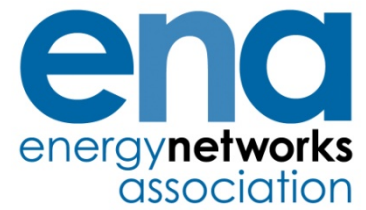


PRODUCED BY THE OPERATIONS DIRECTORATE OF ENERGY NETWORKS ASSOCIATION



Engineering Report 134

Issue 2 2013

Lightning protection for networks up to 132 kV

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First published, March, 2008

### Amendments since publication

Issue	Date	Amendment
Issue 2	November, 2013	<p>Minor revision of Issue 2 to reflect changes in BS EN 62305-1 and BS EN 62305-2 and amendment of affected clauses.</p> <p>This issue includes the following principal technical changes.</p> <p>Normative references added (numbered Clause 2). References from previous 'References' Clause included with following changes:</p> <ul style="list-style-type: none"><li>• ESQCR moved to Bibliography Clause;</li><li>• BS 6651 replaced by the BS EN 62305-1 and BS EN 62305-2;</li><li>• BS EN 60099-8, ENA EREC G78 and ENA TS 41-24 added.</li></ul> <p>Clause 4.4. Table and Figure added of lightning current and flash density across the UK for the period 1999 to 2012. Paragraph 2 amended and a new paragraph added to update the discussion of lightning activity trends taking account of the information provided for the later period.</p> <p>Clause 4.7, paragraph 3. Reference to BS EN 6651 Table C.1 amended to be BS EN 62305-2 Annex A.5.</p> <p>Clause 5, paragraph 3. Reference to Clause 4 of BS EN 60071-1 amended to be Clause 5, arising from the revision of BS EN 60071-1.</p> <p>Clause 6.2.3, Table 3. : 33 kV Crossed Rod Gap dimensions "2 x 90 mm" added to table with table footnote: "Practice of some Companies".</p> <p>Clause 6.6, paragraph 7. Final sentence added: "The additional connection of a high frequency earth to the surge arrester earth terminal will improve the effectiveness of the arrester, particularly where the earth connection is relatively long."</p> <p>Table 6. Reference to IEC 60071-2, Annex F amended to be BS EN 60071-2, Annex F.</p>

		<p>Clause 7.2.1, paragraph 1. Reference to BS EN 6651 amended to be BS EN 62305-2 Annexes A.4 and A.5.</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 Engineering Report (EREP) 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 “EREP 134”, which replaces the previously used abbreviation “ETR 134”.

This document replaces and supersedes ETR 134, Issue 1.

This EREP will enable network operators to assess the risks of damage to their networks caused by lightning and provide guidance on the methods available to mitigate these risks. There is guidance on how to assess the level of risk including information on lightning density across the UK. This includes a summary of the cause and effect of lightning strikes.

The subjects of earthing and protection are discussed in the context of their relevance to the subject of lightning protection. However, a full discussion on these subjects is out of scope for this EREP.

Where necessary, reference is made to published work, both national and international. Annexes A – C provide background information on the theory behind lightning protection. Annex D provides guidance on how to determine insulation co-ordination.



## 1 Scope

This EREP provides non-prescriptive guidance on how to assess the level of risk posed by lightning to equipment on a UK distribution network. The document provides information on how to determine where lightning protection might be required and the various forms that this protection can take.

There is guidance on how to assess the level of risk including information on lightning density across the UK. This includes a summary of the cause and effect of lightning strikes.

The contents of this EREP are applicable to overhead lines, cables, switchgear and transformers for all voltages from low voltage up to 132 kV.

NOTE: The issue of rise of earth potential around mobile phone base stations with antenna fitted on HV towers is documented in Engineering Recommendation G78 [N1], as such this issue will not be considered in this EREP.

## 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 62305-1:2011, *Protection against lightning. General principles*

BS EN 62305-2:2012, *Protection against lightning. Risk management*

BS EN 60071-1:2006+A1:2010, *Insulation co-ordination. Definitions, principles and rules*

BS EN 60071-2:1997, IEC 60071-2:1996, *Insulation co-ordination. Application guide*

BS EN 60099-1:1994, IEC 60099-1:1991, *Surge arresters. Non-linear resistor type gapped arresters for a.c. systems*

BS EN 60099-4:2004+A2:2009, *Surge arresters. Metal-oxide surge arresters without gaps for a.c. systems*

BS EN 60099-5:1997, *Surge arresters. Selection and application recommendation*

BS EN 60099-8:2011, *Surge arresters. Metal-oxide surge arresters with external series gap (EGLA) for overhead transmission and distribution lines of a.c. systems above 1 kV*

### Other publications

[N1] ENA EREC G78, *Recommendations for low voltage supplies to mobile phone base stations with antennae on high voltage structures*

[N2] ENA TS 41-24, *Guidelines for the design, installation, testing and maintenance of main earthing systems in substations*

## 3 Terms and definitions

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

### 3.1

#### Customer Interruptions (CI)

number of customers affected by power cuts per 100 customers per year