tested & comply to:	Delivery period in weeks
9	**TERMINATION BOOTS (heat shrink type) for the following 1 000 V/600 V PVC PVC SWA PVC cables**						
a	**16**	**4**	Stranded copper				
b	**35**	**4**	Stranded copper				
c	**70**	**4**	Stranded copper				
d	**95**	**4**	Stranded copper				
e	**120**	**4**	Solid aluminium				
f	**185**	**4**	Solid aluminium				
g	**240**	**4**	Stranded Copper				
h	**300**	**4**	Stranded aluminium				
i	**300**	**4**	Stranded copper				

Table 12 – TERMINATION BOOTS

Item	**CABLE END CAPS (heat shrink type adhesive lined), for the following cable sizes:**						
10	**Supplied Inside Diameter**	**Fully Shrunk Inside Diameter**	**Size Offer**	**Name of Manufacturer Or Brand name**	**Product or Item Code**	**STANDARDS - Tested & comply to:**	**Delivery Time**
a	35mm	15mm					
b	55mm	25mm					
c	75mm	30mm					
d	100mm	45mm					
e	120mm	70mm					

Table 13– CABLE END CAPS

ITEM	**CABLE OUTDOOR PVC END BOXES - type lxac or similar cold shrink end caps for:**					
11	**TO FIT CABLES:**	**NAME OF MANUFACTURER**	**MANUFACTURER ITEM CODE**	**SABS YES/NO**	**DELIVERY IN WEEKS**	**BROCHURES INCLUDED YES/NO**
a	10mm² - 16mm² x 4 core cables					
b	35mm² - 70mm² x 4 core cables					

Table 14 – CABLE OUTDOOR PVC END BOXES

ITEM	**HEAT SHRINK TUBES WITHOUT ADHESIVE** (thick wall type) state tube length						
12	**SHRINK SIZE**	**TUBE LENGTH**	**NAME OF MANUFACTURER**	**MANUFACTURER ITEM CODE**	**SABS YES/NO**	**DELIVERY IN WEEKS**	**BROCHURES INCLUDED YES/NO**
a	10mm to 3,8mm						
b	19mm to 5,6mm						

c	28mm to 9,5mm						
d	38mm to 12,7mm						
e	51mm to 19mm						
f	76mm to 32mm						
g	90mm to 36mm						

Table 15 – HEAT SHRINK TUBES WITHOUT ADHESIVE

13	**HEAT SHRINK TUBES ADHESIVE LINED** (Thick wall type state tube length)						
a	10mm to 3.8mm						
b	13mm to 5.8mm						
c	28mm to 9.5mm						
d	38mm to 12.7mm						
e	51mm to 19mm						
f	76mm to 32mm						
g	90mm to 36mm						
HEAT SHRINK WRAP AROUND TUBES ADHESIVE LINED (THICK WALL TYPE STATE TUBE LENGTH) - RAP-A-ROUND EQUIVALENT TO RAYTECH CODE CRSM							
h	84mm / 20mm (1500 x 232)						
i	143mm / 36mm (1500 x 232)						

Table 16 – HEAT SHRINK TUBES ADHESIVE LINED

Item	HEAT SHRINK TUBES - MEDIUM VOLTAGE, NON-TRACKING FOR BUSBARS (state tube length)						
14	**SHRINK SIZE**	**TUBE LENGTH**	**NAME OF MANUFACTURER**	**MANUFACTURER ITEM CODE**	**SABS YES/NO**	**DELIVERY IN WEEKS**	**BROCHURES INCLUDED YES/NO**
a	30mm to 12mm						
b	48mm to 18mm						
c	80mm to 31mm						
d	100mm to 40mm						
e	120mm to 50mm						

Table 17 – HEAT SHRINK TUBES - MEDIUM VOLTAGE, NON-TRACKING FOR BUSBARS

ITEM	GLANDS & SHROUDS for PVC. PVC. SWA. PVC cables (shroud must be included)								
15	**STANDARD GLAND SIZE NR:**	**NAME OF MANUFACTURER**	**MANUFACTURER ITEM CODE**	**SABS YES/NO**	**LOCAL CONTENT %**	**DELIVERY IN WEEKS**	**BROCHURES INCLUDED YES/NO**	**FIRM PRICE YES/NO**	**PRICE PER EACH**
a	No. 0								
b	No. 1								
c	No. 2								
d	No. 3								
e	No. 4								
f	No. 5								
g	No. 6								

