



SLOVENSKI STANDARD

SIST ENV 1996-2:2004

01-september-2004

Eurocode 6: Projektiranje zidanih konstrukcij - 2. del: Projektiranje, izbira materialov in izvedba zidovja

Eurocode 6: Design of masonry structures - Part 2: Design, selection of materials and execution of masonry

Eurocode 6: Bemessung und Konstruktion von Mauerwerksbauten - Teil 2: Planung, Auswahl der Baustoffe und Ausführung von Mauerwerk

Eurocode 6: Calcul des ouvrages en maçonnerie - Partie 2: Conception, choix des matériaux et mise en oeuvre des maçonneries

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Ta slovenski standard je istoveten z: **ENV 1996-2:1998**

ICS:

91.010.30	V^@ã}ãããã	Technical aspects
91.080.30	Zidane konstrukcije	Masonry

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EUROPEAN PRESTANDARD
PRÉNORME EUROPÉENNE
EUROPÄISCHE VORNORM

ENV 1996-2

November 1998

ICS 91.010.30; 91.080.30

Descriptors: buildings, construction, masonry work, computation, materials, choice, implementation

English version

Eurocode 6: Design of masonry structures - Part 2: Design, selection of materials and execution of masonry

Eurocode 6: Calcul des ouvrages en maçonnerie - Partie 2:
Calcul, choix des matériaux et mise en oeuvre des
maçonneries

Eurocode 6: Bemessung und Konstruktion von
Mauerwerksbauten - Teil 2: Planung, Auswahl der
Baustoffe und Ausführung von Mauerwerk

This European Prestandard (ENV) was approved by CEN on 27 February 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.

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.

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

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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 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 the methods of testing their performance is available, some of the Structural Eurocodes cover some of these aspects in informative Annexes.

Background of 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/TC250 is responsible for all Structural Eurocodes.

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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/TC250 for the various Eurocodes listed above.

(9) This part 2 of Eurocode 6 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/SC6 at the following address:

DIN - NABau, Burggrafenstrasse 6, Postfach 1107
D107732 - BERLIN 30, Germany.

or to your national standards organization.

National Application Documents (NADs)

(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 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.

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Matters specific to this Prestandard [SIST ENV 1996-2:2004](#)

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(16) The scope of Eurocode 6 is defined in ENV 1996-1-1, and this includes information on the other Parts of Eurocode 6 and the further Parts which are planned.

(17) The scope of this Part of Eurocode 6 is defined in its clause 1.1.

(18) This Part 2 of Eurocode 6 replaces all of Section 6 of ENV 1996-1-1. Section 6 will eventually be omitted from ENV 1996-1-1.

1 GENERAL

1.1 Scope

(1)P The scope of Eurocode 6 for Masonry Structures as given in **1.1.1** of ENV 1996-1-1 applies also to this Part 2.

(2)P This Part 2 provides the necessary Principles and Application Rules for masonry to be designed and constructed satisfactorily in order to comply with the design assumptions of the other Parts of Eurocode 6. Except for the items as given in **1.1(3)P**, it deals with ordinary aspects of masonry design and construction including:

- the selection of materials;
- methods of combining masonry materials and of incorporating other materials required to give functional performance;
- factors affecting the performance and durability of masonry;
- resistance of buildings to moisture penetration;
- storage, preparation and use of materials on site;
- the erection of walls and the connection of walls to walls and to other elements of structure;
- protective procedures during construction.

(3)P This Part 2 does not cover the following items:

- those aspects of masonry covered in other Parts of Eurocode 6;
- applied wall finishes;
- safety aspects of how masonry is erected;
- the environmental effects of masonry buildings, civil engineering works and structures on their surroundings.

1.2 Distinction between Principles and Application Rules

(1)P Depending on the character of the individual paragraphs, a distinction is made in this Part between principles and application rules.

(2)P The principles comprise:

- general statements and definitions for which there is no alternative;
- requirements for which no alternative is permitted unless specifically stated.

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

(4)P The application rules are generally recognised rules that follow the principles and satisfy their requirements. Alternative rules different from the application rules given in this Part may be used

provided that it is shown that the alternative rule accords with the relevant principles and has at least the same reliability.

