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## Elektriska friledningar över 1 kV (AC) – Del 1: Allmänna fordringar – Gemensamma specifikationer

*Overhead electrical lines exceeding AC 1 kV –  
Part 1: General requirements –  
Common specifications*

Som svensk standard gäller europastandarden EN 50341-1:2012. Den svenska standarden innehåller den officiella engelska språkversionen av EN 50341-1:2012.

### Nationellt förord

Den europeiska standarden EN 50341 består av två delar:

- EN 50341-1:2012, som innehåller avsnitt gemensamma för hela CENELEC
- EN 50341-2, som innehåller nationella normativa bilagor, vilka ger de fordringar som i respektive land gäller utöver eller istället för fordringarna i motsvarande avsnitt i del 1.

Denna utgåva 2 av standarden SS-EN 50341-1 innehåller den officiella engelska språkversionen av EN 50341-1:2012. Den gäller i Sverige tillsammans med den tillhörande svenska normativa bilagan som återfinns i SS-EN 50341-2-18, utgåva 1, 2017.

Tidigare fastställd svensk standard SS-EN 50341-1, utgåva 1, 2013, SS-EN 50341-3-18, utgåva 1, 2013 och SS-EN 50423, utgåva 3, 2013, gäller ej fr o m 2017-07-01.

ANM – För användning tillsammans med den nationella normativa bilagan för något annat land kan den tidigare utgåvan av SS-EN 50341-1 fortsätta att gälla, enligt vad som angivits för det landet.

### *Standarder underlättar utvecklingen och höjer elsäkerheten*

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

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English version

**Overhead electrical lines exceeding AC 1 kV -  
Part 1: General requirements -  
Common specifications**

Lignes électriques aériennes dépassant  
AC 1 kV -  
Partie 1: Règles générales -  
Spécifications communes

Freileitungen über AC 1 kV -  
Teil 1: Allgemeine Anforderungen -  
Gemeinsame Festlegungen

This European Standard was approved by CENELEC on 2012-11-19. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

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## Foreword

This document (EN 50341-1:2012) has been prepared by CLC/TC 11 "Overhead electrical lines exceeding 1 kV a.c. (1,5 kV d.c.)".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2013-11-19
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2016-11-19

This document supersedes EN 50341-1:2001 + A1:2009 and EN 50423-1:2005.

The most significant technical changes that have been made are:

- EN 50341-1 takes into account distribution and transmission overhead lines by merging EN 50341-1:2001 + A1:2009 and EN 50423-1;
- EN 50341-1 is consistent with recent editions of Eurocodes;
- one unique method is described concerning the determination of actions on line;
- new design methods and new developments are included.

EN 50341 is divided into the following parts:

- EN 50341-1, Overhead electrical lines exceeding AC 1 kV — Part 1: General requirements — Common specifications
- EN 50341-2, Overhead electrical lines exceeding AC 1 kV — Part 2: National Normative Aspects

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

## **0 Introduction**

### **0.1 Detailed structure of the standard**

The standard comprises two parts, numbered Part 1 and Part 2.

### **0.2 Part 1: General requirements - Common specifications**

This part, also referred to as the Main Body, includes clauses common to all countries. These clauses have been prepared by Working Groups and approved by CLC/TC 11.

The Main Body is available in English, French and German.

### **0.3 Part 2: National Normative Aspects**

The index lists the existing National Normative Aspects (NNAs) related to the different countries; a NNA for a country is normative in that country and informative in other countries.

The National Normative Aspects (NNAs) reflect national practices. They generally include A-deviations, special national conditions and national complements.

### **0.4 A-deviations**

A-deviations are required by existing national laws or regulations, which cannot be altered at the time of preparation of the standard.

Reference is made to CENELEC Internal Regulations Part 2, definition 2.17.

### **0.5 Special national conditions (snc)**

Special national conditions are national characteristics or practices that cannot be changed even over a long period, e.g. those due to climatic conditions, earth resistivity, etc.

Reference is made to CENELEC Internal Regulations, Part 2, definition 2.15.

### **0.6 National complements (NCPTs)**

National complements reflect national practices, which are neither A-deviations, nor special national conditions. It has been agreed within CLC/TC 11 that NCPTs should be gradually adapted to the Main Body, aiming at the usual EN standard structure including only a Main Body, A-deviations and special national conditions.

### **0.7 Language**

The NNAs are published in English and may be published additionally in the national language(s) of the respective country.

## **1 Scope**

### **1.1 General**

This European Standard applies to new overhead electric lines with nominal system voltages exceeding AC 1 kV and with rated frequencies below 100 Hz.

