BRITISH STANDARD

BS EN
40-4:2005

Lighting columns —

Part 4: Requirements for reinforced and prestressed concrete lighting columns

The European Standard EN 40-4:2005 has the status of a British Standard

ICS 93.080.40

National foreword

This British Standard is the official English language version of EN 40-4:2005. It supersedes BS 5649-9:1982 which is withdrawn.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 international/European committee any enquiries on the interpretation, or proposals for change, and keep 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.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

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Lighting columns - Part 4: Requirements for reinforced and prestressed concrete lighting columns

Candélabres d'éclairage public - Partie 4: Prescriptions pour les candélabres d'éclairage public en béton armé et en béton précontraint

Lichtmaste - Teil 4: Anforderungen an Lichtmaste aus Stahl- und Spannbeton

This European Standard was approved by CEN on 27 October 2005.

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Contents

Foreword

This document (EN 40-4:2005) has been prepared by Technical Committee CEN/TC 50 “Lighting columns and spigots”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by June 2006, and conflicting national standards shall be withdrawn at the latest by August 2007.

This document supersedes EN 40-4:1982.

This document has been prepared under Mandate M/111 “Circulation fixtures” given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of the EU Directive 89/106/EEC.

For relationship with EU Directive 89/106/EEC see informative Annex ZA, which is an integral part of this document.

For common aspects reference is made to EN 13369:2004, *Common rules for precast products*, from which also the relevant requirements of the EN 206-1:2000, *Concrete — Part 1: Specification, performances, production and conformity* are taken.

The references to EN 13369:2004 by precast concrete product standards are intended to make them homogeneous and to avoid repetitions of similar requirements.

This document defines in Annex ZA the application methods of CE marking to products designed using the relevant Eurocodes (normally EN 1992-1-1:2004 and EN 1992-1-2). Where, in default of applicability conditions of Eurocodes to the works of destination, design provisions other than Eurocodes are used for mechanical strength and/or fire resistance, the conditions to affix CE marking to the product are described in ZA.3.5.

This document is the fourth in a series relating to specifications for “Lighting columns”. At present the Parts of this standard are as follows:

Part 1: Definitions and terms

Part 2: General requirements and dimensions

Part 3: Design and verification

3-1: Specification for characteristic loads

3-2: Verification by testing

3-3: Verification by calculation

Part 4: Requirements for reinforced and prestressed concrete lighting

Part 5: Requirements for steel lighting columns

Part 6: Requirements for aluminium lighting columns

Part 7: Requirements for fibre reinforced polymer composite lighting columns

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

1 Scope

This document specifies requirements for reinforced and prestressed concrete lighting columns. It applies to columns not exceeding 20 m height for post top lanterns and columns with brackets not exceeding 18 m height for side entry lanterns.

This document specifies:

a) performance related to the essential requirement of resistance to horizontal (wind) loads, measured in accordance with EN 40-3;

b) performance under vehicle impact (passive safety) in support of the Essential Requirement No. 4 Safety in use, measured in accordance with the corresponding test methods included in this document or available in separate European Standards.

2 Normative references

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

EN 40-1:1991, *Lighting columns — Part 1: Definitions and terms*

EN 40-2:2004, *Lighting columns — Part 2: General requirements and dimensions*

EN 40-3-1, *Lighting columns — Part 3-1: Design and verification — Specification for characteristic loads*

EN 40-3-2*, Lighting columns — Part 3-2: Design and verification — Verification by testing*

EN 40-3-3, *Lighting columns — Part 3-3: Design and verification — Verification by calculation*

EN 1992-1-1:2004, Eurocode 2: Design of concrete structures — Part 1-1: General rules and rules for buildings

EN 10204, *Metallic products — Types of inspection documents*

EN 12390-5, *Testing hardened concrete — Part 5: Flexural strength of test specimens*

EN 12767, *Passive safety of support structures for road equipment — Requirements and test methods*

EN 13369:2004, Common rules for precast concrete products

EN 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 40-1:1991, EN 1992-1-1:2004, EN 13369:2004 and the following apply.

3.1
spun concrete
concrete compacted by pressure and vibration using a rotating mould (centrifugal force)

3.2
product family
number of lighting columns, for the purposes of testing and/or calculation (including ITT and FPC testing), where the manufacturer can demonstrate that the results for a characteristic from any one product in the family are representative for all other lighting columns within that same family. A product may be in different families for different characteristics.

NOTE At the plenary meeting of CEN/TC 50 on 5th October 2004 the above definition of product family was agreed. It was also agreed that it should be added to EN 40-1 on next revision. As it is not in the current version of EN 40-1, it is repeated above.

