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Technical Specification 43-125

Issue 2 2017

Design guide and technical specification for overhead lines above 45 kV

Part 3 Vibration dampers and spacers

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PUBLISHING AND COPYRIGHT INFORMATION

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Issue	Date	Amendment
Issue 2	February 2017	Major revision to Issue 1 to: (i) reflect technical changes made to two main Standards referenced namely BS EN 50341-1 and BS EN 50341-2-9 (ii) split document into multi-parts reflecting standalone design requirements and the requirements for individual components and parts of lattice tower design (iii) remove wood poles and steel poles from the scope of TS 43-125 (iv) remove requirements covering optical fibre cable as this topic is covered by ENA TS 43-126. TS 43-125 has been divided into 4 separate documents title: • Part 1 Design basis and electrical requirements • Part 2 Conductor systems, insulators and fittings • Part 3 Vibration dampers and spacers • Part 4 Foundations and site requirements Clause numbering of this Specification has changed significantly due to the document becoming 4 Parts. The cross referencing within the document has been updated accordingly. To ensure consistency to the normative reference BS EN 50341 throughout the document the following key changes have been completed.

		• Where BS EN 50341-1 Part 1 and Part 3-9 are referenced in square brackets as part of the clause title, these references have been amended to ensure all are correct and accurate. • All references to 'Part 3' have been changed to the correct 'Part 2-9' reference as appropriate. • The terminology to describe the design approaches has been amended throughout i.e. i. 'General Approach' is now written as 'Approach 1' ii. 'Empirical Approach' is now written as 'Approach 3' NOTE: To avoid confusion due to the extensive re-numbering of existing clauses and addition of new clauses, the Clause numbering below refers to this version, Issue 1 of Part 3. The Clause numbers of Issue 1 of TS 43-125 are given in brackets, where relevant. This issue includes the following principal technical changes. Foreword: Clause added to introduce Part 3 describing importance of BS EN 50341, splitting of TS 43-125 into 4 parts and explanation of the structure of Part 3. Clause 1: Introductory clause to provide context for the overall role of TS 43-125 and relationship with BS EN 50341 Parts 1 and 2-9. Clause 2.4.2.1 (Issue 1, 9.4.2.1), Commentary section: (i) Paragraph 2: Definition of ground roughness category IV added, as BS 8100-1 has been withdrawn but definition remains valid. (ii) Paragraph 3: Text added that specific standards do not apply for spiral vibration dampers and to refer to ENA TS 43-126 for more information. (iii) Paragraph 4: References added to Cigré Technical Brochure 273 and EPRI Transmission Line Reference Book for further guidance. Clause 2.9.3.4 (Issue 1, 9.9.3.4), Paragraph 3: Test requirements for Stockbridge type aeolian vibration damper clamps for use with OPGW or OPPC replaced by cross-reference to ENA 43-126. Clause 2.9.3.9 (Issue 1, 9.9.3.9), Paragraph 3: Test requirements for aeolian vibration damper clamps for use with OPGW, ADSS or OPPC replaced by cross-reference to ENA 43-126. Clause 2.9.3.10 (Issue 1, 9.9.3.10), Paragraph 3: Test requirements for aeolian vibration dampers for use with OPGW, ADSS or OPPC replaced by cross-reference to ENA 43-126. Clause 3.4.2.1 (Issue 1, 10.4.2.1), Commentary section: (i) Paragraph 3: Definition of ground roughness category IV added, as BS 8100-1 has been withdrawn but definition remains valid. (ii) Paragraph 5: Reference added EPRI Transmission Line Reference Book for further guidance. Clause 3.9.3.11 (Issue 1, 10.8.3.11), list item b): Cross-reference to Clause 8.9.6.2 updated to Clause 4.9.6.2 of ENA TS 43-125, Part 2. Bibliography added. Non-Normative references contained in the Specification 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).

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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 43-125".

Energy Networks Association Technical Specifications (ENA TS) 43 series for Overhead Lines were originally issued as Electricity Supply Industry (ESI) Specifications, and reflected current practice within the industry in the 1970-80s. Design methodology was based on the deterministic approach in accordance with the requirements of the Electricity (Overhead Lines) Regulations 1970. Complementary design requirements were based on the CEGB Transmission Plant Standards, subsequently reissued as ENA Technical Specifications.

