

English Version

**Eurocode 5: Design of Timber Structures - Structural
design of timber-concrete composite structures - Common
rules and rules for buildings**

Eurocode 5 : Conception et calcul des structures en
bois - Calcul des structures mixtes bois-béton - Règles
communes et règles pour les bâtiments

Eurocode 5: Berechnung und Konstruktion von
Holzbauten - Bemessung und Berechnung von Holz-
Beton-Verbundbauteilen - Allgemeine Regeln und
Regeln für den Hochbau

This Technical Specification (CEN/TS) was approved by CEN on 25 July 2021 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.

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European foreword

This document (CEN/TS 19103:2021) 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 document has been prepared under Mandate M/515 issued to CEN by the European Commission and the European Free Trade Association.

This document 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, Turkey 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 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;
- New Eurocodes under development.

0.2 Introduction to EN 1995 (all parts)

(1) EN 1995 (all parts) applies to the design of buildings and civil engineering works in timber (solid timber, sawn, planed or in pole form, glued laminated timber or wood-based structural products, e.g. LVL) or wood-based panels jointed together with adhesives or mechanical fasteners. It complies with the principles and requirements for the safety and serviceability of structures and the basis of design and verification given in EN 1990.

(2) EN 1995 (all parts) is concerned only with requirements for mechanical resistance, serviceability, durability and fire resistance of timber structures. Other requirements concerning thermal or sound insulation, for example, are not considered.

(3) EN 1995 (all parts) is subdivided into various parts:

- EN 1995-1 *General*;
- EN 1995-2 *Bridges*.

(4) EN 1995-1 “General” in itself does not exist as a physical document, but comprises the following two separate parts:

- EN 1995-1-1 *General – Common rules and rules for buildings*;
- EN 1995-1-2 *General – Structural fire design*.

EN 1995-2 refers to the General rules in EN 1995-1-1.

This document supplements EN 1995.

0.3 Verb forms used in this Technical Specification

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.

0.4 National annex for CEN/TS 19103

This document provides values within notes, indicating where national choices can be made. Therefore, a national document implementing CEN/TS 19103 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.

National choice is allowed in CEN/TS 19103 through the following subclauses:

- 4.3.1.2(5) Average timber moisture content due to the environmental conditions
- 4.4.1.1 Partial factor for shrinkage action
- 4.4.1.2 Partial factor for temperature action
- 4.4.1.2 Partial factor for moisture content action
- 4.4.2 Partial factor for connection shear strength

National choice is allowed in CEN/TS 19103 on the application of the following informative annexes:

- Annex A Yearly variations of moisture content averaged over the timber cross-section for timber-concrete composite structures in variable environmental conditions

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 19103

- (1) CEN/TS 19103 gives general design rules for timber-concrete composite structures.
- (2) It provides requirements 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) It 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) It 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 general assumptions of EN 1990 apply.
- (2) CEN/TS 19103 is intended to be used in conjunction with EN 1990, 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 1990:2002¹⁾, *Eurocode - Basis of structural design*

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

EN 1991-1-5:2003, *Eurocode 1: Actions on structures - Part 1-5: General actions - Thermal actions*

EN 1992-1-1:2004²⁾, *Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings*

EN 1993-1-8, *Eurocode 3: Design of steel structures - Part 1-8: Design of joints*

EN 1994-1-1:2004, *Eurocode 4: Design of composite steel and concrete structures - Part 1-1: General rules and rules for buildings*

1) As impacted by EN 1990:2002/A1:2005.

2) As impacted by EN 1992-1-1:2004/A1:2014.

EN 1994-2:2005, *Eurocode 4 - Design of composite steel and concrete structures - Part 2: General rules and rules for bridges*

EN 1995-1-1:2004³⁾, *Eurocode 5: Design of timber structures - Part 1-1: General - Common 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, EN 1995-1-1 and the following apply.

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 standard.

3.1.3

inelastic strain

strain which is caused not by stresses but by shrinkage, swelling or thermal expansion, for example

3.1.4

moisture content

mass of water in wood, expressed as a percentage of its oven-dry mass

3.1.5

quasi-constant environmental conditions

environmental conditions where

- timber is installed close to its expected moisture content in use $m_{C_{use}}$ and
- for softwood timber, the variation of average moisture content in use (Δmc , see Formula (4.5)) 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) As impacted by EN 1995-1-1:2004/A1:2008 and EN 1995-1-1:2004/A2:2014.