SPOORNET
(INFRASTRUCTURE) (POWER SUPPLIES)

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SPECIFICATION FOR THE INSTALLATION OF CABLES

This specification covers Spoornet's requirements for the installation, laying, terminating, jointing, testing and commissioning of the high and low voltage cables.

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1.0 SCOPE

1.1 This specification covers Spoornet's requirements for the installation, laying, terminating, jointing, testing and commissioning of high and low voltage cables.

2.0 REFERENCE LIST

The following publications, drawings and documents (latest edition) are referred to herein.

2.1 South African Bureau of Standards

SABS 97 - Impregnated paper insulated electric cables.

SABS 0142 - Code of practice for the wiring of premises.

SABS 150 - Polyvinylchloride (PVC) insulated electric cables and flexible cords.

SABS 763 - Hot-dip (galvanised) zinc coating.

SABS 1339 - Cross-linked polyethylene insulation of electric cables.

SABS 1299 - Direct-acting indicating electrical measuring instruments and their accessories.

2.2 British Standard Institution

BS 5467 - Armoured cables with thermosetting insulation for electricity supply.

BS 6480 - Impregnated paper-insulated cables.

2.3 Machinery and Occupational Safety Act, Act No. 6, 1983

2.4 Spoornet

CEE.0012 - Method of Tendering

CEE.0045 - Painting of steel components of electrical equipment.

CEE.0089 - Drawings of electrical equipment supplied under electric light and power contracts.

Safety Instructions - High Voltage Electrical Equipment

3.0 APPENDICES

The following appendices form an integral part of this specification.

3.1 Appendix 1 - "Scope of Work"

3.1.1 This appendix specifies the extent of the work required and the order of priorities.

3.2 Appendix 2 - "Drawings".

3.2.1 This appendix lists Spoornets drawings applicable to the installation,

3.2.2 Cable routes indicated on these drawings shall only be a general guide to the contractor.

3.3 Appendix 3 - "Schedule of Items, Estimated Quantities, Unit Rates and Prices".

3.3.1 To ensure a uniform basis for tendering purposes, tenders shall be based on the estimated quantities given in this schedule which shall be completed in full and returned as part of the tender.

Complies/Does not comply

3.3.2 The importance of full completion of this schedule cannot be overstressed as this will constitute the tenderer's quotation.

Complies/Does not comply

3.3.3 Rates specified in this schedule will be applicable if any adjustments to requirements become necessary.

Complies/Does not comply

3.3.4 Any additional items considered to be necessary by the tenderer for the satisfactory completion of the installation and fulfilment of his guarantee shall be added by the tenderer on a similar unit price basis to this schedule and included in his total tendered price.

Complies/Does not comply

3.3.5 Actual quantities required will be based on the final survey by the successful contractor, and payment will be based on the actual measurements.

Complies/Does not comply

4.0 DRAWINGS AND INSTRUCTIONS

4.1 All drawings submitted by the tenderer shall be in accordance with Spoornets Specification No. CEE.0089

Complies/Does not comply

4.2 Where joints and terminations are to be done by others, the contractor shall submit detailed instructions regarding the procedure recommended by the cable manufacturer.

Complies/Does not comply

5.0 STANDARD OF WORK

5.1 The electrical installation shall conform to the requirements of SABS Code of Practice 0142 and shall be to the satisfaction of Spoornet.

Complies/Does not comply

5.2 Galvanising, where specified, shall be in accordance with SABS 763.

Complies/Does not comply

6.0 SAFETY INSTRUCTIONS

6.1 Work on the high voltage equipment shall be carried out in accordance with the Safety Instructions High Voltage Electrical Equipment of Spoornet.

Complies/Does not comply

6.2 All work done must comply with the requirements of the MACHINERY AND OCCUPATIONAL SAFETY ACT, Act No. 6, 1983.

Complies/Does not comply

7.0 SURVEYS

7.1 Pre-installation Route Surveys.

7.1.1 The Contractor shall within 30 days after being awarded the contract, carry out a pre-installation route survey which shall include digging test holes and, guided by the drawings contained in appendix 2, determine a suitable route.

