BRITISH STANDARD

BS EN
14991:2007

Precast concrete products — Foundation elements

The European Standard EN 14991:2007 has the status of a British Standard

ICS 91.100.30

BSI
British Standards

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 14991:2007.

The UK participation in its preparation was entrusted to Technical Committee B/524, Precast concrete products.

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

EN 14991:2007 is a candidate "harmonized" European Standard and fully takes into account the requirements of the European Commission mandate M/100, Products related to precast concrete products, given under the EU Construction Products Directive (89/106/EEC), and intended to lead to CE marking. The date of applicability of EN 14991:2007 as a "harmonized" European Standard, i.e. the date after which this standard may be used for CE marking purposes, is subject to an announcement in the *Official Journal of the European Communities*.

EN 14991:2007 is the subject of transitional arrangements agreed under the European Commission mandate. The Member States have agreed a nominal transition period for the coexistence of EN 14991:2007 and their corresponding national standard(s). It is intended that this period will comprise a nominal nine-month period during which any required changes to national regulations are to be made, followed by a further nominal twelve-month period for the implementation of CE marking. At the end of this coexistence period, the national standard(s) will be withdrawn. In the UK there are no corresponding national standards.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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Precast concrete products - Foundation elements

Produits préfabriqués en béton - Éléments de fondation

Betonfertigteile - Gründungselemente

This European Standard was approved by CEN on 13 January 2007.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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The numbering of clauses is strictly related to EN 13369:2004 Common rules for precast concrete products, at least for the first three digits. When a clause of EN 13369 is not relevant or included in a more general reference of this standard, its number is omitted and this may result in a gap on numbering.

Foreword

This document (EN 14991:2007) has been prepared by Technical Committee CEN/TC 229 “Precast concrete products”, the secretariat of which is held by AFNOR and was examined by and agreed with a joint working party appointed by the Liaison Group CEN/TC 229-TC250, particularly for its compatibility with structural Eurocodes.

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 October 2007, and conflicting national standards shall be withdrawn at the latest by January 2009.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Construction Products Directives (89/106/EEC).

For relationship with EU Directives, see informative Annex ZA, which is an integral part of this document.

This standard is one of a series of product standards for precast concrete products.

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

The references to EN 13369 by CEN/TC 229 product standards are intended to make them homogeneous and to avoid repetitions of similar requirements.

Eurocodes are taken as a common reference for design aspects. The installation of some structural precast concrete products is dealt with by ENV 13670-1: *Execution of concrete structures — Part 1: Common rules*, which has at the moment the status of an European prestandard. In all countries it can be accompanied by alternatives for national application and it shall not be treated as a European Standard.

The programme of standards for structural precast concrete products comprises the following standards, in some cases consisting on several parts:

— EN 1168, *Precast concrete products — Hollow core slabs*

— EN 12794, *Precast concrete products — Foundation piles*

— EN 12843, *Precast concrete products — Masts and poles*

— EN 13747, *Precast concrete products — Floor plates for floor systems*

— EN 15037 (all parts), *Precast concrete products —– Beams for beam-and-block floor systems*

— EN 13224, *Precast concrete products — Ribbed floor elements*

— EN 13225, *Precast concrete products — Linear structural elements*

— EN 14992, *Precast concrete products — Wall elements*

— EN 15258, *Precast concrete products — Retaining wall elements*

— EN 13693, *Precast concrete products — Special roof elements*

— EN 14844, *Precast concrete products — Box culverts*

— EN 13978-1, *Precast concrete products — Precast concrete garages —- Part 1: Requirements for reinforced garages monolithic or consisting of single sections with room dimensions*

— EN 14991, *Precast concrete products — Foundation elements*

— EN 15050, *Precast concrete products — Bridge elements*

— EN 14843, *Precast concrete products — Stairs*

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

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

Introduction

The evaluation of conformity given in this European Standard refers to the completed precast elements which are supplied to the market and covers all the production operations carried out in the factory.

For design rules reference is made to EN 1992-1-1. Additional complementary rules are provided where necessary.

1 Scope

This European Standard deals with the requirements and the basic performance criteria and specifies where applicable minimum values for precast foundation elements (comprising columns with integrated foundation elements, pocket foundation elements, sockets) made of reinforced normal weight concrete for structure of buildings according to EN 1992-1-1.

This European Standard covers terminology, performance criteria, tolerances, relevant physical properties and special aspects of transport and erection.

