SLOVENSKI STANDARD
SIST EN 12794:2005+A1:2007

01-julij-2007

Montažni betonski izdelki - Piloti za temeljenje

Precast concrete products - Foundation piles

Betonfertigteile - Gründungspfähle

Produits préfabriqués en béton - Pieux de fondation

Ta slovenski standard je istoveten z: **EN 12794:2005+A1:2007**

ICS:

91.100.30	Beton in betonski izdelki	Concrete and concrete products
93.020	Zemeljska dela. Izkopavanja. Gradnja temeljev. Dela pod zemljo	Earthworks. Excavations. Foundation construction. Underground works

SIST EN 12794:2005+A1:2007 **en;fr**

EUROPEAN STANDARD

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English Version

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This European Standard was approved by CEN on 22 November 2004 and includes Amendment 1 approved by CEN on 6 April 2007.

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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 Management Centre has the same status as the official versions.

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

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

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Contents

A1 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 is not relevant or included in a more general reference of this European Standard, its number is omitted and this may result in a gap in numbering. A1

Foreword

This document (EN 12794:2005+A1:2007) has been prepared by Technical Committee CEN/TC 229 “Precast concrete products”, the secretariat of which is held by AFNOR.

This document 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.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2007 and conflicting national standards shall be withdrawn at the latest by November 2007.

This document includes Amendment 1, approved by CEN on 2007-04-06.

This document supersedes EN 12794:2005.

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

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 Construction Products Directives (89/106/EEC).

This document 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 an European prestandard. In all countries it can be accompanied by alternatives for national application and it shall not be treated as an European Standard.

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 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-block floor systems — Part 2: Blocks*

EN 13224, *Precast concrete products — Ribbed floor elements*

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

EN 14992, *Precast concrete products — Wall elements : Products properties and performances*

prEN 15258, *Precast Concrete Products — Retaining wall elements*

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

EN 14844, *Precast concrete products — Box culverts*

EN 13978, *Precast concrete products — Precast concrete garages*

EN 14991, *Precast concrete products — Foundation elements*

EN 15050, *Precast concrete bridge elements*

EN 14843, *Precast concrete products — Stairs*

This document defines in Annex ZA the application methods of CE marking to products designed using the relevant EN Eurocodes (EN 1992-1-1). 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.

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, 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

This document specifies the requirements, the basic performance criteria and detailing provisions for precast concrete foundation piles manufactured in a factory environment, stored, transported and ultimately installed on a construction site. The design of structural products shall ensure their fitness for the particular application. Particular attention is to be paid to design co-ordination with other parts of the construction.

1 Scope

This document specifies the terminology, requirements, basic performance criteria, test methods and evaluation of conformity that will be applied to precast concrete foundation piles, factory produced for building and civil engineering works and installed at the site by the use of impact, vibration, pressing or other suitable techniques. This document may also be applied to products manufactured in temporary plants on site where production is controlled in accordance with the provisions of Clause 6 and is protected against adverse weather conditions as necessary.

This document applies to foundation piles produced in a plant as reinforced or prestressed concrete elements. The cross-section may be solid or provided with a hollow core, either prismatic or cylindrical. The cross-section may be constant over the full length or tapered partly or wholly along the pile or pile segment length.

This document deals with foundation piles manufactured either in one length or in segments with cast-in pile joints. The foundation piles may have an enlarged toe or a pile shoe.

This document applies to normal weight concrete as defined in EN 206-1 compacted so as to retain no appreciable amount of entrapped air other than entrained air.

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

EN 1997-1:2004, *Eurocode 7: Geotechnical design — Part 1: General rules*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13369:2004 and the following apply. In general the term “product” refers to an element which is produced in large numbers.

3.1 Foundation piles

A number of these definitions are illustrated in Figure 1.

