SLOVENSKI STANDARD
oSIST prEN 14449:2017

01-december-2017

Steklo v gradbeništvu - Lepljeno steklo in lepljeno varnostno steklo - Standard za proizvod

Glass in building - Laminated glass and laminated safety glass - Product standard

Glas im Bauwesen - Verbundglas und Verbund-Sicherheitsglas - Produktnorm

Verre dans la construction - Verre feuilleté et verre feuilleté de sécurité - Norme de produit

Ta slovenski standard je istoveten z: **prEN 14449**

ICS:

81.040.20 Steklo v gradbeništvu Glass in building

oSIST prEN 14449:2017 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 14449

November 2017

ICS 81.040.20

Will supersede EN 14449:2005

English Version

Glass in building - Laminated glass and laminated safety glass - Product standard

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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

This document (prEN 14449:2017) 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 14449:2005.

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 Regulations/Directive(s), see informative Annex ZA, which is an integral part of this document.

The main changes compared to the previous edition are the following:

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 of the glass components and the stiffness family of the interlayer(s).

This document contains other aspects of importance for trade.

1 Scope

This European Standard covers the assessment and verification of constancy of performances and the factory production control of laminated glass and laminated 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 572-1, *Glass in building — Basic soda-lime silicate glass products — Part 1: Definitions and general physical and mechanical properties*

EN 572-2, *Glass in building — Basic soda lime silicate glass products — Part 2: Float glass*

EN 572-3, *Glass in building — Basic soda lime silicate glass products — Part 3: Polished wired glass*

EN 572-4, *Glass in building — Basic soda lime silicate glass products — Part 4: Drawn sheet glass*

EN 572-5, *Glass in building — Basic soda lime silicate glass products — Part 5: Patterned glass*

EN 572-6, *Glass in building — Basic soda lime silicate glass products — Part 6: Wired patterned glass*

EN 572-8, *Glass in building — Basic soda-lime silicate glass products — Part 8: Supplied and final cut sizes*

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

EN 1036-1, *Glass in building — Mirrors from silver-coated float glass for internal use — Part 1: Definitions, requirements and test methods*

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 1748-1-1, *Glass in building — Special basic products —Borosilicate glasses — Part 1-1: Definition and general physical and mechanical properties*

EN 1748-2-1, *Glass in building — Special basic products - Glass ceramics — Part 2-1 Definitions and general physical and mechanical properties*

EN 1863-1, *Glass in building — Heat strengthened soda lime silicate glass — Part 1: Definition and description*

EN 12150-1, *Glass in building — Thermally toughened soda lime silicate safety glass — Part 1: Definition and description*

EN 12337-1, *Glass in building — Chemically strengthened soda lime silicate glass — Part 1: Definition and description*

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*

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

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using 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*

EN 14178-1, *Glass in building — Basic alkaline earth silicate glass products — Part 1: Float glass*

EN 14179-1, *Glass in building — Heat soaked thermally toughened soda lime silicate safety glass — Part 1: Definition and description*

EN 14321-1, *Glass in building - Thermally toughened alkaline earth silicate safety glass — Part 1: Definition and description*

EN 15681-1, *Glass in building — Basic alumino silicate glass products — Part 1: Definitions and general physical and mechanical properties*

EN 15682-1, *Glass in building — Heat soaked thermally toughened alkaline earth silicate safety glass — Part 1: Definition and description*

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

EN 16477-1, *Glass in building — Painted glass for internal use — Part 1: Requirements*

prEN 16612, *Glass in building — Determination of the lateral load resistance of glass panes by calculation*

EN ISO 12543-1:2011, *Glass in building — Laminated glass and laminated safety glass — Part 1: Definitions and description of component parts (ISO 12543-1:2011)*

EN ISO 12543-2:2011, *Glass in building — Laminated glass and laminated safety glass — Part 2: Laminated safety glass (ISO 12543-2:2011)*

EN ISO 12543-3:2011, *Glass in building — Laminated glass and laminated safety glass — Part 3: Laminated glass (ISO 12543-3:2011)*

EN ISO 12543-4:2011, *Glass in building — Laminated glass and laminated safety glass — Part 4: Test methods for durability (ISO 12543-4:2011)*

EN ISO 12543-5:2011, *Glass in building — Laminated glass and laminated safety glass — Part 5: Dimensions and edge finishing (ISO 12543-5:2011)*

EN ISO 12543-6:2011, *Glass in building — Laminated glass and laminated safety glass — Part 6: Appearance (ISO 12543-6:2011)*

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 ISO 12543-1:2011, EN ISO 12543-2:2011, EN ISO 12543-3:2011, EN ISO 12543-4:2011, EN ISO 12543-5:2011 and EN ISO 12543-6:2011, 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, B and C.