This European Standard does not cover the bearing capacity determined by testing.

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

EN 1997-1:2004, *Eurocode 7: Geotechnical design — Part 1: General rules*

EN 13369:2004, *Common rules for precast concrete products*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in Clause 3 of EN 13369:2004 and the following apply.

3.1
pocket foundation element
precast reinforced concrete unit capable of transferring vertical actions, bending moments and horizontal shears from structural components of the structure (e.g. columns, foundation beams, walls) to the soil (see Figures B.2 to B.4)

3.2
column with integrated foundation element
precast foundation element forming part of a column and permanently fixed to it

3.3
socket
either vertical part of a pocket foundation element (see Figures B.3 and B.4) or separate precast unit corresponding to that part (see Figure B.1)

3.4
footing
horizontal part of the pocket foundation element

NOTE It can either be a part of a pocket unit or be cast on site.

3.5
pocket with keyed surfaces
pocket expressly wrought with indentations or keys at the vertical internal surfaces of the socket

3.6
pocket with smooth surfaces
pocket with the internal surfaces of its socket smooth as cast

3.7
product family
group of foundation elements of the same type and shape, with the same critical dimensions and manufactured with the same type of concrete (type of concrete: see EN 13369:2004, 3.1.8)

4 Requirements

4.1 Material requirements

4.1 of EN 13369:2004 shall apply except that 4.1.4 is not relevant.

4.2 Production requirements

4.2.1 Concrete production

4.2.1 of EN 13369:2004 shall apply.

4.2.2 Hardened concrete

4.2.2 of EN 13369:2004 shall apply.

4.2.3 Structural reinforcement

4.2.3 of EN 13369:2004 shall apply except that 4.2.3.2 is not relevant.

4.3 Finished product requirements

4.3.1 Geometrical properties

4.3.1.1 Production tolerances

4.3.1.1 of EN 13369:2004 shall apply.

4.3.1.2 Minimum nominal dimensions

4.3.1.2 of EN 13369:2004 shall apply.

4.3.2 Surface characteristics

4.3.2 of EN 13369:2004 shall apply.

4.3.3 Mechanical resistance

4.3.3.1 General

4.3.3.1 of EN 13369:2004 shall apply.

4.3.3.2 Verification by calculation

4.3.3.2 of EN 13369:2004, 10.9.6 of EN 1992-1-1:2004 and 6 of EN 1997-1:2004 shall apply. Interactions with soil irregularities shall be checked.

4.3.3.3 Resistance to vertical load and bending moment

10.9.6 of EN 1992-1-1:2004 and Clause 6 of EN 1997-1:2004 shall apply.

4.3.3.4 Verification by calculation aided by physical testing

4.3.3.3 of EN 13369:2004 shall apply.

4.3.3.5 Safety factors

4.3.3.5 of EN 13369:2004 shall apply.

4.3.3.6 Transient situations

4.3.3.6 of EN 13369:2004 shall apply.

4.3.7 Durability

4.3.7 of EN 13369:2004 shall apply.

4.3.8 Other requirements

4.3.8 of EN 13369:2004 shall apply.

5 Test methods

Clause 5 of EN 13369:2004 shall apply.

6 Evaluation of conformity

6.1 General

Compliance of the product with the requirements of this European Standard shall be demonstrated by:

— initial type testing;

— factory production control.

6.1 of EN 13369:2004 shall apply.

6.2 Type testing

6.2 of EN 13369:2004 shall apply.

Previous type tests (or tests) executed before the application of the present standard may be used as type tests provided they are related to the same product family with the same or equivalent or more demanding test method.

6.3 Factory production control

6.3 of EN 13369:2004 shall apply.

Inspection schemes shall be conducted in an accordance with Annex A of the present standard and EN 13369:2004, Annexes D.1 to D.3, D.4 as amended in Annex A and D.5.

7 Marking

Clause 7 of EN 13369:2004 shall apply.

NOTE For CE marking see Annex ZA.

8 Technical documentation

The detailing of the element, referred to 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, the tolerances, the layout of reinforcement, the concrete cover, the expected transient and final support conditions and lifting conditions.

The composition of technical documentation is given in clause 8 of EN 13369:2004.

Annex A
(normative)

Inspection schemes

A.1 Finished product inspection

The Table A.1 replaces item 2 of Table D.4 of EN 13369:2004.