Complies/Does not comply

7.1.2 The contractor shall determine where cables are liable to be subjected to chemical, electrolytic, mechanical or other damage and shall submit his recommendation to the Engineer for approval.

Complies/Does not comply

7.1.3 The Contractor shall submit in triplicate plans of the cable routes selected to the Engineer for approval. Plans may be submitted in sections as the survey progresses.

Complies/Does not comply

7.1.4 No excavation of any section of the cable route shall commence before the Contractor is in possession of the relevant approved plans and the Engineer has authorised the commencement of work on the section concerned.

Complies/Does not comply

7.2 Post Installation Surveys

7.2.1 After completion of all cable laying and jointing and before commissioning of any cable the Contractor shall carry out a final "as laid" survey of the cable routes and submit plans on transparencies suitable for reproduction.

Complies/Does not comply

7.2.2 The cable route plans shall include the following information :

7.2.2.1 Overall length, type, size and voltage of each cable.

7.2.2.2 Accurate indication of the position of each cable joint by indicating two distances to each joint from permanent structures.

Complies/Does not comply

7.2.2.3 Pipes and chambers provided.

8.0 EXCAVATIONS

8.1 Excavations shall be carried out in strict compliance with the specification No. E.7 for works on, over, under or adjacent to a railway line.

Complies/Does not comply

8.2 Trenching procedure shall be programmed in advance, approved by the Engineer and shall not be departed from except with the consent of the Engineer.

Complies/Does not comply

8.3 The Contractor will be advised of any known buried services such as cables, pipes, etc. in the vicinity of the cable route.

8.3.1 When trenching the contractor shall take all necessary precautions to prevent damage to underground services.

Complies/Does not comply

8.3.2 On encountering any uncharted service, the Contractor shall promptly advise the Engineer who will give the necessary instructions. Additional excavations shall be paid for at scheduled rates.

Complies/Does not comply

8.4 Should any underground service, water mains, road pavement, drainage system, building or any other structure be damaged by the Contractor's staff, it shall be reported immediately to the Engineer, who shall arrange for the necessary repairs. The Contractor shall be responsible for the cost of repairs.

Complies/Does not comply

8.5 The removal of obstructions along the cable routes shall be subject to the approval of the Engineer and shall be paid for at the agreed rates.

Complies/Does not comply

8.6 The Contractor shall not trench beneath any railway line without departmental supervision. Should the contractor wish to carry out such work, a minimum of 14 working days notice is required by the Engineer to arrange for the necessary supervision. The cost of such supervision shall not be charged to the Contractor.

Complies/Does not comply

8.7 Excavations crossing oil pipe lines shall not commence until an authorised representative is present on site. The Engineer shall be advised 14 days in advance when such excavations will take place.

Complies/Does not comply

8.7.1 Cable crossings of oil pipe lines shall only be at right angles.

Complies/Does not comply

8.8 Trenches across roads, access ways or foot-paths shall not be left open. If trenching, cable laying and backfilling cannot be done during the same shift, the portion of trench across the full width of the road, etc., must be temporarily backfilled and consolidated sufficiently to carry the traffic concerned without subsidence. Alternatively, adequately strong cover plates shall be laid across the trench.

Complies/Does not comply

8.9 Power driven mechanical excavators may be used for trenching operations. Spoornet shall not be responsible for any damage to other Services in close proximity when using mechanical excavators.

Complies/Does not comply

8.10 The Contractor shall provide shuttering in places where the danger exists of the trench collapsing, and causing damage to formations or other nearby structures.

8.10.1 Shuttering shall be paid for at scheduled rates.

Complies/Does not comply

8.11 Trenches shall be as straight as possible and the bottom of each cable trench shall be firm and of smooth contour without sharp dips or rises which may cause tensile forces in the cable during backfilling.

