BS EN 12839:2012

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Precast concrete products — Elements for fences

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National foreword

This British Standard is the UK implementation of EN 12839:2012. It supersedes BS EN 12839:2001, which is withdrawn.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.

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Precast concrete products - Elements for fences

Produits préfabriqués en béton - Eléments pour clôtures

Betonfertigteile - Betonelemente für Zäune

This European Standard was approved by CEN on 13 November 2011.

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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 13369:2004 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 12839:2012) 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of an identical text or by endorsement, at the latest by July 2012, and conflicting national standards shall be withdrawn at the latest by October 2013.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 12839:2001.

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.

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

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

The references to EN 13369:2004 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 EN 13670-1, *Execution of concrete structures*, 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 an 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 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 *(all parts), 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 15037-1, *Precast concrete products — Beam-and-block floor systems — Part 1: Beams;*

— EN 15037-2, *Precast concrete products — Beam-and-block floor systems — Part 2: Concrete blocks;*

— EN 15037-3, *Precast concrete products — Beam-and-block floor systems — Part 3: Clay blocks;*

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

— EN 15258, *Precast concrete products — Retaining wall 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 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.3.4.

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, Croatia, 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, Turkey and the United Kingdom.

1 Scope

This European standard specifies precast products in reinforced or pre-stressed concrete with or without fibres, to be used together or in combination with other elements to erect fences e.g. boundary fences.

This European standard covers both mechanical resistance determined by calculation and load bearing capacity determined by testing.

Normal weight concrete or light weight concrete elements include posts, solid or open panels, slabs, rails, spurs, struts and base panels.

The intended uses may be nonstructural or lightly structural.

It provides for the evaluation of conformity of elements to this European Standard. Marking conditions are included.

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 206-1:2000, *Concrete — Part 1: Specification, performance, production and conformity*

EN 1991-1-4:2005, *Eurocode 1: Actions on structures — Part 1-4: General actions — Wind actions*

EN 12390-4:2000, *Testing hardened concrete — Part 4: Compressive strength — Specification for testing machines*

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

3 Terms and definitions

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

3.1
types of fences

NOTE Annex A intends to provide information on the possible types of fences in which these elements may be part of.

3.1.1
solid fence
fence made of posts and solid panels or cladding

3.1.2
open-work fence
fence made of posts and open-work panels possibly including solid panels

3.1.3
mesh or wire fence
fence made of posts and woven or welded wire mesh, and/or wires

3.1.4
mixed fence
fence made of posts and a combination of different elements with at least one base panel or fence made of load bearing base enclosure walls acting as a base panel and a combination of different (welded) wire meshes

3.1.5
rail fence
fence made of posts and rails

3.1.6
anti-intruder fence
mesh fence, solid fence or mixed fence with an enhanced level of security provided by the addition of barbed wire, barbed tape or similar attached to posts with cranked or vertical extensions

3.2
post
vertical element of reinforced or pre-stressed concrete, intended to be buried or fastened at its base

NOTE This element is designed to accommodate solid or open-work panels and/or rails, meshes or wires.

3.2.1
intermediate post
post used in the fence line, interposed between ends, direction changes and straining points (if any)

3.2.2
accessory post
post shaped and designed to provide a particular function

3.2.2.1
corner post
post used at a change of direction

3.2.2.2
end post
post used at the extremity of a fence line

3.2.2.3
straining post
post from which tension wires are stretched, with or without struts (e.g. end-straining post, corner post, intermediate straining post)

3.2.2.4
gate post
post used to support a gate

3.3
rail
horizontal element of reinforced or pre-stressed concrete, connected to and supported by the post

NOTE Rails for sports grounds are distinguished from other types of rails.

3.4
panel
horizontal element of reinforced or pre-stressed concrete, connected to the post

3.4.1
solid panel
panel of reinforced concrete

3.4.2
open-work panel
panel with regular or varied open-work patterns

3.4.3
base panel
panel of reinforced concrete used between posts at ground level

3.5
spur
short post intended to support a fence post made with a material other than concrete

3.6
strut
element designed to provide support to post carrying horizontal loads

3.7.
dimension
dimension specified by the manufacturer and generally complying with the dimension indicated in the project or in the manufacturer technical documentation

NOTE 1 The design height of the posts for solid fences is the height of the solid part of the fence.

NOTE 2 The design height of the anti-intruder fence is equal to the height of the post without cranked or vertical extension.

3.8
surface finish
Finishes are classified as one of two categories corresponding to the different manufacturing techniques detailed below.

3.8.1
surface finish as cast
surface finish obtained at demoulding, if necessary after surfacing or finishing

3.8.2
surface finish treated
surface finish obtained after complementary treatment on the concrete in fresh state or in hardened state

3.9
heat treatment
The process of heating the fresh concrete in order to accelerate cement hydration where the temperature of the concrete after compaction is above 45 °C or is in excess of 25 °C above the ambient temperature

3.10
normal weight concrete
3.1.7 of EN 206-1:2000 shall apply

3.11
lightweight concrete
3.1.8 of EN 206-1:2000 shall apply

4 Requirements

4.1 Material requirements

4.1 of EN 13369:2004 shall apply:

4.2 Production requirements

4.2.1 Concrete production

4.2.1 of EN 13369:2004 shall apply, with the following complementary requirements.

However, where instant demoulding of elements is required, they may be produced using a concrete mix of water content and workability suitable for the purpose.

4.2.2 Hardened concrete

4.2.2.1 Compressive strength

For fence elements designed by calculation in durability class 1, 4.2.2.1 of EN 13369:2004 shall apply. In other cases, the following shall apply.

Under the test conditions defined in 5.5, the characteristic compressive strength of concrete for the fractile 0,05 [1)], after a 28 days hardening, shall be at least equal to the following values (cylinder/cube):

— light-weight reinforced concrete LC25/28;

— reinforced concrete C35/45;

— pre-stressed concrete C40/50.

Moreover, no specimen shall have a compressive strength less than 0,8 times the characteristic value.

4.2.3 Structural reinforcement

The length of the longitudinal reinforcement for posts shall not be less than the length of the element minus 100 mm.

4.3 Finished product requirement

4.3.1 Geometrical properties

4.2.3.2.3 of EN 13369:2004 shall apply.

4.3.1.1 Production tolerances

The dimensions of the elements are not fixed. If not otherwise stated class D1 applies to all elements.

4.3.1.1.1 Class D.1

The following tolerances shall apply.

Under the test conditions defined in 5.1, actual dimensions shall conform to the corresponding work dimensions within the following limits:

a) posts:

1) length ± 1 %

1) This means that statistical interpretation of the tests results demonstrate that 95 % of the corresponding production are at least equal to the values defined above.

2)	cross-section dimensions	± 3 mm
3)	straightness	≤ 0,5 %
4)	location of holes	± 5 mm

b) rails:

1)	length (between supports)	± 5 mm
2)	cross-section dimensions	± 3 mm
3)	straightness	≤ 0,5 %

c) panels:

1)	length	± 5 mm
2)	height	± 3 mm
3)	thickness	± 2 mm
4)	squareness	difference between diagonals: ≤ 0,5 % of their effective mean value
5)	flatness	≤ 0,2 % of the length

4.3.1.1.2 Class D2

The following tolerances shall apply.

The producer shall declare the key-dimension for which the dimensional tolerances shall conform to Table 1.

Table 1 — Dimensional tolerances depending on the key-dimension

Key dimension	Permitted deviation
≤ 1 m	± 5 mm
> 1 m	± 10 mm

4.3.1.2 Minimum dimensions

For pre-stressing wires of diameter d expressed in mm the minimum concrete cover to the surface of any wire shall be 2,5 d or 10 mm whichever is the greater. The minimum spacing between wires shall be 4 d centre to centre.

4.3.2 Surface characteristics

4.3.2.1 Surface finish as cast

The maximum total surface area of blowholes is declared by the manufacturer.

NOTE Reference images to identify the severity of blow holes in concrete surfaces could be referred to the guidelines CEN/TR 15739.

4.3.2.2 Instant demoulded product

The surface finish of instant demoulded product shall be defined and agreed between the producer and the purchaser.

4.3.2.3 Ends of the elements

For pre-stressed elements the ends of the wires shall be flushed with the visible parts of the elements, then coated with a waterproofing product provided there is adequate data on its durability.

Top ends of reinforced posts shall be shaped to allow water run-off.

4.3.2.4 Interlocking surfaces

Interlocking surfaces shall have no flaw or burr which could hinder the assembly of the elements.

For interlocking units in particular, tolerances shall be declared by the manufacturer and shall be such as to permit interlocking.

4.3.3 Mechanical resistance

4.3.3.1 General

For elements for fences either the mechanical resistance determined by calculation following 4.3.3.2 of EN 13369:2004 or the load bearing capacity determined by testing following Annex B of this standard shall be declared.

