Transnet SOC Limited
Transnet RME

REQUEST FOR QUOTATION

BOARD LIST TFR RME
TRANSNET FREIGHT RAIL - RME
PROCUREMENT DEPARTMENT
2000

Registration Number: 1990/000900/30
Vat Number : 4720103177

Attention:
TFR Official Tender Board.
Telephone Number :
Fax Number :
Vendor Number :2004815

Quotation Deadline Date : 19.12.2014
Quotation Deadline Time : 12:00

REQUEST for QUOTATION
Transnet RME
RFQ Number / Date
6000214759 / 12.12.2014
Contact Person / Telephone
Eddie Quinn / 035 905 3664
Return to VAX Number/EMAIL
0865159978 / TCPtendersRichardsBay@Transnet.net

Item	Material	Description	RFQ Qty	UoM	Required Del date	Confirm Del date	Unit Price Excl	Total Price Excl
00010		Live Line Tester 25KV A	2	ea	30.01.2015			

Supply & Deliver, 2 x Live Line Testers, 25KV AC, as per the Attached Specification No: BBB3007 - Version: 3, complete with Insulating Pole/Rod for transmission line.
Deliver To: TFR (RME) - Commodore Close Street - Old naval Base - Meerensee - Richards Bay.
Contact: Mr Pierre Crocker Tel: 083 279 0437 / 035 905 3638.

Item	Material	Description	RFQ Qty	UoM	Required Del date	Confirm Del date	Unit Price Excl	Total Price Excl
00020		Portable Earth for 11KV	4	ea	30.01.2015			

Supply & Deliver, 4 x Portable Earths, for 11KV HV, Transmission Line, as per the Attached Specification No: BBB1679 - Version: 4 - Clause 8.1.
Deliver To: TFR (RME) - Commodore Close Street - Old naval Base - Meerensee - Richards Bay.
Contact: Mr Pierre Crocker Tel: 083 279 0437 / 035 905 3638.
==========

Transnet Limited t/a Transnet Freight Rail (R.M.E.) # Richards Bay, hereby invite your company to submit a detailed quotation for:

Transnet SOC Limited
Transnet RME
BOARD LIST TFR RME
TRANSNET FREIGHT RAIL - RME
PROCUREMENT DEPARTMENT
2000
YOUR VAT NUMBER WITH US: NOT

REQUEST FOR QUOTATION

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Item	Material	Description	RFQ Qty	UoM	Required Del date	Confirm Del date	Unit Price Excl	Total Price Excl

The Supply & Delivery of OHTE Testing Materials, (As requested above.)

All technical queries relating to this invitation may be addressed to;
Mr. Pierre Crocker Tel: 083 279 0437 / 035-905 3638.

All tender related queries pertaining to this invitation may be addressed to;
Mr. Eddie Quinn, Tel: 035 # 905 3664.

The closing time for receipt of your official quotations is 12:00 hours on Friday, 19 December 2014.

Transnet desires a validity period of 90 (Ninety) days from the closing date of this RFQ.

Telephonic and late quotes will not be accepted.
All quotations should be clearly marked, and may be forwarded to:
Me Yogeshnie Gengan, Tender & Fax Assistant,
Fax No: 086 515 9978 and / or
e-mailed to: TCPtendersRichardsBay@transnet.net

The contractor's address and identification details have to be shown on each quotation submitted.

Please submit the following documents with your quotation;
- Valid Tax Clearance certificate.
- Copy of your latest B.B.B.E.E. Certificate.

Transnet SOC Limited
Transnet RME
BOARD LIST TFR RME
TRANSNET FREIGHT RAIL - RME
PROCUREMENT DEPARTMENT
2000
YOUR VAT NUMBER WITH US: NOT

Attention:
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Failing to submit any of the documents mentioned above, could result in your quotation to be disqualified / not accepted.

