IIN-AS

Institut luxembourgeois de la normalisation de l'accréditation, de la sécurité et qualité des produits et services

ILNAS-EN 1995-1-1:2004

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



National Foreword

This European Standard EN 1995-1-1:2004 was adopted as Luxembourgish Standard ILNAS-EN 1995-1-1:2004.

Every interested party, which is member of an organization based in Luxembourg, can participate for FREE in the development of Luxembourgish (ILNAS), European (CEN, CENELEC) and International (ISO, IEC) standards:

- Participate in the design of standards
- Foresee future developments
- Participate in technical committee meetings

https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation.html

THIS PUBLICATION IS COPYRIGHT PROTECTED

Nothing from this publication may be reproduced or utilized in any form or by any mean - electronic, mechanical, photocopying or any other data carries without prior permission!

EUROPEAN STANDARD^{LNAS-EN 1995-1-1:20}² **1995-1-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2004

ICS 91.010.30; 91.080.20

Supersedes ENV 1995-1-1:1993

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

© 2004 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

ILNAS-EN 1995-1-1:2004 - Preview only Copy via ILNAS e-Shop

Conten	Contents		
Forewo	rd	7	
SECTION	1 GENERAL	10	
1.1 1.1.2 1.2 1.3 1.4 1.5 1.5.1 1.5.2 1.6	SCOPE Scope of EN 1995 Scope of EN 1995-1-1 NORMATIVE REFERENCES ASSUMPTIONS DISTINCTION BETWEEN PRINCIPLES AND APPLICATION RULES TERMS AND DEFINITIONS General Additional terms and definitions used in this present standard SYMBOLS USED IN EN 1995-1-1	10 <i>10</i> 11 13 13 <i>13</i> <i>13</i> <i>13</i> <i>13</i>	
SECTION	2 BASIS OF DESIGN	19	
2.1 2.1.1 2.1.2 2.1.3 2.2 2.2.1 2.2.2 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2	REQUIREMENTS Basic requirements Reliability management Design working life and durability PRINCIPLES OF LIMIT STATE DESIGN General Ultimate limit states Serviceability limit states BASIC VARIABLES Actions and environmental influences Actions and environmental influences Actions and product properties Actions Actions and product properties Actions Actio	19 19 19 19 19 20 21 21 22 22 22 24 25 25	
SECTION	3 MATERIAL PROPERTIES	26	
3.1 3.1.1 3.1.2 3.1.3 3.1.4 3.2 3.3 3.4 3.5 3.6 3.7	GENERAL Strength and stiffness parameters Stress-strain relations Strength modification factors for service classes and load-duration classes Deformation modification factors for service classes SOLID TIMBER GLUED LAMINATED TIMBER LAMINATED VENEER LUMBER (LVL) WOOD-BASED PANELS ADHESIVES METAL FASTENERS	26 26 26 26 26 26 27 28 29 29 29	
SECTION	4 DURABILITY	30	
4.1 4.2	RESISTANCE TO BIOLOGICAL ORGANISMS RESISTANCE TO CORROSION	30 30	
SECTION	5 BASIS OF STRUCTURAL ANALYSIS	31	
5.1	General	31	

