



Technical Specification 43-120

Issue 2 2012

Fittings for covered conductors for overhead lines
(having rated voltages U_0/U greater than 0.6/1 kV
up to and including 19/33 kV)

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First published, March, 2002

Amendments since publication

Issue	Date	Amendment
Issue 2	December, 2012	<p>Major revision of Issue 1 to align with publication of BS EN 50397-2 and changes in reference BS and IEC Standards. Converted into the new ENA Technical Specification (TS) template and updated in accordance with Engineering Recommendation G0 Issue 1 2012 <i>Rules for structure, drafting and presentation of ENA engineering documents</i>.</p> <p>This issue includes the following principal technical changes:</p> <p>Clause 1 Scope: Covered conductors to BS EN 50397-1 included.</p> <p>Clause 3.10: Definition of covering changed to include polyethylene (PE).</p> <p>Clause 4.1.3 Protection against UV radiation: Test changed to comply with BS EN ISO 4892-3:2006.</p> <p>Clause 4.1.5 Fastenings: Reference changed from "BS 3288" to "BS 3288-2".</p> <p>Clause 4.2 Design: Tests for interference with radio, TV and other communications changed to comply with levels in PD CISPR/TR 18-2:2010 when measured using methods and test equipment that complies with BS EN 55016.</p> <p>Clause 4.5 Identification and marking: Added requirement for markings to be permanent and comply with Clause 7.3 of BS EN 50397-2.</p> <p>Clause 4.7 Tension terminations: Changed requirement for ball, socket, tongue, clevis to comply with CENELEC HD 474 S1.</p> <p>Clause 5 Summary of test requirements:</p>

	<ul style="list-style-type: none"> • Changed requirement for tests to generally comply with BS EN 50397-2 not BS 3288-1 (as amended by the Specification). • Table 1 updated to show changes to mechanical tests. • Title of “Unbalanced load test” changed to “HV pull-through withstand test” to align with BS EN 50397. • “Swing rig” changed to “swinging conductor”. • “Tensile test – conductor damage test” changed to “Additional mechanical tests for IPCs”. • Added option for tests to be carried out with covered conductor to BS EN 50397-1 by agreement with the purchaser subject to details of the manufacturer and key technical parameters of the conductor used being clearly identified in test report. <p>Added requirement for visual examination test to comply with Clause 7.1 of BS EN 50397-2 in Clauses 6, 7 & 8.</p> <p>Added requirement for dimensional inspection and material verification test to comply with Clause 7.2 of BS EN 50397-2 in Clause 6, 7 & 8.</p> <p>Requirements for tensile test changed from BS 3288-1 to BS EN 50397-2.</p> <p>Heat cycle tests changed to refer specifically to Clause 13 of BS EN 61284 with requirement for six samples to be tested at N=1 000 for class A (tension joints) at 70 °C above ambient temperature. Commentary added to permit testing to Clause 7.7 of BS EN 50397-2 if agreed by supplier and purchaser.</p> <p>Clause 6.2.5 impact test: Changed requirement for impact test device to comply with IEC 60811-506: 2012 not BS 6469 (figure 31).</p> <p>Added new Damage and failure load test as BS EN 50397-2 in Clause 7.</p> <p>Added new Slip test as BS EN 50397-2 in Clause 7 & 8.</p> <p>Clause 7.2.4.4: Added new Lift and side load test as BS EN 50397-2.</p> <p>Clause 7.2.3 Load test of erection equipment attachment point: Requirements from ENA TS 43-92 used in place of BS 3288-1.</p> <p>Clause 7.2.5 Torque test: Added requirements to comply with Clause 7.4.10 of BS EN 50397-2. Added “...by slackening the clamp bolts...” to the acceptance criteria.</p> <p>Clause 7.3.1 Test for mechanical damage to the main conductor: Added requirement to comply with Clause 7.4.12 of BS EN 50397-2.</p> <p>Clause 7.3.2 Branch conductor pull-out test: Added requirement to comply with Clause 7.4.13 of BS EN 50397-2. No movement stated as not exceeding 3 mm.</p> <p>Clause 7.5.1 Mechanical routine test: Compliance to BS 3288-1 Clause 6.4 changed to: “A tensile load, which shall be equal to the specified minimum mechanical damage load (SMMDL) shall be applied to the fittings and maintained for 1 minute.</p> <p>Clause 8.2.4 Commentary added to permit testing to Clause 7.7 of BS EN 50397-2 if agreed by supplier and purchaser.</p> <p>Clause 8.2.7 Added 240CC to Table 2.</p> <p>Clause 8.4 Routine tests: Changed requirement to comply with Clauses 6.3, 7.1 and 7.2 of BS EN 50397-2 instead of BS EN 61284 Clauses 6.3, 6.3.1, 6.3.2, 7 and 8.</p>
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		<p>Clause 9.3.2 Resistivity test: Added commentary that BS EN 50397-2 Clause 7.4.15 includes similar mechanical tests for earth parking devices that may be adopted when agreed by the supplier and purchaser.</p> <p>Clause 9.5: Changed title to "Short-time withstand current type test". Updated reference to BS EN 62271-1: 2008 from IEC 60694.</p> <p>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).</p>
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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 43-120”.

