



**SLOVENSKI STANDARD**  
**SIST EN 1997-1:2005/A1:2014**  
**01-maj-2014**

---

**Evrokod 7: Geotehnično projektiranje - 1. del: Splošna pravila**

Eurocode 7: Geotechnical design - Part 1: General rules

Eurocode 7 - Entwurf, Berechnung und Bemessung in der Geotechnik - Teil 1:  
Allgemeine Regeln

Eurocode 7: Calcul géotechnique - Partie 1: Règles générales

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

**Ta slovenski standard je istoveten z: EN 1997-1:2004/A1:2013**

<https://standards.iteh.ai/catalog/standards/sist/a39cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014>

**ICS:**

91.010.30	Tehnični vidiki	Technical aspects
93.020	Zemeljska dela. Izkopavanja. Gradnja temeljev. Dela pod zemljo	Earthworks. Excavations. Foundation construction. Underground works

**SIST EN 1997-1:2005/A1:2014**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 1997-1:2005/A1:2014](https://standards.iteh.ai/catalog/standards/sist/a39cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014)

<https://standards.iteh.ai/catalog/standards/sist/a39cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 1997-1:2004/A1**

November 2013

ICS 93.020; 91.010.30

English Version

## Eurocode 7: Geotechnical design - Part 1: General rules

Eurocode 7: Calcul géotechnique - Partie 1: Règles  
générales

Eurocode 7 - Entwurf, Berechnung und Bemessung in der  
Geotechnik - Teil 1: Allgemeine Regeln

This amendment A1 modifies the European Standard EN 1997-1:2004; it was approved by CEN on 8 August 2013.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant 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 amendment 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

[SIST EN 1997-1:2005/A1:2014](https://standards.iteh.ai/catalog/standards/sist/a39cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014)

<https://standards.iteh.ai/catalog/standards/sist/a39cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014>



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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## Contents

	Page
Foreword.....	3
1 <b>Modification to the Contents</b> .....	4
2 <b>Modifications to National annex for EN 1997-1</b> .....	4
3 <b>Modification to 1.1.2</b> .....	4
4 <b>Modification to 1.2</b> .....	5
5 <b>Modification to 1.6</b> .....	5
6 <b>Modification to Section 8</b> .....	7
7 <b>Modifications to Section 9</b> .....	14
8 <b>Modification to 10.2</b> .....	15
9 <b>Modification to 11.4</b> .....	15
10 <b>Modification to Annex A title and A.1</b> .....	15
11 <b>Modification to A.3.3.4</b> .....	16
12 <b>Modifications to A.4</b> .....	16
13 <b>Modification to A.5</b> .....	17
14 <b>Modification to B.3</b> .....	19

[SIST EN 1997-1:2005/A1:2014](https://standards.iteh.ai/catalog/standards/sist/a39cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014)  
<https://standards.iteh.ai/catalog/standards/sist/a39cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014>

## Foreword

This document (EN 1997-1:2004/A1:2013) has been prepared by Technical Committee CEN/TC 250 "Structural Eurocodes", the secretariat of which is held by BSI.

This Amendment to the European Standard EN 1997-1:2004 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2014, and conflicting national standards shall be withdrawn at the latest by November 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 1997-1:2005/A1:2014](https://standards.iteh.ai/catalog/standards/sist/a39cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014)

<https://standards.iteh.ai/catalog/standards/sist/a39cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014>

**EN 1997-1:2004/A1:2013 (E)****1 Modification to the Contents***Page 3**Delete:* "Section 8 Anchorages"*and replace with:*

"Section 8 Anchors".

**2 Modifications to National annex for EN 1997-1***Page 8***National Annex for EN 1997-1***Delete:*

"8.5.2(2)P, 8.5.2(3), 8.6(4)"

*and replace with:*

"8.4(6)P, 8.4(7)P, 8.5.1(1)P, 8.5.1(2)P, 8.5.2(1)P, 8.5.2(2)P, 8.5.2(3)P, 8.5.2(5)P, 8.5.3(1)P, 8.5.3(2)P, 8.5.3(3)P, 8.5.3(4)P, 8.6.2(2)P, 8.6.2(3)P".

*Delete:*

"

— A.3.1, A.3.2, A.3.3.1, A.3.3.2, A.3.3.3, A.3.3.4, A.3.3.5, A.3.3.6,"

SIST EN 1997-1:2005/A1:2014  
<https://standards.iteh.ai/catalog/standards/sist/459cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014>

*and replace with:*

"

— A.3.1, A.3.2, A.3.3.1, A.3.3.2, A.3.3.3, A.3.3.5, A.3.3.6,".

