Title: **عنوان :**

Neutral Grounding Resistor Test Procedure

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Scope

This document provides the routine test procedure of the Neutral Grounding resistors (NGRs). The routine test contains both electrical and visual check tests.

Reference Document

- **ANSI/IEEE–32, 1972,** "*Requirements, Terminology, and Test Procedure for Neutral Grounding Devices*".
- **IEC 60071–1,** "*Insulation Co-ordination*".
- **ANSI/NETA ATA,** "*Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems*".

Nomenclatures:

Frame earth:	The overall frame or enclosure which is connected to the earth.
Tie rods:	Individual frame of each resistor blocks.
Megger test:	Measurement of insulation resistance of components
Power frequency withstand test:	A dielectric test in which the voltage is a low frequency alternating voltage from an external source applied between conducting parts and between conducting parts and ground

The overall test procedures are defined as follows:

1- Visual and Dimensional Check
2- Resistance Value Test
3- Insulation Resistance Test
4- Power Frequency Withstand Test
5- Insulation Resistance Test
6- Incoming & Outgoing cable connection & integrity of Terminal box connections

The sufficient explanation of each section is presented in the rest of the document.

1- Visual and Dimensional Check

1-1- Confirm Overall dimension is in accordance with the latest revision of applicable drawing.
1-2- Confirm integrity of all resistor connections.
1-3- Confirm all components are correctly installed and connected in accordance with the latest revision of applicable drawing.
1-4- Confirm paint (or other coverage) of Enclosure has not been damage.
1-5- Confirm accuracy & fixing of name plates and labels.

2- Resistance Measurement Test

2-1- Using a digital ohmmeter check and record the value of DC resistance at ambient temperature and correct its value to specified temperature. According to the IEEE-32-1972, Sec 10.1.4, acceptance tolerance in the lack of customer request is ±10%.

3- Primary Insulation Resistance Test (Megger Test)

3-1- Using a digital insulation test, apply acceptance DC voltage between the resistor H.V. connection and individual resistor bank tie rods regarding the ANSI/NETA ATS Table 100.1. Minimum acceptance value is obtained from the Table 100.1.

3-2- Repeat test (3-1) between H.V. connection and frame earth with acceptance DC voltage according to the ANSI/NETA ATS Table 100.1. This test checks the integrity of secondary insulation materials. Minimum acceptance value is obtained from the Table 100.1.

4- Rated Short Duration Power Frequency Withstand Tests (1 Minute)

Remove the connecting link between the resistor and any base point and/or LV connection.

4-1- Using a suitable external source, apply the specified voltage between terminals and ground for the complete device extracted from IEC 60071-1 Table 2.

4-2- Using a suitable external source according to the IEEE-32-1972, Sec. 10.3.2 apply the specified voltage between terminals of each unit and its own individual frame.

Note: The voltage applied from the terminals of each assembly to its own frame shall be:

- Twice the rated voltage of the section of which the frame is a part plus 1000V when rated 600V or less. $V_{rms-applied}(kV) = \frac{2\times V_p}{N} + 1000$

- 2.25 times the rated value plus 2000V when rated over 600V. $V_{rms-applied}(kV) = \frac{2.25\times V_p}{N} + 2000$

In the event of a retest the voltage shall be 80% of the original test voltage.

5- Secondary Insulation Resistance Test (Megger Test)

To ensure that the insulations interval in the section (3) isn't damaged, again the same test is applied.

5-1- Using a digital insulation test apply acceptance DC voltage between the resistor H.V. connection and individual resistor bank tie rods regarding the ANSI/NETA ATS Table 100.1. Minimum acceptance value is obtained from the Table 100.1.

5-2- Repeat test (3-1) between H.V. connection and frame earth with acceptance DC voltage according to the ANSI/NETA ATS Table 100.1. This test checks the integrity of secondary insulation materials. Minimum acceptance value is obtained from the Table 100.1.

6- Incoming & Outgoing cable connection & integrity of Terminal box connections

6-1- Check dimension, distance and integrity of terminals in relation to final drawings.