

**SLOVENSKI STANDARD**  
**SIST EN 1748-1-1:2004****01-november-2004****BUXca Yý U**  
**SIST EN 1748-2:1999**

---

**Steklo v stavbah - Posebni osnovni proizvodi - 1. del: Borosilikatno steklo -1-1.**  
**del: Definicija in splošne fizikalne in mehanske lastnosti**

Glass in building - Special basic products -Borosilicate glasses - Part 1-1: Definition and general physical and mechanical properties

Glas im Bauwesen - Spezielle Basiserzeugnisse - Borosilicatgläser - Teil 1-1:  
Definitionen und allgemeine physikalische und mechanische Eigenschaften  
(standards.iteh.ai)Verre dans la construction - Produits de base spéciaux - Verres borosilicates - Partie 1-1 : Définitions et propriétés physiques et mécaniques générales  
b29-86fe-bdb3ea4da397/sist-en-1748-1-1-2004**Ta slovenski standard je istoveten z: EN 1748-1-1:2004****ICS:**

01.040.81	Úc\ æ•\æš Á^!æ ã} æ ã á • dæU  çæD	Glass and ceramics industries (Vocabularies)
81.040.20	Steklo v gradbeništvu	Glass in building

**SIST EN 1748-1-1:2004** **en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 1748-1-1:2004](#)

<https://standards.iteh.ai/catalog/standards/sist/d011f949-1ba1-4b29-86fe-bdb3ea4da397/sist-en-1748-1-1-2004>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 1748-1-1**

September 2004

ICS 01.040.81; 81.040.20

Supersedes EN 1748-1:1997

English version

## Glass in building - Special basic products -Borosilicate glasses - Part 1-1: Definition and general physical and mechanical properties

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

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

This European Standard was approved by CEN on 21 June 2004.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/d011f949-1ba1-4b29-86fe-bdb3ea4da397/sist-en-1748-1-1-2004>



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

<b>Contents</b>	<b>Page</b>
Foreword.....	3
1 Scope .....	4
2 Normative references .....	4
3 Terms and definitions .....	4
4 Chemical composition .....	6
4.1 Principal constituents .....	6
4.2 Tint .....	6
5 Physical and mechanical characteristics.....	6
5.1 General characteristics .....	6
5.2 Definition of clear borosilicate glass .....	7
5.2.1 Clear transparent borosilicate glass.....	8
5.2.2 Clear translucent borosilicate glass .....	8
5.3 Stability of physical and chemical characteristics.....	9
6 Dimensional requirements.....	9
6.1 Manufacturing dimensions .....	9
6.1.1 Stock sizes .....	9
6.1.2 Final cut sizes .....	9
6.2 Thickness .....	9
6.2.1 Tolerances .....	9
6.3 Length, width, squareness and tolerances .....	10
7 Quality requirements.....	11
7.1 Methods of observation and measurement .....	11
7.1.1 Optical faults .....	11
7.1.2 Visual faults .....	12
7.2 Acceptance levels.....	12
7.2.1 Optical faults, spot faults, linear/extended faults.....	12
7.2.2 Edge defects for final cut sizes .....	13
8 Designation .....	16
Bibliography .....	17

## Foreword

This document (EN 1748-1-1:2004) has been prepared by Technical Committee CEN /TC 129 "Glass in building", the secretariat of which is held by BIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2005, and conflicting national standards shall be withdrawn at the latest by March 2005.

This document supersedes EN 1748-1:1997.

This document consists of the following parts:

- |             |  |
|-------------|--|
| EN 1748-1-1 | <i>Glass in building - Special basic products - Borosilicate glasses – Part 1-1:<br/>Definition and general physical and mechanical properties</i> |
| EN 1748-1-2 | <i>Glass in building - Special basic products - Borosilicate glasses – Part 1-2:<br/>Evaluation of conformity/Product standard</i>                 |

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/d011f949-1ba1-4b29-86fe-bdb3ea4da397/sist-en-1748-1-1-2004>

**EN 1748-1-1:2004 (E)****1 Scope**

This document defines and classifies borosilicate glasses for use in building. It indicates their chemical composition, main physical and mechanical properties, dimensional and minimum quality requirements (in respect of optical and visual faults).

This document applies to borosilicate glasses supplied in stock sizes or in cut sizes for final end use.

This document does not apply to final cut sizes having a dimension less than 100 mm or a surface area less than 0,05 m<sup>2</sup>.

**2 Normative references**

The following referenced documents are indispensable for the application 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.

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

**3 Terms and definitions**

**ITeh STANDARD PREVIEW**  
(standards.iteh.ai)

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

**3.1****borosilicate glass**

silicate glass containing between 7 % and 15 % boron oxide. 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 or translucent, clear or tinted borosilicate glass having parallel and polished faces obtained by continuous casting and flotation on a metal bath.

**3.3****drawn sheet borosilicate glass**

flat, transparent or translucent, clear or tinted borosilicate glass obtained by continuous drawing of a regular thickness and with two surfaces fire polished.

