Electricity Distribution

nationalgrid

Company Directive

ENGINEERING SPECIFICATION
EE SPEC: 123

Dry Type Neutral Earthing Resistors

Policy Summary
This document provides information on the specification of dry type neutral earthing resistors for use of the WPD network.

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Implementation Date: April 2019

Approved by

Policy Manager

Date: 1 April 2019

All references to Western Power Distribution or WPD must be read as National Grid Electricity Distribution or NGED

IMPLEMENTATION PLAN

Introduction

This Engineering Specification details the design for dry type neutral earthing resistor.

Main Changes

This is a new document.

Impact of Changes

This Engineering specification is relevant to:

- All staff who are involved with Substation installation at Primary and Grid
- All staff who are involved with specifying or purchasing dry type neutral earthing resistors

Implementation Actions

Managers should notify relevant staff that this Engineering specification has been issued and brief them on its requirements.

Implementation Timetable

This Engineering specification shall be implemented with immediate effect.

REVISION HISTORY

Document Revision & Review Table		
Date	**Comments**	**Author**
April 2019	• First issue of document specification of dry type neutral earthing resistors	Andrew Reynolds

Table of Contents

1.0 INTRODUCTION

This document covers the specification of dry type neutral earthing resistors for use on Western Power Distribution Primary network at 66kV, 33kV and 11kV, this specification doesn't cover the dry type resistors used in conjunction with Arc suppression coils (Peterson coils) otherwise known as damping resistors these are covered under a separate Equipment Specification.

Metallic resistors offer improvements over liquid resistors such as reduced maintenance requirements, reduction of leakage risk, evaporation of the electrolyte and freezing. These units are calibrated at the factory and offer no drift.

These shall be used either as standalone or in conjunction with a low impedance earthing auxiliary transformer.

2.0 GENERAL

Neutral earthing resistors (NERs) shall be designed, manufactured and tested to the relevant IEEE-32.

3.0 ENCLOSURE

The NER shall be of free standing design and air cooled naturally for outdoor use.

The NER shall be designed to be maintenance free for a minimum of 30 years including the heating effect of the resistor elements.

The enclosure shall be unpainted and finished in hot dipped galvanised steel and a minimum protection rating of IP33 to IEC 60529 with a design that allows rain water to run off freely, without pooling at any point.

All side panels shall be securely fastened and require tools to remove these.

If required a heat shield shall be provided in hot dipped galvanised steel as per the same manufacturer as the enclosure.

Top mounted lifting eyes shall be fitted that are capable of lifting the total weight of the NER.

The design shall be designed to ensure that the bottom section of the NER has a minimum ground clearance of 500mm to prevent damage from flooding.

The NER shall be mounted on a concrete plinth.

4.0 RATING PLATE DETAILS

The rating plate shall be securely fitted with ease of viewing taken into account manufactured from stainless steel with text that lasts a minimum of 30 years. The rating plate will contain the following information:

Manufacturers Name

Manufacturer's serial number

Rated voltage

Line to Neutral voltage

Current rating

Time Rating

Resistance value at 25 degrees C

Recovery time of the resistor after a maximum fault current

5.0 EARTH CONNECTIONS

The NER will be earthed through a low voltage bushing brought out to the outside of the enclosure the LV bushing shall have a rating of 1.2kV and a minimum BIL of 30kV with an M12 stud.

There should be 2 separate earth points to earth the steel enclosure separate from the resistor earth connection.

6.0 CABLE BOXES

The NER shall be equipped with outer cone separable connectors to allow cable connection; these bushings shall be of "C" profile design and in accordance with WPD specifications.

The outer cone separable connecter shall be housed in an earthed cable box with rated at a minimum IP21B as per IEC 60529.

A cable box on the LV earth connection shall be provided to house 0, 1 or 2 ring core neutral CTS as per WPD specification. CT secondary wiring shall be terminated in a terminal block with an undrilled gland plate for outgoing multi core cables. The cable box shall be capable of holding 2 ring CTs with outside dimensions if supplied by Schneider and Hawker Siddeley who are WPDs nominated 11kV fixed pattern switchgear suppliers.

