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**Evrokod 5 - Projektiranje lesenih konstrukcij - 1-3. del: Sovprežne konstrukcije iz lesa in betona**

Eurocode 5 - Design of timber structures - Part 1-3: Timber-concrete composite structures

Eurocode 5 - Bemessung und Konstruktion von Holzbauten - Teil 1-3: Holz-Beton-Verbundkonstruktionen

Eurocode 5 - Conception et calcul des structures en bois - Partie 1-3: Calcul des structures mixtes bois-béton

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91.080.40	Betonske konstrukcije	Concrete structures

**oSIST prEN 1995-1-3:2026**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 1995-1-3**

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English Version

## Eurocode 5 - Design of timber structures - Part 1-3: Timber-concrete composite structures

Eurocode 5 - Conception et calcul des structures en bois - Partie 1-3: Calcul des structures mixtes bois-béton

Eurocode 5 - Bemessung und Konstruktion von Holzbauten - Teil 1-3: Holz-Beton-Verbundkonstruktionen

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

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**prEN 1995-1-3:2026 (E)****European foreword**

This document (prEN 1995-1-3:2026) 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 CEN Enquiry.

This document will supersede CEN/TS 19103:2021.

The first generation of EN Eurocodes was published between 2002 and 2007. This document forms part of the second generation of the Eurocodes, which have been prepared under Mandate M/515 issued to CEN by the European Commission and the European Free Trade Association.

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 recognise 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.

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## 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 EN 1995 (all parts)

EN 1995 (all parts) applies to the design of timber structures and gives specific design rules for buildings and civil engineering timber works.

EN 1995 is subdivided in various parts:

EN 1995-1 in itself does not exist as a single document but comprises the following three separate documents, the basic part being EN 1995-1-1:

EN 1995-1-1, *Eurocode 5 — Design of timber structures — Part 1-1: General rules and rules for buildings*

EN 1995-1-2, *Eurocode 5 — Design of timber structures — Part 1-2: Structural fire design*

EN 1995-1-3, *Eurocode 5 — Design of timber structures — Part 1-3: Timber-concrete composite structures*

EN 1995-2, *Eurocode 5 — Design of timber structures — Part 2: Bridges*

EN 1995-3, *Eurocode 5 — Design of timber structures — Part 3: Execution*

EN 1995-2 “Bridges” refers to the common rules in EN 1995-1-1. The Clauses in EN 1995-2 supplement, modify or supersede them, where relevant.

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EN 1995-3 “Execution” refers to the common rules in EN 1995-1-1. The Clauses in EN 1995-3 supplement the Clauses in EN 1995-1 and 1995-2.

### 0.3 Introduction to EN 1995-1-3

EN 1995-1-3 gives general design rules for timber-concrete composite structures.

### 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 may 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 1995-1-3

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 1995-1-3 can have a National Annex containing all national choices to be used for the design of buildings 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 1995-1-3 through notes to the following clauses:

4.4.1.1(1)                      4.4.1.2(2) – 2 choices                      4.4.2(5)

National choice is allowed in EN 1995-1-3 on the application of the following informative annexes:

Annex A                      Annex B                      Annex C                      Annex D

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 EN 1995-1-3

(1) EN 1995-1-3 gives general design rules for timber-concrete composite structures.

(2) EN 1995-1-3 provides provisions for materials, design parameters, connections, detailing and execution for timber-concrete composite structures. Recommendations for environmental parameters (temperature and moisture content), design methods and test methods are given in the annexes.

(3) EN 1995-1-3 includes rules common to many types of timber-concrete composite but does not include details for the design of glued timber-concrete composites, nor for bridges.

NOTE For the design of glued timber-concrete composites or bridges alternative references are available.

(4) EN 1995-1-3 covers the design of timber-concrete composite structures in both quasi-constant and variable environmental conditions. For ease of use, it provides simple design rules for quasi-constant environmental conditions and more complex rules for variable environmental conditions.

### 1.2 Assumptions

(1) The assumptions of EN 1990 (all parts) apply to this document. It is assumed that the requirements for execution given in EN 1995-3 are complied with.

(2) EN 1995-1-3 is intended to be used in conjunction with EN 1990 (all parts), EN 1991 (all parts), EN 1992 (all parts), EN 1994 (all parts), EN 1995 (all parts), EN 1998 (all parts) when timber structures are built in seismic regions, and ENs for construction products relevant to timber structures.

