

**Eurocode 5:
Design of timber structures
Part 1-1: General
Common rules and rules for buildings**

**Eurokoodeks 5:
Puitkonstruktsioonide projekteerimine
Osa 1-1: Üldist
Üldreeglid ja reeglid hoonete projekteerimiseks**

EESTI STANDARDI EESSÕNA**NATIONAL FOREWORD**

See Eesti standard EVS-EN 1995-1-1:2005+NA:2007 sisaldab Euroopa standardi EN 1995-1-1:2004 ja selle paranduse AC:2006 ingliskeelset teksti ning Eesti rahvuslikku lisa NA:2007.	This Estonian Standard EVS-EN 1995-1-1:2005+NA:2007 consists of the English text of the European Standard EN 1995-1-1:2004 including its corrigendum AC:2006 and the Estonian National Annex NA:2007.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi kättesaadavaks tegemise kuupäev on 24.11.2004.	Date of Availability of the European standard is 24.11.2004.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

ICS 91.010.30; 91.080.20

Standardite reprodutseerimis- ja levitamisoigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Aru 10, 10317 Tallinn, Eesti; www.evs.ee; telefon: 605 5050; e-post: info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:
Aru 10, 10317 Tallinn, Estonia; www.evs.ee; phone: 605 5050; e-mail: info@evs.ee

English version

**Eurocode 5: Design of timber structures - Part 1-1: General -
Common rules and rules for buildings**

Eurocode 5: Conception et calcul des structures en bois -
Partie 1-1 : Généralités - Règles communes et règles pour
les bâtiments

Eurocode 5: Bemessung und Konstruktion von Holzbauten
- Teil 1-1: Allgemeines - Allgemeine Regeln und Regeln für
den Hochbau

This European Standard was approved by CEN on 16 April 2004.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents	Page
Foreword	7
SECTION 1 GENERAL	10
1.1 SCOPE	10
1.1.1 <i>Scope of EN 1995</i>	10
1.1.2 <i>Scope of EN 1995-1-1</i>	10
1.2 NORMATIVE REFERENCES	11
1.3 ASSUMPTIONS	13
1.4 DISTINCTION BETWEEN PRINCIPLES AND APPLICATION RULES	13
1.5 TERMS AND DEFINITIONS	13
1.5.1 <i>General</i>	13
1.5.2 <i>Additional terms and definitions used in this present standard</i>	13
1.6 SYMBOLS USED IN EN 1995-1-1	14
SECTION 2 BASIS OF DESIGN	19
2.1 REQUIREMENTS	19
2.1.1 <i>Basic requirements</i>	19
2.1.2 <i>Reliability management</i>	19
2.1.3 <i>Design working life and durability</i>	19
2.2 PRINCIPLES OF LIMIT STATE DESIGN	19
2.2.1 <i>General</i>	19
2.2.2 <i>Ultimate limit states</i>	19
2.2.3 <i>Serviceability limit states</i>	20
2.3 BASIC VARIABLES	21
2.3.1 <i>Actions and environmental influences</i>	21
2.3.1.1 <i>General</i>	21
2.3.1.2 <i>Load-duration classes</i>	21
2.3.1.3 <i>Service classes</i>	22
2.3.2 <i>Materials and product properties</i>	22
2.3.2.1 <i>Load-duration and moisture influences on strength</i>	22
2.3.2.2 <i>Load-duration and moisture influences on deformations</i>	22
2.4 VERIFICATION BY THE PARTIAL FACTOR METHOD	24
2.4.1 <i>Design value of material property</i>	24
2.4.2 <i>Design value of geometrical data</i>	25
2.4.3 <i>Design resistances</i>	25
2.4.4 <i>Verification of equilibrium (EQU)</i>	25
SECTION 3 MATERIAL PROPERTIES	26
3.1 GENERAL	26
3.1.1 <i>Strength and stiffness parameters</i>	26
3.1.2 <i>Stress-strain relations</i>	26
3.1.3 <i>Strength modification factors for service classes and load-duration classes</i>	26
3.1.4 <i>Deformation modification factors for service classes</i>	26
3.2 SOLID TIMBER	26
3.3 GLUED LAMINATED TIMBER	27
3.4 LAMINATED VENEER LUMBER (LVL)	28
3.5 WOOD-BASED PANELS	29
3.6 ADHESIVES	29
3.7 METAL FASTENERS	29
SECTION 4 DURABILITY	30
4.1 RESISTANCE TO BIOLOGICAL ORGANISMS	30
4.2 RESISTANCE TO CORROSION	30
SECTION 5 BASIS OF STRUCTURAL ANALYSIS	31
5.1 GENERAL	31

