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EUROCODE 3: DESIGN OF STEEL STRUCTURES - PART 1-7: GENERAL RULES - SUPPLEMENTARY RULES FOR PLANAR PLATED STRUCTURAL ELEMENTS WITH OUT OF PLANE LOADING

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Eurocode 3: Bemessung und Konstruktion von Stahlbauten - Teil 1-7: Allgemeine Bemessungsregeln - Ergänzende Regeln für ebene Blechfelder mit Querbelastung

This European Prestandard (ENV) was approved by CEN on 25 December 1998 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 a European Standard.

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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.

EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

Objectives of the Eurocode

(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 is necessary to indicate the quality of the construction products, and the standard of the workmanship, needed to comply with the assumptions of the design rules.

(3) Until the necessary set of harmonized technical specifications for products and for methods of testing their performance is 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 harmonized technical rules for the design of building and civil engineering works which would initially serve as an alternative to the different 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 Structural 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 1-7 of ENV 1993 is published by CEN 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 3 at the following address:

BSI Standards
British Standards House
389 Chiswick High road
London W 4 4AL
England

or to your national standards organization.

National Application Documents (NAD's)

(13) In view of the responsibilities of the 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 by ("boxed values"). The authorities in each member country 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 might 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 country or its Standards Organization.

(15) It is intended that this Prestandard is used in conjunction with the NAD valid in the country where the building or civil engineering works is located.

Matters specific to this Prestandard

(16) The Parts of ENV 1993 that are currently envisaged are:

ENV 1993-1-1	General rules: General rules and rules for buildings;
ENV 1993-1-2	General rules: Structural fire design;
ENV 1993-1-3	General rules: Supplementary rules for cold formed thin gauge members and sheetings;
ENV 1993-1-4	General rules: Supplementary rules for stainless steels;
ENV 1993-1-5	General rules: Supplementary rules for planar plated structures without transverse loading;
ENV 1993-1-6	General rules: Supplementary rules for shell structures
ENV 1993-1-7	General rules: Supplementary rules for planar plated structural elements with out of plane loading;
ENV 1993-2	Steel bridges;
ENV 1993-3	Towers, masts and chimneys;
ENV 1993-4	Silos, tanks and pipelines;
ENV 1993-5	Piling;
ENV 1993-6	Crane supporting structures,
ENV 1993-7	Marine and maritime structures;

ENV 1993-8 Agricultural structures.

(17) This Part 1-7 of ENV 1993 complements Part 2, Part 4 and Part 7 of ENV 1993 by providing the rules for planar plated structures needed in the design of plate segments in bridges, silos, tanks and marine structures.

(18) Because these rules are not specific to bridges, silos and tanks they have been assembled as a separate document, in a form that is capable of future incorporation with other general rules in ENV 1993 -1-1.

1 General

1.1 Scope

(1)P Part 1-7 of ENV 1993 provides principles and application rules for the structural design of unstiffened and stiffened plates which are loaded by out of plane actions. It is to be used in conjunction with ENV 1993-1-1 and the relevant application standards.

(2) Any action consideration, such as:
- definition of an action
- combination of actions
- partial safety factors on actions

are to be taken from ENV 1991 as far as general rules are concerned, and the relevant parts of ENV 1993 as far as specific application rules are concerned.

(3) This document defines only the characteristic values of the resistance; the partial safety factor for resistance are to be taken from the relevant application standards.

(4) This Part 1-7 is concerned with the requirements of an appropriate design against the ultimate limit state taking account of the following failure modes:

- Plastic limit state
- cyclic plasticity
- buckling
- fatigue.

(5) Overall equilibrium of the structure (sliding, uplifting, overturning) is not included in this Part 1-7, but is treated in ENV 1993-1-1. Special considerations for specific applications may be found in the relevant applications parts of ENV 1993-1-1.

(6) The rules in this Part 1-7 refer to plate segments in plated structures which may be stiffened or unstiffened. These plate segments may be individual plates or parts of a plated structure. They are loaded by out of plane actions in combination with in plane actions from overall structural behaviour.

(7)P The verification of unstiffened and stiffened plated structures loaded only by in-plane effects shall be carried out with the design rules given in ENV 1993-1-5. In ENV 1993-1-7 rules for the interaction between the effects of in plane and out of plane loading are given.

(8) Design rules for cold formed thin gauge members and sheeting are given in ENV 1993-1-3.

(9) The temperature range within which the rules of this Part 1-7 are allowed to be applied are defined in the relevant application parts of ENV 1993.

(10) The rules in this Part 1-7 refer to structural design under actions which may be treated as quasi-static in nature.

(11) The rules in this Part 1-7 refer to structures constructed in compliance with the execution specification of ENV 1993-1-1.