



**SLOVENSKI STANDARD**  
**SIST EN 13659:2004+A1:2009**

**01-maj-2009**

**BUXca Yý U**  
**SIST EN 13659:2004**

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Shutters - Performance requirements including safety

Abschlüsse außen - Leistungs- und Sicherheitsanforderungen

Fermetures pour baies équipées de fenêtres - Exigences de performance y compris la sécurité  
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EUROPEAN STANDARD

**EN 13659:2004+A1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2008

ICS 91.060.50

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English Version

**Shutters - Performance requirements including safety**Fermetures pour baies équipées de fenêtres - Exigences  
de performance y compris la sécuritéAbschlüsse außen - Leistungs- und  
Sicherheitsanforderungen

This European Standard was approved by CEN on 2 March 2004 and includes Amendment 1 approved by CEN on 18 August 2008.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG**Management Centre: rue de Stassart, 36 B-1050 Brussels**

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## Foreword

This document (EN 13659:2004+A1:2008) has been prepared by Technical Committee CEN/TC 33 “Doors, windows, shutters, building hardware and curtain walling”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by April 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

NOTE Annex ZB is applicable until December 28th, 2009 and Annex ZC is applicable from December 29th, 2009.

This document supersedes EN 13659:2004.

This document includes Amendment 1, approved by CEN on 2008-08-18.

The start and finish of text introduced or altered by amendment is indicated in the text by tags  $\boxed{A_1}$   $\boxed{A_1}$ .

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 EU Directive(s).

$\boxed{A_1}$  For relationship with EU Directive(s), see informative Annexes ZA, ZB and ZC, which are integral parts of this document.  $\boxed{A_1}$

This European Standard is a part of a series of standards dealing with blinds and shutters for buildings as defined in EN 12216.

This standard specifies the requirements for shutters, the levels of performance and the associated classes where applicable.

It is completed by test standards as well as by the standards referring to specific performance requirements.

Annexes A and B are informative.

Annex C is normative.

This document includes a Bibliography.

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.

**EN 13659:2004+A1:2008 (E)****Introduction**

The performances given in this European Standard which illustrate suitability for use, are required for every type of shutter (intrinsic performances).

Other performances are only required as a complement (specific performances) and result in specific products. Some of them are described in European Standards (e.g. EN 1522, EN 1523, ENV 1627, ENV 1628, ENV 1629, ENV 1630, EN 13123-1, EN 13124-1, EN 13123-2 and EN 13124-2). Others are described in prEN 14500 and prEN14501 in the process of preparation and deal with important subjects such as thermal comfort, i.e.:

- Solar factor;
- Shading factor;
- Direct solar transmittance;
- Secondary heat transfer factor;
- Solar radiation reduction factor.

and visual comfort, i.e.:

- Light control;
- Night privacy;
- Visual contact with the outside;
- Glare control;
- Rendering of colours.

or with the airborne sound insulation brought by shutters (see prEN 14759).

**NOTE** Health and Safety regulations require that the workplace receives as much natural light as is reasonably practical (see EU Directive 89/654/EEC) and protection of operators working with VDV screens against glare control and reflected light (see EU Directive 87/391/EEC).

The list of these documents is given in the Bibliography.

With the aim of clarifying the intentions of the standard and avoiding doubts when reading it, following assumptions were made related to power operated products while producing it:

- Negotiations shall occur between the manufacturer and the purchaser concerning particular conditions for use and places for use such as for nursery schools or for buildings for disabled people which need specific risk analysis;
- The risk analysis carried out in this standard and the corresponding significant hazards listed in annex C suppose a normal use or normally predictable use e.g. which excludes deliberate and conscious risks taken by the user (see Interpretative Document “Safety in use” of EU Construction Products Directive).

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## 1 Scope

This European Standard specifies the performance requirements which shutters shall fulfil when fitted to a building. It deals also with the significant hazards for construction, transport, installation, operation and maintenance of the shutters (see list of significant machine hazards in annex C).

It applies to all shutters as well as similar products whatever their use and nature of the materials used, as follows:

- external Venetian blind, roller shutter, wing shutter, Venetian shutter, flat-closing concertina shutter, concertina shutter or sliding panel shutter, with or without a system of projection.

These products can be operated manually with or without compensating spring, or by means of electric motors (power operated products).

