



# SLOVENSKI STANDARD

## oSIST prEN 12839:2007

01-julij-2007

---

### Betonski izdelki - Elementi za ograje

Precast concrete products - Elements for fences

Betonfertigteile - Elemente für Zäune

Produits préfabriqués en béton - Éléments pour clôtures

Ta slovenski standard je istoveten z: prEN 12839

<https://standards.iteh.ai/catalog/standards/sist/1454f4e9-bd38-4c78-9099-342e63c3a945/osist-pren-12839-2007>

#### ICS:

91.090	Konstrukcije zunaj stavb	External structures
91.100.30	Beton in betonski izdelki	Concrete and concrete products

oSIST prEN 12839:2007

en;fr;de

## **iTeh STANDARD PREVIEW (standards.iteh.ai)**

oSIST prEN 12839:2007

<https://standards.iteh.ai/catalog/standards/sist/1454f4e9-bd38-4c78-9099-342e63c3a945/osist-pren-12839-2007>

May 2007

ICS 91.090; 91.100.30

Will supersede EN 12839:2001

English Version

## Precast concrete products - Elements for fences

Produits préfabriqués en béton - Eléments pour clôtures

Betonfertigteile - Elemente für Zäune

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 229.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

**Warning** : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

# Contents

Page

Foreword.....	4
1 Scope .....	5
2 Normative references .....	5
3 Terms and definitions .....	5
3.1 Types of fences .....	5
3.2 Post .....	6
3.3 Rail .....	7
3.4 Panel .....	7
3.5 Spur .....	7
3.6 Strut .....	7
3.7 Dimension .....	7
3.8 Surface finish .....	7
3.9 Heat treatment .....	8
3.10 Loadbearing capacity .....	8
3.11 Complementary loadbearing capacity .....	8
3.12 Normal weight concrete .....	8
3.13 Lightweight concrete .....	8
4 Requirements .....	8
4.1 Material requirements .....	8
4.2 Production requirements .....	9
4.3 Finished product requirement .....	10
5 Test methods .....	16
5.1 Dimensions .....	16
5.2 Concrete cover .....	19
5.3 Surface characteristic .....	19
5.4 Water absorption .....	19
5.5 Concrete strength .....	19
5.6 Load testing .....	20
5.7 Density .....	26
6 Evaluation of conformity .....	26
6.1 General .....	26
6.2 Initial type testing .....	26
6.3 Factory production control .....	27
6.4 Independent acceptance testing and compliance criteria .....	29
7 Marking and labelling .....	30
7.1 Information .....	30
7.2 Complementary information .....	30
Annex A (informative) Basic types of fences - Terminology .....	31
A.1 General .....	31
A.2 Solid fence .....	31
A.3 Open-work fence .....	32
A.4 Mesh or wire fence .....	32
A.5 Mixed fence .....	33
A.6 Rail fence .....	35
A.7 Anti-intruder fence .....	36
Annex B (normative) Index of references for surface finish as cast - Reference photographs used to appreciate the incidence of blowholes in surfaces .....	38

<b>Annex C</b> (informative) <b>Factory production control procedures</b> .....	<b>42</b>
<b>C.1</b> <b>General</b> .....	<b>42</b>
<b>C.2</b> <b>Procedure</b> .....	<b>42</b>
<b>C.3</b> <b>Guide on inspection frequencies</b> .....	<b>43</b>
<b>Annex D</b> (informative) <b>Acceptance testing of a consignment at delivery</b> .....	<b>47</b>
<b>D.1</b> <b>General</b> .....	<b>47</b>
<b>D.2</b> <b>Sampling</b> .....	<b>47</b>
<b>D.3</b> <b>Places and dates of inspection and acceptance testing</b> .....	<b>47</b>
<b>D.4</b> <b>Compliance</b> .....	<b>48</b>
<b>Annex E</b> (normative) <b>Test of water absorption</b> .....	<b>49</b>
<b>Annex ZA</b> (informative) <b>Clauses of this European Standard addressing the provisions of the EU Construction Products Directive</b> .....	<b>50</b>
<b>ZA.1</b> <b>Clauses of this European Standard addressing the provisions of the EU Construction Products Directive</b> .....	<b>50</b>
<b>ZA.2</b> <b>Procedure for attestation of conformity of precast concrete elements for boundary fences</b> .....	<b>51</b>
<b>ZA.3</b> <b>CE marking</b> .....	<b>52</b>
<b>Bibliography</b> .....	<b>54</b>

