BS EN 13225:2013

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Precast concrete products — Linear structural elements

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National foreword

This British Standard is the UK implementation of EN 13225:2013. It supersedes BS EN 13225:2004, which is withdrawn.

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.

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

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

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Precast concrete products - Linear structural elements

Produits préfabriqués en béton - Éléments de structure linéaires

Betonfertigteile - Stabförmige tragende Bauteile

This European Standard was approved by CEN on 19 January 2013.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

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The numbering of clauses is strictly related to EN 13369, *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 13225:2013) has been prepared by Technical Committee CEN/TC 229 “Precast concrete products”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by October 2013, and conflicting national standards shall be withdrawn at the latest by October 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13225:2004.

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 Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

Compared with the previous edition, the following changes have been made:

a) addition of lightweight concrete in the Scope;

b) change in subclause 4.3.3.3 Seismic behaviour;

c) addition of subclause 4.3.9 Dangerous substances;

d) changes referring to dangerous substances in Annex ZA.

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 products*, from which also the relevant requirements of the EN 206-1 *Concrete — Part 1: Specification, performances, 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.

This standard was examined by and agreed with a joint working group party appointed by the Liaison group CEN/TC 229 – CEN/TC 250, particularly for its compatibility with structural Eurocodes. Eurocodes are taken as a common reference for design aspects. The installation of some structural precast concrete products is dealt with by EN 13670 *Execution of concrete structures.*

The programme of standards for structural precast concrete products comprises the following standards, in some cases consisting of 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 13224, *Precast concrete products — Ribbed floor elements*

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

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

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

— EN 13978, *Precast concrete products — Precast concrete garages*

— EN 14843, *Precast concrete products — Stairs*

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

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

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

— EN 15037, *Precast concrete products — Beam-and-block floor systems*

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

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

This standard defines in Annex ZA the application methods of CE marking to products designed using the relevant EN Eurocodes (EN 1992-1-1, EN 1992-1-2 and EN 1998-1). 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 and/or fire resistance, the conditions to affix CE marking to the product are described in ZA.3.4.

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

Introduction

The evaluation of conformity given in this document 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 and resistance to fire, reference is made to EN 1992-1-1 and EN 1992-1-2. Additional complementary rules are provided where necessary.

In 4.3.3 and 4.3.4, this document includes specific provisions resulting from the application of EN 1992-1-1, EN 1998-1 and EN 1992-1-2 rules made specific for the concerned product. The use of these provisions is consistent with a design of works made with EN 1992-1-1 and EN 1992-1-2.

1 Scope

This European Standard identifies the requirements, the basic performance criteria and evaluation of conformity for precast linear elements (such as columns, beams and frame elements) made of reinforced or prestressed normal or lightweight concrete, used for the construction of the structures of buildings and other civil engineering works, except bridges.

This document covers terminology, performance criteria, tolerances, relevant physical properties, test methods, and aspects of transport and erection.

This document does not cover load bearing capacity determined by testing.

This standard does not cover lintels with length up to 4,5 m used in masonry walls.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 1998-1:2004, *Eurocode 8: Design of structures for earthquake resistance — Part 1: General rules, seismic actions and rules for buildings*

EN 13369:2013, *Common rules for precast concrete products*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13369:2013 and the following apply.

NOTE In general, the term “product” refers to an element which is produced in large numbers.

3.1
beam
element, usually horizontal, for carrying loads primarily by flexure

3.2
column
vertical bearing element subject mainly to compression

3.3
frame
structure composed of two or more linear elements joined together to ensure stability

4 Requirements

4.1 Material requirements

For general aspects, constituent materials of concrete, reinforcing and prestressing steel, inserts and connectors, the relevant clauses of EN 13369:2013, 4.1 shall apply. In particular, the ultimate tensile and tensile yield strength of steel shall be considered.

4.2 Production requirements

For concrete production, hardened concrete and structural reinforcement, the relevant clauses of EN 13369:2013, 4.2 shall apply. In particular, the compressive strength of concrete shall be considered.

4.3 Finished product requirements

4.3.1 Geometrical properties

NOTE The missing numbers correspond to the clauses of EN 13369:2013 which are not relevant for the purposes of this document.

4.3.1.1 Production tolerances

4.3.1.1.1 General

4.3.1.1 of EN 13369:2013 and the following tolerances specific to linear elements shall apply.

The values refer to measurements taken according to 5.2 of EN 13369:2013.