*After:*

"

— A.5",

*add:*

"

— A.6".

**3 Modification to 1.1.2***Page 9***1.1.2 Scope of EN 1997-1***Delete in 1.1.2(2):*

“Section 8: Anchorages”

and replace with:

“Section 8: Anchors”.

#### 4 Modification to 1.2

Page 10

##### 1.2 Normative references

After:

“EN 1992 Eurocode 2 Design of concrete structures”,

add:

“EN 1992-1-1:2004 Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings”.

Replace:

“EN 1537:1999 Execution of special geotechnical work; Ground anchors”

with:

“EN 1537 Execution of special geotechnical work; Ground anchors”

After:

“EN ISO 13793:2001 Thermal performance of buildings – Thermal design of foundations to avoid frost heave”,

add:

“EN ISO 22477-5 Geotechnical investigation and testing – testing of geotechnical structures – Part 5: Testing of anchors (in preparation)”.

#### 5 Modification to 1.6

Page 13

##### 1.6 Symbols

Delete: “ $P$  load on anchorage”

Delete: “ $P_p$  proof load in a suitability test of a grouted anchorage”.

Delete: “ $R_a$  anchorage pull-out resistance”

Delete: “ $R_{a,d}$  design value of  $R_a$ ”

**EN 1997-1:2004/A1:2013 (E)**

Delete: " $R_{a;k}$  characteristic value of  $R_a$ "

Delete:

" $R_{t;d}$  design value of the tensile resistance of a pile or of a group of piles, or of the structural tensile resistance of an anchorage"

and replace with:

" $R_{t;d}$  design value of the tensile resistance of a pile or of a group of piles".

Delete: " $\gamma_a$  partial factor for anchorages".

Delete: " $\gamma_{a;p}$  partial factor for permanent anchorages".

Delete: " $\gamma_{a;t}$  partial factor for temporary anchorages".

Delete: " $\xi_a$  correlation factor for anchorages".

After:

"z vertical distance",

add:

(begin text)

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

**Latin letters used in Section 8**

$E_{ULS;d}$  ultimate limit state design force to be resisted by the anchor  
SIST EN 1997-1:2005/A1:2014  
<https://standards.iteh.ai/catalog/standards/sist/a39cba46-d428-459c-9e44-6317b917a96a/sist-en-1997-1-2005-a1-2014>

$F_{Serv;d}$  design value of the maximum anchor force, including effect of lock off load, and sufficient to prevent a serviceability limit state in the supported structure

$F_{Serv;k}$  characteristic value of the maximum anchor force, including effect of lock off load, and sufficient to prevent a serviceability limit state in the supported structure

$F_{ULS;d}$  design value of the force required to prevent any ultimate limit state in the supported structure

$k_{i;SLS}$  permissible cumulative loss of load over specified time period, defined in EN ISO 22477-5, used to determine serviceability limit state resistance of an anchor

$k_{i;ULS}$  permissible cumulative loss of load over specified time period, defined in EN ISO 22477-5, used to determine ultimate limit state resistance of an anchor

$n$  minimum number of investigation and/or suitability tests

$P_c$  the critical creep load, determined as the load corresponding to the end of the pseudo linear part of the  $\alpha$  versus load diagram as defined in EN ISO 22477-5

$P_o$  lock-off load, load left in the anchor head immediately on completion of the stressing operation

$P_p$  proof load, maximum test load to which an anchor is subjected in a particular load test

$R_m$  measured value of the resistance of an anchor

$R_{SLS;d}$  design value of the resistance of an anchor complying with serviceability limit state criteria



$R_{SLS;k}$  characteristic value of the resistance of an anchor complying with serviceability limit state criteria

$R_{SLS;m}$  measured value of the resistance of an anchor complying with serviceability limit state criteria

$(R_{SLS;m})_{min}$  lowest value of  $R_{SLS;m}$  measured from a number of investigation or suitability tests ( $n$ ), for each distinct ground condition

$R_{t;d}$  ultimate limit state design resistance of the structural elements of an anchor

$R_{ULS;d}$  design value of the resistance of an anchor complying with ultimate limit state criteria

$R_{ULS;k}$  characteristic value of the resistance of an anchor complying with ultimate limit state criteria

$R_{ULS;m}$  measured value of the resistance of an anchor complying with ultimate limit state criteria

$(R_{ULS;m})_{min}$  lowest value of  $R_{ULS;m}$  measured from a number of investigation or suitability tests ( $n$ ), for each distinct ground condition

