

Eurocode 5: Design of timber structures

**Part 1-2: General rules — Structural
fire design**

**(together with United Kingdom
National Application
Document)**

ICS 13.220.50; 91.080.20

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

BSI
Documents



Document Sharing Hub

National Foreword

This publication comprises the English language version of ENV 1995-1-2:1997, *Eurocode 5 — Design of timber structures — Part 1.2: General rules — Structural fire design*, as published by the European Committee for Standardization (CEN), plus the United Kingdom (UK) National Application Document (NAD) to be used with the ENV for the design of buildings to be constructed in the UK.

The UK participation in its preparation was entrusted to Technical Subcommittee B/525/5, Structural use of timber, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

ENV 1995-1-2 results from a programme of work sponsored by the European Commission to make available a common set of rules for the design of building and civil engineering works.

This publication is not to be regarded as a British Standard.

An ENV is made available for provisional application but does not have the status of a European Standard. The aim is to use the experience gained during the ENV period to modify the ENV so that it can be adopted as a European Standard.

The values for certain parameters in the ENV Eurocodes may be set by CEN members so as to meet the requirements of national regulations. These parameters are designated by □ (boxed values) in the ENV.

During the ENV period of validity, reference should be made to the supporting documents listed in the NAD.

It should be noted that ENV 1995-1-2 designs are based on partial factors and characteristic values for actions and material properties, in contrast to BS 5268 which uses permissible stress values.

The purpose of the NAD is to provide essential information, particularly in relation to safety, to enable the ENV to be used for structures and buildings constructed in the UK. The NAD takes precedence over corresponding provisions in the ENV.

The Building Regulations 1991, Approved Document A 1992 (published December 1991) draws designers' attention to the potential use of ENV Eurocodes as an alternative approach to Building Regulation compliance. ENV 1995-1-2 has been thoroughly examined over a period of several years and is considered to offer such an alternative approach when used in conjunction with the NAD.

Compliance with ENV 1995-1-2 and its NAD does not of itself confer immunity from legal obligations.

Users of this document are invited to comment on its technical content, ease of use and any ambiguities and anomalies. These comments will be taken into account when preparing the UK national response to CEN on the question of whether the ENV can be converted into an EN.

Comments should be sent in writing to BSI, 389 Chiswick High Road, London W4 4AL, quoting the document reference, the relevant clause and, where possible, a proposed revision.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or using the "Find" facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Summary of pages

This page consists of a front cover an inside front cover, page i to x, an EN title page, pages 2 to 43 and a back cover.

Amendments issued since publication

Amd. No.	Date	Comments

This Draft for Development, having been prepared under the direction of the Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 January 2000

© BSI 01-2000

The following BSI references relate to the work on this Draft for Development: Committee reference B/525/5

ISBN 0 580 33102 4

National Application Document

**for use in the UK with
ENV 1995-1-2:1994**

Contents of National Application Document

	Page
National foreword	Inside front cover
Introduction	iii
1 Scope	iii
2 Normative references	iii
3 Partial factors, combination factors and other values	iii
4 Additional recommendations	iv
Figure 4.5 — Protected fasteners: a) and b) glued-in plugs, c) protective panels	v
Figure B.1 — Steel plates: a) unprotected, b) protected by gaps, c) protected by glued-in strips, d) protected by panels	v
Table 1 — Partial factors	vi
Table 2 — Combination factors (ψ)	vii
Table 3 — Boxed values (other than $\gamma_{M,fi}$ values)	vii
Table 4 — References in 1995-1-2 to other publications	viii

National Application Document

Introduction

This National Application Document (NAD) has been prepared by Subcommittee B525/5. It has been developed from:

- a) a textual examination of ENV 1995-1-2;
- b) calibration against UK practice, supporting standards and test data;
- c) trial calculations.

It should be noted that this NAD, in common with ENV 1995-1-2 and supporting CEN standards, uses a comma (,) where a decimal point (.) would be traditionally used in the UK.

ENV 1995-1-1 was drafted before the formats for all Eurocodes were harmonized and therefore contains a different format for clause numbering than ENV 1995-1-2. Specifically clauses that comprise:

- general statements and definitions for which there are no alternatives;
- requirements and analytical models for which no alternatives are permitted unless specifically stated;

are known as “Principle” clauses and the clause number is followed by the letter P, e.g. (3)P. In ENV 1995-1-1, the clause number is preceded by the letter P.

