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TECHNICAL SPECIFICATION ADDENDUM

DOCUMENT TITLE	Environmental and Test Requirements for Electronic Equipment
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This Technical Specification shall be read in conjunction with the following amendments:

Check appropriate boxes below

Addition		Replacement	X	Deletion	X
AMENDMENTS					
<u>FOR REPLACEMENT</u>					
4 REFERENCES					
This specification makes reference to the following related specifications:					
International Standards					
ISO 10012 (BS EN ISO 10012)	Measurement Management Systems - Requirements for Measurement Processes and Measuring Equipment				
IEC 60654-1 (BS EN 60654-1)	Industrial-Process Measurement and Control Equipment - Operating Conditions Part 1: Climatic Conditions				
IEC 61000-4 series (BS EN 61000-4 series)	Electromagnetic compatibility part 4: testing and measuring techniques				
IEC 60255 series (BS EN 60255 series)	Measuring relays and protection equipment				
IEC 60068-2-10 (BS EN 60068-2-10)	Environmental testing. Part 2-10: Test J and guidance: mould growth				
IEC 60068-2-1 (BS EN 60068-2-1)	Environmental testing – Part 2-1: Tests – Test A: Cold				
IEC 60068-2-2 (BS EN 60068-2-2)	Environmental testing. Part 2-2. Tests. Test B: Dry heat				
IEC 60068-2-27 (BS EN 60068-2-27)	Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock				

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IEC 60068-2-30 (BS EN 60068-2-30)	Part 2-30: Test Db and guidance: damp heat, cyclic
IEC 60068-2-31 (BS EN 60068-2-31)	Environmental testing – Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens
IEC 60068-2-42 (BS EN 60068-2-42)	Part 2-42: Test Kc: Sulphur dioxide test for contacts and connections
IEC 60068-2-52 (BS EN 60068-2-52)	Part 2-52: Test Kb: Salt mist, cyclic (sodium chloride solution)
IEC 60068-2-78 (BS EN 60068-2-78)	Part 2-78: Tests - Test 2-78: Body Cab: Damp Heat, Steady State
IEC 60068-2-6 (BS EN 60068-2-6)	Test 2-6 Test Fc and guidance: Vibration (sinusoidal)
IEC 61000-6-1 (BS EN 61000-6-1)	Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity for residential, commercial and light-industrial environments
European Standards	
EN 50178 (BS EN 50178)	Electronic equipment for use in power installations
EN 55022 (BS EN 55022)	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
IEC 60529 (BS EN 60529)	Degrees of Protection Provided by Enclosures
IEC 60870 series (BS EN 60870 series)	Telecontrol equipment and systems
ESTI EN 300 132-2	Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current
ETSI ETS 300 386-1	Equipment Engineering (EE); Public Telecommunication Network Equipment Electro-Magnetic Compatibility (EMC) Requirements Part 1: Product Family Overview, Compliance Criteria and Test Levels

5.1 Environment

The equipment shall be subjected to environmental factors such as electrical interference, supply voltage variations, nuclear radiation, dust, vibration, temperature, and salt mist. Where special equipment enclosures are required to satisfy these requirements, the supplier shall define its Degree of Protection by stating its IP Code as given in IEC 60529 (BS EN 60529).

5.3 Temperature and Humidity

Equipment shall operate within its functional specification over the range of the specified atmospheric environmental classes, as defined in NGTS 1 section 1, Environmental Service Conditions.

6.1 Test Methods and Equipment

The test equipment and methods shall comply with ISO 10012 (BS EN ISO 10012).

Table 6 – Radiated Electromagnetic Field from Digital Portable Phones

Source Standard – IEC 61000-4-3

7.63

A conducted and radiated emissions test shall be carried out to check that the equipment meets the requirements of EN 55022 (BS EN 55022). Normally the acceptable limits shall be taken as those applicable to class A equipment.

