

Vervangt NEN-EN 50423-1:2004 Ontw.

Nederlandse norm

# NEN-EN 50423-1 (en)

Bovengrondse elektrische lijnen boven 1 kV tot en met 45 kV wisselspanning - Deel 1:  
Algemene eisen - Gemeenschappelijke specificaties

Overhead electrical lines exceeding AC 1 kV up to and including AC 45 kV - Part 1: General requirements - Common specifications

ICS 29.240.20

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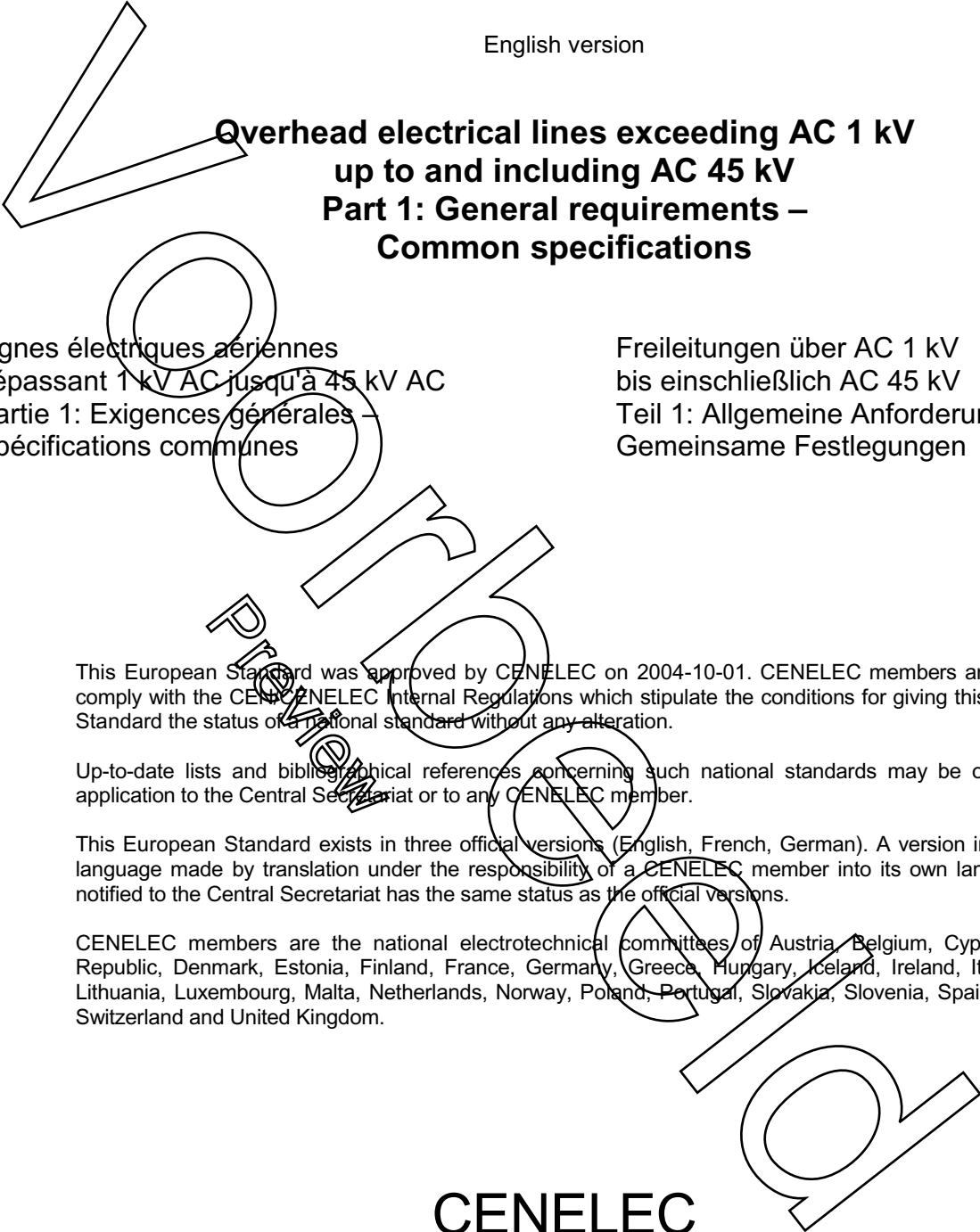
NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2005