5.2	MEMBERS	31
5.3	CONNECTIONS	31
5.4	ASSEMBLIES	32
5.4.1	<i>General</i>	32
5.4.2	<i>Frame structures</i>	32
5.4.3	<i>Simplified analysis of trusses with punched metal plate fasteners</i>	33
5.4.4	<i>Plane frames and arches</i>	34
SECTION 6	ULTIMATE LIMIT STATES	36
6.1	DESIGN OF CROSS-SECTIONS SUBJECTED TO STRESS IN ONE PRINCIPAL DIRECTION	36
6.1.1	<i>General</i>	36
6.1.2	<i>Tension parallel to the grain</i>	36
6.1.3	<i>Tension perpendicular to the grain</i>	36
6.1.4	<i>Compression parallel to the grain</i>	36
6.1.5	<i>Compression perpendicular to the grain</i>	36
6.1.6	<i>Bending</i>	41
6.1.7	<i>Shear</i>	41
6.1.8	<i>Torsion</i>	42
6.2	DESIGN OF CROSS-SECTIONS SUBJECTED TO COMBINED STRESSES	43
6.2.1	<i>General</i>	43
6.2.2	<i>Compression stresses at an angle to the grain</i>	43
6.2.3	<i>Combined bending and axial tension</i>	43
6.2.4	<i>Combined bending and axial compression</i>	43
6.3	STABILITY OF MEMBERS	44
6.3.1	<i>General</i>	44
6.3.2	<i>Columns subjected to either compression or combined compression and bending</i>	44
6.3.3	<i>Beams subjected to either bending or combined bending and compression</i>	45
6.4	DESIGN OF CROSS-SECTIONS IN MEMBERS WITH VARYING CROSS-SECTION OR CURVED SHAPE	47
6.4.1	<i>General</i>	47
6.4.2	<i>Single tapered beams</i>	47
6.4.3	<i>Double tapered, curved and pitched cambered beams</i>	48
6.5	NOTCHED MEMBERS	52
6.5.1	<i>General</i>	52
6.5.2	<i>Beams with a notch at the support</i>	52
6.6	SYSTEM STRENGTH	53
SECTION 7	SERVICEABILITY LIMIT STATES	55
7.1	JOINT SLIP	55
7.2	LIMITING VALUES FOR DEFLECTIONS OF BEAMS	55
7.3	VIBRATIONS	56
7.3.1	<i>General</i>	56
7.3.2	<i>Vibrations from machinery</i>	56
7.3.3	<i>Residential floors</i>	56
SECTION 8	CONNECTIONS WITH METAL FASTENERS	59
8.1	GENERAL	59
8.1.1	<i>Fastener requirements</i>	59
8.1.2	<i>Multiple fastener connections</i>	59
8.1.3	<i>Multiple shear plane connections</i>	59
8.1.4	<i>Connection forces at an angle to the grain</i>	59
8.1.5	<i>Alternating connection forces</i>	61
8.2	LATERAL LOAD-CARRYING CAPACITY OF METAL DOWEL-TYPE FASTENERS	61
8.2.1	<i>General</i>	61
8.2.2	<i>Timber-to-timber and panel-to-timber connections</i>	61
8.2.3	<i>Steel-to-timber connections</i>	63
8.3	NAILED CONNECTIONS	65
8.3.1	<i>Laterally loaded nails</i>	65