## iTeh STANDARD PREVIEW (standards.iteh.ai)

oSIST prEN 12839:2007  
<https://standards.iteh.ai/catalog/standards/sist/1454f4e9-bd38-4c78-9099-342e63c3a945/osist-pren-12839-2007>

## Foreword

This document (prEN 12839:2007) has been prepared by Technical Committee CEN/TC 229 “Precast concrete products”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede 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.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

oSIST prEN 12839:2007  
<https://standards.iteh.ai/catalog/standards/sist/1454f4e9-bd38-4c78-9099-342e63c3a945/osist-pren-12839-2007>

## 1 Scope

This European standard covers precast products in reinforced or prestressed concrete with or without fibres, produced in long series with the same design and mechanical resistance verified by testing to be used together or in combination with other elements to erect fences e.g. boundary fences.

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.

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

## 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 – Performance, production and conformity*.

EN 934-2, *Admixtures for concrete, mortar and grout – Part 2: Concrete admixtures – definitions, requirements, conformity, marking and labelling*.

EN 12350-1, *Testing fresh concrete – Part 1: Sampling*.

EN 12390-1, *Testing hardened concrete – Part 1: Shape, dimensions and other requirements for specimens and moulds*.

EN 12390-2, *Testing hardened concrete – Part 2: Making and curing specimens for strength tests*.

EN 12390-3, *Testing hardened concrete – Part 3: Compressive strength of test specimens*.

EN 12390-4, *Testing hardened concrete – Part 4: Compressive strength - Specification for testing machine*.

EN 12390-7, *Testing hardened concrete – Part 7: Density of hardened concrete*.

EN 13369:2004, *Common rules for precast concrete product*.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1 Types of fences

Annex A provides illustrations of typical fences.

#### 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 working 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 prestressed 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 prestressed concrete, connected to and supported by the post.

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

### 3.4 Panel

#### 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

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

Element designed to provide support to post carrying horizontal loads.

### 3.7 Dimension

<https://standards.iteh.ai/catalog/standards/sist/1454f4e9-bd38-4c78-9099-342e63c3a945/osist-pren-12839-2007>  
oSIST prEN 12839:2007

#### 3.7.1

##### **work 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 the butt.

#### 3.7.2

##### **actual dimension**

dimension found by measurements

### 3.8 Surface finish

#### 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 Loadbearing capacity

Loadbearing capacity is the ability of an element to resist a maximum failure load.

### 3.11 Complementary loadbearing capacity

Complementary loadbearing capacity is the ability of an element to resist a defined load under service conditions and a defined failure load.

### 3.12 Normal weight concrete

Concrete whose density after drying is higher than 2 000 kg/m<sup>3</sup> but lower or equal to 2 600 kg/m<sup>3</sup>.

### 3.13 Lightweight concrete

Concrete having an oven-dry density of not less than 800 kg/m<sup>3</sup> and no more than 2 000 kg/m<sup>3</sup>. It is produced using lightweight aggregate for all or part of the total aggregate.

## 4 Requirements

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

For precast products made into series, mechanical resistance is verified by testing as described hereafter.

For precast products made into short series, it is allowed to use design methods while referring for the calculation of dimensioning to the Eurocodes and 4.3.7 of EN 13369 for the durability.

### 4.1 Material requirements

Only materials with established suitability shall be used.