European Normalised Standard, EN 50341, for the general design requirements of overhead electrical lines, initially for lines with voltages exceeding 45 kV (a.c.) was published in 2001. To complement the main body of the Standard, National Normative Aspects (NNAs) were prepared to reflect existing national laws or regulations relating to the design and/or construction of overhead lines, climatic conditions and current national practices in their own country. BS EN 50341 and its associated NNA Standard became the main normative reference for overhead line design in the United Kingdom (UK) as reflected in ENA TS 43-125 Issue 1.

In 2012, BS EN 50341-1 (subsequently referred to as Part 1) was subject to a technical revision. Technical content was updated and the scope was widened to cover overhead lines exceeding 1 kV a.c. The technical changes in the document impacted a number of topics including overhead line loadings. For example, the move away from using hourly-mean wind speeds for calculating applied forces on overhead line structures to 10-minute mean wind speeds. The ENA conducted specialist analysis of impacts of the revised BS EN 50341-1 and, as such, calculation factors have been incorporated into the NNA, where appropriate, to mitigate onerous overhead line designs.

Following the revision of BS EN 50341-1, the UK NNA was revised and published in 2015 as BS EN 50341-2-9 (subsequently referred to as Part 2-9). The intent of the UK NNA remains the same in that minimum design loading conditions and corresponding 'boxed' values have been specified and reference made to the Project Specification for the actual conditions or values.

Previously, two distinct design approaches were described in BS EN 50341-1 for both the mechanical and electrical design: the 'General Approach' based on the application of probabilistic reliability theory and an 'Empirical Approach' based on long term European experience, i.e. a deterministic-based design. The revised Standard now describes Approaches 1-3. However it is Approach 1 (previously 'General Approach') and Approach 3 (previously 'Empirical Approach') that are followed in the UK as declared in Part 2-9. Indicative values for partial loading or material factors ('boxed' values) are contained within the main body of the Standard, with the actual value specified in the NNA or alternatively in the Project Specification.

To ensure consistency in the application of both Part 1 and Part 2-9 and to provide guidance in the determination of the actual loading cases, boxed values etc., the ENA has prepared this Specification for overhead lines above 45 kV, specifically, lattice tower overhead lines. ENA TS 43-125 Issue 1 contained requirements for wood pole and steel pole overhead lines but this has been removed as such construction is covered by other Engineering Documents, namely: ENA TS 43-30 [1], ENA TS 43-40 [2], ENA TS 43-50 [3] and ENA TS 43-97 [4].

Since neither Part 1 nor Part 2-9 encompasses the installation aspects of overhead line construction, standard clauses covering these requirements have been included at appropriate points. To further assist in the use of these technical guidance documents cross-references have been included in the clause headings.

To provide guidance on the application of Part 1 and Part 2-9, where appropriate, a '*commentary*' has been provided in the text, especially as regards the determination of specific design loading conditions and the corresponding partial loading and material factors.

ENA TS 43-125 has been restructured as a multi-part document with the objective that any future amendments can be completed in an efficient and timely manner. ENA TS 43-125 comprises of the following parts.

ENA TS 43-125 Part 1 – Design basis and electrical requirements.

ENA TS 43-125 Part 2 – Conductor systems, insulators and fittings.

ENA TS 43-125 Part 3 – Vibration dampers and spacers.

ENA TS 43-125 Part 4 – Foundations and site requirements.

Within each Part of TS 43-125, the main clause heading are is to bound the requirements for a particular topic, e.g. Clause 2 in ENA TS 43-125 Part 3 captures all requirements for vibration dampers. Under each main clause, the scope, terms and definitions and normative references are provided, relevant to that topic.

Previous requirements in ENA TS 43-125 Issue 1 covering optical fibre cables have been removed as this topic is covered by ENA TS 43-126 suite of documents.

Project information to be provided by the ENA Member Comany's (ENAMC's) engineer, quality assurance requirements and the need for contractors' and/or suppliers' design submissions have been identified throughout this Specification. For consistency, informative annexes are included at the end of each main clause heading and include the following details.

- Annex A: Project Information to be provided by the ENAMC's Engineer.
- Annex B: Contractors' and/or Suppliers' Q.A. Hold and Notification Points.
- Annex C: Contractors' and/or Suppliers' Design Submissions.

Overhead lines by their very nature constitute a hazardous environment during their construction, maintenance and dismantling. Consequentially, to fulfil the requirements of the CDM Regulations [5] health and safety considerations 'risk assessments' should be undertaken as part of the overall design process.

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