



**SLOVENSKI STANDARD**  
**SIST EN 13747:2005**  
**01-december-2005**

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Precast concrete products - Floor plates for floor systems

Betonfertigteile - Plattendecken mit Ortbetonergänzung

Produits préfabriqués en béton - Prédalles pour systemes de planchers

**Ta slovenski standard je istoveten z: EN 13747:2005**

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**ICS:**

91.100.30	Beton in betonski izdelki	Concrete and concrete products
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ICS 91.100.30

English Version

## Precast concrete products - Floor plates for floor systems

Produits préfabriqués en béton - Prédalles pour systèmes  
de planchers

Betonfertigteile - Plattendecken mit Ortbetonergänzung

This European Standard was approved by CEN on 17 February 2005.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

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## Foreword

This document (EN 13747:2005) has been prepared by Technical Committee CEN/TC 229 "Precast concrete products", the secretariat of which is held by AFNOR, and was examined by and agreed with a joint working party appointed by the Liaison Group CEN/TC229-TC250, particularly for its compatibility with structural Eurocodes.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2006, and conflicting national standards shall be withdrawn at the latest by April 2008.

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 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 89/106/EEC.

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 : *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.

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

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

- EN 1168, *Precast concrete products — Hollow core slabs*
- EN 12794, *Precast concrete products — Foundation piles*
- EN 12843, *Precast concrete products — Masts and poles*
- EN 13747, *Precast concrete products — Floor plates for floor systems*
- prEN 15037-1, *Precast concrete products — Beam-and-block floor systems – Part 1: Beams*
- PrEN 15037-2, *Precast concrete products — Beam and blocks floor systems – Part 2: Blocks*
- EN 13224, *Precast concrete products — Ribbed floor elements*
- EN 13225, *Precast concrete products — Linear structural elements*
- prEN 14992, *Precast concrete products — Wall elements*

## EN 13747:2005 (E)

- EN 13693, *Precast concrete products — Special roof elements*
- prEN 14844, *Precast concrete products — Box culverts*
- EN 13978, *Precast concrete products — Precast concrete garages*
- prEN 14991, *Precast concrete products — Foundation elements*
- prEN 15050, *Precast concrete products bridge elements*
- prEN 14843, *Precast concrete products — Stairs*

This standard defines in Annex ZA the application methods of CE marking to products designed using the relevant EN Eurocodes (EN 1992-1-1:2004 and EN 1992-1-2:2004). 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 organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

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

For design rules reference is made to EN 1992-1-1:2004. Additional complementary rules are provided where necessary.

In clauses 4.3.3 and 4.3.4, the present standard includes specific provisions resulting from the application of EN 1992-1-1:2004 and EN 1992-1-2:2004 rules made specific for the concerned product. The use of these provisions is consistent with a design of works made with EN 1992-1-1:2004 and EN 1992-1-2:2004.

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## 1 Scope

This European standard deals with the requirements, the basic performance criteria and evaluation of conformity for precast floor plates made of reinforced or prestressed normal weight concrete according to EN 1992-1-1:2004, used in conjunction with cast-in-situ concrete (topping) for the construction of composite floor slabs. Annex B gives different types of composite slabs made with floor plates.

These floor plates, with or without void formers, can include lattice girders or stiffening ribs incorporated during the precasting.

They shall be manufactured in factories by casting, slip forming or extrusion.

The products covered by this standard are intended to be used as part of structural floors in applications such as:

- floors and roofs of buildings (including industrial and storage buildings, public buildings as schools, hospitals, etc.);
- parking/circulation areas;
- cover for culverts;
- etc.

The products may be used in seismic areas provided they fulfil the requirements specific to this use.

This standard does not cover:

- reinforced floor plates with a nominal thickness less than 40 mm;
- prestressed floor plates with a nominal thickness less than 50 mm;
- floor plates with a very smooth upper face, such as defined in 6.2.5 of EN 1992-1-1:2004.

## 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 13369:2004, *Common rules for precast concrete products*.

EN 10080, *Steel for the reinforcement of concrete — Weldable reinforcing steel — General*.

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

EN 12390-6, *Testing hardened concrete — Part 6: Tensile splitting strength of test specimens*.

EN 1991-1-1:2002, *Eurocode 1: Actions on structures — Part 1-1: General actions — Densities, self-weight, imposed loads for buildings*.

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

EN 1992-1-2:2004, *Eurocode 2: Design of concrete structures — Part 1-2: General rules — Structural fire design*.

