SPECIFICATION
Insulation / voltage withstand tester

1. Background and Scope

This specification describes the requirements for an Insulation / voltage withstand tester (hi-pot tester).

The End-User of the i-pot tester will be Comisión Nacional de Energía Atómica (CNEA).

The qualification of cables for use in harsh environments in nuclear power plants (NPP) involves subjecting cable samples to different type tests; IEEE 383 Standard provides requirements, direction and methods for qualifying electric components. According to IEEE 383 electric cables need to be subjected to voltage withstand tests at several stages of the qualification program. Cables qualification is dependant, partially, on the cable voltage withstand test results.

CNEA has experience in cable qualification for nuclear sites following IEEE standard. In the past, voltage withstand tests were carried out by third parties due to the lack of the hi-pot tester needed.

Local NPPs in the country are in the process of specifying cables for use in harsh and mild environments. The hi-pot tester is therefore an instrument that will be needed in the near future in order to test and fully qualify such cables.

2. Applicable Documents

The following documents shall be applicable for this Specification to the extent specified hereinafter:

2.1. IEEE Std 383-2015 IEEE Standard for Qualifying Electric Cables and Splices for Nuclear Facilities;
2.2. IEEE Std 95 Recommended Practice for Insulation Testing of AC Electric Machinery (2300 V and Above) With High Direct Voltage;
2.3. IEC 60502 Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1,2 kV) up to 30 kV (Um = 36 kV); and
2.4. IEC 60947:2007 +AMD1:2010+AMD2:2014 CSV: Low Voltage switchgear and control-gear.

In the event of conflict between the documents listed above and the content of this Specification, the content of this Specification shall take precedence to the extent of the conflict.

3. Definitions, Acronyms, and Abbreviations

The following definitions, acronyms, and abbreviations shall apply throughout this Specification unless defined otherwise hereinafter:

CNEA: Comisión Nacional de Energía Atómica (National Atomic Energy Comission).

NPP: Nuclear Power Plant.

IEEE: Institute of Electrical and Electronics Engineers.

IEC: International Electrotechnical Commission.

Hipot: High Potential.

4. Requirements

4.1. Functional and Performance Requirements

The hi-pot tester shall meet the following functional and performance requirements:

4.1.1. It shall provide a programmable AC high voltage with maximum source of 15kVac, accuracy of 2% of full scale. The test voltage shall have a practically sinusoidal waveform and a frequency between 45 Hz and 65 Hz.;
4.1.2. The high-voltage transformer shall be so designed that, when the output terminals are short-circuited after the output voltage has been adjusted to the appropriate test voltage, the output current shall be at least 200 mA;
4.1.3. The overcurrent relay shall not trip when the output current is less than 100 mA;
4.1.4. The equipment's input voltage shall be 220Vac or 380 Vac, 50Hz; and
4.1.5. The equipment's testing time shall be programmable with a time base of 60s in a time range up to 120 min.

4.2. Technical Requirements

The hi-pot tester shall meet the following technical requirements:

4.2.1. The equipment's total size shall not exceed 60(W)x60(D)x110(H) cm;
4.2.2. The equipment's total weight shall not exceed 10 kg or if its weight exceed 10kg the equipment shall has wheels in order to be transportable;
4.2.3. The equipment shall allow continuous current measurement during testing; and
4.2.4. The equipment working temperature shall be from 0 to 45°C and storage temperature from 0°C up to 60°C.

5. Marking

All markings shall be in Spanish or English language.

6. Packing

The System, for the shipment by air, sea or road to the End-User, shall be packed in accordance with international standards that are applicable for the shipment by air, sea or of this kind.

7. Quality Requirements

7.1. The hi-pot tester shall be manufactured and shipped in accordance with the Contractor's ISO quality assurance system or an equivalent quality assurance system.

7.2. The Contractor shall document the compliance with this quality assurance system.

8. Testing and Acceptance

Calibration certificate and equipment warranty are required.

9. Qualification requirement

The Supplier shall have a representative in Argentina for technical support.

10. Deliverable Data Items

The Contractor shall provide two complete sets of operation and servicing manuals and technical drawings in Spanish or English language.