Note: #Transnet may not necessarily accept the lowest or any other offer and reserves the right to select in its favor any or, a portion of any offer made"

If you have been contacted directly by the Supply Chain Office (Via a RFQ.), and you are unable to quote for these items, please submit a NO QUOTE.

Otherwise we look forward to receive your detailed quote by the date and time stated.

Yours faithfully,

Transnet SOC Limited
Transnet RME
BOARD LIST TFR RME
TRANSNET FREIGHT RAIL - RME
PROCUREMENT DEPARTMENT
2000
YOUR VAT NUMBER WITH US: NOT

REQUEST FOR QUOTATION

Registration Number: 1990/000900/30
Vat Number : 4720103177

Attention:
TFR Official Tender Board.
Telephone Number :
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Quotation Deadline Date : 19.12.2014
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REQUEST for QUOTATION
Transnet RME
RFQ Number / Date
6000214759 / 12.12.2014
Contact Person / Telephone
Eddie Quinn / 035 905 3664
Return to VAX Number/EMAIL
0865159978 / TCPtendersRichardsBay@Transnet.net

Delivery Address
TFR RME Richards Bay
Old Naval Base, Commodores Clo
Meerensee, Richards Bay
3900

This RFQ is subject to the following conditions:
1. Price/s : The price/s quoted in SA currency and is excluding of V.A.T
2. Delivery : The price/s quoted should include delivery cost to the delivery address stated on the RFQ
3. Returnables : A valid tax clearance certificate and BBBEE certificate from a SANAS accredited verification agency attached to quotation for all quotes above R30 000. Please note that only the official Transnet RFQ will be accepted and all other correspondence to be attached to the original
4. Safety : To confirm to Transnet Freight Rail Health & Safety plan and specification; HAS-std-0001, copy available on request.
5. Confirmation: To confirm your participation in this tender process please sign and return this document as immediate effect prior to the quotation deadline.
6. Negotiations: The Employer may elect to negotiate the final terms of the contract/order with the preferred tenderer in accordance with Clauses F.2.17 and F.3.13 of the CIDB Standard Conditions of Tender. A copy of which is available upon request.
7. Quotes will not be acceptable if not sending to the given fax or e-mail (please do not CC any buyer)
8. Should your company not receive any response from Transnet within 30 days of closing of a RFQ, please accept that your quotation was unsuccessful.

Signature

Date

TRANSNET
freight rail
A division of Transnet limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

LIVE LINE TESTER (HIGH VOLTAGE DETECTOR) FOR USE ON AC OVERHEAD TRACK EQUIPMENT (25 AND 50 kV AC).

Appendix 1: To be filled in by Transnet Freight Rail

Author:	Chief Engineering Technician Section: Technology Management	B.L. Ngobeni	
Approved:	Senior Engineer Section: Technology Management	L.O. Borchard	
Authorised:	Principal Engineer Section: Technology Management	W.A. Coetzee	

Date: 24 November 2010

Circulation restricted to: Transnet Freight Rail
Technology Management

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1.0 SCOPE

1.1 This specification covers Transnet Freight Rail's requirements for live line testers to be used on 25kV and 50kV AC overhead track equipment.

2.0 APPENDICES

The following appendices form an integral part of this specification.

2.1 Appendix 1: Schedule of Requirements.

2.2 Appendix 2: Technical Data Sheet

3.0 STANDARDS AND PUBLICATIONS

The latest versions of the following publications and standards are referred to herein.

3.1 SOUTH AFRICAN NATIONAL STANDARD

SANS 61243-1* Live working - Voltage detectors, Part 1: Capacitive type to be used for voltages exceeding 1kV AC.

4.0 TENDERING PROCEDURE

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

4.2 The tenderer shall motivate a statement of non-compliance.

4.3 The tenderer shall complete Appendix 2: Technical data sheet.

4.4 The tenderer shall submit descriptive literature consisting of detailed technical specifications, general construction 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 tenderer from consideration.

