SLOVENSKI STANDARD

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Steklo v gradbeništvu - Stekleni zidaki in stekleni tlakovci - 2. del: Ovrednotenje skladnosti/standard za izdelek

Glass in building - Glass blocks and glass pavers - Part 2: Evaluation of conformity/Product standard

Glas im Bauwesen - Glassteine und Betongläser - Teil 2: Konformitätsbewertung/Produktnorm

Verre dans la construction - Briques et dalles de verre - Partie 2: Evaluation de la conformité/Norme produit

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EUROPEAN STANDARD

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English Version

Glass in building - Glass blocks and glass pavers - Part 2: Evaluation of conformity/Product standard

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 1051-2:2007) has been prepared by Technical Committee CEN/TC 129 “Glass in building”, the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by April 2008, and conflicting national standards shall be withdrawn at the latest by July 2009.

This part of the document does not stand-alone, it is a part of one document:

— EN 1051-1: Glass in building — Glass blocks and glass pavers — Part 1: Definitions and description

— EN 1051-2: Glass in building — Glass blocks and glass pavers — Part 2: Evaluation of conformity/Product standard

This document contains other aspects of importance to trade.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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

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

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

1 Scope

This document covers the evaluation of conformity and the factory production control requirements of and recommendations for glass block and glass paver units.

This standard does not cover panels incorporating glass blocks or glass paver units.

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

EN 1051-1:2003, *Glass in building — Glass blocks and glass pavers — Part 1: Definitions and description*

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

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

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

EN ISO 7459, *Glass containers — Thermal shock resistance and thermal shock endurance — Test methods (ISO 7459:2004)*

EN ISO 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system (ISO 7500-1:2004)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1051-1:2003 and the following apply.

3.1
initial type testing
determination of the performance of a product (characteristic, durability), on the basis of either actual tests or other procedures (such as conventional, standardised, tabulated or general accepted values, standardised or recognised calculation methods, test reports when made available, …), in accordance with this standard that demonstrates compliance with this standard

3.2
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

3.3
product description
document that details the relevant parameters, e.g. process conditions, structure, etc., for defining a product that complies with the standard. It includes specific reference(s) to characteristics that are modified by the production process.

3.4
significant change
variation in performance beyond the permitted tolerance for the characteristic

4 Requirements

4.1 Conformity with the product family glass blocks and glass paver units

Products shall conform to the definition and fulfil the requirements of glass blocks and glass paver units as defined in EN 1051-1.

NOTE EN 1051-1 covers dimensional, compressive strength and breakage load requirements.

4.2 Determination of the performances of characteristics

4.2.1 Characteristics of glass blocks and glass paver units

Glass blocks and glass paver units are made of soda lime silicate glass in accordance with EN 572-1. The characteristics listed in Table 1, concern general accepted values, calculated values or measured values

Table 1 — Necessary information on characteristics of soda lime silicate glass

Characteristic	Symbol	Unit
Generally accepted values:		
- density	ρ	kg/m³
- hardness	$HK_{0,1/20}$	GPa
- Young's modulus -	E	Pa
- Poisson's ratio	μ	Dimensionless
- Specific heat capacity	c	J/(kg.K)
- Coefficient of linear expansion	α	K^{-1}
- Thermal conductivity (for *U*-value)	λ	W/(m.K)
- Mean refractive index to visible radiation	n	Dimensionless
- Emissivity	ε	Dimensionless
Measured values:		
- light transmittance	τ_v	Dimensionless
- solar direct transmittance	τ_e	Dimensionless
Calculated values:		
- total solar energy transmittance	g	Dimensionless

Glass blocks and glass paver units have mechanical/thermal characteristics that are specific to the product. These characteristics are listed in Table 2.

