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Eurocode 4 - Design of composite steel and concrete structures - Part 1-102: Composite dowels

Táto norma obsahuje anglickú verziu európskej normy.

This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 05/26

Táto predbežná slovenská technická norma je určená na overenie. Prípadné pripomienky pošlite do októbra 2027 Úradu pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky.

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TECHNICAL SPECIFICATION
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CEN/TS 1994-1-102

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English Version

**Eurocode 4 - Design of composite steel and concrete
structures - Part 1-102: Composite dowels**

Eurocode 4 - Bemessungsregeln für die Verwendung
von Verbunddübeln

This Technical Specification (CEN/TS) was approved by CEN on 18 August 2025 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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

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CEN/TS 1994-1-102:2025**European foreword**

This document (CEN/TS 1994-1-102:2025) 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.

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.

This Technical Specification has 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 this document.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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 glass structures

New parts are under development, e.g. Eurocode for design of fibre-polymer composite structures and 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 CEN/TS 1994-1-102

This document applies to the structural design of composite dowels as shear connectors for composite members. 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 Basis of structural and geotechnical design. Furthermore, it complies with the rules for the design of composite structures as given in EN 1994 (all parts).

0.3 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.

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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.

0.4 National annex for CEN/TS 1994-1-102

This document gives values within notes indicating where national choices can be made. Therefore, a national document implementing CEN/TS 1994-1-102 can have a National Annex containing all Nationally Determined Parameters to be used for the assessment of buildings and civil engineering works in the relevant country.

When not given in the National Annex, the national choice shall be the default choice specified in the relevant Technical Specification.

The national choice can be specified by a relevant authority.

When no choice is given in the Technical Specification, in the National Annex, or by a relevant authority, the national choice can be agreed for a specific project by appropriate parties.

National choice is allowed in CEN/TS 1994-1-102 through notes to the following clauses:

8.2(1)	8.3.1(1)	8.3.3(3)	8.5(2)
10(3)	A.4(2)	A.4(4)	A.4(5)
A.4(7)	A.5(7)	A.8(4)	

National choice is allowed in CEN/TS 1994-1-102 on the application of the following informative annexes:

None

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

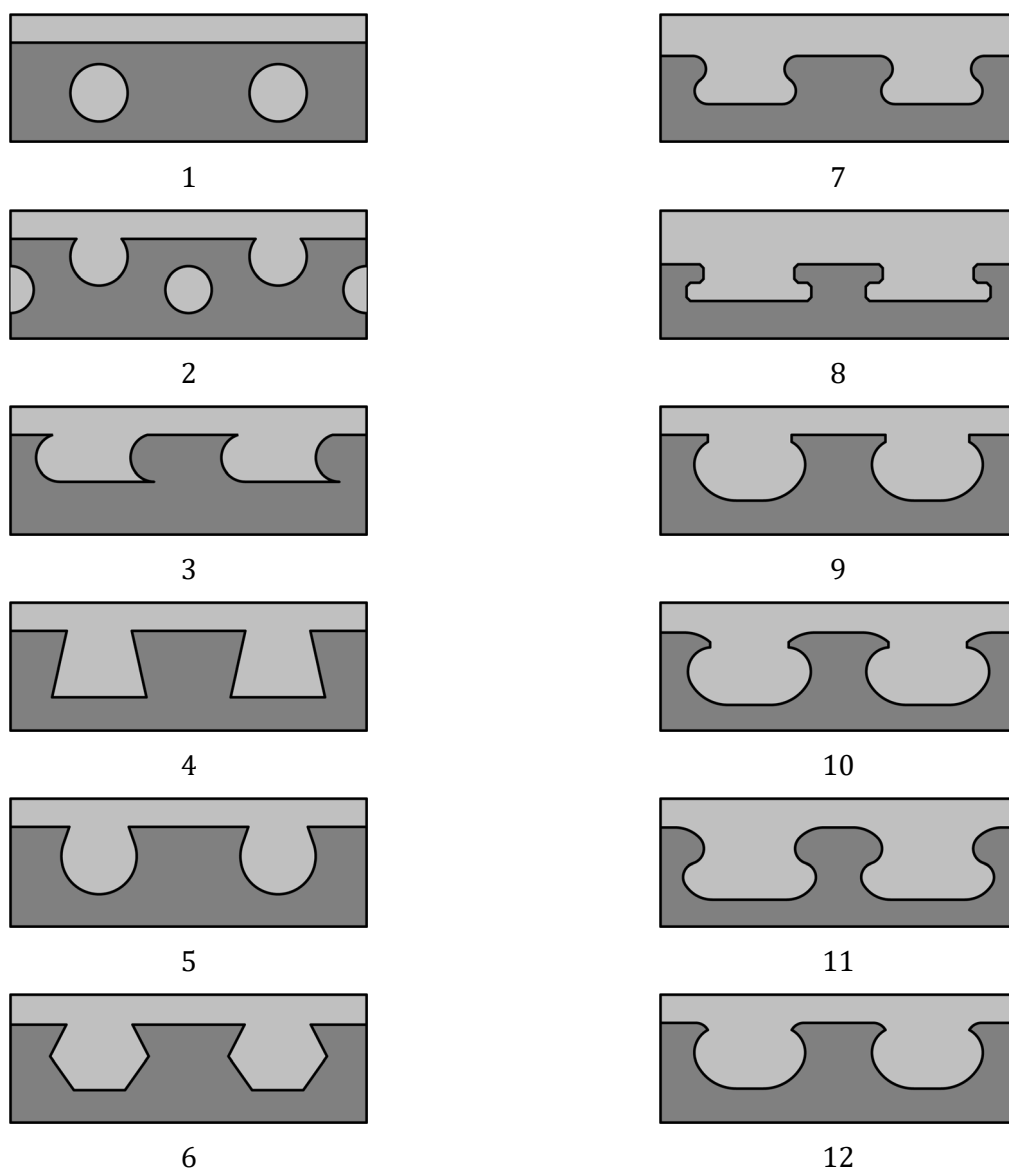
1.1 Scope of CEN/TS 1994-1-102

(1) This document gives design rules for composite dowels as shear connectors for composite members. It provides general rules for composite dowels in different shapes and specific rules for specifically shaped composite dowels.

(2) Shear connection by composite dowels consists of regular spaced steel connectors with concrete dowels in between. The steel connectors of composite dowels are cut from hot-rolled steel plates, sections or bars, and encased in reinforced concrete to achieve composite action between the steel part and the concrete part of the composite member.

(3) The composite member can be used in civil engineering construction under static, quasi-static and dynamic loads. It can be used in both hogging and sagging moment regions and also under hogging and sagging transverse bending.

NOTE Figure 1.1 provides typical shapes of composite dowels.



CEN/TS 1994-1-102:2025**Key**

- 1 closed circular composite dowels
- 2 open and closed circular composite dowels
- 3 saw tooth dowel
- 4 re-entrant dowel
- 5 drop-shaped dowel
- 6 crown dowel
- 7 puzzle shape PZ
- 8 puzzle shape PZT
- 9 clothoidal dowel 1
- 10 clothoidal dowel CL
- 11 clothoidal dowel 2
- 12 modified clothoidal dowel MCL

Figure 1.1 — Typical cross-sections of composite dowels**1.2 Assumptions**

(1) The assumptions of EN 1990 apply to this document.

(2) This document is intended to be used in conjunction with EN 1990, EN 1991 (all parts), EN 1992-1-1, EN 1993-1-1, EN 1993-1-5, EN 1993-1-8, EN 1993-1-9, EN 1993-2, EN 1994 (all parts) and EN 1998 (all parts).

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 1990, *Eurocode — Basis of structural and geotechnical design*

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 1993-1-1, *Eurocode 3 — Design of steel structures — Part 1-1: General rules and rules for buildings*

EN 1993-1-9, *Eurocode 3 — Design of steel structures — Part 1-9: Fatigue*

EN 1994 (all parts), *Eurocode 4 — Design of composite steel and concrete structures*

EN 1994-1-1:—,¹ *Eurocode 4 — Design of composite steel and concrete structures — Part 1-1: General rules and rules for buildings*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN

¹ Under preparation. Stage at the time of publication: FprEN 1994-1-1:2025.