## 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 1990-1:2023+A1:2026, *Eurocode — Basis of structural and geotechnical design — Part 1: New structures*

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 1993-1-8, *Eurocode 3 — Design of steel structures — Part 1-8: Joints*

EN 1995-1-1:2025, *Eurocode 5 — Design of timber structures — Part 1-1: General rules and rules for buildings*

EN 14592, *Timber structures — Dowel-type fasteners — Requirements*

## 3 Terms, definitions and symbols

### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1990-1, EN 1995-1-1 and the following apply.

**prEN 1995-1-3:2026 (E)****3.1.1****continuous fastener**

fastener that is continuous along the length of the timber component

**3.1.2****connection**

any device or system formed of connected parts and an associated fastener or fasteners as well as, where applicable, notches, which resists slip and transfers the related shear force at the interface between timber and concrete

Note 1 to entry: Examples include dowel-type fasteners of any material, notches, plates and continuous fasteners, any of which can be either mechanically fixed or bonded.

Note 2 to entry: Staples fall beyond the scope of this document.

**3.1.3****induced strain**

strain which is caused not by stresses but by volumetric changes, e.g. shrinkage, swelling or thermal expansion

**3.1.4****moisture content**

percentage of mass of moisture in wood compared to its dry mass

**3.1.5****quasi-constant environmental conditions**

environmental conditions where

- timber is installed close to its expected moisture content in use  $\omega_{\text{use}}$  and
- for softwood timber, the variation of average moisture content in use ( $\Delta\omega$ , see Formula (4.7)) does not exceed 6 % and
- the temperature variations of the air do not exceed 20 °C

Note 1 to entry: The indoor conditions of a heated building are a typical example of quasi-constant conditions.

**3.1.6****shrinkage of concrete**

decrease in dimension of a piece of concrete due to the hardening process

**3.1.7****shrinkage of timber**

decrease in dimension of a piece of timber due to reduction of moisture content

**3.1.8****swelling of timber**

increase in dimension of a piece of timber due to increase of moisture content

**3.1.9****thermal expansion**

linear thermal expansion between given temperatures

### 3.1.10 variable environmental conditions

conditions that do not comply with quasi-constant environmental conditions

Note 1 to entry: Typical examples where variable environmental conditions can be experienced are balconies, unheated roof spaces and outdoor covered and uncovered spaces.

## 3.2 Symbols and abbreviations

For the purposes of this document, the symbols given in EN 1995-1-1 and the following apply.

### 3.2.1 Latin upper-case letters

$A_{1/2}$	Area of cross-section 1 or 2
$A_{\text{conc,ef}}$	Effective area of the concrete cross-section
$A_{\text{sf}}$	Area of transverse reinforcement in concrete flange
$A_{\text{tim}}$	Area of the timber cross-section
$C_{\text{J,ind}}$	Coefficient which considers the interaction between vertical load $q_d$ and induced strains in terms of slip in the joint
$C_{\text{p,ind}}$	Coefficient which correlates the induced strains with a fictitious load
$E_{1/2}$	Modulus of elasticity of cross-section 1 or 2
$F_{\text{acc,perm}}$	Maximum or minimum vertical load due to all vertical loads in the permanent load-duration class, with vertical loads considered as accompanying.
$E_{\text{conc}}$	Modulus of elasticity of concrete
$E_{\text{conc,fin}}$	Effective long-term modulus of elasticity of concrete
$E_k$	Characteristic combination of actions
$F_{\text{lead,perm}}$	Maximum or minimum vertical load due to all vertical loads in the permanent load-duration class, with vertical loads considered as leading;
$E_{\text{q,per}}$	Quasi-permanent combination of actions
$E_u$	Fundamental combination of actions
$E_s$	Design value of the modulus of elasticity of the steel reinforcement as given in EN 1992-1-1:2023, 5.2.4
$E_{\text{tim}}$	Mean modulus of elasticity of timber parallel to the grain
$E_{\text{tim,fin}}$	Effective long-term modulus of elasticity of timber parallel to the grain
$(EI)_i$	Bending stiffness of the cross-section $i$
$(EI)_{\text{ef,EC5-AnnexB}}$	Effective bending stiffness according to EN 1995-1-1:2025, B.5
$(EI)_{\text{ef,ind}}$	Modified effective bending stiffness according to EN 1995-1-1:2025, B.5, which accounts for the interaction between vertical load and induced strains
$F_{\text{est}}$	Estimated load-carrying capacity as defined in accordance with EN 26891 and used in determining the mean slip modulus for ultimate limit states
$F_{\text{max}}$	Characteristic load-carrying capacity in an Annex C test, as determined in accordance with EN 26891
$F_{\text{Rd}}$	Design load-carrying resistance for a notched connection