The extent of the application of this standard by each country in respect of existing overhead lines is subject to the requirements of the National Normative Aspects (NNA) applicable to that country.

The specific definition as to the meaning and extent of a “new overhead line” is to be identified by each National Committee (NC) within their own NNA. At the least, it shall mean a totally new line between two points, A and B.

### **1.2 Field of application**

This European Standard also applies to covered conductor overhead lines and overhead insulated cable systems with nominal system voltage exceeding AC 1 kV up to and including AC 45 kV and with rated frequencies below 100 Hz. Additional requirements and simplifications are specified that apply only for this voltage range.

Design and construction of overhead lines with insulated conductors, where internal and external clearances can be smaller than specified in the standard, are not included for lines exceeding 45 kV. Other requirements of the Standard may be applicable, and where necessary NNAs should be consulted.

This European Standard is applicable for optical Ground Wires (OPGWs) and optical Conductors (OPCONs). However the standard is not applicable to telecommunication systems which are used on overhead transmission lines either attached to the transmission line conductor/earth wire system (e.g. wraparound, etc.) or as separate cables supported by the transmission supports for example All Dielectric Self Supporting (ADSS) or for telecommunication equipment mounted on individual transmission line structures. When such cases are necessary, requirements can be given in the NNAs.

This European Standard does not apply to:

- overhead electric lines inside closed electrical areas as defined in EN 61936-1;
- catenary systems of electrified railways, unless explicitly required by another standard.

### **1.3 Structure of the European Standard EN 50341-1**

Normative references, definitions and symbols with their significations are listed in Clause 2 below.

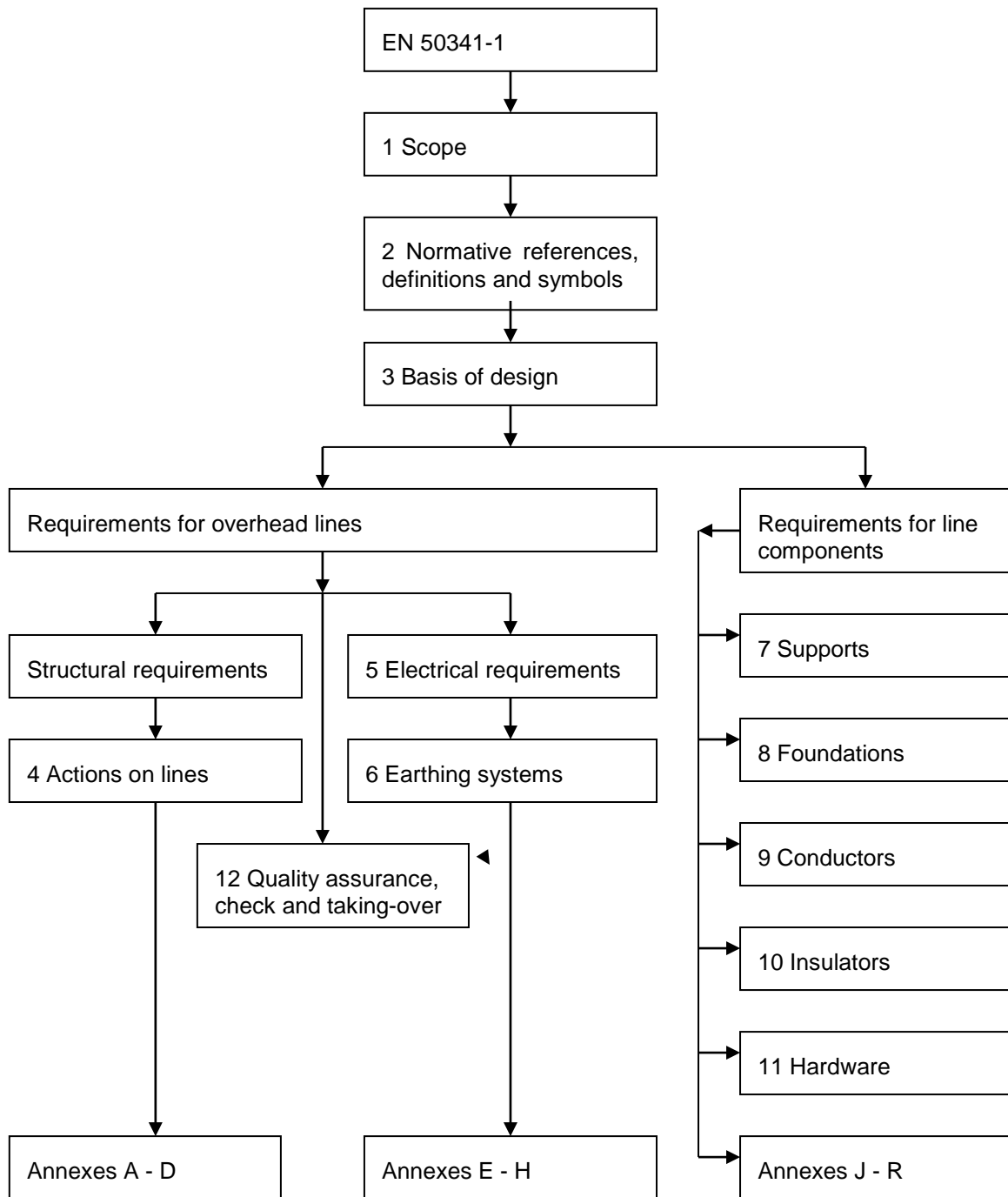
In Clause 3, the basis of design according to this standard is given.

