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Technical Specification 12-11

Issue 5 2018

Enclosed unfilled terminations of cables with rated voltages 12, 24 and 36 kV

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PUBLISHING AND COPYRIGHT INFORMATION

Operations Directorate
Energy Networks Association
6th Floor, Dean Bradley House
52 Horseferry Rd
London
SW1P 2AF

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Amendments since publication

Issue	Date	Amendment
Issue 4	February, 2012	Minor revision of Issue 3. This issue includes the following principal technical changes. Clause 3.1 Separable connector: Definition amended to delete description relating to conical form. Table 3 & Table 4: Description of cable arrangement modified for “3 cores or 1 core through 1 hole”. 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 5	January, 2018	Major revision of Issue 4. This issue includes the following principal technical changes. Title changed to clarify that the TS refers specifically to terminations in unfilled enclosures. Description ‘dry’ removed. The Foreword has been augmented with a caveat stating that illustrations of cable terminations in enclosures (Annex B) do not imply that these arrangements are available or suitable for all cable sizes and termination types. The Scope clause has been redrafted to define more clearly the cable termination categories referenced in the TS. Table 1 (cable sizes) has been deleted since its content is documented in the referenced cable Standard. Cable standards in addition to BS 7870 have been included together with a note regarding larger cable sizes. Normative references clause has been revised to remove a withdrawn Standard, to re-reference standards where these are now BS publications, and to add other cable standards and the Standard for cable conductor lugs. Several additions have been made to the Terms and definitions clause in order to clarify the meaning of terms relating to cable accessory types. Definitions of ‘cable test access’ and ‘dry termination’ have been deleted

		since they are not referenced in the text. Clause 4: a description of enclosure function has been added and service conditions deleted where these are stated in the referenced standards. Clause 5: Issue 4 Table 2 (Rated normal current) has been deleted since its content is documented in the referenced Standard. The referenced test Standard for cables installed in enclosures has been changed from IEC 60502-2 to BS 7888-4.1. Clause 6.1: New paragraphs added concerning resistance to mechanical impact and requirements for surface finish etc. Clause 6.2: The Note has been deleted since provision for earth leakage equipment etc is noted elsewhere. Clause 6.4: Text has been added to stress the importance of adequate ventilation of enclosures and the prevention of persistent condensation. New Clause 6.6 on cable and termination support has been added Clause 6.8.1 (was Issue 4 Clause 6.7.1): Reference to 'inside cone' terminations has been removed. Clause 6.9 (was Issue 4 Clause 6.8): Text has been added relating to 3-core cables and multiple single-core cables. Content of Tables 1 and 2 has been combined into a new Table 1. Table 2 has been deleted. Cable size limit has been removed for single-core cables through separate holes (previously 800 mm^2). New Clause 6.10 with restrictions on the inclusion of additional equipment within cable enclosures. New Clause 6.11 regarding enclosures fitted with extensions. New Clause 7.1.1 regarding type testing of cable terminations. Clause 7.1.2 (was Issue 4 Clause 7.1.1) augmented with requirements for lightning impulse voltage test. New Clause 7.1.4 requiring a temperature rise test on enclosures with cables carrying rated current load. New Clause 7.1.5 concerning solar gain. Annex B has been re-classified 'informative' since it represents only 'typical' enclosure arrangements. 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 (ENA 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 “TS 12-11”.

This ENA TS supersedes ENA TS 12-11 Issue 4 2012.

The Electricity at Work Regulations 1989 (the Regulations), made under the Health and Safety at Work etc. Act 1974, apply to unfilled cable enclosures (cable boxes) for the termination of cables wherever manufactured, purchased or installed. Appendix 2 of the Memorandum of Guidance to the Regulations lists Standards, Codes of Practice and other publications which contain guidance relevant to the Regulations and electrical safety.

Enclosed unfilled cable terminations covered by this ENA TS shall comply with the latest issues of the relevant International and British Standards listed. This ENA TS is intended to amplify and/or clarify the requirements of these Standards and should be read in conjunction with them.

Annex A (normative) of this ENA TS includes “Self-Certification Conformance Declaration” sheets to enable manufacturers/suppliers to declare conformance or otherwise, clause by clause, with relevant parts of this document.

