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Technical Specification 09-9

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Distribution cables of rated voltage 0.6/1/ (1.2) kV with XLPE insulation, concentric waveform copper wire and solid aluminium conductors

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PUBLISHING AND COPYRIGHT INFORMATION

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Amendments since publication

Issue	Date	Amendment
7	February 2016	Minor revision to align TS 09-9 with the latest revision of BS 7870-3.40 and BS 7870-3.50. This issue includes the following principal technical changes. The title has been changed to align more closely with BS 7870 and to reflect current voltage designation terminology. The test for shrinkage of insulation (retraction) has been included as a sample test in addition to its existing inclusion as a type test. The shrinkage limit of 1% required in Issue 6 of TS 09-9 has been increased to 2%. BS 7870 imposes a maximum shrinkage of 4% and is specified only as a type test. Appendix A (informative) of Issue 6 (additional technical particulars of cables) has been deleted on the basis that this information is provided by manufacturers/suppliers in standard data sheets. Appendix B (informative) of Issue 6 (user information) has been deleted on the basis that the relevant cable technology is now mature and the historical and general guidance information in this Appendix is no longer needed. An advisory note from this Appendix concerning selection of conductor connectors has been included in Clause 4. Relevant definitions have been included in a new 'Terms and definitions' clause. A bibliography clause has been added. 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 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 09-9”.

This Specification replaces and supersedes ENA TS 09-9 Issue 6 2010.

ENA TS 09-9 describes the requirements for low voltage distribution cables used by Distribution Network Operators (DNOs). These requirements are based on the relevant clauses of BS 7870.

This document includes a “Self-certification conformance declaration” sheet (Annex A) and “Type test conformance declaration” sheets (Annexes B and C) that may be used to enable a manufacturer (or a supplier who is not also the manufacturer) to declare conformance or otherwise, clause by clause, with relevant parts of this document.

This Specification meets the requirements of the Utilities Contracts Regulations 2006 [N1] as amended.

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

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1 Scope

This Specification describes constructional and test requirements for the following types of low voltage cable.

Underground application

3-core, 3-phase, with a waveform concentric combined neutral and earth conductor, having conductor sizes 35, 70, 95, 120, 185, 240 and 300 mm^2.

4-core, 3-phase and a separate neutral, with a waveform concentric earth conductor, having conductor sizes 95, 185, 240 and 300 mm^2.

These cables are generally in accordance with BS 7870-3.40 and are normally laid either direct in ground or in ducts as part of an underground distribution system.

Application within buildings

3-core, 3-phase, with a concentric combined neutral and earth conductor, having conductor sizes 95, 185 and 300 mm^2.

4-core, 3-phase and a separate neutral, with a concentric earth conductor, having conductor sizes 95, 185 and 300 mm^2.

These cables are generally in accordance with BS 7870-3.50 and are normally installed where performance in fire conditions is particularly important.

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 7870-3.40, *LV and MV polymeric insulated cables for use by distribution and generation utilities – Part 3: Specification for distribution cables of rated voltage 0.6/1 kV – Section 3.40: XLPE insulated, copper wire waveform concentric cables with solid aluminium conductors (Implementation of HD 603)*

BS 7870-3.50, *LV and MV polymeric insulated cables for use by distribution and generation utilities – Part 3: Specification for distribution cables of rated voltage 0.6/1 kV – Section 3.50: XLPE insulated, copper wire waveform or helical concentric cables with solid aluminium conductors, having low emission of smoke and corrosive gases when affected by fire*

This Specification makes reference on a clause by clause basis to the normative Standards publications. For simplicity, the term “the relevant Standard” is used to indicate a reference to one or other of the normative Standards according to the cable type under consideration.

Other publications

[N1] Utilities Contracts Regulations 2006 (S.I. 2006 No.6) and amendment, the Utilities Contracts (Amendment) Regulations 2009 (S.I. 2009 No. 3100)

3 Terms and definitions

3.1
bedding layer
non-metallic cushioning layer applied beneath a metallic layer such as concentric wires

3.2
concentric conductor
conductor so constructed as to surround one or more insulated conductors

3.3
sector-shaped conductor
shaped conductor the cross-section of which approximates to a sector of a circle

3.4
waveform conductor
concentric conductor applied helically with the direction of lay reversing in regular sequence

3.5
XLPE (cross-linked polyethylene)
extruded thermoplastic polyethylene insulation whose molecular structure has been changed (cross-linked) by a chemical or physical process

NOTE: Other relevant definitions may be found in IEC 60050-461.

4 Core conductors

The core conductors shall conform to Clause 4 of the relevant Standard.

Users should be aware that aluminium sector-shaped conductors have cross-sectional profiles that can vary, for example between one cable manufacturer and another. It is therefore important to take this into consideration when assessing connectors, since a connector that will fit one particular conductor profile may not fit another.

5 Insulation

The insulation of core conductors shall conform to Clause 5 of the relevant Standard. Excessive insulation retraction is not acceptable (see Clause 15). Where a reduction in the amount of insulation retraction is achieved using methods that do not conform to the relevant Standard (e.g. by knurling of the conductors), the details shall be agreed between the purchaser and manufacturer.

The identification of cores shall conform to Clause 5 of the relevant Standard.

6 Assembly of cores

The assembly of cores shall conform to Clause 6 of the relevant Standard.

7 Concentric conductor

7.1 Material

The concentric conductor material shall conform to Clause 7.1 of the relevant Standard.

7.2 Application

The application of the concentric conductor shall conform to Clause 7.2 of the relevant Standard except that the spacing of the wires shall be such that the gap between adjacent wires does not exceed 4 mm at any point.