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Technical Specification 12-4

Issue 2 2016

Terminating equipment for pilot cables subject to induced transient voltages exceeding 650 V r.m.s.

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PUBLISHING AND COPYRIGHT INFORMATION

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Amendments since publication

Issue	Date	Amendment
Issue 1	Amendment 1, 1996	Minor amendment of Issue 1 to reflect changes in Standards referenced that have been updated, withdrawn and/or superseded. The technical intent of the document remains unchanged. This amendment has the following principal technical change. Clause 4.1: Impact strength of boxes to conform to Appendix B, which replaces compliance to BS 4137, Appendix A. Appendix B added; detailing the impact test requirements.
Issue 2	January 2016	Major revision of Issue 1 to reflect changes made to the standards referenced and to add requirements for termination of fibre optic pilot cables. This issue includes the following principal technical changes. Foreword: Revised to reference the addition of fibre optic pilot cable requirements. Clause 2: References updated, deleted or added as relevant. Clause 3: Definitions of “multicore and multipair cable” and “optical fibre cable” added and definitions of “pilot cables” and “local pilot cables” modified to take into account the introduction of fibre optic pilot cables. Clause 4: Retains requirements for equipment for multicore and multipair pilot cables. Clause subdivided to improve clarity, with the following changes to requirements: (i) 4.1.1 Construction: Requirement for metal boxes to have ≥1.6 mm thickness deleted and replaced by impact strength performance requirements given in Clause 4.1.3. ii) 4.1.2 Insulation materials: Reference to withdrawn “BS 7447” updated to “BS EN 60695”.

		(iii) 4.1.3 Impact strength: Requirements for impact testing of materials for boxes unchanged but now to apply to both metallic and insulated materials. (iv) 4.1.5 Padlocks: Requirement modified by adding that padlocks to conform to ENA TS 50-18 unless otherwise specified in the Enquiry. Clause 4.2: Table 1, reference to withdrawn "BS 2572" updated to "BS EN 60893-3-4". Clause 5 Design and construction of equipment for optical fibre pilot cables: New Clause to specify requirements for optical fibre cable equipment, with the following sub-clauses: 5.1 Boxes 5.1.1 Construction 5.1.2 Insulation materials (requirements same as for metallic pilot boxes) 5.1.3 Impact strength (requirements same as for metallic pilot boxes) 5.1.4 Degree of protection (requirements same as for metallic pilot boxes) but to apply to plug and socket connection and to any socket attached to the terminal box when the plug has been disconnected 5.1.5 Padlocks (requirements same as for metallic pilot boxes) 5.2 Optical fibre cable terminations 5.3 Earthing Clause 5, (re-numbered as Clause 6) Table 2: (i) Column 1: Entry for terminal box split into two to provide provision for different inscription on boxes for (a) metallic pilots and (b) fibre optic pilots with metallic sheaths or armouring. (ii) Column 5: Reference to "EA TS 50-18 Part 1: Clause 12" updated to "ENA TS 50-18 Clause 6.8". (iii) Column 6: Reference to "EA TS 50-18 Part 1: Clause 12" updated to "ENA TS 50-18 Clause 6.8". Clause 6 (re-numbered as Clause 7): (i) After 1st sentence: Additional requirement that unless otherwise specified, the protective coating systems shall be suitable for the service conditions of atmospheric-corrosivity category C3 (medium), ENA TS 98-1 Tables 1 & 2. (ii) 2nd sentence: Requirement amended so that colours other than light grey for external surfaces and white for internal surfaces may be acceptable, subject to the Engineer's approval. Clause 7 (re-numbered as Clause 8): Sub-clauses re-structured to separate out clearly the requirements for terminal boxes for multicore or multipair cable pilots, barrier equipment and terminal boxes for optical fibre pilots. (i) Type test and routine test requirements for terminal boxes for metallic cable pilots and for barrier equipment remain unchanged. Clause 7.1 (re-numbered as Clause 8.1.1), Table 3: Row 5 'Test 4', Column 4 'Test Voltage Applied Between': For clarity, the wording "…the handles forming part of the disconnecting…" amended to "…the handles forming part of the loose equipment utilised for disconnecting…". 8.3: Additional Clause specifying test requirement for optical fibre equipment. 8.3.1 Type approval tests (i) Mechanical and optical conformance of the optical fibre terminations to meet the requirements of BS EN 61753-1-3 to be demonstrated.