3.1.1
pile
long element to be driven in the ground to provide support to the foundation

3.1.2
single length pile
pile without joints

3.1.3
segmental pile
pile with joints

3.1.4
pile length
distance between pile top and pile bottom

3.1.5
pile segment
single unit of a jointed pile

3.1.6
segment length
length of a pile segment forming a part of the pile length

3.1.7
pile top
surface of a pile head

3.1.8
pile head
upper section of a pile

3.1.9
pile shaft
section of the pile between pile head and pile toe

3.1.10
pile toe
lower part of a pile

3.1.11
pile bottom
surface of a pile toe

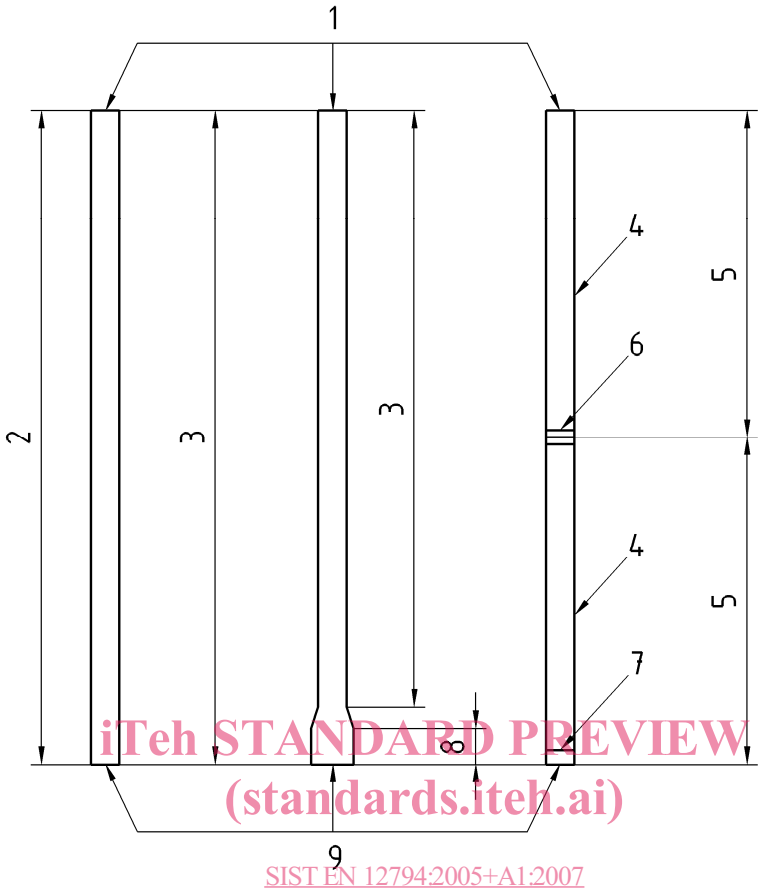
3.1.12
enlarged toe
a concrete section with a cross-section greater than the pile shaft, cast in one production operation

3.1.13
shape factor
ratio between the pile length or the length of a segment and the smallest transverse dimension of the shaft

3.1.14
pile joint
a device by which separate segments of a segmental pile are structurally connected

3.1.15
pile shoe
a device by which the pile toe may be strengthened or protected

3.1.16
crack ring
a device by which the pile head or toe may be strengthened or protected



Key

1 Pile top
2 Pile length
3 Shaft length
4 Pile segment
5 Segment length
6 Pile joint
7 Pile shoe
8 Pile toe
9 Pile bottom

Figure 1 — Terms and definitions

4 Requirements

4.1 Material requirements

For general aspects, constituent materials of concrete, reinforcing and prestressing steel, inserts and connectors the relevant Clauses of EN 13369:2004 4.1 shall apply. The ultimate tensile and tensile yield strength of steel shall be considered.

4.2 Production requirements

4.2.1 Concrete production

4.2.1 of EN 13369:2004 shall apply.

4.2.2 Hardened concrete

4.2.2.1 Strength classes

4.2.2.1 of EN 13369:2004 shall apply.