8.3.1.1	General	65
8.3.1.2	Nailed timber-to-timber connections	67
8.3.1.3	Nailed panel-to-timber connections	70
8.3.1.4	Nailed steel-to-timber connections	70
8.3.2	<i>Axially loaded nails</i>	70
8.3.3	<i>Combined laterally and axially loaded nails</i>	72
8.4	STAPLED CONNECTIONS	72
8.5	BOLTED CONNECTIONS	74
8.5.1	<i>Laterally loaded bolts</i>	74
8.5.1.1	General and bolted timber-to-timber connections	74
8.5.1.2	Bolted panel-to-timber connections	75
8.5.1.3	Bolted steel-to-timber connections	76
8.5.2	<i>Axially loaded bolts</i>	76
8.6	DOWELLED CONNECTIONS	76
8.7	SCREWED CONNECTIONS	77
8.7.1	<i>Laterally loaded screws</i>	77
8.7.2	<i>Axially loaded screws</i>	77
8.7.3	<i>Combined laterally and axially loaded screws</i>	78
8.8	CONNECTIONS MADE WITH PUNCHED METAL PLATE FASTENERS	78
8.8.1	<i>General</i>	78
8.8.2	<i>Plate geometry</i>	78
8.8.3	<i>Plate strength properties</i>	79
8.8.4	<i>Plate anchorage strengths</i>	80
8.8.5	<i>Connection strength verification</i>	80
8.8.5.1	Plate anchorage capacity	80
8.8.5.2	Plate capacity	82
8.9	SPLIT RING AND SHEAR PLATE CONNECTORS	83
8.10	TOOTHED-PLATE CONNECTORS	86
SECTION 9	COMPONENTS AND ASSEMBLIES	89
9.1	COMPONENTS	89
9.1.1	<i>Glued thin-webbed beams</i>	89
9.1.2	<i>Glued thin-flanged beams</i>	91
9.1.3	<i>Mechanically jointed beams</i>	92
9.1.4	<i>Mechanically jointed and glued columns</i>	93
9.2	ASSEMBLIES	93
9.2.1	<i>Trusses</i>	93
9.2.2	<i>Trusses with punched metal plate fasteners</i>	94
9.2.3	<i>Roof and floor diaphragms</i>	95
9.2.3.1	General	95
9.2.3.2	Simplified analysis of roof and floor diaphragms.	95
9.2.4	<i>Wall diaphragms</i>	96
9.2.4.1	General	96
9.2.4.2	Simplified analysis of wall diaphragms – Method A	96
9.2.4.3	Simplified analysis of wall diaphragms – Method B	99
9.2.4.3.1	Construction of walls and panels to meet the requirements of the simplified analysis	99
9.2.4.3.2	Design procedure	100
9.2.5	<i>Bracing</i>	102
9.2.5.1	General	102
9.2.5.2	Single members in compression	102
9.2.5.3	Bracing of beam or truss systems	103
SECTION 10	STRUCTURAL DETAILING AND CONTROL	105
10.1	GENERAL	105
10.2	MATERIALS	105
10.3	GLUED JOINTS	105
10.4	CONNECTIONS WITH MECHANICAL FASTENERS	105
10.4.1	<i>General</i>	105
10.4.2	<i>Nails</i>	105
10.4.3	<i>Bolts and washers</i>	105

