



A Division of Transnet SOC Limited




INFRASTRUCTURE ENGINEERING

ELECTRICAL DEPARTMENT

SPECIFICATION

500V -10KV ELECTRONIC DIGITAL INSULATION

TESTER

Author:	Engineer		
	Rail network Technical	Kamvelihle Cuba	
Approved:	Senior Technologist		
	Rail network Technical	Charles Shihlomule	
Authorised:	Principal Engineer		
	Rail network Technical	Selby Mathebula	
Date:			26/08/2024

Circulation Restricted To:

Transnet Freight Rail - Infrastructure

© This document as a whole is protected by copyright. The information herein is the sole property of Transnet Ltd. It may not be used, disclosed or reproduced in part or in whole in any manner whatsoever, except with the written permission of and in a manner permitted by the proprietors.

CONTENTS

1. GENERAL REQUIREMENTS3

2. OPERATING CONDITIONS.....3

3. QUALIFICATIONS3

4. PERFORMANCE3

5. TECHNICAL REQUIREMENTS3

 5.1 General Description3

 5.2 Operational requirements4

 5.3 Power supply requirements4

 5.4 Measuring Capability4

 5.5 Memory and data transfer5

 5.6 Preferred mass and housing5

 5.7 Additional requirements.....5

6. DATA PLATE.....5

7. LEGAL AND OPERATIONAL6

1. GENERAL REQUIREMENTS

- 1.1 This specification outlines the requirements of a portable, heavy duty digital insulation tester, S1-1068 type or similar.
- 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 as well as salt laden and industrial atmosphere.

Altitudes:	From sea level to 2000m above sea level.
Relative humidity:	10% to 95%
Atmospheric conditions:	May vary from heavily saline to dry and dusty conditions.
Ambient air temperatures:	-10° C to 50° C. (daily average +30° 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.

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 from 500V up to 10000V. 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: 500V,1000V,2500V,5000V and 10000V.

5.2.2.Capable of testing in increments of 500V.

5.2.3 Measuring range: 0 to 25GΩ and 25GΩ to 500GΩ.

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.

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 1 to 99 min timer.

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 in case 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
500V	200kΩ to 5GΩ 5GΩ to 50GΩ	3% + 2 digit
1000V	200kΩ to 20GΩ 20GΩ to 200GΩ	3% + 2 digit
2500V	200kΩ to 50GΩ 50GΩ to 500GΩ	3% + 2 digit
5000V	200kΩ to 500GΩ	3% + 2 digit

10000V	100GΩ to 1TΩ	3% + 2 digit
Short circuit current (Max)	1mA – 1.25mA	
Bar graph range	0 to 1TΩ	
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	±(5%=2nA)
Capacitance measurements	0.01uF to 15.00uF	0.03uF± (15%rdg+)
Live Circuit indicator	30V to 600V AC/DC 50/60 Hz	±(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. LEGAL AND OPERATIONAL

- 7.1 The insulation tester should comply with the requirements of national and other international standards applicable to insulation test instruments and gauges.
- 7.2 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.
- 7.3 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.
- 7.4 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.