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Environmental test requirements for protection and control equipment and systems

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Issue	Date	Amendment
Issue 3 Amendment 1	November 2012	Typographical errors corrected in table 3 and references to tables in sections 4, 5 & 6
Issue 4	March 2015	Minor revision of Issue 3 to reflect changes in a number of the British Standards references that have been updated, withdrawn and/or superseded. The technical or intent of the document remains unchanged. This issue includes the following principal technical changes. Foreword: Revised by the addition of text to describe the role of TS 48-5. Clause 2: References updated, deleted or added as relevant. Clause 3: Clause added with relevant terms and definitions included. Clause 3 (re-numbered 4): (i) Paragraph 3, 1st sentence: Wording revised by removing “Approved”. (ii) Paragraphs 3, 4 & 5: Wording requiring that requirements “will” be carried out revised to be that requirements “shall” be carried out. Clause 4.2 (re-numbered 5.2): (i) Paragraph 1: Reference to BS EN 60068-2-3 updated to BS EN 60068-2-78. Technical requirements unchanged. (ii) Paragraph 1: Wording “…severity class 40°C 56 cycles…” corrected to be “…using 93% humidity at 40 °C for a duration of 56 days …” to align with the test requirements in BS EN 60068-2-78. (iii) Paragraph 2, sentence 2: Added the test requirement “…100% humidity…” for clarity.

		Clause 6.1 (re-numbered 7.1): (i) Paragraphs 1, 2 & 3: Wording that requirements "will"' be carried out revised to be that requirements "shall" be carried out. (ii) Paragraph 3: Reference to BS EN 60255-11 updated to BS EN 60255-26 clauses 7.2.11, 7.2.12 and 7.2.13. Test requirement for a.c. ripple increased from 12% to 15% to align with BS EN 60255-26 Table 4, item 4.7. (iii) Last paragraph: Sentences 2 & 3 deleted because reference to testing to class ESI 1 and class ESI 2 has been removed from ENA TS 48-4. Clause 6.5.1 (re-numbered 7.5.1): (i) Paragraph 1: Reference to BS EN 60255-5 updated to BS EN 60255-27 Clause 10.6.4.3". Technical requirements unchanged. (ii) Paragraph 2: Test requirement for the insulation voltage test amended to clarify that the 2 kV a.c. test voltage is 2 kV a.c. r.m.s. and a test duration of 1 minute added. (iii) Paragraph 3: Reference to BS EN 60255-5 updated to BS EN 60255-27 Table 14. Test requirement amended from 2.5 kV to 2.3 kV to align with BS EN 60255-27 Table 14. (iv) Last paragraph: Test requirement for the withstand voltage test amended to clarify that the 1 kV a.c. test voltage is 1 kV a.c. r.m.s. and a test duration of 1 minute added. Clause 6.5.2 (re-numbered 7.5.2), sentence 2: Reference to BS EN 60255-5 updated to BS EN 60255-27 Clause 10.6.4.2. Technical requirements unchanged. Clause 7.1 (re-numbered 8.1), Paragraph 1: Reference to BS EN 60255-22-1 updated to BS EN 60255-26 Clause 7.2.6. Wording "…class III at…" deleted because not referenced in BS EN 60255-26. Technical requirements unchanged. Clause 7.2 (re-numbered 8.2): Reference to BS EN 60255-22-2 updated to BS EN 60255-26 Clause 7.2.3. Wording "…class III at…" deleted because not referenced in BS EN 60255-26. Technical requirements unchanged. Clause 7.3 (re-numbered 8.3): Reference to BS EN 60255-22-3 updated to BS EN 60255-26 Clause 7.2.4. Technical requirements unchanged. Clause 7.4 (re-numbered 8.4): Reference to BS EN 60255-22-4 updated to BS EN 60255-26 Clause 7.2.5. Wording "…level IV…" amended to "…Zone A…" to match BS EN 60255-26. Technical requirements unchanged. Clause 7.5 (re-numbered 8.5): Reference to BS EN 60255-22-5 updated to BS EN 60255-26 Clause 7.2.7. Wording "…class 3…" amended to "…level 3…" to match BS EN 60255-26. Technical requirements unchanged. Clause 7.6 (re-numbered 8.6): Reference to BS EN 60255-22-6 updated to BS EN 60255-26 Clause 7.2.8. Wording "…class 3…" and "…class 4…" amended to "…level 3…" and "…level 4…" to match BS EN 60255-26. Technical requirements unchanged. Clause 7.7.2 (re-numbered 8.7.2): Paragraph 2: Reference to BS EN 60255-22-7 updated to BS EN 60255-26 Clause 7.2.9. Wording "…Class A…" amended to "…Zone A…" to match BS EN 60255-26. Technical requirements unchanged. Clause 7.11 (re-numbered 8.11): Reference to BS EN 60255-25 updated to BS EN 60255-26 clauses 7.1.2 and 7.1.3. Technical requirements extended to include tests at frequencies above 1 GHz to align with BS EN 60255-26 - see amendment to Annex A, Table A4 row 12. Appendix A (re-named Annex A):