5.0 SERVICE CONDITIONS

5.1 The live line tester (high voltage sensing device) shall be designed to operate under the following environmental conditions:

- Altitude — 0 - 1800 meters above sea level.
- Relative Humidity — 10% to 90%
- Ambient Temperature Range — Minus 10°C to plus 55°C.
- Level of Pollution — Heavily salt laden or polluted with smoke from industrial sources.
- Lightning density — 12 ground flashes/km^2/annum.

6.0 ELECTRICAL SERVICE CONDITIONS

6.1 The live line tester must be designed so that it can operate continuously and safely under the following electrical conditions:

For 25kV traction systems:

6.1.1 Highest system voltage 43.3kV

6.1.2 Nominal system voltage 25kV

6.1.3 Minimum system voltage 10kV

6.1.4 Frequency 50Hz± 10%

For 50kV traction systems:

6.1.6	Highest system voltage	86.6kV
6.1.7	Nominal system voltage	50kV
6.1.8	Minimum system voltage	25kV
6.1.9	Frequency	50Hz

6.2 The Voltage to be detected can also have harmonics superimposed on the 50Hz power frequency component. The Total Harmonic Distortion (THD) on the Voltage can be in the order of 30% comprised mainly of lower order (below 1 kHz) harmonics.

7.0 MECHANICAL SERVICE CONDITIONS

7.1 The equipment shall be of robust design to withstand rough handling, shock and vibration when transported in its case over extremely rough roads.

8.0 TECHNICAL REQUIREMENTS OF THE EQUIPMENT

8.1 The live line tester will be in compliance with SANS 61243-1 unless where otherwise stated in this specification.

8.2 The tester shall operate safely when used in direct contact with live conductors for the voltages specified in the operating conditions.

8.3 The live line tester shall be an outdoor type.

8.4 The live line tester shall be of the capacitive type with the use of an internal power supply for self test purposes.

8.5 The contact electrode shall make physical contact will the equipment under investigation.

8.6 Indication shall be of visual nature. The tester shall have a green light indicating de-energised condition and flashing a red light indicating energised condition.

8.7 Additional Audible signals may also be used.

8.8 The indicators shall be clearly visible when viewed from ground level in bright daylight conditions or be able to store the reading until the equipment is returned to ground.

8.9 The tester shall be able to switch off automatic after 2 minutes if no high voltage is detected.

8.10 The tester shall have a power on switch. When the tester comes in contact with a live conductor it will automatically switch on.

8.11 An internal testing element shall be provided to test the live tester for correct functioning.

8.12 The high voltage sensing device shall be safe and waterproof when used in light rain for extended periods.

8.13 The tester shall indicate its battery condition or status.

8.14 The tester batteries shall last more than an hour on continuous operation.

8.15 The housing of the internal batteries shall be constructed to prevent leaking batteries damaging the electronic parts or switching components.

8.16 The live line tester accuracy shall be insensitive to electromagnetic fields from adjacent live catenaries or conductors.

8.17 The live part of the tester will be fully insulated from the user when in use for the insulation levels specified.

8.18 It is essential that the live line tester or high voltage sensing device is designed and manufactured for very high reliability and long life with a minimum of maintenance requirements.

8.19 The live line tester shall be safe for use when the Voltage to be detected contains lower order harmonics (below 1 kHz).

9.0 MECHANICAL CONSTRUCTION AND CHARACTERISTIC REQUIREMENTS OF THE EQUIPMENT

9.1 The basic mechanical assembly of the live line tester shall include a contact electrode, indicator and adaptor as illustrated in Fig 1b of SANS 61243-1.

9.2 The supply of an insulating pole, handle, hand guard and limit mark that conforms to SANS 61243-1 is optional.

9.3 If an insulating pole/rod material is supplied it shall be constructed from reinforced fibre glass.

9.4 The insulating pole shall be of such a length that the test electrode can make physical contact with a conductor 7m above the rail level.