4.3.3.2 Complementary load bearing capacity

4.3.3.2.1 General

For elements designed by testing, the complementary load bearing capacity is the ability of an element to resist a defined load under service conditions and a defined failure load.

An element shall withstand a complementary load bearing capacity corresponding to:

— its minimum failure load or, for posts, its normal service and failure loads;

— in the case of posts for solid fences, the class of post in relation with wind under end use conditions, when tested in accordance with Annex B.

4.3.3.2.2 Basis of the requirements for mechanical properties

The requirements for mechanical properties of the elements (Tables 3 to 11) are based on:

a) a maximum above-ground height equal to 2,50 m (excluding extensions for barbed wires);

b) a centre to centre distance between posts of:

   1) 2 m for solid fences and rails for sports grounds;

   2) 3 m for mesh or wire fences;

   3) 2,5 m for other types of fences;

c) wind actions for posts for solid fences:

   1) the peak velocity pressure at height z, which includes mean and short term velocity fluctuations, should be determined according to EN 1991-1-4 (see Table 2).

For different fence heights or post centres, properties shall be determined by interpolation.

Table 2 — Examples of basic wind velocity for posts for solid fences

Basic wind velocity km/h	$V_{b,0}$[a] m/s
80	22
87	24
95	26
100	28
120	33
140	39
[a] According to § 4.2 of EN 1991-1-4:2005.	

4.3.3.2.3 Mechanical resistance of posts

Under the test conditions defined in Annex B, posts shall meet the following requirements:

a) at the limit of working conditions: after release of the normal service load (Tables 3 to 7) the deflection shall not exceed 1 % of the element's above-ground length, and any cracks shall be closed;

b) at the ultimate limit state: the failure load shall be at least equal to the value of the normal failure load (Tables 3 to 7) for the fractile 0,05 [2)].

2) This means that statistical interpretation of the tests results demonstrates that 95 % of the corresponding production are at least equal to the specification.

Moreover, no post shall have a failure load of less than 0,8 times the normal failure load.

NOTE It is recommended that posts for solid fences of at least class B should be used on the sea front or in exposed areas. Local provisions valid in the place where the fence is to be erected should be considered.

For a straining post or "for straining posts", the requirements of 4.3.3.2.2 according to the mechanical resistance apply.

For dimensions which exceed those indicated in the tables, the required mechanical properties shall be defined individually.

The values of loads for intermediate posts are:

Table 3 — Intermediate posts for solid fences (service load)

	Normal failure load N			
Above-ground height of the slabs m	**1,00**	**1,50**	**2,00**	**2,50**
Class of post[a]				
A	1 400	1 400	1 800	2 200
B	1 400	1 800	2 500	3 100
C	1 400	2 300	3 200	4 000
[a] In relation with wind pressures (see EN 1991-1-4).				

Table 4 - Intermediate posts for solid slabs fences (failure load)

	Normal failure load N			
Above-ground height of the slabs m	**1,00**	**1,50**	**2,00**	**2,50**
Class of post[a]				
A	2 300	2 300	3 200	4 000
B	2 300	3 200	4 500	5 600
C	2 600	4 100	5 700	7 200
[a] In relation with wind pressures (see EN 1991-1-4).				

Table 5 — Intermediate posts for open-work fences and posts for mixed fences with a height of the solid part longer than 900 mm

Above-ground height of panels m	≤ 1,20	1,50	2,00	2,50
Normal service load N	1 400	1 400	1 800	2 200
Normal failure load N	2 300	2 300	3 200	4 000

Table 6 — Intermediate posts for mesh or wire fences and posts for mixed fences with a height of the solid part lower or equal to 900 mm

Above-ground height of posts m	≤ 1,20	1,50	2,00	2,50
Normal service load N	1 400	1 400	1 400	1 400
Normal failure load N	2 100	2 100	2 100	2 100

Table 7 — Intermediate posts for rail-fences

Intended purpose	Sports grounds	Other types
Centre to centre distance of posts m	2,00	2,50
Normal service load N	4 000	3 200
Normal failure load N	5 900	4 800

4.3.3.2.4 Mechanical resistance of base or solid or open-work panels and rails

Under the test conditions defined in Annex B, base, solid or open-work panels and rails shall meet the following requirements:

a) the failure load shall be at least equal to the normal failure load for the fractile 0,05 [3)];

b) moreover, no element shall have a failure load less than 0,8 times the normal failure load.

Values of minimum failure loads are given in Tables 8 to 11.

Table 8 — Solid panels

Length of panels m		1,90 ≤ L ≤ 2,05	
Height of panels m		0,25 < H ≤ 0,50	≤ 0,25
Minimum failure load N	class A	800	600
	class B	1 000	750
NOTE It is recommended that panels of at least class B should be used on the sea front or in exposed areas. Local provisions valid in the place where the fence is to be erected should be considered.			

Table 9 — Open-work panels

Length of panels m	1,90 ≤ L ≤ 2,05		
Height of panels m	≤ 0,90	0,90 < H ≤ 1,10	1,10 < H ≤ 1,25
Minimum failure load N	800	1 500	1 900

Table 10 — Base panels

Centre to centre distance between posts m	2,00		2,50	
Height of panels m	≤ 0,25	0,25 < H ≤ 0,50	≤ 0,25	0,25 < H ≤ 0,50
Minimum failure load N	600	800	750	1 000

3) This means that statistical interpretation of the tests results demonstrates that 95 % of the corresponding production are at least equal to the specification.

Table 11 — Rails

Intended purpose	Sports grounds	Others	
Nominal length of rails (centre to centre distance between posts) m	2,00	2,00	2,50
Minimum failure load N	3 000	2 000	2 600

4.3.3.3 Transient situations

4.3.3.6 of EN 13369:2004 shall apply.

4.3.4 Resistance and reaction to fire

Not relevant.

4.3.5 Acoustic properties

Not relevant.

4.3.6 Thermal properties

Not relevant.

4.3.7 Durability

4.3.7.1 Class 1

The durability of the load bearing capacity of elements for fences in normal serviceability conditions is ensured by the characteristic compressive strength of concrete, concrete cover and water absorption of concrete.

Concrete cover relates to the main external faces of elements.

Under the test conditions defined in 5.2 the actual concrete cover shall be at least:

— either 15 mm, reduced to 10 mm when the thickness of the element section is ≤ 10 cm with a steel wire diameter ≤ 10 mm or reduced to 7 mm when the compressive strength of concrete is at least C55/67 with a steel wire diameter ≤ 5 mm and water/(cement + k x addition) ratio is ≤ 0,40;

— or the maximum aggregate size;

whichever is the greatest.

Moreover:

— for pre-stressed elements 4.3.3.2 applies;

— for reinforced posts, the actual concrete cover of the surface remaining exposed to the bad weather after implementation of the products measured at top and base shall be at least 15 mm.

Water absorption of concrete: under the test conditions defined in 5.4, the water absorption of concrete for the fractile 0,05[4)] shall not exceed 6,5 % in mass. Moreover, no individual value on specimen shall exceed 6,8 %.

4.3.7.2 Class 2

Clause 4.3.7 of EN 13369:2004 shall apply for a design working life of 50 years.

As an alternative, durability may be ensured by using performance based design methods, e.g. Annex J of EN 206-1:2000, provided the correlation is demonstrated.

4.3.8 Safety in handling

In addition to 4.3.8.1 of EN 13369:2004, the following shall apply:

Mechanical resistance specified in 4.3.3 takes products handling into consideration. In addition, the supplier shall indicate if necessary the limits for handling and storage.

5 Test methods

5.1 Dimensions

5.1.1 Measuring equipment

Measuring equipment shall be accurate to 0,5 mm, until 2 m, and accurate to 1 mm beyond.

The equipment is composed of:

— a 3 m tape measure for measurement of dimensions of rectangular sides;

— callipers for measurement of thickness;

— a 3 m aluminium straight edge and a set of machinist's slip gauges for measurement of flatness-straightness;

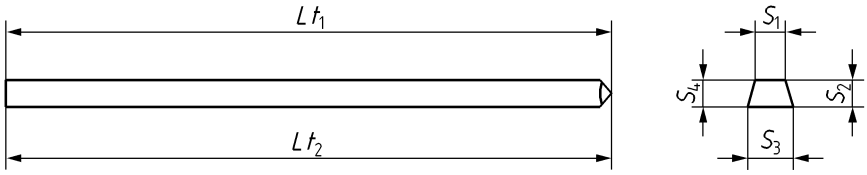
— a 500 mm measuring rule for other measurements.

It is recommended that this equipment be supplemented with two set squares to facilitate the location of the points from which measurements are to be taken.

