



TRANSNET
freight rail

A Division of Transnet SOC Limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

INSTALLATION OF LOW AND MEDIUM VOLTAGE CABLES

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1.0 SCOPE

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

2.0 APPENDICES

The following appendices form an integral part of this specification and shall be read in conjunction with it

- 2.1 Appendix 1 - "Scope of Work" - to be completed by Transnet Freight Rail (Client).
 2.2 Appendix 2 - "Schedule of Requirements" – (to be completed by Tenderer).
 2.3 Appendix 3 – "Normative SANS references"

3.0 STANDARDS, PUBLICATIONS AND DRAWINGS

Unless otherwise specified this specification must be read in conjunction with the current edition of the relevant SANS, BS and Transnet Freight Rail's specifications.

3.1 British Standards

- BS 5467: Electric cables – thermosetting insulated, armoured cables for voltages of 600/1000V and 1900/3300V.
 BS 6480: impregnated paper – installed lead or lead alloy sheathed electric cables of rated voltages up to and including 33 000V

3.2 South African National Standards

- SANS 32: Internal and/or external protective coatings for steel tubes - Specification for hot dip galvanized coatings applied in automatic plants.
 SANS 97: Electric cables - Impregnated paper-insulated metal-sheathed cables for rated voltages 3,3/3,3 kV to 19/33 kV (excluding pressure assisted cables)
 SANS 121: Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods.
 SANS 1339: Electric cables - Cross-linked polyethylene (XLPE) insulated cables for rated voltages 3,8/6,6 kV to 19/33 kV
 SANS 10142-1: The wiring of premises Part 1: Low-voltage installations.
 SANS 10142-2: The wiring of premises Part 2: Medium-voltage installations above 1 kV A.C not exceeding 22 kV A.C and up to and including 3 000 kW installed capacity

3.3 Transnet Freight Rail Instructions

- BBD 8210 - General work and works on, over, under or adjacent to a railway lines and near high voltage equipment
 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.
 Electrical Safety Instructions 2012 - High Voltage Electrical Equipment

3.4 Transnet Freight Rail Drawings

- CEE PA-0105 - Precast concrete slab cover for cable protection.
 CEE-PK-14 - Electrical cable route marker.
 CEE-MA-307 – Route marker electrical cables.
 FG 263 - Accommodation of cables in Railway formations

3.5 Statutory Requirements

- Occupational Health and Safety Act and Regulations, Act 85, 1993

- 3.6 Any items offered in accordance with other standards will be considered at the sole discretion of Transnet Freight Rail. The tenderer shall supply full details stating where the item differs from these specifications as well as supplying a copy (in English) of the recognised standard specification(s) with which it complies.

4.0 TENDERING METHODS

- 4.1 Tenderer shall indicate clause by clause compliance with the specification. This shall take the form of a separate document listing all the specifications clause numbers indicating the individual statement of compliance or non-compliance. This document can be used by tenderer to elaborate on their response to a clause.
- 4.2 A statement of non-compliance shall be motivated by the tenderer.
- 4.3 Tenderer shall complete Appendix 2 – “Schedule of requirements”.
- 4.4 Tenderer shall submit descriptive literature consisting of detailed technical specifications, general constructional details and principal dimensions, together with clear illustrations of the equipment offered.
- 4.5 Failure to comply with clauses 4.1, 4.2, 4.3 and 4.4 could preclude a tender from consideration.

5.0 SERVICE CONDITIONS

The equipment shall be designed and rated for installation and continuous operation under the following conditions:

Altitude:	0 to 1800m above sea level.
Ambient temperature:	-10°C to +55 °C.
Relative humidity:	10% to 90%
Lightning Conditions:	12 ground flashes per square kilometre per annum.
Pollution:	Heavily salt laden or polluted with smoke from industrial sources.

6.0 GENERAL REQUIREMENTS

- 6.1 The tenderer shall submit all drawings in accordance with Transnet Freight Rails Specification CEE.0089
- 6.2 Where joints and terminations are to be done by others, the contractor shall submit detailed instructions regarding the procedure recommended by the cable manufacturer.
- 6.3 The electrical installation shall conform to the requirements of SANS 10142 part 1 and 2 and shall be to the satisfaction of Transnet Freight Rail.
- 6.4 Galvanising where specified shall be in accordance with SANS 32 and SANS 121.
- 6.5 Work on the high voltage equipment shall be carried out in accordance with the Transnet Freight Rail's Safety Instructions 2012 - High Voltage Electrical Equipment.
- 6.6 All work done must comply with the requirements of Occupational Health and Safety Act and Regulations, Act 85, 1993

SURVEYS

- 6.7 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 Transnet Freight Rail's drawings to determine a suitable route.
- 6.8 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 Depot Maintenance Manager (Electrical) for approval.
- 6.9 The Contractor shall submit in triplicate plans of the cable routes selected to the Depot Maintenance Manager (Electrical) for approval. Plans may be submitted in sections as the survey progresses.

- 6.10 No excavation of any section of the cable route shall commence before the Contractor is in possession of the relevant approved plans and the Depot Maintenance Manager (Electrical) has authorised the commencement of work on the section concerned.
- 6.11 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.
- 6.12 The cable route plans shall include the following information:
- 6.12.1 Overall length, type, size and voltage of each cable.
- 6.12.2 Accurate indication of the position of each cable joint by indicating two distances to each joint from permanent structures.
- 6.12.3 Pipes and chambers provided.
- 7.0 EXCAVATIONS**
- 7.1 Excavations shall be carried out in strict compliance with the specification BDD 8210 for general work and works on, over, under or adjacent to a railway lines and near high voltage equipment.
- 7.2 Trenching procedure shall be programmed in advance, approved by the Depot Maintenance Manager (Electrical) and shall not be departed from except with the consent of the Depot Maintenance Manager (Electrical).
- 7.3 The Contractor will be advised of any known buried services such as cables, pipes, etc. in the vicinity of the cable route.
- 7.3.1 When trenching the contractor shall take all necessary precautions to prevent damage to underground services.
- 7.3.2 On encountering any uncharted service, the Contractor shall promptly advise the Depot Maintenance Manager (Electrical) who will give the necessary instructions. Additional excavations shall be paid for at scheduled rates.
- 7.4 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 Depot Maintenance Manager (Electrical), who shall arrange for the necessary repairs. The Contractor shall be responsible for the cost of repairs.
- 7.5 The removal of obstructions along the cable routes shall be subject to the approval of the Depot Maintenance Manager (Electrical) and shall be paid for at the agreed rates.
- 7.6 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 Depot Maintenance Manager (Electrical) to arrange for the necessary supervision. The cost of such supervision shall not be charged to the Contractor.
- 7.7 Excavations crossing oil pipe lines shall not commence until an authorised representative is present on site. The Depot Maintenance Manager (Electrical) shall be advised 14 days in advance when such excavations will take place.
- 7.7.1 Cable crossings of oil pipe lines shall only be at right angles.
- 7.8 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.
- 7.9 Power driven mechanical excavators may be used for trenching operations. Transnet Freight Rail shall not be responsible for any damage to other Services in close proximity when using mechanical excavators.
- 7.10 The Contractor shall provide shuttering in places where the danger exists of the trench collapsing, and causing damage to formations or other nearby structures.
- 7.10.1 Shuttering shall be paid for at scheduled rates.

- 7.11 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.
- 7.11.1 Trenches shall have no sharp objects which may cause damage to the cable during laying or backfilling.
- 7.12 The unfinished depth of trenches unless otherwise stated shall be as follows:
- 7.12.1 HV cables and associated pilot cables = 1 000 mm.
- 7.12.2 LV cables and separate pilot cables = 750 mm.
- 7.13 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.
- 7.13.1 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 SANS 97 and SANS 1339.
- 7.13.2 Trenching in railway formations shall be in accordance with Transnet Freight Rail's drawing FG 263.
- 7.14 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.
- 7.14.1 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.
- 7.15 When excavating close to railway tracks, the ballast must be covered by tarpaulins or other sheeting to prevent soiling.
- 7.16 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.
- 7.17 Transnet Freight Rail 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.

8.0 CABLE LAYING

8.1 GENERAL

- 8.1.1 All possible care shall be exercised in handling cables on site.
- 8.1.2 Any drum of cable showing signs of damage shall not be used.
- 8.1.3 The outer covering (insulation) of cables shall not be damaged in any way and cables shall not be bent at radii less than allowed by the manufacturer.
- 8.1.4 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 the contractor.
- 8.1.5 Cable pulling and laying shall be done manually unless otherwise approved by the Depot Maintenance Manager (Electrical). No cable shall be subjected to a tension exceeding that stipulated by the cable manufacturer.

8.2 IN TRENCHES

- 8.2.1 High Voltage cables shall be spaced at a minimum of 300 mm apart (centre to centre).
- 8.2.2 Low Voltage cables shall be spaced at a minimum of 150 mm apart (centre to centre).
- 8.2.3 Pilot cables shall be laid beside the associated power cables.
- 8.2.4 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.

- 8.2.5 Pilot cables, when they are routed separately from their associated power cables, may be run next to one another.
- 8.2.6 Single core low voltage cables to be clamped in trefoil formation.
- 8.2.7 Where the cable cannot be laid down at the specified depth, prior authority shall be obtained from the Depot Maintenance Manager (Electrical) 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.
- 8.2.8 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.
- 8.2.9 Suitable rollers may be used during the laying of cables.
- 8.2.10 Cables shall be visually inspected for damage during and after laying. Any damage shall be reported immediately to the Depot Maintenance Manager (Electrical) who will issue the necessary instructions.
- 8.3 IN SLEEVE PIPES
- 8.3.1 All cables crossing beneath roads and pavements shall be enclosed in cement or PVC pipes with a minimum internal diameter of 150mm. The Depot Maintenance Manager (Electrical) 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.
- 8.3.2 Pipes shall maintain or exceed the specified cable spacing.
- 8.3.3 Only one High Voltage cable shall be laid per pipe.
- 8.3.4 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.
- 8.3.5 All cables crossings underneath railway tracks shall be in pipes in accordance with Transnet Freight Rail's drawing FG 263.
- 8.4 IN DUCTS AND BUILDINGS
- 8.4.1 Concrete ducts and pipes within buildings will be provided by others.
- 8.4.2 Before installing cables, the ducts are to be inspected to ensure that they are suitable and clean as not to damage the cables.
- 8.4.3 The cables are to be neatly positioned and cross overs are to be avoided.
- 8.4.4 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.
- 8.4.5 The Contractor shall supply all cable trays, racks, wooden cleats or other supports required to adequately support cables not laid in ducts.
- 8.4.6 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 SANS 32 and SANS 121 when used within 50 km of the sea or inland exposed conditions.
- 8.4.7 Where cable enters buildings sufficient measures shall be installed to ensure no moisture/water is digressing into the ducts. A sealing system based rubber modules from multi removable layers may be used.
- 8.5 UNDER BRIDGES AND IN TUNNELS
- 8.5.1 Where a cable route can only be against the concrete wall of a bridge or tunnel the cable shall be supported on:
- 8.5.1.1 Suitable brackets at 750 mm intervals or.

- 8.5.1.2 Straining wire secured at maximum 1 200 mm intervals.
- 8.5.2 Brackets shall be of robust design and shall be galvanised and painted in accordance with Transnet Freight Rail's specification CEE.0045.
- 8.5.3 The height of the cable route on the brackets or strain wire shall be determined and agreed upon on site.
- 8.5.4 The brackets or strain wire shall be supplied and installed by the contractor.
- 8.6 CROSSING OF PIPELINES AND OTHER CABLES
- 8.6.1 Cables shall pass beneath pipelines with a 300 mm minimum clearance between the top of any cable and the bottom of any oil pipe.
- 8.6.1.1 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.
- 8.6.2 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 Transnet Freight Rail's drawing CEE PA-0105 shall be placed between the two cables parallel to the lower cable.
- 8.7 IN RAILWAY FORMATIONS
- 8.7.1 Cables to be accommodated in railway formations shall be laid in accordance with Transnet Freight Rail's drawing FG 263.
- 8.8 SECURED TO POLES
- 8.8.1 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.
- 8.8.2 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.
- 8.8.3 Straps and pipes shall be supplied and installed by the Contractor.
- 8.9 EXPOSED CONDITIONS
- 8.9.1 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 SANS 32 and SANS 121.
- 8.9.2 These pipes or boxed sections shall be firmly secured to the bank or cut, at regular intervals.
- 8.9.3 All such material shall be supplied and installed by the Contractor.
- 8.9.4 Stake routes shall only be supplied when specifically called for in Appendix 1.
- 9.0 CABLE TERMINATIONS**
- 9.1 GENERAL
- 9.1.1 All cables shall be terminated and connected to the respective equipment, whether provided by the Contractor or by others.
- 9.1.2 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.
- 9.1.3 Termination of cables on outdoor equipment shall not be done during inclement weather conditions.

- 9.1.4 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.
- 9.1.5 All materials necessary for cable termination shall be provided by the Contractor.
- 9.1.6 The contractor shall ensure that correct phase rotation is maintained throughout.
- 9.1.7 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.
- 9.2 HV Cables
- 9.2.1 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 Depot Maintenance Manager (Electrical). This bond shall be easily removable for testing purposes.
- 9.2.2 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.
- 9.3 LV Cables (and Pilot Cables)
- 9.3.1 All cut ends of cables are to be sealed with suitable tape, or other approved means until they are ready to be terminated.
- 9.3.2 The cables shall terminate in compression type glands, brass or bronze, suitable for PVC SWA ECC cables.
- 9.3.2.1 The glands shall be fitted with neoprene shrouds or corrosion guard to prevent the ingress of moisture and dust at the point of cable entry.
- 10.0 CABLE JOINTS**
- 10.1 General
- 10.1.1 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.
- 10.1.2 Jointing shall not be carried out during inclement weather.
- 10.1.3 The cores of cables shall be jointed number to number or colour to colour.
- 10.1.4 The joints shall not impair the anti-electrolysis characteristics of the cables.
- 10.1.5 The conductor bridging the armouring shall be adequate to carry the prospective earth fault current.
- 10.1.6 A through joint shall only be permitted after every full drum length of cable.
- 10.1.7 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.
- 10.1.8 Transnet Freight Rail reserves the right to be present during jointing operations to familiarise themselves with any special techniques.
- 10.1.9 No joint shall be situated inside a cable pipe.
- 11.0 COVERING, BACKFILLING AND REINSTATEMENT**
- 11.1 Filling of trenches shall not commence before the Depot Maintenance Manager (Electrical) or his authorised representative has inspected and approved the cables and cable joints in situ in the section of trench concerned.

- 11.2 Trenches in railway formations shall be backfilled and reinstated in accordance with Transnet Freight Rail's drawing FG 263.
- 11.3 All other trenches shall be backfilled and reinstated as follows:
- 11.3.1 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.
- 11.3.1.1 Only soil with a thermal resistivity of 1,5 degrees C.m/watt, or lower may be used for this purpose.
- 11.3.1.2 When necessary imported fill shall be arranged by the Contractor and paid for at scheduled rates.
- 11.3.1.3 The backfill material shall be free from rubble/stones or foreign material.
- 11.3.2 HV cables shall, where likely to be mechanically damaged as decided by the Depot Maintenance Manager (Electrical), be protected by concrete slabs (to Drawing CEE PA-0105) 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.
- 11.3.3 Reinforced resin protection trench covers might also be used instead of concrete slabs. These covers shall be made of material which is flame retardant, non toxic and corrosion resistant.
- 11.3.4 The minimum dry densities of backfilling after compaction shall be not less than 1600 kg/cubic metre.
- 11.3.5 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 Depot Maintenance Manager (Electrical). 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.
- 11.3.5.1 Backfilling at pipe entries shall be such as not to stress or damage the cable during compaction from the top.
- 11.3.6 A continuous plastic cable warning tape, to drawing 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.
- 11.4 The back filled trench shall be maintained in a thoroughly safe condition by the contractor for the duration of the contract.
- 11.5 All back filling of road crossings shall be mechanically rammed.
- 11.6 Final surfacing of roads shall be restored by others unless called for under "Scope of Work", Appendix 1.
- 11.7 Concrete cable route markers shall be provided and installed by the contractor in accordance with drawing CEE-PK-14.
- 11.8 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.
- 12.0 MEASUREMENTS**
- 12.1 All measurements for payment purposes shall be made jointly by representatives of the Contractor and Transnet Freight Rail and shall be agreed upon by both parties. The Contractor shall be responsible for obtaining the Depot Maintenance Manager (Electrical)'s signed approval of such measurements.

