



TRANSNET
freight rail

A division of Transnet limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

LIVE LINE TESTER (MEDIUM VOLTAGE DETECTOR) FOR USE BETWEEN 6.6 kV AND 22 kV AC

Appendix 1: To be filled in by Transnet Freight Rail

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1.0 SCOPE

- 1.1 This specification covers Transnet Freight Rail's requirements for live line testers to be used between 6.6 kV and 22 kV AC.

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 this 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 submit descriptive literature consisting of detailed technical specifications, general construction details and principle dimensions, together with clear illustrations of the equipment offered.
- 4.4 Tenderers shall complete Appendix 2: Technical Data Sheet
- 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/km²/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 6.6kV Voltage systems:

- | | | |
|-------|------------------------|-----------|
| 6.1.1 | Highest system voltage | 7.2kV |
| 6.1.2 | Nominal system voltage | 6.6kV |
| 6.1.3 | Frequency | 50Hz± 10% |

For 22kV Voltage systems:

- 6.1.4 Highest system voltage 24kV
- 6.1.5 Nominal system voltage 22kV
- 6.1.6 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 between 6.6 kV and 22 kV.
- 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 with 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 batteries of the tester 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. "6.6kV to 22kV AC".
- 11.1.2 "Transnet Approved BBD7268".
- 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 one copy 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 APPENDIX 1

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

16.1.1 Quantity required:
.....

16.1.2 Depot and Address Required for:
.....
.....
.....
.....
.....
.....

16.1.3 Electrical Characteristics

16.1.3.1 System Voltage (6.6kV/22kV AC):

16.2 INSULATION ROD

16.2.1 Insulating pole/rod required for transmission (Yes/No):.....

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

17.0 APPENDIX 2**17.1 TECHNICAL DATA SHEET** (To be filled in by Tenderer)**17.1.1 Tender information**

17.1.1.1 Tenderer

17.1.1.2 Tender no.

17.1.1.3 Date:

17.1.2 General

17.1.2.1 Type (Indoor/Outdoor):

17.1.2.2 Conductor material:.....

17.1.2.3 Insulating material:.....

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

17.1.3 Battery

17.1.3.1 Internal/External Battery?.....

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

17.1.3.3 Battery type:.....

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

17.1.4 Physical appearance

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

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

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

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

17.1.4.5 Mechanical lifetime:.....

17.1.5 Electrical

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

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

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

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