1 Scope

This NAD provides the information required to enable ENV 1995-1-2:1994, *Eurocode 5: Design of timber structures — Part 1-2: General rules — Structural fire design*, to be used for the design of buildings and civil engineering structures to be constructed in the UK.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this NAD. For dated references, subsequent amendments to, or revisions of any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 476-4:1984, *Fire tests on building materials and structures — Part 4: Non-combustibility test for materials*.

BS 476-11:1988, *Fire tests on building materials and structures — Part 11: Method of assessing heat emission from building materials*.

BS 1230-1:1994, *Gypsum plasterboard — Part 1: Specification for plasterboard excluding material submitted to secondary operations*.

BS 1297:1987, *Specification for tongued and grooved softwood flooring*.

BS 5803, *Thermal insulation for use in pitched roof spaces in dwellings*.

BS 5268-2:1996, *Structural use of timber — Part 2: Code of practice for permissible stress design, materials and workmanship*.

BS 6399-1:1996, *Loadings for buildings — Part 1: Code of practice for dead and imposed loadings*.

BS EN 300:1997, *Oriented strand board (OSB) — Definitions, classification and specifications*.

BS EN 301:1992, *Adhesives, phenolic and aminoplastic, for load-bearing timber structures: classification and performance requirements*.

BS EN 309:1992, *Wood particleboards — Definition and classification*.

BS EN 313-1:1996, *Plywood — Classification and terminology — Classification*.

BS EN 316:1993, *Wood fibreboards — Definition, classification and symbols*.

BS EN 338:1995, *Structural timber — Strength classes*.

DD ENV 1991-2-2:1996, *Basis of designs and actions on structures — Part 2-2: Thermal actions — Actions on structures exposed to fire*.

DD ENV 1993-1-2, *Steel structures — Part 1-2: Rules for structural fire design — Supplementary rules for structural fire designs*.

DD ENV 1995-1-1:1994, *Design of timber structures — Part 1-1: General rules and rules for buildings*.

Table 4 contains references to other publications cited in this Eurocode.

3 Partial factors, combination factors and other values

- a) The values for partial safety factors (γ) should be as given in Table 1 of this NAD.
- b) As the calculation of fire resistance is related to the design of the building elements in the non-fire situation, the combination factors (ψ) in Table 2 of this NAD are the same as in Table 2 of the NAD of ENV 1995-1-1. These values differ from those given in ENV 1991-1.
- c) The values for other boxed values should be as given in Table 3 of this NAD.

4 Additional recommendations

4.1 General guidance

The following points should be followed when designing to ENV 1995-1-2.

4.2 Section 2 Basic principles

a) Subclause 2.1, item (1)P and item(3)P

The criteria *R*, *E* and *I* shall meet the requirements of the relevant UK national regulations for fire resistance.

b) Subclause 2.4, item (3)

This clause lays down three alternative ways of designing for the effects of fire on timber members:

- 1) simplified effective cross-section method;
- 2) reduced strength and stiffness method;
- 3) general method.

Methods 1) and 2) have been calibrated against present UK design procedures and found acceptable. Method 3) cannot be used as it requires the input of data not available at this time.

NOTE Method 2) gives smaller cross-sections than method 1), but greater computational effort is needed.

c) Subclause 2.5.3, item (3)

Using the procedure for accidental design situations described in subclause 2.3.2.2 item P(2) of ENV 1995-1-1, it is possible to derive values for actions in fire ($E_{fi,d}$) less than 0,6 of the actions in normal temperature design (E_d). For UK designs, equation 2.3.2.2b of ENV 1995-1-1 should be used while observing the minimum requirement of equation (2.7) of ENV 1995-1-2 such that:

$$E_{fi,d} \geq 0,6E_d$$

4.3 Section 3 Materials

a) Subclause 3.1, item (2)

Wood panels and solid timber softwood boarding which conform to BS 1297 may be used, as may hardwood boarding which has the same profiles as given in BS 1297:1987.

b) Subclause 3.1, item (3)

Wood-based panels which conform to the requirements given in BS 5268-2:1996 may be used.

c) Subclause 3.1, item (7) and, item (8)

The value of t_{pr} should be determined by testing. However, values for t_{pr} may be obtained for the following commonly-used fire protective claddings from the following subclauses:

- wood and wood-based panels, subclause 3.2, item (2);
- gypsum plasterboard type F to prEN 520, C.3.2, item (2);
- gypsum plasterboard types A and H to prEN 520, C.3.2, item (3);
- non-combustible insulating materials, C.3.2, item (4).