		(i) Descriptor “(normative)” added to the title. (ii) Tables A.1 to A.4: Clause numbering in column 1 updated to reflect the clause re-numbering in the document. (iii) Table A.1, row 3, “Clause 5.2 - Relative humidity”: Entry added for outdoor equipment test at 100%, 40 °C, 56 days. (iv) Table A.3, row 3, “7.1 - DC supply voltage dips, short interruptions and voltage variations immunity test”: Reference to BS EN 60255-11 updated to BS EN 60255-26. Test requirement for a.c. ripple increased from 12% to 15% to align with Clause 7.1. (v) Table A.3, rows 5 & 6, “7.1 - DC Supply voltage”: Reference to ESI 1 and ESI 2 deleted. (vi) Table A.3, row 10 “Clause 7.5.1 Insulation – Dielectric”: Reference to “BS EN 60255-5” updated to “BS EN 60255-27”. Specified test level for high impedance relays amended from 2.5 kV to 2.3 kV and test duration of 1 minute added to the 2 kV insulation test and the 1 kV withstand test. (vii) Table A.3, row 11, Clause 7.5.2 Insulation – Impulse Voltage”: Reference to BS EN 60255-5 updated to BS EN 60255-27. Test at 5 kV amended to be 5 kV peak. (viii) Table A.4, rows 1 to 6 and row 8: References to BS EN 60255-22-1 to BS EN 60255-22-7 respectively updated to BS EN 60255-26. (ix) Table A.4, row 11, “8.10 Teleprotection equipment of power systems”: Reference to IEC 60834-2 amended to BS EN 60834-2. (x) Table A.4, row 12, “8.11 Conducted and radiated emission”: Reference to BS EN 60255-25 updated to BS EN 60255-26. Test requirements extended to include tests at frequencies above 1 GHz to align with BS EN 60255-26 Table 1, item 1.2. Bibliography: Clause added and reference to ENA TS 50-18 included. Details of all other technical, general and editorial amendments are included in the associated Document Amendment Summary for this Issue (available on request from the Operations Directorate of ENA).
Issue 4 + A1	2016	Annex A 6.1, 6.2, 6.3, 7.2: Updated to correct errors in Standards references - to match those referenced in Clause 8. Annex A 8.1: Added requirement for fast damped oscillatory waveforms to meet requirements of BS EN 61000-4-18. Annex A 8.1 to 8.6: Relevant clause numbers added to match those referenced in Clause 8. Annex A 8.3: Reference to BS EN 61000-4-3 superfluous and deleted. Annex A 8.11: Corrected “71dB” to “73dB” for frequency range 0.5 MHz to 30 MHz and “1 Hz” to “1 GHz” for radiated emission test.

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Foreword

This Technical Specification (TS) is published by the Energy Networks Association (ENA) and comes into effect from the date of publication. It has been prepared under the authority of the ENA Engineering Policy and Standards Manager and has been approved for publication by the ENA Electricity Networks and Futures Group (ENFG). The approved abbreviated title of this engineering document is “ENA TS 48-5”.

This document replaces and supersedes Technical Specification 48-5 Issue 3 A1 2010.

This document details the normal environmental test requirements that protection and control equipment and systems are required to comply with for approval by the ENA Protection Assessment Panel. It is intended that individual ENA Member Company Specifications will, where appropriate, specify additional requirements to those in this document. Where applicable, the test requirements are specified with reference to International and British Standards, together with the class of test severity to be achieved.

Where the term “shall” or “must” is used in this document it means the requirement is mandatory. The term “should” is used to express a recommendation. The term “may” is used to express permission. Where the term “shall” is used in this document it expresses a requirement. The term “may” is used to express permission.

NOTE: Commentary, explanation and general informative material is presented in smaller type, and does not constitute a normative element.

1 Scope

This document details the ENA Protection Assessment Panel (PAP) normal environmental test requirements for protection and control equipment and systems intended for use by ENA Member Companies.

NOTE: Individual ENA Member Company Specifications will, where appropriate, specify additional requirements to those in this document.