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$F_{t,Ed}$	Design tensile force between the timber and the concrete cross-section
$F_{v,Ed}$	Design shear force per connection
$F_{v,Rd}$	Design load-carrying resistance per connection
$F_{v,Rk}$	Characteristic connection shear strength
$I_{1/2}$	Moment of inertia of cross-section 1 or 2
$I_{tim}$	Moment of inertia of the timber cross-section
$K$	Stiffness of the connection
$K_{max/min}$	Maximum or minimum stiffness of the connection
$K_{ref}$	Reference stiffness of connection
$K_{SLS}$	Slip modulus for serviceability limit states
$K_{SLS,fin}$	Final slip modulus for serviceability limit states
$K_{SLS,t_c}$	Mean slip modulus for serviceability at time $t_c$
$K_{ULS}$	Instantaneous slip modulus of the connection for ultimate limit states
$K_{ULS,fin}$	Final slip modulus for ultimate limit states
$K_{ULS,t_c}$	Slip modulus for ultimate limit states at time $t_c$
$L$	Span of the beam
$M(q_d + 0,8p_{ind})$	Resulting bending moment due to external loads and part (80 %) of the fictitious load equivalent to induced strains
$M(q_d)$	Resulting bending moment due to external load only
$M_i$	Bending moment of component $i$
$M_{max,2}$	Maximum bending moment in cross-section 2
$M_{tim}$	Bending moment in the timber cross-section
$N_i$	Axial force in cross-section $i$
$N_{max,2}$	Maximum axial force in cross-section 2
$N_{tim}$	Axial force in the timber cross-section
$T_{0,conc/tim}$	Initial average temperature in the concrete or timber at time $t_c$
$T_{max/min,conc/tim}$	Maximum or minimum temperature in the concrete or timber (averaged over the cross-section)
$V_{max}$	Effective maximum shear force
$V(q_d)$	Resulting shear force due to external load
$X_d$	Design value of a strength property of timber or a wood-based product

**3.2.2 Latin lower-case letters**

$a_1$	Spacing of fasteners parallel to the grain
$a_{mm,1}$	Distance from the centroid of cross-section 1 to the centroid of the effective composite cross-section
$a_{3c/3t}$	Distance between the fastener and the unloaded or loaded edge

$a_4$	Spacing of fasteners perpendicular to the grain
$b_{\text{conc}}$	Width of the concrete
$b_{\text{conc,ef}}$	Effective width of the concrete
$b_n$	Notch width
$b_{\text{tim}}$	Width of the timber
$c_{\text{min,dur}}$	Minimum concrete cover for durability of steel reinforcement
$c_{\text{nom}}$	Nominal concrete cover
$d$	Fastener diameter or rebar diameter
$d_g$	Diameter of the aggregate
$e_{12}$	Distance between the centres of gravity of the cross-sections
$f_{\text{cd}}$	Design value of the compressive strength of concrete
$f_{\text{ck}}$	Characteristic compressive cylinder strength of the concrete at 28 days
$f_{\text{ctd}}$	Design value of the tensile strength of concrete
$f_{\text{h,2,k}}$	Characteristic embedment strength of the concrete member for evaluation of the load-carrying resistance based on the Johansen models
$f_{\text{vcd}}$	Effective design shear strength for the concrete
$f_{\text{v,t,d}}$	Design shear strength of the timber member
$f_{\text{yd}}$	Design value of the yield strength of steel reinforcement
$h_c$	Height of the concrete without the depth of the notch
$h_{\text{s,c}}$	Nominal height of the connector
$h_f$	Thickness of the concrete flange
$h_n$	Notch depth
$k_{\text{def}}$	Deformation factor of timber
$k_{\text{def}}'$	Deformation factor for connections between concrete and timber
$k_{\text{mod}}$	Modification factor for duration of load and moisture content for timber strength
$k_{\text{mod}}'$	Modification factor for duration of load and moisture content for the strength of connections between concrete and timber
$k_s$	Mean slip modulus for serviceability limit states, determined from Annex C tests in accordance with EN 26891
$k_{\text{tc}}$	Coefficient for concrete, taking into account the effect of high sustained loads on compressive strength
$k_v$	Adjustment factor for shear strength
$l_{\text{min}}$	Minimal shear length of the timber
$l_n$	Notch length
$l_s$	Distance between notches
$l_{\text{shear}}$	Length of the shear surface around the shear connectors
$l_v$	Length of timber in front of the notch

