



INFRASTRUCTURE ENGINEERING

ELECTRICAL DEPARTMENT

SPECIFICATION

Specification For An 5kV Electronic Digital Insulation Tester

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Date:		12 July 2023




12 July 2023

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Transnet Freight Rail - Infrastructure

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1. General Requirements

- 1.1 This specification outlines the requirements of a portable, heavy duty digital insulation tester.
- 1.2 The insulation tester shall be ergonomically designed for maximum operator productivity and safety.

2. Operating Conditions

- 2.1 The insulation tester will be operated in all weather conditions at altitudes varying from sea level to 2000m above sea level, relative humidity 10% to 90% and atmospheric conditions which vary from heavily saline to dry and dusty.
- 2.2 Ambient air temperatures ranging from -20° C to 50° C.

3. Qualifications

- 3.1 The design of the insulation tester is to be that of the manufacturer, but must be of robust construction in order to meet sustained heavy duty demands, yet it must be light and easy handled by one operator.
- 3.2 The insulation tester will be acceptable in standard factory production finish and colour. Details to be furnished.

4. Performance

- 4.1 The actual design and service life of the insulation tester is to be stated.
- 4.2 The insulation tester are to be easily and economically maintained with standard workshop/calibration tools and equipment. Details of maintenance/service/calibration firms (locally) that can perform such services are to be supplied at the time of tendering.

5. Technical Requirements

5.1 General Description

- 5.1.1 A heavy duty, portable and digital display insulation tester capable of testing switchgear, motors, generators, transformers and cables up to 5000V. The tester will be used for a wide range of tests: from simple spot checks to timed tests and breakdown tests. It should have measurement storage and PC interface with software.
- 5.1.2 The equipment must come in a lockable case capable of storing all accessories furnished with the device.

5.2 Operational requirements

- 5.2.1 Test voltages of 250V,500V,1000V,2500V and 5000V.
- 5.2.2.Capable of testing in 50V increments between 250V and 1000V, and 100V increments between 1000V and 5000V.
- 5.2.3 Measures 0 to 1 Tera – Ohm.
- 5.2.4 Warning voltage function that alerts the user that line voltage is present and gives the voltage reading up to 600V AC or DC.

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- 5.2.5 Guard system that eliminates the effect of surface leakage current on high-resistance measurements.
 - 5.2.6 Large digital LCD that shows detailed measurement data.
 - 5.2.7 Cable for insulation capacitance.
 - 5.2.8 Leakage current.
 - 5.2.9 Ramp function (0-5000 V DC) for breakdown testing.
 - 5.2.10 Must have a timer 1 to 99 minutes.
 - 5.2.11 Automatic calculation of polarization index and dielectrically absorption required.
 - 5.2.12 Storage for all measurements parameters.
 - 5.2.13 Should include quick link software and optical interface cable.

5.3 Power supply requirements

- 5.3.1 Main power source shall be from a pack of rechargeable and a backup pack of batteries shall also be provided incase the main source run out.
- 5.3.2 The batteries shall have a maximum 3 hours recharge time, automatic cut-off shall also be provided. The battery packs shall be fully protected against overcharge and over-discharge
- 5.3.3 The charge source shall be of 220V AC, 50Hz of a normal South African electrical socket.

5.4 Measuring Capability

Test Voltage (DC)	Range	Accuracy
250V	200k Ω to 5G Ω 5G Ω to 50G Ω	5% 20%
500V	200k Ω to 10G Ω 10G Ω to 100G Ω	5% 20%
1000V	200k Ω to 20G Ω 20G Ω to 200G Ω	5% 20%
2500V	200k Ω to 50G Ω 50G Ω to 500G Ω	5% 20%
5000V	200k Ω to 100G Ω 100G Ω to 1T Ω	5% 20%
Short circuit current	Greater than 1 mA and less than 2mA.	
Bar graph range	0 to 1T Ω	
Insulation test voltage accuracy	0% to + 10% at 1mA load current	
Induced AC mains current rejection	2mA maximum	
Charging rate for capacitive load	5 seconds per uF	
Leakage current	1nA to 2mA	$\pm(5\%=2nA)$
Capacitance measurements	0.01uF to 15.00uF	0.03uF \pm (15%rdg+)
Live Circuit indicator	30V to 600V AC/DC 50/60 Hz	$\pm(5\% + 2V)$
Time increments indicated to within 1 second	1 to 99 min, settable in 1 min.	
Ramp	0 to 100% of selected test voltage	

5.5 Memory and data transfer

- 5.5.1 The device shall have data storage.
- 5.5.2 The device shall have the provisions for data downloading to a PC using a USB cable

5.6 Preferred mass and housing

- 5.6.1 The mass of the unit shall not exceed 5 kg

5.6.2 The housing for the units making up this device shall be of robust construction to sustain heavy duty demands under the service conditions as stated in clause 2 of this specification.

5.7 Additional requirements

5.7.1 An operator's handbook, calibration chart and spare parts list must be supplied with each device in order to ensure that the device is operated in accordance to the manufacturer's instructions.

5.7.2 Sufficient training must be given to all operators of these machines.

5.7.3 All devices and equipment must be supplied complete with essential tools and consumable items as necessary. Details to be furnished for any tools required.

6. Data Plate

6.1.1 The insulation tester must come with a data plate.

6.1.2 The brand and model number of the insulation tester must clearly shown.

6.1.3 The actual weight in kilograms (kg) of the insulation tester must be shown on the machine

6.1.4 The actual dimensions of the insulation tester must be indicated in millimetres (mm).

7. Quality Control

7.1 All insulation testers must be manufactured in an environment that complies to the latest ISO 9000 to ISO 9004 or similar quality control standards. Details must be furnished.

7.2 Insulation testers will be subject to a technical evaluation and the final decision will, amongst others, be based on these findings.

8. Legal and Operational

8.1 All equipment to comply with the requirements of the SABS and other specification(s) applicable to insulation test instruments and gauges.

8.2 The information as requested by the various clauses in this specification is to be supplied in form of technical data, pamphlets and/or drawings. If this is not complied to, offers may be overlooked.

8.3 Insulation testers not already in service with Transnet Freight Rail must be made available for testing/evaluation during the adjudication of the tender. Technical improvements on existing testers/equipment are to be substantiated by physical examples.

8.4 All insulation testers are to be guaranteed for a minimum period of 24 months against faulty material and workmanship - fair wear and tear excluded. Full details of guarantee are to be submitted.

8.5 Maintenance/service/calibration centres for this type of device shall be available locally. Full details of such organisations are to be submitted.