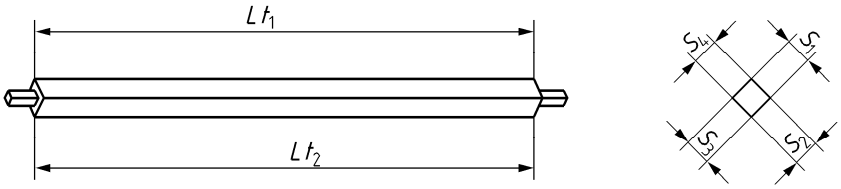
4) This means that statistical interpretation of the tests results demonstrates that 95 % of the corresponding production are at least equal to the specification.

5.1.2 Posts and rails

5.1.2.1 Length and section



a) Post



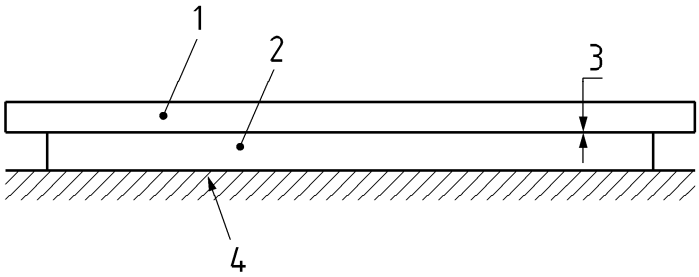
b) Rails

$$Lt = \frac{Lt_1 + Lt_2}{2}$$

$$S = \frac{S_1 + S_2 + S_3 + S_4}{4}$$

Figure 1 — Measurement of length and section of post and rail

5.1.2.2 Straightness



Key

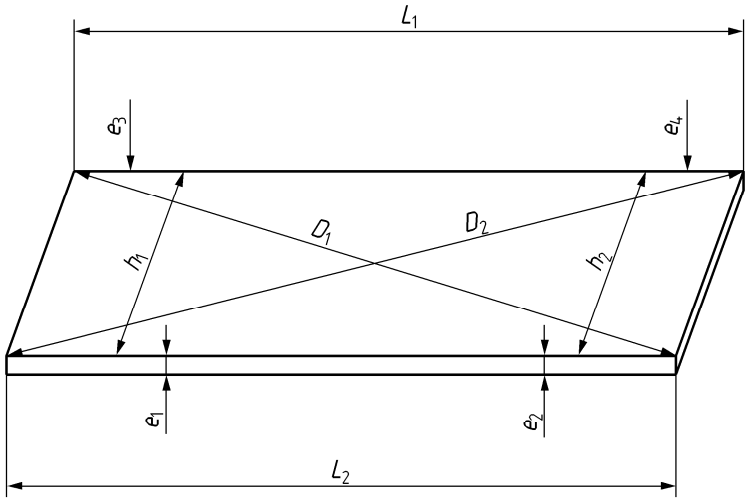
1 Aluminium straight edge
2 Post or rail
3 Maximum deviation recorded with an adjusting wedge (Δ)
4 Plane surface

f or $p = \frac{\Delta}{LT} \times 100$ in %

Figure 2 — Measurement of straightness of post and rail

5.1.3 Panels

5.1.3.1 Length, height, thickness and squareness



Key

L Length
e Thickness
Sq Squareness
H Height

$$L = \frac{L_1+L_2}{2}$$

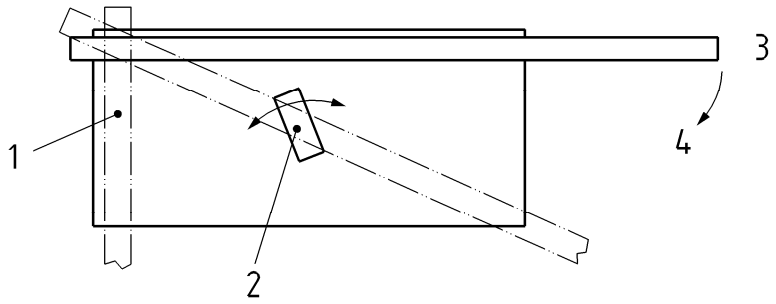
$$e = \frac{e_1+e_2+e_3+e_4}{4} \qquad H = \frac{h_1 + h_2}{2}$$

$$Sq = \frac{2(D_1-D_2)}{D_1+D_2}\times 100 \text{ in \%}$$

Figure 3 — Measurement of length, height, thickness and squareness of panels

5.1.3.2 Flatness

The maximum deviation between the surface and the rule, which is measured by the sweep of the slip gauge, is the flatness deviation.



Key

1 Final position
2 Gauge
3 Initial position
4 Direction of rotation

Figure 4 — Measurement of flatness of panels

5.2 Concrete cover

The concrete cover shall be measured on whole elements with a covermeter or on elements which have been tested to failure adjacent to the fracture. Where a covermeter is used, its calibration shall be checked before by using concrete samples containing steel reinforcement with known covers.

5.3 Surface characteristic

5.3.1 Surface finish as cast

The surface finish shall be assessed against the reference photographs in (on the 1/1 scale).

NOTE It could be useful to refer to CEN/TR 15739.

5.3.2 Surface finish treated

NOTE Possible efflorescences due to lime or water migrations have no effect on the performances of the elements; they reduce progressively with time.

5.4 Water absorption

The test method given in Annex G of EN 13369:2004 shall apply.

5.5 Concrete strength

Test specimens for assessing concrete strength at transfer of pre-stress shall be cured in a manner similar to that of the elements concerned.

5.1.1 of EN 13369:2004 shall apply.

5.6 Load testing

For elements verified by testing the test method given in Annex B shall apply.

5.7 Density

According to its density, the concrete is defined dense or lightweight (see definition in 3.10 and 3.11).

When the density of the concrete is given after oven drying, it should be measured in accordance with EN 12390-7.

For the lightweight aggregate concrete, the mean values of the specimen submitted for testing should not deviate by more than ± 10 % of the declared values.

6 Evaluation of conformity

6.1 General

6.1 of EN 13369:2004 shall apply.

6.2 Initial type testing

6.2.1 General

In addition to 6.2 of EN 13369:2004, the following shall apply:

6.2.2 Load bearing capacity and durability

Table 12 — Number of elements to be tested in initial type tests

Requirements	Number of test pieces
Load bearing capacity by testing (see 4.3.3)	3 elements
Durability class 1: Durability of load bearing capacity against corrosion and freeze-thaw (concrete strength), see 4.3.7 Durability class 2: Initial testing of concrete composition and other relevant durability parameters.	3 specimens

6.2.3 Other characteristics

Table 13 — Number of elements to be tested in initial type tests

Requirements	Number of test pieces
Dimensions (see 5.1)	3 elements
Reinforcement and concrete cover (see 5.2)	3 elements
Finish (see 5.3)	3 elements
Durability class 1: Water absorption of concrete (see 5.4)	1 element (and 3 specimens cut in this element)
Design by testing: Load bearing capacity for specific intended uses (see 4.3.3)	3 specimens

6.3 Factory production control

6.3.1 General

In addition to 6.3 of EN 13369:2004, the following shall apply:

6.3.2 Finished elements

A sampling and testing plan for the product shall be prepared and implemented for all properties (including marking) to be checked.

Annex C of this standard applies.

6.4 Independent acceptance testing and compliance criteria

Where elements which have been delivered to a job site become subject to a verification, they should be sampled, verified as given in Annex D.

NOTE An example of reference inspection scheme for surface finish of products is given in the technical report CEN/TR 15739, independent acceptance testing and compliance criteria.

7 Marking and labelling

NOTE For CE marking purposes, only marking and labelling conditions of ZA.3 apply.

7.1 Information

The manufacturer shall mention the following information on at least one product by unit of packaging or on delivery notes or on certificate or any documentation supplied with concrete elements for fences:

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

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

— number of this European standard;

— title of this European standard;

— load bearing capacity (design by testing only): declared value expressed in newtons according to the result of initial type testing rounded down to the nearest ten;

— embedding length of the post.

7.2 Complementary information

The following particulars may be marked on product or on packaging or on delivery notes or on certificate or any documentation supplied with concrete elements for fences:

— a means of identifying the date of manufacture of the elements;

— the unit weight of element;

— a means of identifying rails for sports grounds fences;

— the fence height which the post in question is intended to support (excluding any barbed wire extensions);

— other nominal sizes of elements (optional);

— the type of fence for which the elements are designed, according to Annex A.

8 Technical documentation

Clause 8 of EN 13369:2004 shall apply.