Table 18 – GLANDS & SHROUDS for PVC. PVC. SWA. PVC cables

ITEM	NAME OF MANUFACTURER	MANUFACTURER ITEM CODE	COMPLY TO NRS YES/NO	DELIVERY IN WEEKS	BROCHURES INCLUDED YES/NO
16	**ALUMINIUM CRIMPING FERRULES for 4 core solid sectoral core aluminium cables (600/1 000 V) Samples must be submitted.**				
a	120mm²				
b	185mm²				
c	300mm²				
	ALUMINIUM CRIMPING FERRULES for **4** core **stranded** aluminium cable (600/1 000 V) Samples must be submitted.				
d	120mm²				
e	185mm²				
f	300mm²				
	ALUMINIUM CRIMPING FERRULES for **3 core stranded** aluminium cable (11/6.35kV) Samples must be submitted.				
g	185mm² (MV cable)				

Table 19 – ALUMINIUM CRIMPING FERRULES

ITEM	**TERMINAL CRIMPING LUGS** for 4 core solid **sectoral** core cable (600/1 000 V) Samples must be submitted.					
17	**To fit core size & Palm hole DIA**		**NAME OF MANUFACTURER**	**MANUFACTURER ITEM CODE**	**BROCHURES INCLUDED YES/NO**	**DELIVERY IN WEEKS**
a	120mm²	12mm				
b	185mm²	12mm				
c	300mm²	16mm				

Table 20 – TERMINAL CRIMPING LUGS for solid **sectoral** core cables

ITEM	**To fit core size & Palm hole DIA**		**NAME OF MANUFACTURER**	**MANUFACTURER ITEM CODE**	**BROCHURES INCLUDED YES/NO**	**DELIVERY IN WEEKS**
18	**LUGS ALUMINIUM - TERMINAL CRIMPING LUGS** for **stranded** aluminium cables. Samples must be submitted.					
a	120mm² - 3 core 11 kV PILAC	12mm				
b	185mm² - 3 core 11 kV PILAC	12mm				
c	240mm² - 3 core 11 kV PILAC	16mm				
d	300mm² - 4 core PVC PVC SWA PVC 600/1 000 V	16mm				
e	500mm² - Single core 33 kV with **straight palm**	No hole				
f	800mm² - Single core 11 kV with **straight palm**	No hole				

Table 21 – TERMINAL CRIMPING LUGS for solid **stranded** core cables

ITEM	**TINNED COPPER CRIMPING FERRULES** for the following stranded copper conductor sizes: Samples must be submitted.					
19	**TO FIT CORE SIZE AND MINIMUM BARREL LENGTH**	**NAME OF MANUFACTURER**	**MANUFACTURER ITEM CODE**	**COMPLY TO NRS YES/NO**	**DELIVERY IN WEEKS**	**BROCHURES INCLUDED YES/NO**
a	1,5mm² Length not less than 12mm					
b	2,5mm² Length not less than 15mm					
c	4,0mm² Length not less than 15mm					
d	6,0mm² Length not less than 15mm					
e	10mm² Length not less than 25mm					
f	16mm² Length not less than 30mm					
g	35mm² Length not less than 40mm					
h	70mm² Length not less than 45mm					
i	95mm² Length not less than 60mm					
j	120mm² Length not less than 60mm					
k	150mm² Length not less than 60mm					
l	185mm² Length not less than 60mm					
m	240mm² length not less than 75mm					
n	300mm² Length not less than 80mm					

Table 22 – TINNED COPPER CRIMPING FERRULES

ITEM	**Tinned PRE-INSULATED COPPER CRIMPING FERRULES for the following stranded copper conductor sizes: Samples must be submitted.**							
20	**DESCRIPTION: SIZE WIRE TO FIT & COLOUR OF INSULATION**		**NAME OF MANUFACTURER**	**MANU-FACTURER ITEM CODE**	**COMPLY TO NRS YES/NO**	**LOCAL CONTENT %**	**DELIVERY IN WEEKS**	**BROCHURES INCLUDED YES/NO**
a	1,5mm²	Red						
b	2,5mm²	Blue						
c	4mm²	Yellow						
d	6mm²	As per standard						