Figures 1 and 2 describe, for columns and beams, the relevant tolerances, where Δh corresponds to ΔL of EN 13369:2013, 4.3.1.1.

4.3.1.1.2 Principal dimensions

For linear elements, the tolerances are given in Table 1.

Table 1 — Tolerances for linear elements

Measurement	Permitted deviation	Values
Angle deviation δ of end- or cross-sections	$\pm \delta$	$h/100 \geq 5$ mm
Bow misalignment ε in any principal plane	$\pm \varepsilon$	$L/700$

For cross-section dimensions, length and reinforcement placing, the corresponding permitted deviations Δh, ΔL and Δc are given in 4.3.1.1 of EN 13369:2013.

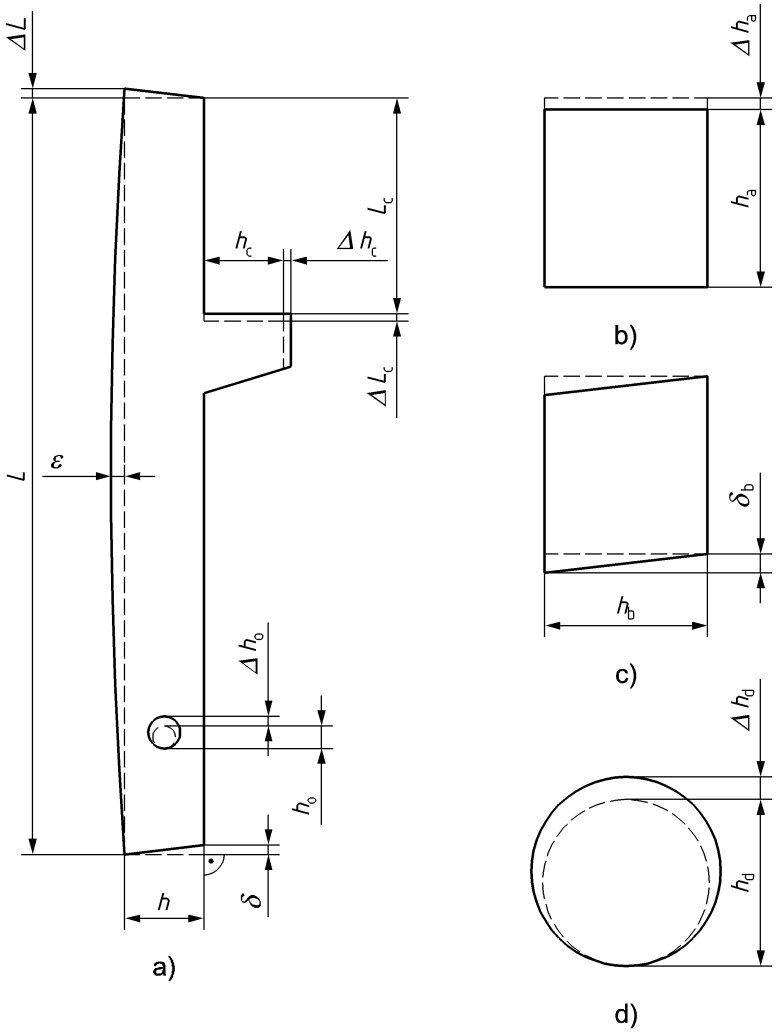
For the size of holes and openings 1,5 times the values of Δh and δ tolerances may be assumed. For the overall positioning of holes and inserts 1,5 times the values of ΔL and Δh tolerances may be assumed. Other values may be given in project specifications.

The values of the tolerances do not include the deformation effects of any applied load or of prestressing. In the verification of the measured deviations, such deformations shall be taken into account by computing their value for the test situation.

NOTE Bow misalignment corresponds to deviation from straightness. For beams in the vertical plane, it corresponds to camber.

4.3.1.1.3 Columns

For columns, tolerances of 4.3.1.1.2 are described in Figure 1.