For a material, the establishment of suitability may result from a European Standard which refers specifically to the use of this material in concrete or in concrete products ; it may also result, under the same conditions, from an ISO Standard.

Where this material is not covered by a European or ISO Standard, or if it deviates from the requirements of these standards, the establishment of suitability may result from:

— the relevant national standards or provisions valid in the place of use of the product which refers specifically to the use of this material in concrete or in concrete products;

or

— a European Technical approval specifically to the use of this material in concrete or concrete products.

For new materials, where none of the above requirements can be satisfied, the properties shall be documented by theoretical and/or experimental evaluation.

## 4.2 Production requirements

### 4.2.1 Concrete production

The relevant part of clause 4.2.1 of EN 13369 shall apply, with the following complementary requirements.

#### 4.2.1.1 Composition

##### 4.2.1.1.1 Use of admixtures

The aptitude for use is established for the admixtures in accordance with EN 934-2.

##### 4.2.1.1.2 Chloride content

The chloride content of a concrete, expressed as the percentage of chloride ions by mass of cement, shall not exceed the value for the selected class given in Table 1.

**Table 1 — Maximum chloride content of concrete**

Concrete use	Chloride content class <sup>a</sup>	Maximum Cl <sup>-</sup> content by mass of cement <sup>b</sup>
Containing steel reinforcement or other embedded metal	Cl 0,20	0,20 %
	Cl 0,40	0,40 %
Containing prestressing steel reinforcement	Cl 0,10	0,10 %
	Cl 0,20	0,20 %
<sup>a</sup> For a specific concrete use, the class to be applied depends upon the provisions valid in the place of use of the concrete. <sup>b</sup> Where type II additions are used and are taken into account for the cement content, the chloride content is expressed as the percentage chloride ion by mass of cement plus total mass of additions that are taken into account.		

##### 4.2.1.1.3 Resistance to alkali-silica reaction

Where aggregates contain varieties of silica susceptible to attack by alkalis (Na<sub>2</sub>O and K<sub>2</sub>O originating from cement or other sources) and if the product is exposed to humid conditions, special precautions in the choice of constituents shall be taken.

#### 4.2.1.2 Concrete temperature

The temperature of fresh concrete shall not be less 5 °C at the time of placing.

### 4.2.2 Hardened concrete

#### 4.2.2.1 Compressive strength

Under the test conditions defined in 5.5, the characteristic compressive strength of concrete for the fracture 0,05<sup>1)</sup>, after a 28 days hardening, shall be at least equal to the values given in Table 2.

<sup>1)</sup> This means that statistical interpretation of the tests results demonstrate that 95 % of the corresponding production are at least equal to the specification.

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

**Table 2 — Characteristic compressive strength**

Concrete	Light-weight reinforced concrete		Reinforced concrete		Prestressed concrete	
Specimens	Cylinders N/mm <sup>2</sup>	Cubes N/mm <sup>2</sup>	Cylinders N/mm <sup>2</sup>	Cubes N/mm <sup>2</sup>	Cylinders N/mm <sup>2</sup>	Cubes N/mm <sup>2</sup>
Characteristic compressive strength of concrete for the fractile 0,05	25	28	35	45	40	50

#### 4.2.2.2 Early compressive strength of concrete for prestressed products

The minimum compressive strength at transfer of the prestress force shall be 25 N/mm<sup>2</sup>.

#### 4.2.3 Reinforcement

##### 4.2.3.1 Length of longitudinal reinforcement for posts

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

##### 4.2.3.2 Position of prestressing steel wires

For prestressing wires of diameter  $d$  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  $4 d$  mm centre to centre. The requirements of 4.3.8.2 also apply.

#### 4.3 Finished product requirement

##### 4.3.1 Geometrical properties

The dimensions of the elements are not fixed.