Table A.1 — Finished product inspection

	Subject	Method	Purpose	Frequency
Product Testing				
2a	Critical dimensions	Measuring according to 5.2 of EN 13369:2004	Conformity with the requirements of this standard and with the design specification	One product / family / 5 production days One product/production day
2b	Internal surface characteristics in case of pockets with keyed surfaces	Visual inspection	Roughness for shear resistance	As for critical dimensions If treated after production: 1 element/roughening process/production day

Annex B
(informative)

Typical shapes of foundation elements

B.1 Typology

Precast concrete foundation elements dealt with in this European Standard can be distinguished in some principal types according to the following criteria:

a) sockets constituting separate units (see Figure B.1);

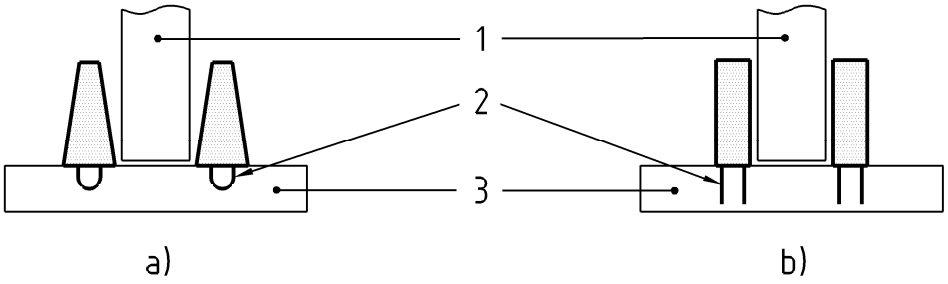
b) pocket foundation elements:

— without footing (see Figure B.2);

— with footing: with or without gentle slope (see Figure B.3);

— with stiffeners (see Figure B.4);

c) columns with integrated foundation elements (see Figure B.5).

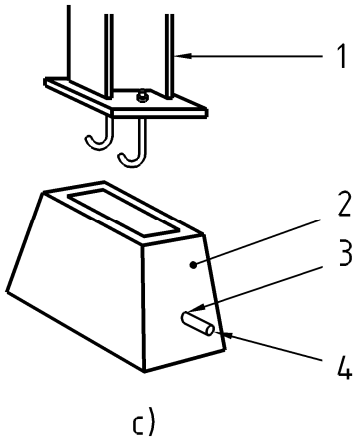


a) for concrete column, with chamferred edges

b) for concrete column, with straight edges

Key

1 concrete column
2 reinforcement protruding from the socket
3 cast on site footing