Key

a) lateral view: principal tolerances
b) cross section (linear deviation)
c) cross section (angle deviation)
d) circular cross section (linear deviation)

Figure 1 — Tolerances for columns

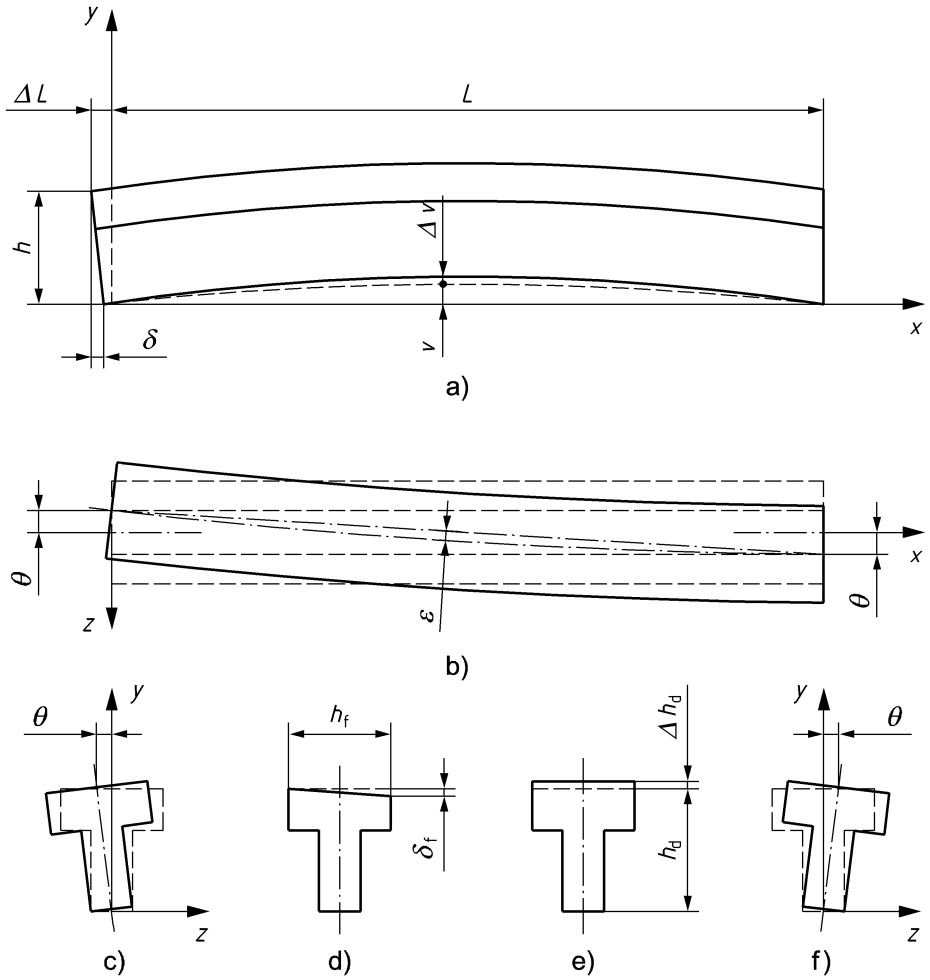
4.3.1.1.4 Beams

For beams, the tolerances, additional to those of 4.3.1.1.2, are given in Table 2 (see Figure 2).

Table 2 — Tolerances for beams

Measurement	Tolerance	Values
Skew θ of the vertical central plane	$\pm\ \theta$	L/700
Camber v in vertical plane	$\pm\ \Delta v$	L/700

For prestressed elements 1,5 times the value of Δv tolerance may be assumed; this includes the effects of prestressing tolerance.



Key

a) lateral view: principal tolerances
b) in plan view: principal tolerances
c) cross section (skew)
d) cross section (angle deviation)
e) cross section (linear deviation)
f) cross section (skew)

Figure 2 — Tolerances for beams

4.3.1.1.5 Other elements

For other types of linear precast structural elements, such as frame elements (see Figure 3), all the production tolerances and the method for checking shall be defined in the project specifications, in a similar manner to that given in this document. The permitted deviations of cross sections shall be in accordance with Table 4 of EN 13369:2013.

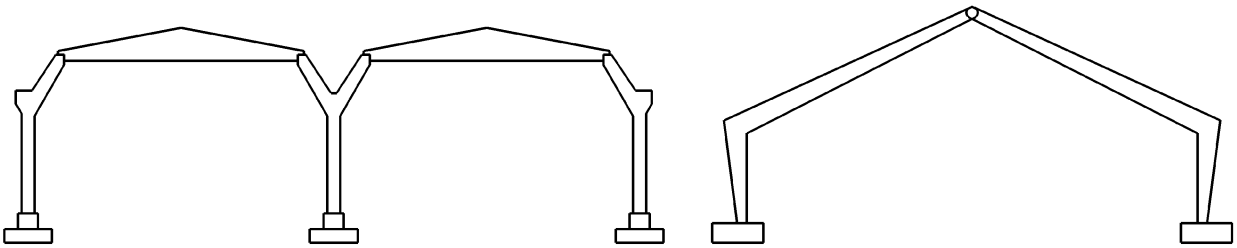


Figure 3 — Examples of frame elements

4.3.1.2 Minimum dimensions

4.3.1.2 of EN 13369:2013 shall apply.