##### 4.3.1.1 Production tolerances

For Class D1 products 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:

— length	$\pm 1 \%$
— cross-section dimensions	$\pm 3 \text{ mm}$
— straightness	$\leq 0,5 \%$
— location of holes	$\pm 5 \text{ mm}$

## b) rails:

— length (between supports)	$\pm 5$ mm
— cross-section dimensions	$\pm 3$ mm
— straightness	$\leq 0,5$ %

## c) panels:

— length	$\pm 5$ mm
— height	$\pm 3$ mm
— thickness	$\pm 2$ mm
— squareness	difference between diagonals: $\leq 0,5$ % of their effective mean value
— flatness	$\leq 0,2$ % of the length

For Class D2 products the tolerances shall be taken from EN 13198.

The producer shall declare the key-dimension for which the dimensional tolerances shall then be conforming to Table 3

**Table 3 — Dimensional tolerances depending on the key-dimension and use**

Key dimension	Isolated positioning	Continuous positioning
$\leq 1$ m	$\pm 15$ mm	$\pm 5$ mm
$> 1$ m	$\pm 15$ mm	$\pm 10$ mm

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

### 4.3.2 Surface characteristics

#### 4.3.2.1 Surface finish as cast

In accordance with Annex B, the maximum total surface area of blowholes is declared by the manufacturer.

#### 4.3.2.2 Surface finish treated

(see 5.3.2).

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

#### 4.3.2.3 Ends of the elements

For prestressed 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 runoff.

#### 4.3.2.4 Interlocking surfaces

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

#### 4.3.3 Mechanical resistance

##### 4.3.3.1 Loadbearing capacity

As defined in 3.10 the loadbearing capacity shall be declared according to the result of the load testing as described in 5.6.1.

##### 4.3.3.2 Complementary loadbearing capacity

An element shall withstand a complementary loadbearing capacity as defined in 3.11 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 wind under end use conditions, when tested in accordance with 5.6.2.

##### 4.3.3.2.1 Basis of the requirements for mechanical properties

The requirements for mechanical properties of the elements (Tables 5 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:
  - 2 m for solid fences and rails for sports grounds;
  - 3 m for mesh or wire fences;
  - 2,5 m for other types of fences;
- c) classes of wind for posts for solid fences:
  - three classes of wind are defined in Table 4.

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

**Table 4 — Classes of wind for posts for solid fences**

Classes of wind	Wind characteristics		
	Normal wind speed		Basic dynamic pressure <sup>a</sup>
	km/h	m/s	
A	100	28	$5 \cdot 10^{-4}$
B	120	33	$7 \cdot 10^{-4}$
C	140	39	$9 \cdot 10^{-4}$

<sup>a</sup> Conventional value at 10 m above ground, for a normal site, without screen effect, on an element of which the largest dimension is 0,50 m.

#### 4.3.3.2.2 Mechanical resistance of posts

Under the test conditions defined in 5.6.2, posts shall meet the following requirements:

- at the limit of working conditions: after release of the normal service load (Tables 4 to 7) the deflection shall not exceed 1 % of the element's above-ground length, and any cracks shall be closed;
- at the ultimate limit state: the failure load shall be at least equal to the value of the normal failure load (Tables 5 to 7) for the fractile 0,05<sup>2)</sup>.

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 straining post, the mechanical resistance of posts requirements 4.3.3.2.2 apply but normal and failure loads are increased by 50 %, except for straining post used with struts.

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 5 — Intermediate posts for solid fences**

Above-ground height of the slabs (m)		1,00	1,50	2,00	2,50
Class of wind	Class of post	Normal service load (N)			
A	A	1 400	1 400	1 800	2 200
B	B	1 400	1 800	2 500	3 100
C	C	1 400	2 300	3 200	4 000
Class of wind	Class of post	Normal failure load (N)			
A	A	2 300	2 300	3 200	4 000
B	B	2 300	3 200	4 500	5 600
C	C	2 600	4 100	5 700	7 200

**Table 6 — 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 7 — 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

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