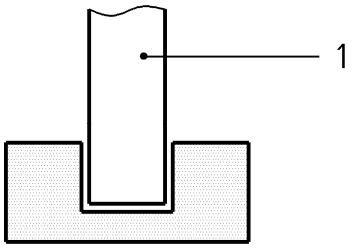


c) for steel column

Key

1 steel column
2 precast concrete socket
3 hole for steel bar
4 steel bar

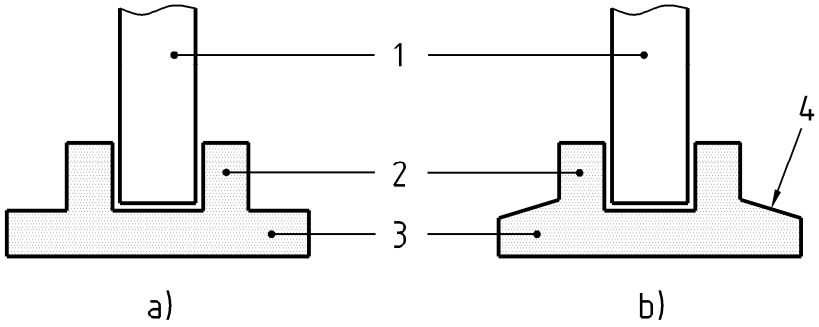
Figure B.1 — Examples of sockets



Key

1 concrete column

Figure B.2 — Example of pocket foundation without footing

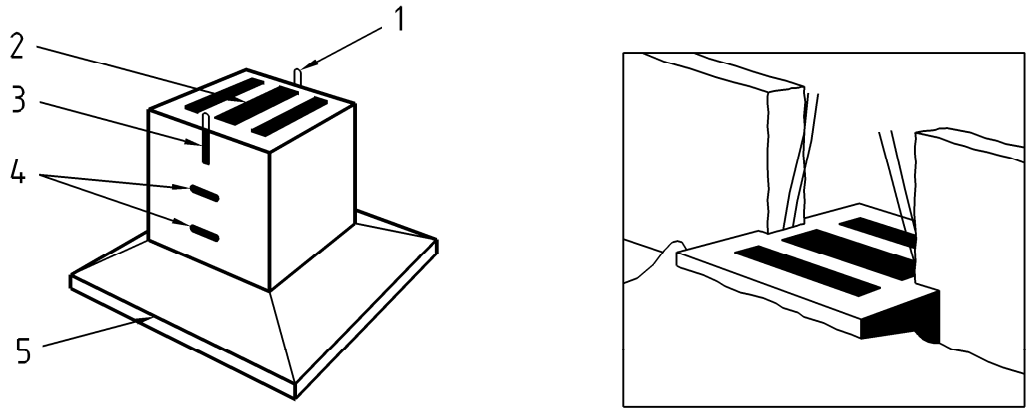


a) for concrete column, with parallelepiped footing

b) for concrete column, with footing with gentle slope

Key

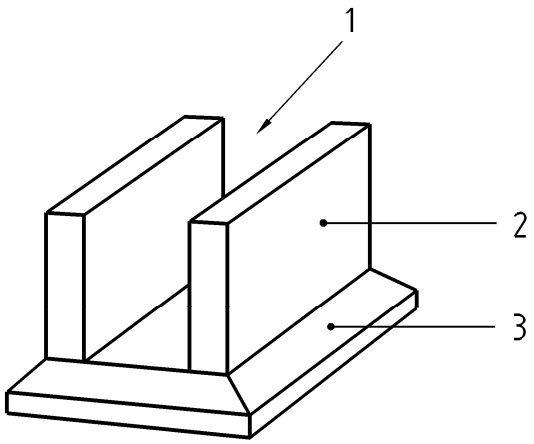
1 concrete column
2 socket
3 footing
4 gentle slope



c) for steel column and concrete foundation beams

Key

1 steel loop
2 internal stiffener
3 encasing
4 holes for steel bars
5 footing with gentle slope

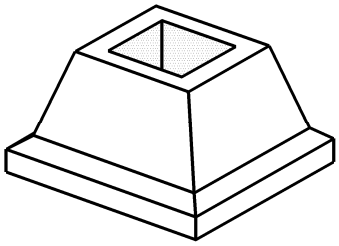


d) for wall

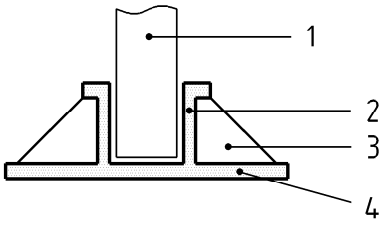
Key

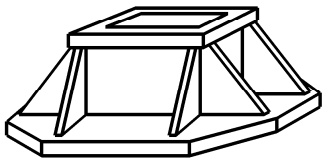
1 gap for the wall
2 socket
3 footing with gentle slope

Figure B.3 — Examples of pocket foundations with footing



a1) for concrete column (without stiffener)

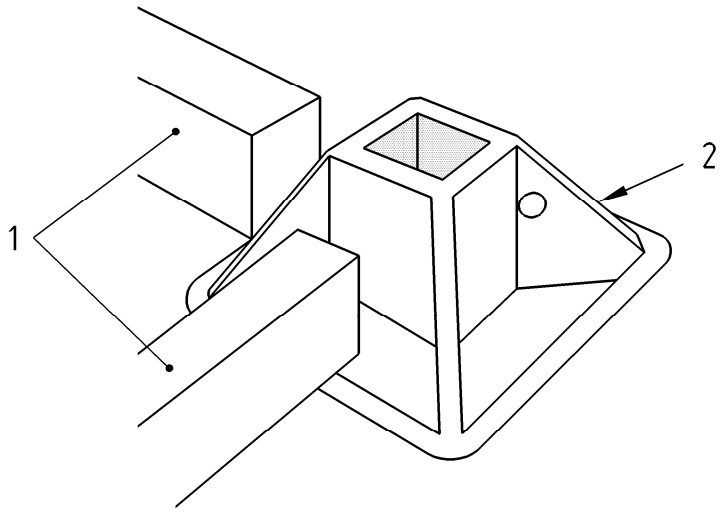




a2) for concrete column (with stiffeners)