- 12.2 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.
- 12.3 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".
- 12.4 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.
- 12.5 The classification of different types of ground for measurement purposes shall be as follows:
- 12.5.1 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.
- 12.5.2 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.

13.0 TESTS

- 13.1 The costs of all post-installation tests shall be borne by the Contractor.
- 13.2 The Contractor shall be responsible for remedial work necessary due to damages caused during tests.
- 13.3 Transnet Freight Rail 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.
- 13.4 Test instruments shall be of the accuracy class. Calibration certificates from a recognised testing authority shall be available for inspection and shall not be older than one year.
- 13.5 Time measurements shall be carried out using an approved digital timer.
- 13.6 The final commissioning site tests will be carried out by Transnet Freight Rail.
- 13.6.1 A suitably qualified staff member of the Contractor shall assist Transnet Freight Rail during the tests and shall carry out any remedial work where necessary.
- 13.7 The contractor shall notify the Depot Maintenance Manager (Electrical) in writing 4 weeks before the commissioning date and shall have carried out the following site tests before such date:
- 13.7.1 Prove the continuity and insulation resistance of the multicore pilot cables.
- 13.7.2 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.
- 13.7.3 The following voltages withstand tests on each completed cable run:
- 13.7.3.1 Paper insulated cables:
- (i) Rating up to 12,7/22 kV shall be tested in accordance to SANS 97.
 - (ii) Rating 19/33 kV shall be tested in accordance to BS 6480.
- The extruded PVC impermeable serving shall withstand a test voltage of 10 kV DC between armouring and earth for 1 minute.
- The insulation between armouring and lead sheath shall withstand a test voltage of 4 kV DC for 1 minute.

13.7.3.2 XLPE Insulated Cables:

All cables rated up to 19/33 kV shall be tested in accordance to SANS 1339, and cables rated up to 1,9/3,3 kV shall be tested in accordance to BS 5467.

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.

- 13.7.4 The Contractor shall submit three copies of certified test reports to the Depot Maintenance Manager (Electrical) within three weeks after completion of the tests.

14.0 GUARANTEE

- 14.1 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.
- 14.2 The guarantee period shall commence the day the installation is formally handed over to and accepted by Transnet Freight Rail.
- 14.3 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.
- 14.4 Any defects that may become apparent during the guarantee period shall be rectified to the satisfaction of, and free of cost to Transnet Freight Rail.
- 14.5 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 Transnet Freight Rail of such defects.
- 14.6 Should the Contractor fail to comply with the requirements stipulated above, Transnet Freight Rail shall be entitled to undertake the necessary repair work or effect replacement of defective apparatus or materials, and the Contractor shall reimburse Transnet Freight Rail the total cost of such repair or replacement, including the labour costs incurred in replacing defective material.

15.0 APPENDIX 1

SCOPE OF WORK
(To be filled by the client)

1.0 Site inspection required (Yes/No).....

Date :

Time :

Client's Signature:

“PREVIEW COPY ONLY”

16.0 APPENDIX 2

SCHEDULE OF REQUIREMENTS

(To be filled by Tenderer)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
1.0	Route surveys		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		/m		
5.0	Concrete slabs supplied and installed		each		
6.0	Plastic cable warning tape supplied and installed		/m		
7.0	150 mm dia. half round concrete pipes supplied and installed		/m		
8.0	150 mm dia. Cement or PVC pipes supplied and installed		/m		
9.0	Cutting of checker Plates		/m cut		
10.0	Backfilling of trenches with soil		/cubic metre		
11.0	Backfilling of trenches with 10:1 soil/cement mix		/cubic metre		
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		

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
16.0	Installation of cables				
16.1	Installed in trenches				
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				
16.2.1	High Voltage Cables		/m		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				
16.2.2	Low Voltage Cables		/m		
	..... Core.....		mm sq		
	..... Core.....		mm sq		
	..... Core.....		mm sq		
	..... Core.....		mm sq		
16.3	Installed in ducts				
16.3.1	High Voltage Cables		/m		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
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				
17.1.1	High Voltage Cables		/m		
	240 mm sq				
	185 mm sq				
	120 mm sq				
	95 mm sq				
	16 mm sq				
	Other sizes				
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				
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		

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
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				
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).				

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
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				
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		

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT RATE	TOTAL
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				
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				

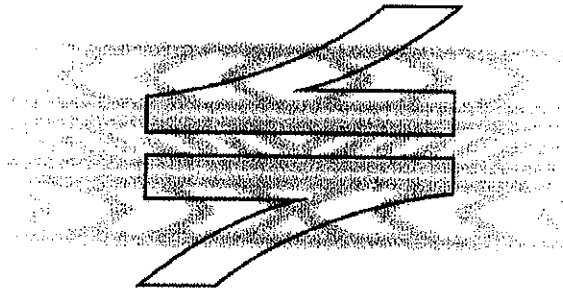
TENDERER'S SIGNATURE.....

DATE.....

17.0 APPENDIX 3

- SANS 1411 – 1: Materials of insulated electric cables and flexible cords Part 1: Conductors.
- SANS 1411 – 2: Materials of insulated electric cables and flexible cords Part 2: Polyvinyl chloride (PVC).
- SANS 1411 – 3: Materials of insulated electric cables and flexible cords Part 3: Elastomers.
- SANS 1411 – 4: Materials of insulated electric cables and flexible cords Part 4: Cross-linked polyethylene (XLPE).
- SANS 1411 – 5: Materials of insulated electric cables and flexible cords Part 5: Halogen-free, flame-retardant materials.
- SANS 1411 – 6: Materials of insulated electric cables and flexible cords Part 6: Armour.
- SANS 1411 – 7: Materials of insulated electric cables and flexible cords Part 7: Polyethylene (PE).
- SANS 1507 – 1: Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 1: General.
- SANS 1507 – 2: Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 2: Wiring cables.
- SANS 1507 – 3: Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 3: PVC Distribution cables
- SANS 1507 – 4: Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 4: XLPE Distribution cables
- SANS 1507 – 5: Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 5: Halogen-free distribution cables.
- SANS 10198 – 1: The selection, handling and installation of electric power cables of rating not exceeding 33 kV Part 1: Definitions and statutory requirements.
- SANS 10198 – 2: The selection, handling and installation of electric power cables of rating not exceeding 33 kV Part 2: Selection of cable type and methods of installation.
- SANS 10198 – 3: The selection, handling and installation of electric power cables of rating not exceeding 33 kV Part 3: Earthing systems - General provisions.
- SANS 10198 – 4: The selection, handling and installation of electric power cables of rating not exceeding 33 kV Part 4: Current ratings.
- SANS 10198 – 5: The selection, handling and installation of electric power cables of rating not exceeding 33 kV Part 5: Determination of thermal and electrical resistivity of soil.
- SANS 10198 – 6: The selection, handling and installation of electric power cables of rating not exceeding 33 kV Part 6: Transportation and storage.
- SANS 10198 – 7: The selection, handling and installation of electric power cables of rating not exceeding 33 kV Part 7: Safety precautions.

“PREVENTION IS BETTER THAN CURE”



SPOORNET

A division of Transnet limited

**TECHNICAL
RAILWAY ENGINEERING
SPECIFICATION**

**PAINTING OF STEEL COMPONENTS OF
ELECTRICAL EQUIPMENT**

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1.0 SCOPE

This specification covers the surface preparation, paint systems and painting of steel components of electrical equipment.

2.0 REFERENCES AND GLOSSARY

The following standards and specifications are referred to herein:

2.1 South African Bureau of Standards: -

SABS 064 : Code of Practice for the Preparation of Steel Surfaces for Coating.

SABS 1091 : National Colour Standards for Paint.

2.2 Trade names :

OptiDegreaser

OptiPrime^{Aqua}

Noxyde

2.3 Classification of level of surface degradation:

RE1 – 0.05% of surface rusted

RE2 – 0.5% of surface rusted

RE3 – 1.0% of surface rusted

RE4 – 3.0% of surface rusted

RE5 – 8.0% of surface rusted

3.0 METHOD OF TENDERING

3.1 Tenderers shall indicate clause by clause compliance or non-compliance with the specification. This shall take the form of a separate document listing all the specification clause numbers indicating the individual statement of compliance or non-compliance. Tenderers to elaborate on their response to a clause can use this document.

4.0 SURFACE PREPARATION

4.1 NON-GALVANISED STEELWORK

4.1.1 New Steelwork

SURFACE PREPARATION (Read: NOTES and SPECIAL INSTRUCTIONS)	PRODUCT REQUIREMENTS & APPLICATION (See Variations for Specific Environmental Conditions)
<ul style="list-style-type: none"> > Sandblast to a standard of Sa2 to remove mill scale and/or flash rust > Remove dust with <u>clean</u> compressed air (Check air for oil contamination) 	<ul style="list-style-type: none"> > Apply a stripe coat to edges, bolts, crevices, nuts and rivets. > Apply one thick coat of Noxyde to the entire structure with contrasting color. > Apply a final thick coat of Noxyde at a consumption rate of minimum 400g/m²

4.1.2 Previously Coated Steelwork

4.1.2.1 COATING START FAILING TO A LEVEL OF RE 2

<ul style="list-style-type: none"> > Test for adhesion (refer to supplier) > Degrease thoroughly with OptiDegreaser > Hydro Blast complete substrate using a rotating nozzle and minimum 250 bar at the nozzle 	<ul style="list-style-type: none"> > Apply a stripe coat to edges, bolts, nuts and rivets and fill crevices. > Apply one coat of Noxyde to entire substrate in a contrasting color
--	--

4.1.2.2 COATING FAILURE AND RUSTING TO A LEVEL OF RE 4

<ul style="list-style-type: none"> > Remove all visible traces of rust by mechanical means ST2 (chip/grind/sand) OR shotblasting /spotblasting) > Degrease thoroughly with OptiDegreaser > Hydro Blast complete substrate using a rotating nozzle and minimum 250 bar at the nozzle. 	<ul style="list-style-type: none"> > Apply a thick coat of Noxyde to the de-rusted areas, edges, bolts, nuts and rivets and fill crevices > Apply one coat of Noxyde at a consumption rate of minimum 400g/m² to the entire substrate using a contrasting color.
--	---

4.1.2.3 BITUMEN COATED

<ul style="list-style-type: none"> > Remove all visible rust and loosely adhering bitumen coating by means of chipping and scraping (ST2) > Degrease thoroughly with OptiDegreaser > Hydro Blast complete substrate using a rotating nozzle and minimum 250 bar at the nozzle. 	<ul style="list-style-type: none"> > Apply a thick coat of Noxyde to the de-rusted areas, edges, bolts, nuts and rivets and fill crevices > Apply two coats of Noxyde at a consumption rate of minimum 400g/m² per coat to the complete substrate using contrasting colors
--	---

4.1.2.4 BADLY RUSTED STEEL WITH PITTING & CRUST FORMATION TO RE 5

<ul style="list-style-type: none"> > 1. Degrease thoroughly with OptiDegreaser > 2. Hydro Blast complete substrate using a spinner tip and minimum 250 bar at the nozzle > 3. Shotblast/sandblast complete substrate giving particular attention to bolts nuts rivets and crevices. Sa2 > 4. Dedust 	<ul style="list-style-type: none"> > Apply a first thick coat of Noxyde to the entire substrate > Apply a stripe coat to edges, bolts, nuts and rivets and fill crevices using a contrasting color > Apply a final coat of Noxyde at a consumption rate of minimum 400g/m²
---	---

4.2 GALVANISED STEELWORK

4.2.1 NEW AND WEATHERED GALVANISING WITH A SMOOTH GLOSSY FINISH

<ul style="list-style-type: none"> > Degrease thoroughly with OptiDegreaser > Rinse down with copious quantities of potable water 	<ul style="list-style-type: none"> > Apply one thin coat of OptiPrime^{AQUA} (100 micron wet/35 micron dry) > Apply a stripe coat of Noxyde to edges, bolts, nuts and rivets and fill crevices > Apply two coats of Noxyde at a consumption rate of minimum 400g/m² per coat to the complete substrate using contrasting colors
---	--

4.2.2 WEATHERED GALVANISING

4.2.2.1 White rust (zinc oxide)

<ul style="list-style-type: none"> ➤ Degrease thoroughly using OptiDegreaser – ensure that all traces of "white rust" are removed ➤ Rinse down with copious quantities of potable water 	<ul style="list-style-type: none"> ➤ Apply one thin coat Noxyde ➤ Apply a stripe coat of Noxyde to edges, bolts, nuts and rivets and fill crevices ➤ Apply a final coat of Noxyde at a consumption rate of minimum 400g/m² per coat to the complete substrate using a contrasting color
---	---

4.2.2.2 Combination of red rust (iron oxide) and white rust (zinc oxide)

<ul style="list-style-type: none"> ➤ Remove all traces of red rust ➤ Degrease thoroughly using OptiDegreaser – ensure that all traces of "white rust" are removed ➤ Rinse down with copious quantities of potable water 	<ul style="list-style-type: none"> ➤ Apply a thick coat of Noxyde to the de-rusted areas, edges, bolts, nuts and rivets and fill crevices ➤ Apply a final coat of Noxyde at a consumption rate of minimum 400g/m² per coat to the complete substrate using a contrasting color
--	---

NOTES and SPECIAL INSTRUCTIONS:		
1 Sand or Grit-blasting a) Always use clean, non-recycled grit b) Always use fine or extra fine grit c) Always use oil free air d) Always use a moisture trap e) Dedust	2 Degreasing: a) Use only OptiDegreaser b) Dilute according to instructions – see data sheet c) Always follow up with hydro-blasting to remove all chemical residues	3 Hydro-blasting: a) Always use clean potable water b) Use a rotating nozzle and ensure a pressure of minimum 250 bar at the nozzle c) Remove ALL traces of dirt and any form of salt contamination and residues of the degreasing agent d) Concentrate in crevices and other similar "collection" areas

5. PRODUCT APPLICATION

5.1 METHOD OF APPLICATION

OptiPrime ^{QRA}	Noxyde
Temperature-Min 5 °C Relative humidity-Max 80% R.H. ➤ Apply by brush, lacquer roller or airless spray using a no. 11 nozzle ➤ Apply one thin coat only - 100 micron wet = 35 micron dry (DFT) ➤ Small parts can be dipped - dilute with 10% water for dipping	Temperature-Min. 8 °C, Max. 55 °C Relative Humidity-Max 80% R.H. ➤ Apply by brush, roller or airless spray ➤ For airless spray applications refer to "Tips for airless spraying of Noxyde"

5.2 DRYING TIME AND OVERCOAT PERIODS

<ul style="list-style-type: none"> ➤ Do not overcoat within 12 hours ➤ Wash down with clean potable water (100 bar) before over coating to remove dust or any other form of intermediate contamination 	<ul style="list-style-type: none"> ➤ Drying time is dependant on ambient conditions and can vary from a few minutes (in dry windy conditions) to a few hours (in humid shaded conditions) ➤ Overcoat as soon as possible to avoid contamination of previous coat ➤ Wash down with clean potable water (100 - 150 bar) before over coating if danger of contamination exists or if left more than 4 hours before over coating
--	---

5.3 CURING TIME

n/a	> 7 - 14 days to "full cure". During this period the product is prone to mechanical damage - the longer time it is allowed to cure, the tougher it becomes
-----	--

5.4 DRY FILM THICKNESS (DFT) READINGS

35 micron	<ul style="list-style-type: none"> > Severe coastal & marine environments (in the spray zone) - TWO stripe coats & overall minimum DFT of 400 micron > Normal coastal environment (1.5 km from the coast line) - a single stripe coat & overall minimum DFT of 400 micron > Non coastal high rainfall areas, in the immediate vicinities of rivers, dams, lakes, etc., and in industrial areas with high levels of chemical pollution - a single stripe coat & overall minimum DFT of 400 micron > Dry non aggressive environments - a single stripe coat & overall minimum DFT of 250 micron <p>NOTE: DFT readings can only be taken after 72 hours</p>
-----------	--

5.5 Notwithstanding the above requirements, all surfaces shall be cleaned according to the appropriate method described in SABS 064 for the particular surface to be cleaned, the contamination to be removed and the primer to be applied.

