SLOVENSKI STANDARD
oSIST prEN 1992-4:2026

01-junij-2026

Evrokod 2 - Projektiranje betonskih konstrukcij - 4. del: Projektiranje pritrjevanja za uporabo v betonu

Eurocode 2 - Design of concrete structures - Part 4: Design of fastenings for use in concrete

Eurocode 2 - Bemessung und Konstruktion von Stahlbeton- und Spannbetontragwerken - Teil 4: Bemessung der Verankerung von Befestigungen in Beton

Eurocode 2 - Calcul des structures en béton - Partie 4 : Conception et calcul des éléments de fixation pour béton

Ta slovenski standard je istoveten z: **prEN 1992-4**

ICS:

91.010.30	Tehnični vidiki	Technical aspects
91.080.40	Betonske konstrukcije	Concrete structures

oSIST prEN 1992-4:2026 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT prEN 1992-4

April 2026

ICS 91.010.30; 91.080.40

Will supersede EN 1992-4:2018

English Version

Eurocode 2 - Design of concrete structures - Part 4: Design of fastenings for use in concrete

Eurocode 2 - Calcul des structures en béton - Partie 4 : Conception et calcul des éléments de fixation pour béton

Eurocode 2 - Bemessung und Konstruktion von Stahlbeton- und Spannbetontragwerken - Teil 4: Bemessung der Verankerung von Befestigungen in Beton

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 250.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

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Ref. No. prEN 1992-4:2026 E

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European foreword

This document (prEN 1992-4:2026) has been prepared by Technical Committee CEN/TC 250 “Structural Eurocodes”, the secretariat of which is held by BSI. CEN/TC 250 is responsible for all Structural Eurocodes and has been assigned responsibility for structural and geotechnical design matters by CEN.

This document is currently submitted to the Enquiry.

This document will supersede EN 1992-4:2018.

prEN 1992-4:2026 includes the following significant technical changes with respect to EN 1992-4:2018:

— Deletion of Seismic rules in EN 1992-4; transferred to the revised EN 1998-1-1;

— Adjustment of EN 1992-4 with respect to EN 1992-1-1:2023, 7.2.1.8 Concrete blow-out failure;

— Revision of provisions for supplementary reinforcement, in 7.2;

— Requirements for stiff baseplate in e.g. 6.2.1;

— Added informative Annex G with methods for checking fixture stiffness

— Added informative Annex H for an alternative method for the design of supplementary reinforcement

The Eurocodes have been drafted to be used in conjunction with relevant execution, material, product and test standards, and to identify requirements for execution, materials, products and testing that are relied upon by the Eurocodes.

The Eurocodes recognize the responsibility of each Member State and have safeguarded their right to determine values related to regulatory safety matters at national level through the use of National Annexes.

0 Introduction

0.1 Introduction to the Eurocodes

The Structural Eurocodes comprise the following standards generally consisting of a number of Parts:

— EN 1990 Eurocode — Basis of structural and geotechnical design

— EN 1991 Eurocode 1 — Actions on structures

— EN 1992 Eurocode 2 — Design of concrete structures

— EN 1993 Eurocode 3 — Design of steel structures

— EN 1994 Eurocode 4 — Design of composite steel and concrete structures

— EN 1995 Eurocode 5 — Design of timber structures

— EN 1996 Eurocode 6 — Design of masonry structures

— EN 1997 Eurocode 7— Geotechnical design

— EN 1998 Eurocode 8 — Design of structures for earthquake resistance

— EN 1999 Eurocode 9— Design of aluminium structures

— EN 19100 Eurocode 10 — Design of structural glass

— New parts are under development, e.g. Eurocode 11 for design of fibre-polymer composite structures and Eurocode 12 design of tensioned membrane structures

The Eurocodes are intended for use by designers, clients, manufacturers, constructors, relevant authorities (in exercising their duties in accordance with national or international regulations), educators, software developers, and committees drafting standards for related product, testing and execution standards.

NOTE Some aspects of design are most appropriately specified by relevant authorities or, where not specified, can be agreed on a project-specific basis between relevant parties such as designers and clients. The Eurocodes identify such aspects making explicit reference to relevant authorities and relevant parties.