Annex A
(informative)

Basic types of fences

A.1 General

There are six basic types of fences:

— solid fences;

— open-work fences;

— mesh or wire fences;

— mixed fences;

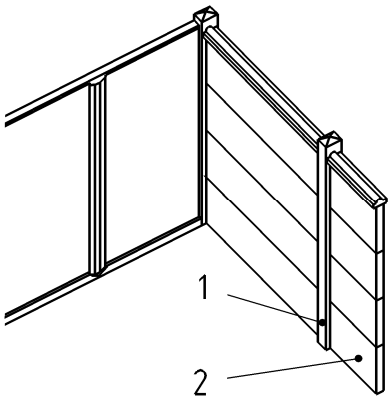
— rail fences;

— anti-intruder fences.

Elements may be made of concrete or not.

A.2 Solid fence

Solid fences are made of posts and solid panels or cladding for the purpose of providing a screen with a height of at least 900 mm.



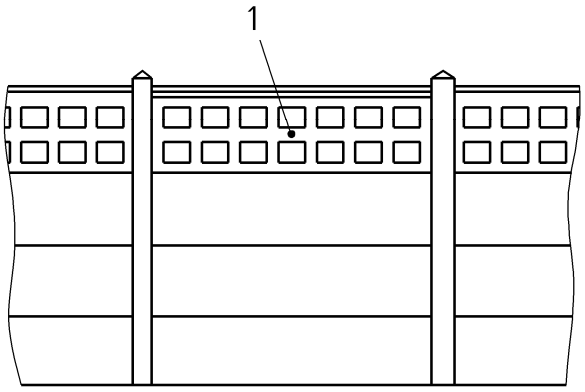
Key

1 Post
2 Solid pane

Figure A.1 — Example of solid fence

A.3 Open-work fence

Open-work fences are made of posts and open-work panels in association or not with solid panels.



Key

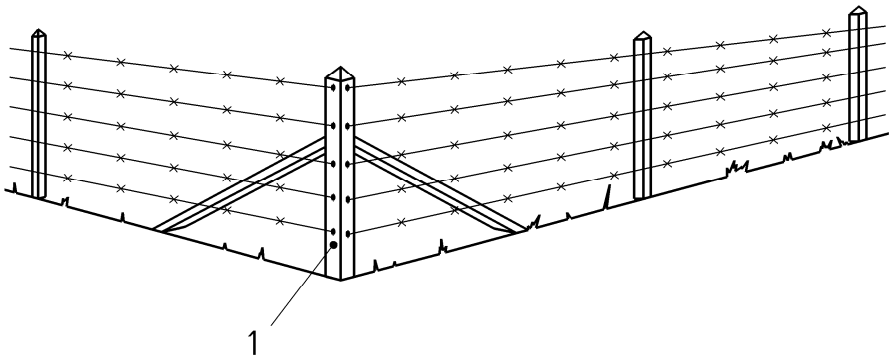
1 Open work panel

Figure A.2 — Example of open-work fence

A.4 Mesh or wire fence

Mesh or wire fences are made of posts and mesh or wires.

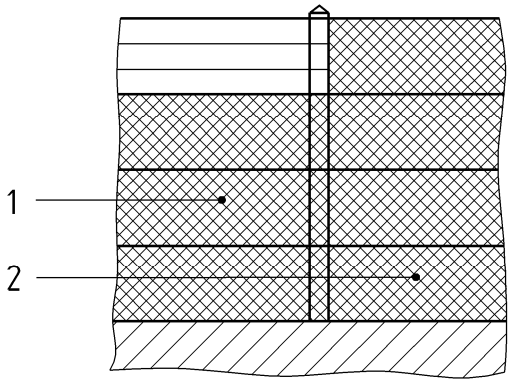
The number of wires may vary.



Key

1 Post and wire

a) wire fence



Key

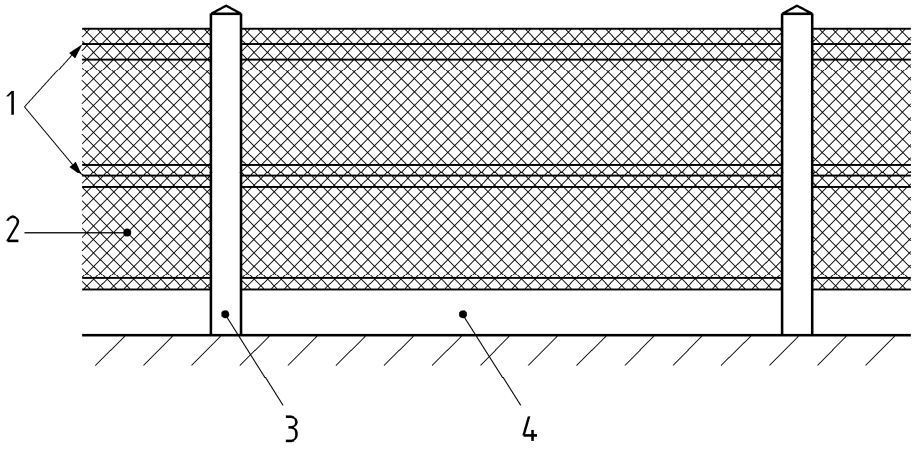
1 Posts and mesh and wire
2 Posts and mesh

b) mesh or mesh and wire fences

Figure A.3 — Examples of mesh or wire fences

A.5 Mixed fence

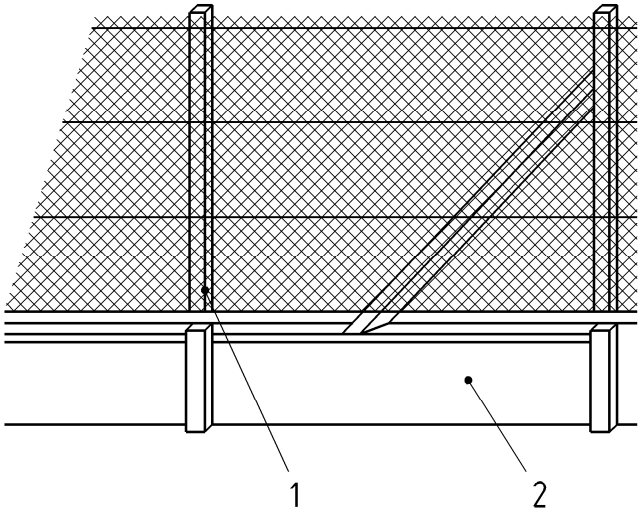
Mixed fences are made of posts, base panels and rails or wires or mesh.



Key

1 Rails
2 Mesh
3 Post
4 Base panel

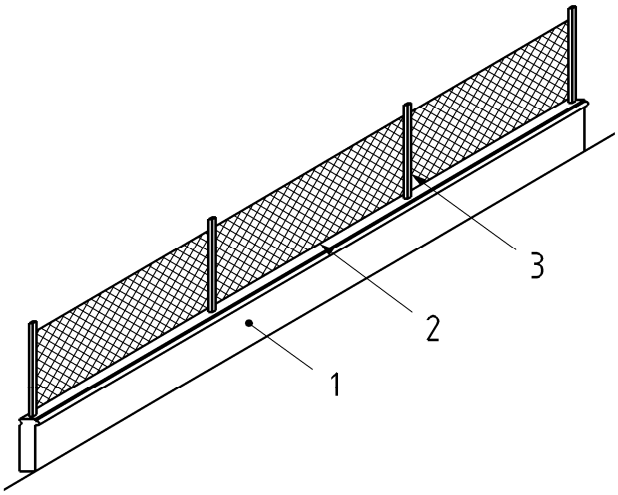
a) with rails, post, base panel and wire or mesh



Key

1 Post
2 Base panel

b) with posts, base panels and wires or mesh



Key

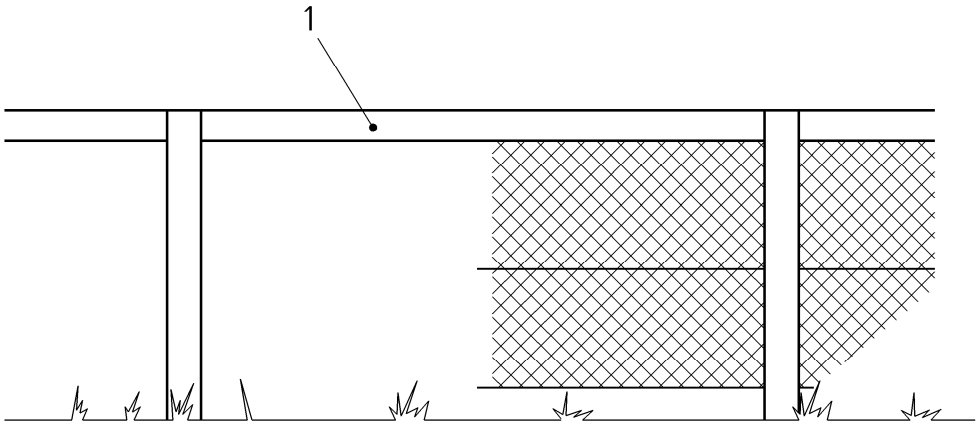
1 Base enclosure walls
2 Mesh
3 Steel pipe