4 Materials

Materials shall conform to EN 13369:2004, 4.1.

5 Geometrical properties

5.1 General

Product dimensions shall conform to EN 40-2 and where applicable defined on the basis of the specific design and calculations.

5.2 Production tolerances

Production tolerances shall conform to EN 40-2, the total length being measured from ground level. Dimensions shall be measured in accordance with 13.2.2.

The tolerance on column mass shall be ± 10 %.

6 Design and design verification

The column shall be designed to safely sustain the dead loads and the wind loads specified in EN 40-3-1, and shall be verified in accordance with one of the following methods:

a) Clauses 7.1 and 12.2.2

b) Compliance with 7.1 and EN 13369 (for common rules), and the following:

- geometrical data (main dimensions and main cross sections, including tolerances) of the lighting column as Clause 5 and 7.5; and
- properties of the materials and constituents products used that are needed to determine, according to the national provisions valid in the place of use, or possible use, the resistance to horizontal loads.

c) Compliance with the purchaser's specific design

It may be assumed by the manufacturer that where he is requested to produce the lighting column following the provisions of the client's specific design details supplied by the purchaser, such provisions are compliant with requirements for regulatory marking in the place of intended destination.

7 Construction and properties

7.1 Concrete

The production of concrete shall conform to EN 13369:2004, 4.2. The concrete used for reinforced concrete columns must conform to compressive strength class C 30/37 or higher in accordance with EN 206-1. The concrete used for prestressed concrete lighting columns shall conform to compressive strength class C 35/45 or higher.

7.2 Surface characteristics

When determined in accordance with 13.2.1, the surface of the column shall be free from damage that may adversely affect its structural integrity or reduce its durability.

In the absence of regulatory requirements or specifications to the contrary, blemishes or surface irregularities are admissible, but shall be limited to:

a) diameter ≤ 25 mm;

b) depth ≤ 5 mm providing the cover is not reduced below the minimum values specified in 7.3.

The maximum crack width caused by shrinkage or temperature in the cement rich layer shall not exceed 0,2 mm.

The finishing of the surface shall be considered acceptable providing that the requirements of this document are not adversely affected.

7.3 Durability and cover to reinforcement

The requirements for durability shall be in accordance with EN 13369:2004, 4.3.7.

For products with a design working life not exceeding 30 years, Annex A shall apply.

7.4 Dangerous substances

Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material.

NOTE Attention is drawn to the maximum permitted levels of dangerous substances as governed by national regulations of the Member State of destination.

7.5 Detailing

7.5.1 Spacing of bars

Where verified by testing in accordance with EN 40-3-2, the minimum space between individual bars and/or external parts of bundles of reinforcing material shall be at least:

a) with respect to casting:

the maximum aggregate size;

b) with respect to anchoring and bonding:

1) 2/3 of the relevant equivalent diameter of reinforcing material (for reinforcing material);

2) the nominal diameter of tendons with a minimum of 8 mm (for prestressing material).

The above rules shall not apply to splices.

7.5.2 Transverse reinforcement

7.5.2.1 Reinforced concrete columns (for spun concrete see 7.5.2.3)

The maximum pitch of spirals or spacing of link shall result either from the design or from type tests. In particular, when load-bearing capacity of the column is verified by testing in accordance with EN 40-3-2, the maximum distance between transverse reinforcements units shall be according to the results, with a maximum of 1,50 m.

7.5.2.2 Prestressed concrete columns (for spun concrete see 7.5.2.3)

Where verified by tests defined in EN 40-3-2, transverse reinforcement shall not be necessary.

7.5.2.3 Reinforced or prestressed spun concrete columns

The minimum transverse reinforcement ratio shall be:

a) for column diameters at the foot equal to or greater than 800 mm, 0,15 % of the longitudinal concrete section;

b) for column diameters at the foot less than 400 mm, 0,05 % of the longitudinal concrete section;

c) for column diameters at the foot equal to or less than 800 mm and greater than 400 mm by linear interpolation between the above mentioned values.

8 Protection against mechanical impact

A type test shall be carried out on each type of column base, or part, provided that each end of the part extends at least 0,3 m above and below the door opening. The test shall conform to an impact protection category of IK08 as specified in EN 62262 with the door fitted.

The test equipment shall be either impact pendulum hammer or vertical free fall hammer. The manufacturer shall declare the test method used.

NOTE A single test method will be adopted when the EN 40 series of product standards is revised.

The number of impacts shall be five and shall be applied around the circumference at the mid height of the door. For circular columns these shall be equally spaced around the remaining circumference excluding the door. For octagonal columns these shall be on each of the adjacent faces excluding the door.

