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DIN EN 1168

ICS 91.100.30

Supersedes
DIN EN 1168:2009-07
See start of application

Precast concrete products – Hollow core slabs (includes Amendment A3:2011) English translation of DIN EN 1168:2011-12

Betonfertigteile –
Hohlplatten (enthält Änderung A3:2011)
Englische Übersetzung von DIN EN 1168:2011-12

Produits préfabriqués en béton –
Dalles alvéolées (Amendement A3:2011 inclus)
Traduction anglaise de DIN EN 1168:2011-12

Document comprises 83 pages

Translation by DIN-Sprachendienst.
In case of doubt, the German-language original shall be considered authoritative.

A comma is used as the decimal marker.

Start of application

The start of application of this standard is due to be 1 December 2011.

DIN EN 1168:2009-07 may be used in parallel until 30 June 2013 (see deadline in the EU Official Journal).

It should be noted that, in Germany, CE conformity marking of construction products will be permitted once this standard has been listed in the *Bundesanzeiger* (German Federal Gazette) and from the date given therein.

National foreword

This standard has been prepared by Technical Committee CEN/TC 229 “Precast concrete products” (Secretariat: AFNOR, France).

The responsible German body involved in its preparation was the *Normenausschuss Bauwesen* (Building and Civil Engineering Standards Committee), Working Committee NA 005-07-08 AA *Betonfertigteile (SpA zu CEN/TC 229)*.

Amendments

This standard differs from DIN EN 1168:2009-07 as follows:

a) the scope has been extended to include solid slab elements;

b) EN ISO 15630-3 has been added in Clause 2 “Normative references”;

c) new terms and definitions have been added;

d) specifications relating to longitudinal bars and production tolerances have been modified;

e) specifications relating to vertical grooves have been added;

f) specifications relating to shear and torsion capacity have been modified;

g) specifications relating to the shear capacity of elements subjected to torsion have been modified;

h) specifications relating to the load capacity of elements supported on three edges, resistance to fire and test methods have been modified;

i) specifications relating to load distribution factors for three or four supported edges have been modified;

j) a new Annex K “Thermal prestressing” has been added;

k) the Bibliography has been updated.

Previous editions

DIN EN 1168: 2005-08, 2008-10, 2009-07

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1168:2005+A3

October 2011

ICS 91.060.30; 91.100.30

Supersedes EN 1168:2005+A2:2009

English Version

Precast concrete products - Hollow core slabs

Produits préfabriqués en béton - Dalles alvéolées

Betonfertigteile - Hohlplatten

This European Standard was approved by CEN on 1 July 2004 and includes Amendment 1 approved by CEN on 14 January 2008, Amendment 2 approved by CEN on 4 January 2009 and Amendment 3 approved by CEN on 11 August 2011.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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

CEN members are the national standards bodies of 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 and United Kingdom.

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

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Ref. No. EN 1168:2005+A3:2011: E

Contents

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

Foreword

This document (EN 1168:2005+A3:2011) has been prepared by Technical Committee CEN/TC 229 “Precast concrete products”, the secretariat of which is held by AFNOR [A2] and was examined by and agreed with a joint working party appointed by the Liaison Group CEN/TC 229 – CEN/TC 250, particularely for its compatibility with structural Eurocodes [A2].

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 April 2012, and conflicting national standards shall be withdrawn at the latest by July 2013.

[A1] This European Standard was examined by and agreed with a joint working party appointed by the Liaison Group CEN/TC 229 – TC 250, particularly for its compatibility with structural Eurocodes. [A1]

This document includes Amendment 1 approved by CEN on 2008-01-14, Amendment 2 approved by CEN on 2009-01-04 and Amendment 3 approved by CEN on 2011-08-11.

This document supersedes [A3] EN 1168:2005+A2:2009 [A3].

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] [A1], [A2] [A2] and [A3] [A3].

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 Construction Products Directives (89/106/EEC) of the European Union (EU).

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.