10.4.4	<i>Dowels</i>	106
10.4.5	<i>Screws</i>	106
10.5	ASSEMBLY	106
10.6	TRANSPORTATION AND ERECTION	106
10.7	CONTROL	107
10.8	SPECIAL RULES FOR DIAPHRAGM STRUCTURES	107
10.8.1	<i>Floor and roof diaphragms</i>	107
10.8.2	<i>Wall diaphragms</i>	108
10.9	SPECIAL RULES FOR TRUSSES WITH PUNCHED METAL PLATE FASTENERS	108
10.9.1	<i>Fabrication</i>	108
10.9.2	<i>Erection</i>	108
ANNEX A	(INFORMATIVE): BLOCK SHEAR AND PLUG SHEAR FAILURE AT MULTIPLE DOWEL-TYPE STEEL-TO-TIMBER CONNECTIONS	110
ANNEX B	(INFORMATIVE): MECHANICALLY JOINTED BEAMS	112
B.1	SIMPLIFIED ANALYSIS	112
B.1.1	<i>Cross-sections</i>	112
B.1.2	<i>Assumptions</i>	112
B.1.3	<i>Spacings</i>	112
B.1.4	<i>Deflections resulting from bending moments</i>	112
B.2	EFFECTIVE BENDING STIFFNESS	114
B.3	NORMAL STRESSES	114
B.4	MAXIMUM SHEAR STRESS	114
B.5	FASTENER LOAD	114
ANNEX C	(INFORMATIVE): BUILT-UP COLUMNS	116
C.1	GENERAL	116
C.1.1	<i>Assumptions</i>	116
C.1.2	<i>Load-carrying capacity</i>	116
C.2	MECHANICALLY JOINTED COLUMNS	116
C.2.1	<i>Effective slenderness ratio</i>	116
C.2.2	<i>Load on fasteners</i>	116
C.2.3	<i>Combined loads</i>	117
C.3	SPACED COLUMNS WITH PACKS OR GUSSETS	117
C.3.1	<i>Assumptions</i>	117
C.3.2	<i>Axial load-carrying capacity</i>	118
C.3.3	<i>Load on fasteners, gussets or packs</i>	119
C.4	LATTICE COLUMNS WITH GLUED OR NAILED JOINTS	119
C.4.1	<i>Assumptions</i>	119
C.4.2	<i>Load-carrying capacity</i>	120
C.4.3	<i>Shear forces</i>	122
ANNEX D	(INFORMATIVE): BIBLIOGRAPHY	123

Foreword

This European Standard EN 1995-1-1 has been prepared by Technical Committee CEN/TC250 "Structural Eurocodes", the Secretariat of which is held by BSI.

This European Standard shall be given the status of a National Standard, either by publication of an identical text or by endorsement, at the latest by May 2005, and conflicting national standards shall be withdrawn at the latest by March 2010.

This European Standard supersedes ENV 1995-1-1:1993.

CEN/TC250 is responsible for all Structural Eurocodes.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Background of the Eurocode programme

In 1975, the Commission of the European Community decided on an action programme in the field of construction, based on article 95 of the Treaty. The objective of the programme was the elimination of technical obstacles to trade and the harmonisation of technical specifications.

Within this action programme, the Commission took the initiative to establish a set of harmonised technical rules for the design of construction works which, in a first stage, would serve as an alternative to the national rules in force in the Member States and, ultimately, would replace them.

For fifteen years, the Commission, with the help of a Steering Committee with Representatives of Member States, conducted the development of the Eurocodes programme, which led to the first generation of European codes in the 1980s.

In 1989, the Commission and the Member States of the EU and EFTA decided, on the basis of an agreement¹ between the Commission and CEN, to transfer the preparation and the publication of the Eurocodes to CEN through a series of Mandates, in order to provide them with a future status of European Standard (EN). This links de facto the Eurocodes with the provisions of all the Council's Directives and/or Commission's Decisions dealing with European standards (e.g. the Council Directive 89/106/EEC on construction products – CPD – and Council Directives 93/37/EEC, 92/50/EEC and 89/440/EEC on public works and services and equivalent EFTA Directives initiated in pursuit of setting up the internal market).

The Structural Eurocode programme comprises the following standards generally consisting of a number of Parts:

EN 1990:2002	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

¹ Agreement between the Commission of the European Communities and the European Committee for Standardisation (CEN) concerning the work on EUROCODES for the design of building and civil engineering works (BC/CEN/03/89).

EN 1998	Eurocode 8: Design of structures for earthquake resistance
EN 1999	Eurocode 9: Design of aluminium structures

Eurocode standards recognise the responsibility of regulatory authorities in each Member State and have safeguarded their right to determine values related to regulatory safety matters at national level where these continue to vary from State to State.