After testing, no visible crack shall appear.

The test shall validate those products with an outside diameter (or flat dimension) equal to or less than the diameter being tested, with the same wall thickness and material strength.

For mechanical impact test, a type shall be defined by the shape, the dimensions and type of concrete/reinforcement of the section at mid door height.

For sections other than circular or octagonal, the provisions defined above shall apply.

9 Apertures and cable ways

9.1 Door openings and cable entry slots

The door opening and the cable entry slots shall conform to EN 40-2:2004, 4.3 and 4.4. Door openings shall be designed in accordance with EN 13369:2004, 4.3.3.

9.2 Internal finish and sharp edges

9.2.1 Cableways

Cableways shall conform to the requirements of EN 40-2:2004, 4.4.4.

9.2.2 Access points

All access points used for the installation and fitting of electrical equipment shall be free from rough edges and burrs.

10 Marking and labelling

All columns and brackets shall be clearly and durably marked with:

a) name or symbol of the manufacturer;

b) year of manufacture;

c) reference to this document;

d) unique product code.

The marking shall be formed either in the material or by painting, hard stamping or by a securely fixed label.

Where applicable, such marking shall not obscure or lead to confusion with regulatory marking.

NOTE For CE marking refer to Annex ZA.

11 Technical documentation

11.1 General

The detailing of the column, including geometrical data with the complementary properties of materials and inserts, shall be given in technical documentation, which includes the construction data, such as the dimensions, tolerances, layout of reinforcement, the concrete cover, required support conditions and lifting conditions.

For columns designed in accordance with 6 a), mounting and fixing details shall be provided.

The composition of technical documentation is given in EN 13369:2004, Annex O.

11.2 Handling, storage and transportation

The manufacturer shall give information for handling and storage to prevent damage or deterioration. The manufacturer shall also give information for supporting and attaching the column segment to the vehicle used for transport.

11.3 Traceability

Delivered product or products batches shall be definitely identifiable and traceable with regard to their production data. For this purpose, the manufacturer shall establish and maintain for seven years the records required in the relevant technical specification, and shall mark the products or their delivery documents accordingly.

12 Conformity control

12.1 General

Conformity of the product with the requirements shall be demonstrated by:

— initial type testing;

— factory production control.

12.2 Evaluation of conformity

12.2.1 Factory production control

Factory production control shall be in accordance with EN 13369:2004, 6.3.

Inspection procedures for columns shall be conducted in accordance with Annex B and EN 13369:2004, Annexes D1, D3 and D.5.

The test on the potential compressive strength in EN 13369:2004, Annex D.3.1, item 8 shall be replaced by flexural strength test (in accordance with EN 12390-5) on moulded specimens, if the required flexural strength has been determined during type testing.

12.2.2 Initial type testing

12.2.2.1 General

Type testing shall be in accordance with EN 13369:2004, 6.2 and Annex C of this document.

Tests previously performed in accordance with the provisions of this document (same product, same characteristic(s), test method or more demanding test method, sampling procedure, system of attestation of conformity, etc.) shall be taken into account where applicable.

Type testing for mechanical impact shall be in accordance with Clause 8.

The manufacturer shall choose one of the three following methods.

12.2.2.2 Verification by calculation

Verification by calculation shall be conducted in accordance with EN 13369:2004, 4.3.3.2 and EN 40-3-3 for each product family defined by the manufacturer.

12.2.2.3 Verification by calculation aided by testing

Verification by calculation aided by testing shall be conducted in accordance with EN 13369:2004, 4.3.3.3 and EN 40-3-2. Three samples shall be tested. The tested samples shall cover the range of design stress of the products' sections for each product family defined by the manufacturer. When this calculation method is applied to other plants, with the same production conditions, complementary verification tests covering the stress range shall be performed on two sample columns of the yet untested production from each other plant.

Type test result shall be considered positive when each individual test is positive.

12.2.2.4 Verification by testing

Verification by testing shall be conducted in accordance with EN 13369:2004, 4.3.3.4 and EN 40.3.2. Two tests shall be performed (one on a product with approximately the maximum length, one with approximately the smallest length) for each product family defined by the manufacturer.

Type test result shall be considered positive when each individual test is positive.

12.3 Sampling

For random sampling the minimum number of articles from each lot to form the control sample shall conform to Table 1. A lot shall consist of columns with or without brackets of the same nominal height/projection, type and design strength.

