TRANSNET
freight rail

A Division of Transnet SOC Limited

INFRASTRUCTURE ENGINEERING

ELECTRICAL DEPARTMENT SPECIFICATION

THREE-PHASE TRANSFORMER TURNS RATIO TESTER

Author: Siyabonga Khoza
Engineer, RN-Technical Office

Author: Kamvelihle Cuba
Engineer, RN-Technical Office

Approved: Charles Shihlomule:
Senior Technologist, RN-Technical Office

Approved: Selby Mathebula:
Principal Engineer, RN-Technical Office

Date: 26/08/2024

Circulation Restricted To:

Transnet Freight Rail - Infrastructure

CONTENTS

1. GENERAL REQUIREMENTS

1.1. This specification outlines Transnet Freight Rail`s requirements for the supply and delivery of a Three Phase Transformer Turns Ratio Tester (TTR300 or similar).

1.2. The Three Phase Transformer Turns Ratio Tester shall be ergonomically designed for maximum operator productivity and safety.

1.3. The instrument shall be of robust nature and designed to withstand the rough conditions of the railway environment. Proper casing or carry bag shall be supplied with each instrument.

2. OPERATING CONDITIONS

2.1. The Three Phase Transformer Turns Ratio 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:-10º C to 50º C. (daily average +30˚C)

3. FUNCTIONAL REQUIREMENTS

3.1. The portable Three Phase Transformer Turns Ratio Tester shall be capable of applying a voltage to the high-voltage winding of a transformer and accurately measure the resulting voltage from the low voltage winding

3.2. The Three Phase Transformer Turns Ratio Tester must be capable of measuring:

3.2.1. All types of transformer Turns ratio.

3.2.2. Excitation current.

3.2.3. Phase angle deviation between the high and low voltage winding.

3.2.4. Percentage ratio error.

4. TECHNICAL SPECIFICATIONS

4.1. The portable Three Phase Transformer Turns Ratio Tester shall comply with the following technical requirements:

4.1.1. The instrument shall be designed to cater for 240VAC (± 10%), 250VA, 50Hz (± 3%).

4.1.2. The equipment shall provide accurate measurement of the exciting current to 0.1 mA.

4.1.3. The equipment shall be capable of automatic or manual selection of 8, 40, or 80 Vrms excitation voltage.

4.1.4. The equipment shall be capable of providing excitation current range and accuracy of 0-500 mA .

4.1.5. The equipment shall be capable of measuring the phase angle deviation between the high and low side of the transformer with a resolution of 0.1 minutes (1/600 of a degree).

4.1.6. The equipment shall be capable of providing the operator with results that are comparable to the nameplate or expected ratio results and display the percentage error vs the nameplate for each test and winding.

5. SOFTWARE FEATURES

5.1. The portable Three Phase Transformer Turns Ratio Tester shall have the following software features:

5.1.1. A built-in software tools for testing turns ratio, excitation current, phase angle deviation and percentage ratio error.

5.1.2. An option for remote control and operation through a computer.

5.1.3. A feature for automatic report generation with options to customize reports.

6. PHYSICAL AND MECHANICAL REQUIREMENTS

6.1. The portable Three Phase Transformer Turns Ratio Tester must be compact and lightweight design for ease of transport and use in the field. Its weight shall not exceed 12kgs excluding accessories.

6.2. It must be rugged and durable in construction to withstand harsh field conditions.

6.3. It must have an effective cooling system to prevent overheating during prolonged use

7. ACCESSORIES

7.1. The portable Three Phase Transformer Turns Ratio must be supplied with all necessary cables, connectors, and adapters for various cable types. The main testing cables shall not be less than 6m in length.

7.2. Its carry case must be durable, weather-resistant carrying case for protection during transport.

7.3. It must be supplied with a complete grounding kit to ensure safe operation during testing.

8. COMPLIANCE AND CERTIFICATION

8.1. The portable Three Phase Transformer Turns Ratio must comply with relevant international standards.

8.2. It must be supplied with calibration certificates traceable to national standards.

8.3. It must come with a minimum of 2 years warranty where the supplier shall take full responsibility in repairing or replacing the faulty unit and component unless it has been proven to be negligence on the side of the end user.

9. SUPPORT AND TRAINING

9.1. The OEM or contractor shall provide on-site training for not less than 10 operators and maintenance personnel.

9.2. The OEM shall be willing to provide technical support with quick response times.

9.3. The instrument shall be supplied with comprehensive user manual, service manual, and technical documentation.

10. EVALUATION OF SUBMITTED DOCUMENTS

10.1. All bidders shall submitted data sheets with clear pictures of the instrument and its accessories.

10.2. Data sheets shall detail relevant technical, operational, functional and other relevant requirements as indicated in the specification. Failure to provide detailed datasheets shall result in the disqualification of the bidder.