### 3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply. For general terms EN 13369:2004 shall apply.

#### 3.1 Floor plates

##### 3.1.1

##### **floor plate**

generally reinforced or prestressed concrete plates are used as permanent formwork for cast-in-situ concrete, which, when hardened, forms a structurally composite slab with the floor plate

**NOTE** Some floor plates may be used as formwork for cast-in-situ concrete, with no contribution to the strength of the finished floor.

##### 3.1.2

##### **reinforced floor plate**

floor plate in which reinforcing steel constitutes the main reinforcement of the composite slab

##### 3.1.3

##### **prestressed floor plate**

floor plate in which the prestressing steel constitutes all or part of the main reinforcement of the composite slab

##### 3.1.4

##### **floor plate with lattice girders**

floor plate in which continuous lattice girders are incorporated generally in the longitudinal direction (i.e. parallel to the span) to provide strength and rigidity for transient situations

##### 3.1.5

##### **floor plate with ribs**

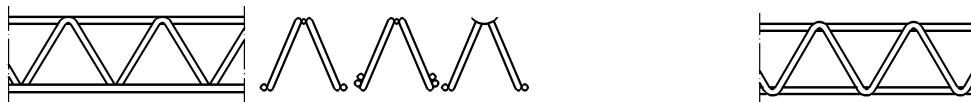
floor plate in which continuous stiffening ribs are positioned generally in the longitudinal direction (i.e. parallel to the span) to provide strength and rigidity for transient situations

#### 3.2

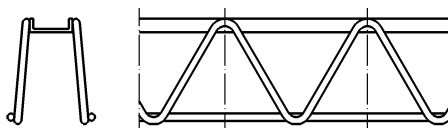
##### **lattice girders**

two dimensional or three dimensional metallic structure comprising an upper chord, one or more lower chords and continuous or discontinuous diagonals which are welded or mechanically connected to the chords

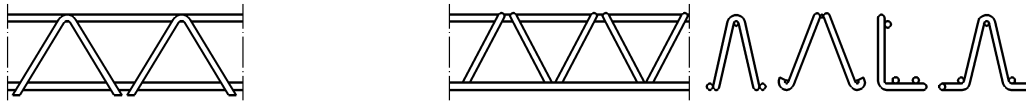
Figure 1 gives some examples of lattice girders.



a) continuous diagonals



b) continuous diagonals with steel profile unfilled with concrete

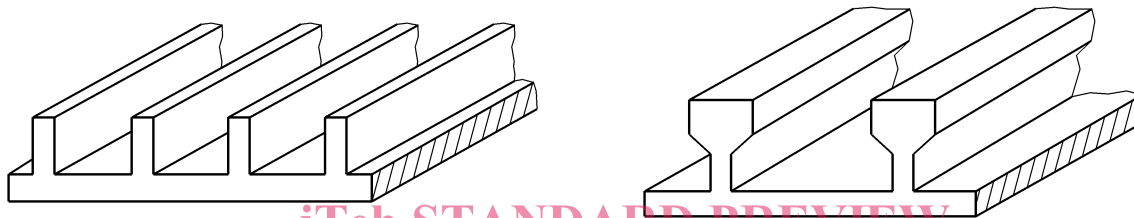


c) discontinuous diagonals

Figure 1 — Examples of lattice girders

**3.3 stiffening rib**

continuous concrete profile formed on the upper surface of the floor plate during the precasting operation. It extends generally in the main direction of the floor plate. Figure 2 gives examples of different stiffening rib configurations



a) rectangular ribs

b) T-section ribs

Figure 2 — Examples of stiffening ribs  
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**3.4 Dimensions**

**3.4.1 length,  $L$**

dimension of the product in the main mechanical direction (i.e. supporting the most important bending moment)

**3.4.2 width,  $b$**

dimension perpendicular to the length

**3.4.3 thickness,  $h_p$**

nominal distance between the upper and the lower faces of the floor plate. Where the upper surface is uneven (see Figure 3) the distance should be measured to the mean plane of the surface

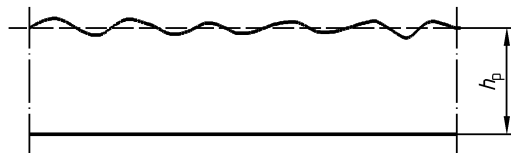


Figure 3 — Thickness  $h_p$  of a floor plate

### 3.4.4 edge

side of the floor plate. A distinction is made between:

- supported edge: edge intended for connection to the support elements of the structure;
- lateral edge: edge between contiguous floor plates;
- free edge: edge left free after construction of the floor.