Complies/Does not comply

8.11.1 Trenches shall have no sharp objects which may cause damage to the cable during laying or backfilling.

Complies/Does not comply

8.12 The unfinished depth of trenches unless otherwise stated shall be as follows :

8.12.1 HV cables and associated pilot cables = 1 000 mm

8.12.2 LV cables and separate pilot cables = 750 mm

8.13 The width of the trench unless otherwise stated shall be 500 mm for one or two HV cables and associated pilot cables, and shall increase by 300 mm for each additional HV cable and its associated pilot cable.

8.13.1 The width of the trench at any bend or places where cable slack is required, shall be such that the bending radius of the cables shall not be less than that specified for the particular cable as per specifications SABS 150, SABS 97 and SABS 1339.

Complies/Does not comply

8.13.2 Trenching in railway formations shall be in accordance with Spoornet's Chief Civil Engineer's drawing FG 263.

8.14 The material excavated from each trench shall be placed in such a manner as to prevent nuisance or damage to adjacent ditches, railway lines, drains, gateways and other properties and shall not interfere with traffic.

Complies/Does not comply

8.14.1 Where, owing to certain considerations, this is not possible the excavated materials shall be removed from site and be returned for refilling the trench on completion of laying.

Complies/Does not comply

8.15 When excavating close to railway tracks, the ballast must be covered by tarpaulins or other sheeting to prevent soiling.

Complies/Does not comply

8.16 Removal of accumulated water or other liquid from trenches shall be done by the Contractor at his expense. The Contractor shall provide all pumps and appliances required to carry out this operation. Water or any other liquid removed shall be disposed of without creating any nuisance or hazard.

Complies/Does not comply

8.17 Spoornet reserves the right to alter any cable route or portion thereof prior to cable laying. Payment in respect of any additional work involved shall be at scheduled rates.

Complies/Does not comply

9.0 CABLE LAYING

9.1 General

9.1.1 All possible care shall be exercised in handling cables on site.

Complies/Does not comply

9.1.2 Any drum of cable showing signs of damage shall not be used.

Complies/Does not comply

9.1.3 The outer covering of cables shall not be damaged in any way and cables shall not be bent at radii less than allowed by the manufacturer.

Complies/Does not comply

9.1.4 When cable is supplied by the contractor, the drums thereof remain the property of the Contractor and shall be removed from the site and disposed of by him.

Complies/Does not comply

9.1.5 Cable pulling and laying shall be done manually unless otherwise approved by the Engineer. No cable shall be subjected to a tension exceeding that stipulated by the cable manufacturer.

9.2 IN TRENCHES

9.2.1 High Voltage cables shall be spaced at a minimum of 300 mm apart (centre to centre).

9.2.2 Low Voltage cables shall be spaced at a minimum of 150 mm apart (centre to centre).

9.2.3 Pilot cables shall be laid beside the associated power cables.

9.2.4 High Voltage and Low Voltage cables (and pilot cables not associated with High Voltage cable) shall be spaced at a minimum of 300 mm apart.

9.2.5 Pilot cables, when they are routed separately from their associated power cables, may be run next to one another.

9.2.6 Cables shall not be buried on top of each other except where cable runs cross.

9.2.7 Where the cable cannot be laid down at the specified depth, prior authority shall be obtained from the Engineer by the Contractor to protect the cable by means of 150 mm diameter half round concrete pipes with 50 mm concrete slab coverings, or other approved methods.

9.2.8 Where cables have to be drawn around corners well lubricated skid plates shall be used. The skid plates shall be securely fixed and constantly examined during cable laying operations.

9.2.9 Suitable rollers may be used during the laying of cables.

9.2.10 Cables shall be visually inspected for damage during and after laying. Any damage shall be reported immediately to the Engineer who will issue the necessary instructions.

Complies/Does not comply

9.3 IN SLEEVE PIPES

9.3.1 All cables crossing beneath roads and pavements shall be enclosed in asbestos cement pipes with a minimum internal diameter of 150mm. The Engineer shall be advised timeously of the locations and quantity of pipes to be laid and chambers to be provided by others. Separate lengths of pipe shall be properly jointed.