4.4 Section 4 Structural fire design

a) Subclause 4.4.3, item (2)

Where a column is continuous through two or more storeys, the column may be assumed to be restrained in position at intermediate floors provided the fire resistance of the intermediate floor(s) is not less than that needed by the column.

b) Subclause 4.4.6, item (2)P

In the UK, walls are assumed to be subject to fire from one side at a time and floors are assumed to be subject only to fire on the soffit and are classified as “separating constructions” in accordance with ENV 1995-1-2:1994, 1.3. A free standing column that can be subject to fire on all sides is classified as a “non-separating construction”.

c) Subclause 4.5

The procedures given in 4.5 are a simplified approach for the design of joints in fire. A more rigorous treatment is given in annex B.

Information concerning connectors is given in the NAD of ENV 1995-1-1.

4.5 refers only to three member joints and Table 4.2 refers only to wood-to-wood joints.

d) Subclause 4.5.4, item (1)

The correct Figure 4.5 is given.

4.5 Annex B Supplementary rules for joints

a) Subclause B.5

Change the number of the third item from (2) to (3).

The correct Figure B.1 is given.

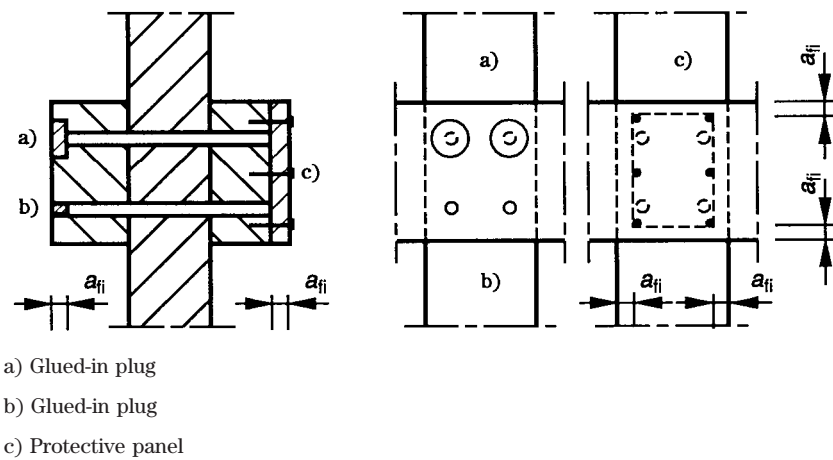


Figure 4.5 — Protected fasteners: a) and b) glued-in plugs, c) protective panels

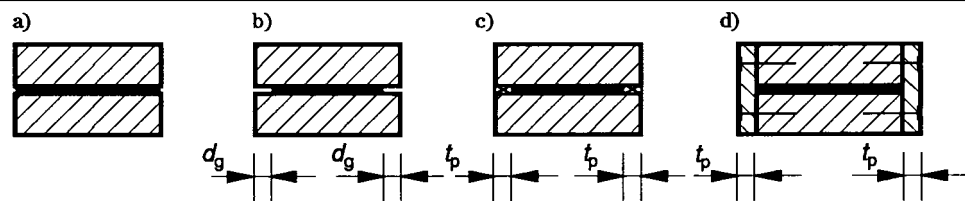


Figure B.1 — Steel plates: a) unprotected, b) protected by gaps, c) protected by glued-in strips, d) protected by panels

4.6 Annex C Walls and Floors

a) Subclause C.3.2

For the purposes of this NAD, the term non-combustible includes both non-combustible and limited combustibility materials.