4.3.2 Surface characteristics

4.3.2 of EN 13369:2013 shall apply.

4.3.3 Mechanical resistance

4.3.3.1 General

For requirements on mechanical strength, 4.3.3 of EN 13369:2013 (referring to EN 1992-1-1:2004) shall apply, except 4.3.3.4 dealing with verification by testing.

4.3.3.2 Transient situations

For transient situations, 4.3.3.6 of EN 13369:2013 shall apply.

In Annex A, important information is given for lateral buckling of slender beams during lifting, transportation and erection.

4.3.3.3 Seismic behaviour

Within the scope of 5.2.2 of EN 1998-1:2004, precast columns of one-storey buildings with hinged top connections to the beams belong to frame systems under the following conditions:

a) the columns are designed on the assumption that their tops are connected along both main directions of the building to the supported elements by structural connections as specified in 5.11.3.1(2) of EN 1998-1:2004;

b) the column normalised axial load (ratio between design axial action and corresponding design strength) does not exceed 0,3 in the seismic design situation;

c) the columns are based with full degree of support in foundations designed in accordance with 5.11.2.1.2 of EN 1998-1:2004;

d) the minimum cross-sectional dimension of primary seismic columns shall not be less than 200 mm;

e) unless $\theta \leq 0{,}1$ (see 4.4.2.2(2) of EN 1998-1:2004), the cross-sectional dimensions of primary seismic columns should not be smaller than:

   1) one twentieth of the larger distance between the point of contraflexure and the end of the column (effective length l_0 according to EN 1992-1-1:2004, 5.8.3.2), for bending within a plane parallel to the column dimension considered;

   2) 250 mm.

4.3.4 Resistance and reaction to fire

4.3.4.1 Resistance to fire

Fire resistance R, dealing with load-bearing capacity of linear precast concrete structural elements, expressed in terms of classes or resistance to parametric fire, shall be declared following 4.3.4.1 to 4.3.4.3 of EN 13369:2013.

4.3.4.4 Reaction to fire

For reaction to fire, 4.3.4.4 of EN 13369:2013 shall apply.

4.3.7 Durability

4.3.7 of EN 13369:2013 shall apply.

4.3.8 Other requirements

4.3.8.1 Safety in handling

4.3.8.1 of EN 13369:2013 shall apply.

4.3.9 Dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonised test methods, verification and declaration on release/content should be done taking into account national provisions valid in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction web site on EUROPA accessed through: *http://ec.europa.eu/enterprise/construction/cpd-ds/*

5 Test methods

Clause 5 of EN 13369:2013 shall apply.

6 Evaluation of conformity

6.1 General

6.1 of EN 13369:2013 shall apply.

6.2 Initial type testing

6.2 of EN 13369:2013 shall apply.

6.3 Factory production control

NOTE The missing numbers correspond to the clauses of EN 13369:2013 included in the general references made in this subclause.

6.3 of EN 13369:2013, except 6.3.6.5, shall apply.

6.3.6.5 Finished products

Compliance verifications on the finished products shall be performed following, in addition to items 4 to 6 of Table D.4.1 of EN 13369:2013, the control chart of Table 3 of this document. Other verifications can be performed where a special necessity arises.

The checks shall be carried out as soon as possible, preferably in the factory, and never after the precast units have been received and accepted by the client.

Table 3 — Finished product inspection

Subject	Aspect	Method	Frequency	Registration
Pretensioned tendons	initial slippage	gauge meter	1 element per bed per production day	notation in the record form
Elements	surface finish	visual inspection	Every element	notice of imperfections
Elements	total length	see 5.2	1 every 10 elements or 1 every casting line	notation in the record form
Elements	vertical deflection "v" (camber)[b]	see 5.2	1 at least every month	notation in the record form
Elements	other geometrical tolerances	see 5.2	1 at least every month for every casting line	notation in the record form

[a] Slippage (shortening of the steel versus the concrete surface) has to be limited to the values given in 4.2.3.2.4 of EN 13369:2013.