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

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 document 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, type and subtype of interlayer, type of glasses 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
significant change
variation in performance beyond the permitted tolerance for the characteristic which is not covered by substitution rules

3.11
folio interlayer
solid film which is placed between the plies of glass or plastics

Note 1 to entry: Folio interlayers differ with respect to the polymer types and their subtypes. Examples of polymers are PVB, EVA, PUR, ionomers.

Note 2 to entry: Examples of subtypes of polymers are characterized by colour, acoustic properties and adhesion level.

3.12
cast-in-place interlayer
interlayer which is obtained by pouring a liquid between the plies of glass or plastic glazing material and curing it thus achieving a solid film

Note 1 to entry: Cast-in-place interlayers differ with respect to the polymer types and their subtypes. Examples of polymers are PUR, PMMA.

Note 2 to entry: Examples of subtypes of polymers depend on characteristics in use: e.g. clear or tinted, acoustic, safety, etc.

3.13
fire protection interlayer
interlayer which comprises a significant amount of water, and reacts at high temperatures to give the product its fire resistant properties

3.14
product family
group of products determined by the manufacturer, which is made with the same interlayer type (polymers for folio/sheets, cast in place interlayers, fire protection interlayers) and which is tested for TT/FPC using the same test method

Note 1 to entry: The presence of inserts may lead to a new family.

Note 2 to entry: The presence of different interlayer subtypes may lead to a new family.

4 Requirements

4.1 Product description

For conformity purposes, the laminated/laminated safety glass manufacturer is responsible for the preparation and maintenance of a product description. This description shall describe the product and product family. A product family can be related e.g. to the performance, to the composition or to a combination of these.

An exchange of interlayer types within one product family is not allowed. An exchange of subtypes is allowed provided the performance characteristics remain unchanged.

Disclosure of the product description shall be at the discretion of the laminated/laminated 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 ISO 12543-1 to -6 and prEN 14449, and all other standards with which the manufacturer claims compliance,

— component parts:

  — glass types and thicknesses (see 4.2.1.2);

  — plastics glazing sheet materials types and thicknesses;

  — interlayer types, subtypes and thicknesses;

— the order of stacking of the components;

— lamination process, e.g. folio, cast-in-place, etc.;

— coatings if present and their position relative to an interlayer.

The interlayers may be listed either in full, i.e. chemical composition, or by a manufacturer's code.

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

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

4.2 Determination of the characteristic's performances

4.2.1 Characteristics of laminated glass and laminated safety glass

4.2.1.1 General

The characteristics of laminated glass and laminated safety glass, listed in Table 1, are those of the glass panes used as components (see 4.2.1.2).. Since they are not changed significantly by the laminating process, they shall be used for laminated glass and laminated safety glass.

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.

Table 1 — Characteristics of glass components

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	α_l	K^{-1}
Thermal conductivity	λ	W/(m.K)
Mean refractive index to visible radiation	n	Dimensionless

4.2.1.2 Glass panes used as components for the production of laminated and laminated safety glass

4.2.1.2.1 General

Glass substrates used for the production of laminated glass and laminated safety glass:

— shall be covered by Harmonized European Specifications (as defined in regulation EU 305/2011) as listed below, or,

— if not covered by Harmonized European Specifications, demonstration shall be made that those glasses have a chemical composition and a mechanical stability over time equivalent to the requirements of the relevant standard listed.