Table 1 — Control sample size related to lot size

Number of articles in the lot	Minimum number of articles in the control sample
1 to 3	1
4 to 500	3
501 to 1 200	5

12.4 Dimensional verification

All dimensional parameters given in EN 40-2 and applicable to the lot shall be verified. These include:

a) length/projection;

b) cross-section – at each end and at all changes in cross-section;

c) door opening;

d) cable entry slot;

e) planting depth;

f) flange plate dimensions;

g) base plate dimensions;

h) lantern fixing diameter, length and angle.

Tolerances shall be in accordance with EN 40-2:2004, Clause 5.

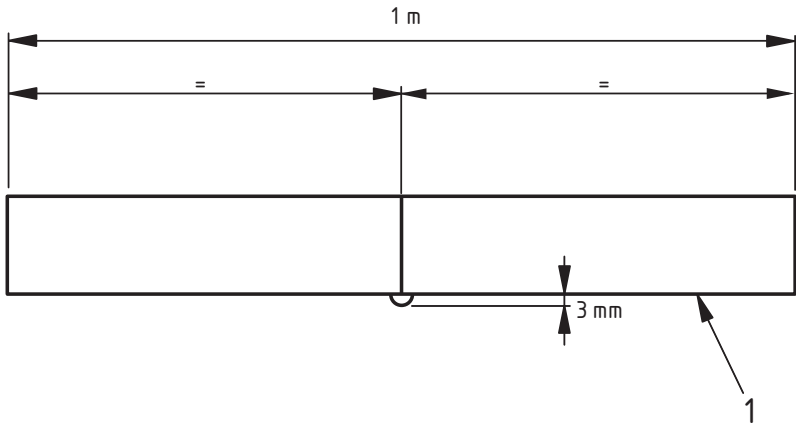
Measurements shall be taken with the column and/or bracket in the horizontal position. Dimensions shall be verified using a measuring tape or gauge, which shall be checked for accuracy in accordance with a documented calibration procedure.

12.5 Straightness verification

When any article in the control sample indicates nonconformity, it shall be verified by Method A and/or Method B. For both methods the column shall be placed horizontally on flat ground or timber bearers with the face showing the greatest curvature at 90° to the vertical plane.

Method A: A line shall be fixed at each end of the column above the maximum bow, tautened, and measurements taken from the line to the column surface with rule or tape measure at a minimum of six locations at or near the apparent position of maximum curvature.

Method B: A gauge as shown in Figure 1 shall be placed with edge 'X' on the suspect surface normal to the axis of the column and moved along that surface at intervals not exceeding 1 m. For polygonal columns the two adjacent surfaces shall also then be checked and for circular columns the surfaces at 15° ± 5° on each side of the line originally checked.



Key

1 Edge X

Figure 1 — Steel gauge for verifying straightness

12.6 Material verification

The material specification shall be verified by a manufacturer's inspection in accordance with EN 10204. Records shall be in place to establish that the verified material(s) have been used in the articles in the lot.

12.7 Design verification

Design shall be based on loads specified in accordance with EN 40-3-1, and shall be verified in accordance with Clause 6.

13 Test parameters

13.1 Tests on concrete

Tests on concrete shall be performed in accordance with EN 13369:2004, 5.1.

13.2 Measuring of dimensions and surface characteristics

13.2.1 Appearance of surface finish

For units made with special surface finishes and where required by the purchaser, acceptance testing shall be on the basis of comparison with a sample prepared by the manufacturer and approved by the purchaser.

This comparison shall be made under daylight and dry conditions and from a distance corresponding to normal usage, the distance to be no greater than the column length.

13.2.2 Measurement of dimensions

Dimensions shall be measured with devices having an accuracy of ± 1,0 mm, except for column length. For column length the accuracy shall be ± 0,5 %. The measuring devices and testing methods shall be described in the manufacturer's quality documents.

13.3 Concrete cover

The method of testing of the concrete cover of the reinforcement shall be described in the factory production control. It shall be performed with an accuracy of ± 2,0 mm.

The testing of the concrete cover of the reinforcement shall be recorded as destructive or non-destructive.

14 Performance under vehicle impact – passive safety

Where the manufacturer declares a performance for passive safety, the performance of the lighting column regarding passive safety under vehicle impact shall conform to the classification given in EN 12767.

If the manufacturer does not declare a performance for passive safety, the column shall be deemed to be class 0 in accordance with EN 12767.

NOTE See Annex ZA for conditions where NPD may be used.

Annex A
(normative)

Concrete cover

For products with a design working life not exceeding 30 years, the ambient conditions shall be in accordance with EN 13369:2004, Table A.1 and the minimum concrete cover shall be as specified in Table A.1 and tested in accordance with 13.3.