0.2 Introduction to EN 1992 (all parts)

(1) EN 1992 applies to the design of buildings, bridges and civil engineering structures in plain, reinforced and prestressed concrete. It complies with the principles and requirements for the safety and serviceability of structures, the basis of their design and verification that are given in EN 1990 (all parts), *Basis of structural and geotechnical design*.

(2) EN 1992 is only concerned with the requirements for resistance, serviceability, durability and fire resistance of concrete structures. Other requirements, e.g. concerning thermal or sound insulation, are not considered.

(3) EN 1992 is subdivided into various parts:

— EN 1992-1-1, *Design of concrete structures — Part 1-1: General rules and rules for buildings, bridges and civil engineering structures*,

— EN 1992-1-2, *Design of concrete structures —Part 1-2: Structural fire design,*

— EN 1992-4, *Design of concrete structures —Part 4: Design of fastenings for use in concrete.*

0.3 Introduction to EN 1992-4

(1) EN 1992-4 describes the principles and requirements for safety, serviceability and durability of fastenings in concrete. It is based on the limit state concept used in conjunction with a partial factor method.

(2) EN 1992-4 also serves as a reference document for other CEN/TCs concerning fastenings in concrete.

(3) Numerical values for partial factors and other reliability parameters are recommended as basic values that provide an acceptable level of reliability. They have been selected assuming that an appropriate level of workmanship and of quality management applies. When EN 1992-4 is used as a base document by other CEN/TCs the same values need to be taken.

0.4 Verbal forms used in the Eurocodes

The verb “shall” expresses a requirement strictly to be followed and from which no deviation is permitted in order to comply with the Eurocodes.

The verb “should” expresses a highly recommended choice or course of action. Subject to national regulation and/or any relevant contractual provisions, alternative approaches could be used/adopted where technically justified.

The verb “may” expresses a course of action permissible within the limits of the Eurocodes.

The verb “can” expresses possibility and capability; it is used for statements of fact and clarification of concepts.

0.5 National Annex for EN 1992-4

National choice is allowed in this document where explicitly stated within notes. National choice includes the selection of values for Nationally Determined Parameters (NDPs).

The national standard implementing EN 1992-4 can have a National Annex containing all national choices to be used for the design of buildings, bridges and civil engineering works to be constructed in the relevant country.

When no national choice is given, the default choice given in this document is to be used.

When no national choice is made and no default is given in this document, the choice can be specified by a relevant authority or, where not specified, agreed for a specific project by appropriate parties.

National choice is allowed in EN 1992-4 through notes to the following clauses:

4.4.1(2*)*	4.4.2.2(2)	4.4.2.3(1)	4.4.2.4(1)
4.7(2)	A.2.2	C.2(2)	

National choice is allowed in EN 1992-4 on the application of the following informative annexes:

Annex B	Annex C	Annex G	Annex H
Annex I			

The National Annex can contain, directly or by reference, non-contradictory complementary information for ease of implementation, provided it does not alter any provisions of the Eurocodes.

1 Scope

1.1 General

(1) EN 1992-4 provides a design method for fastenings (connection of structural elements and non-structural elements to structural components), which are used to transmit actions to the concrete.

NOTE 1 Additional rules for the transmission of the fastener loads within the concrete member to its supports are given in EN 1992-1-1:2023, 4.4 and Annex A of this document.

NOTE 2 Inserts embedded in precast concrete elements during production, under Factory Production Control (FPC) conditions and with the due reinforcement, intended for use only during transient situations for lifting and handling, are covered by CEN/TR 15728.

(2) EN 1992-4 is intended for safety related applications in which the failure of fastenings can result in collapse or partial collapse of the structure, cause risk to human life or lead to significant economic loss.

(3) The support of the fixture can be either statically determinate or statically indeterminate. Each support can consist of one fastener or a group of fasteners.

(4) EN 1992-4 is valid for applications which fall within the scope of the EN 1992 (all parts). In applications where special considerations apply, e.g. nuclear power plants or civil defence structures, modifications can be necessary.

(5) EN 1992-4 does not cover the design of the fixture.

NOTE Rules for the design of the fixture are given in the appropriate standards meeting the requirements on the fixture as given in this document.

1.2 Assumptions

(1) The assumptions of EN 1990 (all parts) apply to EN 1992-4

(2) This document uses the fastener design theory[1] (see Figure 1.1) and applies to:

a) cast-in fasteners such as headed fasteners, anchor channels with rigid connection (e.g. welded, forged) between anchor and channel;

b) post-installed mechanical fasteners such as expansion fasteners, undercut fasteners and concrete screws;

c) post-installed bonded fasteners and bonded expansion fasteners.

