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NELIKANTELEMENDID**

**Precast concrete products - Box culverts  
CONSOLIDATED TEXT**

**EESTI STANDARDI EESSÕNA****NATIONAL FOREWORD**

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English Version

## Precast concrete products - Box culverts

Produits préfabriqués en béton - Cadres enterrés

Betonfertigteile - Hohlkastenelemente

This European Standard was approved by CEN on 17 April 2006 and includes Amendment 1 approved by CEN on 22 August 2008 and Amendment 2 approved by CEN on 22 October 2011.

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<sup>A1</sup> 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. <sup>A1</sup>

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## Foreword

This document (EN 14844:2006+A2:2011) has been prepared by Technical Committee CEN/TC 229 "Precast concrete products", the secretariat of which is held by AFNOR <sup>A1</sup> 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 <sup>A1</sup>.

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of an identical text or by endorsement, at the latest by May 2012, and conflicting national standards shall be withdrawn at the latest by August 2013.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 includes Amendment 1, approved by CEN on 2008-08-22, and Amendment 2, approved by CEN on 2011-10-22.

This document supersedes <sup>A2</sup> EN 14844:2006+A1:2008 <sup>A2</sup>.

The start and finish of text introduced or altered by amendment is indicated in the text by tags <sup>A1</sup> <sup>A1</sup> and <sup>A2</sup> <sup>A2</sup>.

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).

<sup>A2</sup> *deleted text* <sup>A2</sup>

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 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.

<sup>A2</sup> Eurocodes are taken as a common reference for design aspects. The installation of some structural precast concrete products is dealt with by EN 13670, *Execution of concrete structures*. <sup>A2</sup>

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

- $\boxed{A_1}$  EN 13978-1, *Precast concrete products — Precast concrete garages — Part 1: Requirements for reinforced garages monolithic or consisting of single sections with room dimensions*  $\boxed{A_1}$
- EN 13224, *Precast concrete products — Ribbed floor elements*
- $\boxed{A_1}$  EN 14843  $\boxed{A_1}$ , *Precast concrete products — Stairs*
- EN 14844, *Precast concrete products — Box culverts*
- $\boxed{A_1}$  EN 14991  $\boxed{A_1}$ , *Precast concrete products — Foundation elements*
- $\boxed{A_1}$  EN 14992  $\boxed{A_1}$ , *Precast concrete products — Wall elements : Products properties and performances*
- $\boxed{A_2}$  EN 15037-1  $\boxed{A_2}$ , *Precast concrete products — Beam-and-block floor systems — Part 1: Beams*
- $\boxed{A_2}$  EN 15037-2  $\boxed{A_2}$ , *Precast concrete products — Beam-and-block floor systems — Part 2: Concrete blocks*
- $\boxed{A_2}$  EN 15037-3, *Precast concrete products — Beam-and-block floor systems — Part 3: Clay blocks*  $\boxed{A_2}$
- $\boxed{A_2}$  EN 15037-4, *Precast concrete products — Beam-and-blocks floor systems — Part 4: Expanded polystyrene blocks*  $\boxed{A_2}$
- $\boxed{A_2}$  prEN 15037-5, *Precast concrete products — Beam-and-block floor systems — Part 5: Lightweight blocks for simple formwork*  $\boxed{A_2}$
- $\boxed{A_1}$  EN 15050  $\boxed{A_1}$ , *Precast concrete bridge elements*
- $\boxed{A_2}$  EN 15258  $\boxed{A_2}$ , *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). 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.

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this European Standard.

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 the United Kingdom.

## Introduction

The Construction Products Directive sets out Essential Requirements to be considered, depending upon the use made of the product. For box culverts it was mandated that the requirements for mechanical resistance and stability should be considered. For these requirements this standard will mainly refer to clauses of EN 1992-1-1, *Eurocode 2: Design of concrete structures — Part 1-1: General rules and rules for buildings*.

The mandate also requires consideration of durability, from the point of view of freeze thaw action and corrosion, which is also addressed by the Eurocodes referred to above.

Ⓜ deleted text Ⓜ

## 1 Scope

This European Standard deals with both large (structural) and small (non-structural or light structural) box culverts of rectangular cross-section formed monolithically and designed as continuous elements with a joint detail shaped to allow the possible incorporation of sealing materials. Box culverts can be used for creation of voids below ground for conveyance and storage of materials. e.g. conveyance and storage of wastewater, cable tunnels and subways

**A2** For the purposes of this European Standard, box culverts having internal cross-sectional dimensions ( $W$  and  $H$  in Figure 1) less than or equal to 1 250 mm are considered as small (non-structural or light structural). All other units are defined as large. **A2** The elements are generally manufactured in factories using either normal weight or lightweight concrete and usually require reinforcing steel. This standard does not include units manufactured from autoclaved aerated concrete, nor prefabricated reinforced box culverts of lightweight concrete with open structure.

Each unit is structurally complete. They are used in combination to form a total structure of appropriate length (including joints) and capacity.

## 2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

**A2** EN 206-1:2000, *Concrete — Part 1: Specification, performance, production and conformity* **A2**

EN 1992-2, *Eurocode 2: Design of concrete structures — Concrete bridges — Design and detailing rules*

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

## 3 Terms and definitions, symbols and abbreviated terms

### 3.1 Terms and definitions

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

#### 3.1.1

##### **corner splay**

internal chamfering of the corners

### 3.2 Symbols and abbreviations

Principal and other dimensions and their symbols are given in Figure 1.

The symbols comply with EN 1992-1-1 as far as possible and are listed:

$W$  internal width

$H$  internal height

$L$  unit length (measured from end of spigot to base of socket for rebated joint – see Figure 1a))