9.5 The length of the handle shall be such that it can safely be operated by two hands.

9.6 For the case that the insulating pole, handle, hand guard and limit mark is not supplied the adaptor shall be of such nature that it can fit into a 'Rose' type end fitting.

9.7 The contact electrode shall be of suspension hook type to allow for easy contact with overhead track equipment.

9.8 The size of the suspension hook shall be such that a conductor of maximum diameter of 50 mm can be tested.

9.9 The live line tester shall have a maximum weight of 5 kg.

9.10 The equipment shall be of robust design to withstand rough handling.

9.11 An appropriate carry case, capable of sufficiently protecting the live line tester from damage due to vibrations during transport under severe service road conditions, shall be provided.

9.12 The equipment shall withstand shock and vibration.

9.13 The tester construction shall be such that overhaul and maintenance can be easily undertaken.

10.0 TESTS AND CONFORMANCES

10.1 The live line tester shall comply with all tests stated in SANS 61243-1. Test values/parameters shall be according to SANS 61243-1 unless the values differ from the ones stated in this specification.

11.0 MARKINGS

11.1 The equipment shall be clearly marked in accordance to SANS 61243-1.Additional markings:

11.1.1 Voltage range e.g. "25kV to 50 kV AC"

11.1.2 "Transnet Approved BBB3007"

11.1.3 Manufacturer's name, symbol and serial number

11.1.4 Date of manufacture

11.2 The functions of all switches and indicators shall be clearly and permanently marked.

11.3 All markings shall be in English.

12.0 SPECIAL TOOLS, SERVICING AIDS MANUALS AND SPARE PART LISTS

12.1 All auxiliary equipment and accessories, which are required for the operation of the equipment in accordance with the requirements of this specification, shall be accounted for in the tendered price.

12.2 Special tools or servicing aids required for the maintenance or repair shall be quoted for separately.

12.3 The tenderer shall supply comprehensive copies of instruction/maintenance manuals with each tester.

12.4 The tenderer shall prescribe the interval for maintenance and calibration.

13.0 GUARANTEE AND DEFECTS

13.1 The tenderer shall guarantee the satisfactory operation of the equipment supplied and accept liability for maker's defects, which may appear in design, materials and workmanship.

13.2 The tenderer shall specify a guarantee period that shall not be less than 12 months and the period shall commence on the date of delivery.

14.0 TRAINING

14.1 The tenderer shall make a separate quotation on training given on how to use the equipment if required.

15.0 TEST CERTIFICATE

15.1 The tenderer shall provide the type tests certificates on the day of delivery of the equipment. All certificates shall have detailed information about the type tests and the test methods used in accordance to SANS 61243-1 and as stipulated in this specification.

16.0 CHANGE

This specification was changed under cover of Engineering Change Proposal (ECP) BBD6962.

