

BUSHINGS FOR HIGH VOLTAGE ALTERNATING CURRENT SYSTEMS

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PURPOSE AND SCOPE

This document describes the technical requirements for User's equipment directly connected to the England and Wales Transmission system and located within NGET's busbar protection zone operating at nominal voltages of 400 kV, 275 kV, 132 kV and 66 kV unless otherwise agreed with the user as defined in the Bilateral agreement. The principles of this document applies to equipment connected at other voltages".

This Specification defines the functional and performance requirements for bushings for connection to the Transmission System in England and Wales. It supports the more general requirements defined in the companion documents TS 1 (RES) and TS 2.2 (RES).

This specification is applicable to bushings intended for use on alternating current systems only. Bushings which are intended for use in high voltage direct current systems are covered by a separate specification.

PART 1 – PROCEDURAL

1 GENERAL REQUIREMENTS

Bushings shall comply with TS 1 (RES), and TS 2.2 (RES).

Bushings shall comply with BS EN 60137.

2 PERFORMANCE REQUIREMENTS

Bushings shall comply with the performance requirements of BS EN 60137 according to the relevant rating requirements detailed in TS 1 (RES), and TS 2.2 (RES).

3 TYPE TEST REQUIREMENTS

Bushings shall be type tested to BS EN 60137.

During the Temperature Rise Test the thermal time constant shall be determined on raising and lowering the temperature.

An oil sample for DGA shall be taken from all oil filled bushings, before and after the dielectric type tests. Acceptance criteria for the dissolved gas levels in oil will be agreed between the user and the bushing supplier. There shall be no change in the dissolved gas levels before and after type tests.

Informative: These requirements are in addition to the requirement of BS EN 60137.

4 ADDITIONAL TYPE TEST FOR BUSHINGS OF THE CAPACITIVELY GRADED TYPE

Bushings for all switchgear applications shall have chopped impulse tests similar to those specified for transformer bushings in BS EN 60137. The bushings shall be subjected to 5 impulses of negative polarity, chopping of the impulse being made by means of an air

insulated gap. The peak voltage level shall be 100% of the rated BIL. The time to sparkover of the chopping gap shall be between 1 μ s and 6 μ s.

Bushings for gas insulated switchgear shall also be subjected to 30 impulses of both positive and negative polarities with a chopping gap immersed in SF6 and located adjacent to the SF6 end of the bushing. The peak voltage level shall be 60% of the rated BIL. The time to sparkover of the chopping gap shall be between 1 μ s and 6 μ s.

Routine tests shall be performed before and after all type tests.

5 ROUTINE TEST REQUIREMENTS

All bushings shall be routine tested to BS EN 60137.

An oil sample for DGA shall be taken not less than 24 hours after the final routine electrical testing has been performed. The results shall be included in the routine test report.

Informative: These requirements are in addition to the requirement of BS EN 60137.

6 FORMS AND RECORDS

Not applicable.

PART 2 - DEFINITIONS AND DOCUMENT HISTORY

7 DEFINITIONS

The definitions used in TS 1 (RES) and TS 2.2 (RES) are applicable to this specification.

8 AMENDMENTS RECORD

Issue	Date	Summary of Changes / Reasons	Author(s)	Approved By (Inc. Job Title)
1	October 2014	New document	Richard Poole	GCRP

8.1 Procedure Review Date

4 years from publication date.

PART 3 - GUIDANCE NOTES AND APPENDICES

9 REFERENCES

9.1 International, European and British National Standards

This document makes reference to or should be read in conjunction with the documents listed below. Where a Standard has been harmonised into a Euronorm, only this latter reference is given. The issue and date of the documents detailed below shall be that applicable at the time of issue of this specification unless a specific issue date is given.

BS EN 60137 Bushings for Alternating Voltages above 1000V

BS EN 62271 High Voltage switchgear and control gear.

IEC TS 60815-1 Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles - Edition 1.0

IEC TS 60815-2	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 2: Ceramic and glass insulators for a.c. systems - Edition 1.0
IEC TS 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 3: Polymer insulators for a.c. systems - Edition 1.0
BS EN 60567	Oil-filled electrical equipment - Sampling of gases and of oil for analysis of free and dissolved gases - Guidance

9.2 National Grid TS (RES) Documents

The following TS (RES) documentation is relevant to bushings and should be read in conjunction with this document.

TS 1 (RES) Ratings and General Requirements for Plant, Equipment, Apparatus and Services for use on and Direct Connections to the National Grid Transmission System

TS 2.1 (RES) Substations

TS 2.2 (RES) Switchgear for use on, and at connection points to, the National Grid System

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