Status and field of application of Eurocodes

The Member States of the EU and EFTA recognise that Eurocodes serve as reference documents for the following purposes:

- as a means to prove compliance of building and civil engineering works with the essential requirements of Council Directive 89/106/EEC, particularly Essential Requirement N°1 – Mechanical resistance and stability – and Essential Requirement N°2 – Safety in case of fire ;
- as a basis for specifying contracts for construction works and related engineering services ;
- as a framework for drawing up harmonised technical specifications for construction products (ENs and ETAs)

The Eurocodes, as far as they concern the construction works themselves, have a direct relationship with the Interpretative Documents² referred to in Article 12 of the CPD, although they are of a different nature from harmonised product standards³. Therefore, technical aspects arising from the Eurocodes work need to be adequately considered by CEN Technical Committees and/or EOTA Working Groups working on product standards with a view to achieving full compatibility of these technical specifications with the Eurocodes.

The Eurocode standards provide common structural design rules for everyday use for the design of whole structures and component products of both a traditional and an innovative nature. Unusual forms of construction or design conditions are not specifically covered and additional expert consideration will be required by the designer in such cases.

National Standards implementing Eurocodes

The National Standards implementing Eurocodes will comprise the full text of the Eurocode (including any annexes), as published by CEN, which may be preceded by a National title page and National foreword, and may be followed by a National annex.

The National annex may only contain information on those parameters which are left open in the Eurocode for national choice, known as Nationally Determined Parameters, to be used for the design of buildings and civil engineering works to be constructed in the country concerned, i.e.:

- values and/or classes where alternatives are given in the Eurocode;
- values to be used where a symbol only is given in the Eurocode;
- country specific data (geographical, climatic, etc.), e.g. snow map;

² According to Art. 3.3 of the CPD, the essential requirements (ERs) shall be given concrete form in interpretative documents for the creation of the necessary links between the essential requirements and the mandates for harmonised ENs and ETAGs/ETAs.

³ According to Art. 12 of the CPD the interpretative documents shall:
give concrete form to the essential requirements by harmonising the terminology and the technical bases and indicating classes or levels for each requirement where necessary ;
indicate methods of correlating these classes or levels of requirement with the technical specifications, e.g. methods of calculation and of proof, technical rules for project design, etc. ;
serve as a reference for the establishment of harmonised standards and guidelines for European technical approvals.

The Eurocodes, *de facto*, play a similar role in the field of the ER 1 and a part of ER 2.

- the procedure to be used where alternative procedures are given in the Eurocode;
- decisions on the application of informative annexes;
- references to non-contradictory complementary information to assist the user to apply the Eurocode.

Links between Eurocodes and harmonised technical specifications (ENs and ETAs) for products

There is a need for consistency between the harmonised technical specifications for construction products and the technical rules for works⁴. Furthermore, all the information accompanying the CE Marking of the construction products which refer to Eurocodes shall clearly mention which Nationally Determined Parameters have been taken into account.

Additional information specific to EN 1995-1-1

EN 1995 describes the Principles and requirements for safety, serviceability and durability of timber structures. It is based on the limit state concept used in conjunction with a partial factor method.

For the design of new structures, EN 1995 is intended to be used, for direct application, together with EN 1990:2002 and relevant Parts of EN 1991.

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 1995-1-1 is used as a base document by other CEN/TCs the same values need to be taken.

National annex for EN 1995-1-1

This standard gives alternative procedures, values and recommendations with notes indicating where national choices may have to be made. Therefore the National Standard implementing EN 1995-1-1 should have a National annex containing all Nationally Determined Parameters to be used for the design of buildings and civil engineering works to be constructed in the relevant country.

National choice is allowed in EN 1995-1-1 through clauses:

2.3.1.2(2)P	Assignment of loads to load-duration classes;
2.3.1.3(1)P	Assignment of structures to service classes;
2.4.1(1)P	Partial factors for material properties;
6.4.3(8)	Double tapered, curved and pitched cambered beams;
7.2(2)	Limiting values for deflections;
7.3.3(2)	Limiting values for vibrations;
8.3.1.2(4)	Nailed timber-to-timber connections: Rules for nails in end grain;
8.3.1.2(7)	Nailed timber-to-timber connections: Species sensitive to splitting;
9.2.4.1(7)	Design method for wall diaphragms;
9.2.5.3(1)	Bracing modification factors for beam or truss systems;
10.9.2(3)	Erection of trusses with punched metal plate fasteners: Maximum bow;
10.9.2(4)	Erection of trusses with punched metal plate fasteners: Maximum deviation.