17.0 APPENDIX 1

17.1 SCHEDULE OF REQUIREMENTS (To be filled in by Transnet Freight Rail)

17.1.1 Quantity required:

2

17.1.2 Depot and Address Required for:

TRANSNET FREIGHT RAIL (RME)
COMMODORE CLOSE
RICHARDS BAY

17.1.3 Electrical Characteristics

17.1.3.1 System Voltage (25kV/50kV AC): 25kV AC

17.2 INSULATION ROD

17.2.1 Insulating pole/rod required for transmission (Yes/No): YES

17.2.2 Insulating pole/rod required for switching panel (Yes/No): No

18.0 APPENDIX 2

18.1 TECHNICAL DATA SHEET (To be filled in by Tenderer)

18.1.1 Tender information

18.1.1.1 Tenderer .....

18.1.1.2 Tender no. .....

18.1.1.3 Date: .....

18.1.2 General

18.1.2.1 Type (Indoor/Outdoor): .....

18.1.2.2 Conductor material:.....

18.1.2.3 Insulating material:.....

18.1.2.4 Wet and dry voltage insulation rating:.....

18.1.3 Battery

18.1.3.1 Internal/External Battery?.....

18.1.3.2 Operating battery Voltage (Volt):.....

18.1.3.3 Battery type:.....

18.1.3.4 Expected service life of the battery (hours continuous):.....

18.1.4 Physical appearance

18.1.4.1 Physical dimensions of carry case (mm):.....

18.1.4.2 Does all accessories fit into carry case?:.....

18.1.4.3 Maximum height live line tester can reach with extension (m):.....

18.1.4.4 Mass of live line tester (kg):.....

18.1.4.5 Mechanical lifetime:.....

18.1.5 Electrical

18.1.5.1 Maximum detection Voltage (Volt):.....

18.1.5.2 Minimum detection Voltage (Threshold Voltage) (Volt):.....

18.1.5.3 Leakage current under dry conditions (Ampere):.....

18.1.5.4 Leakage current under wet conditions (Ampere):.....

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TRANSNET
freight rail
A Division of Transnet Limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

PORTABLE EQUIPMENT FOR EARTHING OR EARTHING AND SHORT-CIRCUITING OF AC AND DC TRACTION, HV TRANSMISSION LINES AND 3kV DC TRACTION SUBSTATION AND TIE-STATION BUSBARS

Author:	Engineering Technician Section: Technology Management	L.N Makhathini
Approved:	Senior Engineer Section: Technology Management	L.O. Borchard
Authorised:	Principal Engineer Section: Technology Management	W.A. Coetzee

Date: 07 September 2011

Circulation Restricted To:

Engineering Infrastructure

Technology Management

INDEX

1.0 SCOPE

This specification covers Transnet`s requirements for earthing devices for use on AC and DC traction, HV transmission lines and 3kV DC traction substation and tie-station busbars.

2.0 STANDARDS AND PUBLICATIONS

2.1 Unless otherwise specified all materials and equipment supplied shall comply with the applicable and latest editions of SANS, IEC and Transnet's publications.

2.2 The following publications are referred to in this specification:

2.2.1 SOUTH AFRICAN NATIONAL STANDARDS

SANS 61230 - Live working – portable equipment for earthing or earthing and short-circuiting.

2.2.2 INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC 61138 - Cables for portable earthing and short-circuiting devices.

2.2.3 TRANSNET

CEE.0224 - Drawings, Catalogues, Instruction Manuals and Spares Lists for Electrical Equipment Supplied Under Contract.

TRANSNET DRAWING

CEE-TWH-0002 - Typical Earthing Device, Busbar chambers, 3kV DC traction substations and tie-stations

3.0 METHOD OF TENDERING

3.1 Tenderers 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.

3.2 A statement of non-compliance shall be motivated by the tenderer.

3.3 Tenderers shall submit descriptive literature consisting of detailed technical specifications, general constructional details and principal dimensions, together with clear illustrations of the equipment offered.

3.4 Failure to comply with clauses 3.1, 3.2 and 3.3 could preclude a tender from consideration.

4.0 APPENDIX

The following appendix forms an integral part of this specification:

Appendix 1: Schedule of requirements.

5.0 SERVICE CONDITIONS

The earthing devices shall be designed to operate under the following environmental conditions:

Ambient temperature : Minus 5°C to plus 50°C.

Air pollution : Heavy saline laden industrial and locomotive fumes.

6.0 DRAWINGS AND INSTRUCTION MANUALS

Drawings and / or instruction manuals shall be supplied in accordance with Transnet's specification No. CEE.0224.

7.0 AC AND DC TRACTION EARTHING AND SHORT-CIRCUITING DEVICES

These devices shall have conductor sizes in accordance to clause 10.1 and shall consist of the following: -

7.1 Line to rail jumper shall consist of a 15m long jumper cable to clause 10.1.1.2, a line clamp in accordance to clause 10.2 on one end and a rail clamp to clause 10.3 on the other end.

7.2 Line to line jumper shall consist of a jumper cable, 5m or 10m long to clause 10.1.1.1 with a line clamp in accordance to clause 10.2 on each end.

