



SLOVENSKI STANDARD
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Steklo v gradbeništvu - Posebni osnovni proizvodi - 1. del: Borosilikatno ravno steklo -1-1. del: Definicija in splošne fizikalne in mehanske lastnosti

Glass in building - Special basic products - Borosilicate float glass - Part 1-1: Definitions and general physical and mechanical properties

Glas im Bauwesen - Spezielle Basiserzeugnisse - Borosilikat-Floatglas - Teil 1-1: Definitionen und allgemeine physikalische und mechanische Eigenschaften

Verre dans la construction - Produits de base spéciaux - Glace borosilicate - Partie 1-1 : Définitions et propriétés physiques et mécaniques générales

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ICS:

81.040.20 Steklo v gradbeništvu Glass in building

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EUROPEAN STANDARD
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DRAFT
prEN 1748-1-1

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ICS 81.040.20

Will supersede EN 1748-1-1:2004

English Version

Glass in building - Special basic products - Borosilicate float glass - Part 1-1: Definitions and general physical and mechanical properties

Verre dans la construction - Produits de base spéciaux
- Glace de borosilicate - Partie 1-1 : Définitions et propriétés physiques et mécaniques générales

Glas im Bauwesen - Spezielle Basiserzeugnisse - Borosilikat-Floatglas - Teil 1-1: Definitionen und allgemeine physikalische und mechanische Eigenschaften

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 129.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents	Page
European foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Chemical composition	6
4.1 General	6
4.2 Tint	6
5 Physical and mechanical characteristics	6
5.1 General characteristics	6
5.2 Characteristic bending strength	7
5.3 Designation of clear borosilicate float glass	7
5.3.1 General	7
5.3.2 Clear transparent borosilicate float glass	8
5.4 Stability of physical and chemical characteristics	8
6 Dimensional requirements	9
6.1 Manufacturing dimensions	9
6.1.1 Stock sizes	9
6.1.2 Supplied and final cut sizes	9
6.2 Thickness and thickness tolerances	9
6.3 Length, width and squareness	10
7 Quality requirements	10
7.1 General	10
7.2 Quality criteria and their evaluation	11
7.2.1 Optical	11
7.2.2 Appearance	11
7.3 Methods of observation and measurement	11
7.3.1 Optical faults	11
7.3.2 Visual faults (spot faults, linear/extended faults)	12
7.4 Acceptance levels	13
7.4.1 Optical faults	13
7.4.2 Visual faults (spot faults, linear/extended faults)	13
7.5 Edge defects for final cut sizes	14
7.5.1 Entrant and emergent faults	14
7.5.2 Bevel	14
7.5.3 Limitations on edge defects	15
8 Designation	15
Annex A (informative) Complementary information related to REACH	16
Bibliography	17

European foreword

This document (prEN 1748-1-1:2017) has been prepared by Technical Committee CEN/TC 129 “Glass in Building”, the secretariat of which is held by NBN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1748-1-1:2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This European Standard consists of the following parts:

- EN 1748-1-1 Glass in Building — Special basic products - Borosilicate float glass — Part 1-1: Definitions and general physical and mechanical properties;
- EN 1748-1-2 Glass in Building — Special basic products - Borosilicate float glass — Part 1-2: Product standard.

This European Standard differs from EN 1748-1-1:2004 as follows:

- a) Rolled and Drawn sheet production methods have been removed, the standard scope is reduced to Borosilicate float glass (scope and title have been modified);
- b) chemical composition has been modified in Table 1;
- c) classes for linear expansion coefficients have been deleted (notes in Table 2);
- d) Clause 5 and Clause 6 have been revised, further nominal thicknesses have been added, sub Clause 6.3 “Tolerances and squareness” has been completely revised; the squareness of rectangular glass panes is now expressed by the difference between its diagonals;
- e) Clause 5 translucent borosilicate glass has been removed;
- f) Clause 7 has been completely revised (including the Zebra method of observation optical faults);
- g) Clause 7: categories of defects have been removed, only one quality is defined (Table 8);
- h) a new informative Annex A given complementary information related to REACH has been added;
- i) the document has been editorial revised.

prEN 1748-1-1:2017 (E)**1 Scope**

This European Standard specifies and classifies special basic products - borosilicate float glass, indicates their chemical composition, their main physical and mechanical characteristics, their dimensional and minimum quality requirements (in respect of optical and visual faults).