⁴ see Art.3.3 and Art.12 of the CPD, as well as clauses 4.2, 4.3.1, 4.3.2 and 5.2 of ID 1.

Section 1 General

1.1 Scope

1.1.1 Scope of EN 1995

(1)P EN 1995 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 1990:2002.

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

(3) EN 1995 is intended to be used in conjunction with:

EN 1990:2002 Eurocode – Basis of design

EN 1991 “Actions on structures”

EN’s for construction products relevant to timber structures

EN 1998 “Design of structures for earthquake resistance”, when timber structures are built in seismic regions

(4) EN 1995 is subdivided into various parts:

EN 1995-1 General

EN 1995-2 Bridges

(5) EN 1995-1 “General” comprises:

EN 1995-1-1 General – Common rules and rules for buildings

EN 1995-1-2 General rules – Structural Fire Design

(6) EN 1995-2 refers to the common rules in EN 1995-1-1. The clauses in EN 1995-2 supplement the clauses in EN 1995-1.

1.1.2 Scope of EN 1995-1-1

(1) EN 1995-1-1 gives general design rules for timber structures together with specific design rules for buildings.

(2) The following subjects are dealt with in EN 1995-1-1:

Section 1: General

Section 2: Basis of design

Section 3: Material properties

Section 4: Durability

Section 5: Basis of structural analysis

Section 6: Ultimate limit states

Section 7: Serviceability limit states

Section 8: Connections with metal fasteners

Section 9: Components and assemblies

Section 10: Structural detailing and control.

(3)P EN 1995-1-1 does not cover the design of structures subject to prolonged exposure to temperatures over 60°C.

1.2 Normative references

(1) This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO standards:

ISO 2081:1986	Metallic coatings. Electroplated coatings of zinc on iron or steel
ISO 2631-2:1989	Evaluation of human exposure to whole-body vibration. Part 2: Continuous and shock-induced vibrations in buildings (1 to 80 Hz)

European Standards:

EN 300:1997	Oriented Strand Board (OSB) – Definition, classification and specifications
EN 301:1992	Adhesives, phenolic and aminoplastic for load-bearing timber structures; classification and performance requirements
EN 312-4:1996	Particleboards – Specifications. Part 4: Requirements for load-bearing boards for use in dry conditions
EN 312-5:1997	Particleboards – Specifications. Part 5: Requirements for load-bearing boards for use in humid conditions
EN 312-6:1996	Particleboards – Specifications. Part 6: Requirements for heavy duty load-bearing boards for use in dry conditions
EN 312-7:1997	Particleboards – Specifications. Part 7: Requirements for heavy duty load-bearing boards for use in humid conditions
EN 335-1:1992	Durability of wood and wood-based products – definition of hazard classes of biological attack. Part 1: General
EN 335-2:1992	Durability of wood and wood-based products – definition of hazard classes of biological attack. Part 2: Application to solid wood
EN 335-3:1995	Durability of wood and wood-based products – Definition of hazard classes of biological attack. Part 3: Application to wood-based panels
EN 350-2:1994	Durability of wood and wood-based products – Natural durability of solid wood. Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe
EN 351-1:1995	Durability of wood and wood-based products – Preservative treated solid wood. Part 1: Classification of preservative penetration and retention
EN 383:1993	Timber structures – Test methods. Determination of embedding strength and foundation values for dowel type fasteners
EN 385:2001	Finger jointed structural timber. Performance requirements and minimum production requirements
EN 387:2001	Glued laminated timber – Production requirements for large finger joints. Performance requirements and minimum production requirements
EN 409:1993	Timber structures – Test methods. Determination of the yield moment of dowel type fasteners – Nails