[b] See 4.3.1.1.4 and Figure 2.

The manufacturer shall keep the records of the elements produced (position number, date of casting and construction data) for the required period of archiving and make them available when required.

7 Marking

Clause 7 of EN 13369:2013 shall apply.

NOTE For CE marking see Annex ZA.

8 Technical documentation

The detailing of the element, with respect to geometrical data and 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 13369:2013.

Annex A
(informative)

Precautions about lateral buckling of beams

Except where proper stiffening and/or bracing provisions are adopted to ensure stability during transitory stages before the completion of the structure, special verifications against lateral buckling should be performed for slender beams for which the horizontal flexural stiffness is much lower than the vertical one. This is the case of narrow sections with $I_z << I_y$ such as the one of Figure A.1. A simplified rule to check the necessity of special verifications is given in 5.9 of EN 1992-1-1:2004.

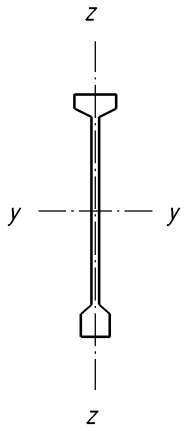


Figure A.1 — Cross section of a deep beam

The different transitory and final situations that may require special buckling verifications are listed below:

— lifting conditions with pendulum suspension can be very unstable because of the low degree of restraint and of possible axial compression (see Figures A.2 and A.3);

— storage conditions are usually less sensitive to buckling due to the higher degree of restraint, but special care is to be given to ensure the torsional effectiveness of bearings;

— transportation conditions of the beams can require a special design, inclusive of possible buckling effects, made case by case;

— transitory conditions after installation can submit the beams to overloads while lacking in the bracing effects of the surrounding elements (see Figures A.4 and A.5);

— final situation of the completed structure is usually stiffened by the diaphragm effect of the floor or by other special bracing systems, provided lateral supports of the beams and proper connections are applied;

— isolated beams in final structural conditions (e.g. for bridge crane railways) require special design calculations, inclusive of lateral and torsional effects of actions, which usually lead to non-slender proportions.

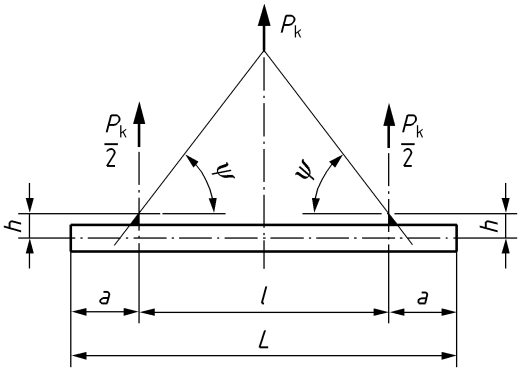


Figure A.2 — Lifting condition of a beam

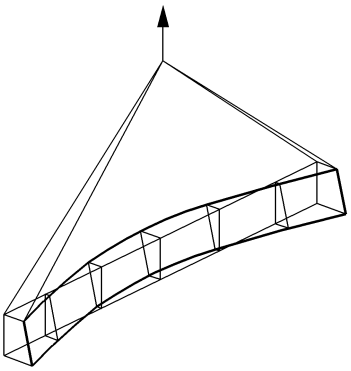


Figure A.3 — Lateral buckling in lifting condition

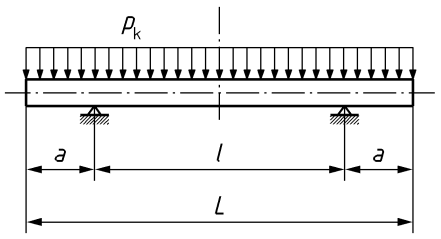


Figure A.4 — Laying condition of a beam

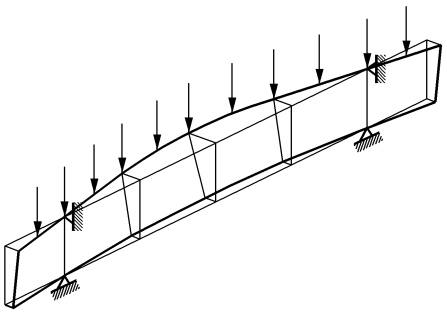


Figure A.5 — Lateral buckling in laying condition

Annex ZA
(informative)

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

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under the mandate M/100[1)] "Precast Concrete Products" 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 linear structural elements covered by this annex for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

This annex has the same scope as Clause 1 of this standard. It establishes the conditions for CE marking of linear structural elements (such as columns, beams and frame elements) made of reinforced or prestressed normal weight concrete, used for the construction of the structures of buildings and other civil engineering works, except bridges, and shows the relevant clauses applicable (see Table ZA.1).