The standard specifies in Clauses 4 to 6 the general requirements that shall be met for the structural and electrical design of overhead lines to ensure that the line is suitable for its purpose with due consideration given to safety of public, construction, operation, maintenance and environmental issues.

Clauses 7 to 11 of this standard consider the structural and electrical requirements that shall be met for the design, installation and testing of overhead line components including supports, foundations, conductors, insulator strings and hardware as determined by the relevant design parameters of the line.

Finally, Clause 12 considers the quality assurance requirements during design, manufacturing and construction.

Flowchart 1.1 summarises the structure of the European Standard EN 50341-1, its Clauses 1 to 12 and its Annexes A to R.



**Flowchart 1.1 — Structure of the European Standard EN 50341-1**

## **2 Normative references, definitions and symbols**

### **2.1 Normative references**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

**Eurocodes:**

<b>Reference</b>	<b>Title</b>
EN 1990:2002	<i>Eurocode — Basis of structural design</i>
EN 1991-1-4:2005	<i>Eurocode 1: Actions on structures — Part 1-4: General actions — Wind actions</i>
EN 1991-1-6:2005	<i>Eurocode 1 — Actions on structures Part 1-6: General actions — Actions during execution</i>
EN 1992-1-1:2004	<i>Eurocode 2: Design of concrete structures — Part 1-1: General rules and rules for buildings</i>
EN 1993-1-1:2005	<i>Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings</i>
EN 1993-1-3:2006	<i>Eurocode 3: Design of steel structures — Part 1-3: General rules — Supplementary rules for cold-formed members and sheeting</i>
EN 1993-1-5:2006	<i>Eurocode 3: Design of steel structures — Part 1-5: Plated structural elements</i>
EN 1993-1-8:2005	<i>Eurocode 3: Design of steel structure — Part 1-8: Design of joints</i>
EN 1993-1-11:2006	<i>Eurocode 3 — Design of steel structures — Part 1-11: Design of structures with tension components</i>
EN 1993-3-1:2006	<i>Eurocode 3 — Design of steel structures — Part 3-1: Towers, masts and chimneys — Towers and masts</i>
EN 1995-1-1:2004	<i>Eurocode 5: Design of timber structures — Part 1-1: General — Common rules and rules for buildings</i>
EN 1997-1:2004	<i>Eurocode 7: Geotechnical design — Part 1: General rules</i>
EN 1997-2:2007	<i>Eurocode 7: Geotechnical design — Part 2: Ground investigation and testing</i>
EN 1998-6:2005	<i>Eurocode 8: Design of structures for earthquake resistance — Part 6: Towers, masts and chimneys</i>

**Other European Standards:**

<b>Reference</b>	<b>Title</b>
EN ISO 1461:2009	<i>Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods (ISO 1461:2009)</i>
EN ISO 2063	<i>Thermal spraying — Metallic and other inorganic coatings — Zinc, aluminium and their alloys (ISO 2063)</i>
EN ISO 9001	<i>Quality management systems — Requirements (ISO 9001)</i>

