

საქართველოს სტანდარტი

ქარხნული ბეტონის ნაწარმი-ღრუ გულიანი ფილები

საქართველოს სტანდარტების და მეტროლოგიის
ეროვნული სააგენტო
თბილისი

სსტ ენ 1168:2005+A3:2011/2013

საინფორმაციო მონაცემები

1 შემუშავებულია საქართველოს სტანდარტების და მეტროლოგიის ეროვნული სააგენტოს სტანდარტების დეპარტამენტის მიერ

2 დამტკიცებულია და შემოღებულია სამოქმედოდ საქართველოს სტანდარტების და მეტროლოგიის ეროვნული სააგენტოს 2013 წლის 11 ნოემბრის № 84 განკარგულებით

3 მიღებულია გარეკანის თარგმნის მეთოდით სტანდარტიზაციის ევროპული კომიტეტის სტანდარტი ენ 1168:2005+A3:2011/2013 „ქარხნული ბეტონის ნაწარმი-ღრუ გულიანი ფილები“

4 პირველად

5 რეგისტრირებულია საქართველოს სტანდარტების და მეტროლოგიის ეროვნული სააგენტოს რეესტრში: 2013 წლის 11 ნოემბერი №268-1.3-5584

წინამდებარე სტანდარტის სრული ან ნაწილობრივი აღწარმოება, ტირაჟირება და გავრცელება საქართველოს სტანდარტების და მეტროლოგიის ეროვნული სააგენტოს ნებართვის გარეშე არ დაიშვება

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

საინფორმაციო ნაწილი. სრული ტექსტის სახანაგავად შეიძინეთ სტანდარტი.

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.....	4
Introduction	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	8
3.1 Definitions	8
4 Requirements	9
4.1 Material requirements	9
4.1.1 Prestressing steel	10
4.2 Production requirements	10
4.2.1 Structural reinforcement	10
4.3 Finished product requirements	11
4.3.1 Geometrical properties	11
4.3.2 Surface characteristics	14
4.3.3 Mechanical resistance	14
4.3.4 Resistance and reaction to fire	23
4.3.5 Acoustic properties	23
4.3.6 Thermal properties	23
4.3.7 Durability	24
4.3.8 Other requirements	24
5 Test methods	24
5.1 Tests on concrete	24
5.2 A_3 Tests on pre-stressing steel A_3	24
5.3 Measuring of dimensions and surface characteristics	24
5.3.1 Element dimensions	24
5.4 Weight of the products	25
6 Evaluation of conformity	25
6.1 A_2 General	25
6.2 Type testing	25
6.2.1 General	25
6.2.2 Initial type testing	26
6.2.3 Further type testing	26
6.3 Factory production control A_3	26
7 Marking	27
7.1 General	27
8 Technical documentation	27
Annex A (normative) Inspection schemes	28
Annex B (informative) Typical shapes of joints	31
Annex C (informative) Transverse load distribution	33
Annex D (informative) Diaphragm action	42
Annex E (informative) Unintended restraining effects and negative moments	43
Annex F (informative) Mechanical resistance in case of verification by calculation: shear capacity of composite members	46

Annex G (informative) **A3** Resistance to fire **A3**49

Annex H (informative) **Design of connections**57

Annex J (normative) **A1** Full scale test **A1**59

Annex K (normative) **A3** Thermal prestressing **A3**65

Annex ZA (informative) **A2** Clauses of this European Standard addressing essential requirements or other provisions of EU Directives **A2**67

Bibliography81

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

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, particularly 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*

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

- EN 13693, *Precast concrete products – Special roof elements*
- A_1 EN 13747 A_1 , *Precast concrete products – Floor plates for floor systems*
- A_1 EN 13978-1, *Precast concrete products - Precast concrete garages - Part 1: Requirements for reinforced garages monolithic or consisting of single sections with room dimensions* A_1
- A_1 EN 14843 A_1 , *Precast concrete products - Stairs*
- A_1 EN 14844 A_1 , *Precast concrete products – Box culverts*
- A_1 EN 14991 A_1 , *Precast concrete products – Foundation elements*
- A_1 EN 14992, *Precast concrete products – Wall elements* A_1
- A_2 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* A_2
- A_1 EN 15258 A_1 , *Precast concrete products – Retaining wall elements*
- A_1 EN 15050 A_1 , *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.