



# SLOVENSKI STANDARD

## SIST EN 50341-2-8:2019

01-april-2019

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**Nadzemni električni vodi za izmenične napetosti nad 1 kV - 2-8. del: Nacionalna normativna določila (NNA) za Francijo (na podlagi EN 50341-1:2012)**

Overhead electrical lines exceeding AC 1 kV - Part 2-8: National Normative Aspects (NNA) for France (based on EN 50341-1:2012)

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Ta slovenski standard je istoveten z: <sup>SIST EN 50341-2-8:2019</sup> **EN 50341-2-8:2017**  
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EUROPEAN STANDARD

**EN 50341-2-8**

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2017

ICS 29.240.20

English Version

**Overhead electrical lines exceeding AC 1 kV - Part 2-8: National  
Normative Aspects (NNA) for France (based on EN 50341-  
1:2012)**

This European Standard was approved by CENELEC on 2017-08-09.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

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

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## European foreword

- 1 The French National Committee (NC) is identified by the following address:  
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[www.afnor.org](http://www.afnor.org)
- 2 The French NC has prepared the present EN 50341-2-8:2017 (Part 2-8), listing the French National Normative Aspects; it is solely responsible for it and has duly incorporated it into the procedures of CENELEC and CLC/TC 11.

Note The French NC takes full responsibility for the satisfactory technical coordination of the present Part 2-8 and EN 50341-1:2012. Any quality control/assurance checks necessary have been performed. However, it should be noted that such quality control/assurance has been performed under the general responsibility of the French NC pursuant to national laws and regulations.

- 3 Part 2-8 is normative in France and informative for other countries.
- 4 Part 2-8 shall be read in conjunction with EN 50341-1:2012 (Part 1). All Clause numbers used in the present Part 2-8 correspond to the numbering in Part 1. Specific subclauses with the prefix "FR" shall be read as amendments to the associated text in Part 1. All requests for clarification relating to the application of Part 2-8 in relation to Part 1 shall be sent to the French NC which, in conjunction with CLC/TC 11, will clarify the requirements.

When no reference is made to a specific subclause in Part 2-8, Part 1 applies.

- 5 For the "boxed values" defined in Part 1, any amended values defined in Part 2-8 shall be applied in France. None of the boxed values present in Part 1 or Part 2-8 shall be amended in such a way as to increase the risk in a Project Specification.
- 6 The regulations and standards specifically used in the present Part 2-8 and relating to overhead electrical lines exceeding AC 1 kV are listed in subclauses 2.1/FR.1 to 2.1/FR.6.

NOTE All national standards referred to in the present Part 2-8 will be replaced by the related European Standards as they become available and are declared applicable by the French NC and therefore reported to the secretariat of CLC/TC 11.



- 0**     **Introduction**  
Part 1 applies without change.

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## 1 Scope

### 1.1 General

#### (ncpt) **FR.1 Scope of Part 1 and Part 2-8**

Part 1 and the present Part 2-8 apply to new overhead lines as defined in 1.1/FR.2 "Definition of a new overhead line".

#### (ncpt) **FR.2 Definition of a new overhead line**

A new overhead line denotes any new overhead electrical line exceeding AC 1 kV built on new foundations and:

- flanked by two substations or two terminal towers preceding said substations.
- or
- flanked by a substation or a terminal tower at one end and in a branch situation (including branch tower) or tapping situation at the other end.

#### (ncpt) **FR.3 Application to existing overhead lines**

This standard does not apply to existing overhead lines exceeding AC 1 kV in France.

#### (ncpt) **FR.4 Application to overhead lines for which technical studies are underway**

Any decision to apply the requirements of the present standard to new overhead line projects for which technical studies are underway shall be stipulated in the Project Specification.

#### (ncpt) **FR.5 Application to overhead lines under construction**

The requirements of the present standard do not apply to overhead lines under construction.

