

## **INFRASTRUCTURE ENGINEERING**

## ELECTRICAL DEPARTMENT SPECIFICATION

# CIRCUIT BREAKER SPEED AND OHMIC CONTACT TESTER-CIRCUIT BREAKER ANALYSER

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Date:

26/08/2024

Circulation Restricted To:

Transnet Freight Rail - Infrastructure

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#### 1. GENERAL REQUIREMENTS

- 1.1. The circuit breaker analyser shall be suitable for testing and evaluating all single poles, two poles and three poles medium voltage and high voltage circuit breakers within the Transnet environment which are used in electrical systems rated up to 220kV AC.
- 1.2. The circuit breaker analyser shall be an EGIL200 type or an instrument with same or better features.
- 1.3. The design must comply with international standards (e.g., IEC, IEEE).

#### 2. OPERATING CONDITIONS

2.1. The circuit breaker analyser shall 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 circuit breaker analyser shall be capable of performing the following tests:
  - 3.1.1. It must accurately measure the time it takes for the circuit breaker contacts to open and close.
  - 3.1.2. It must be capable of measuring the timing of all three phases simultaneously.
  - 3.1.3. It must be capable of measuring the timing of both main and resistor contacts.
  - 3.1.4. It must have the ability to measure the travel distance of the circuit breaker contacts during operation.
  - 3.1.5. It must calculate the speed of the contacts during opening and closing operations.
  - 3.1.6. It must have the ability to record and analyse the motion of the circuit breaker's operating mechanism.
  - 3.1.7. It must be capable of measuring the current drawn by the operating coils during the opening and closing operations.
  - 3.1.8. It must provide a detailed current profile during operation, which helps in diagnosing issues with the operating mechanism.

- 3.1.9. It must be capable of analysing the first trip operation of a circuit breaker after a prolonged period of inactivity to assess its performance under real-world conditions.
- 3.1.10. It must be able to measure the contact resistance in both static and dynamic states, which is essential for assessing the condition of the contact surfaces.
- 3.1.11. The instrument must log and timestamp all test events for precise analysis, and it must have the ability to log multiple events for complex testing scenarios.
- 3.1.12. It must provide options for both internal and external triggering of tests and synchronize measurements with external events or other test equipment.

#### 4. TECHNICAL REQUIREMENTS

- 4.1. The instrument shall be capable of handling test voltages up to 300 V AC and DC.
- 4.2. It shall be capable of measuring and sourcing currents up to 60 A for circuit breaker testing.
- 4.3. It must have high measurement accuracy, with typical tolerances of  $\pm 0.5\%$  for timing and  $\pm 1\%$  for resistance.
- 4.4. It must have timing measurements with an accuracy of ±1 millisecond or better.
- 4.5. The contact resistance measurements must range from microohms to milliohms, with an accuracy of  $\pm 1\%$ .
- 4.6. The coil voltage measurement must range from 0 to 110 V with an accuracy of ±0.5%.
- 4.7. The coil current measurement must range from 0 to 20 A with an accuracy of ±0.5%.
- 4.8. It must be equipped an LCD touch screen with intuitive graphical user interface (GUI) for easy operation.

#### 5. SOFTWARE FEATURES

- 5.1. The circuit breaker analyser shall have the following software features:
  - 5.1.1. Its system must include test automation software compatible with Windows and Android platforms.
  - 5.1.2. It must have features for storing and retrieving test data, with export options to CSV, PDF, and XML formats.
  - 5.1.3. It must be capable for automated report generation with customizable templates for different tests and clients.
  - 5.1.4. It must be operatable from a computer and have the capability for remote diagnostics and software updates, ensuring the system remains up to date with the latest features and improvements.

5.1.5. It must have a built-in memory for storing test results and data, with options for exporting data via USB, ethernet or other interfaces. USB option is necessary.

#### 6. PHYSICAL AND MECHANICAL REQUIREMENTS

- 6.1. The circuit breaker analyser must be compact and lightweight design for ease of transport and use in the field. Its weight shall not exceed 30kgs excluding accessories and auxiliaries.
- 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.
- 6.4. The system must include built-in overvoltage protection to prevent damage to the equipment and ensure user safety.
- 6.5. The instrument design should include an interlock mechanism that prevents testing unless all connections are properly secured.

#### 7. ACCESSORIES

- 7.1. The circuit breaker analyser must be supplied with all necessary auxiliaries and cables, connectors, and adapters for various test procedures. All main cables must have high voltage insulation and not less than 10m in length.
- 7.2. Its carry case must be durable, weather resistant (IP53) carrying case for protection during operation and transportation.
- 7.3. It must be supplied with a complete grounding kit to ensure safe operation during testing.
- 7.4. It must have an option of external power supply (230V AC @ 50Hz) for continuous operation in the field.

#### 8. COMPLIANCE AND CERTIFICATION

- 8.1. The circuit breaker analyser must compliance 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. TECHNICAL EVALUATION**

- 10.1.All bidders shall submit 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.