Complies/Does not comply

9.3.2 Pipes shall maintain or exceed the specified cable spacing.

Complies/Does not comply

9.3.3 Only one High Voltage cable shall be laid per pipe.

Complies/Does not comply

9.3.4 Pipes shall extend at least 1 m on either side of the road- or pavement formations and shall maintain the specified cable depth. All pipes shall be graded for water drainage : the required grade is 1:400.

Complies/Does not comply

9.3.5 All cables crossings underneath railway tracks shall be in pipes in accordance with Chief Civil Engineer's drawing FG 263.

9.4 IN DUCTS AND BUILDINGS

9.4.1 Concrete ducts and pipes within buildings will be provided by others.

9.4.2 Before installing cables, the ducts are to be inspected to ensure that they are suitable and clean as not to damage the cables.

Complies/Does not comply

9.4.3 The cables are to be neatly positioned and cross overs are to be avoided.

Complies/Does not comply

9.4.4 Steel checker plates over ducts will be supplied by others. The tenderer will however be required to cut all the slots for emerging cables. These slots are to be neatly cut and smoothed to avoid damage to the cable.

Complies/Does not comply

9.4.5 The Contractor shall supply all cable trays, racks, wooden cleats or other supports required to adequately support cables not laid in ducts.

Complies/Does not comply

9.4.6 Cable trays or racks shall be of reinforced glass fibre or steel suitably treated to prevent corrosion, Steel trays, racks and other supports shall be galvanised in accordance with SABS 763 when used within 50 km of the sea or inland exposed conditions.

Complies/Does not comply

9.5 UNDER BRIDGES AND IN TUNNELS

9.5.1 Where a cable route can only be against the concrete wall of a bridge or tunnel the cable shall be supported on :

9.5.1.1 suitable brackets at 750 mm intervals.

or

9.5.1.2 straining wire secured at maximum 1 200 mm intervals.

Complies/Does not comply

9.5.2 Brackets shall be of robust design and shall be galvanised and painted in accordance with specification CEE.0045

Complies/Does not comply

9.5.3 The height of the cable route on the brackets or strain wire shall be determined and agreed upon on site.

Complies/Does not comply

9.5.4 The brackets or strain wire shall be supplied and installed by the contractor.

Complies/Does not comply

9.6 CROSSING OF PIPELINES AND OTHER CABLES

9.6.1 Cables shall pass beneath pipelines with a 300 mm minimum clearance between the top of any cable and the bottom of any oil pipe.

Complies/Does not comply

9.6.1.1 The level of any cable at an oil pipeline crossing shall be maintained for not less than 3 m on either side of the centre line of the pipeline or on either side of the centre line of the outermost pipelines where there is more than one pipeline on the same route.

Complies/Does not comply

9.6.2 Where cables cross communication or signal cables, at least 300 mm of fill shall be provided between the two cables. In addition a concrete slab in accordance with Spoornets drawing No. CEE 55/027367 shall be placed between the two cables parallel to the lower cable.

Complies/Does not comply

9.7 IN RAILWAY FORMATIONS

9.7.1 Cables to be accommodated in railway formations shall be laid in accordance with Chief Civil Engineer's drawing No. FG 263.

Complies/Does not comply

9.8 SECURED TO POLES

9.8.1 Cables to be terminated at disconnectors (isolators) mounted on wood, concrete or steel poles, shall be clamped onto such structures by means of stainless steel straps applied at such a tension that the cable or cable sheath is not damaged. Straps shall be located at intervals of not more than 1,2 m.

Complies/Does not comply

9.8.2 Cables shall be protected by a pipe or boxed section of galvanised steel or other approved material for a distance of 250 mm below and 600 mm above ground level, strapped or screwed to the pole at a minimum of two points and connected to the earth connection, if of steel construction.

Complies/Does not comply

9.8.3 Straps and pipes shall be supplied and installed by the Contractor.

Complies/Does not comply

9.9 EXPOSED CONDITIONS

9.9.1 Whenever cables enter buildings or tunnels, or where excavations are not permitted down banks or cuts, the exposed portion shall be suitably protected by means of concrete slabs, or suitable steel pipes or boxed sections which shall be galvanised in accordance with SABS 763.