c) with self-bearing base enclosure walls

Figure A.4 — Examples of mixed fences

A.6 Rail fence

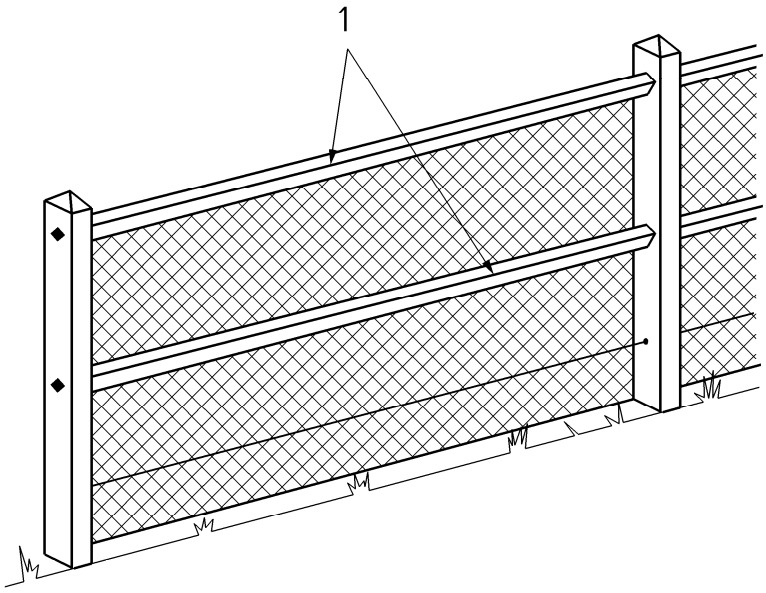
Rail fences are made of posts and rails, with or without infill.



Key

1 Rail

a) with one rail



b) with two rails

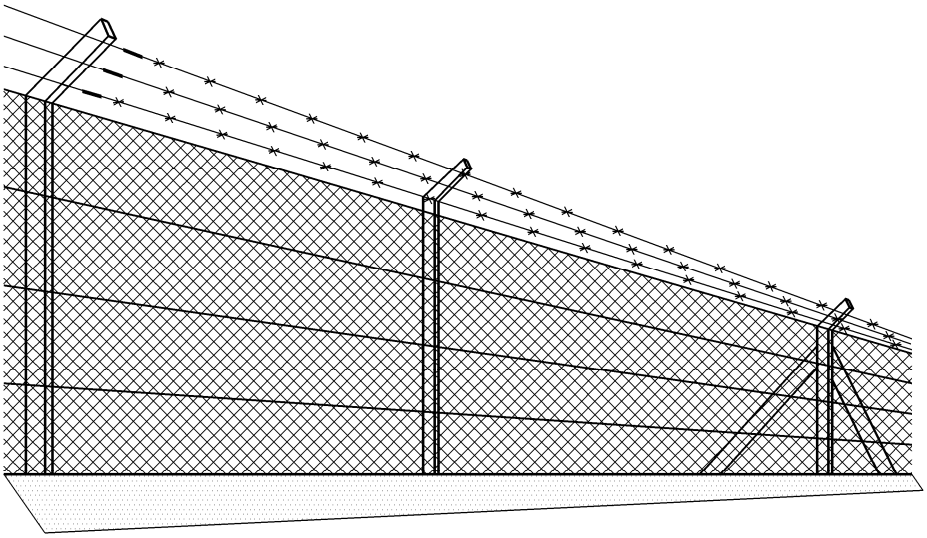
Key

1 Rails

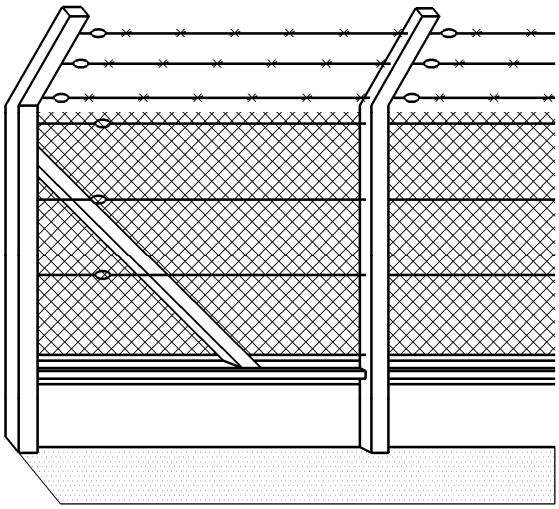
Figure A.5 — Examples of rail fences

A.7 Anti-intruder fence

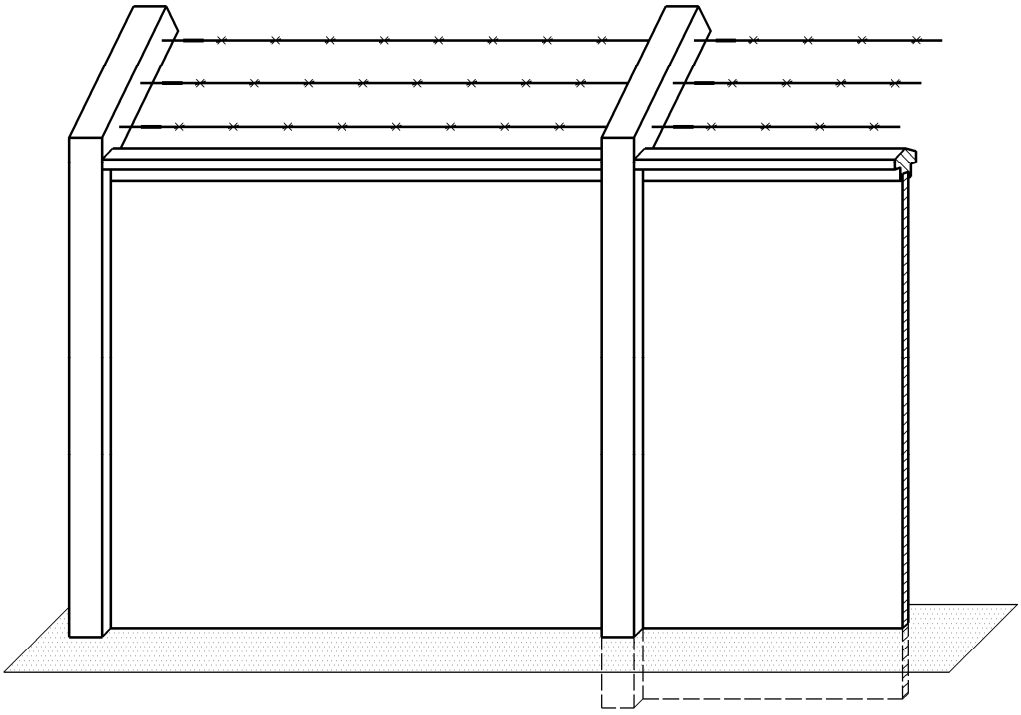
Anti-intruder fences are made of solid slab fences, mixed fences or mesh fences.



a) with posts, wire and mesh



b) with posts, base panels, wire and mesh



c) with posts, solid panels and wire

Figure A.6 — Examples of anti-intruder fences

Annex B
(normative)

Test method for the determination of the load bearing capacity and the complementary load bearing capacity

B.1 Load testing

B.1.1 Test method for load bearing capacity

B.1.1.1 Apparatus

B.1.1.1.1 A testing machine complying with EN 12390-4:2000, Class 3.

B.1.1.2 Test piece

A test piece shall consist of one complete element.

B.1.1.3 Testing of posts

B.1.1.3.1 Principle

Each element is tested in horizontal position. The test load is applied at the midpoint of the above-ground length and in the direction of wind loading, as shown in Figure B.1.

The weight of the post shall be taken into consideration.