Table A.1 — Minimum concrete cover

Ambient conditions	Exposure classes [a]	Minimum concrete cover mm			
		For longitudinal steels		For stirrups or spirals	
		≥ C40/50 [b]	< C40/50 [b]	≥ C40/50 [b]	< C40/50 [b]
C	XC2/XC3	15	20	10	15
D	XC4	15	20	10	15
E	XD1/XS1	20	25	15	20
F	XD2/XS2	25	30	20	25

[a] Exposure class is defined in EN 206-1:2000, 4.1.

[b] Compressive strength class is defined in EN 206-1:2000, 4.3.1.

For bar diameters greater than 20 mm the values given in Table A.1 shall be increased by 5 mm. When steel with corrosion protection or non-ferrous fibre reinforcement is used, the concrete cover given in Table A.1 may be reduced by 5 mm.

Inside hollow core columns the concrete cover given in Table A.1 may be decreased by 5 mm, but the minimum internal concrete cover shall not be less than 8 mm.

When the concrete class is ≥ C50/60 and its water absorption is less than 3,5 % the concrete cover given in Table A.1 may be reduced by 5 mm, but the minimum external concrete cover shall not be less than 15 mm for longitudinal steel and shall not be less than 10 mm for stirrups or spirals.

For products with a working life of 15 years and a concrete class ≥ C40/50 the concrete cover given in Table A.1 may be reduced by 5 mm, but the minimum concrete cover shall not be less than 10 mm for longitudinal steel and shall not be less than 8 mm for stirrups or spirals.

Annex B
(normative)

Inspection scheme

This Annex is complementary to EN 13369:2004, D.4. The finished product inspection scheme is described in Table B.1.

Table B.1 — Finished product inspection

	Subject	Method	Purpose	Frequency
1	Compressive strength of concrete [a]	In accordance with EN 13369:2004, 5.1.1	Conformity with the requirements of this document	1 test of 3 specimens every production week
2	Final inspection of the product	Visual check before casting of dimensions and concrete cover	Conformity with the requirements of this document	Every product
3	Marking/labelling of the product	Visual check	Conformity with the requirements of this document	Every product
4	Storage of the product	Visual check	Conformity with the requirements of this document Segregation of non-conforming products	Daily
5	Delivery of the product	Visual check	Correct delivery age, loading and loading documents	Every product
[a] Replaces 8 and 9 from EN 13369:2004, Annex D, D.3.1.				

Annex C
(normative)

Initial type tests

C.1 When a product first demonstrates conformity with this document, for example when a new product type is developed, and before offering it for sale, appropriate tests shall be carried out to verify that the properties of the product meet the requirements of this document. The tests shall be either physical tests or by calculation. Where tests have previously been performed in compliance with the requirements of this document the results can be taken into account for initial type testing. Whenever a significant change occurs in the raw material or the production process, which could change the properties of the finished product this shall be considered as constituting a new product type.

C.2 The tests shall be the reference tests called up in this document for the properties selected from the following list, consistent with the intended use of the product:

C.2 a)

— dimensions;

— straightness;

— material;

— protection against mechanical impact.

C.2 b)

— design;

— performance under vehicle impact (passive safety), where applicable.

C.3 Where verification of design is by calculation, using computer software, design verification for the purposes of ITT and FPC shall be deemed to apply to all lighting columns within the product family designed using the same software, provided the representative calculation(s) have been verified.

The results of the initial tests shall be recorded.

Annex Y
(informative)
Choice of CE marking method

Y.1 General

The manufacturer should choose to apply, for CE marking, one of the alternative methods described in ZA.3, on the basis of the following conditions.

Y.2 Method 1

The declaration of geometrical data and material properties as specified in ZA.3.3 applies when the following condition occurs:

— off the shelf and catalogue products.

Y.3 Method 2

The declaration of product properties determined following this document and EN Eurocodes, as specified in ZA.3.4, apply when the following condition occurs:

— precast product with product properties declared by the manufacturer.

Specific indications are given in ZA.3.4.2 in case of a resistance to horizontal loads verified by testing.

Y.4 Method 3

The declaration of conformity with a given specification as specified in ZA.3.5 applies when the following condition occurs:

— when the purchasing client provides specific design documents.

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of the EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under the Mandate M/111 “Circulation fixtures” given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this Annex ZA meet the requirements of the Mandate M/111 given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the road lighting columns covered by this European Standard for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

WARNING — Other requirements and other EU Directives, not affecting the fitness of intended use(s), can be applicable to the road lighting columns falling within the scope of this European Standard.

NOTE In addition to any specific clauses relating to dangerous substances contained in this Standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm).

This Annex ZA establishes the conditions for CE marking of lighting columns made of reinforced or prestressed concrete not exceeding 20 metres, and shows the relevant clauses applicable.