(5) In this Part application rules are identified by a number in brackets, as in this paragraph.

1.3 Assumptions

(1)P The following assumptions apply:

- structures are designed by appropriately qualified and experienced personnel;
- adequate supervision and quality control is provided in factories, in plants, and on site;
- construction is carried out by personnel having the appropriate skill and experience;
- the construction materials and products are used as specified in this Eurocode or in the relevant material or product specifications.
- the structure will be adequately maintained;
- the structure will be used only for the purposes for which it was designed.

(2)P Design shall be in accordance with Section 2 and shall take into account Section 3. Execution shall be in accordance with the design and Section 3. The design Principles are valid only when the Principles for execution and workmanship given in Section 3 are complied with.

(3)P Numerical values identified by [] are given as indications. Other values may be specified by Member States.

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1.4 Normative references

(1) 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 hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Prestandard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 771 (all Parts)	Specification for masonry units
EN 998-2	Specification for mortar for masonry - Masonry mortar
EN 845 (all Parts)	Specification for ancillary components for masonry
EN 1015-17	Methods of test for masonry mortar - Determination of water-soluble chloride content of fresh mortars
EN 1052 (all Parts)	Methods of test for masonry
ENV 206	Concrete - Performance, production, placing and compliance criteria
ENV1996-1-1	Eurocode 6: Design of masonry structures - Part 1: General rules for buildings - Rules for reinforced and unreinforced masonry
ISO 1000	The use of SI units
ISO 8930	Terminology

1.5 Definitions

1.5.1 Terms common to all Eurocodes

(1)P Unless otherwise stated in the following, the terminology used in International Standard ISO 8930 and the terminology common for all Eurocodes shall apply to ENV 1996-2 (see 1.4.1 of ENV 1996-1-1).

1.5.2 Special terms used in ENV 1996-1-1

(1)P Unless otherwise stated in the following, the special terminology used in ENV 1996-1-1 shall apply to Part 2.

1.5.3 Special terms used in ENV 1996-2

1.5.3.1 Terms relating to communication of design

(1)P **design specification:** Documents describing the designer's requirements for the construction, including drawings, schedules, references to parts of other documents and written instructions.

(2)P **manufacturer:** Maker of products or agent of the maker.

1.5.3.2 Terms relating to climatic factors and exposure conditions

(1)P **macro conditions** Climatic factors dependent on the general climate of the region in which a structure is built, modified by the effects of local topography and/or other aspects of the site.

(2)P **micro conditions** Localised climatic and environmental factors dependent on the position of a masonry element within the overall structure and taking into account the effect of protection, or lack of protection, by constructional details or finishes.

1.5.3.3 Terms relating to masonry units

(1)P **accessory masonry unit:** A masonry unit which is shaped to provide a particular function, e.g. to complete the geometry of the masonry

1.5.3.4 Terms relating to mortars

(1)P Unless otherwise stated in this Part 2, the terminology used in EN 998-2 shall apply for mortars and their constituent materials.

1.5.3.5 Other terms

(1)P **applied wall finish:** A covering of material continuously bonded to the surface of the masonry.

(2)P **cavity width:** The distance perpendicular to the plane of the wall between the cavity faces of the masonry leaves of a cavity wall or that between the cavity face of a veneer wall and the masonry backing structure.

(3)P **cladding**: A covering of material(s) fastened or anchored in front of the masonry and not continuously bonded to it.

1.6 S.I. units

(1)P S.I. units in accordance with ISO 1000 shall be used.

1.7 Symbols

(1)P Symbols in accordance with ENV1996-1-1 shall be used.

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2 DESIGN CONSIDERATIONS

2.1 Factors affecting the durability of masonry

2.1.1 General

(1)P Masonry shall be designed to have adequate performance for its intended use.

2.1.2 Micro conditions of exposure

(1)P The micro conditions to which the masonry is expected to be exposed shall be taken into account in the design.

(2)P When deciding the micro conditions of exposure of the masonry, the effect of applied finishes and protective claddings shall be taken into account

(3) Micro conditions of exposure of completed masonry should be categorised into classes:

MX1 - In a dry environment;

MX2 - Exposed to moisture or wetting;

MX3 - Exposed to wetting plus freeze/thaw cycling;

MX4 - Exposed to saturated salt air or seawater;

MX5 - In an aggressive chemical environment.