A limited combustibility material is defined as:

- 1) any material which when tested to BS 476-11:1988, does not flame or cause any rise in temperature on either the centre (specimen) or furnace thermocouples;
- 2) any material of density 300 kg/m³ or more which, when tested to BS 476-11:1988, does not flame, and the rise in temperature on the furnace thermocouple is not more than 20 °C;
- 3) any material of density 300 kg/m³ or more, which when tested to BS 476-11:1988, does not flame for more than 10 s, with the rise in temperature on the centre (specimen) thermocouple not more than 35 °C and on the furnace thermocouple not more than 25 °C;
- 4) totally inorganic materials such as concrete, fired clay, ceramics, metals, plaster and masonry containing not more than 1 % by weight or volume of organic material. (Use in buildings of combustible metals such as magnesium/aluminium alloys should be assessed in each individual case);
- 5) products classified as non-combustible under BS 476-4:1984;
- 6) any material with a non-combustible core at least 8 mm thick, having combustible facings (on one or both sides) not more than 0,5 mm thick. (Where a flame spread rating is specified, these materials should also meet the appropriate test requirements.)

b) Subclause C.3.2, item (2)

- 1) Gypsum wallboard type F of prEN 520 is equivalent to type 5 of BS 1230.
- 2) Gypsum wallboard type A of prEN 520 is equivalent to type 1 of BS 1230.
- 3) Gypsum wallboard type H of prEN 520 is equivalent to type 3 of BS 1230.
- 4) For a single layer of gypsum plasterboard, $\xi = 1,0$. For multiple layers of gypsum plasterboard, $\xi = 0,8$ for the outer layer and $\xi = 1,0$ for the inner layers.

c) Subclause C.3.2, item (4)

Only mineral wool made from rock or slag to the requirements of BS 5803 meets the recommendations of this clause.

d) Figure 6

The insulation may be tightly fitting, glued or pinned.

e) Figure C.8

The title of Figure C.8 should be “Example of connections of walls to adjoining floors and walls”.

Table 1 — Partial factors

Reference	Definition	Symbol	Condition	Value	
				Boxed	UK
2.3	Partial factor for materials	$\gamma_{M,fi}$	Timber and wood based materials	1,0	1,0

Table 2 — Combination factors (ψ)

Variable action	Type of activity/occupancy ¹	ψ_0	ψ_1	ψ_2
Imposed floor loads.	Self-contained dwellings and communal areas in blocks of flats not more than three stories high.	0,5	0,4	0,2
	Other types of occupancy	0,7	0,6	0,3
	Garages, parking, vehicle access ramps.	0,7	0,7	0,6
Imposed ceiling loads.	Self-contained dwellings and communal areas in blocks of flats not more than three stories high.	0,5	0,4	0,2
	Other types of occupancy	0,7	0,2	0,0
Imposed roof loads Wind loads	All types of occupancy	0,7	0,2	0,0

Table 3 — Boxed values (other than $\gamma_{M,fi}$ values)

Reference	Definition	Value	
		Boxed	UK
2.3(1)P	k_{fi} for solid timber	1,25	1,25
	k_{fi} for glued laminated timber and wood-based panels.	1,15	1,15
2.5.2(3)	Coefficient of E_d in equation 2.7.	0,60	0,60
Table 4.2	η_{30} for nails	0,80	0,80
	η_{30} for bolts	0,45	0,45
	η_{30} for dowels (non-projecting)	0,80	0,80
	η_{30} for connectors with bolts	0,45	0,45
	η_{30} for connectors with nails	0,80	0,80
Table 4.3	η_{30} for nails	1,00	1,00
	η_{30} for bolts	0,45	0,45
	η_{30} for dowels (non-projecting)	1,00	1,00
B.1	Coefficient of D in equation B.1.	20	20
B.2	Coefficient in equation B.3.	0,6	0,6
	η_{30} in equation B.4.	0,6	0,6
B.3(3)	c for steel plates as middle members.	12	12
	c for wooden middle members.	6,0	6,0
B.4(2)	Coefficient of t_1 in equation B.8.	0,25	0,25
	Values of η_{30} in equation B.9.	0,60	0,60
C.2.3(3)	I minute (also Figures C.1 and C.2).	15	15
	II minutes (also Figures C.1 and C.2).	5	5
	III minutes (also Figure C.3)	5	5

