SLOVENSKI PREDSTANDARD

SIST ENV 1999-1-1

prva izdaja
oktober 2002

Eurocode 9 - Projektiranje konstrukcij iz aluminijevih zlitin - Del 1-1: Splošna pravila - Splošna pravila in pravila za stavbe (prevzet ENV 1999-1-1:1998 z metodo platnice)

Eurocode 9 - Design of aluminium structures - Part 1-1: General rules - General rules and rules for buildings

Eurocode 9 - Conception et dimensionnement des structures en aluminium - Partie 1-1: Règles générales - Règles générales et règles pour les bâtiments

Eurocode 9 - Bemessung und Konstruktion von Aluminiumbauten - Teil 1-1: Allgemeine Regeln - Allgemeine Bemessungsregeln und Bemessungsregeln für den Hochbau

Deskriptorji: gradbeništvo, jeklena konstrukcija, aluminij, aluminijasta konstrukcija, projektiranje, predpisi za gradnjo, računanje, splošno

ICS 91.010.30; 91.080.10

Referenčna številka
SIST ENV 1999-1-1:2002 ((sl),en)

Nadaljevanje na straneh od II do IV in od 1 do 212

NACIONALNI UVOD

Predstandard SIST ENV 1999-1-1 ((sl),en), Eurocode 9 - Projektiranje konstrukcij iz aluminijevih zlitin - Del 1-1: Splošna pravila - Splošna pravila in pravila za stavbe, prva izdaja, 2002, ima status slovenskega predstandarda in je z metodo platnice prevzet evropski predstandard ENV 1998-1-1 (en), Eurocode 9 - Design of aluminium structures - Part 1-1: General rules - General rules and rules for buildings, May 1998.

NACIONALNI PREDGOVOR

Evropski predstandard ENV 1999-1-1:1998 je pripravil tehnični odbor Evropskega komiteja za standardizacijo CEN/TC 250 Konstrukcijski Evrokodi.

Odločitev za prevzem tega predstandarda po metodi platnice je sprejela delovna skupina WG 9 Aluminijaste konstrukcije, ki je pripravila tudi nacionalni dokument za uporabo v Sloveniji, potrdil pa tehnični odbor TC KON Konstrukcije.

Ta slovenski predstandard se lahko uporablja samo v skladu z nacionalnim dokumentom, ki je sestavni del SIST ENV 1999-1-1:2002.

Ta slovenski predstandard je dne 2002-09-02 odobrila direktorica SIST.

Rok veljavnosti tega predstandarda je do izdaje evropskega standarda EN 1999-1-1.

DELI EVROKODA 9 (EC 9 OZIROMA ENV 1999) SPREJETI V NACIONALNO STANDARDIZACIJO:

SIST ENV 1999-1-2:2002	((sl),en)	Eurocode 9 - Projektiranje konstrukcij iz aluminijevih zlitin - Del 1-2: Splošna pravila - Projektiranje požarnovarnih konstrukcij
SIST ENV 1999-2:2002	((sl),en)	Eurocode 9 - Projektiranje konstrukcij iz aluminijevih zlitin - 2. del: Konstrukcije, občutljive na utrujanje

OPOMBI

- Povsod, kjer se v besedilu predstandarda uporablja izraz “evropski predstandard”, v SIST ENV 1999-1-1:2002 to pomeni “slovenski predstandard”.

- Nacionalni uvod in nacionalni predgovor nista sestavni del predstandarda.

VSEBINA **Stran**

NACIONALNI DOKUMENT ZA UPORABO V SLOVENIJI

Ta predstandard se uporablja z naslednjimi parametri:

Za vrednosti parametrov, podanih v okvirju (večinoma delni varnostni faktorji odpornosti ali zunanjih vplivov), se v SIST ENV 1999-1-1:2002 privzamejo priporočene vrednosti, podane v ENV 1999-1-1:1998.

