SLOVENSKI STANDARD
oSIST prEN 19100-3:2024

01-november-2024

Evrokod 10 - Projektiranje steklenih konstrukcij - 3. del: Stekleni elementi pod vplivom obtežb, ki delujejo v ravnini elementov

Eurocode 10 - Design of glass structures - Part 3: In-plane loaded glass components

Eurocode 10 - Bemessung und Konstruktion von Bauteilen aus Glas - Teil 3: In Scheibenebene belastete Elemente

Eurocode 10 - Calcul des structures en verre - Partie 3: Composants en verre chargés dans leur plan

Ta slovenski standard je istoveten z: **prEN 19100-3**

ICS:

81.040.20	Steklo v gradbeništvu	Glass in building
91.080.99	Druge konstrukcije	Other structures

oSIST prEN 19100-3:2024 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 19100-3

September 2024

ICS 81.040.20; 91.080.99

Will supersede CEN/TS 19100-3:2021

English Version

Eurocode 10 - Design of glass structures - Part 3: In-plane loaded glass components

Eurocode 10 - Calcul des structures en verre - Partie 3: Composants en verre chargés dans leur plan

Eurocode 10 - Bemessung und Konstruktion von Bauteilen aus Glas - Teil 3: In Scheibenebene belastete Elemente

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

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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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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Ref. No. prEN 19100-3:2024 E

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European foreword

This document (prEN 19100-3:2024) 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 CEN/TS 19100-3:2021.

In comparison with the previous edition, the following changes have been made:

— modified title and scope;

— updated references.

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.

0 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 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 of structures for earthquake resistance*

EN 1999 *Eurocode 9 — Design of aluminium structures*

EN 19100 *Eurocode 10 — Design of glass structures*

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 19100 (all parts)

EN 19100 (all parts) applies to the structural design of mechanically supported glass components and assemblies of glass components. It complies with the principles and requirements for the safety and serviceability of structures, the basis of their design and verification that are given in EN 1990, *Basis of structural and geotechnical design.*

EN 19100 is subdivided into three parts:

EN 19100-1, *Eurocode 10 — Design of glass structures — Part 1: General rules*

EN 19100-2, *Eurocode 10 — Design of glass structures — Part 2: Out-of-plane loaded glass components*

EN 19100-3, *Eurocode 10 — Design of glass structures — Part 3: In-plane loaded glass components*

0.3 Introduction to EN 19100-3

EN 19100-3 applies to the structural design of in-plane loaded glass components in conjunction with EN 19100-1 and EN 19100-2.

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 19100-3

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

The national standard implementing EN 19100-1 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 document is to be used.

When no national choice is made and no default is given in this document, 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 19100-1 through notes to the following clauses:

4.2.1(2)	4.2.1(5) – 2 choices	4.3.1(2)	4.3.1(3)
4.3.1(7)	7.3.2(1)	8.2(3)	10.3.1(4) – 2 choices
10.3.3(1)	10.3.4.3(2)	10.4.1(1)	

National choice is allowed in EN 19100-3 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 prEN 19100-3

(1) This document gives design rules for glass components and assemblies primarily subjected to in-plane loading. It also covers effects of loads acting both in-plane and parallel to the plane produced by the neutral axes of the component, including construction rules for joints connecting in-plane loaded glass components.

1.2 Assumptions

(1) The assumptions of EN 1990, prEN 19100-1 and prEN 19100-2 apply.

(2) This document is intended to be used in conjunction with, EN 1990, EN 1991 (all parts), EN 1993-1-1, EN 1995-1-1, EN 1998 (all parts), EN 1999-1-1, prEN 19100-1, prEN 19100-2 and EN 12488.

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. through 'should' clauses) and permissions (i.e. through 'may' clauses).

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

prEN 19100-1:2024, *Eurocode 10 — Design of glass structures — Part 1: Basis of design and materials*

prEN 19100-2:2024, *Eurocode 10 — Design of glass structures — Part 2: Design of out-of-plane loaded glass components*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 19100-1 and prEN 19100-2 and the following apply.