### 1.2 Field of application

#### (ncpt) **FR.1 Application to radio telecommunication equipment**

Part 1 and Part 2-8 apply to radio telecommunication equipment mounted on the towers of new overhead lines, particularly with respect to wind and ice assumptions. Radio equipment shall be arranged on the support so that it can be accessed and operations performed in accordance with safety regulations.

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## 2 Normative references, definitions and symbols

### 2.1 Normative references

#### (a-dev) **FR.1 Interministerial Decree of 17 May 2001**

The Interministerial Decree of 17 May 2001, published in the Official Journal of the French Republic of 12 June 2001, contains the minimum requirements for the distribution and transmission of power.

The (a-dev) subclauses of the present Part 2-8 refer to the Interministerial Decree of 17 May 2001 and form a brief description thereof. Reference should be made to the original document for details of the requirements of the Interministerial Decree.

#### (a-dev) **FR.2 Law no. 91-1414 of 31 December 1991**

Law no. 91-1414 of 31 December 1991 amends the French Employment Code and the French Public Health Code to promote the prevention of occupational risks, and transposes EU directives relating to occupational health and safety.

#### (a-dev) **FR.3 Law no. 93-1418 of 31 December 1993**

Law no. 93-1418 of 31 December 1993 amends the provisions of the French Employment Code applicable to building and civil engineering operations to ensure the safety and protect the health of workers, and transposes Council Directive no. 92/57/EEC of 24 June 1992. Said directive relates to the implementation of minimum safety and health requirements at temporary or mobile construction sites.

#### (a-dev) **FR.4 Interministerial Decree of 14 May 1963**

The Interministerial Decree of 14 May 1963 specifies the characteristics of the safety data plates to be affixed to power line supports.

#### (ncpt) **FR.5 Standards**

##### Reference

##### Title

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NF C11-201

*Réseaux de distribution publique d'énergie électrique [Public electrical power systems]*

NF C18-510

*Opérations sur les ouvrages et installations électriques et dans un environnement électrique - Prévention du risque électrique [Operations on electrical networks and installations and in an electrical environment - Electrical risk prevention]*

NF EN 50540

*Conductors for overhead lines. Aluminium conductors steel supported (ACSS)*

NF EN 61672-1

*Electroacoustics. Sound level meters. Part 1: Specifications*

NF P94-261

*Justification of geotechnical work - National application standards for the implementation of Eurocode 7 - Shallow Foundations - Geotechnical design*

NF P94-262

*Justification of geotechnical work - National application standards for the implementation of Eurocode 7 - Deep Foundations*

NF S31-010

*Acoustics - Environmental noise characterization and measurement. Special measuring methods*

UTE C11-001

*Conditions techniques auxquelles doivent satisfaire les distributions d'énergie électrique [Technical conditions to be met by electrical power distribution systems] – Illustrated Technical Decree of 17 May 2001*

#### (ncpt) **FR.6 Reference national standards**

Standard UTE C11-001 reproduces, annotates and illustrates the Interministerial Decree of 17 May 2001 (see 2.1/FR.1). Certain subclauses (a-dev or ncpt) of the present Part 2-8 are taken from this standard.

Standard NF C11-201 defines the construction rules for the structures (overhead lines, underground networks and substations) forming electrical power distribution networks with a nominal voltage of less than AC 50 kV. Certain subclauses (ncpt) of the present Part 2-8 are taken from this standard.

The requirements relating to human safety in relation to electrical hazards during electrical or non-electrical operations, on networks or installations or in an environment the voltage of which is less than or equal to 500 kV AC or DC, are given in NF C18-510. The present Part 2-8 is not intended to replace the provisions of this standard.

(ncpt) **FR.7 Scientific publications**

[1] Ducloux, H. and Figueroa, L.: Background information about the wind action model of CENELEC EN 50341-1 (2012) and associated expected reliability of electrical overhead lines, *Journal of Wind Engineering and Industrial Aerodynamics*, Volume 157, Pages 104-117, October 2016, ISSN 0167-6105, doi:10.1016/j.jweia.2016.08.006.