V tem predstandardu se za prevajanje uporabljajo naslednji enakovredni izrazi, skupni vsem Eurocode:

construction works	gradbeni objekt, zgradba
execution	izvedba
structure	nosilna konstrukcija
type of building or civil and structural engineering works	vrsta stavb in inženirskih objektov
form of structure	tip konstrukcije
construction material	gradbeni material
type of construction	vrsta gradnje
method of construction	postopek gradnje
structural system	sistem nosilne konstrukcije

EUROPEAN PRESTANDARD
PRÉNORME EUROPÉENNE
EUROPÄISCHE VORNORM

ENV 1999-1-1

May 1998

ICS 91.010.30; 91.080.10

Descriptors: civil engineering, steel construction, aluminium, design, building codes, computation, generalities

English version

Eurocode 9: Design of aluminium structures - Part 1-1: General rules - General rules and rules for buildings

Eurocode 9: Conception et dimensionnement des structures en aluminium - Partie 1-1: Règles générales - Règles générales et règles pour les bâtiments

Eurocode 9: Bemessung und Konstruktion von Aluminiumbauten - Teil 1-1: Allgemeine Regeln - Allgemeine Bemessungsregeln und Bemessungsregeln für den Hochbau

This European Prestandard (ENV) was approved by CEN on 26 October 1997 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.

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.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

Contents

Foreword

Objectives of the Eurocodes

The Structural Eurocodes comprise a group of standards for the structural and geo-technical design of buildings and civil engineering works.

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

- As a means to prove compliance of building and civil engineering works with the essential requirements of the Construction Products Directive (CPD)

- As a framework for drawing up harmonized technical specifications for construction products.

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.

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

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".

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

CEN Technical Committee CEN/TC 250 is responsible for all Structural Eurocodes.

Eurocode programme

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	Geo-technical design
EN 1998	Eurocode 8	Design of structures for earthquake resistance
EN 1999	Eurocode 9	Design of aluminium structures

Separate sub-committees have been formed by CEN/TC 250 for the various Eurocodes listed above.

This part of the Structural Eurocode for Design of Aluminium Structures, is being issued by CEN as a European Prestandard (ENV) with an initial life of three years.

This Prestandard is intended for experimental practical application in the design of the building and civil engineering works covered by the scope as given in 1.1.2 and for the submission of comments.

After approximately two years CEN members will be invited to submit formal comments to be taken into account in determining future action.

Meanwhile feedback and comments on this Prestandard should be sent to Secretariat of sub-committee CEN/TC 250/SC 9 at the following address:

Secretariat of CEN/TC 250/SC 9
c/o Norwegian Council for Building Standardization
Postboks 129 Blindern
N - 0314 OSLO

or to your national standards organization.

National Application Documents

In view of the responsibilities of authorities in member countries for the safety, health and other matters covered by the essential requirements of the CPD, certain safety elements in this ENV have been assigned indicative values which are identified by □. The authorities in each member country are expected to assign definitive values to these safety elements.

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

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

Matters specific to this Prestandard

General

The scope of Eurocode 9 is defined in 1.1.1 and the scope of this Part of Eurocode 9 is defined in 1.1.2.

In using this Prestandard in practice, particular regard should be paid to the underlying assumptions and conditions given in 1.4.

In developing this Prestandard, background documents have been prepared, which give commentaries on, and justifications for, some of the provisions in the Prestandard.

Use of Annexes

The eight sections of this Prestandard are complemented by a number of Annexes, some normative and some informative.

The normative Annexes have the same status as the sections to which they relate. Most have been introduced by moving some of the more detailed Application Rules, which are needed only in particular cases, out of the main part of the text to aid its clarity.

Concept of Reference Standards

When using this Prestandard reference needs to be made to various CEN and ISO standards. These are used to define the product characteristics and processes which have been assumed to apply in formulating the design rules.

This Prestandard mentions certain "Reference Standards". Where any referenced CEN or ISO standard is not yet available, the National Application Document should be consulted for the standard to be used instead. It is assumed that only those grades and qualities given in section 3 will be used for buildings and civil engineering works designed to this European Prestandard.

Partial safety factors

This Prestandard gives general rules for the design of aluminium structures which relate to limit states of members such as fracture in tension, failure by instability phenomena or fracture of the connections.

Most of the rules have been calibrated against test results in order to obtain consistent values of the partial safety factors for resistance γ_M.

In order to avoid a large variety of γ_M values, two categories were selected:

- γ_{M1} is to be applied to resistance related to the 0,2 % proof strength $f_{0,2}$ (e.g. for all instability phenomena)
- γ_{M2} is to be applied to resistance related to the ultimate tensile stress f_u (e.g. net section strength in tension or bolt and weld resistances).

Fabrication and execution

Section 7 of this Prestandard is intended to indicate some minimum standards of workmanship and normal tolerances that have been assumed in deriving the design rules given in the Prestandard.