7.64

In the specific case where equipment is to be powered from a 48 V D.C. communication supply, self generated interference requirements are described by ETSI (European Telecommunication Standards Institute) standards EN 300 132-2 and ETS 300 386-1 as follows:

- (a) Conducted emissions 25 Hz to 20 kHz EN 300 132-2 Section 4.9
- (b) Conducted emissions 0.02 – 30 MHz ETS 300 386-1 Section 7.2.3

8.2

Test conditions shall be in accordance with IEC 60068-2-2 (BS EN 60068-2-2), test Bd at the upper temperature of the Environmental Class ($\pm 2^{\circ}\text{C}$, RH=60%; see NGTS 1 section 1) specified in the corresponding functional NGTS or the contract documentation.

8.8

Test conditions shall be in accordance with IEC 60068-2-1 (BS EN 60068-2-1), test Ad at the lower temperature of the Environmental Class ($\pm 2^{\circ}\text{C}$, RH=60%; see NGTS 1 section 1) specified in the corresponding functional NGTS or the contract documentation.

8.12 Damp Heat – Non-maloperate (Type Test)

This test is undertaken on complete items of equipment in their normal operational mode. The test is based on IEC 60068-2-78 (BS EN 60068-2-78) which is designed to avoid the formation of condensation on the EUT. The following conditions shall apply:

- (a) The test duration shall be 2 days except where noted below and unless a longer period is specified.
- (b) The test conditions shall be $40 \pm 2^{\circ}\text{C}$ with $93 \pm 3\%$ RH; except for equipment which can directly cause the opening or closing of a circuit breaker which shall be subjected to either IEC 60068-2-3 (BS EN 60068-2-3) at $40 \pm 2^{\circ}\text{C}$ with $93 \pm 3\%$ RH for 56 days, or IEC 60068-2-30 (BS EN 60068-2-30) for 6 times 24 hour cycles of $+ 25^{\circ}\text{C}$ to $+55^{\circ}\text{C}$ with $93 \pm 3\%$ RH.
- (c) The initial performance check shall be made with the equipment under ambient conditions in the test chamber. In the case of tests to IEC 60068-2-78 (BS EN 60068-2-78), the equipment shall be switched off on completion of this check.
- (d) In the case of tests to IEC 60068-2-78 (BS EN 60068-2-78) after test conditions have been achieved, the equipment shall be re-energised two hours before test conditions are allowed to alter and a further performance check carried out during the last hour at the elevated temperature and humidity. The equipment shall remain energised for the remainder of the test.
- (e) Single chamber controlled recovery conditions shall be applied, after which the final performance check shall be made.

8.14

The equipment has be subjected to a low temperature test in accordance with IEC 60068-2-1 (BS EN 60068-2-1) at -25°C for 96 hours or -40°C for 16 hours. The EUT shall also be subjected to a high temperature test according to IEC 60068-2-2 (BS EN 60068-2-2) at 70°C for 96 hours.

8.16

Unless otherwise agreed, tests shall be undertaken to confirm that the degree of protection provided by

of protection (IP) are given in IEC 60529 (BS EN 60529).

8.18 Salt Corrosion (Type Test)

When required the salt corrosion test shall be carried out in accordance with IEC 60068-2-52 (BS EN 60068-2-52) Test Kb, severity 1. At the end of the test there shall be no undue deterioration of metal parts, finishes, and materials.

8.21

The test shall be carried out in accordance with IEC 60068-2-30 (BS EN 60068-2-30) Test Db with the following conditions:

- (a) The upper temperature shall be 40°C.
- (b) The number of cycles shall be 12.
- (c) During the temperature-fall period condensation shall occur.
- (d) Immediately after the end of the test the components or equipment shall be visually examined; there shall be no undue deterioration or corrosion and there shall be no significant change of electrical or mechanical characteristics.

8.22 Mould Growth (Type Test)

Informative: The test may be required on samples of components, materials and finishes where their resistance to mould growth is unknown or suspect.

If required, the test shall be carried out in accordance with IEC 60068-2-10 (BS EN 60068-2-10) Test J.

8.24

The test shall be carried out in accordance with IEC 60068-2-42 (BS EN 60068-2-42) Test Kc. The duration of the test will be 4, 10 or 21 days.

9.2

This test shall be carried out in accordance with IEC 60068-2-31 (BS EN 60068-2-31) Test Ec. The test will vary depending on the relative dimensions of the equipment.

