



National Standards Authority of Ireland

STANDARD

ENV 1995-1-1:1995

ICS 91.080.20

National Standards
Authority of Ireland
Dublin 9
Ireland

Tel: (01) 807 3800
Fax: (01) 807 3838

**EUROCODE 5 – DESIGN OF TIMBER
STRUCTURES – PART 1-1: GENERAL RULES
AND RULES FOR BUILDINGS**

*This Irish Standard was
published under the authority
of the National Standards
Authority of Ireland
and comes into effect on:*

April 7, 1995

**NO COPYING WITHOUT NSAI
PERMISSION EXCEPT AS
PERMITTED BY COPYRIGHT
LAW**

© NSAI 1995

Price Code AB

Údarás um Chaighdeán Náisiúnta na hÉireann

EUROPEAN PRESTANDARD

ENV 1995-1-1

PRÉNORME EUROPÉENNE

EUROPÄISCHE VORNORM

December 1993

UDC 624.92.016.02:624.07

Descriptors: Buildings, timber structures, computations, building codes, rules of calculation

English version

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

Eurocode 5 - Calcul des structures en bois -
Partie 1-1: Règles générales et règles pour les
bâtiments

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

This European Prestandard (ENV) was approved by CEN on 1992-11-20 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, 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

CONTENTS

FOREWORD

1 INTRODUCTION

1.1 SCOPE

- 1.1.1 SCOPE OF EUROCODE 5
- 1.1.2 SCOPE OF PART 1-1 OF EUROCODE 5
- 1.1.3 FURTHER PARTS OF EUROCODE 5

1.2 DISTINCTION BETWEEN PRINCIPLES AND APPLICATION RULES

1.3 ASSUMPTIONS

1.4 DEFINITIONS

- 1.4.1 TERMS COMMON TO ALL EUROCODES
- 1.4.2 SPECIAL TERMS USED IN PART 1-1 OF EUROCODE 5

1.5 S.I. UNITS

1.6 SYMBOLS USED IN PART OF 1 EUROCODE 5

- 1.6.1 GENERAL
- 1.6.2 SYMBOLS USED IN CHAPTER 2
- 1.6.3 SYMBOLS USED IN CHAPTERS 3-7 AND ANNEXES

1.7 REFERENCES

2. BASIS OF DESIGN

2.1 FUNDAMENTAL REQUIREMENTS

2.2 DEFINITIONS AND CLASSIFICATIONS

- 2.2.1 LIMIT STATES AND DESIGN SITUATIONS
 - 2.2.1.1 Limit States
 - 2.2.1.2 Design Situations
- 2.2.2 ACTIONS
 - 2.2.2.1 Definitions and principal classification
 - 2.2.2.2 Characteristic values of actions
 - 2.2.2.3 Representative values of variable actions
 - 2.2.2.4 Design values of actions
 - 2.2.2.5 Design values of the effects of actions
- 2.2.3 MATERIAL PROPERTIES
 - 2.2.3.1 Characteristic values
 - 2.2.3.2 Design values
- 2.2.4 GEOMETRICAL DATA
- 2.2.5 LOAD ARRANGEMENTS AND LOAD CASES