5.6 Blast cleaning of components shall be in accordance with clause 4.3 of SABS 064 to a degree of cleanliness of at least Sa 2 for inland exposure components and Sa 2 ½ for coastal exposure components. See Table 1 of SABS 064 for the appropriate profile.

5.7 Sheet metal that cannot be blast cleaned shall be cleaned by pickling according to clause 4.6 of SABS 064.

5.8 Components that will be powder coated shall be cleaned and prepared by the surface conversion process according to clause 5 of SABS 064 to a medium weight classification of table 2 of that specification.

5.9 Oil and accumulated dirt on steel components where no rusting is present shall be removed according to clause 3 of SABS 064.

6.0 PAINT SYSTEM

A choice of two systems is available to suit the contractors equipment.

6.1 Noxyde paint system

1st coat: OptiPrime^{Aqua}

Wet film thickness: 100 micrometers. Dry film thickness: 35 micrometers.

2nd coat: Noxyde Topcoat

Dry film thickness: 165 micrometers @ 400g/m².

6.1.1 Paint application:

6.1.1.1 The primer and paint is normally applied by brush at supply viscosity (no reducer required).

6.1.1.2 The practical spreading rate of the primer and paint is a function of the ambient temperature, wind velocity and the application technique, but will generally fall in the range of 400g/m² in low to mild corrosive areas, and 500g/m² in severely corrosive areas.

6.1.1.3 Once the applied coat of primer/paint is touch dry, the next coat of paint may be applied.

6.1.1.4 If painted steelwork is to be bolted onto structures, it is imperative that the paint has been allowed to hard dry before the steelwork is bolted onto structures. This is to prevent the soft paint being damaged when tightening the bolts securing the steelwork to the structures.

6.2 Powder Coating System.

The powder-coating process shall be in accordance with SABS 1274 type 4: Corrosion-resistant coatings for interior use and using the thermosetting type high gloss coatings.

7.0 COATINGS AND WORKMANSHIP

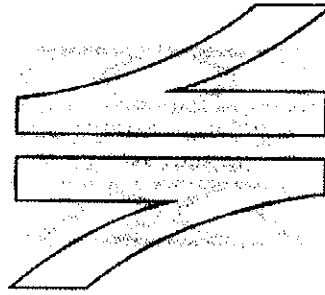
7.1 All specified coatings shall be applied according to the relevant specification and the manufacturer's instructions shall be followed.

7.2 Coatings shall not be applied under conditions that may be detrimental to the effectiveness of the coating or the appearance of the painted surface.

7.3 When examined visually, the finished products shall have a uniform appearance and shall show no sign of damage. Damaged areas shall be repaired coat for coat to obtain the desired finish.

TENDERER'S SIGNATURE.....

DATE.....



SPOORNET

A division of Transnet limited

**TECHNICAL
RAILWAY ENGINEERING
SPECIFICATION**

**HOT DIP GALVANISING AND PAINTING OF
ELECTRIFICATION STEELWORK**

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1.0 SCOPE

- 1.1 This specification covers the hot dipped galvanising and painting of electrification steelwork.
- 1.2 The extent of work includes galvanising and painting of steelwork consisting of universal column masts with welded on bases up to 14 m in length and small part steelwork consisting of channel, angle and flat iron fittings, welded assemblies and tubular cantilevers.

2.0 REFERENCES

- 2.1 The following publications (latest edition) are referred to herein:

SABS 763: Hot Dipped Galvanising.

SABS 1091: National Colour Standards for Paint.

3.0 METHOD OF TENDERING

- 3.1 Tenderers shall indicate clause by clause compliance or non-compliance with the specification. This shall take the form of a separate document listing all the specification clause numbers indicating the individual statement of compliance or non-compliance.
- 3.2 The Schedule of Requirements, Quantities and Prices, Appendix 1 to this specification shall be fully completed by Tenderers. Failure to submit a fully completed sheet may preclude a tender from further consideration.

4.0 APPENDICES

The following appendices form an integral part of this specification:

Appendix 1: Schedule of Requirements, Quantities and Prices.

5.0 GALVANISING OF STEELWORK

- 5.1 The steelwork must be cleaned and hot dip galvanised to SABS 763 except for the following:
- 5.1.1 No ammonium chloride salts shall be used on withdrawal from the molten zinc.
- 5.2 After galvanising no passivation must take place. Quenching may be done with clean water. No sodium dicromate must be used.
- 5.3 All surface contamination of zinc oxide (zinc ash) must be removed by means of brushing.

6.0 PRIMER COATING

- 6.1 The hot dip galvanising shall be followed as soon, as is practical by the painting procedures as specified hereunder:
- 6.1.1 Prior to painting, all steelwork shall be cleaned with a solvent cleaner and washed down with clean water to remove all traces of solvent. The solvent cleaner used must be compatible with zinc (similar to Galv Clean).
- 6.1.2 The primer coating, a two-component polyamide cured epoxy primer e.g.: PLASCOGUARD GEHOPPENS PRIMER or equivalent shall be applied to a dry film thickness of 75 microns. Application shall be in accordance with the manufacturers

- instructions.
- 6.1.3 The primer coating shall be allowed to cure for a minimum period of 48 hours before handling to facilitate coating of the rest of the surfaces as well as the application of the intermediate coat.
- 6.1.4 A coat of a two-component high-build micaceous iron oxide pigmented polyamide cured re-coatable epoxy e.g.: SIGMACOVER CM MIOCOAT or equivalent shall be applied to a wet film thickness of 75-85 microns. Application shall be in accordance with manufacturers instructions.
- 6.1.5 A further 48 hours period must be allowed for curing of the primer coatings before handling the steelwork for transportation purposes.
- 6.2 All care must be exercised during handling to prevent damage of the painted surfaces.
- 6.3 Loading of steelwork must be done in such a way to limit damage of surfaces to a minimum during transit.
- 6.4 Only non-metallic slings should be used, preferably nylon or cotton material.
- 6.5 Spornet reserves the right to inspect the premises where this work is carried out at any time during the duration of galvanising and primer painting.
- 6.6 Spornet shall inspect all steelwork at the Tenderers premises before dispatch of any such steelwork.
- 7.0 TOP COATING**
- 7.1 The topcoat shall be applied directly after erection of the steelwork in accordance with procedures hereunder:
- 7.1.1 Damage of the primed surfaces shall be repaired, after erection, by the application of one or more coats of a two component high build micaceous iron oxide pigmented polyamide cured re-coatable epoxy coating e.g.: SIGMACOVER CM MIOCOAT or equivalent until the original film thickness is obtained.
- 7.1.2 A topcoat of a two-component aliphatic isocyanate cured acrylic finish e.g.: SIGMADUR GLOSS or equivalent shall be applied according to the paint manufacturers instructions to a minimum dry film thickness of 50 microns. The topcoat shall be determined by whether steelwork is for Spornet or the South African Rail Commuter Corporation.
- 7.1.2.1 For Spornet the colour shall be French Grey (SABS 1091: Code H30).
- 7.1.2.2 For the South African Rail Commuter Corporation the colour shall be Medium Sea Grey (SABS 1091: Code G24).
- 8.0 QUALITY**
- 8.1 The tenderer shall submit a copy of a Quality Plan to be implemented during the process. The Quality Plan shall include stages for preparation of metalwork prior to galvanising, for the galvanising and for the painting process.
- 8.2 The Quality Plan shall furthermore make provision for the customer's requirements for inspection and acceptance points and witnessing of tests to establish whether requirements of SABS 763 in so far as preparation of steelwork prior to galvanising, galvanising and painting requirements as per this specification are complied with.

9.0 SUBSTITUTION

- 7.1 This instruction replaces Specification CEE.0183.95.
- 7.2 All clauses have been revised to suit latest requirements e.g.: removal of the Complies/Does not complies reference.

END

TENDERER'S SIGNATURE: _____

DATE: _____

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Appendix 1

SCHEDULE OF REQUIREMENTS, QUANTITIES AND PRICES

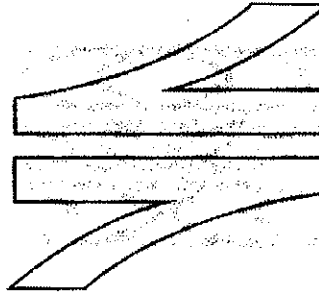
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SPOORNET

A division of Transnet limited

**TECHNICAL
CONFIGURATION MANAGEMENT
SPECIFICATION**

**DRAWINGS, CATALOGUES, INSTRUCTION MANUALS
AND SPARES LISTS FOR ELECTRICAL EQUIPMENT
SUPPLIED UNDER CONTRACT**

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1.0 SCOPE

This specification covers Spoornet's requirements for drawings, catalogues, and instruction manuals and spares lists of electrical equipment supplied under contract.

2.0 DEFINITIONS

2.1 "Design drawings for approval" defines those drawings, which have to be submitted to Spoornet for approval prior to manufacture of equipment.

2.2 "Installation drawings" defines those drawings, which are required for the installation of the equipment.

2.3 "As Built drawings" defines those drawings, which reflect all the various approved designs, layouts, etc., of the actual final accepted state of the equipment.

3.0 STANDARDS AND SPECIFICATIONS

3.1 The following standards and specifications are referred to:

CEE.0012: Method of Tendering

SABS 0111: Engineering Drawings.

BS 308: Engineering Drawing Practice.

NRS 002: Graphical Symbols for Electrical Diagrams.

IEC 617: Graphical Symbols for Diagrams.

ASHRAE: American Society of Heating Refrigeration Air-conditioning Engineers Standard.

3.1.1 The following Spoornet standard (Electrical) symbol drawings are listed for reference:

CEE-PA-19: Symbols for Electrical Installations.

CEE-PA-42: Symbols for Distribution and Transmission Layout.

CEE-PA-101: Symbols for Air-conditioning installations.

CEE-TA-62: Standard Electrification Symbols.

3.2 Tenderers and contractors shall ensure that they work to the latest issues and amendments of the above standards and specifications.

4.0 APPENDIX

The following appendix forms an integral part of this specification:

Appendix 1: SCHEDULE OF REQUIREMENTS

This appendix calls for specific requirements applicable to the contract.

5.0 METHOD OF TENDERING

5.1 Tendering shall be in accordance with Spoornet (Electrical) specification CEE.0012.

5.2 Tenderers shall indicate clause by clause compliance or non-compliance with the specification. This shall take the form of a separate document listing all the specification clause numbers indicating the individual statement of compliance or non-compliance.

5.3 The Schedule of Requirements, Quantities and Prices, Appendix 1 to this specification shall be fully completed by Tenderers. Failure to submit a fully completed sheet may preclude a tender from further consideration.

6.0 LANGUAGE AND UNITS OF MEASURE

Drawings and documents shall be prepared in English and the ISO unit of measure. Other offers will be considered on merit.

7.0 DRAWINGS

7.1 Drawings shall be generated in either Microstation or any CAD format, which can be read by Microstation, but offers on other media will be considered on merit.

7.2 Drawings shall be prepared in such a manner that they fully comply with the requirements of SABS 0111 and/or BS 308.

7.3 Symbols, with their explanations used on the drawings but not covered by the NRS 002, IEC 617, ASHRAE or Spoornet's symbol drawings shall be furnished i.e. then included on the drawing or supplied on a separate symbol list which is to be cross referenced to the drawing.

7.4 Where the publications referred to in clause 3.1 are at variance, the practice detailed in SABS 0111 shall take preference.

7.5 Drawings shall be prepared for ISO; "A" series size sheets and shall not be greater than A1 size except as detailed below.

7.5.1 Where under exceptional circumstances the nature of the work is such that a size A1 is impractical, then the A0 size may be used.

7.5.2 Long drawings, where necessary for wiring/circuit diagrams, cable run diagrams, track layouts, etc., shall be prepared with widths equal to the widths of the "A" series sheets as required, but preferably not exceeding the length of an A0 sheet.

7.6 All interrelated drawings shall be clearly and adequately cross-referenced.

7.7 The Contractor hereby grants to Transnet a non-exclusive licence, in accordance with the provisions of section 22 of the Copyright Act, 1978;

7.7.1 to copy any plan, diagram, drawing, specification, bill of quantities, design calculation or other similar document made by the Contractor, other than under the direction or control of Transnet, in connection with the extent of work;

7.7.2 to make free and unrestricted use thereof for its own purposes;

7.7.3 to provide copies thereof to consultants to Transnet to be used by them for the purpose of such consultations and consulting services and-

7.7.4 to provide other parties with copies thereof for the purpose of tenders invited by Transnet.

- 7.7.5 Such non-exclusive licence shall apply *mutatis mutandis* to any plan, diagram, drawing, specification, bill and/or schedule of quantities, design calculation or other similar document made, other than under the direction or control of Transnet, by any principal or subcontractor of the Contractor. The provisions of this clause shall not apply to documents made, in the case of plant or equipment to be supplied, for the manufacturing process of such equipment, but only to the equipment supplied itself.
- 7.7.6 Transnet shall make no separate or extra payment in respect of any non-exclusive licence granted in terms hereof.

8.0 INFORMATION REQUIRED ON DRAWINGS

- 8.1 A title block shall be provided in the lower right hand corner of each drawing, indicating:
- 8.1.1 Descriptive title.
 - 8.1.2 Contractor's drawing number.
 - 8.1.3 Space for Spornet's drawing number (as requested in clause 7.7).
 - 8.1.4 Place of installation.
 - 8.1.5 Contract / Order number.
 - 8.1.6 Contractor's name.
 - 8.1.7 Signature or name of approving officer (as requested in clause 8.0).
 - 8.1.8 Approval date.
 - 8.1.9 Issue number.
 - 8.1.10 Projection symbol for multi-view drawings, if required.
- 8.2 Successful Tenderers can obtain a copy of Spornet's standard title block (Microstation or DXF formats) free of charge by contacting the Documentation Management section.
- 8.3 On wiring and circuit diagrams, the following shall be specified:
- 8.3.1 Cable and wire sizes.
 - 8.3.2 Values of resistance.
 - 8.3.3 Breaking capacity of switches.
 - 8.3.4 Ratings of equipment.
- 8.4 On each assembly or sub-assembly drawing, the following shall be given:
- 8.4.1 Description of item.
 - 8.4.2 Quantity required for assembly depicted.
 - 8.4.3 Material manufactured from.
 - 8.4.4 The classification of the material according to the relevant SABS specification or other specifications referred to herein.