7.3 Rail to rail jumpers shall consist of cables 5m or 10m long to clause 10.1.1.2 with a rail clamp in accordance to clause 10.3 on each end.

8.0 HV TRANSMISSION LINE EARTHING AND SHORT-CIRCUITING DEVICES

8.1 6,6 and 11kV Transmission

These devices shall consist of a single jumper cable, 4m long connected with lugs and a locknut bolt, to three tails, each of length 9m, all being in accordance to clause 10.1.1.1 with three line clamps in accordance to clause 10.2 on the ends of the three tails and a rail clamp in accordance to clause 10.3 on the other end of the single 4m long cable.

8.2 33kV Transmission

These devices shall consist of a single jumper cable, 14m long connected with lugs and a locknut bolt, to three tails, each of length 3m, all being in accordance to clause 10.1.1.1 with three line clamps in accordance to clause 10.2 on the ends of the three tails and a rail clamp in accordance to clause 10.3 on the other end of the single 14m long cable.

The top assembly of three wires must be 3 meters each in length and the bottom single wire 14 meters in total 17meter.

9.0 3kV DC TRACTION SUBSTATION AND TIE-STATION BUSBAR DEVICES.

These devices shall be supplied in accordance with Transnet drawing No CEE-TWH-0002.

10.0 MATERIALS

10.1 CONDUCTORS: - Cables for portable earthing and short-circuiting equipment shall be supplied in accordance to IEC 61138

10.1.1 The conductor sizes shall be:

10.1.1.1 35 mm² plus 4 mm² / minus 0 mm² (1120 strands minimum).

10.1.1.2 70 mm² plus 8 mm² / minus 0 mm² (2250 strands minimum).

10.1.2 Conductor material shall be at least 99,95% pure copper.

10.1.3 Conductors shall be covered with transparent PVC insulation. The insulation thickness of item 10.1.1.1 shall be 1,2 mm (min) and the insulation thickness of item 10.1.1.2 shall be 1,5 mm (min).

10.1.4 Terminations shall be by means of hexagonally crimped lugs and be designed such that there is a positive lock between the lug and the clamp. The terminations shall be covered by a 200mm long, transparent, heavy-duty heat shrink tube.

10.1.4.1 Any deviation/improvement to the terminations shall be clearly stated as well as the advantage gained.

10.1.5 A pre-production sample of the cable, 500mm in length, fully terminated at one side, shall be submitted to the responsible Transnet representative for approval.

10.2 LINE CLAMPS: -

Line clamps shall:

10.2.1 withstand a torque of 20Nm without breaking.

10.2.2 offer a serrated connection to the conductor.

10.2.3 be fitted with a coupling aid to facilitate application from ground level.

10.2.4 be constructed of Cu-Ni-Si or aluminium alloy or similar tough conductive metal.

10.2.5 be of the screw-on type.

10.2.6 be capable of clamping conductors up to 38mm diameter for use on 3kV DC electrification and 23mm diameter for use on 25/50kV AC electrification and transmission lines.

10.2.7 withstand a fault current of 27 kA for a period of 30 milli-seconds without being destroyed.

10.3 RAIL EARTH CLAMPS: -

Rail earth clamps shall:

10.3.1 be constructed of Cu-Ni-Si or aluminium alloy or similar tough conductive metal.

10.3.2 ensure a positive electrical connection to the flange of heavily corroded rails even during short-circuit conditions.

10.3.3 withstand a fault current of 27 kA for a period of 30 milli-seconds without being destroyed.

10.4 OPERATING/EARTHING RODS: -

Operating rods shall:

10.4.1 be constructed of fibre glass.

10.4.2 be complete with bell-mouthed operating sockets and all the necessary attachments.

10.4.3 be 6m long and consisting of 4 sections, each 1 500mm long.

10.4.4 have a tough positive locking mechanism to lock the sections together.

10.4.5 be designed to withstand a head load of 80N.

