



SLOVENSKI STANDARD

oSIST prEN 13024-2:2018

01-april-2018

Steklo v stavbah - Toplotno kaljeno borosilikatno varnostno steklo - 2. del: Standard za izdelek

Glass in building - Thermally toughened borosilicate safety glass - Part 2: Product standard

Glas im Bauwesen - Thermisch vorgespanntes Borosilicat-Einscheibensicherheitsglas - Teil 2: Produktnorm

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Verre dans la construction - Verre borosilicate de sécurité trempé thermiquement - Partie 2: Norme de produit

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EUROPEAN STANDARD
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Glass in building - Thermally toughened borosilicate safety glass - Part 2: Product standard

Verre dans la construction - Verre borosilicate de sécurité trempé thermiquement - Partie 2: Norme de produit

Glas im Bauwesen - Thermisch vorgespanntes Borosilicat-Einscheiben-Sicherheitsglas - Teil 2: Produktnorm

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

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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prEN 13024-2:2018 (E)**European foreword**

This document (prEN 13024-2:2018) 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 13024-2:2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports basic work requirements of EU Regulation and essential requirements of EU Directive(s).

For relationship with EU Regulation/Directive(s), see informative Annex ZA, which is an integral part of this document.

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

- a) The standard has been revised to fulfil the requirements of the Regulation (EU) No 305/2011 (Construction Product Regulation), modified by Regulations (EU) No 157/2014, (EU) No 568/2014 and (EU) No 574/2014.
- b) The solar factor, g , is listed within the spectrophotometric characteristics to be declared in the Declaration of Performances (DoP).
- c) The durability/conformity assessment is listed within the characteristics to be declared in the DoP.
- d) The mechanical resistance shall be given in the DoP by the characteristic bending strength.

This document is part of the standard series EN 13024 consisting of:

- EN 13024-1, *Glass in building — Thermally toughened borosilicate safety glass — Part 1: Definition and description*;
- EN 13024-2, *Glass in building — Thermally toughened borosilicate safety glass — Part 2: Product standard*.

This document contains other aspects of importance for trade.

1 Scope

This document covers the assessment and verification of constancy of performances and the factory production control of flat thermally toughened borosilicate safety glass for use in buildings.

NOTE For glass products with electrical wiring or connections for, e.g. alarm or heating purposes, other directives, e.g. Low Voltage Directive, may apply.

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.

EN 356, *Glass in building — Security glazing — Testing and classification of resistance against manual attack*

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

EN 673, *Glass in building — Determination of thermal transmittance (U value) — Calculation method*

EN 1063, *Glass in building — Security glazing — Testing and classification of resistance against bullet attack*

EN 1096-1, *Glass in building — Coated glass — Part 1: Definitions and classification*

EN 1096-2:2012, *Glass in building — Coated glass — Part 2: Requirements and test methods for class A, B and S coatings*

EN 1096-3:2012, *Glass in building — Coated glass — Part 3: Requirements and test methods for class C and D coatings*

EN 12600, *Glass in building — Pendulum test — Impact test method and classification for flat glass*

EN 12758, *Glass in building — Glazing and airborne sound insulation — Product descriptions and determination of properties*

EN 12898, *Glass in building — Determination of the emissivity*

prEN 13024-1:2018, *Glass in building — Thermally toughened borosilicate safety glass — Part 1: Definition and description*

EN 13501-1, *Fire classification of construction products and building element — Part 1: Classification using test data from reaction to fire tests*

EN 13501-2, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*

EN 13501-5, *Fire classification of construction products and building elements — Part 5: Classification using data from external fire exposure to roofs tests*

EN 13541, *Glass in building — Security glazing — Testing and classification of resistance against explosion pressure*

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EN 15998, *Glass in building — Safety in case of fire, fire resistance — Glass testing methodology for the purpose of classification*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13024-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1**factory production control****FPC**

documented, permanent and internal control of production in a factory, in accordance with this standard

Note 1 to entry: See also Annexes A and B.

3.2**product-type**

set of representative performance levels or classes of a construction product, in relation to its essential characteristics, produced using a given combination of raw materials or other elements in a specific production process

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3.3**essential characteristic**

characteristic of the construction product which relate to the basic requirements for construction works

Note 1 to entry: Basic requirements for construction work are given in the regulation (EU) No 305/2011, Annex I.