-
- 8.4.5 The class or process of finish and/or coating.
- 8.4.6 Where special parts are specified, the name of the manufacturer, the size, capacity and the name or catalogue number of each part shall be furnished.
- 8.4.7 The mass of finished item depicted on the drawing.
- 8.4.8 Dimensions from a proper reference surface.
- 8.4.9 Dimension tolerances.
- 8.5 *On electrification drawings, the following shall be specified:*
- 8.5.1 Kilometre distances.
- 8.5.1.1 Kilometre distances of all new and existing masts measured from the preceding kilometre post.
- 8.5.2 Civil
- 8.5.2.1 The following civil information shall be shown:
- 8.5.2.1.1 Bridges.
- 8.5.2.1.2 Tunnels.
- 8.5.2.1.3 Pipes.
- 8.5.2.1.4 *Culverts.*
- 8.5.2.1.5 Subways.
- 8.5.2.1.6 Manholes.
- 8.5.2.1.7 Off track platforms.
- 8.5.2.1.8 Water-furrows along track.
- 8.5.2.1.9 Service roads that may influence electrification.
- 8.5.2.1.10 Level crossings.
- 8.5.2.1.11 All banks and cuttings.
- 8.5.2.1.12 Retaining walls.
- 8.5.2.1.13 Gradient markers and gradients.
- 8.5.2.1.14 Boundary fences (where relevant).
- 8.5.2.1.15 The beginning and ending of transition and circular curves and the radius.
- 8.5.2.3 On all station plans the beginning and ending of the platforms to be indicated, as well as all buildings and structures on the platform which may effect electrification. All secondary platforms/structures/obstacles, which may effect electrification, must also be shown.
- 8.5.2.4 All points with stock rail joints, intersection of centre lines and all ends of point positions to be shown, as well as the type of point, e.g. 1:9 LH (left hand).
-

-
- 8.5.3 Electrical
- 8.5.3.1 The following electrical information shall be shown:
- 8.5.3.1.1 New and existing masts and structures with appropriate sizes.
- 8.5.3.1.2 Span lengths.
- 8.5.3.1.3 Tension lengths.
- 8.5.3.1.4 Mast to track centres.
- 8.5.3.1.5 Tension type (spring or weight).
- 8.5.3.1.6 Transmission lines, Transnet and Eskom (Showing crossing heights above rail level).
- 8.5.3.1.7 Telkom lines.
- 8.5.3.1.8 Height gauges.
- 8.5.3.1.9 Power and Lighting kiosks.
- 8.5.3.1.10 Electrical cables nearer than 3,2m from track centre, as well as cables crossing the track.
- 8.5.3.2 Wire profiles showing clearances/wire heights for all transmission and telecommunication lines that cross the tracks shall be shown on the drawing at the point of crossing, in either tabular or graphic format.
- 8.5.3.3 *Wire profile for all bridges and tunnels shall be shown on separate drawings.*
- 8.5.3.4 Important information that shall be noted are:
- 8.5.3.4.1 Basic span.
- 8.5.3.4.2 Ruling contact wire height.
- 8.5.3.4.3 Reference to bonding drawings.
- 8.5.3.4.4 Wire sizes.
- 8.5.3.4.5 Types of structures and foundations.
- 8.5.3.4.6 Tables for traction and transmission line (Showing wire heights).
- 8.5.3.4.7 Dropper chart.
- 8.5.3.4.8 Overlaps.
- 8.5.3.4.9 Jumpers.
- 8.5.3.4.10 Staggering.
- 8.5.3.4.11 References to switching diagram drawings.
- 8.5.3.4.12 Any other relevant information.
- 8.5.4 Signal.
- 8.5.4.1 The following signal information shall be shown:
-

- 8.5.4.1.1 Signal gantries (showing direction of aim).
- 8.5.4.1.2 Independent signals (showing direction of aim).
- 8.5.4.1.3 Signal kiosks.
- 8.5.4.1.4 Telephones.
- 8.5.4.1.5 Signal relay rooms.
- 8.5.4.1.6 Radio repeater rooms.
- 8.5.4.1.7 Signal cables nearer than 3,2m from track centre, as well as cables crossing the track.
- 8.5.5 Electrification information must be clearly indicated on drawings (see also drg no CEE-TA-62 for Standard Electrification Symbols).
- 8.7 The successful tenderer shall obtain Spoornet's drawing numbers from the Documentation Management section of Spoornet well in advance in writing, wherein details of all relevant drawings, i.e. titles and makers numbers are quoted. Against this information Spoornet will allocate its own numbers for inclusion by the Contractor on the original drawings.
- 9.0 CERTIFICATION OF DRAWINGS**
- The contractor against a date to certify that the drawing has been checked and is correct in all respects shall approve each drawing. This also includes changes.
- 10.0 CHANGES TO DRAWINGS**
- Any drawing returned to the Contractor for changes shall be re-submitted to Spoornet within 21 days with the appropriate changes endorsed thereon.
- 11.0 SUBMISSION OF TENDER DRAWINGS**
- The Tenderer shall submit drawings of all major items of equipment with the tender. The drawings shall be sufficiently detailed (e.g. safety factors) to enable suitability of the design to be judged and to enable Spoornet to prepare a reasonably accurate estimate of the cost of maintenance.
- 12.0 DRAWINGS TO BE SUPPLIED BY SUCCESSFUL TENDERER**
- 12.1 Two prints of each design drawing for approval to be submitted prior to commencement of work or manufacture of any equipment to Spoornet. This includes drawings of general layouts, cable routes, schematic diagrams, foundations, equipment etc.
- 12.2 Two prints of each installation and/or erection drawing to be submitted to Spoornet. This includes drawings of modular steel buildings, structures etc. and shall be delivered at the same time the delivery of the equipment commences.
- 12.3 The successful tenderer shall supply one complete set of approved (signed) "As Built" working drawings as well as the electronic files thereof. Drawings shall be fully dimensioned, fully detailed, clear and neat. The set shall comprise all electrical and mechanical drawings considered necessary by Spoornet and shall include drawings of all renewable parts or items. "As Built" drawings of all enclosures, structures and foundations shall also be supplied.

- 12.4 All relevant "As Built" drawings required shall be delivered to Spoornet within 90 days of completion of the installation and delivery of equipment.
- 12.5 Until all relevant drawings called for in the contract are delivered, the contract will be considered incomplete.
- 13.0 CATALOGUES**
- 13.1 Tenderers shall submit a separate quotation for the supply of the itemised part catalogues when specified in the Schedule of Requirements. The size shall be A4 (297 mm x 210 mm). Consideration shall be given on merit of the supply of these catalogues electronically (PDF format).
- 13.2 The information contained in the catalogues shall be classified into convenient sectors and be indexed. Thumb tabs shall be provided for quick reference to sections. All apparatus shall be illustrated by means of photographs or detailed sketches on which both the parts and the catalogue numbers of the parts are clearly shown. Catalogues shall have exploded views of components for clarity where needed.
- 13.3 The following information shall be given in tabular form:
- 13.3.1 Designation of apparatus or item of equipment.
- 13.3.2 Description of part including information such as dimensions, sizes, resistance values, stranding, material, current ratings, etc.
- 13.3.3 Catalogue number.
- 13.3.4 Manufacturer's name.
- 13.3.5 "As Built" drawing and item number where applicable.
- 13.3.6 Quantity of parts required for each piece of apparatus.
- 13.3.7 Illustrating photographs or sketch number.
- 13.3.8 Nato registration where applicable.
- 13.4 In a suitable section of the catalogue the following information shall be given:
- 13.4.1 Index to "As Built" Drawings.
- 13.4.1.1 "As Built" drawing number.
- 13.4.1.2 Heading.
- 13.4.1.3 Parts shown on drawing.
- 13.4.2 Index to catalogue numbers.
- 13.4.2.1 Catalogue numbers in numerical order.
- 13.4.2.2 Catalogue volume number, where applicable.
- 13.4.2.3 Section in which part is listed.
- 13.4.2.4 Page number.

-
- 13.4.3 Special tools.
- 13.4.3.1 Designation and description of special tools.
- 13.4.3.2 Catalogue number.
- 13.5 Each volume shall be neatly bound in hard serviceable cover on which the contract numbers volume number and titles are printed. All the information in the catalogues shall be given in a clear legible manner. The catalogues shall include all items of equipment to be supplied by the successful tenderer.
- 13.6 *Catalogues shall be delivered before date of completion of the contract.*
- 14.0 INSTRUCTION MANUALS**
- 14.1 Tenderers shall submit a separate quotation for the supply of the number of copies of instruction manuals specified in the Schedule of Requirements. The size shall be A4 (297 mm x 210 mm). Consideration shall be given on merit of the supply of these catalogues electronically (PDF format).
- 14.2 The successful tenderer shall submit draft instruction manuals for approval prior to final printing/compiling and delivery.
- 14.3 The approved instruction manuals shall be delivered before commissioning the equipment. If this cannot be met, the successful tenderer shall furnish at least three copies of preliminary instruction manuals, suitable for the use of maintenance staff, until the final instruction manuals are to hand (which shall be before the date of completion of the contract).
- 14.4 The construction, method of operation and purpose of all items of equipment shall be fully explained by means of descriptions and photographs, sketches, drawings or circuit diagrams showing all details.
- 14.5 The information contained in the instruction manuals shall be classified into convenient sections and indexed. Where multiple models are produced each model shall be described in a separate section in such a manner that models not applicable can be omitted. Where possible the sections shall be subdivided as follows:
- 14.5.1 Installation and commissioning.
- 14.5.2 General description and method of operation.
- 14.5.3 Maintenance and inspection.
- 14.5.4 Overhaul and repair of equipment.
- 14.5.5 Technical and maintenance data.
- 14.5.6 Test procedure flow charts.
- 14.5.7 Fault finding and trouble shooting.
- 14.6 The method of calibrating, setting or adjusting all equipment requiring such attention shall be described and where necessary illustrated. The necessary data shall be given in each case to enable the equipment to be checked by measurement if required.
-

14.7 Full step-by-step instructions regarding the servicing and repair of the equipment shall be given together with all the necessary data such as dismantling and assembling procedures, working clearances, tolerances, limits, fits, maximum permissible wear, recommended lubricants, use of special tools, insulation and winding data, spring pressures and tensions, brush data, fuse data, etc. Recommended servicing/rework/replacement of parts frequencies shall also be included in the maintenance and inspection section of the instruction manual.

14.8 Any delay in delivery of the complete supply of satisfactory instruction manuals/preliminary manuals as provided for in this clause, will subject the Contractors to a deduction from the contract sum, of a penalty as defined in the tender, counting from the specified delivery time until such time as the said manuals are delivered.

15.0 COMBINED DOCUMENTS

If desired the catalogues and instruction manuals specified in clauses 12.0 and 13.0 may be combined into single volumes. Tenderers shall state whether or not it is their intention to do so. In this case the delivery shall be as specified in clause 13.3, alternatively the conditions described in clause 13.8 applies.

16.0 SPARES LIST

16.1 To enable Spornet to catalogue and timeously acquire all spares required, the following information shall be submitted before commissioning of equipment:

16.1.1 An itemised schedule of the spares (with reference to alternatives) which are recommended for normal maintenance purposes.

16.1.2 The quantity recommended to be held against each item on the spares list and where sets are supplied, the types and quantity per type to make up a set.

16.1.3 A full and complete ordering description and number of each individual spare with drawing number if relevant.

16.1.4 Where the ordering description and number differs from that of the original manufacturer's catalogue, description and number, the original manufacturer's name, description, type and ordering number shall be listed as well as all other relevant data available.

16.1.5 The national stock number - Nato - number of each spare where the particular spare was imported from a Nato country and where a national stock number was allocated.

16.2 Initially the spares list containing the above information will suffice, but this list shall not in any way replace or supersede the spare parts catalogue mentioned in clause 12.0.

17.0 PACKING OF DRAWINGS, CATALOGUES, INSTRUCTION MANUALS AND SPARES LISTS

All items shall be packed in such a way that they are received in good condition.

18.0 SUBSTITUTION

This specification replaces specification CEE.0224.94

TENDERER'S SIGNATURE: _____

DATE: _____

FOR SPOORNET: _____

GRADE: _____

END

“PREVIEW COPY ONLY”