Table 2 – Characteristics specific to glass blocks and glass paver units

Characteristic	Symbol	Unit
Measured values		
- compressive strength[a]	-	N/mm^2
- breaking loads[b]	-	kN
- residual stress (thermal shock)[c]	-	K
[a] For glass blocks – determined in accordance with EN 1051-1:2003, Annex A		
[b] For glass paver units – determined in accordance with EN 1051-1:2003, Annex B		
[c] For glass blocks and glass paver units – determined in accordance with Annex B		

4.2.2 Determination of essential characteristics of glass blocks and glass paver units

4.2.2.1 General

The essential characteristics that are specific to blocks and glass paver units are as follows:

— Safety in the case of fire – Reaction to fire.

— Safety in use – Mechanical resistance: Resistance against sudden temperature changes and temperature differentials.

— Safety in use – Mechanical resistance.

— Protection against noise – Airborne sound reduction.

— Energy conservation and heat retention – Thermal properties.

— Energy conservation and heat retention – Radiation properties – Light transmittance and reflectance.

— Energy conservation and heat retention – Radiation properties – Solar energy characteristics.

Other characteristics are only applicable for panels made of glass blocks or glass paver units.

If the glass block and glass paver unit 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 standard including his specific process control conditions.

4.2.2.2 Safety in the case of fire - Reaction to fire

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

Basic soda lime silicate glass products are products/materials that do 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)

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

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

NOTE Can only be determined for panels made from glass blocks or glass paver units.

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

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

NOTE Can only be determined for panels made from glass blocks or glass paver units.

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

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

NOTE Can only be determined for panels made from glass blocks or glass paver units.

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

The resistance against sudden temperature changes and temperature differentials is dependent upon the residual stress within the product and is a measured value determined in accordance with Annex B that shall be ensured by compliance with this standard.

4.2.2.7 Safety in use - Mechanical resistance

The mechanical strength is determined by the compressive strength. Use the compressive strength and/or the breaking load values determined in 4.1.

4.2.2.8 Protection against noise - Direct airborne sound reduction

For direct airborne sound reduction, the glass density and the mass of the glass block or glass paver unit is relevant. The glass density is a conventional value (EN 572-1), the mass shall be determined in accordance with EN 1051-1.

4.2.2.9 Energy conservation and heat retention - Thermal properties

The thermal transmittance shall be determined in accordance with Annex C.

However more accurate *U*-values can be calculated, and may be declared, e.g. by means of finite element or finite difference methods on the basis of the thermal conductivity λ of glass (refer to EN 572-1) and the glass block or glass paver unit dimensions, form and shape in accordance with EN 1051-1.

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

The basic radiation properties shall be determined on a specimen of flat glass prepared from a glass block or glass paver unit. The basic light transmittance and reflectance shall be determined in accordance with EN 410.

NOTE EN 410 is the reference method.

If modelling is used to determine the light transmittance and reflectance of the glass block or glass paver unit it shall be in accordance with Annex D.

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

The basic radiation properties shall be determined on a specimen of flat glass prepared from a glass block or glass paver unit. The solar energy characteristic shall be determined in accordance with EN 410.

NOTE EN 410 is the reference method.

If modelling is used to determine the solar energy characteristic of the glass block or glass paver unit it shall be in accordance with Annex D.

4.3 Durability

When glass blocks and glass paver units shall conform to the definition of glass blocks and glass paver units as 4.1, the characteristic's performances in 4.2 are ensured during an economically reasonable working life.

The durability of glass products, including their characteristics, shall be ensured by the following:

— Compliance with this standard.

— Compliance with instructions from the glass product manufacturer or supplier.

The manufacturer shall supply specific installation instructions or make reference to appropriate technical specifications.

NOTE The durability of glass products depends on:

— building and construction movements due to various actions;

— building and construction vibrations due to various actions;

— deflection and racking of the glass support due to various actions;

— glass support design (e.g. drainage of infiltrated water in the rebate, prevention of direct contact between glass support members and glass);

— accuracy of glass support and glass support member dimensions;

— quality of the assembling of glass support members up to a glass support;

— quality of installation of the glass support into or onto the buildings or constructions;

— glass support expansion due to adsorbed moisture from the air or other sources;

— quality of installation of the glass product into or onto its support.