B.1.1.3.2 Procedure

Each element shall undergo the following operations:

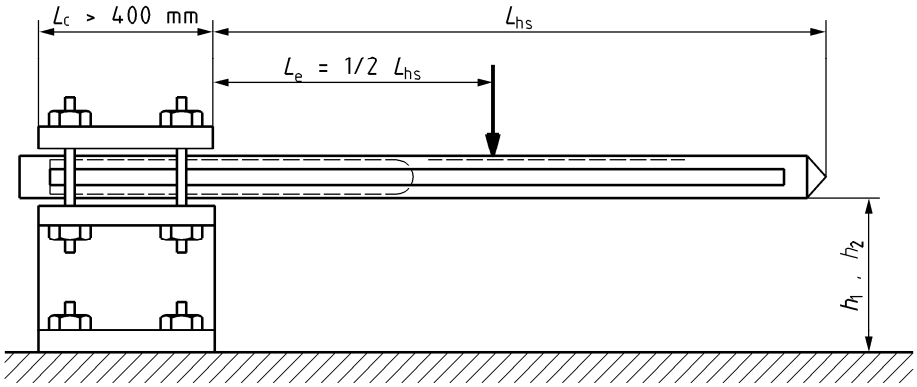
— measure the appropriate distance $L_e = \frac{L_{hs}}{2}$ for the application of loads;

— clamp the post horizontally at its lower end so that the free length of the posts equals its above-ground length L_{hs} when in service;

— apply the load at the distance $L_e \pm 20$ mm from the clamped end;

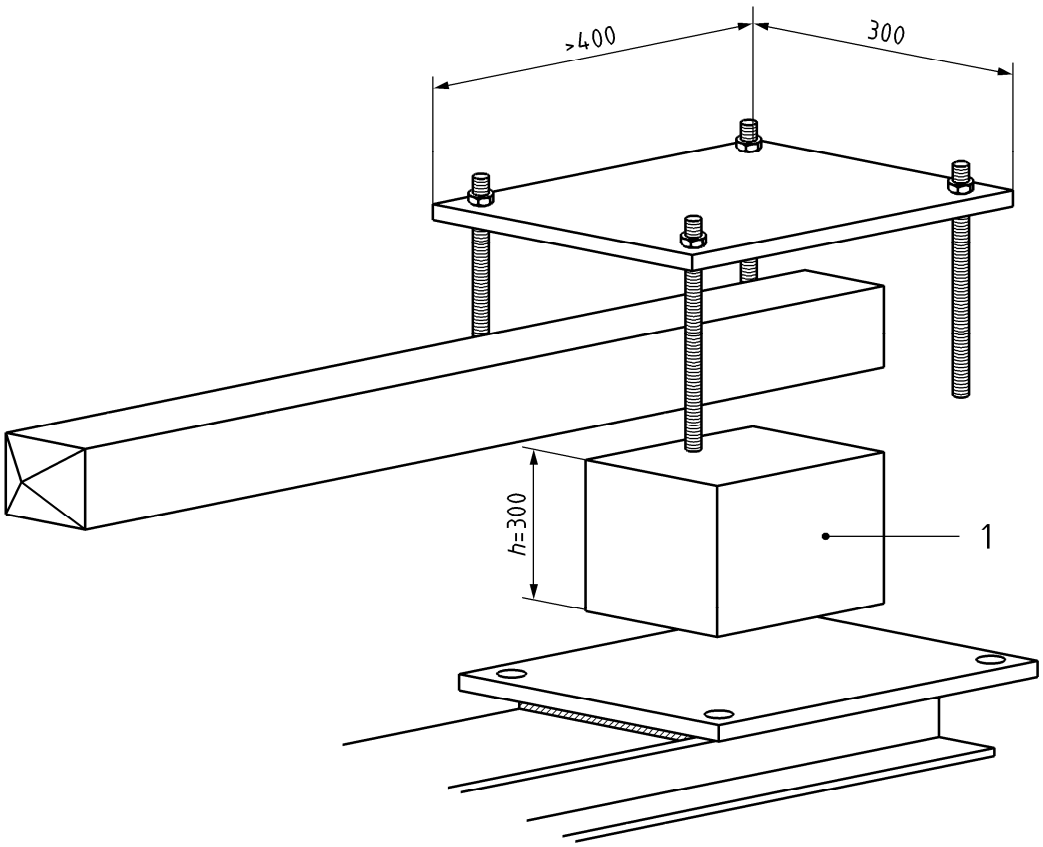
— increase the load at a rate of 100 N/s ± 20 N/s;

— record the failure load R.



a) Positioning of the load application

Dimensions in millimetres



b) Support parts

Key

1 Raising

Figure B.1 — Testing of post

B.1.1.3.3 Expression of results

Note down the total length of the post, the above-ground length L_{hs}, the mass per length $m_{p,}$ the distance L_e.

On the basis of the failure load R recorded, calculate the real failure load R_R:

$$R_R = R + \left(Pm \times L_{hs}\right)$$

where

R is the failure load recorded, in newtons;

m_p is the mass of the post per metre of length, in newtons by metre;

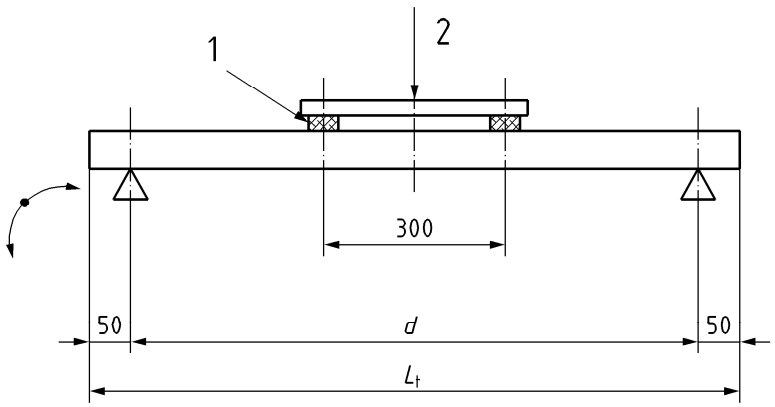
L_{hs} is the above-ground height of posts in metres; for posts for anti-intruder fence, L_{hs} is the height of the straight part of the fence, in metres.

B.1.1.4 Testing of panels

Lay the element horizontally over two supports separated by a distance *d* which is the total length L_t of the panel minus a conventional value of 50 mm at each end (to represent the overlap of the panel in the post). Then apply the load at a rate of 100 N/s ± 20 N/s, over the whole width of the element and over a length of 300 mm, as shown in Figure B.2.

Record the failure load, in newtons.

Dimensions in millimetres



Key

1 Packing piece (wood)
2 Load

Figure B.2 — Testing of panels

NOTE For the base panel with a coping, the load is applied by interposing a hard piece of wood having a thickness equal to the one of the coping (tests for factory production control can be carried out on solid panel).

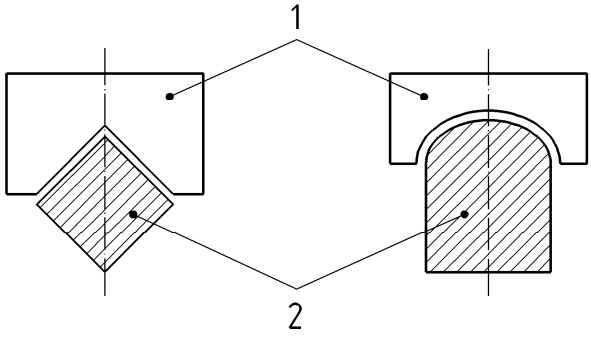
B.1.1.5 Testing of rails

Lay the element horizontally over two supports which are separated by a distance d which is the total length L_t of the rail minus a conventional value of 50 mm at each end (to represent the overlap of the panel in the rail).

Rest the element on the two supports according to the conditions in use, either on one side or, suitably secured, on one edge as shown in Figure B.3.

Apply the load at a rate of 100 N/s ± 20 N/s, over the whole thickness and over a length of 450 mm, as shown in Figure B.4.

Record the failure load, in newtons.

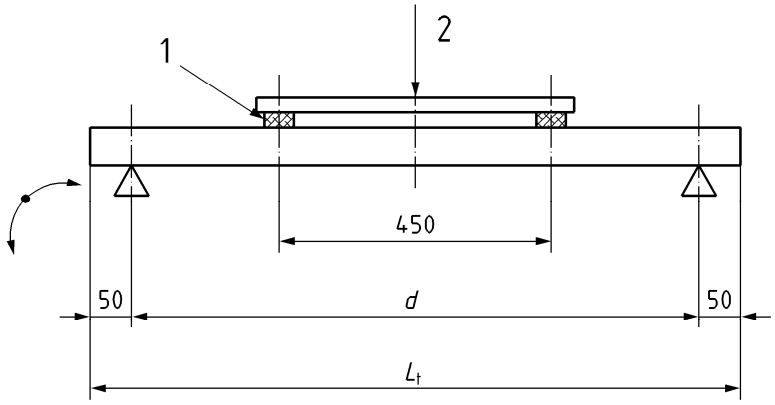


Key

1 Complementary forms in hard wood
2 Rails

Figure B.3 — Examples of complementary forms in hard wood

Dimensions in millimetres



Key

1 Packing (wood)
2 Load

Figure B.4 — Testing of rails

B.1.1.6 Test method for complementary load bearing capacity

B.1.1.7 Apparatus

B.1.1.7.1 A testing machine complying with standard EN 12390-4:2000, Class 3.

B.1.1.8 Test piece

A test piece shall consist of one complete element.