It also indicates to the designer the information relating to a particular structure that needs to be supplied in order to define the execution requirements.

In addition it defines normal clearances and other practical details which the designer needs to use in calculations.

Design assisted by testing

Section 8 is not required in the course of routine design, but is provided for use in the special circumstances in which it may become appropriate.

1 General

1.1 Scope

1.1.1 Scope of ENV 1999 Eurocode 9

(1) ENV 1999 Eurocode 9 applies to the design of buildings, civil and structural engineering works in aluminium. It is subdivided into various separate parts, see 1.1.2.

(2) This Eurocode is only concerned with the requirements for resistance, serviceability and durability of structures. Other requirements, e.g. concerning thermal or sound insulation, are not considered.

(3) Execution is covered to the extent that is necessary to indicate the quality of the construction material and products which should be used and the standard of workmanship on site needed to comply with the assumptions of the design rules. Generally, the rules related to execution and workmanship are to be considered as minimum requirements which may have to be further developed for particular types of buildings or civil and structural engineering works and methods of construction.

(4) ENV 1999 Eurocode 9 does not cover the special requirements of seismic design.

(5) Numerical values of the actions on buildings and civil and structural engineering works to be taken into account in the design are not given in ENV 1999 Eurocode 9. They are provided in ENV 1991 Eurocode 1 "Basis of design and actions on structures" which is applicable to all types of construction.

1.1.2 Scope of Part 1.1 of ENV 1999 Eurocode 9

(1) This European Prestandard gives a general basis for the design of buildings and civil and structural engineering works in aluminium alloy.

(2) The following subjects are dealt with in this initial version of this European Prestandard.

- Section 1: General
- Section 2: Basis of design
- Section 3: Materials
- Section 4: Serviceability limit states
- Section 5: Ultimate limit states (members)
- Section 6: Connections subject to static loading
- Section 7: Fabrication and execution
- Section 8: Design assisted by testing

(3) Most of the contents of Section 1 and Section 2 are common to all Structural Eurocodes, with the exception of some additional clauses which are specific to individual Eurocodes.

(4) This European Prestandard does not cover:

- resistance to fire;
- cases where special measures may be necessary to limit the consequences of accidents;
- fatigue.

1.2 Distinction between Principles and Application Rules

(1) Depending on the character of the individual clauses, distinction is made in this Eurocode between Principles and Application Rules.

(2) The Principles comprise:

- general statements and definitions for which there is no alternative, as well as
- requirements and analytical models for which no alternative is permitted unless specifically stated.

(3) The Principles are identified by the letter P following the paragraph number.

(4) The Application Rules are generally recognised rules which follow the Principles and satisfy their requirements.

(5) It is permissible to use alternative design rules different from the Application Rules given in the Eurocode, provided that it is shown that the alternative rule accords with the relevant Principles and is at least equivalent with regard to the resistance, serviceability and durability achieved by the structure.

(6) In this Eurocode the Application Rules are identified by a number in brackets, as in this paragraph.

1.3 Normative references

(1)P This European prestandard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed below. For undated references the latest edition of the publication referred to applies.

1.3.1 References on aluminium alloys

1.3.1.1 Chemical composition, form and temper definition of wrought products

EN 573-1:1994	Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 1: Numerical designation system.
EN 573-2:1994	Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 2: Chemical symbol based designation system
EN 573-3:1994	Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical compositions
EN 573-4:1994	Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 4: Forms of products
EN 515:1993	Aluminium and aluminium alloys - Wrought products - Temper designations

1.3.1.2 Technical delivery conditions

EN 485-1:1993	Aluminium and aluminium alloys - Sheet, strip and plate - Part 1: Technical conditions for inspection and delivery
prEN 586-1:1996	Aluminium and aluminium alloys - Forgings - Part 1: Technical conditions for inspection and delivery
prEN 754-1:1996	Aluminium and aluminium alloys - Cold drawn rod/bar and tube - Part 1: Technical conditions for inspection and delivery
prEN 755-1:1996	Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 1: Technical conditions for inspection and delivery
prEN 1592-1:1996	Aluminium and aluminium alloys - HF seam welded tubes - Part 1: Technical conditions for inspection and delivery

prEN 12020-1:1995 Aluminium and aluminium alloys - Extruded precision profiles in alloys EN AW-6060 and EN AW-6063- Part 1: Technical conditions for inspection and delivery