This document is not applicable to shutters which are manufactured before the date of application of this document by CEN.

**A1** Noise aspects are not treated in the standard because this is not considered a safety issue. **A1**

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

EN 1050:1996, *Safety of machinery - Principles for risk assessment.*

EN 1070:1998, *Safety of machinery - Terminology.*

EN 1670, *Building hardware - Corrosion resistance - Requirement and test methods.*

EN 1932, *External blinds and shutters - Resistance to wind loads - Method of testing.*

EN 12045, *Shutters and blinds power operated - Safety in use - Measurement of the transmitted force.*

EN 12194, *Shutters, external and internal blinds - Misuse - Test methods.*

EN 12216:2002, *Shutters, external blinds, internal blinds — Terminology, glossary and definitions.*

EN 12833, *Skylight and conservatory roller shutters - Resistance to snow load - Test method.*

EN 12835, *Airtight shutters - Air permeability test.*

EN 13125, *Shutters and blinds - Additional thermal resistance - Allocation of a class of air permeability to a product.*

EN 13245-1:2004, *Plastics - Unplasticized poly(vinyl chloride) (PVC-U) profiles for building applications – Part 1: Designation of light coloured profiles.*

EN 13330, *Shutters - Hard body impact — Test method.*

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EN 13527, *Shutters and blinds – Measurement of operating force — Test methods.*

EN 14201, *Blinds and shutters - Resistance to repeated operations (mechanical endurance) - Methods of testing.*

EN 60335-1, *Household and similar electrical appliances - Safety – Part 1: General requirements (IEC 60335-1:2001, modified)*

EN 60335-2-97, *Safety of household and similar electrical appliances – Part 2-97: Particular requirements for drives for rolling shutters, awnings, blinds and similar equipment (IEC 60335-2-97:1998, modified).*

EN 61310-1, *Safety of machinery – Indication, marking and actuation – Part 1: Requirements for visual, auditory and tactile signals (IEC 61310-1:1995).*

EN ISO 10077-1, *Thermal performance of windows, doors and shutters -Calculation of thermal transmittance - Part 1: Simplified method (ISO 10077-1:2000).*

ISO 9227, *Corrosion tests in artificial atmospheres – Salt spray tests.*

**3 Terms and definitions**

For the purposes of this European Standard, the terms and definitions given in EN 1070:1998 and EN 12216:2002 and the following apply.

**3.1 intrinsic performance**

overall performances of the shutter regardless of its application as opposed to specific performance

**3.2 specific performance**

performance which may be additional and complementary to the intrinsic performances and refers to a specific product (for example, acoustic, thermic, burglary resistance, etc.)

**3.3 curtain**

that part of the product which is set in motion by the operating mechanism, and ensures its function

**3.4 extension/retraction**

movement of the curtain resulting in an increase/decrease the surface area covered

**3.5 opening/closing**

terms used to describe the increase in light (opening) or reduction of light (closing) in an extended position for products with slats or slats which can be tilted or adjusted

NOTE The common parlance uses "open" for retraction and "closed" for extension.

**3.6 rough operation**

sharp action on the operating mechanism or directly on the curtain, resulting in excessive speed at the beginning and a sudden stop at the end

NOTE Rough operation is only possible if the moving part has significant inertia (mass and speed).



**3.7****forced operation**

excessive force exerted on the operating mechanism or directly on the curtain with the aim of causing movement in spite of resistance to the travel of the curtain

**3.8****reversed operation**

extension or retraction of the curtain occurring in the opposite direction to that intended without use of abnormal force

**3.9****winch handle**

operating mechanism consisting of a reel rotated by an operation handle which allows accumulation of a cord, cable, or chain

**3.10****gear with crank handle**

operating mechanism consisting of a gear attached to an axle, a drive shaft, a universal joint, a rotated rod and a crank handle

**3.11****one direction movement of the operating mechanism**

operating mechanism operated by a single cord, belt, etc., extension / retraction being effected by relying on gravity or the potential energy stored up during retraction / extension, respectively

**3.12****endless movement of the operating mechanism**

operating mechanism operated by a loop, movement in one direction extends the curtain (or tilts the laths), and in the reverse retracts the curtain (or tilts the laths) in the opposite direction

**3.13****monocommand**

same mechanism which achieves both opening/closing and extension/retraction

**3.14****vertical loading/racking**

downward force applied to the panel edge of a wing shutter

**3.15**

determination of performance

means of verification of the performance relating to the corresponding requirement

**4 Wind resistance****4.1 General**

The wind resistance of a shutter is assumed by its ability to withstand to specified loads, simulating the action of wind in positive or negative pressure.