Table 23 – Tinned PRE-INSULATED COPPER CRIMPING FERRULES

ITEM	**Tinned SOLID CENTRE COPPER CRIMPING FERRULES and solid end lugs for 70mm² copper conductors. Samples must be submitted.**						
21	**DESCRIPTION**	**NAME OF MANUFACTURER**	**MANUFACTURER ITEM CODE**	**COMPLY TO NRS YES/NO**	**LOCAL CONTENT %**	**DELIVERY IN WEEKS**	**BROCHURES INCLUDED YES/NO**
a	Lug S/E - 70mm² X 12mm hole						
b	Ferrule S/C - 70mm²						

Table 24 – Tinned SOLID CENTRE COPPER CRIMPING FERRULES and solid end lugs for 70mm² copper conductors

ITEM	LUGS COPPER - Tinned copper crimping lugs for the sizes specified. Samples must be submitted.								
22	**Conductor size**	**Barrel length not less than**	**Palm hole dia**	**NAME OF MANUFAC-TURER**	**BARREL LENGTH**	**COMPLY TO NRS YES/NO**	**LOCAL CONTENT %**	**DELIVERY IN WEEKS**	**BROCHURES INCLUDED YES/NO**
a	1,5mm²	7mm	6mm						
b	2,5mm²	7mm	6mm						
c	4,0mm²	7mm	6mm						
d	6,0mm²	10mm	6mm						
e	10mm²	15mm	6mm						
f	10mm²	15mm	10mm						
g	10mm²	15mm	12mm						
h	16mm²	15mm	6mm						
i	16mm²	15mm	10mm						
j	16mm²	15mm	12mm						
k	35mm²	20mm	12mm						
l	35mm²	20mm	16mm						
m	70mm²	25mm	12mm						
n	70mm²	25mm	16mm						
o	70mm²	25mm	20mm						
p	95mm²	30mm	12mm						
q	95mm²	30mm	16mm						

Table 25 – LUGS COPPER - Tinned copper crimping lugs for the sizes specified

ITEM	Tinned COPPER CRIMPING LUGS for the sizes specified. Samples must be submitted.								
23	**Conductor size**	**Barrel length not less than**	**Palm hole dia**	**NAME OF MANUFAC-TURER**	**BARREL LENGTH**	**COMPLY TO NRS YES/NO**	**LOCAL CONTENT %**	**DELIVERY IN WEEKS**	**BROCHURES INCLUDED YES/NO**
a	120mm²	35mm	12mm						
b	120mm²	35mm	16mm						
c	150mm²	35mm	12mm						
d	150mm²	35mm	16mm						
e	185mm²	40mm	16mm						
f	300mm²	50mm	18mm						
g	500mm²	60mm²	18mm						
h	630mm²	70mm	18mm						

Table 26 – Tinned COPPER CRIMPING LUGS for the sizes specified

General material and equipment.

Item	Description	NAME OF MANUFACTURER	Standards	Delivery time
1.	Black Cable Ties R30 150 mm x 3,5 mm,100 in a pack			
2.	Black Cable Ties LK 5 540 mm x 13,0 mm, 50 in a pack			
3.	Compound Plastic This compound shall be suitable for moulding around terminals for insulating purpose and shall be sufficiently firm for moulding, but non-hardening. Bidders must state dielectric strength per mil.			
4.	Resin Oil 11kV This oil is for insulation of through joints and end boxes on 11 kV paper insulated cables, and shall be supplied in tins or drums sealed off from the atmosphere. A full specification of electrical properties, viscosity at operating temperature ranges and boiling point must be stated. Price per 20Liter Drum.			
5.	Resin Oil 33kV This oil is for insulation of through joints and end boxes on 11 kV and 33 kV paper insulated cables, and shall be supplied in tins or drums sealed off from the atmosphere. A full specification of electrical properties, viscosity at operating temperature ranges and boiling point must be stated. Price per 20Liter Drum.			
6.	Insulating Tape PVC adhesive tape 19mm (Black) 1000Volts **P S - CENTLEC would prefer 3M type 1710 or equivalent.**			
7.	Insulating Tape PVC adhesive tape 19mm (Red) 1000Volts **P S - CENTLEC would prefer 3M type 1710 or equivalent.**			
8.	Insulating Tape PVC adhesive tape 19mm (Blue) 1000Volts **P S - CENTLEC would prefer 3M type 1710 or equivalent.**			
9.	Insulating Tape PVC adhesive tape 19mm (Yellow) 1000Volts **P S - CENTLEC would prefer 3M type 1710 or equivalent.**			