1.3.1.3 Dimensions and mechanical properties

EN 485-2:1994 Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties

EN 485-3:1993 Aluminium and aluminium alloys - Sheet, strip and plate - Part 3: Tolerances on shape and dimensions for hot-rolled products

EN 485-4:1993 Aluminium and aluminium alloys - Sheet, strip and plate - Part 4: Tolerances on shape and dimensions for cold-rolled products

prEN 508-2:1996 Roofing products from metal sheet - Specifications for self supporting products of steel, aluminium or stainless steel - Part 2: Aluminium

EN 586-2:1994 Aluminium and aluminium alloys - Forgings - Part 2: Mechanical properties and additional property requirements

prEN 586-3:1996 Aluminium and aluminium alloys - Forgings - Part 3: Tolerances on dimension and form

prEN 754-2:1996 Aluminium and aluminium alloys - Cold drawn rod/bar and tube - Part 2: Mechanical properties

EN 754-3:1995 Aluminium and aluminium alloys - Cold drawn rod/bar and tube - Part 3: Round bars, tolerances on dimension and form

EN 754-4:1995 Aluminium and aluminium alloys - Cold drawn rod/bar and tube - Part 4: Square bars, tolerances on dimension and form

EN 754-5:1995 Aluminium and aluminium alloys - Cold drawn rod/bar and tube - Part 5: Rectangular bars, tolerances on dimension and form

EN 754-6:1995 Aluminium and aluminium alloys - Cold drawn rod/bar and tube - Part 6: Hexagonal bars, tolerances on dimension and form

prEN 754-7:1995 Aluminium and aluminium alloys - Cold drawn rod/bar and tube - Part 7: Seamless tubes, tolerances on dimension and form

prEN 754-8:1995 Aluminium and aluminium alloys - Cold drawn rod/bar and tube - Part 8: Porthole tubes, tolerances on dimension and form

prEN 755-2:1996 Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 2: Mechanical properties

EN 755-3:1995 Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles- Part 3: Round bars, tolerances on dimension and form

EN 755-4:1995 Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles- Part 4: Square bars, tolerances on dimension and form

EN 755-5:1995 Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles- Part 5: Rectangular bars, tolerances on dimension and form

EN 755-6:1995	Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles- Part 6: Hexagonal bars, tolerances on dimension and form
prEN 755-7:1995	Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles- Part 7: Seamless tubes, tolerances on dimension and form
prEN 755-8:1995	Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles- Part 8: Porthole tubes, tolerances on dimension and form
prEN 755-9:1995	Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles- Part 9: Profiles, tolerances on dimension and form
prEN 12020-2:1995	Aluminium and aluminium alloys - Extruded precision profiles in alloys EN AW-6060 and EN AW-6063- Part 2: Tolerances on dimensions and form
prEN 1592-2:1994	Aluminium and aluminium alloys - HF seam welded tubes - Part 2: - Mechanical properties
prEN 1592-3:1994	Aluminium and aluminium alloys - HF seam welded tubes - Part 3: - Tolerance on dimensions and shape of circular tubes
prEN 1592-4:1994	Aluminium and aluminium alloys - HF seam welded tubes - Part 4: - Tolerance on dimensions and form for square, rectangular and shaped tubes

1.3.1.4 Aluminium alloy castings

prEN 1559-1	Founding - Technical conditions of delivery - Part 1: General
prEN 1559-2	Founding - Technical conditions of delivery - Part 4: Additional requirements for aluminium alloy castings
prEN 1706:1993	Aluminium and aluminium alloys - Castings - Chemical composition and mechanical properties
prEN190/120	Castings - System of dimensional tolerances and machining allowances

1.3.2 References on welding

EN 287-2:1992	Approval testing of welders - Fusion welding - Part 2: Aluminium and aluminium alloys
EN 288-1:1992	Specification and approval of welding procedures for metallic materials - Part 1: General rules for fusion welding
EN 288-4:1992	Specification and approval of welding procedures for metallic materials - Part 4; Welding procedure tests for the arc welding of aluminium and its alloys
prEN 288-13	Specification and approval of welding procedures for metallic materials - Part 13 Welding procedure test for the arc welding of cast aluminium and combinations of cast to wrought materials
EN 439:1994	Welding consumables - Shielding gases for arc welding and cutting.
prEN 970	Non destructive examination of welds - Visual examination
prEN 1011-1	Welding - Fusion welding of metallic materials - Part 1: General