Complies/Does not comply

9.9.2 These pipes or boxed sections shall be firmly secured to the bank or cut, at regular intervals.

Complies/Does not comply

9.9.3 All such material shall be supplied and installed by the Contractor.

Complies/Does not comply

9.9.4 Stake routes shall only be supplied when specifically called for in Appendix 1.

10.0 CABLE TERMINATIONS

10.1 General

10.1.1 All cables shall be terminated and connected to the respective equipment, whether provided by the Contractor or by others.

Complies/Does not comply

10.1.2 Jumpers between cable end boxes and disconnectors shall either be short enough to be rigidly self supporting, or shall be supported on suitably placed pin insulators.

Complies/Does not comply

10.1.3 Termination of cables on outdoor equipment shall not be done during inclement weather conditions.

Complies/Does not comply

10.1.4 Both ends of each cable shall be identified by means of embossed stainless steel strips clamped around the cables. The characters shall have a minimum height of 6 mm.

Complies/Does not comply

10.1.5 All materials necessary for cable termination shall be provided by the Contractor.

Complies/Does not comply

10.1.6 The contractor shall ensure that correct phase rotation is maintained throughout.

10.1.7 Glands of cables terminating on equipment provided with frame leakage protection shall be insulated from the frame by high grade non-deteriorating, non-hygroscopic insulation, at least 2 mm thick, capable of withstanding a test voltage of 4 kV DC for one minute.

Complies/Does not comply

10.2 HV Cables

10.2.1 The cable armouring shall be bonded with an approved copper bond to the cable end box at one end of the cable only as directed by the Engineer. This bond shall be easily removable for testing purposes.

Complies/Does not comply

10.2.2 Where for any reason a cable cannot be terminated, sufficient length of cable shall be left to reach the cable end box position. The cable shall be coiled and buried or otherwise protected, The cable end of paper insulated cables shall be capped immediately with a plumbed lead seal. Other cables shall be sealed with suitable tape.

Complies/Does not comply

10.3 LV Cables (and Pilot Cables)

10.3.1 All cut ends of cables are to be sealed with suitable tape, or other approved means until they are ready to be terminated.

Complies/Does not comply

10.3.2 The cables shall terminate in compression type glands, brass or bronze, suitable for PVC SWA ECC cables.

Complies/Does not comply

10.3.2.1 The glands shall be fitted with neoprene shrouds.

Complies/Does not comply

11.0 CABLE JOINTS

11.1 General

11.1.1 Jointing shall be carried out strictly in accordance with the manufacturer's jointing instructions and by artisans thoroughly experienced and competent in jointing the classes of cables used. They shall be adequately supervised to ensure the highest quality of workmanship.

Complies/Does not comply

11.1.2 Jointing shall not be carried out during inclement weather.

Complies/Does not comply

11.1.3 The cores of cables shall be jointed number to number or colour to colour.

Complies/Does not comply

11.1.4 The joints shall not impair the anti-electrolysis characteristics of the cables.

Complies/Does not comply

11.1.5 The conductor bridging the armouring shall be adequate to carry the prospective earth fault current.

Complies/Does not comply

11.1.6 A through joint shall only be permitted after every full drum length of cable.

Complies/Does not comply

11.1.7 Each cable joint shall be identified by a non-corrodible label fixed securely to the top of the joint. Each label shall have stamped on it, in characters having a minimum height of 10 mm, the identification of equipment at each end of the cable concerned.

Complies/Does not comply

11.1.8 Spoornet reserves the right to be present during jointing operations to familiarise themselves with any special techniques.

Complies/Does not comply

11.1.9 No joint shall be situated inside a cable pipe.

Complies/Does not comply

12.0 COVERING, BACKFILLING AND REINSTATEMENT

12.1 Filling of trenches shall not commence before the Engineer or his authorised representative has inspected and approved the cables and cable joints in situ in the section of trench concerned.

Complies/Does not comply

12.2 Trenches in railway formations shall be backfilled and reinstated in accordance with Spoornet's Chief Civil Engineer's drawing No. FG 263.