This European Standard applies to special basic products - borosilicate float glass supplied in stock sizes, supplied sizes or in cut sizes for final end use.

This European Standard does not apply to final cut sizes having a dimension less than 100 mm or a surface area less than 0,05 m².

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 410, *Glass in building — Determination of luminous and solar characteristics of glazing*

ISO 9385, *Glass and glass-ceramics — Knoop hardness test*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1**borosilicate glass**

silicate glass containing between 2 % and 5 % boron and with a chemical composition according to 4.1 of this standard

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Note 1 to entry: As a result of the composition it has a high thermal shock resistance and a very high hydrolytic and acid resistance.

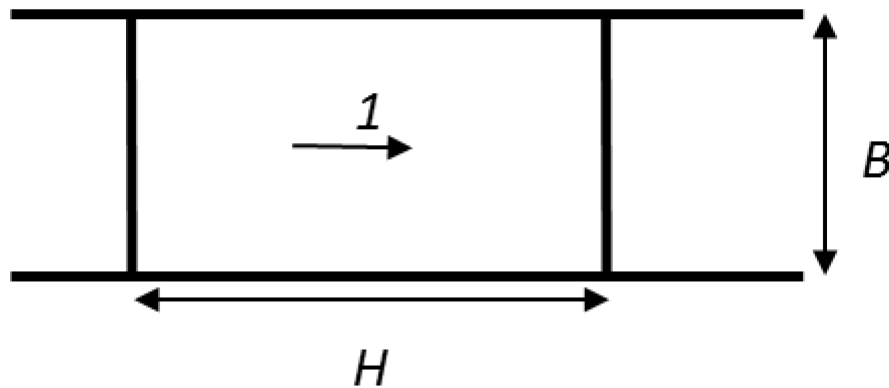
3.2**borosilicate float glass**

flat, transparent, clear or tinted borosilicate glass having parallel and polished faces obtained by continuous casting and floatation on a metal bath

Note 1 to entry: In French called 'glace' and in German 'Floatglas'.

3.3**length, *H* and width, *B***

defined with reference to the direction of draw of the glass ribbon as shown in Figure 1

**Key**

1 → direction of draw

H length

B width

Figure 1 — Relationship between length, width and direction of draw

3.4**stock sizes**

glass delivered in manufacturer's standard stock sizes

3.5**supplied size**

pane of glass that has been supplied either as raw material for further processing and/or cutting down to a size for installation

Note 1 to entry: This is a size that is outside the stock size.

3.6**final cut size**

pane of glass that has been cut down to the dimensions being required either for installation or processing into a final product

Note 1 to entry: Examples of processed final products are insulating glass units and thermally toughened safety glass of those dimensions.

3.7**optical fault**

fault which leads to distortions in the appearance of objects observed through the glass

3.8**visual fault**

fault which alters the visual quality of the glass

Note 1 to entry: Visual faults include spot faults and linear / extended faults.

3.9**spot fault**

nucleus which is generally accompanied by a halo of distorted glass

prEN 1748-1-1:2017 (E)

Note 1 to entry: Spot fault can be solid inclusions, bubbles, etc.

3.10**halo**

area locally distorted, generally around a point defect

3.11**linear/extended fault**

fault which can be on or in the glass, in the form of deposits, marks or scratches that occupy an extended length or area

3.12**edge defect**

defect which can occur on the edge of a cut size piece in the form of entrant and emergent fault and/or bevel

4 Chemical composition**4.1 General**

The magnitude of the proportions by mass of the principal constituents of borosilicate float glass covered by this European Standard is given in Table 1, see also Annex A.

NOTE Oxygen is not mentioned in Table 1 (see Annex A).

Table 1 — Magnitude of the proportions by mass of the constituents of borosilicate glass

Constituents	Proportion by mass of element
Silicon (Si)	32 % to 41 %
Aluminium (Al)	0 % to 4,3 %
Boron (Bo)	2 % to 5 %
Sodium (Na)	0 % to 6 %
Potassium (K)	0 % to 6,7 %
Other components excluding oxygen ^a	< 5 %

^a Properties other than photometric characteristics shall not be significantly altered by these other components.

4.2 Tint

Body tinted glass is obtained by the addition of suitable materials.