10.4.6 not deflect more than 1000mm over the total length with a designed head load of 80N.

10.4.7 withstand an insulation test of 300kV per meter length for a period of 60 seconds.

10.4.8 with regard to any deviation/improvement to the rods shall be clearly stated as well as the advantages gained.

10.5 LINK EXTRACTION FITTINGS: -

Link extraction fittings shall:

10.5.1 be constructed of Cu-Ni-Si or aluminium alloy or similar tough metal.

10.5.2 lock securely to the socket of the operating rod to allow the opening and closing of links etc. using the rod.

10.5.3 with regard to any deviation/improvement to the fittings shall be clearly stated as well as the advantages gained.

11.0 TESTING

11.1 All tests referred to in SANS 61230: clause 5.0, are to be done in accordance with the relevant clauses, unless written exemption from these tests is obtained from Transnet.

12.0 MARKING

12.1 Each rail clamp, line clamp and operating rod shall be marked with the middle five figures of the contract number. The marking shall not affect the performance of the equipment what so ever.

12.2 Marking of devices shall further more fully comply with SANS 61230: clause 4.9, unless written exemption to deviate from the relative clauses is obtained from Transnet.

13.0 PACKING

13.1 Each item called for in the schedule of requirements shall be packed separately in portable packing cases or bags.

13.2 Packing cases or bags shall be marked: "Transnet" in large legible letters at least 30mm high.

APPENDIX 1

SCHEDULE OF REQUIREMENTS

ITEM	DESCRIPTION	QUANTITY
1.0	**AC AND DC TRACTION AND HV TRANSMISSION LINE DEVICES:**	
	Number of components required:	
1.1	**Line to rail jumpers, clause 7.1:**	
	(with clamps according to clauses 10.2 and 10.3)	.....
	(with one clamp according to clause 10.2)	.....
	(with one clamp according to clause 10.3)	.....
	(without clamps)	.....
1.2	**Line to line jumpers, clause 7.2 (5m length):**	
	(with one clamp according to clause 10.2)	.....
	(with two clamps according to clause 10.2)	.....
	(without clamps)	.....
	Line to line jumpers, clause 7.2 (10m length):	
	(with one clamp according to clause 10.2)	.....
	(with two clamps according to clause 10.2)	.....
	(without clamps)	.....
1.3	**Rail to rail jumpers, clause 7.3 (5m length)**	
	(with one clamp according to clause 10.3)	.....
	(with two clamps according to clause 10.3)	.....
	(without clamps)	.....
	Rail to rail jumpers, clause 7.3 (10m length)	
	(with one clamp according to clause 10.3)	.....
	(with two clamps according to clause 10.3)	.....
	(without clamps)	.....

1.4	**HV transmission line devices, clause 8.0 (8.1 and 8.2)**	
	(Locknut bolt and lug)	
	(with clamps according to clauses 10.2 and 10.3)	YES
	(with three clamps according to clause 10.2)	—
	(with one clamp according to clause 10.3)	—
	(without clamps)	—
	HV transmission line devices, clause 8.0	
	(Exothermically welded)	
	(with clamps according to clauses 10.2 and 10.3)	
	(with three clamps according to clause 10.2)	
	(with one clamp to clause 10.3)	
	(without clamps)	
1.5	Operating rods (link sticks), clause 10.4	
1.6	Link extraction fittings, clause 10.5	4
1.7	Line clamp, to clause 10.2	
1.8	Rail earth clamp, to clause 10.3	

2.0	**3kV DC TRACTION SUBSTATION AND TIE-STATION BUSBAR DEVICES:**	
	Number of components required in accordance with drawing No. CEE-TWH-0002 :	
2.1	DC earth leakage busbar to main 3kV DC busbar jumpers (item 1)	
2.2	DC earth leakage busbar to 3kV DC feeder jumpers (item 2)	
2.3	Clamp (item 5)	
2.4	Operating rod (item 6)	

END