<b>Reference</b>	<b>Title</b>
EN ISO 14713 (all parts)	<i>Zinc coatings — Guidelines and recommendations for the protection against corrosion of iron and steel in structures (ISO 14713, all parts)</i>
EN 1090-1	<i>Execution of steel structures and aluminium structures — Part 1: Requirements for conformity assessment of structural components</i>
EN 12385 (all parts)	<i>Steel wire ropes — Safety</i>
EN 12843	<i>Precast concrete products — Masts and poles</i>
EN 14229	<i>Structural timber — Wood poles for overhead lines</i>
EN 50182:2001	<i>Conductors for overhead lines — Round wire concentric lay stranded conductors</i>
EN 50183	<i>Conductors for overhead lines — Aluminium-magnesium-silicon alloy wires</i>
EN 50189	<i>Conductors for overhead lines — Zinc coated steel wires</i>
EN 50326	<i>Conductors for overhead lines — Characteristics of greases</i>
EN 50397-1	<i>Covered conductors for overhead lines and the related accessories for rated voltages above 1 kV a.c. and not exceeding 36 kV a.c. — Part 1: Covered conductors</i>
EN 50522:2010	<i>Earthing of power installations exceeding 1 kV a.c.</i>
EN 55016-1-1	<i>Specification for radio disturbance and immunity measuring apparatus and methods — Part 1-1: Radio disturbance and immunity measuring apparatus — Measuring apparatus</i>
EN 60038	<i>CENELEC standard voltages (IEC 60038)</i>
EN 60071-1	<i>Insulation co-ordination — Part 1: Definitions, principles and rules (IEC 60071-1)</i>
EN 60071-2:1997	<i>Insulation co-ordination — Part 2: Application guide (IEC 60071-2:1996)</i>
EN 60305	<i>Insulators for overhead lines with a nominal voltage above 1 kV — Ceramic or glass insulator units for a.c. systems — Characteristics of insulator units of the cap and pin type (IEC 60305)</i>
EN 60372	<i>Locking devices for ball and socket couplings of string insulator units — Dimensions and tests (IEC 60372)</i>
EN 60383-1	<i>Insulators for overhead lines with a nominal voltage above 1 kV — Part 1: Ceramic or glass insulator units for a.c. systems — Definitions, test methods and acceptance criteria (IEC 60383-1)</i>



<b>Reference</b>	<b>Title</b>
EN 60383-2	<i>Insulators for overhead lines with a nominal voltage above 1 kV — Part 2: Insulator strings and insulator sets for a.c. systems — Definitions, test methods and acceptance criteria (IEC 60383-2)</i>
EN 60433	<i>Insulators for overhead lines with a nominal voltage above 1 kV — Ceramic insulators for a.c. systems — Characteristics of insulator units of the long rod type (IEC 60433)</i>
EN 60437	<i>Radio interference tests on high-voltage insulators (IEC 60437)</i>
EN 60507	<i>Artificial pollution tests on high-voltage insulators to be used on a.c. systems (IEC 60507)</i>
EN 60652	<i>Loading tests on overhead line structures (IEC 60652)</i>
EN 60794-1-1	<i>Optical fibre cables — Part 1-1: Generic specification - General (IEC 60794-1-1)</i>
EN 60794-1-2	<i>Optical fibre cables — Part 1-2: Generic specification — Basic optical cable test procedures (IEC 60794-1-2)</i>
EN 60794-4:2003	<i>Optical fibre cables — Part 4: Sectional specification — Aerial optical cables along electrical power lines (IEC 60794-4)</i>
EN 60794-4-10	<i>Optical fibre cables — Part 4-10: Aerial optical cables along electrical power lines — Family specification for OPGW (Optical Ground Wires) (IEC 60794-4-10)</i>
EN 60865-1	<i>Short circuit currents — Calculation of effects — Part 1: Definitions and calculation methods (IEC 60865-1)</i>
EN 60889	<i>Hard-drawn aluminium wire for overhead line conductors (IEC 60889)</i>
EN 60909-0	<i>Short circuit currents in three-phase a.c. systems — Part 0: Calculation of currents (IEC 60909-0)</i>
EN 61109	<i>Insulators for overhead lines — Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1 000V — Definitions, test methods and acceptance criteria (IEC 61109)</i>
EN 61211	<i>Insulators of ceramic material or glass for overhead lines with a nominal voltage greater than 1 000V — Impulse puncture testing in air (IEC 61211)</i>
EN 61232	<i>Aluminium-clad steel wires for electrical purposes (IEC 61232)</i>
EN 61284	<i>Overhead lines — Requirements and tests for fittings (IEC 61284)</i>
EN 61325	<i>Insulators for overhead lines with a nominal voltage above 1 kV — Ceramic or glass insulator units for d.c. systems — Definitions, test methods and acceptance criteria (IEC 61325)</i>