This Annex ZA has the same scope as Clause 1 and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses

Product: Road lighting column **Intended use:** For circulation areas				
Essential characteristics		**Requirement clauses in this European Standard**	**Levels and/or class(es)**	**Notes**
Resistance to horizontal loads (mechanical impact)	Method 1	6 b)	-	Geometric data and material properties
	Method 2	6 a)	-	m/s; m^2; kg; %
	Method 3	6 c), client's specification	-	Document reference
Performance under vehicle impact (passive safety)	All methods	14	-	Class
Durability	All methods	7.3	-	
NOTE 1 Method 1 = declaration of geometrical data and material properties (see ZA.3.3); Method 2 = declaration of the value of the product properties (see ZA.3.4); Method 3 = declaration of compliance with given client's specification (see ZA.3.5). NOTE 2 Annex Y provides information on the choice of method for CE marking				

The requirement on a certain characteristic is not applicable in those Member States where there are no regulatory requirements for that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these Member States are not obliged to determine nor to declare the performance of their products with regard to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2 Procedure for attestation of conformity of precast concrete lighting columns

ZA.2.1 System of attestation of conformity

The system of attestation of conformity of concrete lighting columns, for the essential characteristics indicated in Table ZA.1, in accordance with the decision of the Commission 1999/94/EC of 03 February 1999 as given in Annex III of the Mandate M/111 "Circulation fixtures", is shown in Table ZA.2, for the indicated intended use(s) and relevant level(s) or class(es).

Table ZA.2 — System of attestation of conformity

Product(s)	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Road lighting columns	For circulation areas	None	1
System 1: See Directive 89/106/EEC (CPD) Annex III.2.(i), without audit testing of samples.			

The attestation of conformity of concrete lighting columns, for the essential characteristics indicated in Table ZA.1, shall be based on the evaluation of conformity procedure indicated in Table ZA.3, resulting from the application of the clauses of this or other European Standards indicated therein.

Table ZA.3 — Assignment of evaluation of conformity tasks for concrete lighting columns under system 1

Tasks		Content of the tasks		Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control	Parameters related to all characteristics of Table ZA.1		12.2.1
	Testing of samples taken at the factory	All characteristics of Table ZA.1. (where verified by testing)		12.3 EN 13369:2004, 6.2.3
Tasks for the notified body	Initial type testing	Method 1	Verification of components	6 b)
		Method 2 Verification by calculation and/or testing	All characteristics Table ZA.1	12.2.2
		Method 3 Verification in accordance with client's design	Verification of components	6 c)
	Initial inspection of factory and of factory production control	Parameters related to all characteristics of Table ZA.1		12.2.1
	Continuous surveillance, assessments and approval of factory production control	Parameters related to all characteristics of Table ZA.1		12.2.1

ZA.2.2 EC certificate and declaration of conformity

When compliance with the conditions of this Annex is achieved, the certification body shall draw up a certificate of conformity (EC certificate of conformity), which entitles the manufacturer to affix the CE marking. The certificate shall include:

a) name, address and identification number of the certification body;

b) name and address of the manufacturer, or the manufacturer's authorized representative established in the EEA, and the place of production;

c) description of the product (type, identification, use, etc.), and a copy of the information accompanying the CE marking;

d) provisions to which the product conforms (e.g. Annex ZA);

e) particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

f) number of the accompanying factory production control certificate;

g) conditions and period of validity of the EC certificate;

h) name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

In addition, the manufacturer shall draw up a declaration of conformity (EC declaration of conformity) including the following:

1) name and address of the manufacturer, or the manufacturer's authorized representative established in the EEA;

2) name and address of the certification body;

3) description of the product (type, identification, use), and a copy of the information accompanying the CE marking;

4) provisions to which the product conforms (i.e. Annex ZA of this EN);

5) particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

6) number of the accompanying EC certificate of conformity;

7) name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of the manufacturer's authorized representative.

The above-mentioned declaration and the EC certificate shall be presented in the official language or languages of the Member State in which the product is to be used.

ZA.3 CE marking and labelling

ZA.3.1 Normal CE marking and labelling

The manufacturer or the manufacturer’s authorized representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown on the product (or when not possible it may be on the accompanying label, the packaging or on the accompanied commercial documents e.g. a delivery note).

The following information shall be added to the CE marking symbol:

a) identification number of the certification body;

b) name or identifying mark and registered address of the manufacturer;

c) last two digits of the year in which the marking is affixed;

d) number of the EC certificate;

e) reference to this European standard;

f) description of the product: generic name, intended use and identification code of the unit;

g) information on those relevant essential characteristics taken from Table ZA.1 which are listed in the relevant Clause ZA.3.3, ZA.3.4 or ZA.3.5;

h) “No performance determined” for characteristics where this is relevant.