Table 4 — References in 1995-1-2 to other publications

Reference in DD ENV 1995-1-2	Document referred to	Document title or subject area	UK document
1.1(1)P	ENV 1991-2-2:1996	Actions on structures exposed to fire.	DD ENV 1991-2-2
	ENV 1995-1-1:1993	Eurocode 5 — Design of timber structures — Part 1.1: General rules and rules for buildings.	DD ENV 1995-1-1
3.1(2)	EN 338:1995	Structural timber — Strength classes.	BS EN 338
	prEN 1194 ^a	Glued laminated timber — Strength classes and determination of characteristic values.	BS 5268-2
		Specification for tongued and grooved flooring.	BS 1297
3.1(3)	EN 309:1992	Particleboards — Definition and classification.	BS EN 309
	EN 313-1:1996	Plywood — Classification and terminology.	BS EN 313-1
	EN 300:1997	Oriented strand board (OSB) — Definitions, classification and specifications.	BS EN 300
	EN 316:1993	Wood fibreboards — Definition, classification and symbols.	BS EN 316
3.2(1)	ENV 13381-7	Contribution to fire resistance of structural members — Part 7: Timber elements	
3.3(2)	EN 301:1992	Adhesives, phenolic and aminoplastic, for load-bearing timber structures; classification and performance requirements.	BS EN 301
B.5(1)	ENV 1993-1-2:1995	Supplementary rules for structural fire design.	DD ENV 1993-1-2
C.3.2		Method for assessing the heat emission from building materials.	BS 476-11
		Non-combustibility test for materials.	BS 476-4
C.3.2(2)	prEN 520 ^a	Gypsum plasterboards — Specifications — Test methods.	BS 1230-1
C.3.2(4)		Thermal insulation for use in pitched roof spaces in buildings.	BS 5803

^a Subject to CEN formal vote.

ICS 13.220.50; 91.040.00; 91.080.20

Descriptors: buildings, timber construction, building codes, computation, fire tests

English version

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

Eurocode 5: Calcul des structures en bois —
Partie 1-2: Règles générales — Calcul du
comportement au feu

Eurocode 5: Bemessung und Konstruktion von
Holzbauten — Teil 1-2: Allgemeine Regeln —
Tragwerksbemessung für den Brandfall

This European Prestandard (ENV) was approved by CEN on 1993-06-22 as a prospective standard for provisional application. The period of validity of this ENV 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 ENV can be converted into an European Standard (EN).

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

© 1994 Copyright reserved to CEN members

Ref. No. **ENV 1995-1-2:1994 E**
AVA Documents
Document Sharing Hub

Contents	Page
Foreword	4
1 General	7
1.1 Scope	7
1.2 Normative References	7
1.3 Definitions	8
1.4 Symbols	10
1.5 Units	11
2 Basic principles	12
2.1 Performance requirements	12
2.2 Actions	12
2.3 Design values of material properties	12
2.4 Basic design procedure	13
2.5 Assessment methods	14
2.5.1 General	14
2.5.2 Global structural analysis	14
2.5.3 Analysis of parts of the structure	14
2.5.4 Member analysis	14
3 Materials	16
3.1 Charring depths	16
3.2 Fire protective cladding	17
3.3 Adhesives	18
4 Structural fire design	19
4.1 Effective cross-section method	19
4.2 Reduced strength and stiffness method	19
4.3 General calculation methods	19
4.4 Special rules	20
4.4.1 General	20
4.4.2 Beams	20
4.4.3 Columns	20
4.4.4 Mechanically jointed components	20
4.4.5 Bracings	21
4.4.6 Floors and walls	21
4.5 Joints	21
4.5.1 General	22
4.5.2 Unprotected joints with side members of wood	22
4.5.3 Unprotected joints with external steel plates	25
4.5.4 Protected joints	25
Annex A (Normative) Reduced strength and stiffness method for standard fire exposure	26
Annex B (Normative) Supplementary rules for joints with unprotected fasteners	28
B.1 Joints with unprotected nails	28
B.2 Joints with unprotected bolts	28
B.3 Joints with unprotected dowels	29
B.4 Connectors	29
B.5 Joints with steel plates	30