<b>Reference</b>	<b>Title</b>
EN 61395	<i>Overhead electrical conductors — Creep test procedures for stranded conductors (IEC 61395)</i>
EN 61466-1	<i>Composite string insulator units for overhead lines with a nominal voltage greater than 1 kV — Part 1: Standard strength classes and end fittings (IEC 61466-1)</i>
EN 61466-2	<i>Composite string insulator units for overhead lines with a nominal voltage greater than 1 kV — Part 2: Dimensional and electrical characteristics (IEC 61466-2)</i>
EN 61467	<i>Insulators for overhead lines — Insulator strings and sets for lines with a nominal voltage greater than 1 000 V — AC power arc tests (IEC 61647)</i>
EN 61472	<i>Live working — Minimum approach distances for a.c. systems in the voltage range 72,5 kV to 800 kV — A method of calculation (IEC 61472)</i>
EN 61773	<i>Overhead lines — Testing of foundations for structures (IEC 61773)</i>
EN 61854	<i>Overhead lines — Requirements and tests for spacers (IEC 61854)</i>
EN 61897	<i>Overhead lines — Requirements and tests for Stockbridge type aeolian vibration dampers (IEC 61897)</i>
EN 61936-1	<i>Power installations exceeding 1 kV a.c. — Part 1: Common rules (IEC 61936-1)</i>
EN 61952	<i>Insulators for overhead lines — Composite line post insulators for A.C. systems with a nominal voltage greater than 1 000V — Definitions, test methods and acceptance criteria (IEC 61952)</i>
EN 62004	<i>Thermal-resistant aluminium alloy wire for overhead line conductor (IEC 62004)</i>
EN 62219	<i>Overhead electrical conductors — Formed wire, concentric lay, stranded conductors (IEC 62219)</i>
HD 474 S1	<i>Dimensions of ball and socket couplings of string insulator units (IEC 60120)</i>

**Other publications:**

<b>Reference</b>	<b>Title</b>
ICAO Regulations-annex 14	<i>Volume 1 — Aerodrome Design and Operations Chapter 6 — Visual aids for denoting obstacles</i>
IEC 60050-441	<i>International Electrotechnical Vocabulary. Switchgear, controlgear and fuses</i>
IEC 60050-466	<i>International Electrotechnical Vocabulary. Chapter 466: Overhead lines</i>

<b>Reference</b>	<b>Title</b>
IEC 60050-471	<i>International Electrotechnical Vocabulary — Part 471: Insulators</i>
IEC 60050-601	<i>International Electrotechnical Vocabulary. Chapter 601: Generation, transmission and distribution of electricity — General</i>
IEC 60050-604	<i>International Electrotechnical Vocabulary. Chapter 604: Generation, transmission and distribution of electricity — Operation</i>
IEC 60287-3-1	<i>Electric cables — Calculation of the current rating — Part 3-1: Sections on operating conditions — Reference operating conditions and selection of cable type</i>
IEC 60471	<i>Dimensions of clevis and tongue couplings of string insulator units</i>
IEC/TS 60479-1:2005	<i>Effects of current on human beings and livestock — Part 1: General aspects</i>
IEC/TR 60575	<i>Thermal-mechanical performance test and mechanical performance test on string insulator units</i>
IEC 60720	<i>Characteristics of line post insulators</i>
IEC 60724	<i>Short-circuit temperature limits of electric cables with rated voltages of 1 kV (<math>U_m = 1,2</math> kV) and 3 kV (<math>U_m = 3,6</math> kV)</i>
IEC 60797	<i>Residual strength of string insulator units of glass or ceramic material for overhead lines after mechanical damage of the dielectric</i>
IEC/TS 60815-1	<i>Selection and dimensioning of high-voltage insulators intended for use in polluted conditions — Part 1: Definitions, information and general principles</i>
IEC/TS 60815-2	<i>Selection and dimensioning of high-voltage insulators intended for use in polluted conditions — Part 2: Ceramic and glass insulators for a.c. systems</i>
IEC/TS 60815-3	<i>Selection and dimensioning of high-voltage insulators intended for use in polluted conditions — Part 3: Polymer insulators for a.c. systems</i>
IEC 60826	<i>Design criteria of overhead transmission lines</i>
IEC/TR 61597	<i>Overhead electrical conductors — Calculation methods for stranded bare conductors</i>
IEC/TR 61774	<i>Overhead lines — Meteorological data for assessing climatic loads</i>
ISO 12494	<i>Atmospheric icing of structures</i>
CISPR/TR 18-2	<i>Radio interference characteristics of overhead power lines and high-voltage equipment — Part 2: Methods of measurement and procedure for determining limits</i>

**Reference****Title**

CISPR/TR 18-3

*Radio interference characteristics of overhead power lines and high voltage equipment — Part 3: Code of practice for minimizing the generation of radio noise*