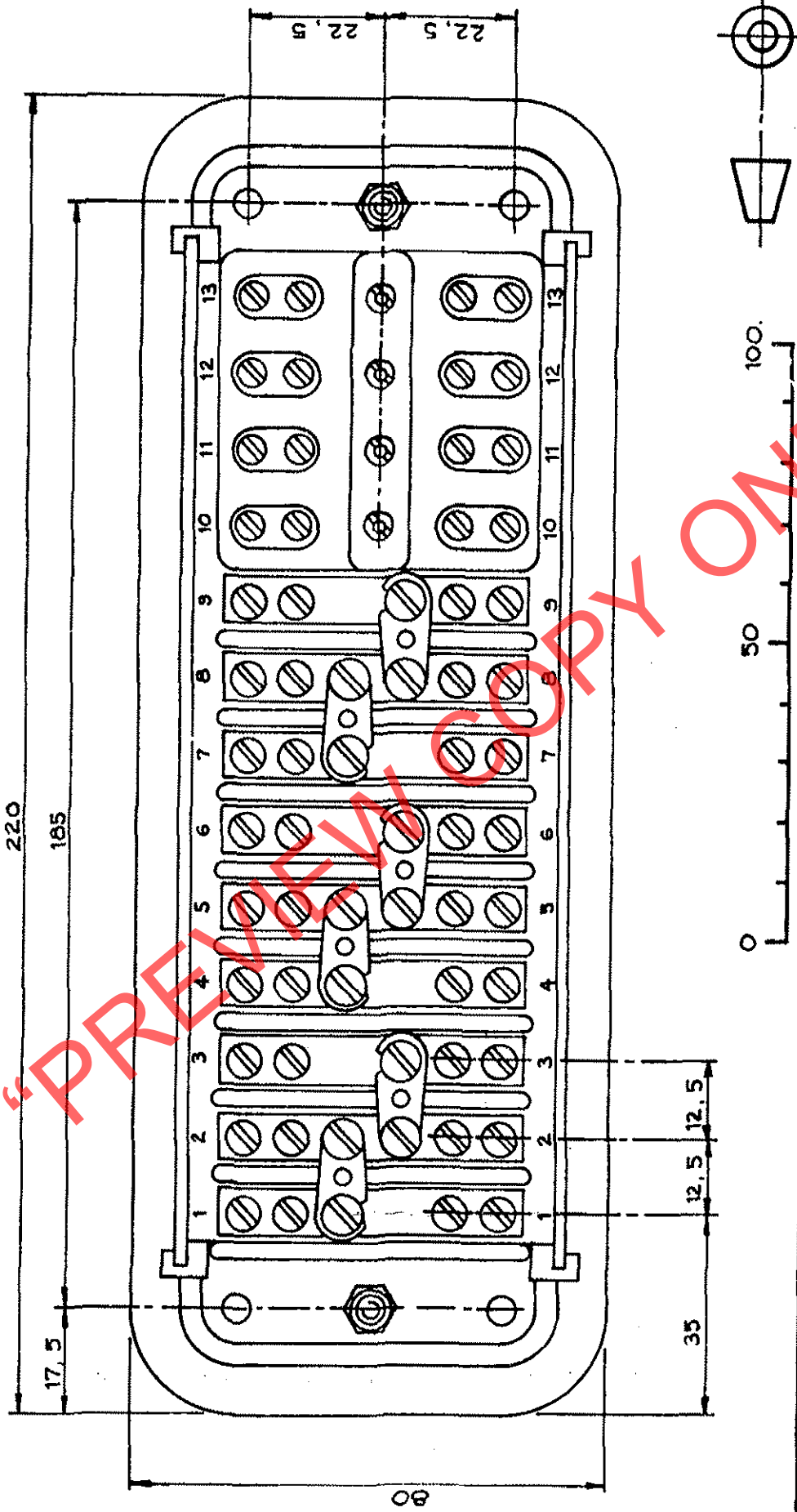
SCHEDULE OF REQUIREMENTS

FOR SPOORNET: _____

GRADE: _____

END

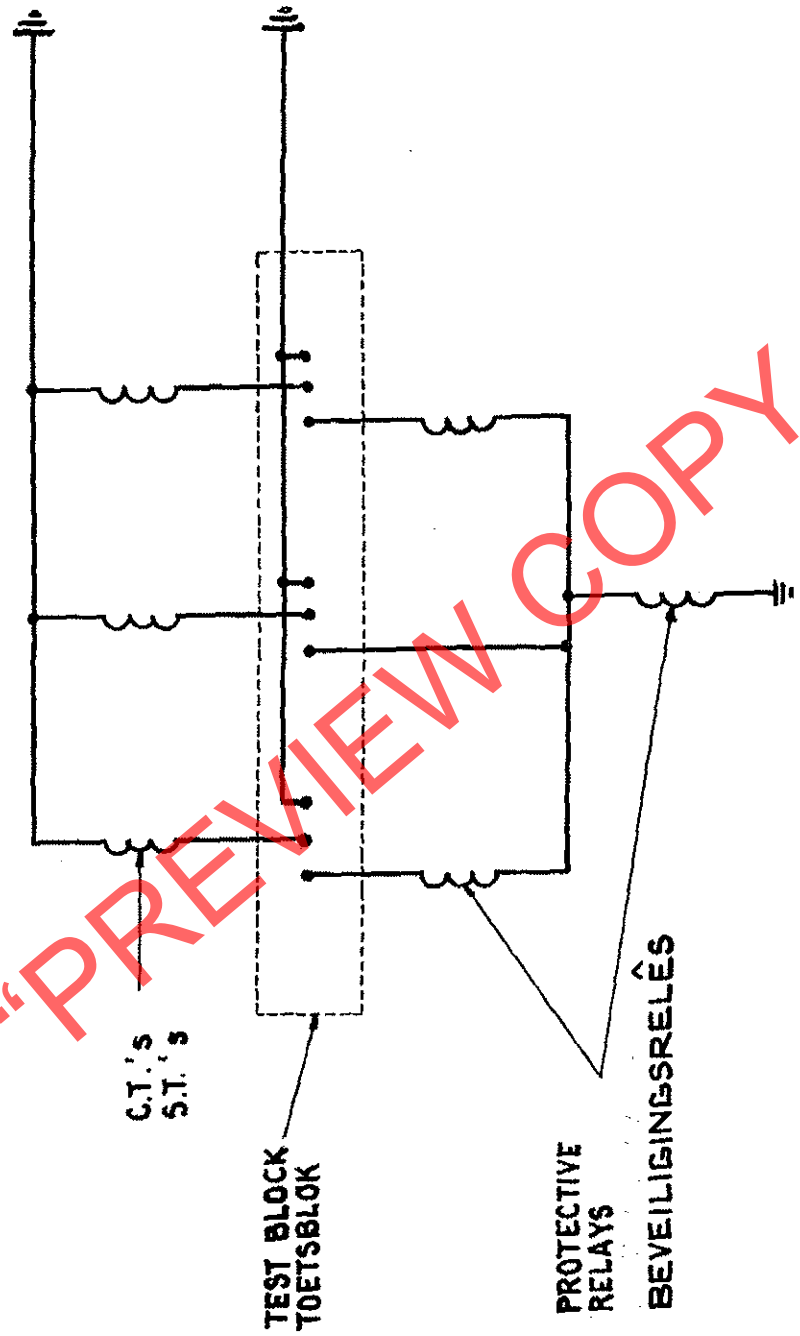
ORIGINAL FRAME SIZE
OORSPRONKLIKE RAAMGROOTTE 267x180.



DRN. J.VANTONDER. GET. J.VANTONDER. NGT. X 9/11/88	GEN. TOLERANCES: LIN ±0,5. ALG. TOLERANSIES: ANG/HOEK ±0,30	CLASS. ASSY. DRG. KLAS. SAMEST. TEK
TRCD. J.VANTONDER. TK. VERW. 278/160	DO. REF. 278/160 ENG. IR.	DRAWING NO. CEE TEKENING NO. CEE
CKD. X 9/11/88 NGS. X 9/11/88	DATE. 26/9/88 DATUM. 26/9/88	PA-13.
<p>TEST BLOCK FOR HV. SWITCHGEAR. TOETS BLOK VIR HS. SKAKELTOERUSTING.</p>		
<p>CHIEF ELECTRICAL ENGINEER ELEKTROTEGNESE HOOFINGENIEUR S A S JOHANNESBURG.</p>		

ORIGINAL FRAME SIZE 390 X 267
 OORSPRONKLIKE RAAMGROOTTE

AMENDMENTS WYSIGINGS.		
NO.	NAME NAAM	DATE DATUM



TYPICAL CONNECTION DIAGRAM.
 PROTECTIVE RELAYS TO
 CURRENT TRANSFORMERS.
 TIPIESE VERBINDINGSDIAGRAM.
 BEVEILIGINGSRELÊS NA
 STROOMTRANSFORMATORS.

DRAWING NO. CEE -
 TEKENING
 PA-56.

DIMENSIONS : MILLIMETRES DRG. N.T.S.
 AFMETINGS : MILLIMETER TEK. N.V.S.

DRN. L. BADENHORST GEN. TOLERANCES : LIN. ± 0.5
 GET. L. BADENHORST ALG. TOLERANSIES : ANG./HOEK -

TRCD. L. BADENHORST D.O. REF. P79/157 ENG. [Signature]
 NGI. I.K. - VERW. IR. [Signature]

CXD. I. Thompson. DATE 81-09-14 for ms.
 NG2. DATUM 81-09-14

CHIEF ELECTRICAL ENGINEER S A S JOHANNESBURG
 ELEKTRIESE HOOFINGENIEUR S A S JOHANNESBURG

PREVIEW COPY ONLY

A4
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MINIMUM COMMUNAL HEALTH REQUIREMENTS IN AREAS OUTSIDE THE JURISDICTION OF A LOCAL AUTHORITY : TEMPORARY FACILITIES FOR CONTRACTOR'S PERSONNEL

1. CAMPS

- 1.1 Prior to the erection of any camp, the Contractor shall submit to the Employer's Deputy, for his approval, details of his proposals as to the site, water supply, sanitation, and size and type of buildings. Where the site is on private land, the Contractor shall submit the written approval for the use of the site of the relevant statutory authority and of the owner and occupier of the land (as applicable).
- 1.2 Camps must not be erected on land infested with field rodents.
- 1.3 Adequate drainage shall be provided to carry off storm and waste water.
- 1.4 Buildings shall be built to a neat and orderly pattern.
- 1.5 All buildings shall have smooth, hard, impervious floors, graded to provide effective drainage and to permit washing.
- 1.6 Camps shall be maintained by the Contractor at his own expense in a clean and tidy condition. The Contractor shall take such steps as the Employer's Deputy and landowner/occupier may demand to prevent the creation of a nuisance.
- 1.7 When so instructed by the Employer's Deputy, the Contractor shall, at his own expense, erect suitable screens between the camp and any public road, thoroughfare or railway line.
- 1.8 After removal of a camp, the Contractor shall, at his own expense, restore the site to its original condition to the satisfaction of the Employer's Deputy and of the landowner and occupier where the site is on private land.

2. HOUSING

- 2.1 Every living room shall have cross ventilation, both constant and occasional. Where only one window is provided, it shall not be in the same wall as the door.
- 2.2 Dimensions of living rooms shall be sufficient to allow 3.5 square metres of floor area and 11 cubic metres of air space for each person over the age of 10 years. The floor area of any living room shall not be less than 7,8 square metres.

- 2.3 Flat-roofed quarters shall have a minimum roof height of 3 metres above floor level. For quarters with pitched roofs, the wall height shall be not less than 2,6 metres above the floor with a minimum height above floor of 3 metres at the top of the pitch.
- 2.4 Doors shall not be less than 2m x 0,75m and must be halved.
- 2.5 Windows of each living room shall have an area not less than one twelfth of the floor area and shall be capable of opening to at least half their full area.
- 2.6 In areas where malaria is prevalent, doors and windows must be fitted with gauze screens.
- 2.7 Cooking shelters shall comprise roofed structures, three sides of which shall be enclosed by a weatherproof material, approved by the Employer's Deputy to a height of at least **1m** above ground level.
 - 2.7.1 Sleeping quarters shall not accommodate more than 8 persons per room.
 - 2.7.2 Pegboards shall be carried on metal or concrete supports and shall be separated by partitions not less than 0,4 metres high extending to within 150mm of the end of the bunk. Pegboards shall be removable for cleaning.

3. WATER SUPPLY AND ABLUTION FACILITIES

- 3.1 The Contractor shall ensure that an adequate and conveniently situated supply of potable water is provided.
- 3.2 Separate buildings for ablution facilities shall be provided. Where approval has been obtained for the housing of both males and females, separate facilities for each sex shall be provided. The proportion shall be 1 cubicle for 20 persons.
- 3.3 Waste water shall be hygienically disposed of.

4. SANITATION

- 4.1 Separate buildings for latrine facilities shall be provided. Where housing are provided for both males and females, separate facilities for each sex shall be provided. The proportions shall be at least one squatting seat for every 15 persons or less in the case of pit latrines, or one for every 10 persons or less in case of pail latrines.

Latrines shall be fly proof and sited at least 10 metres from any other building, and shall not face on any public road, thoroughfare, railway line or residential property. Pits shall not be less than 2,5 metres deep and sited not less than 120 metres from nearest underground water source.

- 4.2 Latrines shall be so constructed, situated and maintained, and night soil so disposed of as to prevent access by animals, breeding of flies, pollution of streams and domestic water supplies, and other nuisances. Where a night soil removal service is operated by a competent authority, use of such service shall be obligatory, and the use of pit latrines and atria pits will not be permitted.

- 4.3 At least one refuse bin of adequate size with close fitting lid shall be provided for each building. Refuse bins shall be emptied and cleaned out daily.
- 4.4 Labour shall be employed on camp sanitation duties on the following basis:-
 - 4.4.1 Where the number of persons living at the camp is 20 or less - one unit.
 - 4.4.2 For additional numbers over 20 living at the camp - one unit per 100 or part thereof.
- 4.5 Unless refuse is removed by a competent authority, it shall be disposed of in pits and covered over daily with a layer of earth or ash of sufficient thickness to prevent depredeations by rodents and the breeding of flies.
- 4.6 Adequate measures shall be taken against all vermin and insects responsible for the spread of disease. Any instructions of a competent health authority shall be carried out promptly and implicitly.
- 4.7 Buildings and bedboards shall be treated whenever necessary with an approved insecticide.
- 4.8 The Contractor shall permit and facilitate inspection of the camp and structures on the site by the staff of Transnet or any other competent authority, and shall comply with any reasonable request by such staff or any other competent authority to eliminate any unsanitary condition.
- 4.9 Any outbreak of infectious disease shall immediately be reported telephonically and confirmed in writing to the Employer's Deputy.
- 4.10 The keeping of animals of any sort is not permitted.
- 4.11 The Contractor shall have on hand at the camp the necessary tools, disinfectants and cleaning materials to maintain and clean the sanitary facilities.

5. RATIONS

Rations, where supplied by the Contractor, shall be stored in a suitable and rodent proof building with sufficient shelving.

P02b-06 (JLH)

TRANSNET SOC LIMITED

(Registration no. 1990/000900/30)

SAFETY ARRANGEMENTS AND PROCEDURAL COMPLIANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT (ACT 85 OF 1993) AND APPLICABLE REGULATIONS

1. General

- 1.1 The Contractor and Transnet SOC Limited (hereinafter referred to as "Transnet") are individual employers, each in its own right, with their respective duties and obligations set out in the Occupational Health and Safety Act, Act 85 of 1993 (the Act) and applicable Regulations.
- 1.2 The Contractor accepts, in terms of the General Conditions of Contract and in terms of the Act, his obligations as an employer in respect of all persons in his employ, other persons on the premises or the Site or place of work or on the work to be executed by him, and under his control. He shall, before commencement with the execution of the contract work, comply with the provisions set out in the Act, and shall implement and maintain a Health and Safety Plan as described in the Construction Regulations, 2003 and as approved by Transnet, on the Site and place of work for the duration of the Contract.
- 1.3 The Contractor accepts his obligation to complying fully with the Act and applicable Regulations notwithstanding the omission of some of the provisions of the Act and the Regulations from this document.
- 1.4 Transnet accepts, in terms of the Act, its obligations as an employer of its own employees working on or associated with the site or place of work, and the Contractor and Project Manager or his deputy shall at all times, co-operate in respect of the health and safety management of the site, and shall agree on the practical arrangements and procedures to be implemented and maintained during execution of the Works.
- 1.5 In the event of any discrepancies between any legislation and this specification, the applicable legislation will take precedence.

2. Definitions

- 2.1 In this Specification any word or expression to which a meaning has been assigned in the Construction Regulations, shall have the meaning so assigned to it, unless the context otherwise indicates: -
- 2.2 The work included in this Contract shall for the purposes of compliance with the Act be deemed to be "**Construction Work**", which, in terms of the Construction Regulations, 2003 means any work in connection with: -
 - (a) the erection, maintenance, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure;

- (b) the installation, erection, dismantling or maintenance of fixed plant where such work includes the risk of a person falling;
 - (c) the construction, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system or any similar civil engineering structure; or
 - (d) the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work;
- 2.3 **“competent person”** in relation to construction work, means any person having the knowledge, training and experience specific to the work or task being performed: Provided that where appropriate qualifications and training are registered as per the South African Qualifications Authority Act, 1995 these qualifications and training shall be deemed to be the required qualifications and training;
- 2.4 **“contractor”** means principal contractor and **“subcontractor”** means contractor as defined by the Construction Regulations, 2003.
- 2.5 **“fall protection plan”** means a documented plan, of all risks relating to working from an elevated position, considering the nature of work undertaken, and setting out the procedures and methods applied to eliminate the risk;
- 2.6 **“health and safety file”** means a file, or other record in permanent form, containing the information required to be kept on site in accordance with the Act and applicable Regulations;
- 2.7 **“Health and Safety Plan ”** means a documented plan which addresses the hazards identified and include safe work procedures to mitigate, reduce or control the hazards identified;
- 2.8 **“Risk Assessment”** means a programme to determine any risk associated with any hazard at a construction site, in order to identify the steps needed to be taken to remove, reduce or control such hazard;
- 2.9 **“the Act”** means the Occupational Health and Safety Act No. 85 of 1993.

3. **Procedural Compliance**

- 3.1 The Contractor who intends to carry out any construction work shall, before carrying out such work, notify the Provincial Director in writing if the construction work:-
- (a) includes the demolition of a structure exceeding a height of 3 metres; or
 - (b) includes the use of explosives to perform construction work; or
 - (c) includes the dismantling of fixed plant at a height greater than 3m,

and shall also notify the Provincial Director in writing when the construction work exceeds 30 days or will involve more than 300 person days of construction work and if the construction work:-

- (a) includes excavation work deeper than 1m; or

- (b) includes working at a height greater than 3 metres above ground or a landing.
- 3.2 The notification to the Provincial Director shall be on a form similar to Annexure A of the Construction Regulations, 2003, also shown in Annexure 1 of this Specification. The Contractor shall ensure that a copy of the completed notification form is kept on site for inspection by an inspector, Project Manager or employee.
- 3.3 The Contractor shall, in accordance with the Act and applicable Regulations, make all the necessary appointments of competent persons in writing on a form similar to Annexure 2 of this Specification and deliver copies thereof to the Project Manager. Copies should also be retained on the health and safety file.
- 3.4 Subcontractors shall also make the above written appointments and the Contractor shall deliver copies thereof to the Project Manager.
- 3.5 In the case of a self-employed Contractor or any subcontractor who has the appropriate competencies and supervises the work himself, the appointment of a construction supervisor in terms of regulation 6.1 of the Construction Regulations, 2003 will not be necessary. The Contractor shall in such a case execute and sign a declaration, as in Annexure 3, by which he personally undertakes the duties and obligations of the "Chief Executive Officer" in terms of section 16(1) of the Act.
- 3.6 The Contractor shall, before commencing any work, obtain from the Project Manager an access certificate as in Annexure 4 executed and signed by him, permitting and limiting access to the designated site or place of work by the Contractor and any subcontractors under his control.
- 3.7 Procedural compliance with Act and Regulations, as above, shall also apply to any subcontractors as employers in their own right. The Contractor shall furnish the Project Manager with full particulars of such subcontractors and shall ensure that they comply with the Act and Regulations and Transnet's safety requirements and procedures.

4. Special Permits

Where special permits are required before work may be carried out such as for hotwork, isolation permits, work permits and occupations, the Contractor shall apply to the Project Manager or the relevant authority for such permits to be issued. The Contractor shall strictly comply with the conditions and requirements pertaining to the issue of such permits.