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State of destination.

In the following subclauses the conditions are given for the application of CE marking. Figure ZA.1 gives the simplified label to affix to the product, containing the minimum set of information and the link to the accompanying document where the other required information are given. For what concern the information on essential characteristics, some of them may be given by an unambiguous reference to

1) technical information (product catalogue) (see ZA.3.3);

2) technical documentation (ZA.3.4);

3) design specification (ZA.3.5).

The minimum set of information to be put directly in the affixed label or in the companying document is given in Figures ZA.2, ZA.3, ZA.4 and ZA.5.

ZA.3.2 Simplified label

In the case of simplified label the following information shall be added to the CE marking symbol:

a) name or identifying mark and registered address of the manufacturer;

b) identification number of the unit (to ensure traceability);

c) last two digits of the year in which the marking is affixed;

d) identification number of the notified body;

e) reference to this European standard.

The same identification number shall mark, in the accompanying documents, the information related to the unit.

Figure ZA.1 gives a model for the simplified label for CE marking.

CE 0123-CPD-0001	CE conformity marking consisting of the CE symbol given in directive 93/68/EEC Identification of the notified body
AnyCo Ltd, PO Bx 21, B-1050 45PJ76/06	Name or identifying mark and registered address of the manufacturer Identification number and last two digits of the year in which the marking was affixed
0123-CPD-0456	Number of the EC certificate
EN 40-4	Number of this European standard

Figure ZA.1 — Example of simplified label

NOTE For small elements or for product stamping reasons, the size can be reduced by removing reference to EN and/or to EC certificate.

ZA.3.3 Declaration of geometrical data and material properties

(Method 1 to determine properties relating to essential requirements “mechanical resistance and stability”.)

Figure ZA.2 gives, for a type of column, the model CE marking inclusive of the information needed to determine, according to design regulation valid in the place of use, the properties related to mechanical resistance and stability, including aspects of durability.

Referring to Table ZA.1 and to the information quoted in the list of ZA.3.1, the following properties shall be declared:

a) compressive strength of concrete;

b) ultimate tensile strength of reinforcing steel;

c) tensile yield strength of reinforcing steel;

d) ultimate tensile strength of prestressing steel;

e) tensile 0,1 proof stress of prestressing steel;

f) geometrical data (only critical dimensions);

g) conditions for durability;

h) possible reference to Technical Information (product catalogue) for detailing, durability and geometrical data.

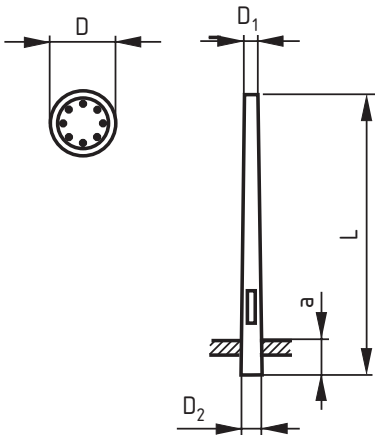
CE 0123-CPD-0001	CE conformity marking consisting of the CE symbol given in directive 93/68/EEC Identification of the notified body
AnyCo Ltd, PO Bx 21, B-1050 45PJ76/06 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Identification number and last two digits of the year in which the marking was affixed Number of the EC certificate
EN 40-4 Prestressed concrete lighting column for circulation areas	Number and title of European standard concerned Generic name, intended use and identification code
Concrete: Compressive strength ..... f_{ck} = 40 N/mm^2 Reinforcing steel: Ultimate tensile strength ..... f_{tk} = 575 N/mm^2 Tensile yield strength ..... f_{yk} = 500 N/mm^2  Length L = 8 000 mm Diameters: D_1 = 150 mm D_2 = 250 mm Embedment $a \geq$ 500 mm Longitudinal bars 6 ø 10 Spiral ø 6 – pitch = 100 mm Covers: to spiral = 15 mm to bars = 21 mm Performance under vehicle impact (passive safety): Class 0. For durability see Technical Information Technical Information: Product Catalogue ABC : 2002 – Clause ii	Information on product geometry and material characteristics including detailing (to be adapted to the specific product by the manufacturer) Note: Numerical values are only as example. Note: the sketch may be omitted if equivalent information are available in clearly identified Technical Information (product catalogue) referred to

Figure ZA.2 — Example of CE marking with Method 1

ZA.3.4 Declaration of product properties

ZA.3.4.1 Declaration of product properties determined by calculation.

