



BILL OF QUANTITY AND PROJECT SPECIFICATION

:

SUPPLY LIVE LINE TESTER AND PORTABLE EARTHING CABLES

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SECTION A: DESCRIPTION OF THE REQUIRED GOODS

1. INTRODUCTION

The purpose of this project is to provide a service to supply and deliver high voltage safety equipment/tools to PRASA regions.

2. DESCRIPTION OF WORKS/SCOPE OF WORKS

Supply and delivery High Voltage Electrical safety tools/equipment to PRASA regions.

2.1 KZN Region Safety tools:

- 1) 9 x Live line testers.
- 2) 14 x portable earthing devices to be used to earth 3kV DC line.
 - Each portable earthing device shall consist of an insulated (Clear or translucent PVC) cable fitted clamps for the rail connection and clamps/hooks for overhead line connection.
 - The minimum cross section area of the earthing cable shall be at least $65mm^2$ copper.
 - The length of each portable earthing cable shall be at least 15m each.
- 3) 7 x Live line testers with a detection range from 6kV AC to 22kV AC.
- 4) 12 x Portable earthing devices for earthing the equipment: Ranging from 6kV AC to 22kV AC.
 - Each portable earthing device shall consist of an insulated (Clear or translucent PVC) cable fitted clamps for the rail connection and clamps/hooks for overhead line connection.
 - The minimum cross section area of the earthing cable shall be at least $50mm^2$ copper.
 - The length of each portable earthing cable shall be at least 15m each.

2.2 Gauteng Region (for detail description of each item, refer to 2.1):

- 1) 7 x Live line tester for 3kV DC application in accordance with specification BBC2076 version 3.
- 2) 12 x portable earthing devices for 3kV DC line earthing in accordance with BBF3690
- 3) 6 x Live line tester for a range from 6kV to 22kV AC.



4) 10 x Portable earthing devices for earthing the (6kV to 22kV) AC in accordance with BBF3690.

2.3 Western Cape Region:

1) 4 x Live line tester for 3kV DC application in accordance with specification BBC2076, refer to section 2.1 above.

2) 3 x portable earthing devices for 3kV DC line earthing in accordance with BBF3690, refer to section 2.1 above.

3) 2 x Live line tester with a detection range of 11kV AC to 33kV AC.

- The Live line tester must be battery powered.

4) 4 x Portable earthing devices for earthing the (11kV to 33kV) AC in accordance with BBF3690.

- Each portable earthing device shall consist of an insulated (Clear or translucent PVC) cable fitted clamps for the rail connection and clamps/hooks for overhead line connection.
- Description and illustration (showing all the connections) of how the earth cable shall be used in-service shall be provided.
- The minimum cross section area of the earthing cable shall be at least 50mm² copper.
- The length of each portable earthing cable shall be at least 15m each.

3. DURATION

The project contract will be for 6 Month from the date of award. i.e., Tenderer having acknowledged the receipt of award letter.

4. GUARANTEE

4.1. Prasa Metrorail shall be formally invited to conduct tests and visually inspect the material before delivery for any defects or damages.

4.2. The material shall be subjected to a guarantee period of one year. The guarantee period shall commence the day it is formally handed over to and accepted by Metrorail.

4.3. Any defects that may become apparent during the guarantee period shall be rectified to the satisfaction of the client at no cost to PRASA.

4.4. Should the contractor fail to comply with the above, Prasa is entitled to take effective replacement of the defective material. The contractor must reimburse Prasa Metrorail



the total cost for replacement of materials.

5. **PENALTY**

Should the Contractor fail to complete delivery on/before the stipulated completion dates, a penalty fee of R5000 per week will be charged.

6. **DELIVERY**

The safety tools shall be delivered as follows:

- The KZN safety tools shall be delivered in Durban PRASA Electrical Depot.
- The Gauteng safety tools shall be delivered in Pretoria PRASA Electrical Depot.
- The Western Cape Safety tools shall be delivered in Salt River PRASA Electrical Depot.

7. **BILL OF QUANTITIES**

Safety Tools			
Item	Qty	Rate	Total
Live line tester for 3kV DC	20		
Portable earth device for use on 3kV DC	29		
Live line tester for use on equipment using voltage ranging from 6kV AC to 22kV AC	13		
Live line tester for use on equipment using voltage ranging from 11kV AC to 33kV AC	2		
Portable earth device for use on 6.6kV AC to 33kV AC	26		
		Total (Exc.)	
		VAT (15%)	
		Total	



SECTION B: TECHNICAL REQUIREMENTS FOR BOTH AC AND DC LIVE LINE TESTERS

1.0 SCOPE

PRASA requirements for live line tester for use on 3 kV DC and for use on 6kV to 22kV AC 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 – Live line testers: 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 a) DC Tester

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.

6.1 b) AC Tester

The tester shall detect a live line energised at a voltage between 6kV and 22kV AC and be safe when in direct contact with the live conductors.

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 a) The DC tester shall have a pick-up voltage of 1.10 kV DC ($\pm 5\%$).

6.4 b) The AC tester shall have a pick-up voltage of 6.6 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 5.5m above rail level.

7.10 The tester shall be able to be used on a 170 mm²



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 weather ability 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

12.2 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.