[2] Ducloux, H. and Nygaard, B. E.: 50-year return-period wet-snow load estimation based on weather station data for overhead line design in France, *Nat. Hazards Earth Syst. Sci.*, Volume 14 Issue 11, Pages 3031-3041, November 2014, ISSN 3031-3041, doi:10.5194/nhess-14-3031-2014.

[3] Chaigneau, L. and Ducloux, H.: Justification du coefficient de modèle  $\gamma_{R;d1}$  utilisé dans la norme NF EN 50341-2-8 pour le dimensionnement des micropieux de catégorie 18 utilisés comme fondations de pylônes de lignes électriques aériennes [Justification of the model factor  $\gamma_{R;d1}$  used in NF EN 50341-2-8 for the design calculation of category 18 micropiles used as overhead power line tower foundations], *Revue Française de Géotechnique*, Volume 147, Article number 4, October 2016, DOI: 10.1051/geotech/2016008

## 2.2 Definitions

(a-dev) **FR.1 Voltage range**

In Part 2-8, the alternating high voltage ranges used are:

- The HVA range, the nominal voltage  $U_n$  of which is such that  $1 \text{ kV} < U_n \leq 50 \text{ kV}$ ;
- The HVB range, the nominal voltage  $U_n$  of which is such that  $U_n > 50 \text{ kV}$ .

(ncpt) **FR.2 Cable**

In Part 2-8, the term cable refers collectively to the conductors defined in 2.2.16 of Part 1 [Source: IEC 466-01:15] and the earth wires defined in 2.2.35 of Part 1 [Source: IEC 466-10-25].

## 2.3 Symbols

(ncpt) **FR.1 Symbols**

Symbol	Meaning	Reference
<b>c</b>	Minimum spacing at mid-span	5.8
<b>d</b>	Diameter of cylindrical elements	4.12.2
<b>d<sub>add</sub></b>	Additional distance	5.6.4
<b>f</b>	Median sag of the conductor	5.8
<b>IN</b>	Ice load per length on the cable	4.5.1
<b>K<sub>c</sub></b>	Factor depending on the position of the conductors	5.8
<b>K<sub>z</sub></b>	Factor depending on the climatic zone	5.8
<b>L</b>	Free length of the insulator string	5.8
<b>l</b>	Half-sum of the lengths of the suspension insulator strings	5.8
<b>m'</b>	Load factor	5.8
<b>N</b>	Thickness of the ice accretion on the cable	4.5.1
<b>R<sub>a1</sub></b>	Additional resistance	6.4.2
<b>R<sub>a2</sub></b>	Resistance to earth of the standing point	6.4.2
<b>r<sub>R</sub></b>	Resistance ratio	3.7.2
<b>t<sub>i</sub></b>	Voltage clearance	5.5.3
<b>α</b>	Swing angle of the cables	5.8

### 3 Basis of design

#### 3.2 Requirements of overhead lines

##### 3.2.2 Reliability requirements

###### (a-dev) FR.1 Minimum requirements for the mechanical design of overhead lines

The minimum requirements relating to the mechanical design of overhead lines are stipulated in Clause 13 "Mechanical strength of constructions" of the Interministerial Decree of 17 May 2001.

###### (ncpt) FR.2 Minimum reliability level of overhead lines

The minimum reliability level to be taken into account in France is reliability level 1.

###### (a-dev) FR.3 Minimum requirements for the mechanical design of temporary lines

In accordance with Clauses 99a "Temporary provisions in an emergency" and 99c "Temporary supply during work", the minimum requirements given in 3.2.2/FR.1 do not apply for the mechanical design of temporary lines.

###### (ncpt) FR.4 Reliability level for temporary lines (HVA)

A reliability level of less than 1 may be used for the design of HVA temporary lines installed for less than one year. The climate assumptions associated with the design of HVA temporary lines shall be stipulated in the Project Specification.

###### (ncpt) FR.5 Reliability level for temporary lines (HVB)

A reliability level of less than 1 may be used for the design of HVB temporary lines installed for less than one year.