4.4 Characteristics other than those listed in 4.2

Optical and visual characteristics shall comply with EN 1051–1.

Dimensional tolerances shall comply with EN 1051–1.

4.5 Dangerous substances

Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the national regulations of the member state of destination.

5 Evaluation of conformity

5.1 General

Evaluation of conformity in accordance with this standard shall be as a result of Factory Production Control and Initial Type Testing in accordance with this standard

1) Factory production control;

This shall include the following:

a) Inspection of samples taken at the factory in accordance with a prescribed test plan;

b) Initial inspection of the factory and of factory production control;

c) Continuous surveillance and assessment of the factory production control.

2) Initial type testing of the product;

NOTE There may be a need to involve a third party, with 1b, 1c, and/or 2, for the purpose of regulatory marking (see Annex ZA).

5.2 Initial type testing of the product (5.1, 2)

5.2.1 General

5.2.1.1 Introduction

All the product's characteristics shall be initial type tested to verify they are in conformity with the requirements of this standard. Instead of performing any actual testing, initial type testing may make use of:

— generally accepted and/or conventional and/or standardised values, in the Clause 2 referenced standards, or in publications that are referred to in these standards;

— standardised calculation methods and recognised calculation methods in Clause 2 referenced standards, or in publications that are referred to in these standards;

— test report(s) on the basis of 5.2.1.3 when made available except for the characteristics listed in 5.2.2.

— where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of conformity with other product standards, these characteristics need not be reassessed providing they remain unchanged by the manufacturing process;

— release of dangerous substances may be assessed indirectly by controlling the content of the substance concerned;

— durability may be assessed indirectly by controlling the production processes according to this standard;

NOTE 1 Products CE marked in accordance with appropriate harmonised European specifications may be presumed to have the performances stated with the CE marking.

NOTE 2 There may be a need to involve a third party for the purpose of regulatory marking (see Annex ZA).

When actual testing is required then the Initial Type Testing (ITT) shall be undertaken on a sample representative of the product taken from direct production or a prototype, any plant and/ or line.

NOTE 3 ITT should be undertaken using the reference method.

Whenever a change occurs in the raw material or production process (subject to the definition of a family), which would change significantly one or more of the characteristics, the type tests shall be repeated for the appropriate characteristic(s).

5.2.1.2 Multiple lines/sites

If a manufacturer operates more than one line and/or site, the following can reduce the requirement for multiple Initial Type Testing (ITT):

i) The manufacturers' technical file for a product shall specifically covers all sites and/or lines of the same manufacturer[1],

ii) The manufacturer shall establish a direct relationship between production control, initial type testing and on-going internal audit testing,

iii) The manufacturer shall have a responsible individual designated to ensure product compliance based on:

— The operation of a consistent Factory Production Control system on all applicable sites and/or lines,

— The manufacturer having obtained evidence that shows the product to be consistent, with respect to both product characteristics and intended use characteristics,

— The manufacturer has in place an internal auditing scheme, including product consistency.

5.2.1.3 Historic Data

Tests previously performed in accordance with the provisions of this standard (same product, same characteristic(s), same or more onerous test method, sampling method and attestation of conformity) may be taken into account.

5.2.2 Type testing if products belong to the product family glass blocks and glass paver units

Initial type testing to establish if a product conforms to the definition of glass blocks and glass paver units, shall be economized as much as possible. For that purpose appropriate available test reports are equivalent to actual testing and may be used instead of actual testing. The initial type testing (in the meaning of validation method) concerns the product aspects as listed in Table 3.

Table 3 — Product aspects to be checked if product belongs to glass blocks and glass paver units

Nr	Product aspect
1	Compressive strength/breaking load
2	Residual stress
3	Dimensions, forms and shapes
4	Chemical composition

5.2.3 Type testing of performances of characteristics

All characteristics in 4.2.2 shall be subject to initial type tests in accordance with 5.2.1.

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[1] The terms 'manufacturer' and 'producer' are understood as being synonyms (see http://europa.eu.int/comn/enterprise/newapproach/newapproach.htm)