Annex C (Normative) Walls and floors	32
C.1 Scope	32
C.2 Design procedure	32
C.2.1 General	32
C.2.2 Load bearing constructions	32
C.2.3 Separating members	32
C.3 Failure times	34
C.3.1 Wood and wood-based panels	34
C.3.2 Non-combustible panels and insulating layers	36
C.4 Minimum dimensions and detailing	37
C.4.1 Minimum dimensions	37
C.4.2 Detailing of panel connections	37
C.4.3 Connections to adjoining floors and walls	38
Annex D (Informative) Parametric Fire Exposure	40
D.1 General	40
D.2 Charring rates and charring depths	40
D.3 Load bearing capacity of members in edgewise bending	41
Annex E (Informative) Thermal properties	42

Foreword

Objectives of the Eurocodes

- (1) The "Structural Eurocodes" comprise a group of standards for the structural and geotechnical design of buildings and civil engineering works.
- (2) They cover execution and control only to the extent that it is necessary to indicate the quality of the construction products, and the standard of workmanship needed to comply with the assumptions of the design rules.
- (3) Until the necessary set of harmonised technical specifications for products and methods for the testing their performance are available, some of the Structural Eurocodes cover some of these aspects in informative Annexes.

Background to the Eurocode Programme

- (4) The Commission of the European Communities (CEC) initiated the work of establishing a set of harmonised technical rules for the design of building and civil engineering works which would initially serve as an alternative to the differing rules in force in the various Member States and would ultimately replace them. These technical rules became known as the "Structural Eurocodes".
- (5) In 1990, after consulting their respective Member States, the CEC transferred the work of further development, issue and updating of the Structural Eurocodes to CEN, and the EFTA Secretariat agreed to support the CEN work.
- (6) CEN Technical Committee CEN/TC 250 is responsible for all Structural Eurocodes.

Eurocode Programme

- (7) Work is in hand on the following Eurocodes, each generally consisting of a number of parts:

EN 1991 Eurocode 1	Basis of design and 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 provisions for earthquake resistance of structures
EN 1999 Eurocode 9	Design of aluminium alloy structures

- (8) Separate sub-committees have been formed by CEN/TC 250 for the various Eurocodes listed above.
- (9) This part 1.1 of Eurocode 5 is being published as a European Prestandard (ENV) with an initial life of three years.
- (10) This Prestandard is intended for experimental application and for the submission of comments.
- (11) After approximately two years CEN members will be invited to submit formal comments to be taken into account in determining future actions.

(12) Meanwhile feedback and comments on this Prestandard should be sent to the Secretariat of CEN/TC 250/SC 5 at the following address:

Secretariat of CEN TC 250/SC 5
BST
Box 5603
S-114 86 STOCKHOLM

or to your national standards organization.

National Application Documents (NAD's)

(13) In view of the responsibilities of authorities in member countries for safety, health and other matters covered by the essential requirements of the Construction Products Directive (CPD), certain safety elements in this ENV have been assigned indicative values which are identified as "boxed" or by []. The authorities in each member state are expected to review the "boxed values" and may substitute alternative definitive values for these safety elements for use in national application.

(14) Some of the supporting European or International standards may not be available by the time this Prestandard is issued. It is therefore anticipated that a National Application Document (NAD) giving any substitute definitive values for safety elements, referencing compatible supporting standards and providing guidance on the national application of this Prestandard, will be issued by each member state or its Standards Organization.

(15) It is intended that this Prestandard is used in conjunction with the National Application Document valid in the country where the building or civil engineering work is located.

Matters specific to this Prestandard

Safety requirements

(16) The general objectives of fire protection are to limit risks with respect to the individual and society, neighbouring property, and where required, directly exposed property, in the case of fire.

(17) The Structural Eurocodes deal with specific aspects of passive fire protection in terms of designing structures and parts thereof for adequate load bearing capacity and for limiting fire spread as relevant.

(18) Required functions and levels of performance are generally specified by the National authorities - mostly in terms of standard fire resistance ratings. Where fire safety engineering for assessing passive and active measures is accepted, requirements by authorities will be less prescriptive and may allow for alternative strategies.

(19) This ENV 1995-1-2, together with ENV 1991-2-2 gives the supplements to ENV 1995-1-1 which are necessary, so that structures designed according to this set of Structural Eurocodes may also comply with structural fire resistance requirements.

Design procedures

(20) A full analytical procedure for structural fire design would take into account the behaviour of the structural system at elevated temperatures, the potential heat exposure and the beneficial effects of active fire protection systems, together with the uncertainties associated with these features and the consequences of failure.