### 3.4.5 upper face

face of the floor plate when in its final position of use. It forms the interface with cast-in-situ topping above the floor plate

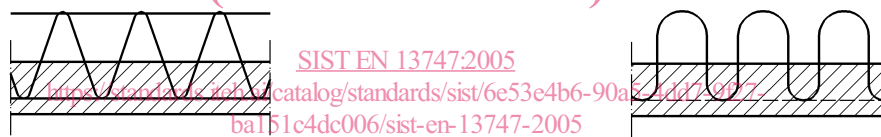
### 3.4.6 lower face

visible face of the precast element in opposition to the upper face

## 3.5 Reinforcements

### 3.5.1 connecting reinforcement

reinforcement anchored on both sides of the interface between the floor plate and the cast-in-situ concrete. It consists of the diagonals of the lattice girder, individual or continuous reinforcement in the form of loops, possibly with a longitudinal bar welded at the top and/or bottom (see Figure 4)



a) lattice girder

b) loops

**Figure 4 — Examples of connecting reinforcement**

3.5.2

**shear reinforcement**

reinforcement with angles,  $\alpha$  and  $\beta$ , generally between  $45^\circ$  and  $90^\circ$  to the plane of the floor plate and the cast-in-situ concrete. In practice it consists of pieces of lattice girders, loops or stirrups (see Figure 5)



Figure 5 — Examples of shear reinforcements

3.6 Void formers

3.6.1

**void former**

element glued, connected or otherwise incorporated into the floor plate during or after precasting (see Figure 6), but before delivery. These elements are generally intended to decrease the weight of the floor

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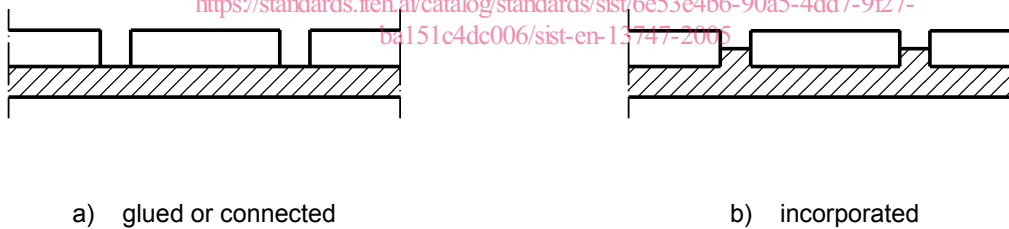


Figure 6 — Void formers

3.6.2

**non-structural void former**

void former that does not contribute to the mechanical strength of the composite slab

3.6.3

**structural void former**

void former that, together with the cast-in-situ concrete, contributes to the mechanical strength of the composite slab

3.7

**cast in unit**

unit incorporated into the floor plate during precasting, e.g. lifting inserts, junction or switch boxes, conduits, ducts, etc.

**3.8****topping**

in-situ concrete layer cast over the entire floor plate surface, so that it acts monolithically by bond, with or without connecting reinforcement

**3.9****composite slab**

slab comprising a floor plate and bonded topping, which together behave as a monolithic slab after the hardening of the topping

**4 Requirements****4.1 Material requirements****4.1.1 General**

Clause 4.1.1 of EN 13369:2004 shall apply.

**4.1.2 Constituent materials of concrete**

Clause 4.1.2 of EN 13369:2004 shall apply.

**4.1.3 Reinforcing steel****4.1.3.1 Bars, coils and welded fabric**

Clause 4.1.3 of EN 13369:2004 shall apply.

**4.1.3.2 Lattice girders**

Bars and coils used in production of lattice girder shall comply with EN 10080.

The weld strength or the mechanical strength of joints of lattice girder shall match the anchorage requirements in the concrete.

**4.1.3.3 Connecting reinforcement**

Connecting reinforcement, other than lattice girder, shall be ribbed, indented or smooth steel complying with their relevant standards. Where its suitability can be proven prestressing wires and strands may also be used.

When a welded longitudinal bar is present the steel of connecting reinforcement shall be weldable.

The weld strength or the mechanical strength of joints of connecting reinforcement shall match the anchorage requirements in the concrete.

**4.1.4 Prestressing steel**

Clause 4.1.4 of EN 13369:2004 shall apply.

For prestressing steel, the nominal diameter shall be less than or equal to 13 mm. Only indented wire or strands made of several smooth or indented wires shall be used.

**4.1.5 Inserts and connectors**

Clause 4.1.5 of EN 13369:2004 shall apply.