10.	Insulating Tape PVC adhesive tape 19mm (Green) 1000Volts **P S - CENTLEC would prefer 3M type 1710 or equivalent.**			
11.	Terylene Tape - 19mm wide for 11 kV paper cable Work: 19 mm x 10m (Specify the thickness)			
12.	CREPE PAPER TAPE IN OIL 25mmx 10m (Specify the thickness)			
13.	SELF FUSING BLACK RUBBER TAPE, Corona resistant, ozone resistant, 0,75mm thick, 18mm wide and with a dielectric strength of at least 30 kV/mm.			
14.	INSULATION FILLING TAPE –(Scots fill or equivalent) Must be black elastic type putty in tape form, non-corrosive 3,0 mm thick, 38 mm wide and with a dielectric strength of at least 20 kV/mm.			
15.	BLACK CORROSION RESISTANCE TAPE Min 50mm wide, 0.19mm thickness & for use at not more than 600V or 80°C.			
16.	HEAVY DUTY VINYL ELECTRICAL TAPE - 38mm wide x 0.25mm thick x 13 m long roll - 600V/105°C			
17.	DENZO TAPE - Wax impregnated cotton gauze tape, 40mm wide x 10m rolls, individually wrapped or plastic bagged			
18.	BUCKLES This equipment is required for strapping cables to poles. Buckles and strap shall be of stainless steel metal with a minimum thickness of 0.7mm. BUCKLES – 19mm to take 2 x 0.7mm strapping			
19.	BUCKLES This equipment is required for strapping cables to poles. Buckles and strap shall be of stainless steel metal with a minimum thickness of 1mm BUCKLES - 19mm to take 2 x 1.0mm strapping			

20.	STRAPPING This equipment is required for strapping cables to poles. Buckles and strap shall be of stainless steel metal with a minimum thickness of 0.7mm. Strapping material shall be 19mm and 12mm wide and buckles shall be suitable for use with this strapping. Roll of 20 meters.			
21.	PVC PIPES FOR CABLE PROTECTION Pipes offered must be rigid or ribbed black PVC type for underground use and must be supplied in lengths of not less than 3 meter. Jointing must be by means of yellow slip-on collars. (Specify the thickness.) 75 mm Inside Diameter			
22.	PVC PIPES FOR CABLE PROTECTION Pipes offered must be rigid or ribbed black PVC type for underground use and must be supplied in lengths of not less than 6 meter. Jointing must be by means of yellow slip-on collars. (Specify the thickness.) 100mm Inside Diameter			
23.	PVC PIPES FOR CABLE PROTECTION Pipes offered must be rigid or ribbed black PVC type for underground use and must be supplied in lengths of not less than 6 meter. Jointing must be by means of yellow slip-on collars. (Specify the thickness.) 150mm Inside Diameter			
24.	COMPOUND FOR CABLE BOXES HT This compound shall be suitable for filling cable joint and end boxes and shall comply with the following specifications: Pouring temperature : 159ºC Softening temperature : 64 - 70ºC General purpose for cast boxes up to : 33 kV			

Table 27 – General material and equipment.

6. EVALUATION CRITERIA

All proposals submitted will be evaluated in accordance with the criteria set out in the policy of Supply Chain Management of the Entity.
The most suitable candidate will then be selected. Please take note that CENTLEC (SOC) Ltd is not bound to select any of the bidders submitting proposals.
Furthermore, technical competence is the principal selection criteria, CENTLEC (SOC) Ltd will evaluate the technical criteria first, and will only look at the price and BBBEE level of contribution if it is satisfied with the technical evaluation. As a result of this, CENTLEC (SOC) Ltd does not bind itself in any way to select the bidder offering the lowest price.