2 Normative references

The following referenced documents, in whole or part, are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Standards publications

IEC 60834-2:1993, *Performance and testing of teleprotection equipment of power systems. Analogue comparison system*

BS EN 60068-1:2014, *Environmental testing. General and guidance*

BS EN 60068-2-1:2007, *Environmental testing. Tests. Test A. Cold*

BS EN 60068-2-2:2007, *Environmental testing procedures - tests - dry heat*

BS EN 60068-2-30 BS EN 60068-2-30:2005, *Environmental testing. Tests. Test Db and guidance: Damp heat, cyclic (12 h + 12 h cycle)*

BS EN 60068-2-78:2013, *Environmental testing. Tests. Test Cab: Damp heat, steady state*.

BS EN 60255-1:2010, *Measuring relays and protection equipment. Common requirements*

BS EN 60255-21-1:1996, IEC 60255-21-1:1988, *Electrical relays. Vibration, shock, bump and seismic tests on measuring relays and protection equipment. Vibration tests (sinusoidal)*

BS EN 60255-21-2:1996, IEC 60255-21-2:1988, *Electrical relays. Vibration, shock, bump and seismic tests on measuring relays and protection equipment. Shock and bump tests*

BS EN 60255-21-3:1995, *Electrical relays. Vibration, shock, bump and seismic tests on measuring relays and protection equipment. Seismic tests*

BS EN 60255-26:2013, IEC 60255-26:2013, *Measuring relays and protection equipment. Electromagnetic compatibility requirements*

BS EN 60255-27:2014, *Measuring relays and protection equipment. Product safety requirements*

BS EN 60529:1992+A2:2013, *Degrees of protection provided by enclosures (IP code)*

BS EN 60834-1:2000, IEC 60834-1:1999, *Teleprotection equipment of power systems. Performance and testing. Command systems*

BS EN 61000-4-3:2006+A2:2010, *Electromagnetic compatibility (EMC). Testing and measurement techniques. Radiated, radio-frequency, electromagnetic field immunity test*

BS EN 61000-4-5:2014, *Electromagnetic compatibility (EMC). Testing and measurement techniques. Surge immunity test*

BS EN 61000-4-8:2010, *Electromagnetic compatibility (EMC). Testing and measurement techniques. Power frequency magnetic field immunity test*

BS EN 61000-4-9:1994, IEC 61000-4-9:1993, *Electromagnetic compatibility (EMC). Testing and measurement techniques. Pulse magnetic field immunity test. Basic EMC publication*

BS EN 61000-4-10:1994, IEC 61000-4-10:1993, *Electromagnetic compatibility (EMC). Testing and measurement techniques. Damped oscillatory magnetic field immunity test. Basic EMC publication*

BS EN 61000-4-16:1998+A2:2011, *Electromagnetic compatibility (EMC). Testing and measurement techniques. Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz*

BS EN 61000-4-18:2007+A1:2010, *Electromagnetic compatibility (EMC). Testing and measurement techniques. Damped oscillatory wave immunity test*

Other publications

[N1] ENA TS 48-4, *DC relays associated with a tripping function in protection systems*

3 Terms and definitions

For the purposes of this document, Clause 3 of BS EN 60068-1 and of BS EN 60255-1 shall apply.

4 General

This document details the normal environmental test requirements for protection and control equipment and systems intended for use within the ENA Member Company networks. Where applicable, the test requirements of the British Standards and International Electrotechnical Commission (IEC) Standards are specified together with the class of test severity. When a Standard is quoted, all the relevant clauses apply.

A summary of the Standards and test level requirements are listed in Annex A.

Type tests will be carried out by the manufacturer or a test house nominated by the manufacturer. The cost of testing shall be borne by the manufacturer. The manufacturer shall list all proposed type tests in a formal test plan for agreement by the PAP before formal testing takes place. The PAP will normally accept suitable authenticated documentation to confirm that the type testing has been carried out in accordance with the applicable specification. Exceptionally, however, some environmental tests will require to be witnessed by the PAP. These tests will be indicated at the time of agreeing the test plan and become part of the test plan schedule in order to avoid unnecessary duplication of testing.

The general requirements are applicable to relays and systems housed in relay rooms. More severe test requirements are listed for equipment which is likely to be sited in a harsher environment, such as pole mounted auto-reclosers and other outdoor equipment. Other special requirements may be necessary when the equipment is to be used in a harsh environment and these shall be agreed during the preparation of the test plan.

Where equipment is to be mounted as an integral part of switchgear, i.e. pole mounted auto-reclosers, and offered as a combined unit, additional conjunctive testing shall take place to ensure correct operation of the equipment during switchgear operation, switchgear atmospheric tests and primary fault current tests.