Annex B (informative) of this ENA TS shows drawings of typical assemblies of cable enclosures for various cable terminations. These drawings are intended to illustrate the usual arrangement of various cable termination types within enclosures. They do not imply that a particular termination type is available for all cable sizes or is suitable for installation within enclosures having minimum dimensions tabled in this ENA TS.

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

1 Scope

This Technical Specification (ENA TS) defines technical requirements for termination of polymeric insulated cables enclosed within unfilled earthed metal housings (cable boxes) attached to distribution switchgear and transformers. Cables, terminations and equipment within the scope of this ENA TS are of rated voltages 12 kV to 36 kV.

The earthed metal enclosures are intended for housing the terminations of single and 3-core cables to BS 7870-4 (unarmoured cables), BS 6622 (armoured cables) and IEC 60502-2. Cables with conductor sizes larger than those listed in the referenced standards shall conform to the general requirements of the relevant standard.

Cable terminations recognised in this ENA TS (and illustrated in Annex B) are;

- separable inside or outside cone plug-in (fully screened) types for mating with appropriate standardised bushings;
- fully or partially insulated (unscreened) types, e.g. heat-shrink, cold-shrink and slip-on designs.

The location of inside cone type terminations does not require a separate air-filled termination enclosure (see Figure B4) and therefore Clauses 4 and 6 of this ENA TS do not apply.

Terminations of other types are not excluded provided they are compatible with the enclosures as defined in this ENA TS.

Detailed requirements for design and construction are not specified, but fundamental considerations on these aspects are given in Clause 5.

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 6622, *Electric cables. Armoured cables with thermosetting insulation for rated voltages from 3.8/6.6 kV to 19/33 kV. Requirements and test methods*

BS 7870-4.10, *LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables with extruded insulation of rated voltages 11 kV to 33 kV. Single-core 11 kV to 33 kV cables (Implementation of HD 620)*

BS 7870-4.11, *LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables with extruded insulation of rated voltages 11 kV to 33 kV. Single-core 33 kV lead sheathed cables (Implementation of HD 620)*

BS 7870-4.20, *LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables with extruded insulation of rated voltages 11 kV to 33 kV. Three-core 11 kV cables (Implementation of HD 620)*

BS 7888-4.1, *Test requirements on accessories for use on power cables of rated voltage from 3,6/6 (7,2) kV up to 20,8/36 (42) kV. Cables with extruded insulation*

BS EN 50181, *Plug-in type bushings above 1 kV up to 52 kV and from 250 A to 2,50 kA for equipment other than liquid filled transformers*

BS EN 50336*, Bushings for transformers and reactor cable boxes not exceeding 36 kV*

BS EN 60529, *Degrees of protection provided by enclosures (IP code)*

BS EN 61238-1, *Compression and mechanical connectors for power cables for rated voltages up to 36 kV (U_m = 42 kV). Test methods and requirements*

BS EN 62271-1, *High-voltage switchgear and controlgear. Common specifications*

BS EN 62271-200, *High-voltage switchgear and controlgear. AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

IEC 60502-2, *Power cables with extruded insulation and their accessories for rated voltages from 1 kV (U_m = 1,2 kV) up to 30 kV (U_m = 36 kV) – Part 2: Cables for rated voltages from 6 kV (U_m = 7,2 kV) up to 30 kV (U_m = 36 kV)*

Other publications

[N1] ENA TS 41-36, *Distribution switchgear for service up to 36 kV (cable and overhead conductor connected)*

[N2] Statutory Instrument 2002 No. 2665, *The Electricity Safety, Quality and Continuity Regulations 2002 (as amended)*[1]

3 Terms and definitions

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

3.1
fully insulated cable termination
cable termination in an **unfilled enclosure** in which all live metal parts and terminated cable cores within the enclosure are fully shrouded for the appropriate rated system voltage

3.2
inside cone cable termination
fully screened cable termination designed to fit to a female **plug-in type bushing**

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1 S.I. 2012 No.381, *Electricity Safety, Quality and Continuity Regulations (Northern Ireland) 2012 (as amended)*, applies in Northern Ireland.