

Eurocode 5: Design of timber structures —

Part 1-2: General — Structural fire design

ICS 13.220.50; 91.010.30; 91.080.20

National foreword

This British Standard is the UK implementation of EN 1995-1-2:2004, incorporating corrigenda June 2006 and March 2009. It supersedes DD ENV 1995-1-2:2000 which is withdrawn.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by CEN corrigendum March 2009 is indicated in the text by **AC2** ~~AC2~~ (which supersedes the changes incorporated by CEN corrigendum June 2006).

The structural Eurocodes are divided into packages by grouping Eurocodes for each of the main materials: concrete, steel, composite concrete and steel, timber, masonry and aluminium; this is to enable a common date of withdrawal (DOW) for all the relevant parts that are needed for a particular design. The conflicting national standards will be withdrawn at the end of the co-existence period, after all the EN Eurocodes of a package are available.

Following publication of the EN, there is a period allowed for the national calibration during which the National Annex is issued, followed by a co-existence period of a maximum three years. During the co-existence period Member States are encouraged to adapt their national provisions.

At the end of this co-existence period, the conflicting parts of national standard(s) will be withdrawn.

In the UK, the primary corresponding national standards are:

— BS 5268-4.1:1978, *Structural use of timber — Part 4: Fire resistance of timber structures — Section 4.1: Recommendations for calculating fire resistance of timber members*;

— BS 5268-4.2:1990, *Structural use of timber — Part 4: Fire resistance of timber structures — Section 4.2: Recommendations for calculating fire resistance of timber stud walls and joisted floor constructions*;

and based on this transition period, these standards will be withdrawn on a date to be announced, but at the latest by March 2010.

The UK participation in its preparation was entrusted by Technical Committee B/525, Building and civil engineering structures, to Subcommittee B/525/5, Structural use of timber.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 15 December 2004

© BSI 2009

Amendments/corrigenda issued since publication

Amd. No.	Date	Comments
16498 Corrigendum No. 1	31 July 2006	Implementation of CEN corrigendum June 2006
	31 August 2009	Implementation of CEN corrigendum March 2009

ISBN 978 0 580 67354 2

Where a normative part of this EN allows for a choice to be made at the national level, the range and possible choice will be given in the normative text, and a note will qualify it as a Nationally Determined Parameter (NDP). NDPs can be a specific value for a factor, a specific level or class, a particular method or a particular application rule if several are proposed in the EN.

To enable EN 1995-1-2 to be used in the UK, the NDPs will be published in a National Annex, which will be made available by BSI in due course, after public consultation has taken place.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

English version

Eurocode 5: Design of timber structures - Part 1-2: General - Structural fire design

Eurocode 5: Conception et Calcul des structures en bois -
Part 1-2: Généralités - Calcul des structures au feu

Eurocode 5: Entwurf, Berechnung und Bemessung von
Holzbauten - Teil 1-2: Allgemeine Regeln - Bemessung für
den Brandfall

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

Foreword	4
Background of the Eurocode programme	4
Status and field of application of Eurocodes	5
National Standards implementing Eurocodes	5
Links between Eurocodes and harmonised technical specifications (ENs and ETAs) for products	6
Additional information specific to EN 1995-1-2	6
National annex for EN 1995-1-2	7
Section 1 General	9
1.1 Scope	9
1.1.1 Scope of Eurocode 5	9
1.1.2 Scope of EN 1995-1-2	9
1.2 Normative references	10
1.3 Assumptions	10
1.4 Distinction between principles and application rules	10
1.5 Terms and definitions	11
1.6 Symbols	11
Section 2 Basis of design	14
2.1 Requirements	14
2.1.1 Basic requirements	14
2.1.2 Nominal fire exposure	14
2.1.3 Parametric fire exposure	14
2.2 Actions	15
2.3 Design values of material properties and resistances	15
2.4 Verification methods	16
2.4.1 General	16
2.4.2 Member analysis	17
2.4.3 Analysis of parts of the structure	18
2.4.4 Global structural analysis	19
Section 3 Material properties	20
3.1 General	20
3.2 Mechanical properties	20
3.3 Thermal properties	20
3.4 Charring depth	20
3.4.1 General	20
3.4.2 Surfaces unprotected throughout the time of fire exposure	21
3.4.3 Surfaces of beams and columns initially protected from fire exposure	23
3.4.3.1 General	23
3.4.3.2 Charring rates	26
3.4.3.3 Start of charring	27
3.4.3.4 Failure times of fire protective claddings	28
3.5 Adhesives	29
Section 4 Design procedures for mechanical resistance	30
4.1 General	30
4.2 Simplified rules for determining cross-sectional properties	30
4.2.1 General	30
4.2.2 Reduced cross-section method	30
4.2.3 Reduced properties method	31
4.3 Simplified rules for analysis of structural members and components	32
4.3.1 General	32
4.3.2 Beams	32
4.3.3 Columns	33
4.3.4 Mechanically jointed members	33
4.3.5 Bracings	34
4.4 Advanced calculation methods	34
Section 5 Design procedures for wall and floor assemblies	35

5.1	General	35
5.2	Analysis of load-bearing function	35
5.3	Analysis of separating function	35
Section 6	Connections	36
6.1	General	36
6.2	Connections with side members of wood	36
6.2.1	Simplified rules	36
6.2.1.1	Unprotected connections	36
6.2.1.2	Protected connections	37
6.2.1.3	Additional rules for connections with internal steel plates	38
6.2.2	Reduced load method	39
6.2.2.1	Unprotected connections	39
6.2.2.2	Protected connections	41
6.3	Connections with external steel plates	41
6.3.1	Unprotected connections	41
6.3.2	Protected connections	41
6.4	Simplified rules for axially loaded screws	41
Section 7	Detailing	43
7.1	Walls and floors	43
7.1.1	Dimensions and spacings	43
7.1.2	Detailing of panel connections	43
7.1.3	Insulation	43
7.2	Other elements	43
Annex A (Informative)	Parametric fire exposure	45
A1	General	45
A2	Charring rates and charring depths	45
A3	Mechanical resistance of members in edgewise bending	47
Annex B (informative)	Advanced calculation methods	48
B1	General	48
B2	Thermal properties	48
B3	Mechanical properties	50
Annex C (Informative)	Load-bearing floor joists and wall studs in assemblies whose cavities are completely filled with insulation	52
C1	General	52
C2	Residual cross-section	52
C2.1	Charring rates	52
C2.2	Start of charring	54
C2.3	Failure times of panels	54
C3	Reduction of strength and stiffness parameters	56
Annex D (informative)	Charring of members in wall and floor assemblies with void cavities	58
D1	General	58
D2	Charring rates	58
D3	Start of charring	58
D4	Failure times of panels	58
Annex E (informative)	Analysis of the separating function of wall and floor assemblies	60
E1	General	60
E2	Simplified method for the analysis of insulation	60
E2.1	General	60
E2.2	Basic insulation values	61
E2.3	Position coefficients	62
E2.4	Effect of joints	62
Annex F (informative)	Guidance for users of this Eurocode Part	68

Foreword

This European Standard EN 1995-1-2 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 1995-1-2:1994.

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 1980's.

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 the 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	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).