B.1.1.9 Testing of posts

B.1.1.9.1 Principle

Each element is tested in horizontal position. The test load is applied at the midpoint of the above-ground length and in the direction of wind loading, as shown in Figure B.1.

The weight of the post shall be taken into consideration.

So, each test load to be applied (C_{es} and C_{er}) is calculated as follows:

$$C_e = C - \left(m_p \times L_{hs}\right)$$

with $L_e = \frac{L_{hs}}{2}$

where

C_e is the test load to be applied, in newtons (C_{es} = test service load, C_{er} = test failure load);

C is the normal load specified in Tables 3 to 7, except for straining posts for which values in the tables shall be multiplied by 1,5, in newtons;

m_p is the weight of the post per metre of length, in newtons per metre;

L_{hs} is the fence height (in metres) which the post in question is intended to support, excluding any barbed wire extensions;

L_e is the distance between the embedding of the post and the point of application of load, in metres.

EXAMPLE For a class C intermediate post with L_{hs} = 2,5 m and m_p = 400 N/m:

a) the weight of the post out of embedding will be m_p x L_{hs} = 1 000 N;

b) from reference to Tables 5 to 7:

1) normal service load is 4 000 N;

2) normal failure load is 7 200 N.

Therefore, the test loads to apply are:

— test service load C_{es} = 4 000 N – 1 000 N = 3 000 N;

— test failure load C_{er} = 7 200 N – 1 000 N = 6 200 N.

B.1.1.9.2 Procedure

Each element shall undergo the following operations:

— measure the appropriate distance $L_e = \frac{L_{hs}}{2}$ for the application of test loads;

— calculate the test loads C_{es} (service) and C_{er} (failure), from Tables 3 to 7;

— clamp the post horizontally at its lower end so that the free length of the posts equals its above-ground length L_{hs} when in service;

— from the top of the post, measure height h_1, as shown in Figure B.1 and record it;

— apply the load at the distance L_e from the clamped end;

— increase the load at a rate of 100 N/s ± 20 N/s, up to C_{es};

— release the load and record any persistent crack;

— from the top of the post, measure height h_2 and record it;

— reload at a rate of 100 N/s ± 20 N/s until failure occurs;

— record the failure load R.

B.1.1.9.3 Expression of results

Note down the total length of the post, the above-ground length L_{hs}, the mass per length $m_{p,}$ the distance L_e and the corresponding values for C_{es} and C_{er}.

Calculate the deflection f as a percentage as follows:

$$f = \frac{h_2 - h_1}{L_{hs}} \times 100$$

where

h_1 is the distance between the ground level and the lower face of the post before loading in millimetres;

h_2 is the distance between the ground level and the lower face of the post after release of the normal service load, in millimetres;

L_{hs} is the fence height (in millimetres) which the post in question is intended to support, excluding any barbed wire extensions.

On the basis of the failure load R recorded, calculate the real failure load R_R:

$$R_R = R + \left(m_p \times L_{hs}\right)$$

where

R is the failure load recorded, in newtons;

m_p is the mass of the post per metre of length, in newtons by metre;

L_{hs} is the above-ground height of posts specified in Tables 3 to 6, in metres; for posts for anti-intruder fence, L_{hs} is the height of the straight part of the fence, in metres.

B.1.1.10 Testing of panels

Apply the same method as B.1.1.4.

B.1.1.11 Testing of rails

Apply the same method as B.1.1.5.

Annex C
(normative)

Factory production control procedures

The Annex D (inspection scheme) of EN 13369:2004 shall apply, with the following complementary requirements:

Table C.1 — Finished product control

Subject		Aim	Method	Frequency
1	Shape and dimensional tolerances[a]	Conformity with the requirements for the manufacturer declared properties	measuring	1 element per 2 000 elements for each type of element for fences according to Clause 3
2	Visual aspect and surface characteristic[a]	Conformity with the requirements for the manufacturer declared properties	measuring	
3	Bending strength[a] [b] (for elements verified by testing)	To assess conformity with intended value	testing	2 elements per 7 500 elements for each type of element for fences according to Clause 3
4	Reinforcement according to 4.2.3.1 and 4.2.3.2[a]	Conformity with documented factory procedures	measuring	
5	Water absorption of concrete[a]	Testing according to Annex G of EN 13369:2004	testing on three specimens of an element	1 element per 5 000 tons of each mixture and process
6	Concrete cover[a]	To assess conformity with intended value	inspection with covermeter or measuring on elements previously submitted to bending test	2 elements per 7 500 elements for each type of element for fences according to Clause 3
7	Storage	Conformity with the requirements of this standard	visual inspection	daily
8	Marking/labelling	Conformity with the requirements of this standard	visual inspection	daily

[a] If one element of the sample does not comply with the specification, every element of a second sample of the double size of the first should comply with the specification.

[b] Moreover any element of the first sample with a test result < 0,8 times the specification will cause the instant rejection of the corresponding production.

Annex D
(informative)

Acceptance testing of a consignment at delivery

D.1 General

In the event that there is a requirement on site for a check on product compliance the following sampling procedure can be followed.

D.2 Sampling

The number of elements required for acceptance testing is given in Table D.1.

Acceptance is declared for each element taken from a batch of up to 500 elements of the same marking (see 7.1). The actual supplying size is determined between the manufacturer/supplier as appropriate for the particular site situation. The representatives shall have the opportunity to be present when sampling.

Table D.1 — Number of elements required for acceptance testing

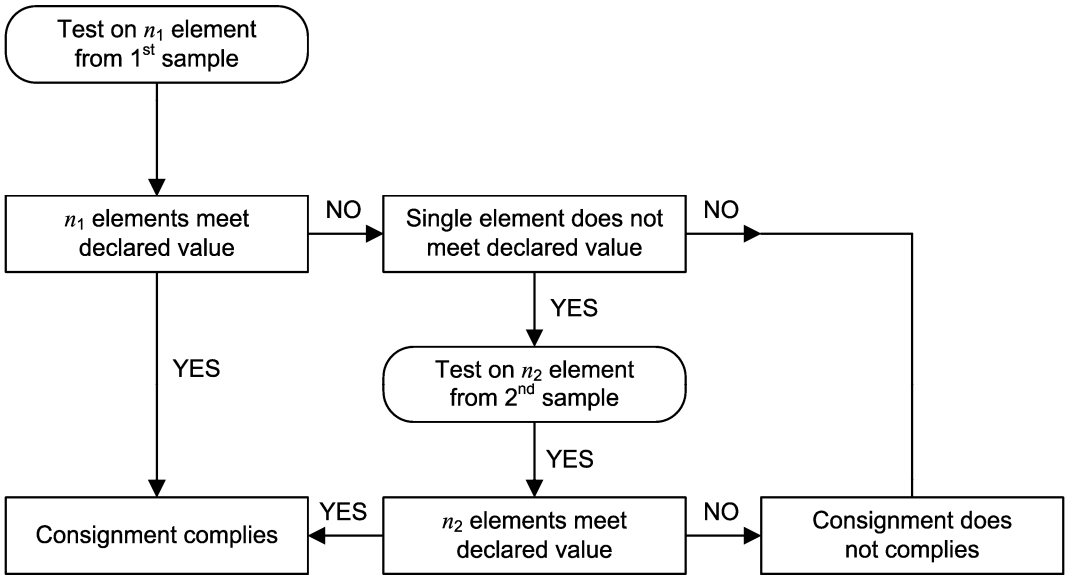
Characteristic	Requirement clause	Assessment method	Number of elements per sample	
			1st sample n_1	2nd sample n_2
Dimensions	4.3.1	5.1	3	3
Concrete cover	4.3.1.2, 4.3.7.1	5.2	3	3
Surface characteristic	4.3.2	5.3	3	3
Water absorption	4.3.7.1	Annex G EN 13369:2004	1	1
Mechanical resistance	4.3.3	Annex B	3	6

D.3 Places and dates of inspection and acceptance testing

The location of the laboratory of place of inspection and testing, the dates and representation of the parties shall be subject to agreement between them. The agreed tests shall be carried out in the sequence agreed by the parties. If a particular property of a batch of fences is found to be non-compliant as described in D.4, the remaining tests may be carried out by agreement between the parties.

D.4 Compliance

The results of tests on fences shall comply with the specifications given in Clause 4 or with the values for the properties stated by the manufacturer.



Key

n_1 and n_2 are as given in Table D.1

Figure D.1 — Compliance evaluation procedures

Annex ZA
(informative)

Relationship between this European Standard and the essential requirements of EU Directive 89/106/EEC, EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under the mandate M/100 "Precast Concrete Products"[5)] 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 precast concrete elements for boundary fences 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 precast concrete elements for boundary fences 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 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.

NOTE 2 An informative database of European and national provision on dangerous substances is available at the Construction web site on EUROPA (accessed through http://ec.europa.eu/enterprise/construction/cpd-ds/

This Annex establishes the conditions for the CE marking of the concrete elements for boundary fences intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

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

5) As amended.

