

SUBSTATION POLYMERIC AND CERAMIC INSULATION

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TABLE OF CONTENTS

PURPOSE AND SCOPE	1
PART 1 – PROCEDURAL	1
1 GENERAL REQUIREMENTS	1
2 SPECIFIC REQUIREMENTS	2
3 TEST REQUIREMENTS	3
4 FORMS AND REPORTS.....	4
PART 2 - DEFINITIONS AND DOCUMENT HISTORY	5
5 DEFINITIONS	5
6 AMENDMENTS RECORD	5
7 IMPLEMENTATION.....	5
PART 3 - GUIDANCE NOTES AND APPENDICES	6
8 REFERENCES	6
APPENDIX A HEAVY WETTING TEST SPECIFICATION	7

PURPOSE AND SCOPE

This document forms part of a suite of documents which define National Grid's functional and performance requirements for new plant.

This specification defines the characteristics and performance requirements for all ceramic and polymeric insulation for A.C. applications within a substation. Specific standards and requirements shall be found in the relevant technical specifications for individual equipment types. Individual equipment specifications will take precedence over this document.

PART 1 – PROCEDURAL

1 GENERAL REQUIREMENTS

1.1 GENERAL

- 1.1.1 Substation insulation may be either ceramic or polymeric.
- 1.1.2 Glass insulation shall not be accepted for substation insulation.
- 1.1.3 All insulation shall be suitable for use in Site Pollution Severity (SPS) class D or class E environments, as defined in BS EN 60815-1 section 8.3.
- 1.1.4 Insulation manufacturers shall state any limitations due to indoor substation usage, e.g. accumulation of dust and debris etc.
- 1.1.5 Insulation manufacturers shall state any limitations due to outdoor substation usage e.g.; pollution, UV degradation, algae, vermin attack, vandalism, etc.

1.2 Electrical

- 1.2.1 The Unified Specific Creepage Distance (USCD) shall be equal or greater than 43.3 mm/kV for class D Site Pollution Severity (SPS), or 53.7 mm/kV for class E SPS as defined in BS EN 60815-2 for ceramic section 7 and BS EN 60815-3 section 7 for polymeric. The insulation manufacturer shall state the USCD.

Informative note: Class D is equivalent to the previous class III (25mm/kV) and Class E is equivalent to the previous class IV (31mm/kV).

- 1.2.2 Methods which artificially enhance anti-pollution performance, i.e. palliative coating and shed extenders etc, in order to satisfy the requirements of this specification are not acceptable.

1.3 Identification and marking

All insulation shall be identified and marked in accordance with relevant BS EN standards.

1.4 Transport, storage and installation

Manufacturers shall provide appropriate instructions and information covering general conditions during transport, storage and installation of the insulation. Where appropriate these instructions shall include recommendations for cleaning or maintenance.

1.5 Drawing

An outline drawing shall be provided. It shall include principal dimensions of the insulation unit and shall be representative of actual shed profile, and cross sectional area. Information for identification shall also be included in the drawing.

2 SPECIFIC REQUIREMENTS

2.1 SPECIFIC REQUIREMENTS FOR CERAMIC INSULATION

- 2.1.1 Pollution and heavy wetting performance may be demonstrated directly by type test in accordance with 3.1.3 or, in the case of vertically mounted insulation, on the basis of dimensional compliance. Non vertical insulation ($>15^\circ$ from vertical) must undergo pollution and heavy wetting performance tests.

- 2.1.2 In order to meet the requirements of dimensional compliance, the shed profile parameters of the insulation shall be in accordance with BS EN 60815-2, clause 9 for the relevant Site Pollution Severity with the following clarifications and additions:

- The shed profile shall be alternating long short
- The value of “s”, spacing as defined in BS EN 60815-2, shall not be less than 70mm.
- The shed angle shall also be no greater than 20° .
- There shall be no deviations (major or minor) from the required parameters in BS EN 60815-2 for dimensional compliance.

2.2 SPECIFIC REQUIREMENTS FOR POLYMERIC INSULATION

- 2.2.1 The insulation manufacturer shall provide data sheets for the polymeric insulation properties.

- 2.2.2 In order to meet the requirements of dimensional compliance, the profile parameters of the insulation shall be in accordance with BS EN 60815-3, clause 9 for the relevant Site Pollution Severity with the following clarifications and additions:

- There shall be no deviations (major or minor) from the required parameters in BS EN 60815-3 for dimensional compliance.

2.2.3 The material shall be a Hydrophobicity Transfer Material (HTM) suitable for Type A pollution environment.

2.2.4 The physical structure of the insulation shall be described. The use of High Temperature Vulcanization (HTV) or Room Temperature Vulcanization (RTV) or Liquid Silicone Rubber (LSR) shall be stated.

3 TEST REQUIREMENTS

3.1 SPECIFIC TEST REQUIREMENTS FOR CERAMIC INSULATION

3.1.1 Hollow ceramic insulation shall be tested in accordance with BS EN 62155.

3.1.2 Solid ceramic insulation shall be tested in accordance with BS EN 60168.

3.1.3 The pollution performance requirements shall be tested when dimensional compliance is not met. The insulation shall be mounted at the orientation intended for service during pollution and heavy wetting tests.

External insulation shall be in accordance with the relevant requirements, including table 1 and table 2, and recommendations of IEC 60815.

Insulation	IEC 60815 pollution class	IEC 60507 salt fog withstand test specification kg/m ³	NGT heavy wetting test specification kg/m ³
Indoor	A	No test withstand required	No test withstand required
Outdoor	D	80	80
Outdoor (special)	E	>160	> 160
Outdoor Horizontal	D & E	80	80

Table 1: Pollution, Salt Fog and Heavy Wetting Test Requirements

Note 1: Pollution Class E may be specified for sites which are judged to be subject to severe coastal or industrial pollution.

Note 2: Details of the heavy wetting specification can be found in appendix A.

Note 3: Products consisting of internally graded insulation contained within an external AIS insulating enclosure or weather-shield, such as bushings, instrument transformers or grading capacitors, shall be considered a single item for the purposes of pollution and heavy wetting tests.

Note 4: Phase to earth insulation connected in parallel and having a shed-to-shed separation distance of less than 0.5 times the phase-to-earth clearance shall be considered as a single item for the purposes of pollution and heavy wetting tests.