4.2.1.2.2 Basic glasses

These are glass products manufactured from soda lime silicate glass in accordance with EN 572-1 and consist of the follows:

— Float glass	EN 572-2
— Polished wired glass	EN 572-3
— Drawn sheet glass	EN 572-4
— Patterned glass	EN 572-5
— Wired patterned glass	EN 572-6
— Supplied and final cut sizes	EN 572-8

4.2.1.2.3 Special basic glasses

These are glass products manufactured from a variety of compositions, which are in accordance with appropriate European standards, and consist of the follows:

— Borosilicate glass	EN 1748-1-1
— Glass ceramics	EN 1748-2-1
— Alkaline earth silicate glass	EN 14178-1
— Alumino silicate glass	EN 15681-1

4.2.1.2.4 Strengthened glasses

These are soda lime silicate glasses that have been strengthened by thermal or chemical means and are as follows:

— Heat strengthened	EN 1863-1
— Chemically strengthened	EN 12337-1

4.2.1.2.5 Thermally toughened safety glasses

These are glasses that have been toughened by thermal treatment and are as follows:

— Thermally toughened soda lime silicate safety glass	EN 12150-1
— Thermally toughened borosilicate safety glass	EN 13024-1
— Heat soaked thermally toughened soda lime silicate safety glass	EN 14179-1
— Thermally toughened alkaline earth silicate safety glass	EN 14321-1
— Heat soaked thermally toughened alkaline earth silicate safety glass	EN 15682-1

4.2.1.2.6 Coated glass

— Coated glass	EN 1096-1

4.2.1.2.7 Surface worked glass

— Surface worked glass (e.g. sand blasted, acid etched)

The glass panes, processed or unprocessed, may be:

— transparent, translucent or opaque;

— clear or coloured.

4.2.1.2.8 Mirrors

— Silvered glass EN 1036-1

4.2.1.2.9 Painted glass

— Painted glass EN 16477-1

4.2.2 Determination of characteristics of laminated glass and laminated safety glass

4.2.2.1 General

If the laminated glass and/or laminated 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.

When a coated glass is used with the coating not facing the interlayer, a new type test as given in 4.2.2.3 to 4.2.2.11 and 4.2.2.15 is not necessary provided that the requirements of Annexes B and C are fulfilled.

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.

An increase of glass thickness or change in stacking order will not adversely affect the classification with respect to reaction to fire.

4.2.2.4 Safety in the case of fire - External fire performance (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.

A test performed with clear float glass is regarded representative for tinted, patterned, coated, surface treated and thermally treated substrates.

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.

However the following exceptions apply:

— For S-applications: If further glasses and interlayers are added, the classification remains the same.

— For NS- Application: If further glasses and interlayers are added on the attack side, the classification remains the same.

— If annealed glass is replaced by heat strengthened glass of the same thickness the classification remains the same.

In those cases, no new bullet resistance test is necessary to maintain the same class.

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.

However:

— If further glasses and interlayers are added, the classification remains the same.

— If interlayer and/or glass thickness(es) are increased, the classification remains the same.

— If annealed glass is replaced by heat strengthened glass, the classification remains the same.

In those cases, no new burglar resistance test is necessary to maintain the same class.

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.

NOTE Laminated glass conforming to EN ISO 12543-3 (without classification on the basis of EN 12600) will be declared NPD.

When the essential characteristics comprise bullet resistance, explosion resistance and/or burglar resistance, and the product is to be defined as a laminated safety glass then the classification according to EN 12600 can be undertaken on test specimens that consist of two glasses, thickness 3 mm nominal, separated by an interlayer, thickness 0,76 mm nominal. When for a type of glass no 3 mm nominal exists, the nearest thickness shall be used. When for a type of interlayer no 0,76 mm nominal exist, the nearest thickness shall be used.

However,

— If the interlayer thickness is increased no new pendulum impact test is necessary to maintain the same class, provided that the interlayer subtype remains the same.

— If glass thickness is increased no new pendulum impact test is necessary to maintain the same class, provided that the glass type remains the same and the interlayer thickness is at least 0,5 mm.

— If annealed glass is replaced by thermally treated glasses no new pendulum impact test is necessary to maintain the same class.

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 value is given in the standards for the appropriate glass substrate (see 4.2.1.2). If the laminated glass or laminated safety glass is made from different glass types then the lowest value given in the corresponding standards shall be declared.

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

The ordered assemblies of laminated glass or laminated safety glass (thickness and types of glass components or plastic glazing sheet materials – interlayers) shall ensure the resistance against wind,