The relative specific goal criteria are as follows

No.	Criteria	Description	Points
1.	Track record and experience	Submit reference letter(s), signed off by an authorised official to confirm the successful delivery and supply for similar materials to local authorities. Three (3) letters = **20 points** Four (4) or more letters = **35 points**	35
2.	Delivery Period	Delivery period to be stated next to each item. Within one (1) – two (2) weeks = **25 points** Three (3) – four (4) weeks = **20 points** Five (5) weeks or more = **10 points**	25
3.	Quality and compliance to SANS requirements as specified in the technical specifications	Submit standards certificates for all items that needs to comply with such standards. Certificates submitted for at least: ISO 9001 certificate as obtained from the manufacturer = **20 points** Relevant SANS Certificates as per technical specification as obtained from manufacturers = **20 points**	40
	TOTAL		**100**

Table 28 – Evaluation criteria

A bidder who gets a minimum of 70 points and above on will qualify to the next stage. Individual tenders would have to be evaluated according to the preferential point system.

The bidder must score minimum points as follows:

- Item 1 – 20 points
- Item 2 – 10 points
- Item 3 – 40 points; in the Evaluation Criteria

The point system applicable to this project will be: 80/20

- points for Price
- 20 points for BBEEE certificate from accredited verification agencies.

Price and referential points scoring – (Stage 2)

A Maximum of 70 Points is allocated for price on the following basis:

$$Ps = 80\left(1 - \frac{Pt - Pmin}{Pmin}\right)$$

Where:

Ps = Points Scored for comparative price of bid under consideration

Pt = Comparative Price of bid under consideration

Pmin = Comparative Price of lowest acceptable bid

In terms of Regulation 5(2) and 6(2) of the Preferential Procurement Regulations, Preference points must be awarded to a bidder for attaining the B-BBEE status level of contribution in accordance with the table below

B-BBEE Status Level of Contributor	Number of Points (80/20 System)
1	20
2	18
3	14
4	12
5	8
6	6
7	4
8	2
Non-Compliant Contributor	0

Table 29 – BBBEE level status

8 PRICING SCHEDULES

PRICING SCHEDULE 3A: LOW VOLTAGE CONTROL CABLES

	DESCRIPTION OF LOW VOLTAGE CABLES:						UNIT OF MEASUREMENT	PRICE PER ITEM	DELIVERY
Item 3A	Conductor Size in mm²	No. of cores	Conductor material Stranded copper (Cu) or stranded Aluminium (Al)	INSULATION AND ARMOURING	VOLTAGE		SPECIFIC UNIT OF MEASUREMENT		DELIVERY PERIOD IN WEEKS
					E	E o			
d	1.5	19 pair	See detail specification - item 5.13.6	PVC PVC SWA PVC colour coded or numbered	1 000	600	per meter		

Table 36 – PRICING SCHEDULE 3A: LOW VOLTAGE CONTROL CABLES

PRICING SCHEDULE 3B: DATA COMMUNICATION CABLES

	DESCRIPTION OF DATA COMMUNICATION CABLES:						SPECIFIC UNIT OF MEASUREMENT		DELIVERY PERIOD IN WEEKS
Item 3 B	Conductor Size in mm²	No. of cores	Conductor material Stranded copper (Cu) or stranded Aluminium (Al)	INSULATION AND ARMOURING	VOLTAGE		SPECIFIC UNIT OF MEASUREMENT		DELIVERY PERIOD IN WEEKS
					E	E o			
A	0.2	8 core	See detailed specification - item 5.13.7	Polyethylene	110V	63.5V	per meter		
B	0.5	80 cores (40 pair)	See detailed specification - item 5.13.8	Polyethylene	110V	63.5V	per meter		
C	2.29	1	See detailed specification - item 5.13.9	Polyethylene			per meter		

D		1	See detail specification - item 5.13.10	Polyethylene			per meter		
E		12	See detail specification - item 5.13.11 with table at 5.13.11.6				per meter		