Complies/Does not comply

12.3 All other trenches shall be backfilled and reinstated as follows:

12.3.1 Two 75 mm thick layers of soil sifted through a 6 mm mesh shall be laid directly under and over the cables respectively and consolidated by hand ramming only.

Complies/Does not comply

12.3.1.1 Only soil with a thermal resistivity of 1,5 degrees C.m/watt, or lower may be used for this purpose.

Complies/Does not comply

12.3.1.2 When necessary imported fill shall be arranged by the Contractor and paid for at scheduled rates.

Complies/Does not comply

12.3.2 HV cables shall, where likely to be mechanically damaged as decided by the engineer, be protected by concrete slabs (to Drawing No. CEE 55/027367) to be supplied and laid by the Contractor on top of the sifted soil. These slabs shall be laid close-butted, convex end to concave end, directly above each HV cable throughout the underground portion except where otherwise protected as by pipes, etc. Only unbroken cable protection slabs may be used, and only slabs actually laid will be paid for.

Complies/Does not comply

12.3.3 The minimum dry densities of backfilling after compaction shall be not less than 1 600 kg/cubic metre.

Complies/Does not comply

12.3.4 All excavations made (whether for the purpose of cable laying, joint bays or trial holes) shall be back-filled in 150 mm layers, the earth in each layer being well rammed and consolidated and sufficient allowance being made for settlement. The back-filling shall be completed to the satisfaction of the Engineer. If necessary, water shall be used to obtain the specified compacted density. Any cable damaged during backfilling shall be replaced by the Contractor at his own expense.

Complies/Does not comply

12.3.4.1 Backfilling at pipe entries shall be such as not to stress or damage the cable during compaction from the top.

12.3.5 A continuous plastic cable warning tape, to drawing No. CEE-MA-307 shall be laid directly above each HV cable, 150 mm below the normal surface level and run for the full length of the cable before completing the back-filling.

Complies/Does not comply

12.4 The back filled trench shall be maintained in a thoroughly safe condition by the contractor for the duration of the contract.

Complies/Does not comply

12.5 All back filling of road crossings shall be mechanically rammed.

Complies/Does not comply

12.6 Final surfacing of roads shall be restored by others unless called for under "Scope of Work", Appendix 1.

Complies/Does not comply

12.7 Concrete cable route markers shall be provided and installed by the contractor in accordance with drawing CEE-PK-14.

Complies/Does not comply

12.8 Pipes shall be filled with a sand/water mixture to also have a thermal resistivity of 1,5 degrees C.m/watt or lower when dry. The sand used in the mixture shall be chemically tested not to be harmful to the cable outer sheath.

Complies/Does not comply

13.0 MEASUREMENTS

13.1 All measurements for payment purposes shall be made jointly by representatives of the Contractor and Spoornet and shall be agreed upon by both parties. The Contractor shall be responsible for obtaining the Engineer's signed approval of such measurements.

Complies/Does not comply

13.2 Measurements of cable length shall be made from centre to centre of cable joints and to the cable ends and will exclude any wastage due to jointing and terminating.

Complies/Does not comply

13.3 When cable is drawn through pipes, only the portion remaining in the pipe will be paid for at the rates quoted for "as installed in pipes".

Complies/Does not comply

13.4 Determination of trench volume for measurement purposes shall be based on measured length and specified width and depth. No allowance shall be made where trenches have to be widened at the bottom to accommodate cables, cable joints and protection slabs.

Complies/Does not comply

13.5 The classification of different types of ground for measurement purposes shall be as follows:

13.5.1 Soft rock will be taken as broken or friable rock which can be removed by pick or mechanical excavator or paving breaker. This includes hard clay.

13.5.2 Hard rock will be taken as rock which cannot be removed by a mechanical excavator and requires drilling and blasting or splitting. This includes reinforced or plain concrete.

14.0 TESTS

14.1 The costs of all post-installation tests shall be borne by the Contractor.

Complies/Does not comply

14.2 The Contractor shall be responsible for remedial work necessary due to damages caused during tests.

Complies/Does not comply

14.3 Spoornet reserves the right to carry out any further tests deemed necessary, using either the Contractor's instruments and equipment or its own, or both. The costs of such tests will not be charged to the Contractor.