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$p_{ind}$	Fictitious vertical load which represents the effects of induced strains on the structure
$q_d$	Design value of the external loads
$s_{ef}$	Effective spacing of the connections
$s_f$	Spacing of the transverse reinforcement bars in the concrete slab when checking in-plane actions in the concrete
$s_{max/min}$	Maximum or minimum spacing of the connections
$s_t$	Transverse spacing of the fasteners when checking in-plane shear in the concrete
$t$	A point in time
$t_0$	The time when the concrete achieves the design strength or the time when the design-imposed load is applied to the composite structure, whichever is the earlier
$t_{\infty}$	Time for design for long-term condition
$t_c$	Time according to EN 13670:2009, 8.5(6) when curing and protection of the concrete are complete
$t_p$	Time of removal of props
$t_s$	Age of concrete at the beginning of drying according to EN 1992-1-1:2023, B.6(1)
$u_{ULS,tc}$	Mean ultimate slip
$v_u$	Ultimate slip determined in an Annex C test in accordance with EN 12512
$w_k$	Crack width in concrete
$w_{max}$	Recommended maximum crack width in concrete EN 1992-1-1:2023, Table 9.1
$z$	Distance between the centres of gravity of the cross-sections.

**3.2.3 Greek upper-case letters**

$\Delta F_d$	Design longitudinal shear over a certain length of beam in verification of concrete for in-plane shear (including diaphragm actions)
$\Delta \omega$	Total change over the annual cycle of the average timber moisture content due to environmental conditions
$\Delta \omega^{-/+}$	Reduction or increase in average moisture content in timber over the annual cycle with respect to the expected moisture content in use $\omega_{use}$
$\Delta \omega_{calc}$	Timber moisture content variation (averaged over the timber cross-section) to be considered in the design
$\Delta \omega_d$	Difference between the average timber moisture content in use $\omega_{use}$ and the average value $\omega_0$ at time $t_c$
$\Delta T_E$	Non-linear temperature difference component of the composite section
$\Delta T_{MY}$	Temperature difference component about the z-z axis, with linear variation
$\Delta T_{MZ}$	Temperature difference component about the y-y axis, with linear variation
$\Delta T_{u,conc}^{-/+}$	Change in the average temperature of the concrete in the composite section from initial to minimum or maximum
$\Delta T_{u,i,calc}$	Temperature variation of the cross-section $i$ (1 or 2) to be considered in the design

$\Delta T_{u,tim}^{-/+}$	Change in the average temperature of the timber in the composite section from initial to minimum or maximum
$\Delta \varepsilon$	Difference in induced strain between the timber part and the concrete part
$\Delta x$	Length under consideration in verification of concrete for in-plane shear (including diaphragm actions)
$\theta$	Angle of the concrete strut

### 3.2.4 Greek lower-case letters

$\alpha$	Angle of a notch
$\alpha_{c,T}$	Coefficient of linear thermal expansion of concrete
$\alpha_{i,T}$	Coefficient of thermal expansion of the cross-section $i$
$\alpha_{t,u/T}$	Coefficient of linear moisture or thermal expansion of timber parallel to the grain
$\gamma_1$	Composite factor of the concrete cross-section
$\gamma_c$	Partial factor for concrete
$\gamma_{SH}$	Partial factor for shrinkage action
$\gamma_T$	Partial factor for thermal action
$\gamma_u$	Partial factor for moisture content action
$\gamma_v$	Partial factor for connection shear strength
$\varepsilon_{conc}$	Shrinkage of concrete according to EN 1992-1-1:2023
$\varepsilon_{ef,conc}$	Effective shrinkage of concrete
$\varepsilon_i$	Induced strain of the cross-section
$\rho_{mean}$	Mean value of timber member density
$\sigma_{conc,c/t,d}$	Design compressive or tensile stress in the concrete member, caused by axial force and bending
$\tau_{Ed}$	Design longitudinal shear stress for verification of concrete for in-plane shear
$\varphi$	Creep coefficient of the concrete
$\psi_{0,\omega}$	Factor for combination value of yearly variations of average timber moisture content
$\psi_{1,\omega}$	Factor for frequent value of yearly variations of average timber moisture content
$\psi_{2,\omega}$	Factor for quasi-permanent value of average timber moisture content variations
$\psi_{conc/tim}$	Coefficient for the effect of composite action on the creep coefficient of the concrete or timber cross-section
$\psi_{con}$	Coefficient for the effect of composite action on the creep coefficient of the connection
$\omega$	Moisture content of timber (averaged over the timber cross-section)
$\omega_0$	Moisture content of timber at time $t_c$
$\omega_{max/min}$	Maximum or minimum moisture content of timber during annual cycles
$\omega_{use}$	Expected moisture content of timber in use (mean over the year, averaged over the timber cross-section)