(3) For other types of fasteners, modifications of the design provisions can be necessary.

(4) This document applies to fasteners with established suitability for the specified application in concrete covered by provisions, which refer to this document and provide data required by this document. The suitability of the fastener is stated in the relevant European Technical Product Specification.

1 In fastener design theory the concrete tensile capacity is directly used to transfer loads into the concrete component.

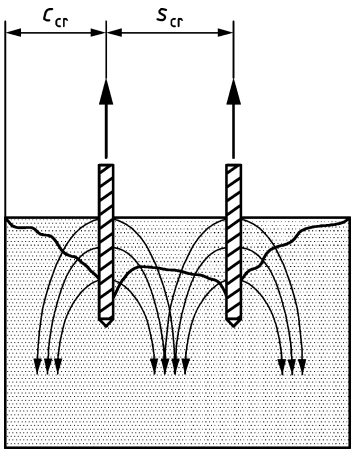
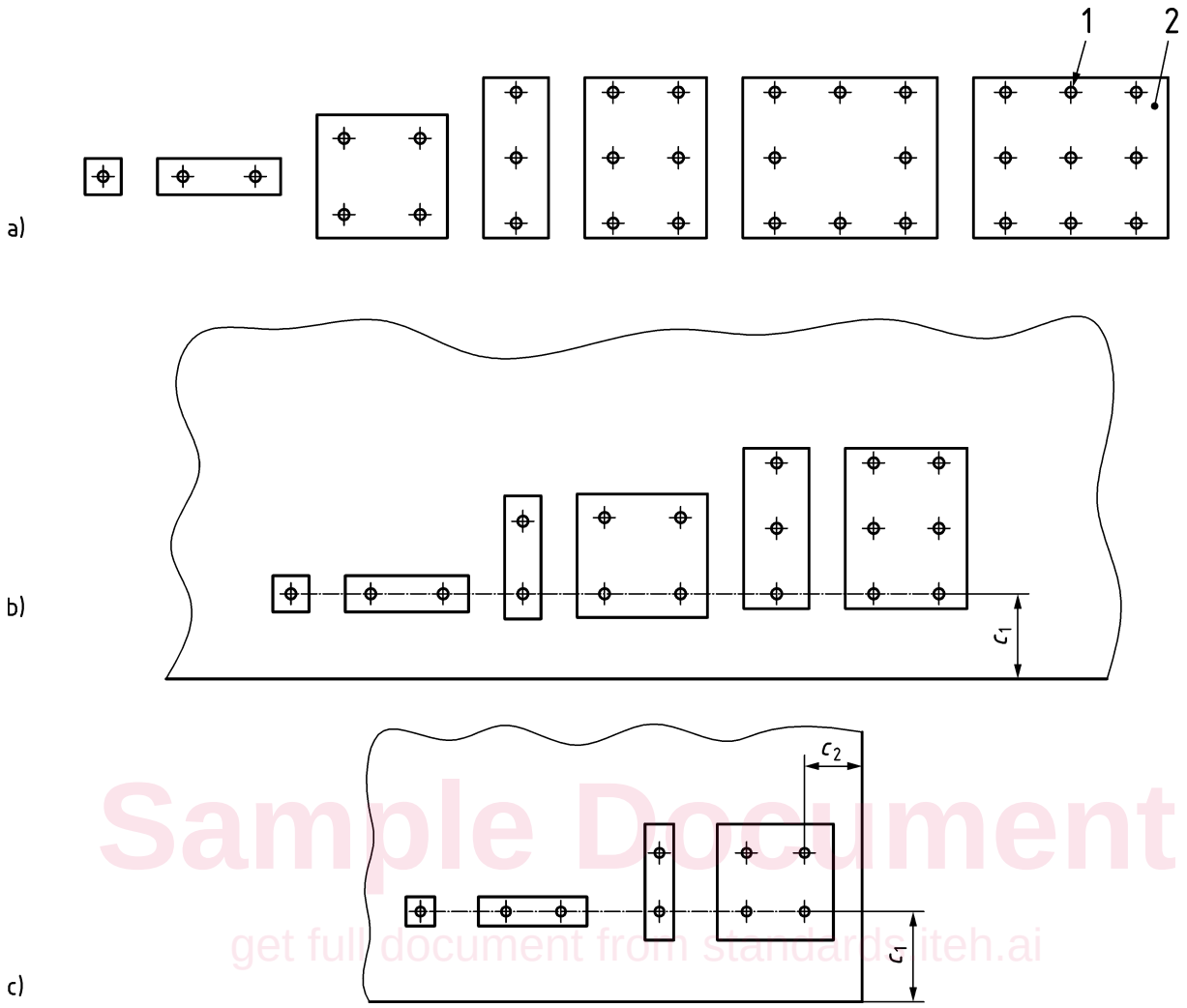