Complies/Does not comply

14.4 Test instruments shall be of the accuracy class 1.0 or better in accordance with SABS 1229. Calibration certificates from a recognised testing authority shall be available for inspection and shall not be older than one year.

Complies/Does not comply

14.5 Time measurements shall be carried out using an approved digital timer.

Complies/Does not comply

14.6 The final commissioning site tests will be carried out by Spoornet.

Complies/Does not comply

14.6.1 A suitably qualified staff member of the Contractor shall assist Spoornet during the tests and shall carry out any remedial work where necessary.

Complies/Does not comply

14.7 The contractor shall notify the Engineer in writing 4 weeks before the commissioning date and shall have carried out the following site tests before such date :

Complies/Does not comply

14.7.1 Prove the continuity and insulation resistance of the multicore pilot cables.

Complies/Does not comply

14.7.2 Verify that the insulation level between frame and earth of switchboards fitted with frame leakage protection is not reduced by the installation of the cables.

Complies/Does not comply

14.7.3 The following voltage withstand tests on each completed cable run:

14.7.3.1 Paper insulated cables:

(i) rating up to 12,7/22 kV : test specified in paragraph D-3 of SABS 97.

Complies/Does not comply

(ii) rating 19/33 kV : test specified in paragraph B-3 of BS 6480, Part 1.

Complies/Does not comply

The extruded PVC impermeable serving shall withstand a test voltage of 10 kV DC between armouring and earth for 1 minute.

Complies/Does not comply

The insulation between armouring and lead sheath shall withstand a test v for 1 minute.

Complies/Does not comply

14.7.3.2 XLPE Insulated Cables:

All cables rated up to 19/33 kV shall be tested as specified in appendix E, clause 1.4, of SABS 1339, and cables rated up to 1,9/3,3 kV shall be tested as specified in appendix B, clause B.6, of BS 5467.

Complies/Does not comply

Note :

Where a new XLPE cable is to be joined to an existing XLPE Cable, the test shall differ, in that a 4 kV DC test voltage shall be applied for one minute between the brass screens of the cores and the armouring. The outer sheath shall withstand a test voltage of 10 kV DC for 1 minute between the armouring and earth.

Complies/Does not comply

14.7.4 PVC insulated cables shall be tested as specified in paragraph D-3 of SABS 150.

Complies/Does not comply

14.7.5 The Contractor shall submit three copies of certified test reports to the Engineer within three weeks after completion of the tests.

15.0 GUARANTEE

15.1 All work undertaken by the Contractor shall be subject to a guarantee for a period of one year against faulty and/or inferior workmanship and material.

Complies/Does not comply

15.2 The guarantee period shall commence the day the installation is formally handed over to and accepted by Spoornet.

Complies/Does not comply

15.3 The Contractor shall undertake to repair all faults or defects due to bad workmanship and/or faulty materials, and to replace all defective equipment or materials during the guarantee period.

Complies/Does not comply

15.4 Any defects that may become apparent during the guarantee period shall be rectified to the satisfaction of, and free of cost to Spoornet.

Complies/Does not comply

15.5 The Contractor shall undertake work on the rectification of any defects that may arise during the guarantee period within 7 days of his being notified by Spoornet of such defects.

Complies/Does not comply

15.6 Should the Contractor fail to comply with the requirements stipulated above, Spoornet shall be entitled to undertake the necessary repair work or effect replacement of defective apparatus or materials, and the Contract shall reimburse Spoornet the total cost of such repair or replacement, including the labour costs incurred in replacing defective material.

Complies/Does not comply

TENDERER'S SIGNATURE .....

DATE .....

CHIEF ENGINEER (POWER SUPPLIES)
(INFRASTRUCTURE)

SCOPE OF WORK

1.0 Site inspection required/not required.

Date : .....

Time : .....

