SLOVENSKI STANDARD
oSIST prEN 1991-1-3:2023

01-maj-2023

Evrokod 1 - Vplivi na konstrukcije - 1-3. del: Obtežba snega

Eurocode 1 - Actions on structures - Part 1-3: Snow loads

Eurocode 1 - Einwirkungen auf Tragwerke - Teil 1-3: Allgemeine Einwirkungen - Schneelasten

Eurocode 1 - Actions sur les structures - Partie 1-3 : Charges de neige

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EUROPEAN STANDARD

NORME EUROPÉENNE

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English Version

Eurocode 1 - Actions on structures - Part 1-3: General actions - Snow loads

Eurocode 1 - Actions sur les structures - Partie 1-3: Actions générales - Charges de neige

Eurocode 1 - Einwirkungen auf Tragwerke - Teil 1-3: Allgemeine Einwirkungen, Schneelasten

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 250.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 1991-1-3:2023) has been prepared by Technical Committee CEN/TC 250 “Structural Eurocodes”, the secretariat of which is held by BSI.

CEN/TC 250 is responsible for all Structural Eurocodes and has been assigned responsibility for structural and geotechnical design matters by CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1991-1-3:2003.

The first generation of EN Eurocodes was published between 2002 and 2007. This document forms part of the second generation of the Eurocodes, which have been prepared under Mandate M/515 issued to CEN by the European Commission and the European Free Trade Association.

The Eurocodes have been drafted to be used in conjunction with relevant execution, material, product and test standards, and to identify requirements for execution, materials, products and testing that are relied upon by the Eurocodes.

The Eurocodes recognize the responsibility of each Member State and have safeguarded their right to determine values related to regulatory safety matters at national level through the use of National Annexes.

Introduction

0.1 Introduction to the Eurocodes

The structural Eurocodes comprise the following standards generally consisting of a number of Parts:

— EN 1990, *Eurocode: Basis of structural and geotechnical design*

— EN 1991, *Eurocode 1: 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 structure*

— 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 of structures for earthquake resistance*

— EN 1999, *Eurocode 9: Design of aluminium structures*

— New parts are under development, e.g. Eurocode for design of structural glass

The Eurocodes are intended for use by designers, clients, manufacturers, constructors, relevant authorities (in exercising their duties in accordance with national or international regulations), educators, software developers, and committees drafting standards for related product, testing and execution standards.

NOTE Some aspects of design are most appropriately specified by relevant authorities or, where not specified, can be agreed on a project-specific basis between relevant parties such as designers and clients. The Eurocodes identify such aspects making explicit reference to relevant authorities and relevant parties.

0.2 Introduction to EN 1991

(1) EN 1991 provides the actions to be considered for the structural design of buildings, bridges and other civil engineering works, or parts thereof, including temporary structures, in conjunction with EN 1990 and the other Eurocodes.

(2) The actions on structures, including in some cases geotechnical structures in conjunction with EN 1997 as appropriate, provided in EN 1991 are intended to be applied in conjunction with the other Eurocodes for the verification of safety, serviceability and durability, as well as robustness of structures, including the execution phase.

(3) The application of this document for the verifications mentioned in (2) follows the limit state principle and is based on the partial factor method, unless explicitly prescribed differently.

(4) EN 1991 does not cover the specific requirements of actions for seismic design, unless explicitly stated in EN 1998. Provisions related to such requirements are given in EN 1998, which complements and is consistent with EN 1991.

(5) EN 1991 is also applicable in the case of existing structures for their:

— structural assessment,

— design of repairs, improvements and alterations,

— assessment for changes of use.

NOTE In this case additional or amended provisions can be necessary.

(6) EN 1991 is also applicable to the design of structures where materials or actions outside the scope of the other Eurocodes are involved.

NOTE In this case additional or amended provisions can be necessary.

0.3 Introduction to EN 1991-1-3

EN 1991-1-3 gives design guidance and actions from snow for the structural design of buildings and civil engineering works.

EN 1991-1-3 is addressed to all parties involved in construction activities (e.g. public authorities, clients, designers, contractors, producers, consultants, etc.).