Dimensions of CTs from Schneider are:

2000A

Height 320mm

Width 245mm

Depth 80mm without fixing frame 180mm with frame

Weight 11.5kg

1250A

Height 320mm

Width 245mm

Depth 90mm without fixing frame 190mm with frame

Weight 16kg

Dimensions of CTs from HSS are.

2000A

Height 267mm

Width 245mm

Depth 216mm

Weight 25kg

1250A

Height 267mm

Width 245mm

Depth 216mm

Weight 25kg

Terminal blocks shall be of spring loaded type that can incorporate hook blade crimps.

The HV cable box shall have a removable, pre drilled gland plate with a pilot hole suitable of taking up to a 630mmSq EPR cable, that can be fitted with a suitable cable gland as per WPD specification.

Terminations shall be able to accept EPR terminations up to 630mmSq EPR.

The LV cable box shall have a removable, pre drilled gland plate with a pilot hole.

All cable boxes shall be vented to prevent condensation build up.

7.0 RESISTOR ELEMENT

The resistor element shall be manufactured from a high temperature resistance alloy capable of withstanding wide temperature swings, while retaining its mechanical strength. All insulators shall be ceramic throughout.

The tolerance on the nominal resistance at 25 degrees C shall be not greater than +/- 10%.

The temperature coefficient of resistance of the element material shall be such that the increase in resistance over the operating temperature range, when carrying rated current for rated time, this shall be limited to 3.5% per 100 degrees C rise.

8.0 CTs

Shall be in accordance with WPD specification these will be detailed at time of each individual request by the project engineer responsible for the installation of the NER.

9.0 SAFETY

Signs shall be fitted to advise that the unit is hot during operation do not touch.

Where required a heat shield can be fitted.

APPENDIX 1 RATINGS

Item No.	Item Description	Resistance (Ohms) at 25 C +/-10%	Rated Current (A)	Continuous Current (A)	Time (s)	Rated Voltage (V)	BIL (kV)	TRC (C)
42870	NER 11KV 750A NO CT HOT DIP GALVANISED STEEL	8.47	750	100	20	11	95	0.035%
42872	NER 11KV 750A 1CT HOT DIP GALVANISED MILD STEEL	8.47	750	100	20	11	95	0.035%
42874	NER 11KV 750A 2 CTS HOT DIP GALVANISED MILD STEEL	8.47	750	100	20	11	95	0.035%
42876	NER 11KV 1000A NO CT HOT DIP GALVANISED M STEEL	6.35	1000	100	20	11	95	0.035%
42878	NER 11KV 1000A 1 CT HOT DIP GALVANISED MD STEEL	6.35	1000	100	20	11	95	0.035%
42880	NER 11KV 1000A 2 CTS HOT DIP GALVANISED MD STEEL	6.35	1000	100	20	11	95	0.035%
43573	NER 11KV 1500A NO CT HOT DIP GALVANISED MILD STEEL	4.23	1500	100	20	11	95	0.035%
43574	NER 11KV 1500A 1 CT HOT DIP GALVANISED MILD STEEL	4.23	1500	100	20	11	95	0.035%
43575	NER 11KV 1500A 2 CTS HOT DIP GALVANISED MILD STEEL	4.23	1500	100	20	11	95	0.035%
43576	HEAT SHIELD HOT DIP GALVANISED PER NER	NA	NA	NA	NA	NA	NA	NA

APPENDIX A

SUPERSEDED DOCUMENTATION

No document is superseded by the issue of this document.

APPENDIX B

ASSOCIATED DOCUMENTATION

ANSI/IEEE-32
EE SPEC: 1
IEC 60529
POL:CA2
POL:CA3

APPENDIX C

KEY WORDS

NER, Dry, Neutral.