EN 460:1994	Durability of wood and wood-based products – Natural durability of solid wood – Guide of the durability requirements for wood to be used in hazard classes
EN 594:1995	Timber structures – Test methods – Racking strength and stiffness of timber frame wall panels
EN 622-2:1997	Fibreboards – Specifications. Part 2: Requirements for hardboards
EN 622-3:1997	Fibreboards – Specifications. Part 3: Requirements for medium boards
EN 622-4:1997	Fibreboards – Specifications. Part 4: Requirements for softboards
EN 622-5:1997	Fibreboards – Specifications. Part 5: Requirements for dry process boards (MDF)
EN 636-1:1996	Plywood – Specifications. Part 1: Requirements for plywood for use in dry conditions
EN 636-2:1996	Plywood – Specifications. Part 2: Requirements for plywood for use in humid conditions
EN 636-3:1996	Plywood – Specifications. Part 3: Requirements for plywood for use in exterior conditions
EN 912:1999	Timber fasteners – Specifications for connectors for timber
EN 1075:1999	Timber structures – Test methods. Testing of joints made with punched metal plate fasteners
EN 1380:1999	Timber structures – Test methods – Load bearing nailed joints
EN 1381:1999	Timber structures – Test methods – Load bearing stapled joints
EN 1382:1999	Timber structures – Test methods – Withdrawal capacity of timber fasteners
EN 1383:1999	Timber structures – Test methods – Pull through testing of timber fasteners
EN 1990:2002	Eurocode – Basis of structural design
EN 1991-1-1:2002	Eurocode 1: Actions on structures – Part 1-2: General actions – Densities, self-weight and imposed loads
EN 1991-1-3	Eurocode 1: Actions on structures – Part 1-3: General actions – Snow loads
EN 1991-1-4	Eurocode 1: Actions on structures – Part 1-4: General actions – Wind loads
EN 1991-1-5	Eurocode 1: Actions on structures – Part 1-5: General actions – Thermal actions
EN 1991-1-6	Eurocode 1: Actions on structures – Part 1-6: General actions – Actions during execution
EN 1991-1-7	Eurocode 1: Actions on structures – Part 1-7: General actions – Accidental actions due to impact and explosions
EN 10147:2000	Specification for continuously hot-dip zinc coated structural steel sheet and strip – Technical delivery conditions
EN 13271:2001	Timber fasteners – Characteristic load-carrying capacities and slip moduli for connector joints
EN 13986	Wood-based panels for use in construction – Characteristics, evaluation of conformity and marking

EN 14080	Timber structures – Glued laminated timber – Requirements
EN 14081-1	Timber structures – Strength graded structural timber with rectangular cross-section – Part 1, General requirements
EN 14250	Timber structures. Production requirements for fabricated trusses using punched metal plate fasteners
EN 14279	Laminated veneer lumber (LVL) – Specifications, definitions, classification and requirements
EN 14358	Timber structures – Fasteners and wood-based products – Calculation of characteristic 5-percentile value and acceptance criteria for a sample
EN 14374	Timber structures – Structural laminated veneer lumber – Requirements
EN 14544	Strength graded structural timber with round cross-section – Requirements
EN 14545	Timber structures – Connectors – Requirements
EN 14592	Timber structures – Fasteners – Requirements
EN 26891:1991	Timber structures. Joints made with mechanical fasteners. General principles for the determination of strength and deformation characteristics
EN 28970:1991	Timber structures. Testing of joints made with mechanical fasteners; requirements for wood density (ISO 8970:1989)

NOTE: As long as EN 14250, EN 14081-1, EN 14080, EN 13986, EN 14374, EN 14358, EN 14544, EN 14545 and EN 14592 are not available as European standards, more information may be given in the National annex.

1.3 Assumptions

- (1)P The general assumptions of EN 1990:2002 apply.
- (2) Additional requirements for structural detailing and control are given in section 10.

1.4 Distinction between Principles and Application Rules

- (1)P The rules in EN 1990:2002 clause 1.4 apply.

1.5 Terms and definitions

1.5.1 General

- (1)P The terms and definitions of EN 1990:2002 clause 1.5 apply.

1.5.2 Additional terms and definitions used in this present standard

1.5.2.1

Characteristic value

Refer to EN 1990:2002 subclause 1.5.4.1.

1.5.2.2

Dowelled connection

Connection made with a circular cylindrical rod usually of steel, with or without a head, fitting tightly in prebored holes and used for transferring loads perpendicular to the dowel axis.

1.5.2.3

Equilibrium moisture content