CHIEF ENGINEER (POWER SUPPLIES)
(INFRASTRUCTURE)

REFERENCE :

DRAWINGS

DRAWING NO.	TITLE
CEE 55/027367	Concrete slab, cable protection
CEE-PK-14	Route marker, cable, electrical.
CEE-MA-307	Tape, cable warning, underground
FG 263	Accommodation of cables in Railway formations.

CHIEF ENGINEER (POWER SUPPLIES)
(INFRASTRUCTURE)

REFERENCE :

SCHEDULE OF ESTIMATED QUANTITIES AND UNIT RATES

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
1.0	Route surveys (clause 7.0)		complete		
2.0	Excavations in				
a)	Hard rock		/cubic metre		
b)	Soft rock		/cubic metre		
c)	Soil		/cubic metre		
3.0	Transportation of soil		/cubic metre		
4.0	Shuttering (clause 8.10)		/m		
5.0	Concrete slabs supplied and installed (clause 12.3.2)		each		
6.0	Plastic cable warning tape supplied and installed (clause 12.3.5)		/m		
7.0	150 mm dia. half round concrete pipes supplied and installed (clause 9.2.7.)		/m		
8.0	150 mm dia. asbestos cement pipes supplied and installed		/m		
9.0	Cutting of checker plates (clause 9.4.4)		/m cut		
10.0	Backfilling of trenches with soil (clause 12.3)		/cubic metre		
11.0	Backfilling of trenches with 10:1 soil/cement mix (clause 12.2)		/cubic metre		

SCHEDULE OF ESTIMATED QUANTITIES AND UNIT RATES

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
12.0	Importation of soil		/cubic metre		
13.0	Concrete cable route markers		each		
14.0	Reinstate tarred surface		/cubic metre		
15.0	Reinstate concrete surface		/cubic metre		
16.0	Installation of cables				
16.1	Installed in trenches (Clause 9.2)				
16.1.1	High Voltage Cables		/m		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				
16.1.2	Low Voltage Cables		/m		
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
16.2	Installed in sleeve pipes (clause 9.3)				
16.2.1	High Voltage Cables		/m		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				

SCHEDULE OF ESTIMATED QUANTITIES AND UNIT RATES

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
16.2.2	Low Voltage Cables		/m		
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
16.3	Installed in ducts (clause 9.4)				
16.3.1	High Voltage Cables		/m		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				
16.3.2	Low Voltage Cables		/m		
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
17.0	Installation of cables (Special conditions)				
17.1	Cable supports (clause 9.4.5 and 9.4.6)				
17.1.1	High Voltage Cables		/m		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				

SCHEDULE OF ESTIMATED QUANTITIES AND UNIT RATES

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
17.1.2	Low Voltage Cables		/m		
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
17.2	Securing cables to poles (clause 9.8)				
17.2.1	High Voltage Cables		/m		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				
17.2.2	Low Voltage Cables		/m		
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
17.3	Securing cables to concrete/tunnel walls				
17.3.1	High Voltage Cables		/m		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				

SCHEDULE OF ESTIMATED QUANTITIES AND UNIT RATES

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
17.3.2	Low Voltage Cables		/m		
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
17.4	Installation of cables in track formations				
17.4.1	High Voltage Cables		/m		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				
17.4.2	Low Voltage Cables		/m		
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
18.0	Cable terminations complete (Supply material, terminate and connect up).				
18.1	XLPE cable				
18.1.1	High Voltage terminations		each		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				

SCHEDULE OF ESTIMATED QUANTITIES AND UNIT RATES

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
18.1.2	Low Voltage terminations		each		
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
18.2	PILC SWA cable				
18.2.1	High Voltage terminations		each		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				
18.2.2	Low Voltage terminations		each		
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
	..... core ..... mm sq				
19.0	Cable joints complete (Supply material, terminate and connect up)				
19.1	PVC to PVC		each		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				

SCHEDULE OF ESTIMATED QUANTITIES AND UNIT RATES

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
19.2	XLPE to XLPE		each		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				
19.3	PILC to PILC		each		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				
19.4	XLPE to PILC		each		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				

TENDERER'S SIGNATURE .....

DATE .....

CHIEF ENGINEER (ELECTRICAL)
(INFRASTRUCTURE)