2.3 DESIGN REQUIREMENTS

2.3.1 GENERAL

2.3.2 ULTIMATE LIMIT STATES

2.3.2.1 Verification conditions

2.3.2.2 Combinations of actions

2.3.2.3 Design values of permanent actions

2.3.3 PARTIAL SAFETY FACTORS FOR ULTIMATE LIMIT STATE

2.3.3.1 Partial safety factors for actions on building structures

2.3.3.2 Partial safety factors for materials

2.3.4 SERVICEABILITY LIMIT STATES

2.4 DURABILITY

2.4.1 GENERAL

2.4.2 RESISTANCE TO BIOLOGICAL ORGANISMS

2.4.3 RESISTANCE TO CORROSION

3. MATERIAL PROPERTIES

3.1 GENERAL

3.1.1 STRENGTH AND STIFFNESS PARAMETERS

3.1.2 CHARACTERISTIC VALUES

3.1.3 STRESS-STRAIN RELATIONS

3.1.4 CALCULATION MODELS

3.1.5 SERVICE CLASSES

3.1.6 LOAD-DURATION CLASSES

3.1.7 MODIFICATION FACTORS FOR MOISTURE CONTENT AND DURATION OF LOAD

3.2 SOLID TIMBER

3.2.1 GRADING

3.2.2 CHARACTERISTIC STRENGTH AND STIFFNESS VALUES AND DENSITIES

3.2.3 TIMBER SIZES

3.2.4 MODIFICATION FACTORS FOR SERVICE CLASS AND DURATION OF LOAD

3.2.5 FINGER JOINTS

3.3 GLUED LAMINATED TIMBER

3.3.1 PERFORMANCE REQUIREMENTS

3.3.2 CHARACTERISTIC STRENGTH AND STIFFNESS VALUES

3.3.3 SIZES OF GLUED LAMINATED TIMBER

3.3.4 MODIFICATION FACTORS FOR SERVICE CLASS AND DURATION OF LOAD

3.3.5 LARGE FINGER JOINTS

3.4 WOOD-BASED PANELS

- 3.4.1 PLYWOOD
 - 3.4.1.1 Requirements
 - 3.4.1.2 Characteristic strength and stiffness values
 - 3.4.1.3 Modification factors for service class and duration of load
- 3.4.2 PARTICLEBOARD
 - 3.4.2.1 Requirements
 - 3.4.2.2 Characteristic strength and stiffness values
 - 3.4.2.3 Modification factors for service class and duration of load
- 3.4.3 FIBREBOARD
 - 3.4.3.1 Requirements
 - 3.4.3.2 Characteristic strength and stiffness values
 - 3.4.3.3 Modification factors for service class and duration of load

3.5 ADHESIVES

4. SERVICEABILITY LIMIT STATES

- 4.1 GENERAL REQUIREMENTS
- 4.2 JOINT SLIP
- 4.3 LIMITING VALUES OF DEFLECTION
 - 4.3.1 BEAMS
 - 4.3.2 TRUSSES
- 4.4 VIBRATIONS
 - 4.4.1 GENERAL
 - 4.4.2 VIBRATIONS FROM MACHINERY
 - 4.4.3 RESIDENTIAL FLOORS

5. ULTIMATE LIMIT STATES

5.1 BASIC RULES

- 5.1.1 GENERAL
- 5.1.2 TENSION PARALLEL TO THE GRAIN
- 5.1.3 TENSION PERPENDICULAR TO THE GRAIN
- 5.1.4 COMPRESSION PARALLEL TO THE GRAIN
- 5.1.5 COMPRESSION AT AN ANGLE TO THE GRAIN
- 5.1.6 BENDING
- 5.1.7 SHEAR
 - 5.1.7.1 General
 - 5.1.7.2 End-notched beams
- 5.1.8 TORSION
- 5.1.9 COMBINED BENDING AND AXIAL TENSION
- 5.1.10 COMBINED BENDING AND AXIAL COMPRESSION

5.2 COLUMNS AND BEAMS

- 5.2.1 COLUMNS
- 5.2.2 BEAMS
- 5.2.3 SINGLE TAPERED BEAMS
- 5.2.4 DOUBLE TAPERED, CURVED AND PITCHED CAMBERED BEAMS

5.3 COMPONENTS

- 5.3.1 GLUED THIN-WEBBED BEAMS
- 5.3.2 GLUED THIN-FLANGED BEAMS
- 5.3.3 MECHANICALLY JOINTED BEAMS
- 5.3.4 MECHANICALLY JOINTED AND GLUED COLUMNS

5.4 ASSEMBLIES

- 5.4.1 TRUSSES
 - 5.4.1.1 General
 - 5.4.1.2 General analysis
 - 5.4.1.3 Simplified analysis
 - 5.4.1.4 Strength verification of members
 - 5.4.1.5 Trusses with punched metal plate fasteners
- 5.4.2 ROOF AND FLOOR DIAPHRAGMS
- 5.4.3 WALL DIAPHRAGMS
- 5.4.4 PLANE FRAMES
- 5.4.5 BRACING
 - 5.4.5.1 General
 - 5.4.5.2 Single members in compression
 - 5.4.5.3 Bracing of beam or truss systems
- 5.4.6 LOAD SHARING

6. JOINTS

6.1 GENERAL

6.2 LATERAL LOAD-CARRYING CAPACITY OF DOWEL-TYPE FASTENERS

- 6.2.1 TIMBER-TO-TIMBER AND PANEL-TO-TIMBER JOINTS
- 6.2.2 STEEL-TO-TIMBER JOINTS
- 6.2.3 MULTIPLE SHEAR JOINTS

6.3 NAILED JOINTS

- 6.3.1 LATERALLY LOADED NAILS
 - 6.3.1.1 General
 - 6.3.1.2 Nailed timber-to-timber joints
 - 6.3.1.3 Nailed panel-to-timber joints
 - 6.3.1.4 Nailed steel-to-timber joints
- 6.3.2 AXIALLY LOADED NAILS
- 6.3.3 COMBINED LATERALLY AND AXIALLY LOADED NAILS