Figure 1.1 — Fastener design theory — Example

(4) This document applies to single fasteners and groups of fasteners. In a group of fasteners, the loads are applied to the individual fasteners of the group by means of a common fixture. In a group of fasteners, this document applies only if fasteners of the same type and size are used.

(5) The configurations of fastenings with cast-in place headed fasteners and post-installed fasteners covered by this document are shown in Figure 1.2.

(6) For anchor channels, the number of anchors is not limited.



Key

1 fastener

2 fixture (baseplate)

a) 1) Fastenings without hole clearance for all edge distances and for all load directions.

2) Fastenings with hole clearance according to Table 6.1 situated far from edges ($c_i \geq \max\{10h_{ef}; 60d_{nom}\}$) for all load directions.

3) Fastenings with hole clearance according to Table 6.1 situated near to one or more edges ($c_i < \max\{10h_{ef}; 60d_{nom}\}$) loaded in tension only.

b) Fastenings with hole clearance according to Table 6.1 situated near to one edge ($c_i < \max\{10h_{ef}; 60d_{nom}\}$) for all load directions.

c) Fastenings with hole clearance according to Table 6.1 situated near to two edges (e.g. corner) or more ($c_i < \max\{10h_{ef}; 60d_{nom}\}$) for all load directions.

Figure 1.2 — Configuration of fastenings with headed and post-installed fasteners covered by this document

(7) This document applies to fasteners with a minimum diameter or a minimum thread size of 6 mm (M6) or a corresponding cross section. In case of fasteners for fastening statically indeterminate redundant non-structural systems as addressed in 7.3, the minimum thread size is 5 mm (M5). The maximum diameter of the fastener is not limited for tension loading but is limited to 60 mm for shear loading.

(8) EN 1992-4 applies to fasteners with embedment depth $h_{ef} \geq 40$ mm. Only for fastening statically indeterminate redundant non-structural systems as addressed in 7.3 smaller effective embedment depth may be used. For fastenings with post-installed bonded fasteners, only fasteners with an embedment depth $h_{ef} \leq 20d$ are covered. The actual value for a particular fastener can be found in the relevant European Technical Product Specification.

(9) This document covers metal fasteners made of either carbon steel (EN ISO 898-1 and EN ISO 898-2, EN 10025-1, EN 10080), stainless steel (EN 10088-2 and EN 10088-3, EN ISO 3506-1 and EN ISO 3506-2) or malleable cast iron (ISO 5922). The surface of the steel can be coated or uncoated. This document is valid for fasteners with a nominal steel tensile strength $f_{uk} \leq 1\,000$ N/mm^2. This limit does not apply to concrete screws.

(10) Loading on the fastenings covered by this document can be static, quasi-static and fatigue. The suitability of the fastener to resist fatigue is specifically stated in the relevant European Technical Product Specification. Anchor channels subjected to fatigue loading or seismic loading are not covered by this document.

(11) The loading on the fastener resulting from the actions on the fixture (e.g. tension, shear, bending or torsion moments or any combination thereof) will generally be axial tension and/or shear. When the shear force is applied with a lever arm a bending moment on the fastener will arise. EN 1992-4 considers axial compression on the fixture only when it is transmitted to the concrete either directly to the concrete surface without acting on the embedded fastener load transfer mechanism or via fasteners suitable for resisting compression.

(12) In case of anchor channels, shear in the direction of the longitudinal axis of the channel is not covered by this document.

NOTE Design rules for anchor channels with loads acting in the direction of the longitudinal axis of the anchor channel can be found in CEN/TR 17080.