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English version



**Overhead electrical lines exceeding AC 1 kV  
up to and including AC 45 kV  
Part 1: General requirements –  
Common specifications**

Lignes électriques aériennes  
dépassant 1 kV AC jusqu'à 45 kV AC  
Partie 1: Exigences générales –  
Spécifications communes

Freileitungen über AC 1 kV  
bis einschließlich AC 45 kV  
Teil 1: Allgemeine Anforderungen –  
Gemeinsame Festlegungen

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Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 11, Overhead electrical lines exceeding 1 kV a.c. (1,5 kV d.c.).

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50423-1 on 2004-10-01.

This European Standard is to be read with EN 50341-1:2001.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2005-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-10-01

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Preview

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Preview  
Voorbeeld

## Introduction

This standard is based on EN 50341-1 “Overhead electrical lines exceeding AC 45 kV – Part 1: General requirements – Common Specifications”.

As an aid to the user the clause numbers of this standard refer to, amend, substitute for or add to the text of the same clause number in EN 50341-1. Consequently, contrary to usual practice, the clauses of this standard are not numbered sequentially.

In order to avoid confusion regarding references to NNAs, the NNAs of EN 50341 (ie. EN 50341-3) are referred to as “associated NNAs” to EN 50341. All other reference to NNAs in this standard refer to those included in EN 50423-3, which may be either entirely new NNAs or amended and updated NNAs of EN 50341-3.

## 1 Scope

This standard applies to bare and covered conductor overhead lines and overhead insulated cable systems with nominal voltage exceeding AC 1 kV up to and including AC 45 kV and with rated frequencies below 100 Hz.

In general the requirements in EN 50341-1 apply. This standard specifies additional requirements and simplifications that apply only for this voltage range.

In connection with EN 50341-1, this standard specifies the general requirements that shall be met for the design and construction of new overhead lines to ensure that the line is suitable for its purpose with regard to safety of persons, maintenance, operation and environmental considerations.

This standard does not apply to:

- overhead electric lines inside closed electrical areas as defined in HD 637 S1;
- catenary systems of electrified railways unless explicitly required by another standard.

## 2 Definitions, list of symbols and references

As EN 50341-1, except the following are added:

### 2.1 Definitions

#### 2.1.14 conductor (of an overhead line)

##### 2.1.14.1

##### **covered conductor**

conductor surrounded by a covering made of insulating material to protect against accidental contact between other covered conductors and with earthed parts. Due to being unscreened, covered conductors are not sufficiently insulated to be touch-proof

##### 2.1.14.2

##### **overhead insulated cable system**

system in which each conductor is surrounded by a covering made of insulating material, which fully protects against all leakage currents phase to phase or to earthed parts. In the majority of cases, each phase conductor will have a core screen. Examples of such overhead insulated cable system include: aerial bundled conductors (ABC); self-supporting and lashed underground cable; and “Universal” cable systems

##### 2.1.107

##### **glu-lam wooden poles**

an abbreviation for glued laminated wooden poles. In respect of this standard, the term refers to wooden poles manufactured from such glued laminations in contrast to naturally grown timber poles

## 2.2 List of symbols

The following symbols are additional to those included in EN 50341-1.

| Symbol | Signification  | References  |
|--------|--|-------------|
| a      | spacing of the two poles of a structure at half structure height           | 4.2.2.4.4   |
| c      | minimum clearance between the conductors at mid-span                       | 5.4.3.1     |
| d      | diameter of the insulated cable/ line                                      | Table 5.4.3 |
| $d_m$  | the average of the mean diameters from two separate poles                  | 4.2.2.4.4   |
| f      | sag of the conductor at a temperature of +40 °C                            | 5.4.3.1     |
| $k_a$  | coefficient according to Table 5.4.3.1                                     | 5.4.3.1     |
| $l_k$  | length in m of any insulator set swinging orthogonal to the line direction | 5.4.3.1     |