3.4**performance of a construction product**

performance related to the relevant essential characteristics, expressed by level or class, or in a description

3.5**level**

result of the assessment of the performance of a construction product in relation to its essential characteristics, expressed as a numerical value

3.6**class**

range of levels, delimited by a minimum and a maximum value, of performance of a construction product

3.7**type testing****TT**

determination of the performance of a product (characteristic, durability), on the basis of either actual tests or other procedures (such as conventional, standardized, tabulated or general accepted values, standardized or recognized calculation methods, test reports when made available, ...), in accordance with this European standard and that demonstrates compliance with this European standard

3.8**test report**

document that covers the results of tests undertaken on a representative sample of the product from production or on a prototype design of the product

3.9**product description**

document that details the relevant parameters, e. g. process conditions, structure, etc., for defining a product that complies with the standard and that includes specific reference(s) to characteristics that are modified by the production process

3.10**product family**

group of products determined by the manufacturer, which is made with similar components and processes and which is tested for FPC using the same test method

3.11**significant change**

variation in performance beyond the permitted tolerance for the characteristic

4 Requirements**4.1 Product description**

For conformity purposes, the thermally toughened borosilicate safety glass manufacturer is responsible for the preparation and maintenance of a product description. This description shall describe the product and/or product family.

Disclosure of the product description shall be at the discretion of the thermally toughened borosilicate safety glass manufacturer or his agent except in the case of regulatory requirements.

The product description shall contain at least the following:

- a reference to EN 13024-1 and EN 13024-2 and all other standards with which the manufacturer claims compliance;
- the spectrophotometric properties and durability of coated glass, i.e. coated glass that conforms with EN 1096-1, EN 1096-2, EN 1096-3, when those properties are changed, intentionally or unintentionally, by the thermal toughening process.

The definition of product families shall be consistent with the product description.

The substitution of materials shall maintain the conformity with the product description. The substituting material can be added to the product family and also the product description when compliance has been demonstrated.

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4.2 Determination of the characteristic's performances

4.2.1 Characteristics of thermally toughened borosilicate safety glass

4.2.1.1 General

The characteristics of thermally toughened borosilicate safety glass, listed in Table 1, are in general those of the glass substrate and can be found in the appropriate product standard (see 4.2.1.2). Since they are not changed significantly by the thermal toughening process, they shall be used for thermally toughened borosilicate safety glass. The exceptions shall be the characteristic bending strength ($f_{g,k}$) and the resistance against sudden temperature changes and temperature differentials.

For glass substrates covered by Harmonized European specifications, generally accepted values, declared values, or calculated values of the characteristics listed in Table 1 shall be used.

If glass panes are used which are not covered by Harmonized European specifications (as defined in regulation EU305/2011), it shall be demonstrated that those glasses have a chemical composition and mechanical stability over time equivalent to the requirements of the relevant standard listed.

Table 1 — Characteristics of glass substrates

Characteristic	Symbol	Unit
Density	ρ	kg/m ³
Hardness (Knoop hardness in accordance with ISO 9385)	$HK_{0,1/20}$	Dimensionless
Young's modulus	E	GPa
Poisson's ratio	μ	Dimensionless
Characteristic bending strength	$f_{g,k}$	MPa
Resistance against sudden temperature changes and temperature differentials	-	K
Specific heat capacity	c	J/(kg·K)
Coefficient of linear expansion	$\alpha_{ }$	K ⁻¹
Thermal conductivity	λ	W/(m·K)
Mean refractive index to visible radiation	n	Dimensionless

4.2.1.2 Glass panes used as substrates for the production of thermally toughened borosilicate safety glass

The glass substrates listed in prEN 13024-1:2018, Clause 4, may be used for the production of thermally toughened borosilicate safety glass.

4.2.2 Determination of characteristics of thermally toughened borosilicate safety glass

4.2.2.1 General

If the thermally toughened borosilicate safety glass manufacturer wishes to claim that any performance characteristic is independent of the production equipment used, then the factory production control system shall be in accordance with this document including his specific process control conditions.

4.2.2.2 Safety in the case of fire - Resistance to fire

Fire resistance shall be determined and classified in accordance with EN 13501-2.

The testing methodology specified in EN 15998 shall be used for glass products that are claiming fire resistance.

4.2.2.3 Safety in the case of fire - Reaction to fire

Reaction to fire shall be determined and classified in accordance with EN 13501-1.

Thermally toughened borosilicate safety glass is a product / material that does not require to be tested for reaction to fire (e.g. products/materials of Classes A1 according to Commission Decision 96/603/EC, as amended 2000/605/EC).