Wind resistance is specified through classes defined by threshold values of nominal pressure  $p$  and safety pressure  $\gamma \times p$  with  $\gamma = 1,5$

**EN 13659:2004+A1:2008 (E)****a) Nominal wind pressure  $p$** 

Represents the wind pressure applied to the shutter for which the shutter shall not sustain deformation or deterioration which is detrimental to its correct operation.

**b) Safety wind pressure  $1,5 p$** 

Represents the wind pressure applied to the shutter for which no deterioration which may be dangerous for the persons shall be observed: breakage, coming out from the fixing or locking devices.

Safety wind pressure  $1,5 p$  corresponds to a net pressure (difference of the pressures on each surface taking due account of their signs) calculated according to annex B with a wind velocity having a mean return period of 20 years (annual probability of excess of 0,05).

NOTE Nominal wind pressure corresponds approximately to a wind having a mean return period of 3 years.

**4.2 Determination**

The determination shall be in accordance with the test methods specified in EN 1932.

**4.3 Performance requirement****4.3.1 General**

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As a function of the type of shutter, the performance criteria specified in Tables 2, 3 and 4 shall be achieved having applied the test loads  $F_N$  and  $F_S$  as specified in Table 1.

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**Table 1 — Test loads**

Non projecting curtain	Projecting curtain
$F_N = \beta \times p \times L \times H$	$F_N = 2\beta \times p \times L \times H$
$F_S = \gamma \times F_N$ , with $\gamma = 1,5$	$F_S = \gamma \times F_N$ , with $\gamma = 1,5$

where:

- L, H** is the width and height of shutter as specified in EN 1932
- p** is the threshold value of wind test pressure in  $N/m^2$  corresponding to the class of resistance considered (see 4.4)
- $\beta$**  is the coefficient of passage of effect of loads distributed to those of the test loads with:
- $\beta = 1$** , in the case of roller shutter, wing shutter, venetian shutter, sliding concertina shutter, concertina shutter, sliding panel shutter (see Table 2)
- $\beta = 0,2$** , in the case of external venetian blind (see Table 3)
- $\gamma$**  is the conversion coefficient between nominal and safety loads, with  **$\gamma = 1,5$** .

The classification as given in Table 5 is only obtained after the safety level is achieved.

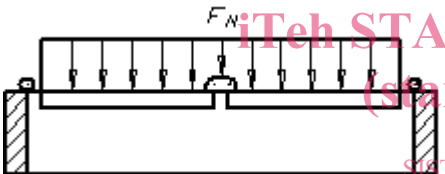
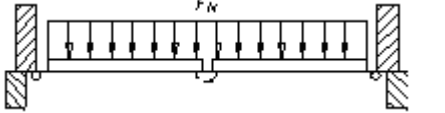
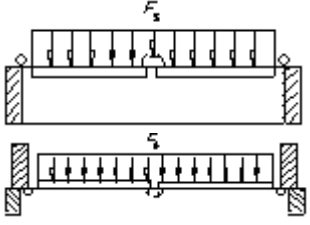
### 4.3.2 Performance of the curtain

#### ROLLER SHUTTER, WING SHUTTER, VENETIAN SHUTTER, FLAT-CLOSING CONCERTINA SHUTTER, CONCERTINA SHUTTER, SLIDING PANEL SHUTTER

The curtain, in the extended non projecting position, is uniformly loaded according to the sequences described in Table 2:

- either in the horizontal position under the effect of spread loads reproducing uniform pressure;
- or in the vertical position to test under pneumatic pressure.