Table 37 – PRICING SCHEDULE 3B: DATA COMMUNICATION CABLES

Item **5**	**DESCRIPTION OF ITEM**	**UNIT OF MEASUREMENT**	**PRICE PER ITEM**	**DELIVERY**
		SPECIFIC UNIT OF MEASUREMENT		**DELIVERY PERIOD IN WEEKS**
a	**TERMINATIONS - INDOOR PILAC** **16mm² Cu x 3, 11kV PILAC PVC -** Indoor termination for terminating 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable with for **16mm²** stranded copper conductors with 650mm tails, complete, including earthing kit and torque-shear lugs.	Each		

Table 39 – PRICING SCHEDULE 6: TERMINATIONS – INDOOR & OUTDOOR FOR PILAC & XLPE

Item **6**	**DESCRIPTION OF ITEM**	**UNIT OF MEASUREMENT**	**PRICE PER ITEM**	**DELIVERY**
		SPECIFIC UNIT OF MEASUREMENT		**DELIVERY PERIOD IN WEEKS**

a	**THROUGH JOINTS - PILC -** Heat shrink type **16mm² Cu x 3, 11kV PILAC PVC -** Through joint for 3 Core **paper** insulated, lead covered steel tape armour, PVC sheathed individually screened 11/6,35 kV cable with for **16mm²** stranded copper conductors with earthing sock and CFS clamps, complete with torque-shear ferrules	Each		

Table 40 – PRICING SCHEDULE 7: THROUGH JOINTS – PILC - HEAT SHRINK TYPE

Item	DESCRIPTION OF LV CABLE ACCESSORIES			UNIT OF MEASUREMENT	PRICE PER ITEM	DELIVERY
	Conductor size in mm²	No. of cores	Conductor material	SPECIFIC UNIT OF MEASUREMENT		DELIVERY PERIOD IN WEEKS
9	**TERMINATION BOOTS (heat shrink type) for the following 1 000 V/600 V PVC PVC SWA PVC cables**					
a	**16**	**4**	Stranded copper	each		
b	**35**	**4**	Stranded copper	each		
c	**70**	**4**	Stranded copper	each		
d	**95**	**4**	Stranded copper	each		
e	**120**	**4**	Solid aluminium	each		
f	**185**	**4**	Solid aluminium	each		
g	**240**	**4**	Stranded Copper	each		
h	**300**	**4**	Stranded aluminium	each		

i	**300**	**4**	Stranded copper	each		

Table 43 – PRICING SCHEDULE 10: TERMINATION BOOTS

Item	**CABLE OUTDOOR PVC END BOXES - type lxac or similar cold shrink end caps for:**			
11	**TO FIT CABLES:**	**Specific unit of measurement**	**Price per item**	**Delivery period in weeks**
a	10mm² - 16mm² x 4 core cables	each		
b	35mm² - 70mm² x 4 core cables	each		

Table 45 – PRICING SCHEDULE 12: CABLE OUTDOOR PVC END BOXES

Item	**GLANDS & SHROUDS for PVC. PVC. SWA. PVC cables (shroud must be included)**			
15	**Standard gland size nr:**	**Specific unit of measurement**	**Price per item**	**Delivery period in weeks**
a	No. 0	each		
b	No. 1	each		
c	No. 2	each		
d	No. 3	each		
e	No. 4	each		

f	No. 5	each		
g	No. 6	each		

Table 49 – PRICING SCHEDULE 16: GLANDS & SHROUDS for PVC. PVC. SWA. PVC cables

Item	To fit core size	Specific unit of measurement	Price per item	Delivery period in weeks
16	**ALUMINIUM CRIMPING FERRULES for 4 core solid sectoral core aluminium cables (600/1 000 V) Samples must be submitted.**			
a	120mm²	each		
b	185mm²	each		
c	300mm²	each		
	ALUMINIUM CRIMPING FERRULES for **4** core **stranded** aluminium cable (600/1 000 V) Samples must be submitted.			
d	120mm²	each		
e	185mm²	each		
f	300mm²	each		
	ALUMINIUM CRIMPING FERRULES for **3 core stranded** aluminium cable (11/6.35kV) Samples must be submitted.			
g	185mm² (MV cable)	each		