## 2.3 References

The following references are additional to the reference list in EN 50341-1.

| Reference                | Title  |
|--------------------------|--|
| EN 12843                 | Precast concrete masts and posts   |
| EN 14229 <sup>1)</sup>   | Wood poles for overhead lines. Requirements  |
| EN 50341-1               | Overhead electrical lines exceeding AC 45 kV Part 1: General requirements – Common specifications  |
| EN 50341-3               | Overhead electrical lines exceeding AC 45 kV Part 3: Set of National Normative Aspects   |
| EN 50397-1 <sup>1)</sup> | Covered conductors for overhead lines and the related accessories for rated voltages above 1 kV (d.c.) and not exceeding 36 kV a.c. – Part 1: Covered conductors |
| IEC 61952                | Insulators for overhead lines with a nominal voltage above 1 000 V. Composite line post insulators for a.c. systems.   |

## 3 Basis of design

### 3.1 General

The provisions specified in EN 50341-1 apply. Exceptions to these, if applicable, shall be specified in the NNAs. This clause of the standard provides the basis and the general principles for the design of lines with nominal rated voltages exceeding AC 1 kV, up to and including AC 45 kV (in respect of bare and covered conductor overhead lines and overhead insulated cable systems).

The fifth paragraph of Subclause 3.1 in EN 50341-1 shall be replaced by the following:

In principle, there are two approaches used to determine numerical values for actions and for partial factors. The first is on the basis of the statistical evaluation of meteorological and experimental data and field observations (later called the General Approach) which is based on a probabilistic reliability theory as described in IEC 60826. A second approach (later called the Empirical Approach) is on the basis of using actions obtained by a long experience of construction of overhead lines. Such specific national designs may be specified in the NNAs.

<sup>1)</sup> At draft stage.



## 4 Actions on lines

### 4.1 Introduction

With respect to actions on structures, overhead electric lines with nominal voltage exceeding AC 1 kV up to and including AC 45 kV shall be generally designed according to EN 50341-1 and the associated NNAs. The following clauses specify additional requirements and simplifications that apply only for these voltage ranges.

### 4.2 Actions, General approach

#### 4.2.2.1.6 Wind Speed $V_h$ at arbitrary height $h$ above ground

For elements with a maximum height of 20 m a constant value of the dynamic wind pressure calculated at 10 m height specified in EN 50341-1 is allowed. Specific regulations shall be specified in the NNAs.

#### 4.2.2.3 Wind force on any element of the line

The definition of  $G_x$  in EN 50341-1 is valid for all poles. In the following subclauses, simplified figures for the structural resonance factors of conductors and poles are given.

#### 4.2.2.4.1 Wind forces on conductors

Table 4.2.5 – Span factors  $G_c$

| Terrain category | Span factor $G_c$ as function of wind span $L$ |       |       |       |
|------------------|--|-------|-------|-------|
|                  | Formulae                                       | 100 m | 200 m | 300 m |
| I                | $1,30 - 0,073 \ln(L)$                          | 0,96  | 0,91  | 0,88  |
| II               | $1,30 - 0,082 \ln(L)$                          | 0,92  | 0,87  | 0,83  |
| III              | $1,30 - 0,098 \ln(L)$                          | 0,85  | 0,78  | 0,74  |
| IV               | $1,30 - 0,110 \ln(L)$                          | 0,79  | 0,72  | 0,67  |

NOTE 1 The formulae for  $G_c$  are a simplification of the general expression for  $G_x$  given in 4.2.2.3 of EN 50341-1. The span factor has been estimated on the basis of a wind front covering the span on both sides of the support.

NOTE 2 For the calculation of the conductor tension a reduction in the effect of the wind pressure due to the section length may be taken into account if the terrain conditions and the conductor height above ground remain the same. In such a case, a span factor based on the section length of the line may be applied.

NOTE 3 The formulae given above are not valid for wind spans below 100 m. The values of  $G_c$  below 100 m shall be calculated by linear interpolation between  $G_c = 1,0$  for 0 m span and the calculated value of  $G_c$  for 100 m span.

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