

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
British Standard

ICS 93.080.40

National foreword

This British Standard is the official English language version of EN 40-3-1:2000. It supersedes BS 5649-6:1982 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee B/509, Road equipment, to Subcommittee B/509/50, Street lighting columns, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 18, inside back cover and a back cover.

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

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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of an identical text or by endorsement, at the latest by August 2000, and conflicting national standards shall be withdrawn at the latest by August 2000.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:

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

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 $\beta \times \delta$.

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:

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

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:

$$V_{\text{ref}} = C_{\text{ALT}} \times V_{\text{ref},0}$$

$V_{\text{ref},0}$ 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/m³.

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 $\sqrt{0,92}$.