Table ZA.1 — Relevant clauses for boundary fences

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	4.1.3 Reinforcing steel of EN 13369:2004 4.1.4 Pre-stressing steel of EN 13369:2004	None	N/mm^2
Load bearing capacity (by tests) or 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	4.3.3 Mechanical resistance	None	Design specification
Durability of load bearing capacity against corrosion and freeze-thaw	All methods	4.3.7 Durability	None	declared class

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

— 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 essential characteristic is not of application 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 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 precast concrete elements for boundary fences

ZA.2.1 Systems of attestation of conformity

The system of attestation of conformity for the precast concrete elements for boundary fences 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 3.02.1999 in the OJEU), as given in Annex III of the Mandate M/100 "Precast concrete products" as amended by mandates M/126 and M/130, is shown in Table ZA.2 for the indicated intended use(s) and relevant levels or classes:

Table ZA.2 — System(s) of attestation of conformity for precast concrete elements for boundary fences

Product(s)	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Boundary fences	Non structural and light structural	/	4[a]
[a] System 4 : See CPD Annex III.2.(ii), Third possibility.			

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

Table ZA.3 — Assignation of evaluation of conformity tasks for precast concrete elements for boundary fences

Tasks		Content of the tasks	Evaluation of conformity clauses to apply
Tasks for 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
[a] Initial Type testing (ITT) includes calculation and/or testing. ITT by calculation is not required when only methods 1 and 3a are used.			

ZA.2.2 EC Certificate and Declaration of conformity

When compliance with the conditions of this Annex is achieved, 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 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, etc), 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);

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

This EC Declaration of conformity entitles the manufacturer to affix the CE marking, as described in ZA.3.

This document shall be presented in the official language or languages of the Member State of the EU 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 precast concrete elements for fences (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 accompany the CE marking symbol:

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

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

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

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

— information on 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 ZA.3.5;

— “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 are 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.4, ZA.5 and ZA.6.

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 manufacturer;

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

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

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

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.

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.

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 manufacturer
45PJ76	Identification number of the unit
12	Last two digits of the year in which the marking was affixed
EN 12839:2012	Number of dated version of the 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.

ZA.3.2 Declaration of geometrical data and material properties (method 1)

(Method 1 to determine properties relating to essential requirement "mechanical resistance and stability")

Figure ZA.2 gives, for a type of precast element for fences, 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;

— ultimate tensile strength of pre-stressing steel;

— tensile 0,1 proof stress of pre-stressing steel;

— geometrical data (only critical dimensions);

— conditions for durability against corrosion;

— conditions for durability against freeze-thaw.

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

Figure ZA.2 gives, for a type of precast concrete element for fences, 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, including aspects of durability and serviceability.

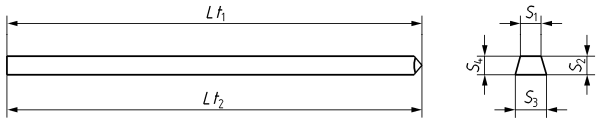
CE	CE conformity marking consisting of the CE symbol given in Directive 93/68/EEC
AnyCo Ltd, PO Bx 21, B-1050	Name or identifying mark and registered address of the manufacturer
12	Last two digits of the year in which the marking was affixed
EN 12839:2012	Number of dated version and title of the European standard concerned
Elements for fences	Generic name and intended use
Post for rail boundary fence	
Concrete : Compressive strength ..... f_{ck} = 45 N/mm^2 Reinforcing steel : Ultimate tensile strength ..... f_{tk} = 580 N/mm^2 Tensile yield strength..... f_{yk} = 500 N/mm^2	Information on product geometry and material characteristics (to be adapted to the specific product by the manufacturer)
	
Lt_1 = xx mm Lt_2 = yy mm S_1 = vv mm S_2 = ww mm S_3 = zz mm S_4 = yy mm	NOTE Numerical values are only as example.
For durability see Technical Information Technical Information: Product Catalogue ABC : 2002- clause ii	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.3.3 Declaration of product properties (method 2)

ZA.3.3.1 Declaration of product properties determined by calculation

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 pre-stressing steel;

— tensile 0,1 proof stress of pre-stressing steel;

— mechanical ultimate strength of the element (calculated design values for non-seismic situations) with bending moment capacity of critical sections;

— safety factors for concrete and steel used in calculation;

— other Nationally Determined Parameters NDPs used in calculation;

— conditions for durability against corrosion (or exposure classes);

— exposure class for durability against freeze-thaw (only for exposed applications);

— geometrical data.

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

Figure ZA.3 gives, for elements for fences, an example of CE marking in the case in which the properties related to mechanical resistance and stability including aspects of durability and serviceability 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 Eurocodes applicable to the works.

CE	CE conformity marking consisting of the CE symbol given in Directive 93/68/EEC
Any Co Ltd, PO Box 21, B-1050	Name or identifying mark and registered address of the manufacturer
12	Last two digits of the year in which the marking was affixed
EN 12839:2012	Number of dated version and title of the European standard concerned
Elements for fences	
Post rail for boundary fence	Generic name and intended use
Concrete: Compressive strength.....f_{ck} = xx N/mm^2	Information on product mandated characteristics
Reinforcing steel: Ultimate tensile strength .....f_{tk} = yyy N/mm^2 Tensile yield strength.....f_{yk} = zzz N/mm^2	(to be adapted to the specific product by the manufacturer)
Mechanical resistance (design values): Bending moment capacity.....mmm kNm	
Material safety factors applied in strength calculation: For concrete .....γ_c= z.zz For steel.....γ_s = x.xx	
For geometrical data, durability, drying shrinkage and other NDPs see the Technical Documentation	
Technical Documentation: Position number.....xxxxxx	

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

ZA.3.3.2 Declaration of product properties determined by testing

(Characteristic value of load bearing capacity determined by testing following 4.3.3.2 of this standard).

Figure ZA.4 gives, for elements for fences, an example of CE marking in the case in which the properties related to mechanical resistance are determined by the manufacturer by means of a verification by testing following 4.3.3.2 of this standard.

The properties listed in ZA.3.3.1 shall be declared except mechanical ultimate strength and safety factors, with the addition of:

— load bearing capacity determined by testing with the characteristic values of the force applied to the top.

CE	CE conformity marking consisting of the CE symbol given in Directive 93/68/EEC
Any Co Ltd, PO Box 21, B-1050	Name or identifying mark and registered address of the manufacturer
12	Last two digits of the year in which the marking was affixed
EN 12839:2012	Number of dated version and title of the European standard concerned
Elements for fences	Generic name and intended use
Post rail for boundary fence	
Concrete: Compressive strength ..... f_{ck} = xx kN/mm^2	Information on product mandated characteristics
Reinforcing steel: Ultimate tensile strength..... f_{tk} = yyy kN/mm^2 Tensile yield strength ..... f_{yk} = zzz kN/mm^2	(to be adapted to the specific product by the manufacturer)
Load bearing capacity (characteristic values): Ultimate force for bending test ..... bbb kN	
Durability of the load bearing capacity :..... class 1	
For geometrical data, durability and other NDPs see the Design Specification	
Design Specification: Order code xxxxxx	

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

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

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 pre-stressing steel;

— tensile 0,1 proof stress of pre-stressing 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.

Figure ZA.5 gives, for elements for fences, an example of 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.

CE	CE conformity marking consisting of the CE symbol given in Directive 93/68/EEC
Any Co Ltd, PO Box 21, B-1050 12	Name or identifying mark and registered address of the manufacturer Last two digits of the year in which the marking was affixed
EN 12839:2012 Elements for fences Solid fence 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, mechanical strength, durability see the design specifications Design Specification provided by the client: Reference .....(file number)	Number of dated version and title of the European standard concerned Generic name and intended use Information on product mandated characteristics (to be adapted to the specific product by the manufacturer)

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

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

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 pre-stressing steel;

— tensile 0,1 proof stress of pre-stressing steel;

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

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

Figure ZA.6 gives, for elements for fences, 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	CE conformity marking consisting of the CE symbol given in Directive 93/68/EEC
Any Co Ltd, PO Box 21, B-1050 12	Name or identifying mark and registered address of the manufacturer Last two digits of the year in which the marking was affixed
EN 12839:2012 Elements for fences Solid fence 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, mechanical strength, durability see the design specifications Design Specification .....(client's order)	Number of dated version and title of the European standard concerned Generic name and intended use Information on product mandated characteristics (to be adapted to the specific product by the manufacturer)

Figure ZA.6 — Example of CE marking with Method 3b

In addition to any specific information relating to dangerous substances shown above, 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.

European legislation without national derogations need not be mentioned.

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

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