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SVENSK STANDARD SS-EN 40-3-1

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Lighting columns – Part 3-1: Design and verification – Specification for characteristic loads

The European Standard EN 40-3-1:2000 has the status of a Swedish Standard. This document contains the official English version of EN 40-3-1: 2000.

Swedish Standards corresponding to documents referred to in this Standard are listed in ”Catalogue of Swedish Standards”, issued by SIS. The Catalogue lists, with reference number and year of Swedish approval, International and European Standards approved as Swedish Standards as well as other Swedish Standards.

Belysningsstolpar – Konstruktion och verifiering – Del 3-1: Specifikation av laster

Europastandarden EN 40-3-1:2000 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 40-3-1:2000.

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ICS 91.160.20

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 40-3-1

February 2000

ICS 91.160.20

Will supersede EN 40-6:1982

English version

Lighting columns - Part 3-1: Design and verification - Specification for characteristic loads

Candélabres d'éclairage public - Partie 3-1: Conception et vérification - Spécification pour charges caractéristiques

This European Standard was approved by CEN on 11 December 1999.

CEN 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 Central Secretariat or to any CEN 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 CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 40-3-1:2000 E

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 50 "Lighting columns and spigots", the secretariat of which is held by BSI.

This European Standard replaces EN 40-6:1982.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2000, and conflicting national standards shall be withdrawn at the latest by August 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

There are six Parts to this standard as follows:

Part 1: Definitions and terms

Part 2: General requirements and dimensions

Part 3-1: Design and verification - Specification for characteristic loads
Part 3-2: Design and verification - Verification by testing
Part 3-3: Design and verification - Verification by calculation

Part 4: Specification for reinforced and prestressed concrete lighting columns

Part 5: Specification for steel lighting columns

Part 6: Specification for aluminium lighting columns

1 Scope

This European Standard specifies design loads for lighting columns. It applies to post top columns not exceeding 20 m height for post top lanterns and to columns with brackets not exceeding 18 m height for side entry lanterns. Special structural designs to permit the attachment of signs, overhead wires, etc. are not covered by this standard.

The requirements for lighting columns made from materials other than concrete, steel or aluminium (for example wood, plastic and cast iron) are not specifically covered in this standard.

This standard includes performance requirements for horizontal loads due to wind. Passive safety and the behaviour of a lighting column under the impact of a vehicle are not included, this group of lighting columns will have additional requirements (see prEN 40-2:1999).

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ENV 1991-2-4 Eurocode 1: Basis of design and actions on structures - Part 2-4: Wind action

3 Basis of loads

3.1 Dead loads

The masses of the brackets and the lanterns shall be taken into consideration.

3.2 Wind pressures

3.2.1 *General*

The characteristic wind pressure q(z), in N/m^2, for any particular height above ground, z, shall be obtained from the following equation:

$$q(z) = \delta \times \beta \times f \times Ce_{(z)} \times q_{(10)}$$

where:

$q_{(10)}$ is the reference wind pressure given in 3.2.2

δ is a factor depending on the column size, and given in 3.2.3

β is a factor depending on the dynamic behaviour of the column given in 3.2.4

f is a topography factor and given in 3.2.5

$Ce_{(z)}$ is a factor depending on the terrain of the site and the height above ground z, and given in 3.2.6

NOTE 1. $q_{(10)}$, f and $Ce_{(z)}$, are based on the principles of ENV 1991-2-4.

NOTE 2. The equivalent dynamic factor Cd described in ENV 1991-2-4 is currently not finalized. It is extremely complex to use for lighting columns and it gives a lower value than the product β x δ.
So, the δ and β factors have been retained for simplicity and security.

3.2.2 Reference wind pressure $q_{(10)}$

The value of $q_{(10)}$ accounts for the geographical location of the lighting column. It is derived from the reference wind velocity V_{ref} (in m/s) using the following equation:

$$q_{(10)} = 0{,}5\ \rho\ (C_s)^2\ V_{ref}^2\ N/m^2$$

where

V_{ref} is defined as the 10 minutes mean wind velocity at 10 m above ground of terrain category II (see Table 1) having an annual probability of exceedence of 0,02 (commonly referred to as having a mean return period of 50 years).

V_{ref} is given by:

$$V_{ref} = C_{ALT}\ V_{ref,o}$$

$V_{ref,o}$ is the basic value of the reference wind velocity at 10 m above sea level obtained from the wind maps referred to in annex A;

C_{ALT} is an altitude factor to be taken as 1,0 unless specified in annex A
Where topography is significant (i.e. when a value of f other than unity is used) then the altitude shall be taken at the base of the topographic feature and not at the level of the site of the column.

ρ is the air density. The air density is affected by altitude and depends on the temperature and pressure to be expected in the region during wind storms. Unless otherwise specified in annex A, the value of ρ shall be taken as 1,25 kg/m^3.

C_s is a factor to convert V_{ref} from an annual probability of exceedence of 0,02 to other probabilities, and can be derived from the equation given in annex A. For lighting columns the normal requirement is for a mean return period of 25 years for which the factor C_s should be taken as $\sqrt{0,92.}$

3.2.3 Factor for column size δ

The greater the size of a surface subject to wind, the more unlikely it is that the maximum pressure, on which the calculation is based, acts over its full area.

The resultant smaller wind load on a component is taken into account by the factor δ dependent on the size of the area.

The ruling dimension for the size of the area subject to the wind is the greatest dimension in one direction.

For a lighting column, this is the nominal height in metres.

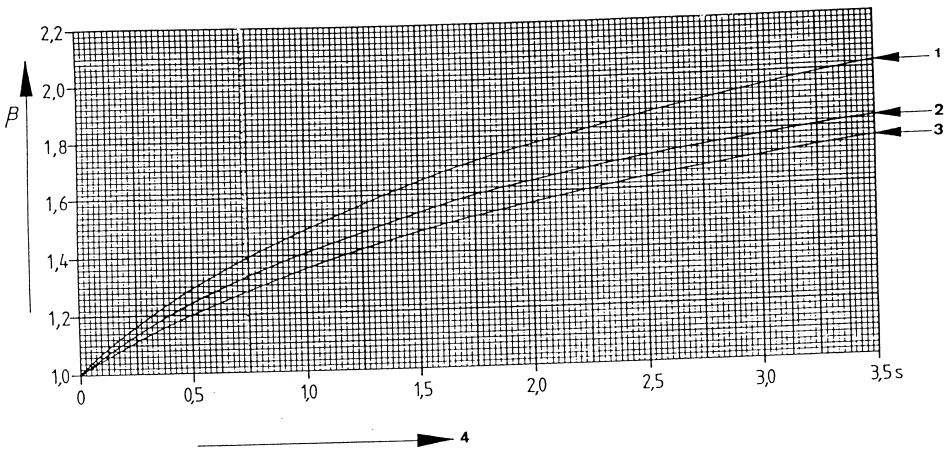
The value of the factor δ shall be obtained from the equation:

$$\delta = 1 - 0,01\ h$$

3.2.4 Factor for dynamic behaviours of lighting column β

The factor β is dependent upon the basic period of vibration T and the damping of the "column/lantern" system and takes into account the increase in the load resulting from the dynamic behaviour of the lighting column cause by wind gusts.

The period of vibration T in seconds for the determination of β in accordance with Figure 1 shall be obtained either by calculation or by testing.



Key

1 Metal
2 Prestressed concrete
3 Reinforced concrete
4 Period of vibration (T)

Figure 1 - Coefficient β for the dynamic behaviour of columns