		(ii) Terminating equipment equipped with earthing bars for use with optical fibre pilot cables having armouring and/or metallic sheath or conduit to demonstrate that all exposed metal is either connected to the earthing bar and the earthing terminal or insulated from earth at the 15 kV level. 8.3.2: Routine tests Terminating equipment equipped with earthing bars for use with optical fibre pilot cables having armouring and/or metallic sheath or conduit to demonstrate that all exposed metal is either connected to the earthing bar and the earthing terminal or insulated from earth at the 15 kV level. Figure 2: Title amended to “Typical arrangement of terminating equipment for multicore or multipair cable pilots”. Appendix A (re-named Annex A): (i) Descriptor “(normative)” added to the title. (ii) Clause A2 (re-numbered A.3): Title amended to “Cabling and wiring for multicore and multipair cables”. (iii) Clause A2.3 (re-numbered A.3.3): Reference to “ENA TS 50-18 Part 2 Clause 3” updated to ENA TS 50-18 Clause 7.2.3”. (iv) New Clause (numbered A.4) titled “Termination of fibre optic pilots”. Requirements added for terminating fibre optic pilots. Appendix B (re-named Annex B): Descriptor “(normative)” added to the title. Appendix B (renamed Annex B), Clause B.1 “Test procedure”: (i) 1st sentence: Reference to withdrawn “BS 2011: Part 2. lEf “ updated to “BS EN 60068-2-75 Clause 5, Test Eha: Pendulum hammer”. (ii) 5th sentence: Text “The height of the fall shall be 250 mm giving an impact energy of 0.5 J” revised to “Using Table 2 of BS EN 60068-2-75, select an equivalent mass of the striking element and height of the fall to give an impact energy of 0.5 J”. Appendix B (renamed Annex B), Clause B.2 “Assessment criteria”: (i) Requirements added of assessment criteria for metallic boxes (Clause B2.2.1). (ii) Assessment criteria for Insulated material boxes (Clause B.2.2) retained unchanged. Annex C: Schedule of requirements added. Table provided, to be completed by Purchaser. Annex D: Self-Certification Conformance declaration added. Table provided, to be completed by manufacturer/supplier, to declare conformance or otherwise, clause by clause. Bibliography: Clause added. No informative references required. 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).

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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 12-4”.

This document replaces and supersedes Technical Specification 12-4 Issue 1 1973.

Pilot cables, comprising either auxiliary multicore and multipair cables to ENA TS 09-6 [N1] or fibre optic cables with metallic sheaths/armouring, and electrically connected equipment may be subject to high transient voltages induced by fault currents in adjacent power circuits. These voltages are developed between the earthing systems at the respective cable terminations and/or induced in the metallic pilot cable conductor, the metallic sheath (where provided) and the armouring.

Since the use of voltage limiting devices, e.g. protective gaps and zener diodes, is generally impractical due to their interference with the function of protection systems under fault conditions, the pilot cable terminating equipment is required to withstand the induced transient voltages. Any associated barrier equipment, interposed between the terminating equipment and the station wiring, is designed to withstand these induced transient voltages and prevent their transfer on to the station wiring.

The purpose of this Specification is to determine the design parameters for terminating equipment subject to induced transient voltages and specify the installation requirements.

To meet the varying service conditions, two induced transient voltage levels are specified for terminating equipment, i.e. 5 and 15 kV r.m.s. ENA TS 09-6 [N1] specifies multicore and multipair cables graded to these induced transient voltages. Barrier equipments are designed to meet the 15 kV r.m.s. level.

To meet varying requirements, boxes housing terminating and barrier equipments are specified to be constructed from either metal or insulation material.

The Specification is dimensional in that it determines the minimum internal clearance for terminal boxes required to facilitate cabling. Overall dimensions of the boxes will depend upon the terminal arrangements required and necessary to achieve the 15 kV r.m.s. insulation level.

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.

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1 Scope

This Specification determines the design parameters for indoor type terminal boxes, and barrier equipment accommodation and connections, for pilot cables subject to induced transient voltages above 650 V r.m.s. but not exceeding 15 kV r.m.s.

The Specification also details the installation requirements essential for the correct operation of the equipment and for the safety of personnel. These requirements are given in Annex A.

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

BS EN 60068-2-75:2014, *Environmental testing. Tests. Test Eh: Hammer tests*

BS EN 60529, *Specification for degrees of protection provided by enclosures (IP code)*

BS EN 60695-1-11:2011, *Fire hazard testing. Guidance for assessing the fire hazard of electrotechnical products. Fire hazard assessment*

BS EN 60893-3-4:2004+A1:2012, *Insulating materials. Industrial rigid laminated sheets based on thermosetting resins for electrical purposes. Specifications for individual materials. Requirements for rigid laminated sheets based on phenolic resins*

BS EN 61753-1-3:2014, *Fibre optic interconnecting devices and passive components. Performance standard. General and guidance for single-mode fibre optic connector and cable assembly for industrial environment, Category I*

BS 2782-1:Method 140A:1992, ISO 1210:1992, *Methods of testing plastics. Thermal properties: Determination of the burning behaviour of horizontal and vertical specimens in contact with a small-flame ignition source*

BS 3643-1:2007, *ISO metric screw threads. Principles and basic data*

BS 3757:1978, *Specification for rigid PVC sheet*

Other publications

[N1] ENA TS 09-6 Issue 8:2012, *Auxiliary multicore and multipair cables*

[N2] ENA TS 50-18 Issue 4:2013, *Application of ancillary electrical equipment*

[N3] ENA TS 98-1 Issue 2:2014, *Environmental classification and corrosion protection of structures, plant and equipment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
multicore or multipair cable
multicore or multipair cable with metallic conductors conforming to ENA TS 09-6 [N1]