- (a) If the height is the smallest dimension, the equipment shall be dropped on the four edges of the base, in accordance with Clause 3.2.1 of IEC 60068-2-31, from a distance of 50 mm.
- (b) If the height is the second largest dimension, the equipment shall be subjected to the topple or pushover test as described in Clause 3.2.3 of IEC 60068-2-3, but be toppled about the two longer bottom edges only.
- (c) If the height is the largest dimension, the test shall be as detailed in b) above, except that the equipment shall be toppled about each bottom edge.

9.3

The test shall be carried out in accordance with IEC 60068-2-6. The EUT shall be subjected to the vibration response test at severity class 1 and the vibration withstand test at severity class 1. These test levels are defined in the related standard IEC 60255-21-1 (BS EN 60255-21-1).

9.7 Shock (Type Test)

A shock test shall be carried out in accordance with IEC 60068-2-27 (BS EN 60068-2-27). The EUT shall be subjected to the shock response test at severity class 1 and the shock withstand test at severity class 1. These test levels are defined in the related standard IEC 60255-21-2 (BS EN 60255-21-2).

FOR DELETION

5.4

Where any Class 1 or Class 2 item of equipment is to be mounted within an enclosure housing other items of equipment, it shall be capable of normal operation at a temperature 15°C higher than the upper temperature limit of the environmental class.

5.5

The temperature rise above ambient within an enclosure, when the equipment is operating normally,

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shall not exceed 10 °C.

5.6

Equipment which can directly cause the operation of a circuit breaker shall operate within its functional specification over the Class 3 range of the atmospheric environmental classes, as defined in the NGTS 1 Table 10, Temperature and Humidity Environmental Classes. The additional 15 °C enclosure factor need not apply.

9.8 Bump (Type Test)

A bump test shall be carried out in accordance with IEC68-2-29. The EUT shall be subjected to the bump test at severity class 1. These test levels are defined in the related standard EN 60255-21-2.

Date Effective From

23/02/2011

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Date	23/02/2011		



National Grid

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Technical
Specification

NGTS 3.24.15
Issue 1
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**Environmental and Test
Requirements for
Electronic Equipment**

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ENVIRONMENTAL AND TEST REQUIREMENTS FOR ELECTRONIC EQUIPMENT

FOREWORD

This specification is an equipment policy specification within the Substation Information, Control and Protection suite of technical specifications. It defines the environmental and test requirements for electronic equipment at the National Grid Company plc (National Grid) owned operational locations.

This specification defines the National Grid Company's Environmental and Test Requirements for Electronic Equipment, which were previously defined in NGTS 2.13. This specification supersedes the environmental and test requirements contained in NGTS 2.13 Issue 3.

This Specification contains general requirements, the specific requirements are in the individual function specifications.

1 SCOPE

- 1.1** All electronic equipment supplied to National Grid for operational use in transmission locations must meet its specified functionality and performance as set out in individual National Grid Technical Specifications and under the relevant environmental conditions stated in this Specification.

2 INTRODUCTION

Relationship with European Standards

Informative: This Specification generally references functional requirements and tests described in IEC or BS Standards. However, in some cases there are no standards that adequately cover the unique performance and functional requirements of an electricity supply system. In these instances specific requirements and tests are detailed in this document.

- 2.1** CENELEC document Electronic Equipment for use in Power Installations (EN 50178) gives minimum design and manufacture requirements with which control equipment within the scope of this specification must comply.
- 2.2** NGTS 3.24.15 specifies those performance requirements that must be met by electronic equipment to be used in National Grid transmission locations.

Guidance to Users

Informative: NGTS 3.24.15 is a generic specification and therefore when used to specify requirements for equipment to be purchased, the NGTS must be supplemented by specific requirements relating to the equipment and application concerned. In most cases this will take the form, inter alia, of specifying which optional tests are to be applied and the test levels required for each port. This information will be contained in the corresponding functional specification or the contract documentation as appropriate.

Users other than National Grid Itself

- 2.3** Other Users connected to the National Grid system, as defined in NGTS 1, shall meet the requirements of NGTS 3.24.15 throughout.