0.4 Verbal forms used in the Eurocodes

The verb “shall” expresses a requirement strictly to be followed and from which no deviation is permitted in order to comply with the Eurocodes.

The verb “should” expresses a highly recommended choice or course of action. Subject to national regulation and/or any relevant contractual provisions, alternative approaches could be used/adopted where technically justified.

The verb “may” expresses a course of action permissible within the limits of the Eurocodes.

The verb “can” expresses possibility and capability; it is used for statements of fact and clarification of concepts.

0.5 National Annex for EN 1991-1-3

National choice is allowed in this standard where explicitly stated within notes. National choice includes the selection of values for Nationally Determined Parameters (NDPs).

The national standard implementing EN 1991-1-3 can have a National Annex containing all national choices to be used for the design of buildings and civil engineering works to be constructed in the relevant country.

When no national choice is given, the default choice given in this standard is to be used.

When no national choice is made and no default is given in this standard, the choice can be specified by a relevant authority or, where not specified, agreed for a specific project by appropriate parties.

National choice is allowed in EN 1991-1-3 through notes to the following clauses:

4.3 (1) NOTE	7.4 (2) NOTE 2	8.1 (1) NOTE 1
6.1 (1) NOTE 1	7.4 (4) NOTE 1	8.2 (2) NOTE
6.1 (1) NOTE 2	7.4 (5) NOTE 1	8.3 (1) NOTE
6.2 (1) NOTE	7.5.2 (3) NOTE	8.4 (1) NOTE
7.3 (2) Table 7.1	7.5.3 (3) Table 7.3	8.4 (3) NOTE 1
7.3 (2) NOTE 2	7.5.3 (4) NOTE	8.4 (3) NOTE 2

7.4 (1) NOTE	7.5.4 (2) NOTE 1	8.6 (1) NOTE 1
7.4 (2) NOTE 1	7.5.4 (2) NOTE 2	8.6 (1) NOTE 2

National choice is allowed in EN 1991-1-3 on the application of the following informative annexes:

Annex A	Annex B	Annex C

The National Annex can contain, directly or by reference, non-contradictory complementary information for ease of implementation, provided it does not alter any provisions of the Eurocodes.

1 Scope

1.1 Scope of EN 1991-1-3

(1) EN 1991-1-3 gives principles and rules to determine the values of loads due to snow to be used for the structural design of buildings and civil engineering works.

(2) This Part does not apply to sites at altitudes above 1500 m, unless otherwise specified.

NOTE For rules for the treatment of snow loads for altitudes above 1500 m see 6.1.

(3) This Part does not give guidance on specialist aspects of snow loading, for example:

— impact snow loads resulting from snow sliding off or falling from a higher roof;

— changes in shape or size of the construction works due to the presence of snow or the accretion of ice which could affect the wind action;

— loads in areas where snow is present all year round;

— lateral loading due to snow creep (e.g. lateral loads exerted by drifts);

— loads due to artificial snow.

1.2 Assumptions

The assumptions given in FprEN 1990:2022, 1.2 apply to EN 1991-1-3.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE See the Bibliography for a list of other documents cited that are not normative references, including those referenced as recommendations (i.e. in “should” clauses), permissions (“may” clauses), possibilities (“can” clauses), and in notes.

FprEN 1990:2022, *Eurocode — Basis of structural and geotechnical design*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in FprEN 1990 and the following apply.

3.1.1
characteristic value of snow load on the ground
s_k
snow load on the ground at the relevant site, based on an annual probability of exceedance of 0,02, excluding exceptional snow loads

3.1.2
altitude of the site
A
height above mean sea level of the site where the structure is to be located, or is already located for an existing structure

3.1.3
exceptional snow load on the ground
s_{Ad}
load of the snow layer on the ground resulting from a snow fall which has an exceptionally infrequent likelihood of occurring

Note 1 to entry See note to 4.3 (1) for locations where this can occur

3.1.4
characteristic value of snow load on the roof
s
product of the characteristic snow load on the ground and the coefficients defined in 3.1.7 to 3.1.9

Note 1 to entry: In accordance with FprEN 1990:2022, 6.1.2.3 (2), the characteristic value of snow load on the roof corresponds to an upper value with an annual probability of exceedance of 0,02 or to a nominal value.