5 Physical and mechanical characteristics**5.1 General characteristics**

Conventional numerical values for the physical and mechanical characteristics of borosilicate float glass excluding 'Characteristic bending strength' ($f_{g,k}$) are given in Table 2. These values, for normal annealed glass without any further toughening, are not precise requirements with which the glass shall strictly comply, but are the generally accepted figures for use in calculations where a high degree of accuracy is not required.

Table 2 — General characteristic values of borosilicate glass

Characteristic	Symbol	Value and unit
Density (at 18 °C)	ρ	2 200 kg/m ³ to 2 500 kg/m ³
Hardness (Knoop)	HK _{0,1/20}	450 to 600 ^a
Young's modulus (modulus of elasticity)	E	(6 to 7) × 10 ¹⁰ Pa
Poisson's ratio	μ	0,2
Specific heat capacity	C_p	0,8 × 10 ³ J/(kg·K)
Nominal value of average coefficient of linear expansion between 20 °C and 300 °C	α	(3,1 to 6,0) × 10 ⁻⁶ /K
Resistance against temperature differential and sudden temperature change	\square	80 K ^b
Thermal conductivity	λ	1,2 W/(m·K)
Mean refractive index to visible radiation (at 589,3 nm)	n	1,5
Emissivity (corrected)	ε	0,837

^a Knoop Hardness in accordance with ISO 9385.
^b Generally accepted value that is influenced by edge quality and glass type.

5.2 Characteristic bending strength

The characteristic bending strength value applies to quasi-static loading over a short time (e.g. wind loading) and relate to a 5 % probability of breakage at the lower limit of the 95 % confidence interval.

The value of the characteristic bending strength, $f_{g,k}$, for borosilicate float glass is 45 MPa.

NOTE Methods of determination of the bending strength of glass are given in EN 1288-1, EN 1288-2, EN 1288-3, (see [1], [2], [3]). Design of glass panes is covered by prEN 16612 (see [4]).

5.3 Designation of clear borosilicate float glass

5.3.1 General

A borosilicate float glass product is designated as clear borosilicate float glass when it is not tinted and when the light transmittance of the glass material, unmodified by the possible presence of a coating or surface roughness, complies with 5.3.2.

In order to measure the light transmittance characteristics of glass and to determine whether it can be designated as a clear glass, it is necessary, in some cases, to carry out a pre-treatment such as the following:

- coatings on smooth surfaces shall be eliminated, without modifying the thickness of the glass substrate;
- rough surfaces, with or without coatings, shall be eliminated by smoothing and polishing. The thickness of the glass will be modified by this process.

The light transmittance of the glass substrate shall be measured with its surfaces in a polished condition.

prEN 1748-1-1:2017 (E)

NOTE The light transmittance values given in 5.3.2 are not suitable for design. They are values used only for the designation of clear glass and exclude the effects of coatings and of surface roughness. The values of light transmittance used for design can be obtained from the glass manufacturer. They are determined in accordance with EN 410.

5.3.2 Clear transparent borosilicate float glass

A transparent borosilicate float glass product shall be designated as clear glass when it is not tinted and when its light transmittance:

- after any necessary pre-treatment,
- measured according to EN 410 and
- rounded to the nearest 0,01

is greater than or equal to the value given in Table 3 for the nominal thickness of the glass product.

NOTE The limiting value given in Table 3 is appropriate, provided that the measured thickness of the glass product is within the allowable tolerances for the nominal thickness of that glass product.

Table 3 — Minimum light transmittance values for designating a transparent glass product as clear

Nominal thickness [mm]	Minimum value
1,1 to 5	0,90
5,5 to 8	0,89
9 to 12	0,86
15	0,84
19	0,82
25	0,80

5.4 Stability of physical and chemical characteristics

For borosilicate float glass products, the physical and chemical characteristics can be considered as remaining constant over time due to the following reasons.

- a) Since glass is insensitive to photochemical effects, the spectral properties (transmissions of light and solar energy) of the basic glass products are not modified by direct or indirect solar radiation.
- b) The surface of glass used in building is virtually insensitive to attack from the environment.

Whilst the surface of the glass when installed in a building is virtually insensitive to attack from water care should be taken to protect the glass surface prior to installation. Inappropriate storage can result in water/humidity being drawn up between glass sheets. This concentrated environment can cause attack of the surface (see [5]).