1) As amended.

Table ZA.1 — Relevant clauses for linear elements

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/mm²
Ultimate tensile and tensile yield strength (of steel)	All methods	4.1.3 Reinforcing steel and 4.1.4 Prestressing steel of EN13369:2013	None	N/mm²
Mechanical resistance	Method 1	Information listed in ZA.3.2	None	Geometry and materials
	Method 2	4.3.3 Mechanical resistance 4.2.3.2.1 Initial tensioning stresses of EN 13369:2013 4.2.3.2.4 Slippage of tendons of EN 13369:2013	None	kNm, kN, kN/m N/mm² mm
	Method 3	4.3.3 Mechanical resistance 4.2.3.2.1 Initial tensioning stresses of EN 13369:2013 4.2.3.2.4 Slippage of tendons of EN 13369:2013	None	Design specification
Resistance to fire (for load bearing capacity)	Method 1	Information listed in ZA.3.2	R	Geometry and materials
	Method 2	4.3.4.1 Resistance to fire	R	Min
	Method 3	4.3.4.1 Resistance to fire	R	Design specification
Dangerous substances	All methods	4.3.9 Dangerous substances	None	
Durability against corrosion	All methods	4.3.7 Durability	None	Ambient conditions
Detailing	All methods	4.3.1 Geometrical properties 8 Technical documentation	None	mm /

The manufacturer or his authorised representative in the EEA shall select for CE marking the declaration method(s) he applies among the following:

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

— Method 2 = declaration of geometry, material properties and product properties determined following this standard and EN Eurocodes(see ZA.3.3);

— Method 3 = declaration of product compliance with a given design specification distinguishing:

  — Method 3a = declaration of product compliance with a given design specification provided by the client (ZA.3.4);

  — Method 3b = declaration of product compliance with a given design specification provided by the manufacturer according to the client's order (ZA.3.5).

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 Clause 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 linear precast concrete structural elements

ZA.2.1 System of attestation of conformity

The system of attestation of conformity of linear precast concrete structural 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 (published the 03.02.1999 in the OJEU) 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)
Linear structural elements	Structural	-	2+
System 2+: See Directive 89/106 (CPD) Annex III-2 (ii) First possibility, including certification of the factory production control by an approved 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 linear precast concrete structural elements, 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 linear precast concrete structural elements under system 2+

Tasks		Content of the tasks	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Initial type testing [a]	All characteristics of table ZA.1	6.2
	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	6.3
Tasks under the responsibility of the FPC certification body	Initial inspection of factory and of factory production control [b]	Parameters related to EC of Table ZA.1 relevant for the intended use which are declared namely: — compressive strength (of concrete); — ultimate tensile and tensile yield strength; — mechanical resistance [c] ; — detailing; — durability; — resistance to fire R [c].	6.3
	Continuous surveillance, assessments and approval of factory production control	Parameters related to EC of Table ZA.1 relevant for the intended use which are declared namely: — compressive strength (of concrete); — ultimate tensile and tensile yield strength; — mechanical resistance [c] ; — detailing; — durability; — resistance to fire R [c] .	6.3

[a] Initial Type testing (ITT) includes calculation and/or testing. ITT by calculation is not required when only methods 1 and 3a are used.

[b] Includes assessment that the factory production control system contains documented procedures related to ITT (calculation and/or testing) and that these procedures are followed. Reference to ITT of mechanical resistance and resistance to fire (when assessed by calculation) can be omitted when only methods 1 and 3a) are used.

[c] Only for methods 2 and 3b.

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;

NOTE 1 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

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

NOTE 2 Where some of the information required for the Declaration is already given in the CE marking information, it does not need to be repeated.

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

— 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;

— name and address of the manufacturer;

— 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;

— identification of the products covered by the Factory Production Control Certificate and for each product, identification of:

  — the method(s) of declaration applied by the manufacturer;

  — whether the product is reinforced or prestressed;

  — other distinguished product families as identified in this standard or by the manufacturer himself and affect the content and/or procedures of the factory production control including the procedure of type testing.