3.1.5
balanced snow load arrangement on the roof
load arrangement which describes the uniformly distributed snow load on the roof, affected by the shape of the roof and its exposure to wind

3.1.6
unbalanced snow load arrangement on the roof
load arrangement which describes the snow load distribution resulting from snow having been moved from one location to another location on a roof or off the roof, depending on the exposure of the roof to wind and the effects of sliding

Note 1 to entry: Unbalanced load arrangements given in this standard assume that wind can have any direction.

3.1.7
snow load shape coefficient
μ_i
ratio of the characteristic ground snow load on the roof to the snow load on the ground, including the effect of wind exposure but without the influence of thermal effects

3.1.8
thermal coefficient
C_t
coefficient defining the change of snow load on roofs as a function of the heat flux through the roof

3.1.9
exposure coefficient
C_e
coefficient defining the reduction or increase of snow load on a roof of an unheated building due to the roof exposure to wind, as a fraction of the characteristic snow load on the ground

3.1.10
flat roof
roof with pitch angles between 0 and 5 degrees, $0° \leq \alpha \leq 5°$

3.2 Symbols and abbreviations

For the purposes of this European Standard, the following symbols, specific to this Part, apply, together with the general notations given in FprEN 1990:2022, Clause 3.

NOTE The notation used is based on ISO 3898:2013.

3.2.1 Latin upper-case letters

C_e exposure coefficient

C_t thermal coefficient

C_{esl} coefficient for exceptional snow loads

$C_{e,F}$ exposure coefficient for flat roof

A altitude of the site

F_s force per unit length exerted by a sliding mass of snow

L length of the longer side of the flat roof

L_c effective roof length

W length of the shorter side of the flat roof

3.2.2 Latin lower case letters

b width of construction work or lateral distance of tilted panels on flat roofs

d depth of the snow layer

h reference height for the calculation of the snow load shape coefficient

h_p height of the parapet

k coefficient to take account of the irregular shape of snow

l_s length of snow drift or snow loaded area

s characteristic snow load on the roof

s_k characteristic value of snow on the ground at the relevant site

s_{Ad} design value of exceptional snow load on the ground at the relevant site

s_e snow load per unit length due to the overhang

s_R rain-on-snow surcharge

w width of the obstruction/parapet

3.2.3 Greek lower-case letters

α angle of pitch of roof

α_{inter} intersection angle

β angle between the horizontal and the tangent to the curve for a cylindrical roof

γ snow weight density

δ snow drift factor

μ_1 snow load shape coefficient for flat roofs

μ_2 snow load shape coefficient for mono-pitched and pitched roofs

$\mu_{2,b}$ basic snow load shape coefficient for pitched roofs

$\mu_{2,p}$ lower limit for the snow load shape coefficient for the roof pitch with a retention device at the lower edge

$\mu_{2,w}$ snow load shape coefficient taking into account the wind driven part of the snow on pitched roofs

μ_3 snow load shape coefficient for multi-span roofs

μ_{3max} maximum value of the snow load shape coefficient for multi-span roofs

μ_4 snow load shape coefficient for cylindrical roofs and domes

μ_5 snow load shape coefficient for roof abutting to taller construction works

μ_6 snow load shape coefficient for local drifting at obstructions

μ_7 snow load shape coefficient for local drifting at parapets

μ_8 snow load shape coefficient for local drifting at intersecting pitched roofs

μ_{8max} maximum value of the snow load shape coefficient for local drifting at intersecting pitched roofs

μ_p upper limit for the snow load shape coefficient for flat roofs with tilted panels

μ_L pertinent snow load shape coefficient for the lower roof (roof abutting to taller construction works)

μ_U pertinent snow load shape coefficient for the upper roof (roof abutting to taller construction works)

μ_s snow load shape coefficient taking into account the sliding part from the upper roof (roof abutting to taller construction works)

μ_w snow load shape coefficient taking into account the wind driven part of the drift, originating from erosion of the snow cover on both the upper and lower roofs (roof abutting to taller construction works)