Key

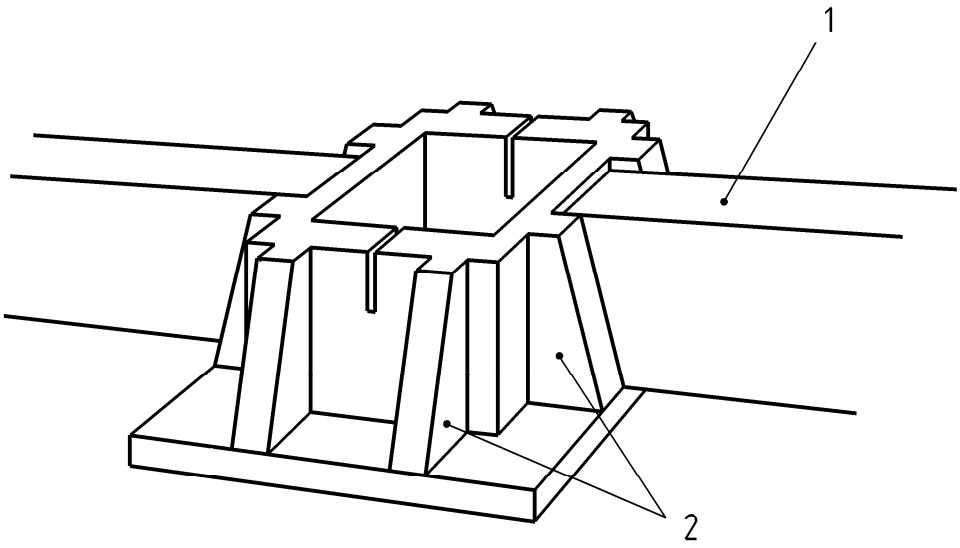
1 precast column
2 socket
3 stiffener
4 footing



b) for concrete foundation beams

Key

1 foundation beams
2 stiffeners



c) other example of application

Key

1 foundation beam
2 stiffeners

Figure B.4 — Further examples of pocket foundations with footing

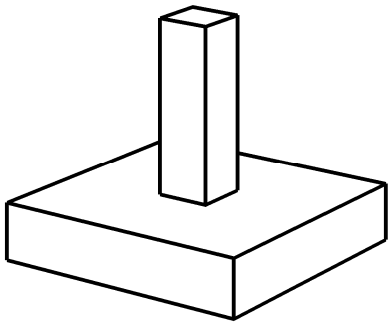


Figure B.5 — Example of column with integrated foundation element

Annex Y
(informative)

Choice of CE marking method

Y.1 General

The producer should choose to apply, for CE marking, one of the 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.3.2 may be applied when the following condition occurs:

— off the shelf and catalogue products.

Y.3 Method 2

The declaration of product properties determined following this standard and EN Eurocodes, as specified in ZA.3.3, should be applied when the following condition occurs:

— precast product with product properties declared by the producer.

Y.4 Method 3

The declaration of compliance with a given specification as specified in ZA.3.4 may be applied when the following condition occurs:

— all other cases than Y.2 and Y.3.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European standard has been prepared under the mandate M/100 "Precast Concrete Products"[1] given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European standard shown in this Annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the foundation elements covered by this annex 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 for intended uses, may be applicable to the foundation elements falling within the scope of this standard.

NOTE 1 In addition to any specific clauses relating to dangerous substances contained in this Standard, there may be 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.

NOTE 2 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 establishes the conditions for CE marking of foundation elements made of reinforced concrete, used for the construction of the structures of buildings and other civil engineering works and shows the relevant clauses applicable. The foundations for bridges are not covered by this standard.

This annex has the same scope as Clause 1 of this standard and is defined by Table ZA.1.

[1] As amended.

Table ZA.1 — Relevant clauses

Essential characteristics		Requirement clauses in this Standard	Levels and/or class(es)	Notes and Unit
Compressive strength (of concrete)	All methods	4.2 Production requirements	None	N/mm^2
Ultimate tensile and tensile yield strength (of steel)	All methods	4.1 Material requirements	None	N/mm^2
Mechanical strength (by calculation)	Method 1	Information listed in ZA.3.2	None	Geometry and materials
	Method 2	4.3.3 Mechanical resistance	None	kNm, kN, kN/m
	Method 3	Design specification	None	
Detailing	All methods	4.3.1 Geometrical properties 8 Technical documentation	None	mm /
Durability	All methods	4.3.7 Durability	None	Ambient conditions

Method 1 = declaration of geometrical data and material properties (see ZA.3.2);

Method 2 = declaration of the value of the product properties (see ZA.3.3);

Method 3 = declaration of compliance with given design specification (see ZA.3.4).