5. Health and Safety Programme

- 5.1 The Tenderer shall, with his tender, submit a Health and Safety Programme setting out the practical arrangements and procedures to be implemented by him to ensure compliance by him with the Act and Regulations and particularly in respect of: -
- (i) The provision, as far as is reasonably practical, of a working environment that is safe and without risk to the health of his employees and subcontractors in terms of section 8 of the Act;

- (ii) the execution of the contract work in such a manner as to ensure in terms of section 9 of the Act that persons other than those in the Contractor's employment, who may be directly affected by the contract work are not thereby exposed to hazards to their health and safety;
 - (iii) ensuring, as far as is reasonably practical, in terms of section 37 of the Act that no employee or subcontractor of the Contractor does or omits to do any act which would be an offence for the Contractor to do or omit to do.
- 5.2 The Contractor's Health and Safety Programme shall be based on a risk assessment in respect of the hazards to health and safety of his employees and other persons under his control that are associated with or directly affected by the Contractor's activities in performing the contract work and shall establish precautionary measures as are reasonable and practical in protecting the safety and health of such employees and persons.
- 5.3 The Contractor shall cause a risk assessment contemplated in clause 5.2 above to be performed by a competent person, appointed in writing, before commencement of any Construction Work and reviewed during construction. The Risk Assessments shall form part of the Health and Safety programme to be applied on the site and shall include at least the following:
- (a) The identification of the risks and hazards that persons may be exposed to;
 - (b) the analysis and evaluation of the hazards identified;
 - (c) a documented Health and Safety Plan, including safe work procedures to mitigate, reduce or control the risks identified;
 - (d) a monitoring and review plan.
- 5.4 The Health and Safety Plan shall include full particulars in respect of: -
- (a) The safety management structure to be instituted on site or place of work and the names of the Contractor's health and safety representatives and members of safety committees where applicable;
 - (b) the safe working methods and procedures to be implemented to ensure the work is performed in compliance with the Act and Regulations;
 - (c) the safety equipment, devices and clothing to be made available by the Contractor to his employees;
 - (d) the site access control measures pertaining to health and safety to be implemented;
 - (e) the arrangements in respect of communication of health and safety related matters and incidents between the Contractor, his employees, subcontractors and the Project Manager with particular reference to the reporting of incidents in compliance with Section 24 and General Administrative Regulation 8 of the Act and with the pertinent clause of the General Conditions of Contract forming part of the Contract and

- (f) the introduction of control measures for ensuring that the Safety Plan is maintained and monitored for the duration of the Contract.
- 5.4 The Health and Safety programme shall be subject to the Project Manager's approval and he may, in consultation with the Contractor, order that additional and/or supplementary practical arrangements and procedures be implemented and maintained by the Contractor or that different working methods or safety equipment be used or safety clothes be issued which, in the Project Manager's opinion, are necessary to ensure full compliance by the Contractor with his obligations as an employer in terms of the Act and Regulations. The Project Manager or his deputy shall be allowed to attend meetings of the Contractor's safety committee as an observer.
- 5.5 The Contractor shall take reasonable steps to ensure that each subcontractor's Health and Safety Plan is implemented and maintained on the construction site: Provided that the steps taken, shall include periodic audits at intervals mutually agreed to between the them, but at least once every month.
- 5.6 The Contractor shall stop any subcontractor from executing any construction work, which is not in accordance with the Contractor's, and/or subcontractor's Health and Safety Plan for the site or which poses a threat to the health and safety of persons.
- 5.7 The Contractor shall ensure that a copy of the Health and Safety Plan is available on site for inspection by an inspector, Project Manager, agent, subcontractor, employee, registered employee organisation, health and safety representative or any member of the health and safety committee.
- 5.8 The Contractor shall consult with the health and safety committee or, if no health and safety committee exists, with a representative group of employees, on the development, monitoring and review of the Risk Assessment.
- 5.9 The Contractor shall ensure that all employees under his control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures before any work commences, and thereafter at such times as may be determined in the Risk Assessment.
- 5.10 The Contractor shall ensure that all subcontractors are informed regarding any hazard as stipulated in the Risk Assessment before any work commences, and thereafter at such times as may be determined in the Risk Assessment.
- 5.11 The Contractor shall ensure that all visitors to a construction site undergoes health and safety induction pertaining to the hazards prevalent on the site and shall be provided with the necessary personal protective equipment.

6. Fall Protection Plan

- 6.1 In the event of the risk and hazard identification, as required in terms of clause 5.3 of this Specification, revealing risks relating to working from an elevated position the contractor shall cause the designation of a competent person, responsible for the preparation of a fall protection plan;

6.2 The Contractor shall implement, maintain and monitor the fall protection plan for the duration of Contract. The Contractor shall also take such steps to ensure the continued adherence to the fall protection plan.

6.3 The fall protection plan shall include:-

- (a) A Risk Assessment of all work carried out from an elevated position;
- (b) the procedures and methods to address all the identified risks per location;
- (c) the evaluation of the employees physical and psychological fitness necessary to work at elevated positions;
- (d) the training of employees working from elevated positions; and
- (e) the procedure addressing the inspection, testing and maintenance of all fall protection equipment.

7. Hazards and Potential Hazardous Situations

The Contractor and the Project Manager shall immediately notify one another of any hazardous or potentially hazardous situations which may arise during performance of the Contract by the Contractor or any subcontractor and, in particular, of such hazards as may be caused by the design, execution and/or location and any other aspect pertaining to the contract work.

8. Health and Safety File

8.1 The Contractor shall ensure that a health and safety file is opened and kept on site and shall include all documentation required as per the Act and applicable regulations, and made available to an inspector, the Project Manager, or subcontractor upon request.

8.2 The Contractor shall ensure that a copy of the both his Health and Safety Plan as well as any subcontractor's Health and Safety Plan is available on request to an employee, inspector, contractor or the Project Manager.

8.3 The Contractor shall hand over a consolidated health and safety file to the Project Manager upon completion of the Construction Work and shall in addition to documentation mentioned in the Act and applicable Regulations include a record of all drawings, designs, materials used and other similar information concerning the completed structure.

ANNEXURE 1

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993

Regulation 3(1) of the Construction Regulations

NOTIFICATION OF CONSTRUCTION WORK

-
-
- 1(a) Name and postal address of principal contractor:

- (b) Name and tel. no of principal contractor's contact person:

2. Principal contractor's compensation registration number:

- 3.(a) Name and postal address of client:

- (b) Name and tel no of client's contact person or agent:

- 4.(a) Name and postal address of designer(s) for the project:

- (b) Name and tel. no of designer(s) contact person:

5. Name and telephone number of principal contractor's construction supervisor on site appointed in terms of regulation 6(1).

6. Name/s of principal contractor's construction sub-ordinate supervisors on site appointed in terms of regulation 6(2).

7. Exact physical address of the construction site or site office:

8. Nature of the construction work:

9. Expected commencement date: _____
10. Expected completion date: _____

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11. Estimated maximum number of persons on the construction site:

12. Planned number of contractors on the construction site accountable to the principle contractor:

13. Name(s) of contractors already chosen.

Principal Contractor

Date

Client

Date

- * THIS DOCUMENT IS TO BE FORWARDED TO THE OFFICE OF THE DEPARTMENT OF LABOUR **PRIOR TO COMMENCEMENT** OF WORK ON SITE.
- * **ALL PRINCIPAL CONTRACTORS** THAT QUALIFY TO NOTIFY MUST DO SO EVEN IF ANOTHER PRINCIPAL CONTRACTOR ON THE SAME SITE HAD DONE SO PRIOR TO THE COMMENCEMENT OF WORK.

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ANNEXURE 2

(COMPANY LETTER HEAD)

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (ACT 85 OF 1993) :

SECTION/REGULATION: _____

REQUIRED COMPETENCY: _____

In _____ terms of _____
I, _____

representing the Employer) do hereby appoint _____

As the Competent Person on the premises at _____

(physical address) to assist in compliance with the Act and the applicable Regulations.

Your designated area/s is/are as follows :-

Date : _____

Signature :- _____

Designation :- _____

ACCEPTANCE OF DESIGNATION

I, _____ do hereby accept this Designation and acknowledge that I understand the requirements of this appointment.

Date : _____

Signature :- _____

Designation :- _____

ANNEXURE 3

(COMPANY LETTER HEAD)

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (ACT 85 OF 1993) :

DECLARATION

In terms of the above _____ am personally assuming the
Act I, _____ duties
and obligations as Chief Executive Officer, defined in Section 1 of the Act and in terms of
Section 16(1), I will, as far as is reasonably practicable, ensure that the duties and obligations
of the Employer as contemplated in the above Act are properly discharged.

Signature :- _____

Date : _____

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ANNEXURE 4

(LETTER HEAD OF BUSINESS DIVISION OR UNIT OF TRANSNET SOC LIMITED)

SITE ACCESS CERTIFICATE

Access to : _____ (Area)
Name of _____
Contractor/Builder :- _____
Contract/Order No.: _____

The contract works site/area described above are made available to you for the carrying out of associated works
In terms of your contract/order
with
(company)

Kindly note that you are at all times responsible for the control and safety of the Works Site, and for persons under your control having access to the site.

As from the date hereof you will be responsible for compliance with the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended, and all conditions of the Contract pertaining to the site of the works as defined and demarcated in the contract documents including the plans of the site or work areas forming part thereof.

Signed : _____ **Date :** _____

PROJECT MANAGER

ACKNOWLEDGEMENT OF RECEIPT

Name of _____ **I,**
Contractor/Builder :- _____

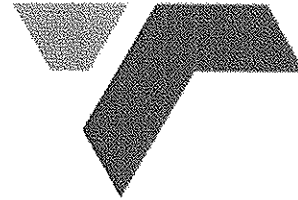
**do hereby acknowledge and accept
the duties**

**and obligations in respect of the Safety of the site/area of Work in terms of the
Occupational Health and Safety Act; Act 85 of 1993.**

Name : _____ **Designation :** _____

Signature : _____ **Date :** _____

TRANSNET



Transnet SOC Limited Registration Number 1990/00900/06

TRANSNET SPECIFICATION

E7/1 - SPECIFICATION FOR GENERAL WORK AND WORKS ON, OVER, UNDER OR ADJACENT TO RAILWAY LINES AND NEAR HIGH VOLTAGE EQUIPMENT

(This specification shall be used in network operator contracts)

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1.0 SCOPE

- 1.1 This specification covers the network operator's requirements for general work and works on, over, under or adjacent to railway lines and near high voltage equipment.

2.0 DEFINITIONS

The following definitions shall apply:

"Authorised Person" - A person whether an employee of the network operator or not, who has been specially authorised to undertake specific duties in terms of Transnet' publication Electrical Safety Instructions, and who holds a certificate or letter of authority to that effect.

"Barrier" Any device designed to restrict access to "live" high-voltage electrical equipment.

"Bond" - A short conductor installed to provide electrical continuity.

"Contractor" - Any person or organisation appointed by the network operator to carry out work on its behalf.

"Contract Supervisor" - The person or juristic person appointed by the network operator from time to time as the Contract Supervisor, to administer the Contractor's performance and execution of the Works according to the powers and rights held by and obligations placed upon the Contract Supervisor in terms of the Contract.

"Dead" - Isolated and earthed.

"Electrical Officer (Contracts)" - The person appointed in writing by the Project Manager in terms of this specification as the person who shall be consulted by the Contractor in all electrical matters to ensure that adequate safety precautions are taken by the Contractor.

"Executive Officer" - The person appointed by the network operator from time to time as the Executive Officer to act according to the rights and powers held by and obligations placed upon him in terms of the Contract.

"High-Voltage" - A voltage normally exceeding 1000 volts.

"Live" - A conductor is said to be "live" when it is at a potential different from that of the earth or any other conductor of the system of which it forms a part.

"Near" - To be in such a position that a person's body or the tools he is using or any equipment he is handling may come within 3 metres of "live" exposed high-voltage electrical equipment.

"Occupation" - An authorisation granted by the network operator for work to be carried out under specified conditions on, over, under or adjacent to railway lines.

"Occupation Between Trains" - An occupation during an interval between successive trains.

"Optical Fibre Cable" - Buried or suspended composite cable containing optical fibres used in:

- telecommunication networks for transmission of digital information and
- safety sensitive train operations systems.

"Project Manager" - As defined in the special conditions of the contract. The person or juristic person appointed by the network operator from time to time as the Project Manager, to administer the Contract according to the powers and rights held by and obligations placed upon him in terms of the Contract.

"Responsible Representative" - The responsible person in charge, appointed by a contractor, who has undergone specific training (and holds a certificate) to supervise (general or direct) staff under his control who perform general work or to work on, over, under or adjacent to railway lines and in the vicinity of high-voltage electrical equipment.

"Total Occupation" - An occupation for a period when trains are not to traverse the section of line covered by the occupation.

"Work on" - Work undertaken on or so close to the equipment that the specified working clearances to the "live" equipment cannot be maintained.

"Work Permit" - A combined written application and authority to proceed with work on or near dead electrical equipment.

"Works" - The contractual intent for the work to be done as defined in the contract at a defined work site.

PART A - GENERAL SPECIFICATION**3.0 AUTHORITY OF OFFICERS OF TRANSNET**

- 3.1 The Contractor shall co-operate with the officers of the network operator and shall comply with all instructions issued and restrictions imposed with respect to the Works which bear on the existence and operation of the network operator's railway lines and high-voltage equipment.
- 3.2 Without limiting the generality of the provisions of clause 3.1, any duly authorised representative of the network operator, having identified himself, may stop the work if, in his opinion, the safe passage of trains or the safety of the network operator's assets or any person is affected. **CONSIDERATIONS OF SAFETY SHALL TAKE PRECEDENCE OVER ALL OTHER CONSIDERATIONS.**

4.0 CONTRACTOR'S REPRESENTATIVES AND STAFF

- 4.1 The Contractor shall nominate Responsible Representatives of whom at least one shall be available at any hour for call-out in cases of emergency. The Contractor shall provide the Contract Supervisor with the names, addresses and telephone numbers of the representatives.
- 4.2 The Contractor guarantees that he has satisfied himself that the Responsible Representative is fully conversant with this specification and that he shall comply with all his obligations in respect thereof.
- 4.3 The Contractor shall ensure that all contractor staff receives relevant awareness, educational and competence training regarding safety as prescribed.

5.0 OCCUPATIONS AND WORK PERMITS

- 5.1 Work to be done during total occupation or during an occupation between trains or under a work permit shall be done in a manner decided by the Contract Supervisor and at times to suit the network operator requirements.
- 5.2 The Contractor shall organise the Works in a manner which will minimise the number and duration of occupations and work permits required.
- 5.3 The network operator will not be liable for any financial or other loss suffered by the Contractor arising from his failure to complete any work scheduled during the period of an occupation or work permit.
- 5.4 The Contractor shall submit to the Contract Supervisor, in writing, requests for occupations or work permits together with details of the work to be undertaken, at least 21 days before they are required. The network operator does not undertake to grant an occupation or work permit for any particular date, time or duration.
- 5.5 The network operator reserves the right to cancel any occupation or work permit at any time before or during the period of occupation or work permit. If, due to cancellation or change in date or time, the Contractor is not permitted to start work under conditions of total occupation or work permit at the time arranged, all costs caused by the cancellation shall be born by the Contractor except as provided for in clauses 5.6 to 5.8.
- 5.6 When the Contractor is notified less than 2 hours before the scheduled starting time that the occupation or work permit is cancelled, he may claim reimbursement of his direct financial losses caused by the loss of working time up to the time his labour and plant are employed on other work, but not exceeding the period of the cancelled occupation or work permit.
- 5.7 When the Contractor is notified less than 2 hours before the scheduled starting time, or during an occupation or work permit, that the duration of the occupation or work permit is reduced, he may claim reimbursement of his direct financial losses caused by the loss of working time due to the reduced duration of the occupation or work permit.
- 5.8 Reimbursement of the Contractor for any loss of working time in terms of clause 5.6 and 5.7, shall be subject to his claims being submitted within 14 days of the event with full details of labour and plant involved, and provided that the Contract Supervisor certifies that no other work on which the labour and plant could be employed was immediately available.
- 5.9 Before starting any work for which an occupation has been arranged, the Contractor shall obtain from the Contract Supervisor written confirmation of the date, time and duration of the occupation.
- 5.10 Before starting any work for which a work permit has been arranged, the Responsible Representative shall read and sign portion C of the Work Permit, signifying that he is aware of the work boundaries within which work may be undertaken. After the work for which the permit was granted has been completed, or when the

work permit is due to be terminated, or if the permit is cancelled after the start, the same person who signed portion C shall sign portion D of the Work Permit, thereby acknowledging that he is aware that the electrical equipment is to be made "live". The Contractor shall advise all his workmen accordingly.