NOTE : When necessary, more closely defined conditions within these classes may be specified using the sub-classes in **Annex A** (e.g. MX2.1 or MX2.2).

(4) To produce masonry that meets specified performance criteria and withstands the environmental conditions to which it is exposed, the determination of the exposure class should take into account:

- climatic factors;
- severity of exposure to wetting;
- exposure to freeze/thaw cycling;
- presence of chemical materials that may lead to damaging reactions.

2.1.3 Climatic factors (macro conditions of exposure)

(1) The effect of the macro conditions on the micro conditions should be taken into account when determining the relative wetness of masonry and its exposure to freeze/thaw cycling.

(2) Concerning the macro conditions the following should be taken into account:

- rain and snow;
- the combination of wind and rain;
- temperature variation;
- relative humidity variation.

2.1.4 Exposure to wetness

(1) The exposure to wetness should be taken into account in determining the micro conditions of exposure of the masonry. The effect of any applied finishes, cladding, weathered overhanging sills, copings, string courses, drainage or other features intended to throw water clear of the masonry should be taken into account.

NOTE : It is acknowledged that climates (macro conditions) vary considerably throughout Europe and that certain aspects of climate can influence the risk of exposure of masonry to wetting and/or freeze/thaw cycling. However, it is the classification of the micro conditions that is relevant for determining the durability of masonry rather than the ranking of the macro conditions. Examples of relative exposure to wetness of masonry elements in a typical building are shown in figures 2.1 and 2.2.

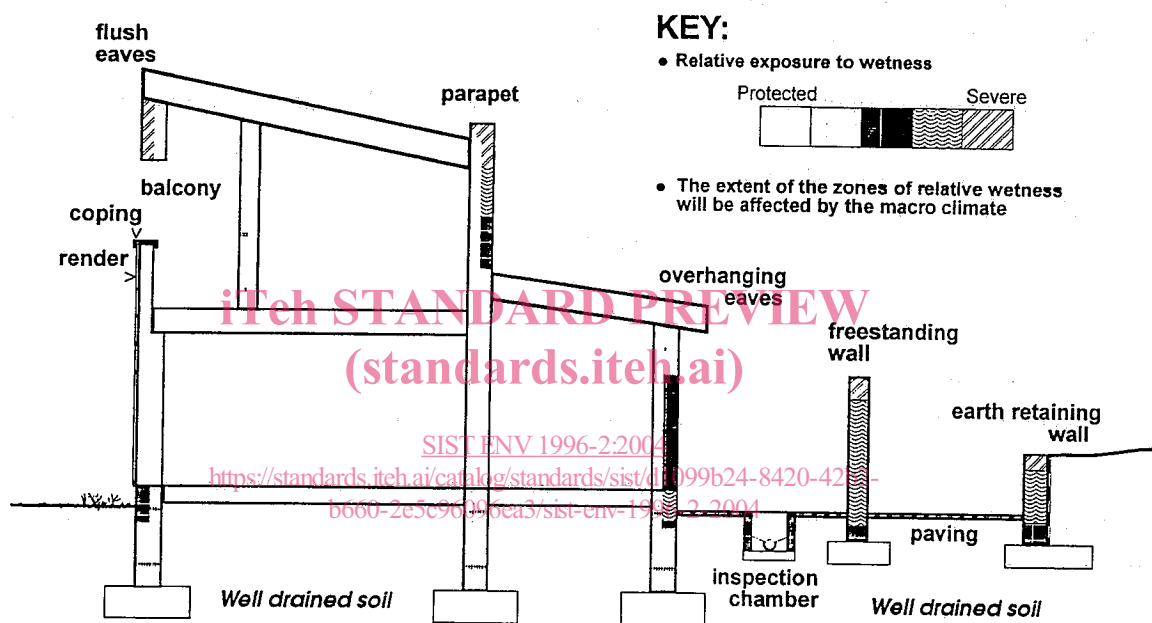


Figure 2.1 (Part of NOTE to 2.1.4(1)): Examples of relative exposure to wetness of masonry (not protected by applied finishes or cladding except where indicated)

2.1.5 Exposure to freeze/thaw cycling

(1) The range and nature of temperature variations should be taken into account in determining the classification of micro conditions of exposure of the masonry.