The minimum return periods of the climatic actions to be taken into account for the design of temporary lines installed for a period of less than one year are given in Table 3/FR.1.

Table 3/FR.1: Return period for temporary lines

Duration	Return period (years)
≤ 3 days	2
≤ 3 months (but > 3 days)	5
≤ 1 year (but > 3 months)	10

If the return periods cannot be used for determining the ice loads, these loads shall be stipulated in the Project Specification on the basis of experience.

###### (ncpt) FR.6 Application of the seasonal coefficient $c_{\text{season}}$ for temporary lines (HVB)

The seasonal coefficient  $c_{\text{season}}$  shall be taken as equal to 1.

###### (ncpt) FR.7 Period of the year during which loads may not be taken into account for the mechanical design of temporary lines (HVB)

It is not necessary to take into account ice loads for the mechanical design of temporary lines located in plain zones (altitude below 700 m) and installed during a period between 1 June and 30 September.

##### 3.2.5 Strength coordination

###### (a-dev) FR.1 Strength coordination

The mechanical strength coordination of the constituent elements of the construction shall be verified in accordance with the provisions of Clause 13 "Mechanical strength of constructions" of the Interministerial Decree of 17 May 2001.

##### 3.2.6 Additional considerations

###### (ncpt) FR.1 Additional considerations

The construction of a new overhead line shall in particular take into account its environment (fauna and flora) and human safety.

Where justified, specific devices (bird warning flags, daytime or night-time marking, etc.) shall be used. These provisions shall be stipulated in the Project Specification.

### 3.3 Limit states

#### 3.3.3 Serviceability limit states

(ncpt)

##### FR.1 Serviceability limit states

The requirements relating to performance criteria and serviceability limit states shall be stipulated in the Project Specification.

### 3.7 Partial factor method and design formula

#### 3.7.2 Basic design formula

The following basic design formula shall be always verified:

$$E_d \leq \frac{R_d}{\gamma_R}$$

Where

$E_d$	is the design value of the effect of the actions specified in clause 4 of Part 2-8;
$R_d$	is the structural design resistance. For supports and foundations, $R_d$ is specified in clauses 7 and 8 of Part 2-8. For conductors and earth wires, $R_d$ is defined in clause 9 as the rated tensile strength. For insulators and hardware, $R_d$ is defined in clauses 10 and 11 as the minimum failure load;
$\gamma_R$	is the resistance ratio specified in 4.13 of Part 2-8.

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## 4 Actions on lines

### 4.1 Introduction

#### (a-dev) FR.1 Choice of approach for estimating climatic data

The lines shall be designed by applying approach 3.

It has been verified that the reliability of lines designed for the wind loads according to approach 3 (see 4.3 of Part 2-8) is at least equivalent to reliability level 1 of Part 1 [1].

It has been verified that the reliability of lines designed for the wet snow loads in plains according to approach 3 (see 4.5 of Part 2-8) is at least equivalent to reliability level 1 of Part 1 [2].

### 4.3 Wind loads

#### 4.3.1 Field of application and basic wind velocity

##### (ncpt) FR.1 Field of application

The wind loads determined according to approach 3 are valid, unless otherwise stipulated in the Project Specification, up to a total support height of 90 m. A special study is necessary for heights above 90 m or for exceptions. In this case, the wind pressures will be justified and stipulated in the Project Specification.

##### (a-dev) FR.2 Wind zones to be taken into account in mainland France

The three wind zones to be taken into account in mainland France are stipulated in Clause 13 "Mechanical strength of constructions" of the Interministerial Decree of 17 May 2001:

- Normal wind zone (NWZ);
- Strong wind zone (SWZ);
- High wind pressure zone (HWPZ).

The high wind pressure zone relates to HVB overhead lines only.

For the HVB system in mainland France, these wind zones are specified in 4.3.1/FR.3. For all other cases, these zones shall be stipulated in the Project Specification.