*(end text)*

After " $\varphi'_d$ " design value of  $\varphi'$  ", add:

*(begin text)*

### Greek letters used in Section 8

$\alpha_{SLS}$  creep rate defining serviceability limit state resistance of an anchor, determined from the displacement per log cycle of time at constant anchor load as defined in EN ISO 22477-5

$\alpha_{ULS}$  creep rate defining ultimate limit state resistance of an anchor, determined from the displacement per log cycle of time at constant anchor load as defined in EN ISO 22477-5

$\gamma_{Serv}, \gamma_{a;ULS}, \gamma_{a;SLS}, \gamma_{a;acc;ULS}, \gamma_{a;acc;SLS}$  partial factors

$\xi_{ULS}$  correlation factor

*(end text)*

## 6 Modification to Section 8

Page 91

### Section 8 Anchorages

Delete the entire text of Section 8, including the title and replace with the following:

*(begin text)*

## Section 8 Anchors

### 8.1 General

#### 8.1.1 Scope

(1)P This Section shall apply to the design of temporary and permanent anchors used e.g.:

**EN 1997-1:2004/A1:2013 (E)**

- to support a retaining structure;
- to ensure the stability of slopes, cuts or tunnels;
- to resist uplift forces on a structure;
- to prevent sliding or tilting;
- to restrain tension cables;

by transmitting a tensile force to a load resisting formation of soil or rock.

(2)P This section shall be used for the design of anchors covered by EN 1537 and other anchors that are consistent with 8.1.2.1, such as screw anchors and expander anchors with a free length.

(3)P Tension members without a free length (such as tension piles) shall be designed using the principles given in Section 7 'Pile foundations'.

(4)P Walls providing fixity for dead-man anchors shall be designed using the principles given in Section 9, 'Retaining structures'.

(5) This section does not cover the design of soil nails or rock bolts.

**8.1.2 Definitions****8.1.2.1****anchor**

installation capable of transmitting an applied tensile load through a free length to a load bearing stratum

**8.1.2.2****grouted anchor**

anchor that uses a bonded length formed of cement grout, resin or similar material to transmit the tensile force to the ground

NOTE A 'grouted anchor' in EN 1997-1 is termed a 'ground anchor' in EN 1537.

**8.1.2.3****permanent anchor**

anchor with a design life which is in excess of two years

**8.1.2.4****temporary anchor**

anchor with a design life of 2 years or less

**8.1.2.5****tendon**

part of an anchor that is capable of transmitting the tensile load from the anchor head to the resisting element in the ground

**8.1.2.6****anchor fixed length**

designed length of an anchor over which the load is transmitted to the surrounding ground

**8.1.2.7****anchor free length**

length of the anchor between the anchorage point at the anchor head and the proximal end of the anchor fixed length

**8.1.2.8****tendon bond length for grouted anchors**

length of the tendon that is bonded directly to the grout and capable of transmitting the applied tensile load

**8.1.2.9****tendon free length**

length of the tendon between the anchorage point at the anchor head and the proximal end of the tendon bond length

**8.1.2.10****apparent tendon free length**

length of tendon which is estimated to be fully decoupled from the surrounding grout and is calculated from the load-elastic displacement data following testing

**8.1.2.11****investigation test**

load test to establish the geotechnical ultimate resistance of an anchor and to determine the characteristics of the anchor in the working load range

**8.1.2.12****suitability test**

load test to confirm that a particular anchor design will be adequate in particular ground conditions

**8.1.2.13****acceptance test**

load test to confirm that an individual anchor conforms with its acceptance criteria

**8.2 Limit states**

(1)P The following limit states (both individually and in combination) shall be considered for all anchors:

- structural failure of the tendon or anchor head, caused by the applied stresses;
- failure of the connection between the tendon and the resisting element in the ground;
- loss of anchor force and excessive displacements of the anchor head due to creep and relaxation;
- failure or excessive deformation of parts of the anchored structure due to the applied anchor force;
- loss of overall stability of the retained ground and the retaining structure (see Section 11);
- limit states in supported or adjacent structures, including those arising from pre-stressing forces;
- instability or excessive deformation of the zone of ground into which tensile forces from a group of anchors are to be transferred;
- failure at the interface between the resisting element and the ground.

(2)P In addition to the limit states listed in 8.2(1)P, the following limit states (both individually and in combination) shall be considered for all grouted anchors:

- failure at the interface between the body of grout and the ground;
- failure of the bond at the interfaces of tendon, encapsulation and grout;
- failure of the bond between the tendon and the grout.