6.0 SPEED RESTRICTIONS AND PROTECTION

- 6.1 When speed restrictions are imposed by the network operator because of the Contractor's activities, the Contractor shall organise and carry out his work so as to permit the removal of the restrictions as soon as possible.
- 6.2 When the Contract Supervisor considers protection to be necessary the Contractor shall, unless otherwise agreed, provide all protection including flagmen, other personnel and all equipment for the protection of the network operator's and the Contractor's personnel and assets, the public and including trains.
- 6.2.1 The network operator will provide training free of charge of the Contractor's flagmen and other personnel performing protection duties. The Contractor shall consult with the Contract Supervisor, whenever he considers that protection will be necessary, taking into account the minimum permissible clearances set out in the Manual for Track Maintenance (Document no. BBB0481):
- Drawing no. BE-97 Sheet 1: Horizontal Clearances: 1065mm gauge (Annexure 1 sheet 1)
 - Drawing no. BE-97 Sheet 2: Vertical Clearances: 1065mm gauge (Annexure 1 sheet 2)
 - Drawing no. BE-97 Sheet 3: Clearances: Platform (Annexure 1 sheet 3)
 - Drawing no. BE-97 Sheet 5: Clearances: 610mm Gauge (Annexure 1 sheet 5)
- 6.3 The Contractor shall appoint a Responsible Representative to receive and transmit any instruction which may be given by the network operator personnel providing protection.

7.0 ROADS AND ROADS ON THE NETWORK OPERATOR'S PROPERTY

- 7.1 The Contractor shall take every reasonable precaution to prevent damage to any roads or bridges used to obtain access to the site, and shall select routes, use vehicles, and restrict loads so that any extraordinary traffic as may arise from the moving of plant or material to or from the site shall be limited as far as is reasonably possible.
- 7.2 The Contractor shall not occupy or interfere in any way with the free use of any public or private road, right-of-way, path or street unless the Contract Supervisor has obtained the approval of the road authority concerned.

8.0 CLEARANCES

- 8.1 No temporary works shall encroach on the appropriate minimum clearances set out in the Manual for Track Maintenance (Document no. BBB0481):
- Drawing no. BE-97 Sheet 1: Horizontal Clearances: 1065mm gauge (Annexure 1 sheet 1)
 - Drawing no. BE-97 Sheet 2: Vertical Clearances: 1065mm gauge (Annexure 1 sheet 2)
 - Drawing no. BE-97 Sheet 3: Clearances: Platform (Annexure 1 sheet 3)
 - Drawing no. BE-97 Sheet 5: Clearances: 610mm Gauge (Annexure 1 sheet 5)

9.0 STACKING OF MATERIAL

- 9.1 The Contractor shall not stack any material closer than 3m from the centre line of any railway line without prior approval of the Contract Supervisor.

10.0 EXCAVATION, SHORING, DEWATERING AND DRAINAGE

- 10.1 Unless otherwise approved by the Contract Supervisor any excavation adjacent to a railway line shall not encroach on the hatched area shown in Figure 1.

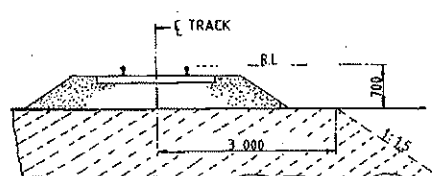


Fig. 1.

- 10.2 The Contractor shall provide, at his own cost any shoring, dewatering or drainage of any excavation unless otherwise stipulated elsewhere in the Contract.
- 10.3 Where required by the Contract Supervisor, drawings of shoring for any excavation under or adjacent to a railway line shall be submitted and permission to proceed, obtained before the excavation is commenced.
- 10.4 The Contractor shall prevent ingress of water to the excavation but where water does enter, he shall dispose of it as directed by the Contract Supervisor.
- 10.5 The Contractor shall not block, obstruct or damage any existing drains either above or below ground level unless he has made adequate prior arrangements to deal with drainage.

11.0 FALSEWORK FOR STRUCTURES

- 11.1 Drawings of falsework for the construction of any structure over, under or adjacent to any railway line shall be submitted to the Contract Supervisor and his permission to proceed obtained before the falsework is erected. Each drawing shall be given a title and a distinguishing number and shall be signed by a registered professional engineer certifying that he has checked the design of the falsework and that the drawings are correct and in accordance with the design.
- 11.2 After the falsework has been erected and before any load is applied, the Contractor shall submit to the Contract Supervisor a certificate signed by a registered professional engineer certifying that he has checked the falsework and that it has been erected in accordance with the drawings. Titles and numbers of the drawings shall be stated in the certificate. Notwithstanding permission given by the Contract Supervisor to proceed, the Contractor shall be entirely responsible for the safety and adequacy of the falsework.

12.0 PILING

- 12.1 The Contract Supervisor will specify the conditions under which piles may be installed on the network operator's property.

13.0 UNDERGROUND SERVICES

- 13.1 No pegs or stakes shall be driven or any excavation made before the Contractor has established that there are no underground services which may be damaged thereby.
- 13.2 Any damage shall be reported immediately to the Contract Supervisor, or to the official in charge at the nearest station, or to the traffic controller in the case of centralised traffic control.

14.0 BLASTING AND USE OF EXPLOSIVES

- 14.1 When blasting within 500m of a railway line, the Contractor shall observe the requirements stipulated in this specification.
- 14.2 No blasting shall be carried out except with the prior written permission of the Contract Supervisor and under such conditions as he may impose.
- 14.3 On electrified lines the Contractor shall also obtain the permission of the Electrical Officer (Contracts) before blasting, and shall give at least 21 days notice of his intention to blast. No blasting shall be done in the vicinity of electrified lines unless a member of the network operator's electrical personnel is present.
- 14.4 The Contractor shall arrange for the supply, transport storage and use of explosives.
- 14.5 The Contractor shall have labour, tools and plant, to the satisfaction of the Contract Supervisor, available on the site to clear immediately any stones or debris deposited on the track or formation by blasting, and to repair any damage to the track or formation immediately after blasting. Repairs to the track shall be carried out only under the supervision of a duly authorised representative of the network operator.
- 14.6 The Contractor shall notify the Contract Supervisor of his intention to blast at least 21 days before the commencement of any blasting operations.
- 14.7 Before any blasting is undertaken, the Contractor and the Contract Supervisor shall jointly examine and measure up any buildings, houses or structures in the vicinity of the proposed blasting to establish the extent of any existing cracking or damage to such structures, etc. The Contractor, shall, subject to the provisions stipulated in the Contract Insurance Policy, make good any deterioration of such buildings, houses, or structures, which, in the opinion of the Contract Supervisor, was directly caused by the blasting.
- 14.8 After completion of the blasting the Contractor shall obtain a written clearance from each landowner in

the vicinity of the blasting operations to the effect that all claims for compensation in respect of damage caused by the blasting operations to their respective properties, have been settled.

14.9 The Contractor shall provide proof that he has complied with the provisions of clauses 10.17.1 to 10.17.4 of the Explosives Regulations (Act 26 of 1956 as amended).

14.10 Blasting within 500m of a railway line will only be permitted during intervals between trains. A person appointed by the Contract Supervisor, assisted by flagmen with the necessary protective equipment, will be in communication with the controlling railway station.

Only this person will be authorised to give the Contractor permission to blast, and the Contractor shall obey his instructions implicitly regarding the time during which blasting may take place.

14.11 The flagmen described in clause 14.10, where provided by the network operator, are for the protection of trains and the network operator's property only, and their presence does not relieve the Contractor in any manner of his responsibilities in terms of Explosives Act or Regulations, or any obligation in terms of this Contract.

14.12 The person described in clause 14.10 will record in a book provided and retained by the network operator, the dates and times:-

(i) when each request is made by him to the controlling station for permission to blast;

(ii) when blasting may take place;

(iii) when blasting actually takes place; and

(iv) when he advises the controlling station that the line is safe for the passage of trains.

14.13 Before each blast the Contractor shall record in the same book, the details of the blast to be carried out. The person appointed by the Contract Supervisor and the person who will do the blasting shall both sign the book whenever an entry described in clause 14.12 is made.

15.0 RAIL TROLLEYS

15.1 The use of rail trolleys or trestle trolleys on a railway line for working on high voltage equipment will be permitted only if approved by the Contract Supervisor and under the conditions stipulated by him.

15.2 All costs in connection with trolley working and any train protection services requested by the Contractor shall, be borne by the Contractor, unless otherwise agreed.

16.0 SIGNAL TRACK CIRCUITS

16.1 Where signal track circuits are installed, the Contractor shall ensure that no material capable of conducting an electrical current makes contact between rails of railway line/lines.

16.2 No signal connections on track-circuited tracks shall be severed without the Contract Supervisor's knowledge and consent.

17.0 PENALTY FOR DELAYS TO TRAINS

17.1 If any trains are delayed by the Contractor and the Contract Supervisor is satisfied that the delay was avoidable, a penalty will be imposed on the Contractor as stipulated in the contract, for the period and number of trains delayed.

18.0 SURVEY BEACONS AND PEGS

18.1 The Contractor shall not on any account move or damage any beacon, bench mark, reference mark, signal or trigonometrical station in the execution of the Works without the written approval of the Contract Supervisor.

Should the Contractor be responsible for any such occurrence, he shall report the circumstances to the Contract Supervisor who will arrange with the Director-General of Surveys for replacement of the beacon or mark at the cost of the Contractor.

18.2 The Contractor shall not move or damage any cadastral or mining beacon without the written approval of the Contract Supervisor and before it has been referenced by a registered land surveyor. Any old boundary beacon, which becomes an internal beacon on creation of new boundaries, shall not be moved without the written approval of the Contract Supervisor.

Should the Contractor move or damage any cadastral or mining beacon without authority, he shall be responsible for having it replaced, at his cost, by a land surveyor.

18.3 The Contractor shall preserve all pegs and bench marks. Such survey points shall not be removed without the written approval of the Contract Supervisor. Should any peg or benchmark be removed without authority, the Contract Supervisor will arrange for its replacement and the cost will be recovered from the Contractor. No claim will be considered for delay in replacing any such peg or bench mark. Each peg replaced shall be checked by the Contractor.

18.4 Where a new boundary has been established, beacons on the fence line shall not be disturbed, and fence posts or anchors may not be placed or excavations made within 0,6 m of any beacon without the prior written approval of the Contract Supervisor.

19.0 TEMPORARY LEVEL CROSSINGS

19.1 The Contract Supervisor may, on request of the Contractor, and if necessary for the purpose of execution of the Works, permit the construction of a temporary level crossing over a railway a line at a position approved by the Contract Supervisor and at the Contractor's cost. The period for which the temporary level crossing is permitted will be at the discretion of the Contract Supervisor.

19.2 The Contractor will provide protection and supervise the construction of the road over the track(s) and within the railway servitude at the level crossing, as well as the erection of all road signs and height gauges. All cost to be borne by the applicant.

The Contractor shall exercise extreme caution in carrying out this work, especially in respect of damage to tracks, services, overhead power and communications routes and prevent contact with "live" overhead electrical equipment.

Unless otherwise agreed, the Contractor will provide the service deviations or alterations to the network operator's track-, structure-, drainage-, electrical-, telecommunications- and train authorisation systems to accommodate the level crossing.

19.3 The Contractor shall take all necessary steps including the provision of gates, locks and, where necessary, watchmen to restrict the use of the temporary level crossing to himself and his employees, his subcontractors and their employees, the staff of the network operator and to such other persons as the Contract Supervisor may permit and of whose identity the Contractor will be advised. If so ordered by the Contract Supervisor, the Contractor shall provide persons to control road traffic using the temporary level crossing. Such persons shall stop all road traffic when any approaching train is within seven hundred and fifty (750) metres of the temporary level crossing, and shall not allow road traffic to proceed over it until the lines are clear.

19.4 The Contractor shall maintain the temporary level crossing within the railway servitude in good condition for the period it is in use. A temporary agreement with the road authority to be concluded for the maintenance of the level crossing outside the railway servitude.

19.5 When the temporary level crossing is no longer required by the Contractor, or permitted by the network operator, the Contractor shall at his own cost remove it and restore the site and the network operator's track-, structure-, drainage-, electrical-, telecommunications- and train authorisation systems to its original condition. Work over the tracks and within the railway servitude will be supervised by the network operator.

20.0 COMPLETION OF THE WORKS

20.1 On completion of the works, the Contractor shall remove all the remaining construction plant and material from the site, other than material which is the property of the network operator, and leave the site in a clean, neat and tidy condition. If material and plant is required for the liability and maintenance period the Contract supervisor must authorise it's retention on site.

21.0 PROTECTION OF PERSONS AND PROPERTY

21.1 The Contractor shall provide and maintain all lights, guards, barriers, fencing and watchmen when and where necessary or as required by the Contract Supervisor or by any statutory authority, for the protection of the Works and for the safety and convenience of the public.

Red, yellow, green or blue lights may not be used by the Contractor as they can be mistaken for signals. Red, yellow, green or white flags shall only be used for protection by the Contractor. Within the precincts of a port the Contractor shall obtain the permission of the Port Captain before installing any light.

- 21.2 The Contractor shall take all the requisite measures and precautions during the course of the Works to:
- (i) protect the public and property of the public,
 - (ii) protect the property and workmen of both the network operator and the Contractor,
 - (iii) avoid damage to and prevent trespass on adjoining properties, and
 - (iv) ensure compliance with any instruction issued by the Contract Supervisor or other authorised person, and with any stipulation embodied in the contract documents which affects the safety of any person or thing.
- 21.3 The network operator will provide, at its own cost, protection for the safe working of trains during such operations as the Contract Supervisor may consider necessary. Protection by the network operator for any purpose whatsoever, does not absolve the Contractor of his responsibilities in terms of the Contract.
- 21.4 The Contractor shall take all precautions and appoint guards, watchmen and compound managers for prevention of disorder among and misconduct by the persons employed on the Works and by any other persons, whether employees or not, on the work site and for the preservation of the peace and protection of persons and property in the direct neighbourhood. Any relocation of camps because of disorder shall be at the Contractor's expense.
- 21.5 All operations necessary for the execution of the Works, including the provision of any temporary work and camping sites, shall be carried out so as not to cause veldt fires, ground and environmental pollution, soil erosion or restriction of or interference with streams, furrows, drains and water supplies.
- If the original surface of the ground is disturbed in connection with the Works, it shall be made good by the Contractor to the satisfaction of the land owner, occupier or responsible authority.
- 21.6 The Contractor shall take all reasonable steps to minimise noise and disturbance when carrying out the Works, including work permitted outside normal working hours.
- 21.7 Dumping of waste or excess materials by the Contractor shall, in urban areas, be done under the direction and control of, and at sites made available by the local authority. Dumping outside local authority boundaries shall be done only with the express permission and under the direction and control of the Contract Supervisor.
- 21.8 The Contractor shall comply with environmental protection measures and specifications stipulated by the Contract Supervisor and/or local and environmental authorities.
- 22.0 INTERFERENCE WITH THE NETWORK OPERATOR'S ASSETS AND WORK ON OPEN LINES**
- 22.1 The Contractor shall not interfere in any manner whatsoever with an open line, nor shall he carry out any work or perform any act which affects the security, use or safety of an open line except with the authority of the Contract Supervisor and in the presence of a duly authorised representative of the network operator.
- 22.2 The Contractor shall not carry out any work or operate any plant, or place any material whatsoever nearer than three metres from the centre line of any open line except with the written permission of the Contract Supervisor and subject to such conditions as he may impose.
- 22.3 Care must be taken not to interfere with or damage any services such as overhead wire routes, cables or pipes and optical fibre cable, except as provided for the work specified. The Contractor will be held responsible for any damage to or interruption of such services arising from any act or omission on his part or of any of his employees, or persons engaged by him on the Works. The cost of repairing, replacing or restoring the services, as well as all other costs arising from any damage to services, shall be borne by, and will be recovered from the Contractor.
- 22.4 Authority granted by the Contract Supervisor and the presence of an authorised representative of the network operator in terms hereof, shall not relieve the Contractor of his duty to comply with this specification.
- 23.0 ACCESS, RIGHTS-OF-WAY AND CAMPSITES**
- 23.1 Where entry onto the network operator's property is restricted, permission to enter will be given only for the purpose of carrying out the Works and will be subject to the terms and conditions laid down by the network operator.
- 23.2 The Contractor shall arrange for campsites, workplaces and access thereto as well as for any right-of-

way over private property to the site of the Works, and for access within the boundaries of the network operator's property. The owners of private property to be traversed shall be approached and treated with fact and courtesy by the Contractor, who shall, if necessary, obtain a letter of introduction to such property owners from the Contract Supervisor.