6.4 STAPLED JOINTS

6.5 BOLTED JOINTS

- 6.5.1 LATERALLY LOADED BOLTS
 - 6.5.1.1 General
 - 6.5.1.2 Bolted timber-to-timber joints
 - 6.5.1.3 Bolted panel-to-timber joints
 - 6.5.1.4 Bolted steel-to-timber joints

6.5.2 AXIALLY LOADED BOLTS

6.6 DOWELLED JOINTS

6.7 SCREWED JOINTS

- 6.7.1 LATERALLY LOADED SCREWS
- 6.7.2 AXIALLY LOADED SCREWS
- 6.7.3 COMBINED LATERALLY AND AXIALLY LOADED SCREWS

6.8 JOINTS MADE WITH PUNCHED METAL PLATE FASTENERS

7. STRUCTURAL DETAILING AND CONTROL

7.1 GENERAL

7.2 MATERIALS

7.3 GLUED JOINTS

7.4 JOINTS WITH MECHANICAL FASTENERS

7.5 ASSEMBLY

7.6 TRANSPORTATION AND ERECTION

7.7 CONTROL

- 7.7.1 GENERAL
- 7.7.2 PRODUCTION AND WORKMANSHIP CONTROL
- 7.7.3 CONTROLS AFTER COMPLETION OF THE STRUCTURE

7.8 SPECIAL RULES FOR DIAPHRAGM STRUCTURES

- 7.8.1 ROOF AND FLOOR DIAPHRAGM STRUCTURES
- 7.8.2 WALL DIAPHRAGMS

7.9 SPECIAL RULES FOR TRUSSED RAFTERS

- 7.9.1 FABRICATION
- 7.9.2 ERECTION

ANNEXES

ANNEX A	(INFORMATIVE) DETERMINATION OF 5-PERCENTILE CHARACTERISTIC VALUES FROM TEST RESULTS AND ACCEPTANCE CRITERIA FOR A SAMPLE
A1	SCOPE
A2	DETERMINATION OF THE 5-PERCENTILE CHARACTERISTIC VALUE A2.1 REQUIREMENTS A2.2 METHOD
A3	ACCEPTANCE CRITERIA FOR A SAMPLE A3.1 REQUIREMENTS A3.2 METHOD
ANNEX B	(INFORMATIVE) MECHANICALLY JOINTED BEAMS
B1	GENERAL B1.1 CROSS SECTIONS B1.2 STRUCTURES AND ASSUMPTIONS B1.3 SPACINGS B1.4 DEFLECTIONS RESULTING FROM BENDING MOMENTS
B2	EFFECTIVE BENDING STIFFNESS
B3	NORMAL STRESSES
B4	MAXIMUM SHEAR STRESS
B5	LOAD ON FASTENERS
ANNEX C	(INFORMATIVE) BUILT-UP COLUMNS
C1	GENERAL C1.1 ASSUMPTIONS C1.2 LOAD-CARRYING CAPACITY
C2	MECHANICALLY JOINTED COLUMNS C2.1 ASSUMPTIONS C2.2 EFFECTIVE SLENDERNESS RATIO C2.3 LOAD ON FASTENERS C2.4 COMBINED LOADS
C3	SPACED COLUMNS WITH PACKS OR GUSSETS C3.1 ASSUMPTIONS C3.2 AXIAL LOAD-CARRYING CAPACITY C3.3 LOAD ON FASTENERS GUSSETS AND PACKS
C4	LATTICE COLUMNS WITH GLUED OR NAILED JOINTS C4.1 STRUCTURES C4.2 LOAD-CARRYING CAPACITY C4.3 SHEAR FORCES

ANNEX D **(NORMATIVE)**
THE DESIGN OF TRUSSES WITH PUNCHED METAL PLATE FASTENERS

- D1** **GENERAL**
- D2** **JOINTS**
- D3** **GENERAL ANALYSIS**
- D4** **SIMPLIFIED ANALYSIS**
- D5** **STRENGTH VERIFICATION OF MEMBERS**
- D6** **STRENGTH VERIFICATION OF PUNCHED METAL PLATE FASTENERS**
 - D6.1** **GENERAL**
 - D6.2** **PLATE GEOMETRY**
 - D6.3** **PLATE STRENGTH CAPACITIES**
 - D6.4** **ANCHORAGE STRENGTHS**
 - D6.5** **JOINT STRENGTH VERIFICATION**
 - D6.5.1** **Plate anchorage capacity**
 - D6.5.2** **Plate capacity**
 - D6.5.3** **Minimum anchorage requirements**

FOREWORD

01 OBJECTIVES OF THE EUROCODES

The Eurocodes constitute a group of standards for the structural and geotechnical design of building and civil engineering works. They will cover execution and control to the extent that it is necessary to indicate the quality of the construction products and the standard of workmanship needed on and off-site to comply with the assumptions of the design rules. While the necessary set of harmonised technical specifications for products and methods for testing their performance is not available, the Eurocodes may cover some of these aspects.