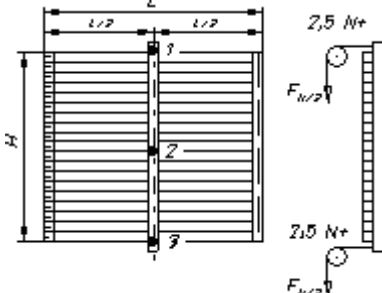
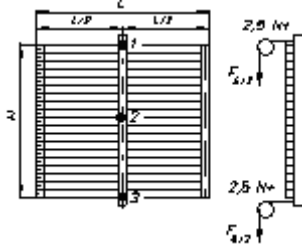
**Table 2 — Roller shutter, wing shutter, venetian shutter, flat-closing concertina shutter, concertina shutter, sliding panel shutter — Performance criteria**

	LOAD: $F_N = \beta \times p \times L \times H$ or $F_N = 2x\beta \times p \times L \times H$ with $\beta = 1$	PERFORMANCE CRITERIA		
		Appearance	Operation	Safety
1	<b>Nominal direct load <math>F_N</math></b> Applied on the external side of curtain 	no visible deterioration of the curtain, fixing locking device and guiding	manual operating effort maintained within the class	—
2	<b>Inverse nominal load <math>F_N</math></b> Applied on the internal side of the curtain 			
3	<b>Direct and inverse safety loads</b> $F_S = 1,5 \times F_N$ and $-F_S = 1,5 \times F_N$ Applied on the external side (direct safety load) then on the internal side of the curtain (inverse safety load) 	—	—	no breakage the curtain shall not come out of its fixings or locking device

#### EXTERNAL VENETIAN BLIND

The loading shall be applied on the external venetian blind in the vertical position by using a rigid rail, according to the sequences described in Table 3.

Table 3 — External venetian blind — Performance criteria

	LOAD: $F_N = \beta \times p \times L \times H$ ( $\beta = 0,20$ )	PERFORMANCE CRITERIA		
		Appearance	Operation	Safety
1 2	<p><b>Nominal direct and inverse loads <math>F_N</math> and <math>-F_N</math></b> Applied on the external side of curtain (nominal direct load) then on the internal side (nominal inverse load)</p> 	residual deflection of laths < 5‰ L		-----
3	<p><b>Direct and inverse safety loads</b> <math>F_S = 1,5 \times F_N</math> and <math>-F_S = 1,5 \times -F_N</math> Applied on the external side of curtain (direct safety load) then on the internal side (inverse safety load)</p> 			no breakage no exit from guide rail


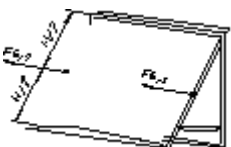
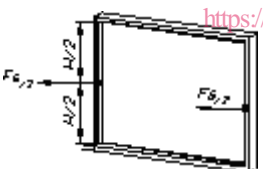
NOTE The coefficient  $\beta = 0,20$  is a global coefficient of adjustment to test results under assigned air speeds.

#### 4.3.3 Performance of the projection mechanism (projecting products)

#### ROLLER SHUTTER, VENETIAN SHUTTER, FLAT-CLOSING CONCERTINA SHUTTER, CONCERTINA SHUTTER

The loading  $F_S$  being applied at mid-height of the curtain, the projection mechanism shall comply with the conditions given in Table 4.

**Table 4 — Roller shutter, venetian shutter, flat-closing concertina shutter, concertina shutter — Performance of the projection mechanism (projecting product)**

	LOAD: $F_S = 1,5 \times F_N$ ( $F_N = 2 \times \beta \times p \times L \times H$ , $\beta = 1$ )	REQUIREMENT CRITERIA		
		Appearance	Operation	Safety
1	<b>Curtain extended and projected</b> Direct safety load $F_S$ (towards interior) 	—	—	the projection system shall stay locked  no breakage
2	<b>Curtain extended and projected</b> Inverse safety load - $F_S$ (towards exterior) 	—	—	the projection system shall stay locked  no breakage
3	<b>Curtain extended but not projected</b> Inverse safety load - $F_S$ (towards exterior) 	—	—	the projection system shall stay locked  no breakage

#### 4.4 Classes of wind resistance

The classes of wind resistance are given by the threshold test pressures specified in Table 5.

**Table 5 — Classes of wind resistance**

Classes	0	1	2	3	4	5	6
Nominal test pressure $p$ (N/m <sup>2</sup> )	< 50	50	70	100	170	270	400
Safety test pressure $1,5 p$ (N/m <sup>2</sup> )	< 75	75	100	150	250	400	600

NOTE Class 0 corresponds to either performance not required or not declared or a product that does not fulfil the requirements of class 1.