2.1.6 Aggressive chemical environments

2.1.6.1 General

(1) The presence of sulfates, chlorides and other aggressive chemicals in the environment should be taken into account in determining the classification of micro conditions of exposure of the masonry.

(2) In coastal areas the exposure of masonry to saturated salt air or seawater should be taken into account.

(3) Where the presence of aggressive chemicals in the environment, other than salt air or seawater, can affect masonry, class MX5 should be assumed. The concentrations, quantities available and rates of reaction of these chemicals should be assessed, as necessary, to enable the selection of masonry materials that are durable in the conditions. Where salts can be transported by water moving through the masonry, the potential for increased concentrations and quantities of available chemicals should be taken into account.

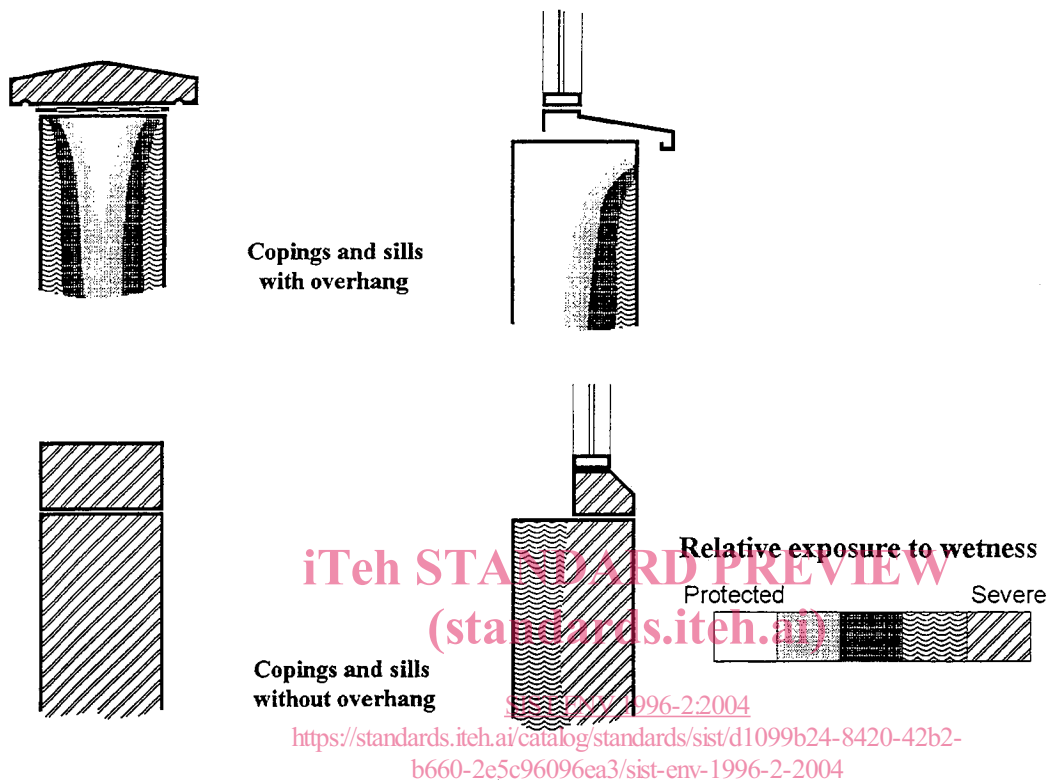


Figure 2.2 (Part of NOTE to 2.1.4(1)): Examples of the effect of building detail on relative exposure to wetness of masonry

2.1.6.2 Sulfate attack

(1) Where the occurrence of sulfates in the environment can affect masonry, the sources of sulfates should be assessed to determine the selection of materials and the need for any additional protection. Possible sources of sulfates that should be taken into account include the following:

- natural soils;
- groundwater;
- waste deposits and filled ground;
- construction materials;
- airborne pollutants.