[A3] Eurocodes are taken as a common reference for design aspects. The installation of some structural precast concrete products is dealt with by EN 13670. In all countries it can be accompanied by alternatives for national application. [A3]

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

— [A1] EN 1168:2005+A1 [A1], *Precast concrete products – Hollow core slabs*

— [A1] EN 12794:2005+A1 [A1], *Precast concrete products – Foundation piles*

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

— [A1] EN 13224:2004+A1 [A1], *Precast concrete products – Ribbed floor elements*

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

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

— [A1] EN 13747 [A1], *Precast concrete products – Floor plates for floor systems*

— [A1] EN 13978-1, *Precast concrete products - Precast concrete garages - Part 1: Requirements for reinforced garages monolithic or consisting of single sections with room dimensions* [A1]

— [A1] EN 14843 [A1], *Precast concrete products - Stairs*

— [A1] EN 14844 [A1], *Precast concrete products – Box culverts*

— [A1] EN 14991 [A1], *Precast concrete products – Foundation elements*

— [A1] EN 14992, *Precast concrete products – Wall elements* [A1]

— [A2] 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*

— prEN 15037-4, *Precast concrete products – Beam-and-block floor systems – Part 4: Polystyrene blocks*

— prEN 15037-5, *Precast concrete products – Beam-and-block floor systems – Part 5: Lightweight blocks* [A2]

— [A1] EN 15258 [A1], *Precast concrete products – Retaining wall elements*

— [A1] EN 15050 [A1], *Precast concrete products – Bridge elements*

This standard defines in Annex ZA the application methods of CE marking to products designed using the relevant EN Eurocodes (EN 1992-1-1 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 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, 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 and United Kingdom.

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. Additional complementary rules are provided where necessary.

The verification of the mechanical resistance of hollow core slabs is, at this stage of standardisation, only fully accepted by calculation; [A2] however, concrete properties adopted as input for calculation of shear resistance depend on the proper functioning of the production machine; therefore a full scale test method to confirm both the shear resistance obtained by calculation and the proper functioning of the production machine, is given in Annex J (normative). [A2]

Special rules for structures with hollow core elements are presented in annexes about load distribution (Annex C), diaphragm action (Annex D), negative moments (Annex E), shear capacity of composite members (Annex F) and design of connections (Annex H).

[A3] Special rules for pre-stressing by means of thermal pre-stressing are given in Annex K. [A3]

Because of some specialities of the product, e.g. the absence of transverse reinforcement, some complementary design rules to EN 1992-1-1 are necessary. Furthermore, research on hollow core slabs has resulted in special, widely used, design rules which are not incorporated in the design rules of EN 1992-1-1. According to subclause 1.2 of EN 1992-1-1:2004 the complementary rules, given in informative annexes in this standard, comply with the relevant principles given in EN 1992-1-1.

Because of the fact that the experimental evidence is mainly based on elements with limited depth and width, this standard is applicable to elements with these limited dimensions. This limitation is not intended to prohibit the application of elements with larger sizes, but the experience is not yet wide enough to draw up standardised design rules.

1 Scope

This European Standard deals with the requirements and the basic performance criteria and specifies minimum values where appropriate for precast hollow core slabs made of prestressed or reinforced normal weight concrete according to EN 1992-1-1:2004.

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

Hollow core elements are used in floors, roofs, walls and similar applications. In this European Standard the material properties and other requirements for floors and roofs are dealt with; for special use in walls and other applications, see the relevant product standards for possible additional requirements.

[A3] The elements have lateral edges with a grooved profile in order to make a shear key to transfer shear through joints contiguous elements. [A3] For diaphragm action the joints have to function as horizontal shear joints.

[A3] To improve this action vertical grooves may be provided. [A3]

The elements are manufactured in factories by extrusion, slipforming or mouldcasting. [A3] Fitting slabs (narrowed slab elements) and recesses to the hollow core slabs can be made during production or afterwards. Hollow core slabs can have provisions for thermal activation, heating, cooling, sound insulation, etc. Due to these provisions, the concrete temperature remains in it's natural range. [A3]

[A3] This European Standard also deals with solid slab elements used in conjunction with hollow core slabs and manufactured by extrusion, slipforming or mouldcasting, equivalent to the manufacturing of hollow core slabs. These solid slabs have the same overall cross-section as hollow core slabs, however without hollow cores. [A3]

[A3] The application of the standard is limited for prestressed elements to a maximum depth of 500 mm and for reinforced elements to a maximum depth of 300 mm.

For both types, the maximum width without transverse reinforcement is limited to 1 200 mm and with transverse reinforcement to 2 400 mm. [A3]

The elements may be used in composite action with an in situ structural topping cast on site.

The applications considered are floors and roofs of buildings, including areas for vehicles in the category F and G of [A2] EN 1991-1-1 [A2] which are not subjected to fatigue loading. For building in seismic zones additional provisions are given in EN 1998-1.

This European Standard does not deal with complementary matters. E.g. the slabs should not be used in roofs without additional protection against water penetration.

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 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*

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*