Table 50 – PRICING SCHEDULE 17: ALUMINIUM CRIMPING FERRULES

Item	**TERMINAL CRIMPING LUGS** for 4 core solid **sectoral** core cable (600/1 000 V) Samples must be submitted.				
17	**To fit core size**	**Palm hole DIA**	**Specific unit of measurement**	**Price per item**	**Delivery period in weeks**
a	120mm²	12mm	each		
b	185mm²	12mm	each		
c	300mm²	16mm	each		

Table 51 – PRICING SCHEDULE 18: TERMINAL CRIMPING LUGS

Item	To fit core size	Palm hole DIA	Specific unit of measurement	Price per item	Delivery period in weeks
18	**LUGS ALUMINIUM - TERMINAL CRIMPING LUGS** for **stranded** aluminium cables. Samples must be submitted.				
a	120mm² -3 core 11 kV PILAC	12mm	each		
b	185mm² - 3 core 11 kV PILAC	12mm	each		
c	240mm² - 3 core 11 kV PILAC	16mm	each		
d	300mm² -4 core PVC PVC SWA PVC 600/1 000 V	16mm	each		
e	500mm² - Single core 33 kV with **straight palm**	No hole	each		
f	800mm² -Single core 11 kV with **straight palm**	No hole	each		

Table 52 – PRICING SCHEDULE 19: TERMINAL CRIMPING LUGS

Item	**TINNED COPPER CRIMPING FERRULES** for the following stranded copper conductor sizes: Samples must be submitted.			
19	**To fit core size and minimum barrel length**	**Specific unit of measurement**	**Price per item**	**Delivery period in weeks**
a	1,5mm² Length not less than 12mm			
b	2,5mm² Length not less than 15mm			
c	4,0mm² Length not less than 15mm			
d	6,0mm² Length not less than 15mm			
e	10mm² Length not less than 25mm			
f	16mm² Length not less than 30mm			
g	35mm² Length not less than 40mm			
h	70mm² Length not less than 45mm			
i	95mm² Length not less than 60mm			
j	120mm² Length not less than 60mm			
k	150mm² Length not less than 60mm			
l	185mm² Length not less than 60mm			
m	240mm² length not less than 75mm			
n	300mm² Length not less than 80mm			

Table 53 – PRICING SCHEDULE 20: TINNED COPPER CRIMPING FERRULES

Item	**Tinned PRE-INSULATED COPPER CRIMPING FERRULES for the following stranded copper conductor sizes: Samples must be submitted.**				
20	**Description: size wire to fit**	**Colour of insulation**	**Specific unit of measurement**	**Price per item**	**Delivery period in weeks**
a	1,5mm²	Red			

b	2,5mm²	Blue			
c	4mm²	Yellow			
d	6mm²	As per standard			

Table 54 – PRICING SCHEDULE 21: Tinned PRE-INSULATED COPPER CRIMPING FERRULES

Item	**TINNED SOLID CENTRE COPPER CRIMPING FERRULES AND SOLID END LUGS FOR 70MM² COPPER CONDUCTORS. Samples must be submitted.**			
21	**Description**	**Specific unit of measurement**	**Price per item**	**Delivery period in weeks**
a	Lug S/E - 70mm² X 12mm hole			
b	Ferrule S/C - 70mm²			

Table 55 – PRICING SCHEDULE 22: TINNED SOLID CENTRE COPPER CRIMPING FERRULES AND SOLID END LUGS FOR 70MM² COPPER CONDUCTORS

Item	**LUGS COPPER - Tinned copper crimping lugs for the sizes specified. Samples must be submitted.**					
22	**Conductor size**	**Barrel length not less than**	**Palm hole dia**	**Specific unit of measurement**	**Price per item**	**Delivery period in weeks**
a	1,5mm²	7mm	6mm			
b	2,5mm²	7mm	6mm			
c	4,0mm²	7mm	6mm			
d	6,0mm²	10mm	6mm			

e	10mm²	15mm	6mm			
f	10mm²	15mm	10mm			
g	10mm²	15mm	12mm			
h	16mm²	15mm	6mm			
i	16mm²	15mm	10mm			
j	16mm²	15mm	12mm			
k	35mm²	20mm	12mm			
l	35mm²	20mm	16mm			
m	70mm²	25mm	12mm			
n	70mm²	25mm	16mm			
o	70mm²	25mm	20mm			
p	95mm²	30mm	12mm			
q	95mm²	30mm	16mm			