5.2 Men 5.3 Con 5.4 Ass 5.4.1 5.4.2 5.4.3 5.4.3 5.4.4	IBERS INECTIONS EMBLIES General Frame structures Simplified analysis of trusses with punched metal plate fasteners Plane frames and arches	31 32 32 32 32 33 34
SECTION 6	ULTIMATE LIMIT STATES	36
6.1 DES 6.1.1 6.1.2 6.1.3 6.1.4 6.1.5 6.1.6 6.1.7 6.1.8 6.2 DES 6.2.1 6.2.2 6.2.3 6.2.4 6.3 STAI 6.3.1 6.3.2	IGN OF CROSS-SECTIONS SUBJECTED TO STRESS IN ONE PRINCIPAL DIRECTION General Tension parallel to the grain Tension perpendicular to the grain Compression parallel to the grain Bending Shear Torsion IGN OF CROSS-SECTIONS SUBJECTED TO COMBINED STRESSES General Compression stresses at an angle to the grain Combined bending and axial tension Combined bending and axial compression BILITY OF MEMBERS General Columns subjected to either compression or combined compression and bend	36 36 36 36 36 36 41 42 43 43 43 43 43 43 43 43 43
6.3.3 6.4 Des SHAPE 47 6.4.1 6.4.2 6.4.3 6.5 Not 6.5.1 6.5.2 6.6 Sys	Beams subjected to either bending or combined bending and compression IGN OF CROSS-SECTIONS IN MEMBERS WITH VARYING CROSS-SECTION OR CURVED General Single tapered beams Double tapered, curved and pitched cambered beams CHED MEMBERS General Beams with a notch at the support	45 47 47 48 52 52 52 52
SECTION 7	SERVICEABILITY LIMIT STATES	55
7.1 JOIN 7.2 LIMI 7.3 VIBF 7.3.1 7.3.2 7.3.3	IT SLIP TING VALUES FOR DEFLECTIONS OF BEAMS ATIONS <i>General</i> <i>Vibrations from machinery</i> <i>Residential floors</i>	55 55 56 56 56 56
SECTION 8	CONNECTIONS WITH METAL FASTENERS	59
8.1 GEN 8.1.1 8.1.2 8.1.3 8.1.4 8.1.5 8.2 LATH 8.2.1 8.2.2 8.2.3 8.3 NAIL 8.3.1	ERAL Fastener requirements Multiple fastener connections Multiple shear plane connections Connection forces at an angle to the grain Alternating connection forces ERAL LOAD-CARRYING CAPACITY OF METAL DOWEL-TYPE FASTENERS General Timber-to-timber and panel-to-timber connections Steel-to-timber connections LeD CONNECTIONS Laterally loaded nails	59 59 59 59 61 61 61 61 63 65 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 Axially loaded nails	70
8.3.3 Combined laterally and axially loaded nails	72
8.4 STAPLED CONNECTIONS	72
8.5 BOLTED CONNECTIONS	/4
8.5.1 Laterally loaded bolts	74
8.5.1.1 General and bolted timber-to-timber connections	74 75
8.5.1.2 Bolted steel to timber connections	75
8.5.2 Avially loaded holts	76
8.6 Dowell ed connections	76
8.7 SCREWED CONNECTIONS	77
8 7 1 Laterally loaded screws	77
8.7.2 Avially loaded screws	77
8.7.3 Combined laterally and axially loaded screws	78
8.8 CONNECTIONS MADE WITH PLINCHED METAL PLATE FASTENERS	78
8.8.1 General	78
8.8.2 Plate geometry	78
8.8.3 Plate strength properties	79
8 8 4 Plate anchorage strengths	80
8.8.5 Connection strength verification	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 Glued thin-webbed beams	89
9.1.2 Glued thin-flanged beams	91
9.1.2 Mechanically ininted beams	92
9.1.4 Mechanically jointed and glued columns	93
9.2 Assemblies	93
921 Trusses	93
9.2.2. Trusses with punched metal plate fasteners	94
9.2.3 Roof and floor diaphragms	95
9.2.3.1 General	95
9.2.3.2 Simplified analysis of roof and floor diaphragms.	95
9.2.4 Wall diaphragms	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 a	
0.2.5 Bracing	100
9251 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 General	105
10.4.2 Nails	105
10.4.3 Bolts and washers	105
	-

10.4.4 10.4.5 10.5 Ass 10.6 TRA 10.7 Con 10.8 SPE 10.8.1 10.8.2 10.9 SPE 10.9.1 10.9.2	Dowels Screws SEMBLY INSPORTATION AND ERECTION NTROL SCIAL RULES FOR DIAPHRAGM STRUCTURES Floor and roof diaphragms Wall diaphragms SCIAL RULES FOR TRUSSES WITH PUNCHED METAL PLATE FASTENERS Fabrication Erection	106 106 106 107 107 107 108 108 108 108
ANNEX A MULTIPLE D	(INFORMATIVE): BLOCK SHEAR AND PLUG SHEAR FAILURE AT OWEL-TYPE STEEL-TO-TIMBER CONNECTIONS	110
ANNEX B	(INFORMATIVE): MECHANICALLY JOINTED BEAMS	112
B.1 SIM <i>B.1.1</i> <i>B.1.2</i> <i>B.1.3</i> <i>B.1.4</i> B.2 EFF B.3 NOF B.4 MAX B.5 FAS	PLIFIED ANALYSIS Cross-sections Assumptions Spacings Deflections resulting from bending moments ECTIVE BENDING STIFFNESS RMAL STRESSES KIMUM SHEAR STRESS ITENER LOAD	112 <i>112</i> <i>112</i> <i>112</i> <i>112</i> <i>112</i> <i>114</i> <i>114</i> <i>114</i>
ANNEX C	(INFORMATIVE): BUILT-UP COLUMNS	116
C.1 GEN C.1.1 C.1.2 C.2 MEC C.2.1 C.2.2 C.2.3 C.3 SPA C.3.1 C.3.2 C.3.3 C.4 LAT C.4.1 C.4.2 C.4.3 ANNEY D (1)	NERAL Assumptions Load-carrying capacity CHANICALLY JOINTED COLUMNS Effective slenderness ratio Load on fasteners Combined loads CCED COLUMNS WITH PACKS OR GUSSETS Assumptions Axial load-carrying capacity Load on fasteners, gussets or packs TICE COLUMNS WITH GLUED OR NAILED JOINTS Assumptions Load-carrying capacity Shear forces	116 116 116 116 116 117 117 117 117 117
ANNEX D (I	NFORMATIVE): BIBLIOGRAPHY	123

ILNAS-EN 1995-1-1:2004

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, Luxemburg, 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 EN 1991	Eurocode: Basis of Structural Design 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).