The Eurocodes are intended to serve as reference documents for the following purposes:

- (a) as a means to prove compliance of building and civil engineering works with the essential requirements of the Construction Products Directive;
- (b) as a framework for drawing up harmonized technical specifications for construction products.

02 BACKGROUND TO THE EUROCODE PROGRAMME

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, ultimately would replace them. These technical rules became known as the 'Structural Eurocodes'.

In 1990, after consulting their respective Member States, CEC and EFTA Secretariat transferred the work on further development, issue and updating of Eurocodes to CEN.

In CEN, Technical Committee CEN/TC 250 has overall responsibility for the Structural Eurocodes.

03 EUROCODE PROGRAMME

Work is in hand on the following Eurocodes each consisting of a number of parts:

- EC 1 : Basis of design and actions on structures
- EC 2 : Design of concrete structures
- EC 3 : Design of steel structures
- EC 4 : Design of composite steel and concrete structures
- EC 5 : Design of timber structures
- EC 7 : Geotechnics
- EC 8 : Design of structures in seismic regions
- EC 9 : Design of aluminium structures (subject to Mandate)

For each Eurocode listed above, CEN/TC 250 has formed a Sub-committee.

This part of Eurocode EC5 which had been finalised and approved for publication under the direction of CEC, is being issued by CEN as European Prestandard (ENV). It is intended for experimental practical application in the design of building and civil engineering works covered by the scope of the Prestandard as given in Clause 1.1.2.

Feedback and comments on this prestandard should be sent to the Secretariat of Sub-Committee SC5 at the following address:

SIS
BST
Drottning Kristinas väg 73
S-11428 STOCKHOLM

04 NATIONAL APPLICATION DOCUMENTS

In view of the responsibilities of Members of states for the safety health and other matters covered by the essential requirements, certain safety elements in this ENV have been assigned indicative values. The authorities in each Member state are expected to assign definitive values to these safety elements.

Many of the supporting standards, including those giving values for actions to be taken into account and measures required for fire protection, will not be available by the time this Prestandard is issued. It is therefore anticipated that a National Application Document giving definitive values for safety elements, referencing compatible supporting standards and giving national guidance on the application of this Prestandard will be issued by each Member State or its Standard Organisation. This Prestandard should be used in conjunction with the National Application Document valid in the country where the building and civil engineering work is to be constructed.

1 INTRODUCTION**1.1 SCOPE****1.1.1 SCOPE OF EUROCODE 5**

- P(1) Eurocode 5 applies to the design of timber structures - i.e., structures made of timber (solid timber, sawn, planed or in pole form, and glued laminated timber) or wood-based panels jointed together with adhesives or mechanical fasteners. It is subdivided into various separate parts, see 1.1.2 and 1.1.3.
- P(2) Eurocode 5 is only concerned with the requirements for mechanical resistance, serviceability and durability of structures. Other requirements, e.g. concerning thermal or sound insulation, are not considered.
- P(3) Execution¹⁾ is covered to the extent that is necessary to indicate the quality of the construction materials and products which should be used and the standard of workmanship on site needed to comply with the assumptions of the design rules. Execution and workmanship are covered in Chapter 7, and are to be considered as minimum requirements which may have to be further developed for particular types of buildings and methods of construction¹⁾.
- P(4) Eurocode 5 does not cover the special requirements of seismic design. Provisions related to such requirements are given in Eurocode 8 "Design of Structures in Seismic Regions"²⁾ which complements Eurocode 5.
- P(5) Numerical values of the actions on buildings and civil engineering works to be taken into account in the design are not given in Eurocode 5. They are provided in Eurocode 1 "Basis of design and actions on structures"²⁾.
- 1.1.2 SCOPE OF PART 1-1 OF EUROCODE 5**
- P(1) Part 1-1 of Eurocode 5 gives a general basis for the design of buildings and civil engineering works.
- P(2) In addition, Part 1-1 gives detailed rules which are mainly applicable to ordinary structures. The applicability of these rules may be limited for practical reasons or due to simplifications; their use and any limits of applicability are explained in the text where necessary.
- P(3) Chapters 1 and 2 are common to all Eurocodes, with the exception of some additional clauses which are required for timber structures.
- P(4) This Part 1-1 does not cover:
- the design of bridges,
 - resistance to fire,

1) For the meaning of this term, see 1.4.1 (2)

2) At present at the draft stage

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- Looking for additional Standards? Visit Intertek Inform Infostore
 - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-