

FEWA-PL-SS-E-0055 REV.0

**TECHNICAL SPECIFICATION
NEUTRAL EARTHING RESISTOR
AND SWITCHGEAR**

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1. NEUTRAL EARTHING RESISTORS

Neutral Earthing Resistors shall be of the metal grid type, drip proof and suitable for outdoor service on 33kV or 11kV as specified in the requirements. The number of NER's shall be as indicated in the single line diagram and scope of supply.

The framework shall be of galvanised steel and totally enclosed by galvanised expanded metal or perforated sheeting with finish coat painting RAL 7032. Zinc coating shall be uniform, clean smooth and free from spangle as possible. The zinc coating shall weight not less than 610 gm/sq.m area and the thickness shall not be less than 0.086 mm and shall withstand the tests as per ISO/R 1460 AND 1461. The protection class shall be at least IP 54. The panel sheet thickness shall be minimum 2.5mm.

The grids shall be of stainless steel alloy/equivalent and be adequately supported on steel rods and insulators and be designed to withstand the specified fault current for 10 sec. Adequate insulating barriers shall be provided to prevent internal flash over.

Safety clearances from exposed live terminal to supporting insulator base shall be as per BS 7354. It should be safe for the personnel to touch the enclosures.

The resistor shall be complete with lifting and jacking lugs, holding down bolts, earth terminals, connectors and bushings suitable for the system phase to neutral voltage. The creepage distance for the bushings shall be 50mm/kV.

The specified resistance is at 40°C and the maximum temperature rises, coefficient of resistance are to be stated in the guaranteed technical particulars. The maximum temperature rise over the site ambient (50°C) shall be limited to 545 °C.

2. NEUTRAL EARTHING SWITCHGEAR

2.1. Insulation Levels and Clearances

The insulation levels, insulator creepage distances and clearances of the neutral earthing equipment are to be identical to the corresponding insulation levels, insulator creepage distances and clearances of the phase conductors of the system being earthed.

2.2. Neutral Earthing Switchgear

Metal clad switchgear panel suitable for outdoor installation shall comprise of adequate number of on load disconnectors as detailed in the single line diagrams/drawings, which form part of this document. The panel sheet thickness shall be minimum 2.5mm and the finish coat painting shall be RAL 7032.

The switchgear shall be fully rated for the system short circuit levels specified for 33 kV and 11kV respectively.

The isolating switches shall be arranged for manual operation and shall be of the air break type. Mechanisms shall be so designed that the disconnector cannot be opened by forces due to fault currents and shall be self locking in both the open and closed position.

Service conditions require that isolating switches shall remain alive and in continuous service for periods of up to two years in the climatic conditions specified and without operation or maintenance.

Disconnecting devices shall be of robust construction carefully fitted to ensure free action and shall be unaffected by the climate conditions at site. Mechanisms shall be as simple as possible and comprise a minimum of bearing and wearing parts. The mechanisms shall be complete with auxiliary switches, terminal blocks and removable cable gland plates and shall include 20% spare auxiliary contacts, terminal blocks etc.

Mechanical and electrical interlocks shall be employed to select only either one of NER's or solid earthing at any time. However, provision shall be made to defeat the same and putting 2 NER's together in service, as desired by the Authority and the detailed design of the interlock shall be subject to FEWA approval.

Mechanical interlocks where employed shall be effective at the point where hand power is applied so that stresses cannot be transferred to parts remote from that point. The interlocking arrangements shall be co-ordinated with control and protection requirement.

Locking facilities including locks and keys shall be provided on disconnecting switch mechanisms in both the open and closed positions.

Neutral earthing disconnectors shall be provided with suitably rated auxiliary switches and contactors (Minimum 12NO+12NC contacts for each 33kV disconnector and 6NO+6NC contacts for each 11kV disconnector), for the purpose of control and circuit supervision. An alarm shall be provided in the remote control panel and SCADA system to indicate the closing of the solid earthing switch.

The enclosure shall have clear indications and nameplates to show clearly the ON and OFF positions along with a mimic diagram.

The NER and NES for the 11kV shall be a combined single unit.

2.3. Transformer and Neutral Resistor Cable Sealing Ends

The cubicle shall be suitable for the termination of the single core XLPE cables as shown in the diagrams.

2.4. Neutral Earthing Connectors and Connections

All electrical connections shall be of copper and shall include all the connectors, connections and cables necessary and the neutral earthing isolators and neutral earthing resistors.

3. TESTS IN FACTORY

Routine tests as per IEEE 60032

Routine tests as per IEC 60265/IEC 60129 as applicable shall be carried out in the presence of the Authority's Engineers.

4. APPLICABLE STANDARDS

IEEE 60032	Resistors
IEC 60129	Specification for AC disconnectors and earth switches
IEC 60265	Specification for high voltage switches
IEC 60137	Bushings for AC voltages above 1000V.
ISO 1461 & BS 729	Hot dip galvanising coating on Iron and steel articles
IEC 60298	Metal enclosed high voltage equipment.