The minimum concrete class for either reinforced or prestressed precast foundation piles shall be C35/45.

4.2.2.2 Compressive strengths

4.2.2.2 of EN 13369:2004 shall apply.

The minimum compressive strength to achieve before transportation or when applicable also before installation of the pile shall be specified.

4.2.3 Structural reinforcement

4.2.3.1 Processing of reinforcing steel

4.2.3.1 of EN 13369:2004 shall apply.

4.2.3.2 Tensioning and prestressing

4.2.3.2.1 Initial tensioning stresses

4.2.3.2.1 of EN 13369:2004 shall apply.

4.2.3.2.2 Accuracy of tensioning

Class A of 4.2.3.2.2 of EN 13369:2004 shall apply.

4.2.3.2.3 Minimum concrete strength at transfer

4.2.3.2.3 of EN 13369:2004 shall apply.

4.2.3.2.4 Slippage of tendons

Not relevant due to the common production technique.

4.3 Finished product requirements

4.3.1 Geometrical properties

4.3.1.1 Production tolerances

The following tolerances shall apply unless stricter tolerances are specified for single piles or pile segments:

— the axis of the pile shaft after production and without the influence of bending stresses shall be straight. The permitted production deviation of straightness is shown in Table 2;

— for cross-sectional dimensions L, the permitted deviation is ΔL from nominal dimensions, see Table 2;

— the top and bottom of the pile shall be perpendicular and symmetric to the central axis of the pile. The angular deviation shall not exceed the following values in class AD1 or class AD2 as shown in Table 1:

Table 1 — Classes of maximum angular deviation of the pile

Class	Maximum permitted deviation
Class AD1	1/100 across the cross section
Class AD2	3/100 or 10 mm across the cross section whichever is less

— The top of the pile shall be either plane or convex.

— Axis of any enlarged toe shall be nominally concentric to the axis of the pile shaft. Maximum permitted deviation is d_e/100 or 20 mm across the cross section whichever is the less. where d_e = depth of the cross-section of enlarged toe;

— for positioning of reinforcing and prestressing steel the permitted deviation is Δd from nominal effective depth d of the reinforcement and Δc from nominal cover c_{nom} of the reinforcement, see Table 2. For the single bar pile see Annex C;

— cover of each reinforcing bar from the pile top and pile bottom shall be within the limits of 10 mm to 50 mm, while the mutual difference between the ends of reinforcing bars shall be less than 20 mm, which is not valid for the single bar pile described in Annex C;

— when determining the deviation from nominal effective depth the location of the reinforcement may be determined as the mean of the measured values of the bars or strands in a cross section;

— the nominal cover c_{nom} of the reinforcement shall be not less than the minimum cover c_{min} plus the lower permitted deviation Δc;

— the position of the reinforcement and its tolerances shall be specified in production drawings.

The requirements shall be verified in accordance with 5.2.

Table 2 — Permitted deviations for dimensions and cover of precast concrete piles

Target dimension of the cross-section in the direction to be checked	ΔL (mm)	Δd (mm)	Δc (mm)
Cross-section dimensions of the pile The actual cross section shall be greater than 95 % of the nominal cross section	+ 15 – 10	– 10	– 10
Nominal length of the pile	+ 150 – 100		
Straightness of the axis of the shaft $L \leq 10$ m 10 m $\leq L <$ 20 m $L \geq 20$ m	 ± 20 ± 2 L [1] ± 40		
NOTE 1 ΔL and Δd are given to ensure that deviations in either cross-sectional dimensions or straightness as well as in the position of the reinforcement do not exceed values covered by the relevant safety factors in the Eurocodes. NOTE 2 The values for Δc are given for durability purposes.			
[1] In this formula the dimension of length L is m.			

4.3.1.2 Minimum dimensions

The shape factor shall not exceed the following values:

Multiple bar reinforced piles/pile segments 75

Prestressed piles 100

The dimensions of an enlarged toe shall be in compliance with Figure 2.