3.1.1
shear element made of glass
glass element sustaining on purpose loads or stresses in-plane (F_x, F_z ,p_x, p_z,)

Note 1 to entry: The element may be loaded also by loading transversal to the plane (q_y).

3.1.2
buckling length
system length of an otherwise similar member with pinned ends, which has the same critical buckling load as a given member or segment of member

[SOURCE: EN 1993-1-1:2022, 3.1.7]

3.1.3
second order analysis
geometrically non-linear analysis taking account of the out-of-plane deflections whilst calculating equilibrium of stresses or sectional forces of a glass pane

3.1.4
third order analysis
geometrically non-linear analysis taking account of both the out-of-plane and in-plane deflections whilst calculating equilibrium of stresses or sectional forces of a glass pane

3.1.5
membrane effect
influence on stresses and sectional forces due to consideration of in-plane deflections in static equilibrium

3.1.6
axes of a glass pane, component or member and their direction
x-x in the glass pane, component or member, preferably one of the gravity lines

y-y perpendicular to the glass pane, defined by the x- and the z-axes

z-z in the glass pane, component or member, perpendicular to x-x

Note 1 to entry: The directions of x-, y- and z-axes should accord to those of thumb (x), index finger (y) and middle finger (z) of the right hand in the defined planes, see Figure 3.1.

Note 2 to entry: When bending about the y-axis occurs this axis is also called strong axis, and accordingly, when bending about the x-axis or the z-axis these axes are called weak axes.

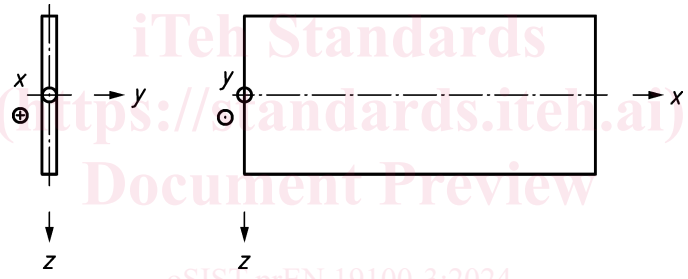

Figure 3.1 — Definition of axes of a glass pane, component or member and their direction

3.1.7
structural redundancy
ability of a structure to redistribute among its members/connections the loads which can no longer be carried by some other damaged portions

3.1.8
sudden fracture
fracture event of unpredictable origin

3.1.9
protection measure
measure that is intended to prevent or reduce the risk of accidental damage of a glass member that may affect its structural function

3.1.10
polymeric-modified mortar
mortar, used for filling gaps between glass and other parts for force and stress transmission

Note 1 to entry: For reasons of strength and ductility, to avoid stress peaks, polymeric materials are added to the mortar.

3.2 Symbols and abbreviations

3.2.1 Latin upper-case letters

A_i	Glass cross section area of ply i
C_1, C_2	Factors taking into account different bending moments
E	Modulus of elasticity for glass
F_{Ed}	Design loading on the structure
F_{cr}	Elastic critical buckling load for global instability mode based on initial elastic stiffnesses
G	Shear modulus of glass
G_{int}	Shear modulus of interlayer
I_i	Moment of inertia of ply i
$I_{T,eff}$	Effective torsional moment of inertia
$I_{z,eff}$	Effective moment of inertia about the minor axis (z-axis)
K_m	Equilibrium parameter
L_B	Buckling length
L_{LT}	Buckling length (lateral torsional buckling)
M_{Ed}	The design value of the moment
$M_{cr,LT}$	Critical buckling moment (lateral torsional buckling)
N_{Ed}	Design value of normal forces in the relevant direction of the considered cross section or joint
N_{cr}	Elastic critical force for the relevant buckling mode
P	Arbitrary in-plane load
$P_{fractured}$	Actions having been present in the plies whose fracture is investigated
$P_{unfractured}$	Actions having been and still being present in the unfractured part of the cross section
P_u	Ultimate arbitrary in-plane load
$P_{P,b}$	Applied bolt pre-stress
$P_{x,I}$ ($P_{x,m}$)	Forces according to Table C.1
$S_{b,Ed}$	Design bolt forces
$S_{Fr,b,Rd}$	Friction shear resistance
V_{Ed}	Design value of the shear force