Table 56 – PRICING SCHEDULE 23: LUGS COPPER - Tinned copper crimping lugs for the sizes specified

Item	**Tinned COPPER CRIMPING LUGS for the sizes specified. Samples must be submitted.**					
23	**Conductor size**	**Barrel length not less than**	**Palm hole dia**	**Specific unit of measurement**	**Price per item**	**Delivery period in weeks**
a	120mm²	35mm	12mm			
b	120mm²	35mm	16mm			
c	150mm²	35mm	12mm			

d	150mm²	35mm	16mm			
e	185mm²	40mm	16mm			
f	300mm²	50mm	18mm			
g	500mm²	60mm²	18mm			
h	630mm²	70mm	18mm			

Table 57 – PRICING SCHEDULE 24: TINNED COPPER CRIMPING LUGS FOR THE SIZES SPECIFIED

General material and equipment.

Item	Description	Specific unit of measurement	Price per item	Delivery period in weeks
1.	Cable Ties R30 150 mm x 3,5 mm,100 in a pack			
2.	Cable Ties LK 5 540 mm x 13,0 mm, 50 in a pack			
3.	Compound Plastic This compound shall be suitable for moulding around terminals for insulating purpose and shall be sufficiently firm for moulding, but non-hardening. Bidders must state dielectric strength per mil.			
4.	Resin Oil 11kV This oil is for insulation of through joints and end boxes on 11 kV paper insulated cables, and shall be supplied in tins or drums sealed off from the atmosphere. A full specification of electrical properties, viscosity at operating temperature ranges and boiling point must be stated. Price per 20Liter Drum.			
5.	Resin Oil 33kV			

	This oil is for insulation of through joints and end boxes on 11 kV and 33 kV paper insulated cables, and shall be supplied in tins or drums sealed off from the atmosphere. A full specification of electrical properties, viscosity at operating temperature ranges and boiling point must be stated. Price per 20Liter Drum.			
11	Terylene Tape - 19mm wide for 11 kV paper cable Work: 19 mm x 10m (Specify the thickness)			
12	CREPE PAPER TAPE IN OIL 25mmx 10m (Specify the thickness)			
13	SELF FUSING BLACK RUBBER TAPE, Corona resistant, ozone resistant, 0,75mm thick, 18mm wide and with a dielectric strength of at least 30 kV/mm.			
14	INSULATION FILLING TAPE –(Scots fill or equivalent) Must be black elastic type putty in tape form, non-corrosive 3,0 mm thick, 38 mm wide and with a dielectric strength of at least 20 kV/mm.			
15	BLACK CORROSION RESISTANCE TAPE Min 50mm wide, 0.19mm thickness & for use at not more than 600V or 80°C.			
16	HEAVY DUTY VINYL ELECTRICAL TAPE - 38mm wide x 0.25mm thick x 13 m long roll - 600V/105°C			
17	DENZO TAPE - Wax impregnated cotton gauze tape, 40mm wide x 10m rolls, individually wrapped or plastic bagged.			
19	BUCKLES This equipment is required for strapping cables to poles. Buckles and strap shall be of stainless steel metal with a			

	minimum thickness of 1mm BUCKLES - 19mm to take 2 x 1.0mm strapping			
25	COMPOUND FOR CABLE BOXES HT This compound shall be suitable for filling cable joint and end boxes and shall comply with the following specifications: Pouring temperature : 159ºC Softening temperature : 64 - 70ºC General purpose for cast boxes up to : 33 kV			

Table 58 – PRICING SCHEDULE FOR General material and equipment

7. CONTACT INFORMATION

7.1 For any further technical information regarding the document contents please contact Mr Andre Oelofse e-mail: Andre.Oelofse@centlec.co.za
Such queries must be done in writing, the email address provided serves this purpose. The answer to one question will be sent to all the other prospective bidders that have bought the bid documents.

7.2 For Supply Chain Related questions, Please contact Mrs. Palesa Makhele at 051 412 2753 or at Palesa.Makhele@centlec.co.za