



A division of Transnet limited

## TECHNOLOGY MANAGEMENT

### SPECIFICATION

# LIVE LINE TESTER (HIGH VOLTAGE DETECTOR) TO BE USED ON 3 kV DC OVERHEAD TRACK EQUIPMENT ONLY

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## **1.0 SCOPE**

This specification covers Transnet Freight Rail's requirements for a live line tester for use on 3 kV DC overhead track equipment.

## **2.0 STANDARDS AND PUBLICATIONS**

2.1 Unless otherwise specified all materials and equipment supplied shall comply with latest edition of the SANS publications.

2.2 The following publication is referred to in this specification:

### **2.2.1 South African National Standard**

SANS 61243-2 - Live working – Voltage detectors: Part 2: Resistive type to be used for voltages of 1 kV to 36 kV AC.

## **3.0 DEFINITIONS**

3.1 The live line tester or high voltage-sensing device will be referred to herein as the tester.

## **4.0 TENDERING PROCEDURE**

4.1 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.

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

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

4.4 Failure to comply with clauses 4.1, 4.2 and 4.3 could preclude a tender from consideration.

## **5.0 SERVICE CONDITIONS**

5.1 The live line tester shall be designed to operate under the following environmental conditions:

Altitude : 0 to 1800 metres above sea level.

Relative humidity : 10 % to 90 %.

Ambient temperature range : Minus 10°C to plus 55°C.

Lightning density : 12 ground flashes per square kilometre per annum.

Air pollution : Heavily salt laden or polluted with smoke from industrial sources.

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

## **6.0 ELECTRICAL REQUIREMENTS**

6.1 The tester shall detect a live line energised at a voltage between 2.3 kV and 3.9 kV DC and be safe when in direct contact with the live conductor.

- 6.2 The insulation level of all the live parts of the tester shall be designed for a safety factor of not less than 2.5 and the live parts of the tester shall be marked with warning signs.
- 6.3 The tester shall not cause a flash over or breakdown between live parts of an installation or between a live part of an installation and earth.
- 6.4 The tester shall have a pick-up voltage of 1.10 kV DC ( $\pm 5\%$ ).
- 6.5 The tester shall be constructed such that the indicator cannot be damaged or shut off as a result of a spark discharge in accordance to SANS 61243-2 clause 4.3.3.
- 6.6 The maximum circuit current through the tester when the rated voltage is applied to the contact electrode shall not exceed 3 mA ( $\pm 5\%$ ).
- 6.7 In accordance to SANS 61243-2 clause 4.2.1.4 the tester shall not be affected in the presence of adjacent live or earthed systems. The presence of interference field shall not affect the indication when used in accordance with instructions for use.

## **7.0 GENERAL REQUIREMENTS**

- 7.1 In accordance to SANS 61243-2 clause 4.1.1 the tester shall be designed and manufactured to be safe for the user, provided it is used in accordance with safe methods of work and operating instructions for use.
- 7.2 The tester shall have a green light indicating de-energised (voltage not present) and a red light indicating energised (voltage present) conditions respectively.
- 7.3 The tester shall give a continuous indication when in direct contact with a live part.
- 7.4 The indicators of the tester shall be clearly visible from ground level in bright daylight conditions and also be in accordance with SANS 61243-2 clause 4.2.2.1.
- 7.5 A tester with a built-in power source shall give a clear indication until the source is exhausted unless its usage is limited by an indication of non readiness or automatic shut-off as mentioned in the operating instructions.
- 7.6 The tester shall have a testing element that will indicate (check) whether the tester is ready or not ready for use in accordance to SANS 61243-2 clause 4.2.7.
- 7.7 The tester shall be safe and waterproof when used in light rain for extended periods.
- 7.8 The tester shall be designed for very high reliability and long life with minimum maintenance requirements.
- 7.9 The tester shall be able to reach a conductor height of 5.5 m above rail level.
- 7.10 The tester shall be able to be used on a 170 mm<sup>2</sup> thick conductor.
- 7.11 The tester connecting leads shall be of highly flexible copper with plastic insulation.
- 7.12 The tester shall switch itself off after 2 minutes if no voltage is detected.
- 7.13 The housing for the batteries of the tester shall be constructed to prevent leaking batteries damaging the electronic parts or switching mechanisms.
- 7.14 The tester shall be fully insulated and a suspension hook shall be provided on the end of the test probe.
- 7.15 The tester shall be provided with a suitable portable carrying case. Where a separate operating stick is provided, it shall also be supplied in a portable carrying case.

- 7.16 The mass of the tester shall be such that it can be handled and operated easily by one person (male or female).
- 7.17 In the event that a rail connection is offered, tenderers shall ensure that the rail connection can be safely made when the tester is in contact with a live conductor.

## **8.0 MECHANICAL REQUIREMENTS**

- 8.1 The tester should be vibration resistant in accordance to SANS 61243-2 clause 4.4.4.
- 8.2 The tester should be drop and shock resistant.

## **9.0 TESTS**

- 9.1 Checking of the testing element shall be done in accordance with SANS 61243-2 clause 5.2.8.
- 9.2 The drop resistance test shall be in accordance with SANS 61243-2 clause 5.4.6.

## **10.0 OPERATING INSTRUCTIONS AND MANUALS**

- 10.1 Each tester has to be accompanied by the manufacturer's operating instructions and manual.

## **11.0 ADDITIONAL INFORMATION**

Tenderers shall provide the following information at the tendering stage:

- 11.1 The battery requirements of the tester and the expected service life of the batteries at 20 operations per day.
- 11.2 The maximum safe working range (voltage) of the tester.
- 11.3 Spare components recommended and availability for local repair.
- 11.4 The mass of the tester.
- 11.5 Experience in the durability of the tester during normal daily use, including weatherability and sustained insulation values.
- 11.6 The dimensions of the carrying case provided with the tester.

## **12.0 MARKINGS**

- 12.1 The equipment shall be clearly marked in accordance to SANS 61243-2. Additional markings:
  - 12.1.1 System operating voltage: - e.g. 3 kV DC only.
  - 12.1.2 Manufacturer's name, symbol and serial number.
  - 12.1.3 Date of manufacture
  - 12.1.4 Transnet Approved BBC2076
- 12.2 The functions of all switches shall be clearly and permanently marked in English.

## **13.0 GUARANTEE**

- 13.1 The tenderer shall guarantee the testers for a period of 12 months and the period shall commence on the date of delivery.

**14.0 CHANGE**

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

**END**