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/EEC and shall be shown on the product (or when not possible it may be on the accompanying label, the packaging or the accompanying commercial documents e.g. a delivery note).

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

— identification number of the certification body;

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

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

— number of the factory production control certificate;

— reference to this European Standard with the date of the version;

— 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 clause ZA.3.2, ZA.3.3, ZA.3.4 or ZA3.5;

— "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 and 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.1, ZA.2, ZA.3, ZA.4ZA.5, ZA.6, ZA.7, ZA.8 and ZA.9.

ZA.3.1.1 Simplified label

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

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

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

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

— number of the factory production control certificate;

— reference to this European Standard with the date of the version.

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

All other information defined by the relevant method of CE marking in one of the relevant clauses ZA.3.2, ZA.3.3, ZA.3.4 and ZA3.5 shall be provided in the accompanying documents.

Figure ZA.1 gives an example for the simplified label for CE marking.

CE	CE conformity marking consisting of the CE symbol given in directive 93/68/EEC
AnyCo Ltd, PO Bx 21, B-1050 45PJ76 13 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer. Identification number of the unit. Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 13225:2013	Number of dated version of this European Standard

Figure ZA.1 — Example of simplified label

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)

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;

— ultimate tensile strength of prestressing steel;

— tensile 0,1 % proof stress of prestressing steel;

— geometrical data (only critical dimensions);

— conditions for durability (exposure class(es));

— detailing;

This information may be given by reference to the manufacturer's Technical Information (product catalogue) for detailing, durability and geometrical data.

Figures ZA.2 and ZA.3 give, for columns and beams, an example of 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 and resistance to fire, including aspects of durability and serviceability.

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 13 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 13225:2013 Linear precast concrete structural element COLUMN (for structures) 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  Series C0 Type 400 × 500 × 6 000 For detailing and durability see Technical Information Technical Information: Product Catalogue ABC : 2002 – Clause ii	Number of dated version 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 manufacturer) NOTE The sketch may be omitted if equivalent information is available in clearly identified Technical Information (product catalogue) referred to.

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

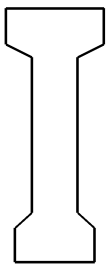
CE 0123	CE conformity marking consisting of the CE symbol given in directive 93/68/EEC Identification of the notified body
AnyCo Ltd, PO Bx 21, B-1050 13 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 13225:2013 Linear precast concrete structural element BEAM (for structures) 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 Prestressing steel : Ultimate tensile strength .....f_{pk} = uuu N/mm^2 Tensile 0.1% proof-stress .....$f_{p0.1k}$ = www N/mm^2  Series IB Type 1 200 × 12 000 For detailing and durability see Technical Information Technical Information: Product Catalogue ABC : 2002 – Clause ii	Number of dated version 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 manufacturer) NOTE The sketch may be omitted if equivalent information are available in clearly identified Technical Information (product catalogue) referred to.

Figure ZA.3 — Example of CE marking with Method 1 for beams

ZA.3.3 Declaration of product properties (method 2)

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;

— ultimate tensile strength of prestressing steel;

— tensile 0,1 % proof stress of prestressing steel;

— mechanical ultimate strength of the element (design values for non-seismic situations) with axial compression capacity for some eccentricities or with bending moment capacity and shear capacity of critical sections;

— resistance to fire R class;

— safety factors for concrete and steel used in calculation;

— other Nationally Determined Parameters (NDPs) used in calculation;

— conditions for durability (exposure class(es));

— geometrical data;

— detailing.

This information may be given by reference to the manufacturer's Technical Documentation for geometrical data, detailing, durability, other NDPs.

Figures ZA.4 and ZA.5 give, for columns and beams, an example of CE marking in the case in which the properties related to mechanical resistance and stability and resistance to fire including aspects of durability and serviceability are determined by the manufacturer by means of EN Eurocodes.

The design values of the mechanical ultimate strength of the element and the resistance to fire class shall be computed using, for the Nationally Determined Parameters, either the values recommended in EN 1992-1-1:2004 and EN 1992-1-2:2004 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 13 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 13225:2013 Linear precast concrete structural element COLUMN (for structures) 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 resistance (design values): Axial compression capacity For eccentricity e = 0,00 m..... uuu kN For eccentricity e = x,xx m .....vvv kN For eccentricity e = y,yy m ..... www kN Material safety factors applied in strength calculation: For concrete ..... γ_c = z.zz For steel ..... γ_s = x.xx Resistance to fire.....RXX for η_{fi} = 0.xx .....RYY for η_{fi} = 0.yy ..... For geometrical data, detailing, durability, possible complementary information on fire resistance and other NDPs see the Technical documentation Technical Documentation: Position Number.....xxxxxx	Number of dated version 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 manufacturer) NOTE The values of resistance to fire may be replaced by a reference to the pertinent part of the technical documentation.