4.2.2.4 Safety in the case of fire - External fire performances (for roof coverings only)

Where the manufacturer wishes to declare external fire performance (e.g. when subject to regulatory requirements), the product shall be tested and classified in accordance with EN 13501-5.

4.2.2.5 Safety in use - Bullet resistance: shatter properties and resistance to attack

Bullet resistance shall be determined and classified in accordance with EN 1063.

4.2.2.6 Safety in use - Explosion resistance: impact behaviour and resistance to impact

Explosion resistance shall be determined and classified in accordance with EN 13541.

4.2.2.7 Safety in use - Burglar resistance: shatter properties and resistance to attack

Burglar resistance shall be determined and classified in accordance with EN 356.

4.2.2.8 Safety in use - Pendulum body impact resistance: shatter properties (safe breakability) and resistance to impact

Pendulum body impact resistance shall be determined and classified in accordance with EN 12600 and with Annex D, D.5. <https://standards.iteh.ai/catalog/standards/sist/8a427edd-baf2-4e3e-86c8->

4.2.2.9 Safety in use - Mechanical resistance: Resistance against sudden temperature changes and temperature differentials

The resistance against sudden temperature changes and temperature differentials is a generally accepted value that is given in EN 13024-1 and shall be ensured by compliance with this standard.

4.2.2.10 Safety in use - Mechanical resistance: Resistance against wind, snow, permanent load and/or imposed loads of the glass unit

The mechanical resistance of thermally toughened borosilicate safety glass is a characteristic value that shall be ensured by compliance with this document.

The value to be declared is the characteristic bending strength of glass, as defined in prEN 13024-1:2018, Table 8.

4.2.2.11 Protection against noise - Direct airborne sound reduction

The sound reduction indexes shall be determined in accordance with EN 12758. However, the information supplied with the incoming glass may be used, as the thermal toughening process does not alter the values.

The values to be declared shall be rounded down to the nearest whole number.

4.2.2.12 Energy conservation and heat retention - Thermal properties

The thermal transmittance value (*U*-value) shall be determined in accordance with the following procedure:

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- a) The normal emissivity ε shall be the declared value of the glass component manufacturer, whether or not the glass is coated. The declared value shall be the one of the toughened state.
- 1) If the values are not altered by the toughening process, a new type test is not necessary.
 - 2) In the case of values supplied by the manufacturer of the coated glass, toughenable or to be toughened, these values can be accepted if the toughening process has been undertaken in accordance with the instructions from the coated glass supplier.
- b) In the case of thermally toughened coated glasses, if the information is not available, the normal emissivity shall be determined in accordance with EN 12898 and Annex C of this standard. The test specimen for measurement shall be prepared in accordance with EN 1096-2:2012, Annex A or EN 1096-3:2012, Annex A.
- c) The U-value shall be determined by calculation in accordance with EN 673, using the normal emissivity as defined above and the nominal thickness of the glass pane.

4.2.2.13 Energy conservation and heat retention - Radiation properties: Light transmittance and reflectance

The light transmittance and light reflectance shall be determined in accordance with the following procedure:

- a) The light transmittance and light reflectance shall be the declared value of the glass component manufacturer, whether or not the glass is coated. The declared value shall be the one of the toughened state.
- 1) If the values are not altered by the toughening process, a new type test is not necessary.
 - 2) In the case of values supplied by the manufacturer of the coated glass, toughenable or to be toughened, these values can be accepted if the toughening process has been undertaken in accordance with the instructions from the coated glass supplier.
- b) In the case of thermally toughened coated glasses, if the information is not available, the light transmittance and light reflectance shall be determined in accordance with EN 410 and Annex C of this standard, for one thickness. The test specimen for measurement shall be prepared in accordance with EN 1096-2:2012, Annex A or EN 1096-3:2012, Annex A.
- c) The light transmittance and the light reflectance of any other thickness shall be calculated according to EN 410.
- d) The tool used to calculate the light transmittance and the light reflectance shall be validated.

The tolerances on the calculated light transmittance and light reflectance are given in Annex C.

4.2.2.14 Energy conservation and heat retention - Radiation properties: Solar energy characteristics

The solar direct transmittance, the solar direct reflectance and the total solar energy transmittance (solar factor or g -value) shall be determined in accordance with the following procedure:

- a) The solar direct transmittance, the solar direct reflectance and the total solar energy transmittance (solar factor or g -value) shall be the declared value of the glass component manufacturer, whether or not the glass is coated. The declared value shall be the one of the toughened state.
- 1) If the values are not altered by the toughening process, a new type test is not necessary.