(13) Design of fastenings under fire exposure is covered by this document (see informative Annex C).

(14) This document is valid for fasteners installed in members made of compacted normal weight concrete with strength classes in the range C12/15 to C90/105 all in accordance with EN 206. The range of concrete strength classes in which particular fasteners may be used is given in the relevant European Technical Product Specification and may be more restrictive than stated above.

NOTE The suitability of a fastener for use in normal weight concrete with fibres and the equivalence of its performance to compacted normal weight concrete without fibres is given in the relevant European Technical Product Specification and can be limited to specific fibre properties.

(15) In general, fasteners are prequalified for applications in concrete members under static loading.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE See the Bibliography for a list of other documents cited that are not normative references, including those referenced as recommendations (i.e. in 'should' clauses), permissions ('may' clauses), possibilities ('can' clauses), and in notes.

EN 206, *Concrete — Specification, performance, production and conformity*

EN 1990-1:2023+A1:2026, *Eurocode — Basis of structural and geotechnical design*

EN 1991 (all parts), *Eurocode 1 — Actions on structures*

EN 1992-1-1:2023, *Eurocode 2 - Design of concrete structures - Part 1-1: General rules and rules for buildings, bridges and civil engineering structures*

EN 1992-1-2, *Eurocode 2 - Design of concrete structures - Part 1-2: Structural fire design*

EN 1998-1-1:2024, *Eurocode 8 - Design of structures for earthquake resistance - Part 1-1: General rules and seismic action*

EN 1998 (all parts), *Eurocode 8 — Design of structures for earthquake resistance*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions in EN 1990 (all parts) and the following apply.

3.1.1
anchor
fastener
element made of steel or malleable iron either cast into concrete or post-installed into a hardened concrete member and used to transmit applied loads (see Figure 3.1 to Figure 3.3)

Note 1 to entry: Both terms may be used interchangeably. For translation purposes one may opt to use only one to avoid misunderstandings. In this document the term anchor is primarily used in the context of anchor channels.

3.1.2
anchor channel
steel profile with rigidly connected anchors (see Figure 3.2) installed prior to concreting

Note 1 to entry: In the case of anchor channels, two or more steel anchors are rigidly connected to the back of the channel and embedded in concrete.

3.1.3
attached element
structural or non-structural component that is part of the fixture

3.1.4
base material
concrete member in which the fastener or anchor channel is installed

3.1.5
baseplate
fixture
element that is being fixed to the base material and transmits loads to the fastener, group of fasteners or anchor channel and to the concrete member in case of bending or compression forces (except in case of stand-off applications)

Note 1 to entry: Typically, steel elements are used as fixture or baseplate.

3.1.6
bending
bending effect induced by a shear load applied with a lever arm with respect to the surface of the concrete member

3.1.7
bonded expansion fastener
bonded fastener designed such that the fastener element can move relative to the hardened bonding compound resulting in follow-up expansion (see Figure 3.3h))

3.1.8
bonded fastener
fastener placed into a hole drilled in hardened concrete, which derives its resistance from a bonding compound placed between the wall of the hole in the concrete and the embedded portion of the fastener (see Figure 3.3g))

3.1.9
cast-in fastener
headed bolt, headed stud, internal threaded socket with head at the embedded end or anchor channel installed before placing the concrete, see also headed fastener

3.1.10
channel bolt
screw or bolt which connects the element to be fixed to the anchor channel (see Figure 3.2)

3.1.11
characteristic edge distance
edge distance required to ensure that the edge does not influence the characteristic resistance of a fastening

3.1.12
characteristic resistance
5 % fractile of the resistance

Note 1 to entry: Value with a 95 % probability of being exceeded, with a confidence level of 90 %.

3.1.13
characteristic spacing
spacing required to ensure the characteristic resistance of a single fastener

3.1.14
combined pull-out and concrete failure of bonded fasteners
failure mode in which failure occurs at the interface between the bonding material and the base material or between the bonding material and the fastener element (bond failure) and contains a concrete cone at the top end

3.1.15
combined tension and shear loads
oblique load
tension and shear load applied simultaneously

3.1.16
concrete blow-out failure
spalling of the concrete on the side face of the concrete element at the level of the embedded head with no major breakout at the top concrete surface

Note 1 to entry: This is usually associated with fasteners with small side cover and deep embedment.