The producer shall select when he applies each method in accordance with Annex Y.

The requirement on a certain characteristic is not applicable in those Member States (MSs) 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 MSs 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 foundation elements

ZA.2.1 System of attestation of conformity

The system of attestation of conformity of foundation elements, for the essential characteristics indicated in Table ZA.1, in accordance with the decision of the Commission 1999/94/EC of 25 January 1999 as given in Annex III of the Mandate M/100 ”Precast concrete products”, is shown in Table ZA.2, for the indicated intended use and relevant levels or classes:

Table ZA.2 — System of attestation of conformity

Product(s)	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Foundation elements	Structural	—	2+
System 2+: See Directive 89/106 (CPD) Annex III-2 (ii) First possibility, including certification of the factory production control by a notified body on the basis of initial inspection of factory and of factory production control as well as of continuous surveillance, assessment and approval of factory production control.			

The attestation of conformity of foundation elements made of reinforced concrete, 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 foundation elements under system 2+

Tasks			Content of the tasks	Evaluation of conformity clauses to apply
Tasks for the manufacturer		Initial type testing	All characteristics of Table ZA.1	6.2 of EN 13369:2004
		Factory production control	Parameters related to all characteristics of Table ZA.1	6.3
		Further testing of samples taken at the factory	All characteristics of Table ZA.1	Item 1 of Table A.1 and 6.2.3 of EN 13369:2004
Tasks for the notified body	Certification of factory production control on the basis of:	Initial inspection of factory and of factory production control	Compressive strength (of concrete) Ultimate tensile and tensile yield strength Detailing Durability	6.1.2. a) and 6.3 of EN 13369:2004 and 6.3 of this European Standard
		Continuous surveillance, assessments and approval of factory production control	Compressive strength (of concrete) Ultimate tensile and tensile yield strength Detailing Durability	6.3 and 6.1.3.2 b) of EN 13369:2004 and 6.3 of this European Standard

ZA.2.2 EC Certificate and Declaration of conformity

When compliance with the conditions of this Annex is achieved, and once the notified body has drawn up the certificate mentioned below, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity, which entitles the manufacturer to affix the CE marking. This declaration shall include:

— name and address of the manufacturer, or his authorised representative established in the EEA, and the place of production;

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

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

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

— the number of the accompanying factory production control certificate;

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

The declaration shall be accompanied by a factory production control certificate, drawn up by the notified body, which shall contain, in addition to the information above, the following:

— name and address of the notified body;

— the number of the factory production control certificate;

— conditions and period of validity of the certificate, where applicable;

— name of, and position held by, the person empowered to sign the certificate.

The above mentioned declaration and the 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 General

The manufacturer or his authorised 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:

— identification number of the certification body;

— name or identifying mark and registered address of the producer;

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

— number of the EC factory production control certificate;

— reference to this European Standard;

— description of the product: generic name and intended use;

— information on those relevant essential characteristics taken from Table ZA.1 which are listed in the relevant ZA.3.2, ZA.3.3 or ZA.3.4;

— "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 is given. For what concerns the information on essential characteristics, some of them may be given by an unambiguous reference to:

— technical information (product catalogue) (see ZA.3.2);

— technical documentation (ZA.3.3);

— design specification (ZA.3.4).

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 and ZA.4.

ZA.3.1.1 Simplified label

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

— name or identifying mark and registered address of the producer;

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

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

— number of the CE factory production control certificate;

— 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 the simplified label to affix to the product, containing the minimum set of information. The other information defined in ZA.3.1 and not given with the simplified label shall be provided with the accompanying documents.

CE	CE conformity marking consisting of the CE symbol given in Directive 93/68/EEC
AnyCo Ltd, PO Bx 21, B-1050	Name or identifying mark and registered address of the producer
45PJ76	Identification number of the unit
07	Last two digits of the year in which the marking was affixed
0123-CPD-0456	Number of the FPC certificate
EN 14991	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 FPC certificate.