(Method 2 to determine properties relating to essential requirements “mechanical resistance and stability”.)

For all design data, including models and parameters used in calculation, reference may be made to the technical (design) documentation.

Referring to Table ZA.1 and to the information quoted in the list of ZA.3.1, the following properties shall be declared:

a) resistance to horizontal loads (type of design verification calculation (C) or testing (T), reference wind velocity V_{ref}, partial load factor class, wind area and weight at top, deflection class, terrain category if different to II;”);

b) safety factors for concrete and steel used in calculation;

c) other Nationally Determined Parameters NDPs used in calculation;

d) performance under impact (passive safety);

e) conditions for durability;

f) possible reference to Technical Documentation for geometrical data, detailing, durability and other NDPs.

Figure ZA.3 gives, for prestressed or reinforced concrete lighting columns, the model CE marking in the case in which the properties related to mechanical resistance are determined by the manufacturer by means of EN Eurocodes.

CE 0123-CPD-0001	CE conformity marking consisting of the CE symbol given in directive 93/68/EEC Identification of the notified body
AnyCo Ltd, PO Bx 21, B-1050 45PJ76/06 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Identification number and last two digits of the year in which the marking was affixed Number of the EC certificate
EN 40-4 Reinforced concrete lighting column for circulation areas	Number and title of European standard concerned Generic name, intended use and identification code
Resistance to horizontal loads: *C-v* = 26m/s; B; 0,25m^2; 20kg; 2 Material safety factors applied in strength calculation: For concrete ..... γ_c = z.zz For steel γ_s = x.xx Performance under vehicle impact (passive safety): Class 0. For durability and other NDPs see the Technical Documentation Technical Documentation: Position Number xxxxxx	Information on product mandated characteristics

Figure ZA.3 — Example of CE marking with Method 2 (verification by calculation)

The design values of the mechanical resistance of the element shall be computed using, for the Nationally Determined Parameters, either the values recommended in EN 1992-1-1:2004 and EN 1992-1-2 or the values given in the national Annex of the Eurocodes applicable to the works.

ZA.3.4.2 Declaration of product properties determined by testing

(Characteristic value of load-bearing capacity determined by testing in accordance with Clause 6).

Figure ZA.4 gives, for prestressed or reinforced concrete lighting columns, the model CE marking in the case in which the properties related to mechanical resistance are determined by the manufacturer by means of verification in accordance with Clause 6.

The properties listed in ZA.3.4 shall be declared except mechanical resistance and safety factors, with the addition of resistance to horizontal loads determined by testing.

CE 0123-CPD-0001	CE conformity marking consisting of the CE symbol given in directive 93/68/EEC Identification of the notified body
AnyCo Ltd, PO Bx 21, B-1050 45PJ76/06 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Identification number and last two digits of the year in which the marking was affixed Number of the EC certificate
EN 40-4 Precast concrete lighting column for circulation areas	Number and title of European standard concerned Generic name, intended use and identification code
Resistance to horizontal loads: *T-v* = 26 m/s; 0,25 m^2; 20 kg; 6 % Performance under vehicle impact (passive safety): Class 0. For durability, see Technical Documentation Technical Documentation: Position Number xxxxxx	Information on product mandated characteristics

Figure ZA.4 — Example of CE marking with Method 2 (verification by testing)

ZA.3.5 Declaration of compliance with a given design specification

(Method 3 to determine properties relating to essential requirements “mechanical resistance and stability”.)

Figure ZA.5 gives, for prestressed or reinforced concrete lighting columns, the model CE marking in the case the product is produced according to a design specification in which the properties related to mechanical resistance and stability are determined by means of design provisions applicable to the works.

This method applies also in case of a design made with means other than EN Eurocodes.

CE 0123-CPD-0001	CE conformity marking consisting of the CE symbol given in directive 93/68/EEC Identification of the notified body
AnyCo Ltd, PO Bx 21, B-1050 45PJ76/06 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Identification number and last two digits of the year in which the marking was affixed Number of the EC certificate
EN 40-4 **Precast concrete lighting column for circulation areas**	Number and title of European standard concerned Generic name, intended use and identification code
For resistance to horizontal loads and durability see the design specifications Design Specification: Order Code xxxxxx	Information on product mandated characteristics

Figure ZA.5 — Example of CE marking with Method 3

In addition to any specific information relating to dangerous substances, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogations need not be mentioned.

Bibliography

EN 206-1, *Concrete — Part 1: Specification, performance, production and conformity*

EN 1992-1-2, *Eurocode 2: Design of concrete structures — Part 1-2: General rules — Structural fire design*

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