This Specification specifies the requirements for fittings and apparatus required for use with covered conductors for overhead lines (having rated voltages U_0/U greater than 0.6/1 kV up to and including 19/33 kV) as detailed in ENA TS 43-122 [N5] and BS EN 50397-1.

Issue 1 of the Specification was prepared essentially as a performance Specification in order that any design of covered conductor fitting could be used, provided that it met the relevant test requirements and could be shown to be satisfactory in the long term (in relation to the other line components). Subsequently, BS EN 50397-2 has been published, which specifies requirements for accessories used with covered conductors to BS EN 50397-1.

This revision incorporates relevant requirements from BS EN 50397-2, where these requirements are compatible with the original performance requirements. Similarly, relevant requirements for non-covered conductor fittings in BS EN 61284 and ENA TS 43-92 that can be applied to covered conductor fittings have been incorporated. The intention is generally to align requirements in ENA TS 43-120 with relevant Standards without any significant reduction in performance required in the previous issue.

Tests for fittings which are to be applied directly to the conductor and require prior removal of the covering, are not separately detailed in this Specification; reference should be made to other Standards, namely BS EN 61284, and ENA TS 43-92 for the basic requirements.

Any additional tests where considered necessary, e.g. related to the coverings on such fittings, are included within this Specification.

Annex A of this Technical Specification includes “Self Certification Conformance Declaration” sheets to enable suppliers to declare conformance or otherwise, clause by clause, with relevant parts of this Specification.

Where the term “shall” is used in this document it expresses a requirement. The term “may” is used to express permission.

1 Scope

This Specification specifies types of fittings for covered conductor overhead lines including those constructed to ENA TS 43-121 [N4] with covered conductors manufactured to ENA TS 43-122 [N5] and includes the tests appropriate to these fittings. The Specification details specific requirements as follows:

- a) Clause 5 — Summary of test requirements.
- b) Clause 6 — Compression covered conductor fittings.
- c) Clause 7 — Mechanical covered conductor fittings.
- d) Clause 8 — Factory formed covered conductor fittings.
- e) Clause 9 — Provision for the connection of earthing leads to HV covered conductors.

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 3288-2, *Insulator and conductor fittings for overhead power lines. Specification for a range of insulator fittings*

BS 4190, *ISO metric black hexagon bolts, screws and nuts. Specification*

BS EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods*

BS EN 50397-1:2006, *Covered conductors for overhead lines and the related accessories for rated voltages above 1 kV a.c. and not exceeding 36 kV a.c. Covered conductors*

BS EN 50397-2:2009, *Covered conductors for overhead lines and the related accessories for rated voltages above 1 kV a.c. and not exceeding 36 kV a.c. Accessories for covered conductors. Tests and acceptance criteria*

BS EN 55016 (all parts), *Specification for radio disturbance and immunity measuring apparatus and methods*

BS EN 60099-4, *Surge arresters. Metal oxide surge arresters without gaps for a.c. systems*

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

BS EN 61284:1998, *Overhead lines. Requirements and tests for fittings*

BS EN 61897:1999, *Overhead lines. Requirements and tests for Stockbridge type Aeolian vibration dampers*

BS EN 62271-1:2008+A1:2011, *High-voltage switchgear and controlgear. Common specifications*

BS EN ISO 4892-3:2006, *Plastics. Methods of exposure to laboratory light sources. Fluorescent UV lamps*

BS EN ISO 9001, *Quality management systems. Requirements*

CENELEC HD 474 S1, *Dimensions of ball and socket couplings of string insulator units*

IEC 60811-506:2012, *Electric and optical fibre cables – Test methods for non-metallic materials - Part 506: Mechanical tests - Impact test at low temperature for insulations and sheaths*

PD CISPR/TR 18-2:2010, *Radio interference characteristics of overhead power lines and high-voltage equipment. Methods of measurement and procedure for determining limits*

Other publications

[N1] ENA TS 43-15, *Insulator binds and equivalent helical fittings for overhead lines*

[N2] ENA TS 43-81, *Portable earthing equipment for high voltage overhead lines up to and including 66 kV*

[N3] ENA TS 43-92, *Overhead Line Fittings*

[N4] ENA TS 43-121, *Specification for single circuit overhead lines of compact covered construction on wood poles for use at high voltage up to and including 33 kV*

[N5] ENA TS 43-122, *XLPE covered-conductors for overhead lines (having rated voltages U_0/U greater than 0.6/1 kV up to and including 19/33 kV)*

3 Terms and definitions

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

3.1

bail

auxiliary length of conductor connected to a covered conductor under line tension and designed to accept a live line tap

3.2

conductor

current carrying core

3.3

connector

current carrying fitting