Figure ZA.4 — Example of CE marking with Method 2 for columns

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 13 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 13225:2013 Linear precast concrete structural element BEAM (for structures) 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 Prestressing steel : Ultimate tensile strength ..... f_{pk} = uuu N/mm^2 Tensile 0.1% proof-stress ..... $f_{p0.1k}$ = www N/mm^2 Mechanical resistance (design values): Bending moment capacity (of the middle section) ..... mmm kNm Shear capacity (of the end sections) ..... vvv kN Material safety factors applied in strength calculation: For concrete ..... γ_c = z.zz For steel ..... γ_s = x.xx Resistance to fire ..... RXX for η_{fi} = 0.xx ..... RYY for η_{fi} = 0.yy ..... For geometrical data, detailing, durability, possible complementary information on fire resistance and other NDPs see the Technical documentation Technical Documentation: Position Number xxxxxx	Number of dated version 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 manufacturer) NOTE Mechanical resistance parameters refer to the precast element without any additional cast-in-situ part. NOTE The values of resistance to fire may be replaced by a reference to the pertinent part of the technical documentation.

Figure ZA.5 — Example of CE marking with Method 2 for beams

ZA.3.4 Declaration of compliance with a design specification provided by the client (method 3a)

Referring to Table ZA.1 and to the information and declared values 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;

— ultimate tensile strength of prestressing steel;

— tensile 0,1 % proof stress of prestressing steel;

— reference to the design documents provided by the client.

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

Figures ZA.6 and ZA.7 give, for columns and beams, an example of CE marking in the case the product is produced according to a design specification prepared by the client (designer of 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 13 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 13225:2013 Linear precast concrete structural element COLUMN (for structures) 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, fire resistance and durability see the design specifications Design Specification provided by the client: Reference..... (file number)	Number of dated version 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 manufacturer)

Figure ZA.6 — Example of CE marking with Method 3a for columns

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 13 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 13225:2013 Linear precast concrete structural element BEAM (for structures) 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 Prestressing steel : Ultimate tensile strength .....f_{pk} = uuu N/mm^2 Tensile 0.1% proof-stress .....$f_{p0.1k}$ = www N/mm^2 For geometrical data, detailing, mechanical strength, fire resistance and durability see the design specifications Design Specification provided by the client: Reference .....(file number)	Number of dated version 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 manufacturer)

Figure ZA.7 — Example of CE marking with Method 3a for beams

ZA.3.5 Declaration of compliance with a design specification provided by the manufacturer according to the client's order (method 3b)

Referring to Table ZA.1 and to the information and declared values 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;

— ultimate tensile strength of prestressing steel;

— tensile 0,1 % proof stress of prestressing steel;

— resistance to fire class;

— reference to the design specifications according to the client's order and dealing with geometrical data, detailing, mechanical strength, fire resistance and durability.

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

Figures ZA.8 and ZA.9 give, for columns and beams, an example of CE marking in the case the product is produced according to a design specification applied by the manufacturer according to the purchaser's order.

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 13 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 13225:2013 Linear precast concrete structural element COLUMN (for structures) 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, fire resistance and durability see the design specifications Design Specification: .....(client's order)	Number of dated version 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 manufacturer)

Figure ZA.8 — Example of CE marking with Method 3b for columns

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 13 0123-CPD-0456	Name or identifying mark and registered address of the manufacturer Last two digits of the year in which the marking was affixed Number of the FPC certificate
EN 13225:2013 Linear precast concrete structural element BEAM (for structures) 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 Prestressing steel : Ultimate tensile strength .....f_{pk} = uuu N/mm^2 Tensile 0.1% proof-stress $f_{p0.1k}$ = www N/mm^2 For geometrical data, detailing, mechanical strength, fire resistance and durability see the design specifications Design Specification: ..... (client's order)	Number of dated version 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 manufacturer)

Figure ZA.9 — Example of CE marking with Method 3b for beams

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