ZA.3.2 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 foundation elements made of reinforced concrete, 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 and serviceability.

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

— compressive strength of concrete;

— ultimate tensile strength of reinforcing steel;

— tensile yield strength of reinforcing steel;

— geometrical data (only critical dimensions);

— conditions for durability;

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

CE 0123	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 07 0123-CPD-0456	Name or identifying mark and registered address of the producer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 14991 Foundation elements Pocket foundation with keyed surfaces and stiffeners Concrete: Compressive strength ..... f_{ck} = cc N/mm^2 Reinforcing steel: Ultimate tensile strength ..... f_{tk} = yyy N/mm^2 Tensile yield strength ..... f_{yk} = zzz N/mm^2 Measures in mm For detailing and durability see Technical Information Technical Information : Product Catalogue ABC : 2007 – clause ii	Number and title of European Standard concerned Generic name and intended use Information on product geometry and material characteristics including detailing (to be adapted to the specific product by the producer) NOTE 1 Numerical values are only as example. NOTE 2 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.3.3 Declaration of product properties

(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:

— compressive strength of concrete;

— ultimate tensile strength of reinforcing steel;

— tensile yield strength of reinforcing steel;

— mechanical resistance of the element to vertical load and bending moment (design values);

— safety factors for concrete and steel used in calculation;

— other Nationally Determined Parameters NDPs used in calculation;

— conditions for durability;

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

Figure ZA.3 gives, for reinforced foundation elements made of reinforced concrete, the model CE marking in the case in which the properties related to mechanical resistance are determined by means of EN Eurocodes.

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

CE 0123	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 07 0123-CPD-0456	Name or identifying mark and registered address of the producer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 14991 Foundation elements Socket for steel column Concrete: Compressive strength ..... f_{ck} = xx N/mm^2 Reinforcing steel: Ultimate tensile strength ..... f_{tk} = yyy N/mm^2 Tensile yield strength ..... …. f_{yk} = zzz N/mm^2 Mechanical ultimate strength (design values): Bending moment capacity (M-N diagram) … kNm Vertical load capacity .....vvv kN Material safety factors applied in strength calculation: For concrete.....γ_c = z.zz For steel.....γ_s = x.xx For geometrical data, detailing, durability, and any complementary information other NDPs see the Technical documentation. Technical Documentation: Position Number.....xxxxxx	Number and title of European Standard concerned Generic name and intended use Information on product mandated characteristics including detailing (to be adapted to the specific product by the producer) NOTE Mechanical resistance parameters refer to the precast element without any additional cast-in-situ part.

Figure ZA.3 — Example of CE marking with Method 2

ZA.3.4 Declaration of compliance with a given design specification

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

a) For cases in which a structural component or kit is produced in accordance with the design details (drawings, material specifications etc.) prepared by the designer of the works.

b) For cases in which the producer has designed and produced a structural component or kit following the provisions of the client's order.

Figure ZA.4 gives, for reinforced foundation elements made of reinforced concrete, 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.

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

— compressive strength of concrete;

— ultimate tensile strength of reinforcing steel;

— tensile yield strength of reinforcing steel.

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

CE 0123	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 07 0123-CPD-0456	Name or identifying mark and registered address of the producer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 14991 Foundation elements Pocket for wall Concrete: Compressive strength.....f_{ck} = xx N/mm^2 Reinforcing steel: Ultimate tensile strength .....f_{tk} = yyy N/mm^2 Tensile yield strength.....f_{yk} = zzz N/mm^2 For geometrical data, detailing, mechanical strength, and durability see the design specifications Design specification: Order Code.....xxxxxx	Number and title of European Standard concerned Generic name and intended use Information on product mandated characteristics including detailing (to be adapted to the specific product by the producer)

Figure ZA.4 — Example of CE marking with Method 3

In addition to any specific information relating to dangerous substances, the product should be also 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 1 European legislation without national derogations need not be mentioned.

NOTE 2 Affixing the CE marking symbol means, if a product is subject to more than one directive that it complies with all applicable directives.

Bibliography

[1] EN 1990, *Eurocode: Basis of structural design*

[2] EN ISO 9001, *Quality management systems — Requirements (ISO 9001:2000)*

[3] ENV 13670-1, *Execution of concrete structures — Part 1: Common rules*

[4] ISO 1803, *Building construction — Tolerances — Expression of dimensional accuracy — Principles and terminology*

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