**3.4****rolled borosilicate glass**

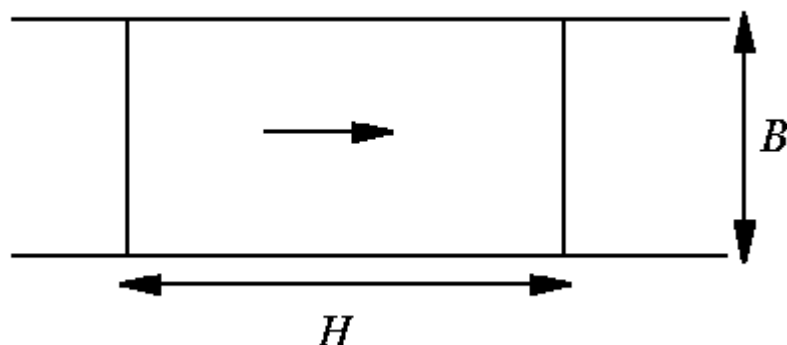
flat, transparent or translucent, clear or tinted borosilicate glass obtained by rolling.

**3.5****cast borosilicate glass**

flat, transparent or translucent, clear or tinted borosilicate glass obtained by casting.

**3.6****nominal length, *H* and nominal width, *B***

pane length or pane width defined with reference to the direction of draw of the glass ribbon as shown in Figure 1, except for cast borosilicate glass which does not have a direction of draw.



### Key

→ Direction of draw

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

### 3.7

#### stock sizes

glass delivered in manufacturers standard stock sizes.

### 3.8

#### final cut size

a pane of glass that has been cut down to the dimensions being required either for installation or processing into a final product e.g. insulating glass units, thermally toughened safety glass.

### 3.9

#### optical faults

these are faults, which lead to distortions on the appearance of objects observed through the glass.

### 3.10

#### visual faults

these are faults, which alter the visual quality of the glass. They are spot faults and linear / extend faults.

### 3.11

#### spot faults

a spot fault is a nucleus, which is sometimes accompanied by a halo of distorted glass. The dimension of a spot fault comprising a nucleus with a halo is obtained by multiplying the dimension of the nucleus by a factor of approximately 3.

### 3.12

#### linear / extended faults

these faults can be on or in the glass, in the form of deposits, marks or scratches that occupy an extended length or area.

### 3.13

#### edge defects

these defects can occur on the edge of a cut size piece in the form of entrant and emergent faults and / or bevels.

### 3.14

#### concentration, c

the sum of the lengths of gaseous inclusions greater than 1,0 mm in any circle of 400 mm diameter.

**EN 1748-1-1:2004 (E)****4 Chemical composition****4.1 Principal constituents**

The magnitude of the proportions by mass of the principal constituents of all the borosilicate glass products covered by this standard is as follows:

— Silicon Dioxide	SiO <sub>2</sub>	70 % to 87 %
— Boron Oxide	B <sub>2</sub> O <sub>3</sub>	7 % to 15 %
— Sodium Oxide	Na <sub>2</sub> O	0 % to 8 %
— Potassium Oxide	K <sub>2</sub> O	0 % to 8 %
— Aluminium Oxide	Al <sub>2</sub> O <sub>3</sub>	0 % to 8 %
— Others		0 % to 8 %

**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 the glass used to manufacture basic products are given in Table 1. 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 1 — Physical and mechanical characteristics of borosilicate glass

Characteristic	Symbol	Value and unit
Density (at 18 °C)	$\rho$	2200 kg/m <sup>3</sup> to 2500 kg/m <sup>3</sup>
Hardness (Knoop)	$HK_{0,1/20}$	4,5 to 6 GPa
Young's modulus (modulus of elasticity)	$E$	6 x 10 <sup>10</sup> Pa to 7 x 10 <sup>10</sup> Pa
Poisson's ratio	$\mu$	0,2
Characteristic bending strength	$f_{g,k}$	45 x 10 <sup>6</sup> Pa <sup>[1]</sup>
Specific heat capacity	$c_p$	0,8 x 10 <sup>3</sup> J/(kg*K)
Nominal value of average coefficient of linear expansion between 20 °C and 300 °C	$\alpha$	Class 1: (3,1 to 4,0)x10 <sup>-6</sup> /K Class 2: (4,1 to 5,0)x10 <sup>-6</sup> /K Class 3: (5,1 to 6,0)x10 <sup>-6</sup> /K
Resistance against temperature differential and sudden temperature change		80 K <sup>[2]</sup>
Thermal conductivity	$\lambda$	1 W/(m*K)
Mean refractive index to visible radiation (380 nm to 780 nm)	$n$	1,5
Emissivity (corrected)	$\epsilon$	0,837
<sup>[1]</sup> A design method will be made available from TC 129 WG8 (prEN 13473) <sup>[2]</sup> Generally accepted value that is influenced by edge quality and glass type		

## 5.2 Definition of clear borosilicate glass

A borosilicate glass product is defined as clear borosilicate glass when it is not tinted and when the light transmittance of the glass material unmodified by the possible presence of a coating and/or surface roughness of, for example, a rolled borosilicate glass, complies with 5.2.1 and 5.2.2.

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

- coatings on smooth surfaces have to be eliminated, without modifying the thickness of the glass substrate.
- rough surfaces, with or without coatings, have to 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.

Clear glass is defined as a glass which is not tinted and which has, after any necessary pre-treatment, a minimum light transmittance according to 5.2.1 and 5.2.2.

NOTE: The values given in 5.2.1 and 5.2.2 are not suitable for design. They are values used only for the definition of clear glass and exclude the effects of coatings and of surface roughness. The values of light transmittance used for design could be obtained from the glass manufacturer. They are determined in accordance with EN 410.