The Contractor shall be responsible for the closing of all gates on roads and tracks used by him or his employees. Except with the prior approval of the Contract Supervisor and the owner or occupier of any private land to be traversed, the Contractor shall not cut, lower, damage, remove or otherwise interfere with any fence or gate which is either on the network operator's property or on private property and which restricts access to the Works. Where such approval has been given, the Contractor shall prevent entry of animals or unauthorised persons onto the network operator's or private property, and shall make the fences safe against trespass at the close of each day's work.

23.3 The Contractor shall take all reasonable steps to confine the movement of vehicles and plant to the approved right-of-way to minimise damage to property, crops and natural vegetation.

23.4 When access is no longer required, and before completion of the Works, the Contractor shall repair, restore or replace any fence or gate damaged during execution of the Works to the satisfaction of the Contract Supervisor and shall furnish the Contract Supervisor with a certificate signed by the owner and occupier of land over which he has gained access to a campsite, workplace and the Works, certifying that the owner and occupier have no claim against the Contractor or the network operator arising from the Contractor's use of the land. Should the Contractor be unable to obtain the required certificate, he shall report the circumstances to the Contract Supervisor.

24.0 SUPERVISION

24.1 The Contract Supervisor will provide overall technical superintendence of the Works, and may direct the Contractor in terms of the provisions of the Contract or in respect of any measures which the Contract Supervisor may require for the operations of the network operator, the safety of trains, property and workmen of the network operator, and for the safety of other property and persons. The Contractor shall carry out the directions of the Contract Supervisor. The superintendence exercised by the Contract Supervisor, including any agreement, approval, refusal or withdrawal of any approval given, shall not relieve the Contractor of any of his duties and liabilities under the Contract, and shall not imply any assumption by the network operator or by the Contract Supervisor of the legal and other responsibilities of the Contractor in carrying out the Works.

24.2 The Contract Supervisor may delegate to any deputy or other person, any of his duties or functions under the Contract. On receiving notice in writing of such delegation, the Contractor shall recognise and obey the deputy or person to whom any such duties or functions have been delegated as if he were the Contract Supervisor.

24.3 The Contractor shall exercise supervision over the Works at all times when work is performed or shall be represented by an agent having full power and authority to act on behalf of the Contractor. Such agent shall be competent and responsible, and have adequate experience in carrying out work of a similar nature to the Works, and shall exercise personal supervision on behalf of the Contractor. The Contract Supervisor shall be notified in writing of such appointment which will be subject to his approval.

24.4 The Contractor or his duly authorised agent shall be available on the site at all times while the Works are in progress to receive the orders and directions of the Contract Supervisor.

25.0 HOUSING OF EMPLOYEES

25.1 The Contractor shall, where necessary, make his own arrangements for suitable housing of his employees. Where temporary housing is permitted by the Contract Supervisor on any part of the site, the Contractor shall provide suitable sanitation, lighting and potable water supplies in terms of the requirements of the local authority or the current network operator's specification; Minimum Communal Health Requirements in Areas outside the Jurisdiction of a Local Authority - E.4B, as applicable.

25.2 Fouling the area inside or outside the network operator's boundaries shall be prevented. The Contractor will be called upon by the Contract Supervisor to dispose of any foul or waste matter generated by the Contractor.

26.0 OPTICAL FIBRE CABLE ROUTES

26.1 The Contractor shall not handle, impact, move or deviate any optical fibre cable without prior approval.

26.2 Works that in any way affect the optical fibre cable requires prior approval from the Contract Supervisor

who will determine the work method and procedures to be followed.

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PART B - SPECIFICATION FOR WORK NEAR HIGH-VOLTAGE ELECTRICAL EQUIPMENT

27.0 GENERAL

27.1 This specification is based on the contents of Transnet's publication ELECTRICAL SAFETY INSTRUCTIONS, as amended, a copy of which will be made available on loan to the Contractor for the duration of the contract.

These instructions apply to all work near "live" high-voltage equipment maintained and/or operated by the network operator, and the onus rests on the Contractor to ensure that he obtains a copy.

27.2 This specification must be read in conjunction with and not in lieu of the Electrical Safety Instructions.

27.3 The Contractor's attention is drawn in particular to the contents of Part I, Sections 1 and 2 of the Electrical Safety Instructions.

27.4 The Electrical Safety Instructions cover the minimum safety precautions which must be taken to ensure safe working on or near high-voltage electrical equipment, and must be observed at all times. Should additional safety measures be considered necessary because of peculiar local conditions, these may be ordered by and at the discretion of the Electrical Officer (Contracts).

27.5 The Contractor shall obtain the approval of the Electrical Officer (Contracts) before any work is done which causes or could cause any portion of a person's body or the tools he is using or any equipment he is handling, to come within 3 metres of any "live" high-voltage equipment.

27.6 The Contractor shall regard all high-voltage equipment as "live" unless a work permit is in force.

27.7 Safety precautions taken or barriers erected shall comply with the requirements of the Electrical Officer (Contracts), and shall be approved by him before the work to be protected is undertaken by the Contractor. The Contractor shall unless otherwise agreed, bear the cost of the provision of the barriers and other safety precautions required, including the attendance of the network operator's staff where this is necessary.

27.8 No barrier shall be removed unless authorised by the Electrical Officer (Contracts).

28.0 WORK ON BUILDINGS OR FIXED STRUCTURES

28.1 Before any work is carried out or measurements are taken on any part of a building, fixed structure or earthworks of any kind above ground level situated within 3 metres of "live" high-voltage equipment, the Electrical Officer (Contracts) shall be consulted to ascertain the conditions under which the work may be carried out.

28.2 No barrier erected to comply with the requirements of the Electrical Officer (Contracts) shall be used as temporary staging or shuttering for any part of the Works.

28.3 The shuttering for bridge piers, abutments, retaining walls or parapets adjacent to or over any track may be permitted to serve as a barrier, provided that it extends at least 2,5 metres above any working level in the case of piers, abutments and retaining walls and 1,5 metres above any working level in the case of parapets.

29.0 WORK DONE ON OR OUTSIDE OF ROLLING STOCK, INCLUDING LOADING OR UNLOADING

29.1 No person may stand, climb or work, whilst on any platform, surface or foothold:

29.1.1 higher than the normal unrestricted access way, namely -

29.1.1.1 external walkways on diesel, steam and electric locomotives, steam heat vans, etc. and

29.1.1.2 walkways between coaches and locomotives.

29.1.2 of restricted access ways in terms of the Electrical Safety Instructions namely -

29.1.2.1 the floor level of open wagons

29.1.2.2 external walkways or decks of road-rail vehicles, on-track maintenance machines and material trains.

29.1.3 Unauthorised staff working on these platforms must be directly supervised by duly authorised persons in terms of clause 607.1.3 of the Electrical Safety Instructions. These persons must attend the relevant electrical safety module training. A letter of training must then be issued by an accredited training authority. A Category C Certificate of Authority must be obtained from the

local depot examining officer.

- 29.2 When in the above positions no person may raise his hands or any equipment he is handling above his head.
- 29.3 In cases where the Contractor operates his own rail mounted equipment, he shall arrange for the walkways on this plant to be inspected by the Electrical Officer (Contracts) and approved, before commencement of work.
- 29.4 The handling of long lengths of material such as metal pipes, reinforcing bars, etc should be avoided, but if essential they shall be handled as nearly as possible in a horizontal position below head height.
- 29.5 The Responsible Representative shall warn all persons under his control of the danger of being near "live" high-voltage equipment, and shall ensure that the warning is fully understood.
- 29.6 Where the conditions in clauses 30.1 to 30.4 cannot be observed the Electrical Officer (Contracts), shall be notified. He will arrange for suitable Safety measures to be taken. The Electrical Officer (Contracts), may in his discretion and in appropriate circumstances, arrange for a suitable employee of the Contractor to be specially trained by the network operator and at the Contractor's cost, as an Authorised Person to work closer than 3 metres from "live" overhead conductors and under such conditions as may be imposed by the senior responsible electrical engineer of the network operator.

30.0 USE OF EQUIPMENT

30.1 Measuring Tapes and Devices

- 30.1.1 Measuring tapes may be used near "live" high-voltage equipment provided that no part of any tape or a person's body comes within 3 metres of the "live" equipment.
- 30.1.2 In windy conditions the distance shall be increased to ensure that if the tape should fall it will not be blown nearer than 3 metres from the "live" high-voltage equipment.
- 30.1.3 Special measuring devices longer than 2 metres such as survey sticks and rods may be used if these are of non-conducting material and approved by the responsible Electrical Engineer of the network operator, but these devices must not be used within 3 metres of "live" high-voltage equipment in rainy or wet conditions.
- 30.1.4 The assistance of the Electrical Officer (Contracts) shall be requested when measurements within the limits defined in clauses 31.1.1 to 31.1.3 are required.
- 30.1.5 The restrictions described in 31.1.1 to 31.1.3 do not apply on a bridge deck between permanent parapets nor in other situations where a barrier effectively prevents contact with the "live" high-voltage equipment.

30.2 Portable Ladders

- 30.2.1 Any type of portable ladder longer than 2 metres may only be used near "live" high-voltage equipment under the direct supervision of the Responsible Representative. He shall ensure that the ladder is always used in such a manner that the distance from the base of the ladder to any "live" high-voltage equipment is greater than the fully extended length of the ladder plus 3 metres. Where these conditions cannot be observed, the Electrical Officer (Contracts) shall be advised, and he will arrange for suitable safety measures to be taken.

31.0 CARRYING AND HANDLING MATERIAL AND EQUIPMENT

- 31.1 Pipes, scaffolding, iron sheets, reinforcing bars and other material which exceeds 2 metres in length shall be carried completely below head height near "live" high-voltage equipment. For maximum safety such material should be carried by two or more persons so as to maintain it as nearly as possible in a horizontal position. The utmost care must be taken to ensure that no part of the material comes within 3 metres of any "live" high-voltage equipment.
- 31.2 Long lengths of wire or cable shall never be run out in conditions where a part of a wire or cable can come within 3 metres of any "live" high-voltage equipment unless the Electrical Officer (Contracts) has been advised and has approved appropriate safety precautions.
- 31.3 The presence of overhead power lines shall always be taken account of especially when communications lines or cables or aerial cables, stay wires, etc. are being erected above ground level.

32.0 PRECAUTIONS TO BE TAKEN WHEN ERECTING OR REMOVING POLES, ANTENNAE, TREES ETC.

- 32.1 A pole may be handled for the purpose of erection or removal near high-voltage equipment under the following conditions:

(i) If the distance between the point at which the pole is to be erected or removed and the nearest "live" high-voltage equipment is more than the length of the pole plus 3 metres, the work shall be supervised by the Responsible Representative.

(ii) If the distance described in (i) is less than the length of the pole plus 3 metres, the Electrical Officer (Contracts) shall be consulted to arrange for an Authorised Person to supervise the work and to ensure that the pole is earthed where possible. The pole shall be kept in contact with the point of erection, and adequate precautions shall be taken to prevent contact with "live" high-voltage equipment.

32.2 The cost of supervision by an Authorised Person and the provision of earthing shall, unless otherwise agreed, be borne by the Contractor.

32.3 The provisions of clauses 33.1 and 33.2 shall also apply to the erection or removal of columns, antennae, trees, posts, etc.

33.0 USE OF WATER

33.1 No water shall be used in the form of a jet if it can make contact with any "live" high-voltage equipment or with any person working on such equipment.

34.0 USE OF CONSTRUCTION PLANT

34.1 "Construction plant" entails all types of plant including cranes, piling frames, boring machines, excavators, draglines, dewatering equipment and road vehicles with or without lifting equipment.

34.2 When work is being undertaken in such a position that it is possible for construction plant or its load to come within 3 metres of "live" high-voltage equipment, the Electrical Officer (Contracts) shall be consulted. He will arrange for an Authorised Person to supervise the work and to ensure that the plant is adequately earthed. The Electrical Officer (Contracts) will decide whether further safety measures are necessary.

34.3 The cost of any supervision by an Authorised Person and the provision of earthing shall, unless otherwise agreed, be borne by the Contractor.

34.4 When loads are handled by cranes, non-metallic rope hand lines shall be used, affixed to such loads so as to prevent their swinging and coming within 3 metres of "live" high-voltage equipment.

34.5 Clauses 35.1 to 35.4 shall apply *mutatis mutandis* to the use of maintenance machines of any nature.

35.0 WORK PERFORMED UNDER DEAD CONDITIONS UNDER COVER OF A WORK PERMIT

35.1 If the Responsible Representative finds that the work cannot be done in safety with the high-voltage electrical equipment "live", he shall consult the Electrical Officer (Contracts) who will decide on the action to be taken.

35.2 If a work permit is issued the Responsible Representative shall-

(i) before commencement of work ensure that the limits within which work may be carried out have been explained to him by the Authorised Person who issued the permit to him, and that he fully understands these limits;

(ii) sign portion C of the permit before commencement of work;

(iii) explain to all persons under his control the limits within which work may be carried out, and ensure that they fully understand these limits;

(iv) care for the safety of all persons under his control whilst work is in progress; and

(v) withdraw all personnel under his control from the equipment on completion of the work before he signs portion D of the work permit.

36.0 TRACTION RETURN CIRCUITS IN RAILS

36.1 DANGEROUS CONDITIONS CAN BE CREATED BY REMOVING OR SEVERING ANY BOND.

36.2 Broken rails with an air gap between the ends, and joints at which fishplates are removed under "broken bond" conditions, are potentially lethal. The rails on either side of an air gap between rail ends on electrified lines shall not be touched simultaneously until rendered safe by the network operator personnel.

36.3 The Contractor shall not break any permanent bonds between rails or between rails and any structure. He shall give the Contract Supervisor at least 7 days written notice when removal of such bonds is necessary.

36.4 No work on the track which involves interference with the traction return rail circuit either by cutting or removing the rails, or by removal of bonds shall be done unless the Electrical Officer (Contracts) is consulted. He will take such precautions as may be necessary to ensure continuity of the return circuit before permitting the work to be commenced.

37.0 HIGH-VOLTAGE ELECTRICAL EQUIPMENT NOT MAINTAINED AND/OR OPERATED BY THE NETWORK OPERATOR

Where the work is undertaken on or near high-voltage electrical equipment which is not maintained and/or operated by the network operator, the Occupational Health and Safety Act No. 85 of 1993, and Regulations and Instructions, or the Mines Health and Safety Act (Act 29 of 1996), shall apply.

Such equipment includes:-

- (i) Eskom and municipal equipment;
- (ii) The Contractor's own power supplies; and
- (iii) Electrical equipment being installed but not yet taken over from the Contractor.

END

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Contract Data

Site Information

The works shall be performed at **PYRAMID SOUTH ERS AND DOORNPOORT 11kV DISTRIBUTION SUBSTATIONS.**

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