(21) At the present time it is possible to undertake a procedure for determining adequate performance which incorporates some, if not all, of these parameters, and to demonstrate that the structure, or its components, will give adequate performance in a real building fire.

(22) However, the principal current procedure in European countries is one based on results from standard fire resistance tests. The classification systems in regulations, which call for periods of fire resistance, take into account (though not explicitly) the features and uncertainties described above.

(23) Due to the limitations of the test method, further tests or analysis may be performed. Nevertheless, the results of standard fire tests form the bulk of input for calculation methods for structural fire design. This prestandard therefore deals in the main with the design for the standard fire resistance.

(24) In this ENV 1995-1-2 the desires of the designers are met by giving calculation methods of different complexity. Among the application rules the designer will *in the first place* find a simple method, which would lead to safe, but perhaps less economic structures. In the second place the designer will find more complex methods, which would increase the amount of design work but also could lead to more economic constructions. In the third place general methods are given, which require more information than is given in this Eurocode. Generally, as an alternative to calculation methods, it is possible to make use of design by testing.

(25) The first category of simple methods is applicable for standard fire exposure and is represented by

- Actions and structural system according to 2.5.4
- Charring depths according to 3.1
- Load bearing capacity of members according to 4.1
- Load bearing capacity of joints according to 4.5

(26) The second category of more complicated methods is represented by

- Actions and structural system according to 2.5.3 or 2.5.4
- Charring depths and load bearing capacity of members for standard fire exposure according to Annex A
- Charring depths and load bearing capacity of members for parametric fire exposure according to Annex D
- Additional application rules regarding load bearing capacity of joints according to Annex B

(27) The third category of general methods is represented by

- Actions according to ENV 1991-2-2
- Structural system according to 2.5.2
- Charring rates and load bearing capacity of members according to section 4.3. Further information is given in Annex E

(28) Tabulated data of design solutions for the designer are not included. It is anticipated that such design aids will be found in handbooks etc.

Section 1 General

1.1 Scope

(1)P This Part 1.2 of ENV 1995 deals with the design of timber structures for the accidental situation of fire exposure and shall be used in conjunction with ENV 1995-1-1 and ENV 1991-2-2. This Part only identifies differences or supplements to the design at normal temperature.

(2)P Part 1.2 of ENV 1995 deals only with passive methods of fire protection. Active methods are not covered.

(3)P Part 1.2 of ENV 1995 applies to building structures where for reasons of general fire safety, they are required to fulfill certain functions in exposure to fire, in terms of

- avoiding premature collapse of the structure (load-bearing failure)
- limiting fire spread (flames, hot gases, excessive heat) beyond designated areas (separating function).

(4)P Part 1.2 of ENV 1995 gives detailed rules for the design structures for the specified requirements with respect to the aforementioned functions and levels of performance.

(5)P Part 1.2 of ENV 1995 applies to those structures or parts of structures which are within the scope of ENV 1995-1-1 and are designed accordingly.

1.2 Normative references

This Part incorporates dated or undated normative references cited at the appropriate places in the text. For undated references the latest edition of the publication referred to applies.

European Standards:

EN 301	Adhesives, phenolic and aminoplastic for load bearing timber structures; classification and performance requirements
EN 309	Particleboards - Definition and classification
EN 316	Wood fibreboards - Definition, classification and symbols
EN 313-1	Plywood - Classification and terminology Part 1: Classification
EN 338	Structural Timber - Strength classes
ENV 1991-2-2	Eurocode 1: Basis of design and actions on structures Part 2.2: Actions on structures - Actions on structures exposed to fire
ENV 1993-1-2	Eurocode 3: Design of steel structures Part 1.2: General rules - Supplementary rules for structural fire design
ENV 1995-1-1:1993	Eurocode 5: Design of timber structures Part 1.1: General rules - General rules and rules for buildings

Drafts of European Standards:

prEN 300	Oriented strand boards (OSB)
prEN 520	Gypsum plasterboards - Specifications - Test methods
prEN 912	Timber fasteners - Specifications for connectors for timber
prEN 1194	Glued laminated timber - Strength classes and determination of characteristic values

Note: In CEN TC 127 the following standard is in preparation: