BS EN 13659:2015

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Shutters and external venetian blinds — Performance requirements including safety

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National foreword

This British Standard is the UK implementation of EN 13659:2015. It supersedes BS EN 13659:2004+A1:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/538/3, Domestic shutters and blinds.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Shutters and external venetian blinds - Performance requirements including safety

Fermetures et stores vénitiens extérieurs - Exigences de performance y compris la sécurité

Abschlüsse außen und Außenjalousien - Leistungs- und Sicherheitsanforderungen

This European Standard was approved by CEN on 16 February 2015.

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Foreword

This document (EN 13659:2015) 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of an identical text or by endorsement, at the latest by November 2015 and conflicting national standards shall be withdrawn at the latest by February 2017.

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 supersedes EN 13659:2004+A1:2008.

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).

For relationship with EU Directive(s), see informative Annex ZA and Annex ZB, which are integral parts of this document.

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

The major modifications to the previous edition are:

— 4.1 “Resistance to wind loads” has been modified and has been aligned with the revised version of EN 1932 “Test methods”;

— 4.2 “Resistance of non retractable elements to pressure loads” has been added to integrate requirements on the shutters and external venetian blinds in the retracted position;

— 4.8 “Resistance of mechanisms holding the shutter in the extended position” has been clarified and modified to be applicable to any type of shutters and external venetian blinds;

— 4.12 “Prevention of access” has been added;

— 4.14 “Additional thermal resistance” has been clarified;

— 4.15 “Total solar energy transmittance” has been added;

— 4.16 “Materials” has been aligned with the new version of EN 13245-1 for plastics and requirements for metals have been clarified;

— 4.17 “Dimensional tolerances” has been modified for external venetian blinds;

— Clause 7 “Assessment and verification of constancy of performance - AVCP” has been aligned with the European template;

— Annex B “Calculation of wind pressure exerted on a shutter – Allocation of a class of wind resistance” has been modified to consider values of Eurocode 1;

— Annex C “List of significant machine hazards” has been modified and EN ISO 12100 has been introduced;

— Annex D “Example of calculation for the wind resistance determination on fixed parts of shutters in retracted position” has been added;

— Annex ZA has been modified to introduce a two mandated characteristics: the total solar energy transmittance g_{tot}, the additional thermal resistance ΔR and revised in accordance with requirements of the CPR.

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, 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document is a type C standard as stated in EN ISO 12100.

The machinery concerned, i.e. power operated products, and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

1 Scope

This European Standard specifies the performance requirements for shutters and external venetian blinds intended to be fitted externally to buildings and other construction works. It deals also with the significant hazards for assembly, transport, installation, operation and maintenance (see list of significant machine hazards in Annex C).

It applies to all shutters and external venetian blinds whatever their use and nature of the materials used, as follows and defined in EN 12216:

— 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). However, the durability and endurance of the autonomous supply for power operated shutters and external venetian blinds not connected to the mains supply are not covered.

This European Standard deals also with all significant hazards, hazardous situations and events when shutters and external venetian blinds are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Annex D).

This European Standard covers shutters and external venetian blinds mounted externally. In case such products are installed internally, they should fulfil all relevant safety requirements defined in EN 13120.

The noise emission of power operated shutters and external venetian blinds is not considered to be a relevant hazard health and safety requirements. Therefore this European Standard does not contain any specific requirements on noise health and safety objective.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 204, *Classification of thermoplastic wood adhesives for non-structural applications*

EN 1522, *Windows, doors, shutters and blinds - Bullet resistance - Requirements and classification*

EN 1523, *Windows, doors, shutters and blinds - Bullet resistance - Test method*

EN 1627, *Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Requirements and classification*

EN 1628, *Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance under static loading*

EN 1629, *Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance under dynamic loading*

EN 1630, *Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance to manual burglary attempts*

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

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

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, *Shutters, external blinds, internal blinds - Terminology, glossary and definitions*

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

EN 13123-1, *Windows, doors and shutters - Explosion resistance - Requirements and classification - Part 1: Shock tube*

EN 13123-2, *Windows, doors, and shutters - Explosion resistance - Requirements and classification - Part 2: Range test*

EN 13124-1, *Windows, doors and shutters - Explosion resistance - Test method - Part 1: Shock tube*

EN 13124-2, *Windows, doors and shutters - Explosion resistance - Test method - Part 2: Range test*

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

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

EN 13330, *Shutters - Hard body impact and prevention of access - Test methods*

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 14648, *Building hardware - Fittings for shutters - Requirements and test methods*

EN 14500, *Blinds and shutters - Thermal and visual comfort - Test and calculation methods*

EN 14501, *Blinds and shutters - Thermal and visual comfort - Performance characteristics and classification*

EN 14759, *Shutters - Acoustic insulation relative to airborne sound - Expression of performance*

EN 60335-2-97, *Household and similar electrical appliances - Safety - Part 2-97: Particular requirements for drives for rolling shutters, awnings, blinds and similar equipment*

EN 61310-1, *Safety of machinery - Indication, marking and actuation - Part 1: Requirements for visual, acoustic and tactile signals*

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

EN ISO 12100, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100)*

ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests*

ISO 11228-3, *Ergonomics - Manual handling - Part 3: Handling of low loads at high frequency*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100, EN 12216, EN 12045 and the following apply.

3.1
shutter
product, where the curtain is made of a rigid material, installed to provide or modify characteristics such as thermal and visual properties of an existing glazed surface (e.g. window, door) to which it is applied

Note 1 to entry: If not specified otherwise, the term “shutter” used in this document refers to any type of shutter or external venetian blind included in the scope of this European Standard.

3.2
intrinsic performance
overall performances of the shutter regardless of its application as opposed to specific performance

3.3
specific performance
performance which may be additional and complementary to the intrinsic performances and refers to a specific product (for example, acoustic, thermal, burglary resistance, etc.)

3.4
curtain
that part of the product which is set in motion by the operating mechanism, and ensures its function

3.5
extension/retraction
movement of the curtain resulting in an increase/decrease the surface area covered

3.6
opening/closing
terms used to describe the increase in light (opening) or reduction of light (closing) in an extended position for products with laths, slats or louvres which can be tilted or adjusted

Note 1 to entry: The common parlance uses “open” for retraction and “closed” for extension.

3.7
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 1 to entry: Rough operation is only possible if the moving part has significant inertia (mass and speed).

3.8
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

3.9
reversed operation
extension or retraction of the curtain occurring in the opposite direction to that intended without use of abnormal force

3.10
winch handle
operating mechanism consisting of a reel rotated by an operation handle which allows accumulation of a cord, cable, or chain

3.11
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

3.12
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

3.13
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

3.14
monocommand
same mechanism which achieves both opening/closing and extension/retraction

3.15
determination of performance
means of verification of the performance relating to the corresponding requirement

4 Product characteristics

4.1 Resistance to wind loads

The wind resistance of a shutter is characterized by its ability to withstand 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_N and safety pressure $p_S = \gamma \times p_N$ with $\gamma = 1,5$:

— Nominal wind pressure p_N: it represents the wind pressure under which the shutter shall not sustain deformation or deterioration detrimental to its correct operation.

— Safety wind pressure p_S: it represents the wind pressure under which no deterioration which may be dangerous for the persons shall be observed (breakage, coming out from the fixing or locking devices).

When tested according to EN 1932, the wind resistance class of shutters shall be given according to Table 1.

Table 1 — Classes of wind resistance

	Classes						
	0	1	2	3	4	5	6
Nominal pressure p_N (N/m^2)	< 50	50	70	100	170	270	400
Safety pressure $p_S = 1,5\ p_N$ (N/m^2)	< 75	75	100	150	250	400	600

NOTE 1 The application of a static pressure over the shutter gives the classification shown in Table 1. It provides an accurate measurement of the intrinsic resistance of a shutter but does not consider the dynamic behaviour of such a shutter in real wind conditions. Annex B gives the rule allowing the calculation of the wind speed from the static pressure for which the shutter has been classified. This calculation rule considers the coefficient C_p of the shutter, i.e. the algebraic difference between the external pressure coefficient C_{pe} and the internal pressure coefficient C_{pi}. The coefficient C_p is mainly depending on the air permeability of the shutter.

NOTE 2 EN 1932 states that "*the tests shall be carried out with the maximum dimensions defined by the manufacturer in the most unfavourable configuration for each product type. The test results obtained can then be applied to all more*

favourable configurations and to all smaller dimensions in the particular product design". For External Venetian Blinds, the dimensions of the test specimens have been fixed (see Annex B and EN 1932:2013, 8.2.3).

4.2 Resistance of non retractable elements to pressure loads

Since some parts of shutters – for example head boxes, guiderails – cannot be retracted, they shall withstand in some cases very high wind speed. The resulting pressure on the product depends on:

— the installation condition,

— the height of the building,

— the location of the building.

This clause applies to the shutter itself. It does not cover the fixing of the shutter to its support for which the manufacturer shall give guidance in the instructions for installation (see 6.3.2).

As the criteria determining the resulting pressure applied to the fixed parts of shutters are depending on installation conditions (location, height,…), it is recommended to refer to National rules – if available – which give such information on the basis of National wind speed map.

The resistance shall be evaluated by calculation using the following procedure:

a) Determine the weakest point of the shutter;

b) Determine the maximum surface where wind stress can be applied;

c) Determine the worst case angle where the wind can apply;

All fixed parts of the shutters, i.e. the parts that are not retracted when the shutter is in the complete retracted position, shall be designed so that there shall be no permanent deformation after a pressure of 800 Pa has been applied.

NOTE An example of determination of wind stress applied is given in Annex D.

4.3 Resistance to snow load (roller shutters only)

4.3.1 General

This clause is only applicable to roller shutters for skylight and conservatory for which the inclination angle from the horizontal is less than 60°.

Under the weight of snow, the shutter fitted to the window shall not sustain deformation or deterioration which is detrimental to its correct operation and the curtain shall not exit from its guide rails.

Two ways of resistance are considered:

1) the shutter itself resists the snow pressure;

2) the shutter resists the snow pressure together with the mechanical association of the glazing, fitted at a distance d defined by the manufacturer.

This second way of resistance is allowed only if the following requirements are fulfilled:

— the shutter accepts a level of deformation resulting in contact with the glazing under the snow loading;

and

— the distance between the shutter and the glazing is not modified by the opening of the window.

4.3.2 Determination of performance

The determination of performance shall be in accordance with the test method specified in EN 12833.

4.3.3 Performance requirement

The shutter resists to the snow pressure p_N, maximum snow pressure specified by the manufacturer, if the following requirements are fulfilled:

— after having applied the nominal pressure p_N, the operating effort shall be maintained within the limit of the initial class;

— under the safety pressure $p_S = \gamma \times p_N$ with $\gamma = 1,5$, the shutter shall not break or exit from the guide rails.

4.3.4 Expression of the results

The results shall be expressed as follows:

a) if the shutter resists itself the snow pressure:

   1) the manufacturer shall declare:

      i) the maximum nominal snow pressure p_N expressed in N/m^2;

      ii) the following form of resistance: shutter alone;

   2) shutters of the same range which are narrower and for which the curtain surface is lower than the product tested shall be deemed to resist at least the same snow pressure p_N than the product tested.

b) if the shutter resists the snow pressure with the mechanical association of the glazing:

   1) the manufacturer shall declare:

      i) the maximum nominal snow pressure p_N expressed in N/m^2;

      ii) the following form of resistance: shutter in association with a glazing which withstands pressure p_N and located at the maximum distance d from the shutter;

   2) shutters of the same range with a width and a height higher than those of the product tested shall be deemed to resist at least the same snow pressure p_N at the condition that the distance from the glazing remains the same.

4.3.5 Classes of snow resistance

No classes are defined for snow resistance.

For each dimension, the manufacturer shall specify the maximum snow pressure the shutter can sustain, by itself or in mechanical association with a closed window.

4.4 Operating effort

4.4.1 General

This clause does not apply to power operated products.

The effort F_c needed to extend /retract the curtain, to tilt the laths and eventually to project the curtain depends on the type of operation.

4.4.2 Determination of performance

The determination of performance shall be in accordance with the test methods specified in EN 13527.

4.4.3 Performance requirement and operational effort classes

The operating effort F_C shall not exceed the values specified in Table 2.

Table 2 — Maximum values of the operating effort F_C

TYPES OF OPERATION		F_C (N)	
		Class 1	Class 2
Crank or winch handle [a,c]		30	15
Belt, cord or chain [a,b,c],		90	50
Rod operation or hand	vertical plane	90	50
	horizontal or sloping plane	50	30
Spring compensated roller shutters can reach 1,5 F_C for locking in the fully extended position. A shutter belongs to class 2 if all the operations of moving the curtain, tilting the laths and projecting the curtain are class 2. Otherwise the shutter is class 1.			
[a] The operating mechanism shall also fulfil the requirement in 4.5. [b] One direction movement or endless movement of the operating mechanism. [c] Monocommand.			

4.5 Operating mechanism — HPV diagrams (“Human Pull Value”)

4.5.1 General

This clause specifies geometrical characteristics of the operating mechanisms taking into account the comfort of the operation.

4.5.2 Performances requirements

4.5.2.1 Gear operation

Gear with crank or winch handle shall have:

— a handle of a length R less than or equal to 0,20 m ($R \leq 0{,}20$ m);

— a reduction ratio **r** of the gear less than 1:10 (average or mean reduction ratio when, for the same gear, several reductions exist).

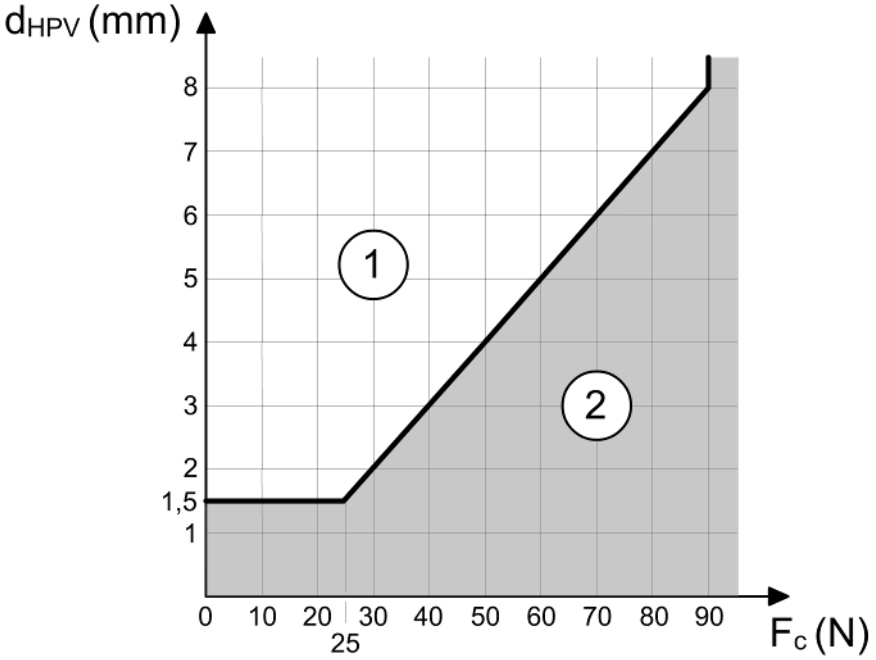
NOTE A reduction ratio of 1:10 means it is necessary to make 10 turns of the cranks to achieve one rotation of the roller tube or axle.

4.5.2.2 Belt, cord or chain operation

These operating mechanisms shall have the minimal dimensions specified in the HPV diagrams (see Figure 1 and Figure 2).

Apparent cord diameter for HPV for n cords with diameter d.

	n	d_{HPV}
●	1	1d
●●	2	1,5d
●● ●	3	2d
●● ●●	4	2,4d
●● ●●●	5	2,7d
●● ●●●	6	3d



d is the diameter of a single cord

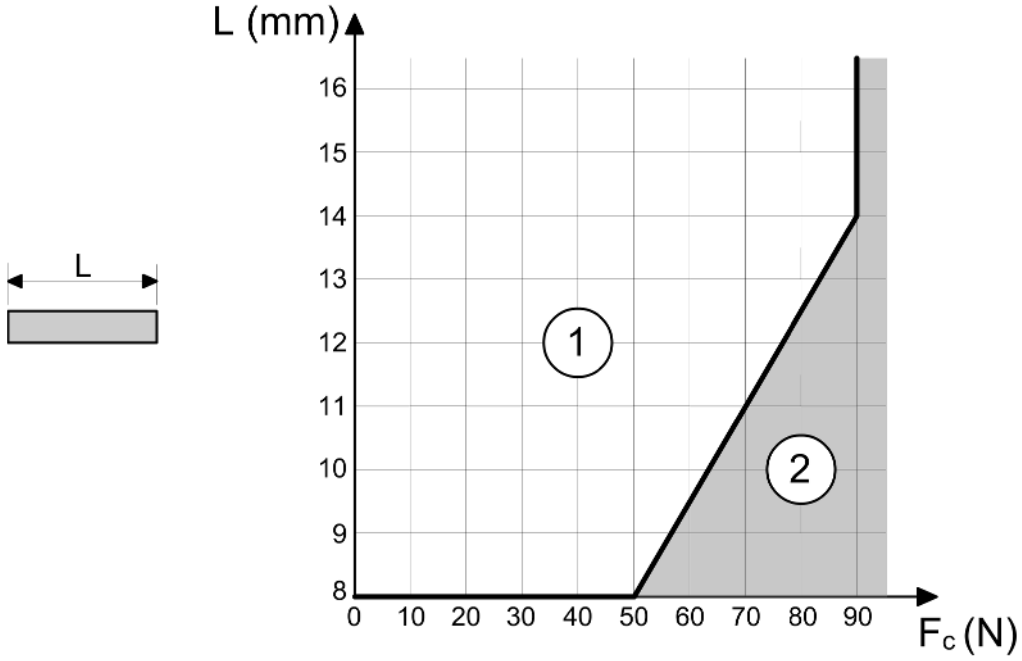
Key

1 acceptable

2 non acceptable

F_c operating effort

Figure 1 — HPV diagram for cord or chain operation



Key

1 acceptable

2 non acceptable

F_c operating effort

Figure 2 — HPV diagram for belt operation

4.6 Resistance in case of misuse

4.6.1 General

4.6.1.1 General requirement

Under the action of abnormal but foreseeable use (misuse), the shutter shall not become misshapen or damaged to the extent that:

a) the damage impairs its correct operation;

b) the damage which leads to a deterioration in appearance.

Misuse operations are related to the displacement of the curtain, the tilting of the laths and, for projected products, to the projection of the curtain.

4.6.1.2 Displacement of the curtain

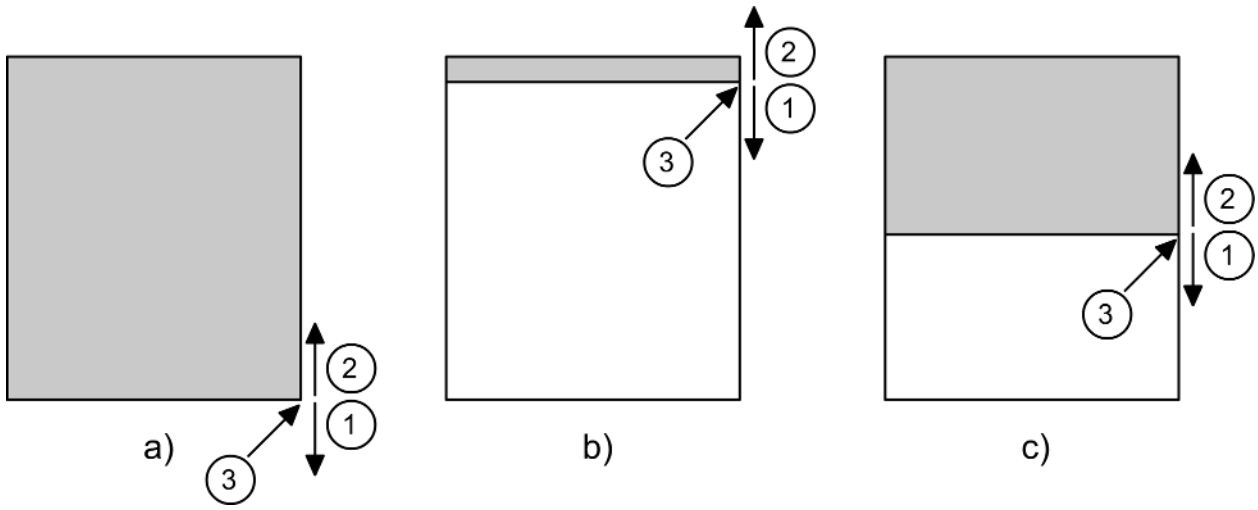
— **Rough operation**

Rough operation occurs during extension and retraction.

— **Forced operation**

Forced operation occurs in the direction of extension and retraction, the curtain being either stopped or blocked in extended or retracted position, or blocked in an intermediate position.

Figure 3 illustrates the six possibilities of forced operations.



Key

1 direction of extension

2 direction of retraction

3 obstruction

a) curtain fully extended

b) curtain fully retracted

c) curtain in intermediate position, obstructed during extension and/or retraction

Figure 3 — Illustration of the six possibilities of forced operation

— **Reversed operation**

Reversed operations are only applicable to roller shutters or to products using a rolling mechanism for extension or retraction.

For these products, operation in situation a1 or b2 illustrated in Figure 3 is a reversed operation when the movement in the opposite direction is possible with an effort less than the limit of the class of operation. If the movement is not possible, it is a forced operation.

Reversed operation occurs on extension with the curtain fully extended and on retraction with the curtain fully retracted.

4.6.1.3 Tilting of laths

— **Rough operation**

Rough operation is not possible, the conditions defining its occurrence are not likely to occur (no excessive speed, no inertia of laths).

— **Forced operation**

Forced operation occurs in both closed positions which are the result of tilting the laths in both directions from the open position.

— **Reversed operation**

Not applicable.

4.6.1.4 Projection of the curtain

— **Rough operation**

Rough operation occurs in the fully projected position when, after having unlocked the projecting, the curtain is left free.

— **Forced operation**

Forced operation occurs at the end of projection, if the operating effort is maintained.

— **Reversed operation**

Not applicable.

4.6.2 Determination of performance

The determination of performance shall be in accordance with the test methods specified in EN 12194.

4.6.3 Performance requirement

After completion of each of the tests, using rough, forced and reversed operations, with the values given in Table 3, the following criteria shall be fulfilled:

— the following appearance defects shall not be visible: no permanent deformation of the curtain, fixing or locking devices and additionally for external venetian blinds a residual deflection of laths ≤ 5‰ L, where L is the length of the slat;

— and, for manual operation, the value of the operating effort shall be maintained within the limit of the initial class (see Table 2).

Some shutters are not designed to withstand an obstruction of the curtain in situations defined in a2, b1, c1 and c2 illustrated in Figure 3. They will not be subjected to the corresponding tests if the technical instructions of the manufacturer have a warning to the user about the risk of damage in case the curtain is obstructed in these situations.

For projecting shutters, the manufacturer shall provide a warning in the case the shutter cannot be extended or retracted in the projected position.

Table 3 — Values of the misuse efforts by type of operation

Effort of misuse operation		Misuse operation
Force (N)	**Torque (Nm)**	
$P_B = 2\ F_C$	not applicable [a]	rough
Movement of curtain		forced [b,c]
$P_F = 180$	$C_F = 60 \times R$	
Projection of curtain	Tilting the laths	
$P_F = 100$	$C_F = 30 \times R$	
$P_I \leq F_C$	$C_I \leq F_C \times R$	reversed

F_C = value of operating effort of the class obtained

P = exerted misuse force

C = exerted misuse torque

$_B$ = rough, $_F$ = forced, $_I$ = reversed

R = maximum length of crank handle described in the technical instructions of the manufacturer with R ≤ 0,20m

[a] Operation by gear is never rough.

[b] If the operating mechanism is equipped with system which limits the force or the torque (see 4.10), values of P_F and C_F are those given by these systems.

[c] For power operated operations, the effort to be applied is the one produced by the motor.

NOTE There are no performance classes.

4.7 Edge loading (wing shutters only)

4.7.1 General

This clause is only applicable to wing shutters.

The aim of this clause is to evaluate aging and subsidence of the shutter and its strap hinges, testing the panel laths upholding and the liaison between the strap hinges on the panel.

This clause evaluates the behaviour of the shutter under the action of vertical effort P_{el} of 500 N, applied to the edge of the leaf. It is not intended to evaluate the capacity of resistance of hinges. Hinges shall be of a grade corresponding to the curtain mass according to EN 14648.

In the case of a curtain with double leaves, the test shall be carried out on each individual leaf fixed to the test rig.

4.7.2 Determination of performance

The determination of performance shall be in accordance with the test methods specified in EN 12194.

4.7.3 Performance requirement

After unloading, the remaining vertical subsidence, measured at the loading point, shall be less than 5 mm/m of the leaf width.

4.8 Resistance of mechanisms holding the shutter in the extended position

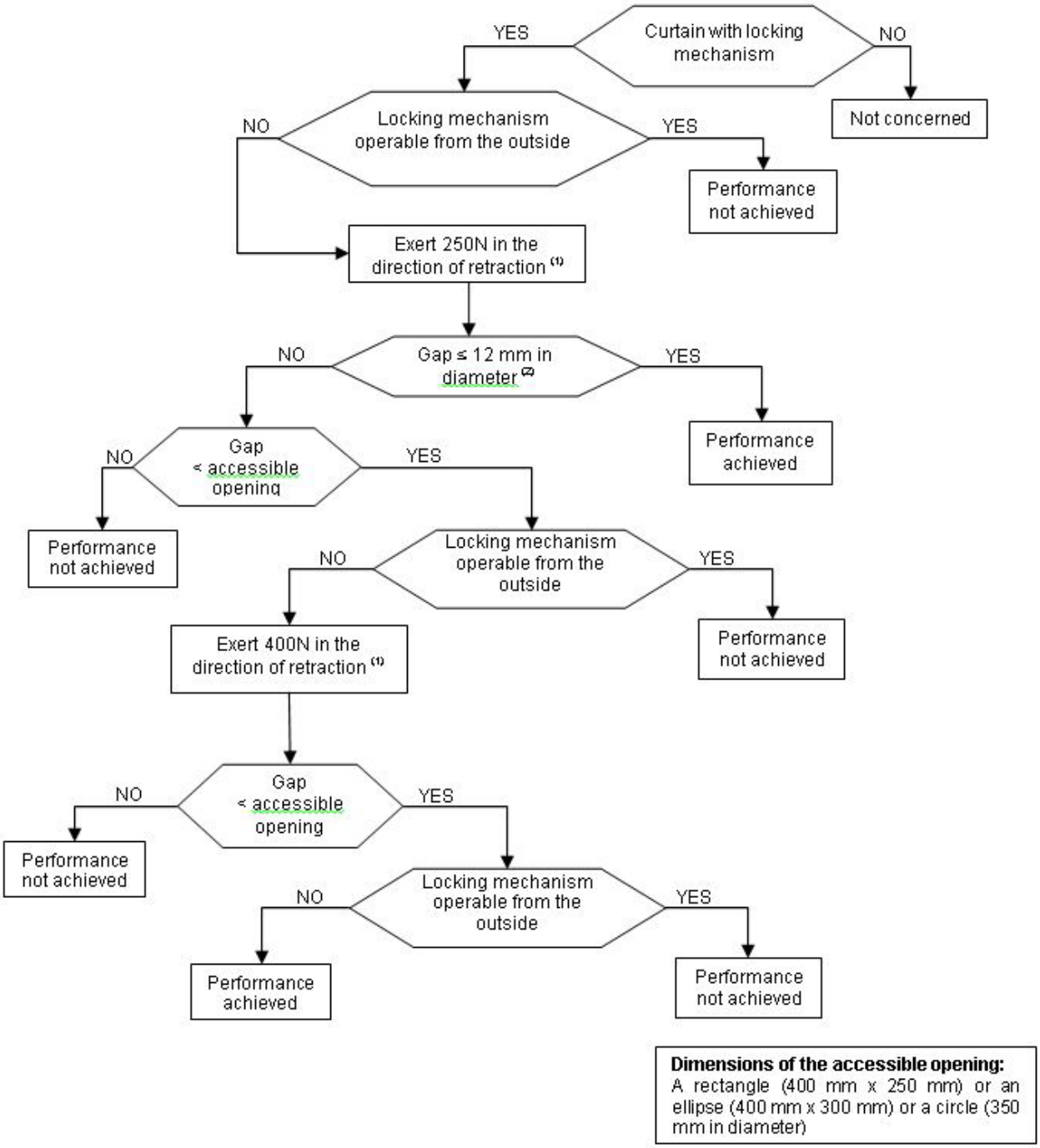
4.8.1 General

When equipped with a specific locking mechanism (as bolt, sash-bolt, self-closing device or espagnolette) holding the curtain fastened or locked in the fully extended position, it shall not be possible to retract the shutter from the exterior under the application of an opening force.

Although this test is carried out on a complete shutter, this clause only applies to the locking mechanisms. The requirements for prevention of access of a complete shutter are covered by 4.12.

4.8.2 Determination of performance

The determination of performance shall be in accordance with the test conditions defined in the following flowchart:



(1) Applied in the middle of the bottom lath or of the primary closing edge.

(2) Checkable with a round bar of 12 mm diameter.

4.8.3 Performance requirement

The shutter in the fully extended position shall not allow an accessible opening under the application of efforts defined in 4.8.2.

4.9 Mechanical endurance (repeated operating cycles)

4.9.1 General

This clause evaluates the ability of the shutter to withstand a number of operating cycles corresponding to a given use:

— the curtain: one cycle corresponds to a complete operation of extension and retraction including the rest times;

— the laths (external venetian blind, roller and wing shutters with tilting laths): one tilt cycle is defined as a complete movement of the pivoting mechanism, moving the laths from one extreme position to the other and then back again.

4.9.2 Determination of performance

The determination of performance shall be in accordance with the test methods specified in EN 14201.

4.9.3 Performance requirement

4.9.3.1 General

After carrying out the cycles related to the appropriate class, the following requirements shall be fulfilled.

4.9.3.2 Manual operation

— The value of the operating effort shall be maintained within the limit of the initial class;

— Wear of the constituent material of the laths: the wall of the laths shall not be perforated as a result of abrasion;

— Relevant parts involved in the safe operation of the product (e.g. storm hooks, guide pin,…) shall not present any breaking, permanent deformation or significant signs of wearing;

NOTE Carrying out a wind resistance test after the endurance test allows to verify the proper resistance of storm hooks without carrying out a visual inspection.

— Operating mechanisms shall not sustain significant damage.

The capability for use of a gear with crank handle, supplied on the market, intended to be incorporated in a shutter, may be determined according to EN 14203. Using gear with crank handle conforming to EN 14203 may allow shutter manufacturers to reach a higher endurance class.

4.9.3.3 Power operated operation

— **Variation of the speed under load**

The ratio $\frac{|T_1 - T_2|}{T_1} \times 100$ shall be less than or equal to 20 %.

where

— T_1 is the time needed for a complete retraction of the curtain, measured at the beginning of the endurance test, after five cycles of functioning;

— T_2 is the time needed for a complete retraction of the curtain measured at the end of the endurance test.

— **Accuracy of the positions of the limit stops**

The variation of the fully retracted and fully extended positions, measured in the two rotation directions and expressed as an angle in relation to the initial value, shall remain in the range of values given in Table 4.

Table 4 — Power operated products — Accuracy of the positions of the limit stops

Motorization type	Limit stops drift	
	Class 1	Class 2
Tubular	±15°	±5°
Square	±10°	±3°

— **Characteristics of the mechanical brake**

— Stopping the movement of the curtain shall not lead to an angular displacement of more than 20°.

— The displacement of the curtain, after applying an overload of 15 % of the weight of the curtain for 12 h, shall not exceed 5 mm, the measurement being carried out at an intermediate position.

NOTE 1 A mechanical brake is a brake applied mechanically by stored energy (spring force) until released with an external sustained electric power supply under the control of the operator or automatically.

— **Grease and oil traces**

There shall be no visible traces of grease or oil.

— **Wear of the constituent material of the laths of the curtain**

The wall of the laths shall not be perforated as a result of abrasion.

Relevant parts involved in the safe operation of the product (e.g. storm hooks, guide pin, …) shall not present any breaking, permanent deformation or significant signs of wearing.

NOTE 2 Carrying out a wind resistance test after the endurance test allows to verify the proper resistance of storm hooks without carrying out a visual inspection.

The suitability for use of a power operated drive, supplied on the market, intended to be incorporated in a shutter, may be determined according to EN 14202. Using a power operated drive conforming to EN 14202 may allow shutter manufacturers to reach a higher endurance class.

4.9.4 Classes of endurance

Table 5 gives the number of cycles corresponding to the three endurance classes specified.

Table 5 — Classes of endurance

Number of cycles	Class 1	Class 2	Class 3
Extension/retraction	3 000	7 000	10 000
Tilting	6 000	14 000	20 000

The orientation cycles which occur during the extension/retraction cycles shall be considered as contributing to the total number of orientation cycles to be carried out.

NOTE Class 2 corresponds to 10 years with 2 cycles per day.

4.10 Operation in frosty conditions

If the shutter cannot be operated in frosty conditions (in case of formation of ice), the information for use shall provide the following warning: “The operation in frosty conditions may damage the product”.

4.11 Impact resistance

4.11.1 General

This clause evaluates the behaviour of the shutter under the action of hard body impact.

4.11.2 Determination of performance

The determination of performance shall be in accordance with the test methods specified in EN 13330.

4.11.3 Performance requirement

Under the action of the hard body of 50 mm diameter, steel ball of 0,5 kg and a drop Z of 0,45 m, the shutter shall not sustain deteriorations:

— which are detrimental to its correct operation; for manual operation the operating effort shall be maintained within the limit of the initial class;

— which lead to unacceptable appearance defects (local indentations and cracks); the average diameter of indents shall not be greater than 20 mm of diameter or 2 mm indentation.

4.12 Prevention of access

4.12.1 General

This clause is applicable to shutters claiming to have a minimum level of prevention of access. These shutters are designated by the generic term “reinforced products”.

NOTE 1 The purpose of the products satisfying this clause is to deter a person seeking unlawful entry and to delay access. The “burglar resistant” products satisfying the EN 1627, EN 1628, EN 1629 and EN 1630 have a significantly higher mechanical performance to those satisfying the highest class of this clause. However, these standards do not address specific requirements applicable to shutters such as access to operating system from outside.

The performance of reinforced shutters is evaluated according to the following criteria:

— retraction of the curtain,

— resistance of the guide rail against splaying,

— rigidity of the curtain under the application of an horizontal force,

— perforation of a lath or of a panel,

— resistance of the bottom lath,

— installation of the shutter,

— ability to dismantle from outside,

— access to installation means from outside,

— access to operating system from outside (including remote control).

The manufacturer shall ensure that the level of performance declared is valid for the whole size range of the product.

NOTE 2 Although a tool (e.g. screwdriver) is sometimes used in the tests, this clause is not intended to reproduce a manual attack. The tool is only used as a part of the test equipment.

NOTE 3 Depending on the type of shutter considered, some of these criteria may not apply.

4.12.2 Retraction of the curtain

4.12.2.1 General

This clause characterizes the capacity of the curtain to resist retraction other than by the operating system.

The test shall be carried out:

— On the smallest size (width and height) declared by the manufacturer, and

— On the biggest size (width and height) declared by the manufacturer.

NOTE These two tests allow definition of the range of product to which the level of performance applies.

4.12.2.2 Determination of performance

The determination of performance shall be in accordance with the test method specified in EN 13330.

4.12.2.3 Performance requirement

The maximum displacement shall not exceed 100 mm under the application of the following forces, exerted in the direction of retraction:

— Class 1: 400 N;

— Class 2: 750 N.

4.12.3 Resistance of the guide rail against splaying

4.12.3.1 General

This clause characterizes the resistance of the guide rail to splaying.

4.12.3.2 Determination of performance

The determination of performance shall be in accordance with the test method specified in EN 13330.

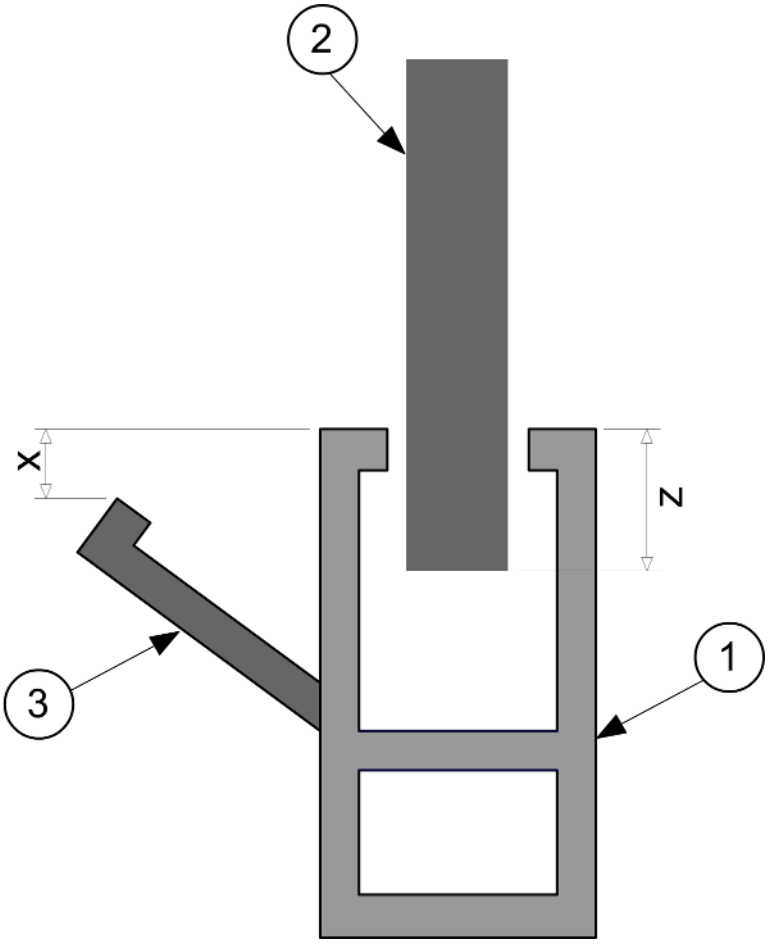
4.12.3.3 Performance requirement

After removing the screwdriver, the distance x, corresponding to the deformation of the leg of the guide rail, shall not exceed the distance z, corresponding to the minimum inserted part of the curtain in the guide rail (see Figure 4) after having applied the following forces:

— Class 1: 150 N;

— Class 2: 300 N.

For the calculation of z, the curtain shall be shifted to the opposite side.



Key

1 guide rail piece

2 curtain

3 deformed leg of the guide rail

Figure 4 — Resistance of the guiderail against splaying

4.12.4 Rigidity of the curtain under the application of an horizontal force

4.12.4.1 General

This clause characterizes the resistance of the curtain under the application of a distributed horizontal force.

4.12.4.2 Determination of performance

The test is carried out according to EN 1932 (wind resistance test method), for the maximum width defined by the manufacturer.

4.12.4.3 Performance requirement

The shutter shall achieve at least the following performance:

— Class 1: class 4 of wind resistance;

— Class 2: class 5 of wind resistance.

4.12.5 Perforation of a lath or of a panel

4.12.5.1 General

This clause characterizes the resistance of a lath or of a panel of the curtain under the application of a dynamic force.

If the curtain is made from panels of lath of different resistance, all the lath and panels shall be tested.

4.12.5.2 Determination of performance

The determination of performance shall be in accordance with the test method specified in EN 13330.

4.12.5.3 Performance requirement

There shall be no complete perforation of the lath or the panel for the following energy level:

— Class 1: 7 J;

— Class 2: 12 J.

No complete perforation means that the tip of the screwdriver has not come through the curtain.

4.12.6 Resistance of the bottom lath

4.12.6.1 General

This clause characterizes the resistance of the bottom lath against deformation in the direction perpendicular to the plane of retraction.

If it is possible to create an opening of more than 12 mm during the curtain retraction test (see 4.12.2), a traction test on the bottom lath shall be carried out. The force shall be applied perpendicularly to the direction of the plane of retraction.

The test shall be carried out on the greatest width declared by the manufacturer.

4.12.6.2 Determination of performance

The determination of performance shall be in accordance with the test method specified in EN 13330.

4.12.6.3 Performance requirement

The bottom lath shall stay in the guide rail under the application of the following force:

— Class 1: 250 N;

— Class 2: 500 N.

4.12.7 Installation of the shutter

4.12.7.1 General

This clause characterizes the resistance of the shutter fixation.

NOTE This clause intends to cover the link between the shutter and its fixation means. It does not cover the resistance of the fixation into its installation support (concrete,…). This part is strongly depending on the installation condition and not on the design of the product.

4.12.7.2 Determination of performance

The determination of performance shall be in accordance with the test method specified in EN 13330.

4.12.7.3 Performance requirement

The guide rail shall stay on its support under the application of the following horizontal force:

— Class 1: 150 N;

— Class 2: 300 N.

4.12.8 Ability to dismantle from outside

When the curtain is in the fully extended position, the means of assembly (example screws) shall not be demountable with a screwdriver, a key or similar from the outside.

If accessible from outside, the access panel (if present) shall not be dismountable without tools or the mounting system shall not be visible.

4.12.9 Access to the installation means from outside

When the curtain is in the fully extended position, the means of fixing shall not be demountable with a screwdriver, a key or similar from the outside.

4.12.10 Access to operating system from outside (including remote control)

No operating system (including the manual override) and no electrical cable shall be accessible from outside.

The remote control signal shall be secured.

The code shall not be reproducible.

4.12.11 Classification of reinforced shutters

The class of reinforced shutters is given by the performances obtained for each of the criteria of 4.12.2 to 4.12.10. The reinforced shutter shall satisfy all of the values in order to gain a classification.

Table 6 presents the minimal values to be fulfilled by reinforced shutters.

Table 6 — Classification of reinforced shutters

Clause	Criteria	Class 1	Class 2
4.12.2	Retraction of the curtain	400 N	750 N
4.12.3	Resistance of the guide rail against splaying	150 N	300 N
4.12.4	Rigidity of the curtain under the application of an horizontal force	Wind resistance class 4	Wind resistance class 5
4.12.5	Perforation of a lath or of a panel	7 J	12 J
4.12.6	Resistance of the bottom lath	250 N	500 N
4.12.7	Installation of the shutter	150 N	300 N
4.12.8	Ability to dismantle from outside	Assembling means not accessible from outside (4.12.8 fulfilled)	
4.12.9	Access to installation means from outside	Fixation means not accessible from outside (4.12.9 fulfilled)	
4.12.10	Access to operating system from outside	Operating means not accessible from outside (4.12.10 fulfilled)	

4.13 Safety in use

4.13.1 General

This clause deals with all significant hazards, hazardous situations and events when shutters and external venetian blinds are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer. The significant machinery hazards related to power operated shutters are listed in Annex C.

4.13.2 Protection from potentially harmful parts

4.13.2.1 General

A contact between the user and the shutter and its parts shall not cause any injury.

4.13.2.2 Determination of performance

The requirements specified in 4.13.2.3 shall be fulfilled.

4.13.2.3 Safety requirement

Elements which may come into contact with passers-by or users, shall not present any sharp or projecting edges, likely to cause injury.

Sharp and projecting edges of any moving parts of the shutter likely to be located at a height lower than 2,50 m from the floor or any permanent access level, shall be rounded with a minimum radius of 0,5 mm.

4.13.3 Power operated shutters – Injurious contact in operation

4.13.3.1 General

Crushing hazards shall be eliminated or reduced.

4.13.3.2 Determination of performance

The requirements specified in 4.13.3.3 shall be fulfilled and, where appropriate, in accordance with the test methods specified in EN 12045.

4.13.3.3 Safety requirement

The requirement is met if, at least, one of the following conditions is fulfilled:

a) In the crushing area as defined in EN 12045 and in between moving slats or laths, the transmitted force on a obstacle shall be lower than 150 N and the speed of extension of the curtain shall be lower than 0,2 m/s.

In addition, in the case of a wing shutter with two or more leaves, a minimum gap of 0,10 m shall be maintained between the leaves in the area of extension (see Figure 5).

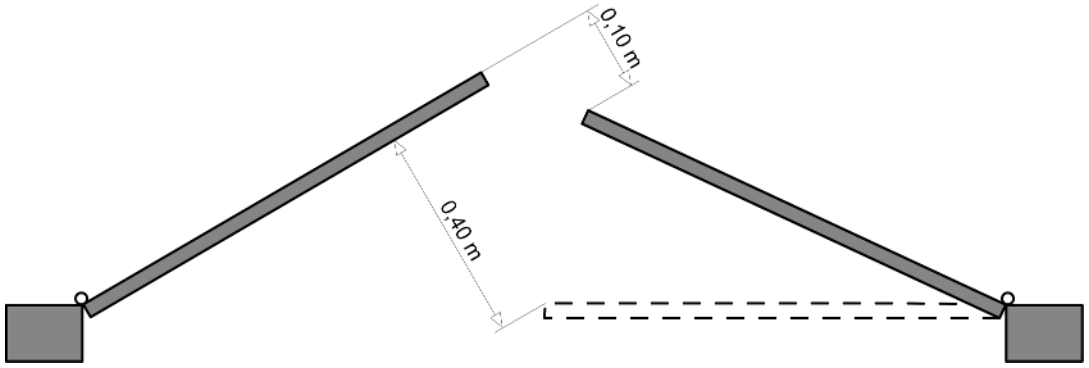


Figure 5 — Gap between the panels at the end of extension

b) The shutter with accumulating or retractable laths fulfils the accumulation condition defined in EN 12045. In addition, the average speed of extension of the curtain in the last 0,40 m shall be less than 0,2 m/s.

c) The shutter has a hold-to-run control and the switch is incorporated in the product or installed in such a way that it allows the control of the movement in the direct view of the complete curtain.

d) The crushing area is at a distance Z greater than or equal to 2,50 m from the floor or any other permanent access level.

e) The shutter:

   1) either prevents contact in the crushing area (guards);

   2) or limits the transmitted force (static operation force) to a value lower than 150 N and allows removal of the obstacle either by reversing the movement of the curtain or by stopping it. With the last solution, it shall be possible to lift up the curtain with a force less than 25 N;

   3) or, in the case of a roller shutter fitted to a roof window, the drive shall stop the movement of the curtain, and within 5 s, start to reverse automatically. During this period, the maximum operating force shall not exceed 250 N for more than 2 s, and the average force calculated over the period of 5 s, shall not exceed 150 N.

Guards designed to protect from the mobile elements of transmission shall be fixed in such a way that they can only be dismounted with the use of a tool.

Roller shutters with perforated laths shall not allow the introduction of a finger between laths. This condition is fulfilled if a 5 mm diameter rod cannot be introduced.

4.13.4 Electrical hazards

The electric drives for rolling shutters shall fulfil EN 60335-2-97.

The electric drives for panel shutters shall fulfil EN 60335-2-97, the test being carried out on a panel shutter giving the most unfavourable conditions. These conditions can be reproduced by simulation.

4.14 Additional thermal resistance ΔR

A shutter, in the extended and closed position, produces an additional thermal resistance ΔR expressed in m^2.K/W.

When calculated according to the method specified in EN ISO 10077-1, on the basis of the air permeability of the shutter determined according to EN 13125, the value of the additional thermal resistance ΔR of the shutter expressed in m^2.K/W shall be determined.

4.15 Total solar energy transmittance g_{tot}

The limitation of solar gains is one of the most important aspects of summer thermal comfort. The solar gains are directly proportional to the total solar energy transmittance g_{tot}. g_{tot} depends on the glazing and the shutter.

When calculated according to EN 13363-1, on the basis of the material properties determined according to EN 14500, the value of the total solar energy transmittance g_{tot} of a shutter shall be determined according to the conditions given in EN 14501. Tolerances given in EN 13363-1 may be considered for the declaration of the g_{tot} value.

NOTE 1 For the calculation of the solar factor g_{tot}, EN 14501 defines four reference glazing. When the glazing that has been used for the calculation is not specified by the manufacturer, EN 14501 defines by default the glazing C (4 mm Float + 16 mm space + 4 mm Float, with low emissivity coating in position 3, space filled with argon, solar factor of the glazing alone g = 0,59).

NOTE 2 A definition of the total solar energy transmittance is given in EN 14501.

4.16 Materials

4.16.1 General

This clause evaluates the ability of constituent materials of the shutter to fulfil the following requirements during an economically reasonable service life:

— colour fastness;

— no degradation of aspect;

— resistance to breakage;

— resistance to corrosion;

— dimensional stability.

NOTE Temperature effects are dealt with in Annex A.

Table 7 defines specific requirements for different constituent materials.

Table 7 — Requirements for constituent materials

Requirements					
Material	**Colour**	**Aspect**	**Resistance**	**Corrosion / Biological attack**	**Dimensional stability**
Rigid plastic	■	■	■		■
Metal				■	
Wood		■		■	■

Only the requirements described by a ■ are covered by this standard.

Selected criteria are linked to the test methods described in 4.16.2, 4.16.3 and 4.16.4. They specify the minimum properties to be fulfilled by constituent materials.

4.16.2 Rigid plastic materials

The minimum characteristics of suitability for use of unplasticized polyvinyl chloride (PVC-U) profiles shall be as specified in Table 8, in reference to EN 13245-1.

Table 8 — PVC-U profiles — Minimum characteristic according to EN 13245–1

Group	Properties	Designation	Comments
1	Material and profile type	PVC-U – Type 1, PVC-U – Type 2, PVC-U – Type 3, or PVC-U – Type 4,	Type 1 profile: PVC-U profile obtained by a mono-extrusion process (coloudred in the mass) Type 2 profile: PVC-U profile obtained by a co-extrusion process Type 3 profile: PVC-U profile as Type 1 or Type 2 with laminated foil Type 4 profile: PVC-U profile as Type 1 or Type 2 with lacquer-coating
2	Identification intended properties	E	
3	Material properties	080,29 or 077,23 or 075,23	
4	Profile properties	PM,3, (23,5) or PM,3, (23,10) or PM,2, (−10,10)	PM: nominal linear mass (23,10) for a PVC profile with an impact resistance of 10 J at 23 °C
5	Ageing light coloured	A4 or A6 or A8 N, 8, 20 or N, 12, 23 or N, 16, 28	A: artificial ageing N, 8, 20: 2 years natural ageing energy of 8 GJ/m^2 and average temperature of 20 °C
Example of a two years exposure: - south of France: code “N, 12, 23” for a global irradiance of 12 GJ/m^2 and an average temperature of 23 °C - light colours shall be defined by: L* ≥ 82, −2,5 ≤ a* ≤ 5; −5 ≤ b* ≤ 15			

4.16.3 Metals

Requirements and classes for resistance to corrosion shall be in accordance with EN 1670, except as follows:

The salt spray test according ISO 9227 shall be carried out:

— either on the different profiles and components used in the shutter, not assembled;

— or on a complete small scale sample of shutter (minimum size 700 mm x 700 mm).

The evaluation of the results shall be carried out by a control of aspect after testing as specified in ISO 9227.

The classes of resistance to corrosion of metals used shall be as specified in Table 9.

Table 9 — Classes of resistance to corrosion

	Classes			
	1	**2**	**3**	**4**
Indoor components	24 h	48 h	96 h	
Outdoor components		48 h	96 h	240 h

Class of resistance of the metal parts of the product: the classes of corrosion C of the metal components of the products are expressed using the following principle: indoor/outdoor.

EXAMPLE The class of corrosion C1/3 means: 24 h resistance for indoor components and 96 h resistance for outdoor components.

4.16.4 Wood

4.16.4.1 General

This clause applies to shutters to be treated or to shutters of a sufficient stability (natural or achieved by a treatment), without moisture repellent protection, with a temporary moisture repellent protection and to shutters having a complete finishing.

4.16.4.2 Aesthetic, physical and mechanical characteristics

4.16.4.2.1 Woods humidity, shrinkage and swelling

The moisture content – during the manufacturing of the wood and upon delivery of the shutter – shall be between 12 % and 18 %, values which correspond to the equilibrium moisture of woods in the outside depending on climates.

In the case of glue joints, compatibility between the moisture of woods and adhesives shall be ensured. The adhesive employed shall be of D4 class according to the EN 204.

The dimensional variation (shrinkage or swelling) shall not exceed 0,3 % for a moisture change of 1 %.

NOTE 1 A protection against moisture regains (moisture-repellent protection) allows to slow down the swelling of the shutter.

NOTE 2 In the case of drying or water regains of woods after installation, it is normal that woods well or shrink. A lath of shutter manufactured at a humidity rate of 18 % and drying at 8 % under the effect of the sun may retract of 2 mm to 3 mm, without the quality or the humidity of the wood being in fault.

4.16.4.2.2 Requirements on the material

Wood used in shutters shall be free from any vegetable or animal spoilage.

Shakes and splits are not permitted.

Elements shall be with straight grains for at least 3/4 of their length.

Sound and adherent knots are not permitted on slats for roller shutters but admitted for other profiles within the following limitations:

Quality for clear or opaque finishes:

if B < 50 mm, 30 kn/m^2 maximum	$D < E$	
if B > 50 mm, 30 kn/m^2 maximum	$D < B/2$	D < 40 mm

when B is the width of the profile, E its thickness and D the maximal diameter of the knots.

4.16.4.3 Stability against biological attacks

4.16.4.3.1 General

The shutter shall be supplied by the manufacturer:

— With the mention “naturally lasting” and specifying the class of use (3a or 3b) and the resistance or not to insects: case of shutters resulting from the use of naturally lasting species. These shutters do not need to undergo additional treatments and may be cut out without their durability being deteriorated.

— With the mention “to be treated if re-cut” and specifying the class of use (3a or 3b) and the resistance or not to insects: case of shutters resulting from the use of treated species. The durability of these shutters is not deteriorated if they are not cut again. If re-cut, the cuts shall be treated again by the purchaser. The treatment against biological attacks shall be carried out before the installation.

— With the mention “to be treated”: case of shutters resulting from the use of non-treated species and non-naturally lasting species. The durability of these shutters is not ensured. These shutters shall be treated by the purchaser. The treatment against biological attacks shall be carried out before the installation.

These mentions shall appear on the labelling of the shutter as defined in 4.16.4.5. When treatments are to be carried out by the purchaser, the manufacturer shall indicate all the treatments and finishes to be applied (including protection against moisture regains).

A non-exhaustive list on the natural resistance of species towards fungal risks and insects for a use as shutter is given in Annex E.

The presence of sapwood, whatever the species, systematically requires a treatment adapted to the class of use targeted (3a or 3b).

NOTE Documents of national implementation may contain recommendations regarding the class of use of the product.

4.16.4.3.2 Fungal stability

According to documents of national implementation, the class of use required for shutters shall be 3a or 3b.

4.16.4.3.3 Stability against insects

Woods that would not resist insects with wood borer larva shall be treated with an efficient insecticide.

4.16.4.4 Temporary and permanent moisture-repellent protection

Any moisture-repellent protection (temporary or permanent) shall be applied on a sufficiently lasting product (naturally or given by treatment) for the targeted class of use.

A product may be supplied:

— "without moisture-repellent protection" (temporary or permanent). The product shall be given a moisture-repellent protection before it is installed.

— "with temporary moisture-repellent protection – one layer" (clear or opaque). Application of a clear or opaque impression for a subsequent finish. Preferably with a paint of semi-permeable impression (permeable to steam and waterproof). The time limits to apply a permanent moisture-repellent protection are given in Annex F.

— "with temporary moisture-repellent protection – two layers". Application, as a supplement to the previous one, of a first finish layer (pre-finish). The time limits to apply a permanent moisture-repellent protection are given in Annex F.

— "with permanent moisture-repellent protection" (complete finish, clear or opaque).

When the shutters are temporarily protected against moisture regains with the application on all their sides of a moisture-repellent protection slowing down hygrometric exchanges, the moisture-repellent value shall be inferior to 0,3.

The moisture-repellent value is defined as the ratio between the water regain of the wood at the end of a finished part and the end of a raw one. The way to determine this value is described in Annex G.

4.16.4.5 Information relative to the protection of shutters

Shutters shall be accompanied by the following information:

— In the case of shutters in wood, the characteristic of stability ("naturally lasting", "to be treated if re-cut", "to be treated") against biological attacks (insects, fungus);

— In the case of shutters already treated ("naturally lasting", "to be treated if re-cut"), the calls of use 3a or 3b (fungal risk);

— In the case of shutters already treated ("naturally lasting", "to be treated if re-cut"), the resistant against insects with wood borer larva;

— In the case of shutters in wood, the characteristic of moisture repellent protection ("without moisture-repellent protection", "with temporary moisture-repellent protection by impression", "with temporary moisture-repellent protection by pre-finishing", "with permanent moisture-repellent protection by complete finishing").

The time limits to apply the moisture repellent protection specified in Annex F shall be communicated to the purchaser.

4.17 Dimensional tolerances

4.17.1 General

Tolerances relate to the overall dimensions (height(s) and width(s)) of the product delivered compared to the ordered dimensions.

4.17.2 Determination of performance

The dimensions are the overall dimensions of the product delivered (e.g. for roller shutters including the guide rails and eventually the head box). The manufacturer shall define the overlapping of the laths inside the guard rail.

4.17.3 Performance requirement

The delivered width and height shall fall within the tolerances listed in Table 10 in the case of shutters other than panel shutters or Table 11 in the case of panel shutters, taken at the temperature of 23 °C ± 5 °C. In case of wood, the reference moisture content is 15 %

Table 10 — Dimensional tolerances related to shutters other than panel shutters

Width L (m)	Tolerances (mm)	Height H (m)	Tolerances [a] (mm)
L ≤ 2	+0 −3	H ≤ 1,5	+0 −4
2 < L ≤ 4	+0 −4	1,5 < H ≤ 2,5	+0 −6
L > 4	+0 −5	H > 2,5	+0 −10
[a] For External Venetian Blinds, the dimensional tolerances in height are +0 / −10 mm regardless of the height.			

Table 11 — Dimensional tolerances related to panel shutters

Width L (m)	Tolerances (mm)	Height H (m)	Tolerances (mm)
Whatever L	±3 mm/m	Whatever H	±2 mm/m

The dimensional tolerances specified in Table 11 are manufacturing tolerances (dimensions of the product at the factory gate). They do not consider the possible dimensional variations due to temperature and humidity variations that could lead to expansions of wood panel shutters.

4.18 Specific characteristics

4.18.1 Bullet resistance

Shutters claiming to have a minimum level of bullet resistance shall be evaluated according to EN 1522 and EN 1523.

4.18.2 Burglar resistance

Shutters claiming to have a minimum level of burglar resistance shall be evaluated according to EN 1627, EN 1628, EN 1629, EN 1630.

4.18.3 Explosion resistance

Shutters claiming to have a minimum level of explosion resistance shall be evaluated according to EN 13123-1, EN 13124-1, EN 13123-2, EN 13124-2.

4.18.4 Airborne sound insulation

Shutters claiming to have a minimum level of airborne sound insulation shall be evaluated according to EN 14759.

5 Handling and storage

5.1 General

This clause specifies requirements related to packaging, storage, handling and delivery of shutters.

5.2 Determination of performance

The requirements specified in 5.3 shall be fulfilled.

5.3 Performance requirement

The shutter or each of its components shall be:

— able to be handled in accordance with ISO 11228-3;

Whenever possible, in case of manual handling the mass per person should be not more than 25 kg.

— wrapped or designed to ensure storage without deterioration.

Any special equipment for assembly, fixing and setting, e.g. appropriate fixing brackets shall be provided.

6 Information for use

6.1 General

Information for use shall be provided according to EN ISO 12100 with the additional requirements specified in the present clause.

6.2 Signal and warning devices

A warning device consisting for example, of the general danger warning pictogram according to EN 61310-1, with the supplementary label giving text information in the following sense “The operator’s instruction shall be read before the use of the product”, shall be attached to the instructions for use, illustrating very clearly the situations where forced operation may damage the product.

6.3 Accompanying documents (in particular the instruction handbook)

6.3.1 General

Written instructions shall be provided in accordance to EN ISO 12100. The following specific information shall be included in these instructions.

6.3.2 Instructions for handling, unpacking and installation

6.3.2.1 General instructions

The instructions shall include a repeat of the information with which the product is marked.

The instructions shall clearly state when the procedure specified can be completed by non-professionals.

The instructions shall include step by step, guidance on the correct sequence of operations to achieve a proper good and safe installation:

— instructions for assembly, installation and fixing;

— the assembly phases;

— any special requirements for storage;

— the methods for safe handling of the shutter and its components, in particular for products delivered in items with high unit mass.

The installation instructions shall state that the instructions for use shall be provided to the end user.

6.3.2.2 Additional instructions for power operated products

The instructions shall include diagrams, drawings, etc., wherever necessary to give clarity to the instructions (especially when a wrong connection can be the cause of risks).

The information on the operations to be carried out to programme an electronic switch or a clock shall be given in a clear manner.

The instruction handbook shall draw the attention of the installer to the fact that modification of the design or configuration of the equipment shall not be made without consulting the manufacturer or his authorized representative.

The instructions for shutters controlled by an hold-to-run switch shall state that the switch shall be installed within sight of movement of the curtain but away from moving parts and at a height in accordance with the national regulations concerning disabled people (preferably less than 1,30 m where possible).

If a manual release is provided, the instructions shall state that the actuating member is to be accessible from a height lower than 1,80 m.

In the case of installation in a windy area and with frequent power failures, the supplier will recommend a manual override device or a substitute power supply.

If shutters are installed at every aperture of the building, consideration should be given to the need to evacuate unless it is already covered by National regulations.

6.3.3 Instructions for use and maintenance

6.3.3.1 General instructions

The instructions for use shall include the duties and conditions under which the shutter shall be used, in particular with regard to:

— correct methods for operating the shutter;

— explanation of the warning signs.

The manufacturer shall inform the installer of the need to arrange a servicing of the product to ensure maintenance of the product itself or neighbouring elements.

The manufacturer shall clearly indicate the items needing replacement, maintenance or verification and the frequency.

When use of the product can result in a dangerous situation the necessary information concerning the operation shall be stated without ambiguity and detailed in the operating instructions.

In case of External Venetian Blinds, the instructions shall state the wind speed above which the EVB shall be retracted.

The instructions shall state the maximum load for which the non retractable parts of the shutters have been designed.

6.3.3.2 Additional specifications for power operated products

Unless the instructions for use and maintenance in accordance with EN 60335-2-97 are provided, the instructions for use and maintenance shall state the substance of the following:

IMPORTANT SAFETY INSTRUCTIONS

WARNING – IT IS IMPORTANT FOR SAFETY OF PERSONS TO FOLLOW THESE INSTRUCTIONS

SAVE THESE INSTRUCTIONS

The instructions shall include the substance of the following:

— Do not allow children to play with the control device of the shutter. Keep remote controls away from children;

— Frequently examine the installation for signs of wear or damage to cables. Do not use if repair is necessary.

The information on the operations to be carried out to programme an electronic switch or a clock shall be given in a clear manner.

The instructions shall give details on how to use the manual release, if applicable, and the substance of the following:

— Take care when operating the manual release with the shutter retracted since it may fall rapidly due to weak or broken springs.

For shutters, which can be operated from a position without the product in view, the user shall take appropriate organisational measures for preventing operation of the shutter when maintenance, such as window or wall cleaning, is being carried out in the vicinity.

For an inspection or maintenance of the electrical parts, the shutter shall be disconnected from the energy supply in a safe way.

If the shutter is equipped with a protective device, the instruction handbook shall draw the attention of the user to the fact that modification of the design or configuration of the equipment without consulting the manufacturer or his authorized representative may create a dangerous situation.

If the shutter is equipped with an autonomous electrical supply, the instruction handbook shall provide information regarding the durability and endurance of such a supply as well as instruction relating to care and maintenance. If any, the expected longevity of the battery shall be specified in years and/or number of cycles.

6.4 Marking

The minimum marking is specified in Clause 8.

7 Assessment and verification of constancy of performance - AVCP

7.1 General

The compliance of shutters and external venetian blinds with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

— Determination of the product type;

— Factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

7.2 Type Testing

7.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests. (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family.

NOTE Products may be grouped in different families for different characteristics.

Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

— at the beginning of the production of a new or modified shutter and external venetian blind (unless a member of the same product range); or

— at the beginning of a new or modified method of production (where this may affect the stated properties); or

— they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the shutter and external venetian blind design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility

on the shutter and external venetian blind manufacturer to ensure that the shutter and external venetian blind as a whole is correctly manufactured and its component products have the declared performance values.

7.2.2 Test samples, testing and compliance criteria

The number of samples of shutters and external venetian blinds to be tested/assessed shall be in accordance with Table 12.

Table 12 — Number of samples to be tested and compliance criteria

Characteristic	Requirement	Assessment method	Number of samples	Compliance criteria
Resistance to wind loads	4.1	EN 1932	1	EN 1932
Additional thermal resistance ΔR	4.14	EN 13125	1	EN 13125
Total solar energy transmittance g_{tot}	4.15	EN 13363-1	1	EN 14501

7.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the shutter and external venetian blind to which they relate.

7.2.4 Shared other party results

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— The results are known to be valid for products with the same essential characteristics relevant for the product performance;

— In addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted [1)] to transmit to the manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;

— The manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:

  — ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type; and

  — keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

1) The formulation of such an agreement can be done by licence, contract, or any other type of written consent.

7.2.5 Cascading determination of the product type results

For some construction products, there are companies (often called “system houses”) which supply or ensure the supply of, on the basis of an agreement[2)], some or all of the components (e.g. in case of windows: profiles, gaskets, weather strips)[3)] to an assembler who then manufactures the finished product (referred to below as the “assembler”) in his factory.

Provided that the activities for which such a system house is legally established include manufacturing/assembling of products as the assembled one, the system house may take the responsibility for the determination of the product type regarding one or several essential characteristics of an end product which is subsequently manufactured and/or assembled by other firms in their own factory.

When doing so, the system house shall submit an “assembled product” using components manufactured by it or by others, to the determination of the product type and then make the determination of the product type report available to the assemblers, i.e. the actual manufacturer of the product placed on the market.

To take into account such a situation, the concept of cascading determination of the product type might be taken into consideration in the technical specification, provided that this concerns characteristics for which either a notified product certification body or a notified test laboratory intervene, as presented below.

The determination of the product type report that the system house has obtained with regard to tests carried out by a notified body, and which is supplied to the assemblers, may be used for the regulatory marking purposes without the assembler having to involve again a notified body to undertake the determination of the product type of the essential characteristic(s) that were already tested, provided that:

— The assembler manufactures a product which uses the same combination of components (components with the same characteristics), and in the same way, as that for which the system house has obtained the determination of the product type report. If this report is based on a combination of components not representing the final product as to be placed on the market, and/or is not assembled in accordance with the system house’s instruction for assembling the components, the assembler needs to submit his finished product to the determination of the product type;

— The system house has notified to the manufacturer the instructions for manufacturing/assembling the product and installation guidance;

— The assembler (manufacturer) assumes the responsibility for the correct assembly of the product in accordance with the instructions for manufacturing/assembling the product and installation guidance notified to him by the system house;

— The instructions for manufacturing/assembling the product and installation guidance notified to the assembler (manufacturer) by the system house are an integral part of the assembler’s Factory Production Control system and are referred to in the determination of the product type report;

— The assembler is able to provide documented evidence that the combination of components he is using, and his way of manufacturing, correspond to the one for which the system house has obtained the determination of the product type report (he needs to keep a copy of the system house’s determination of the product type report);

— Regardless the possibility of referring, on the basis of the agreement signed with the system house, to the latter’s responsibility and liability under private law, the assembler remains responsible for the product being in compliance with the declared performances, including both the design and the manufacture of the product, which is given when he affixes the regulatory marking on his product

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2) This can be, for instance, a contract, license or whatever kind of written agreement, which should also contain clear provisions with regard to responsibility and liability of the component producer (system house, on the one hand, and the assembler of the finished product, on the other hand).

3) These companies may produce components but they are not required to do so.

7.3 Factory Production Control (FPC)

7.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared or cascading product type results, the FPC shall also include the appropriate documentation as foreseen in 7.2.4 and 7.2.5.

7.3.2 Requirements

7.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate constancy of performance of the product at appropriate stages;

— identify and record any instance of non-constancy;

— identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

b) the effective implementation of these procedures and instructions;

c) the recording of these operations and their results;

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 standard and which addresses the provisions of 4.1, 4.14, 4.15 of the present European Standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

7.3.2.2 Equipment

7.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

7.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer’s written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

7.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the constancy of performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

7.3.2.4 Traceability and marking

Individual shutters and external venetian blinds shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

7.3.2.5 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

7.3.2.6 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The characteristics, and the means of control, are:

— Resistance to wind loads: shall be subject to the tests indicated in 4.1 at least once during the entire production period;

— Additional thermal resistance: shall be subject to the tests indicated in 4.14, at least once during the entire production period;

— Total solar energy transmittance: shall be subject to the tests indicated in 4.15 at least once during the entire production period.

7.3.2.7 Non complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

7.3.2.8 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

7.3.2.9 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

7.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan,

and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b),only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment, etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

7.3.4 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 7.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

7.3.5 One-off products, pre-production products (e.g. prototypes)

The shutters and external venetian blinds produced as a one-off, prototypes assessed before full production is established shall be assessed as follows.

For type assessment, the provisions of 7.2.1, 3rd paragraph apply, together with the following additional provisions:

— in case of prototypes, the test samples shall be representative of the intended future production and shall be selected by the manufacturer;

— on request of the manufacturer, the results of the assessment of prototype samples may be included in a certificate or in test reports issued by the involved third party.

The FPC system of one-off products shall ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate. The manufacturer shall maintain records allowing traceability of the product.

For prototypes, where the intention is to move to series production, the initial inspection of the factory and FPC shall be carried out before the production is already running and/or before the FPC is already in practice. The following shall be assessed:

— the FPC-documentation; and

— the factory.

In the initial assessment of the factory and FPC it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European Standard will be available, and

b) that the FPC-procedures in accordance with the FPC-documentation will be implemented and followed in practice, and

c) that procedures are in place to demonstrate that the factory production processes can produce a product complying with the requirements of this European Standard and that the product will be the same as the samples used for the determination of the product type, for which compliance with this European Standard has been verified.

Once series production is fully established, the provisions of 7.3 shall apply.

8 Marking

The minimum marking shall include:

— business name and full address of the manufacturer and, where applicable, his authorized representative;

— mandatory marking;

— year of construction;

— designation of the product;

— designation of series or type, if any;

— serial or identification number, if any;

— rating information (mandatory for electric products, voltage, frequency, power, etc.).

When regulatory marking covers the same information listed above, the provisions of this clause are met.

Annex A
(informative)

Temperature effects

A.1 General

Under the effects of particular climatic conditions present to the installation location of the shutter such as:

— increase in temperature of the shutter due to solar radiation,

— abrupt variation in temperature, for example due to a sudden shower after a prolonged sunshine,

— dropping of temperature in winter;

the shutter should not:

— present permanent deformation,

— sustain breakage or exit from the guide rails,

which are detrimental to its functioning.

NOTE The effects of temperature are important for shutters made of plastic materials:

— high dilatation factor;

— reduction of elasticity modulus at high temperatures;

— lowering of resistance to impact of some synthetic materials at low temperatures;

— high shrinkage.

A.2 Determination of performance

Variations in dimensions resulting from the increase of temperature or from the thermal shock can be solved at the design level in the case of shutters in metal (steel and aluminium) taking into account the linear dilatation factors and the elasticity modulus of materials.

In the case of wood materials, the variations in dimensions are mainly due to the hygrothermic effects. These variations mainly depend on the finished colour of woods. Important subsiding may occur because of dark finishing colours. It is therefore recommended not to use dark colours having an absorption coefficient above 70 % ($\alpha > 70$ %) in the case of wood panels.

In the case of shutters made of plastic materials, the maintaining of the operating force and the mechanical keeping in order of the curtain should be verified at the temperature which can be raised under sun exposition.

NOTE The level of surface temperature which can be raised by the curtain under sun exposition depends on the energy absorption characteristics of the external wall of curtain.

Table A.1 defines the temperatures values which can be raised at the external face of a vertical curtain, for an external ambient temperature of 20 °C.

Table A.1 — Temperature effects

Surface temperature	Absorption factor	Examples of colours concerned
50 °C	$\alpha < 0,5$	Light colours (white, cream, yellow, orange, light red)
60 °C	$0,5 \leq \alpha < 0,8$	Grey, dark red, light green, brown, light blue
70 °C	$\alpha \geq 0,8$	Dark colours (blue, green, brown, black)
For sloping shutters (skylight or conservatory shutters) or projecting shutters, temperatures of the table should be increased of 10 °C.		

A.3 Performance requirement

For the shutter in plastic materials:

— The shutter should operate one time, under the action of variations temperatures given in Table A.2 (related to the colour of the curtain).

Table A.2 — Raised temperatures

Colour of the curtain	Light	Grey, dark red,etc	Dark
Vertical shutters	+ 30°	+ 40°	+ 50°
Sloping or projecting shutters	+ 40°	+ 50°	+ 60°

Functioning of operation should be maintained (for manual operation, operating effort should be maintained within the limit of the initial class).

Annex B
(informative)

Calculation of wind pressure exerted on a shutter — Allocation of a class of wind resistance

B.1 General

The net pressure W exerted by the wind on a facade (difference in the pressures acting on each face of the facade taking due account of their signs) at a site location, is given by:

$$W = ½ \times \rho \times V^2_{ref} \times C_e(z) \times C_p$$

where

ρ	is the air mass density (ρ = 1 225kg/m^3);
Vref	is the reference wind velocity chosen (see below);
$C_e(z)$	is the exposure coefficient depending on the terrain category and the height Z from the ground;
$C_p = C_{pe} - C_{pi}$	is the algebrical difference between the external pressure coefficient C_{pe} and the internal pressure coefficient C_{pi}.

B.2 Application to shutters

Value of C_p

The shutter, considered in the extended and closed position, is widely more permeable than the closed window to which it is fitted. The differences of pressures between the two faces of a shutter fitted to a closed window are due to the turbulent state of the wind. There would be no difference of pressure for a wind with a strictly constant velocity. The more the air permeability of the shutter is the less these differences are.

For distances between a shutter and a window not exceeding 0,50 m, the value of C_p adopted is:

$$C_p = 0,18$$

This value has been determined by measurement during wind tunnel tests on roller shutters. Considering they have an equivalent air permeability, it can be applied to other kind of shutters.

For External Venetian Blinds, the Cp value can vary a lot because of dynamic movements of the curtain. Therefore, defining a wind speed on the basis of the static pressure that an external venetian blind can withstand would be inappropriate.

Value of Ce(z)

In the absence of National data, Table B.1 can be used for the determination of $C_e(z)$,

Table B.1 — Values of $C_e(z)$ according to the terrain categories and the height z

Category of terrain	Height z (m)				
	9	**18**	**28**	**50**	**100**
IV - Area in which at least 15 % of the surface is covered with buildings and their average height exceeds 15 m	1,18	1,57	1,89	2,34	2,93
III - Area with regular cover of vegetation or buildings or with isolated obstacles with separations of maximum 20 obstacle heights (such as villages, suburban terrain, permanent forest)	1,64	2,11	2,43	2,88	3,45
II - Area with low vegetation such as grass and isolated obstacles (trees, buildings) with separations of at least 20 obstacle heights	2,29	2,74	3,04	3,47	4,01
I - Lakes or flat and horizontal area with negligible vegetation and without obstacles	2,71	3,13	3,42	3,81	4,30
0 - Sea or coastal area exposed to the open sea	2,93	3,33	3,59	3,96	4,42

Value of V_{ref}

The Eurocodes consider, for the determination of the resistance to wind of the structures, a value of V_{ref} defined as follow:

V_{ref} is the 10 min mean wind velocity at 10 m above ground of terrain category II having an annual probability of exceedence of 0,02, commonly referred to as having a mean return period of 50 years.

NOTE Maps of equal Vref are available in each country.

For the shutters, which are infilling elements and not structural elements, the mean return period is of 20 years (an annual probability of exceedence of 0,05).

This value will be noted V_{20} and calculated from V_{ref} using Table B.2 or National Application Documents.

Table B.2 — Velocities values corresponding to different return periods T

T (Years)	50	20
Probability Pr	0,02	0,05
V_{ref} (Pr)/V_{ref}	1,0	0,946
$[V_{ref}$ (Pr)/$V_{ref}]^2$	1,0	0,895

$$\mathbf{V^2_{20} = 0{,}895 \times V^2_{ref}}$$

B.3 Allocation of a class of wind resistance to a shutter

In a given site location, with a corresponding $\mathbf{V_{ref}}$ given by the national maps of wind, the wind resistance of the shutter should fulfil the condition:

$$\mathbf{p_S \geq 1/2 \times 1{,}225 \times 0{,}18 \times 0{,}895 \times V^2_{ref} \times C_e(z)}$$

where

p_S is the threshold value of the safety pressure of the class of wind resistance.

Annex C
(normative)

List of significant machine hazards

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this standard, identified by risk assessment as significant for powered operated shutters and which require action to eliminate or reduce the risk.

Table C.1 — Significant hazards (according to EN ISO 12100)

Hazards, hazardous situations and hazardous events	Relevant clause in this standard
Mechanical hazards	4.1, 4.3, 4.6, 4.7 4.13.2, 4.13.3, Clause 6
Electrical hazards	4.13.4 Clause 6
Ergonomic hazards	Clause 5

Annex D
(informative)

Example of calculation for the wind resistance determination on fixed parts of shutters in retracted position

According to the defined methodology:

1) Determine the weakest point of the shutter

   ⇨ In the example given in Figure D.1: Screw 1

2) Determine the maximum surface where wind stress can be applied

   ⇨ In the example given in Figure D.1: 150 mm x 3 000 mm (maximum width of the covering), i.e. 0,450 m^2

3) Determine the test load to fulfil the requirement: 800 Pa, i.e. 800 N/m^2

   ⇨ In the example given in Figure D.1: F = 0,450 m^2 x 800 N/m^2 = 360 N

2) Determine the worst case angle where the wind can pull. This is the test direction for the load F.

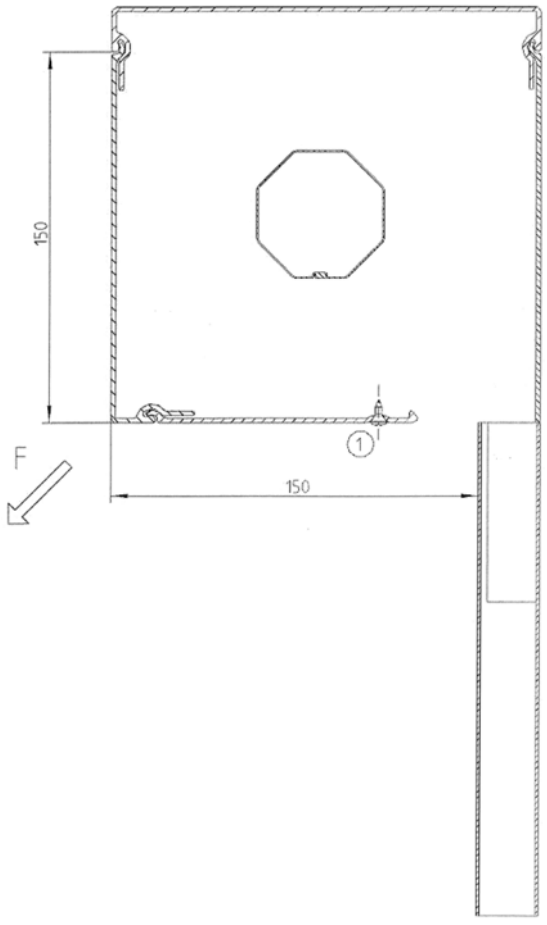

Figure D.1 — Example of fixed part of a shutter: head box of a roller shutter

Annex E
(informative)

List of wood species

This annex gives a non-exhaustive list of the resistance of species towards fungal risks and insects for a use as shutter.

The tables below are giving, as regards fungal risk, estimations in the field of longevity of the wood for the initially planned usage *(concerns perfect heartwood).*

Table E.1 — Wood species coming from areas with temperate climate

Wood species purged of sapwood coming from areas with temperate climate			Fungal durability and class of use		Resistance to insects with wood borer larva
Standard name	**Botanicals**	**Code**	**3a**	**3b**	
Chestnut tree	Castanea sativa	CTST	yes	yes	yes
US white oak	Quercus spp	QCXA	yes	yes	yes
Oak (sessile and/or common)	Quercus petraea Quercus robur	QCXE	yes	yes	yes
US red oak	Quercus spp	QCXR	yes	no	yes
Ash tree	Fraxinus spp	FXXX	yes	no	no
Silver poplar [a]	Populus alba L	POAL	yes	no	no
Locust tree	Robinia pseudoacacia L	ROPS	yes	yes	yes
Cedar	C.deodara	CDXX	yes	yes	yes
Douglas	Pseudotsuga menziesii	PSMN	yes	yes	yes
Spruce [a]	Picea abies	PCAB	yes	no	no
Western Hemlock [a]	Tsuga heterophylla	TSHT	yes	no	no
European larch	Larix decidua	LADC	yes	yes	yes
Maritime pine	Pinus pinaster	PNPN	yes	yes	yes
Austrian black pine and Corsican pine	Pinus nigra	PNNN PNNL	yes	no	yes
Oregon pine (Douglas fir)	Pseudotsuga menziesii	PSMN	yes	yes	yes
Fir-tree	Pinus sylvestris	PNSY	yes	yes	yes
Pitch pine	Pinus caribaea	PNCR	yes	yes	yes
Western Red Cedar	Thuja plicata	THPL	yes	yes	yes
Fir [a]	Abies alba	ABAL	yes	no	no

Wood species purged of sapwood coming from areas with temperate climate			Fungal durability and class of use		Resistance to insects with wood borer larva
Standard name	**Botanicals**	**Code**	**3a**	**3b**	
Pinus eliottii	Pinus eliotti (d = 0,69)	PNEL	yes	yes	no
Pinus taeda	Pinus taeda (d = 0,56)	PNTD	yes	no	no
Pinus radiata	Pinus radiata (Montery pine/USA) (d = 0,48)	PNRD	yes	no	no
Pinus strobus	Pinus strobus (Pine yellow) (d = 0,39)	PNST	yes	no	no
Southern yellow pine	Pinus spp. (palustris & elliottii) (0,66 < d < 0,69)	PNPL	yes	yes	no
[a] For these species, the sapwood is not or little distinct of the heartwood when dry.					

Table E.2 — Species from tropical climate areas

Wood species purged of sapwood coming from areas with temperate climate			Fungal durability and class of use		Resistance to insects with wood borer larva
Standard name	**Botanicals**	**Code**	**3a**	**3b**	
Angelim vermelho (cabbage tree)	Dinizia excelsa	DEEX	yes	yes	yes
Amarante (blue wood)	Peltogyne spp.	PGXX	yes	yes	yes
Andira (partridge wood)	Andira spp.	AAXX	yes	yes	yes
Aningeria	Aningeria spp.	AQXX	yes	no	no
Ayous (Samba)	Triplochiton scleroxylon	TRSC	yes	no	no
Azobe (red iron wood	Lophira alata	LOAL	yes	yes	yes
Balau red	Shorea spp Rubroshorea section d > 0,75	SHRB	yes	yes	yes
Bété	Mansonia altissima	MAAL	yes	yes	yes
Bangkiraï	Shorea spp. Eushorea Section	SHBL	yes	yes	yes
Basralocus	Dicorynia guianensis	DIXX	yes	yes	yes
Bossé	Guarea spp. (Afrique)	GRXX	yes	yes	yes
Bubinga	Guibourtia pellegriniana	GUXX	yes	yes	yes
Bilinga	Nauclea diderrichii	NADD	yes	yes	yes
Bintangor	Calophyllum spp.	CLXX	yes	no	yes
Cambara (Jaboty)	Erisma uncinatum	EUIN	yes	yes	yes

Wood species purged of sapwood coming from areas with temperate climate			Fungal durability and class of use		Resistance to insects with wood borer larva
Standard name	**Botanicals**	**Code**	**3a**	**3b**	
Cumaru	Dipteryx spp.	DXXX	yes	yes	yes
Dibetou	Lovoa spp.	LVXX	yes	yes	yes
Difou	Morus mezogizia	MRMZ	yes	yes	yes
Doussié	Afzelia spp.	AFXX	yes	yes	yes
Eucalyptus grandis (rose gum)	Eucalyptus grandis	EUGR	yes	no	yes
Framiré	Terminalia ivorensis	TMIV	yes	yes	no
Garapa (Grapia)	Apuleia leiocarpa	APLC	yes	yes	yes
Gonçalo alves (Muiracatiara)	Astronium spp	AVXX	yes	yes	yes
Greenheart	Chlorocardium rodiei	CHRD	yes	yes	yes
Iatandza	Albizia ferruginea	AZFR	yes	yes	yes
Ipé (green ebony)	Tabebuia spp ; (denses et foncés)	TBXX	yes	yes	yes
Iroko	Milicia excelsa & M.regia	MIXX	yes	yes	yes
Itauba	Mezilaurus spp.	MZXX	yes	yes	yes
Jatoba	Hymenea spp.	HYXX	yes	yes	yes
Jequitiba	Cariniana spp	CZXX	yes	yes	no
Kapur	Dryobalanops	DRXX	yes	yes	yes
Kempas	Koompassia malaccensis	KOML	yes	yes	yes
Keruing	Dipterocarpus spp	DPXX	yes	yes	yes
Kosipo	Entandrophragma candollei	ENCN	yes	yes	yes
Kotibé	Nesogordonia spp.	NEXX	yes	yes	yes
Lauan white = white seraya (0,45 < d < 0,65)	Parashorea spp.	PHWS	no	no	no
Limba -Fraké	Terminalia superba	TMSP	no	no	no
Limbali	Gilbertiodendron spp.	GBXX	yes	yes	yes
Louro vermelho (red louro)	Sextonia rubra	OCRB	yes	yes	yes
MandioqueIra (Gonfolo)	Qualea spp. & Ruizterania albiflora	QUXX	yes	yes	yes
Maçaranduba	Manilkara spp. (Latin America)	MNXX	yes	yes	yes
Makoré /Douka	Tieghemella spp.	TGAF	yes	yes	yes
Mengkulang	Heritiera spp	HEXM	yes	no	yes
Meranti light red	Shorea spp	SHLR	yes	yes	yes

Wood species purged of sapwood coming from areas with temperate climate			Fungal durability and class of use		Resistance to insects with wood borer larva
Standard name	**Botanicals**	**Code**	**3a**	**3b**	
(d < 0,58)	Rubroshorea section				
Meranti dark red (0,58 < d < 0,75)	Shorea spp Rubroshorea section	SHDR	yes	yes	yes
Merbau	Intsia spp.	INXX	yes	yes	yes
Moabi	Baillonella toxisperma	BLTX	yes	yes	yes
Movingui	Distemonanthus benthamianus	DTBN	yes	yes	yes
Mukulungu	Autranella congolensis	AWCO	yes	yes	yes
Niangon	Heritiera utilis	HEXN	yes	yes	yes
Niové	Staudtia stipitata	SSST	yes	yes	yes
Nyatoh	Palaquium spp	PPXX	yes	yes	yes
Okan	Cylicodiscus gabunensis	CKGB	yes	yes	yes
Okoumé	Aucoumea klaineana	AUKL	yes	no	yes
Padouk	Pterocarpus soyauxii & P.osun	PTXX	yes	yes	yes
Pau amarelo	Euxylophora paraensis	EXPA	yes	yes	yes
Piquiarana	Caryocar glabrum	COGL	yes	yes	no
Pyinkado	Xylia xylocarpa	XYXX	yes	yes	yes
Sapelli	Entandrophragma cylindricum	ENCY	yes	yes	yes
Sipo	Entandrophragma utile	ENUT	yes	yes	yes
Sucupira	Diplotropis spp	BOXX	yes	yes	yes
Tali	Erythrophleum spp. (Afrique)	EYXX	yes	yes	yes
Tatajuba	Bagassa guianensis	BGGN	yes	yes	yes
Tiama	Entandrophragma angolense	ENAN	yes	yes	yes
Teck (from natural forest)	Tectona grandis	TEGR	yes	yes	yes
Teck (of plantation)	Tectona grandis	TEGR	yes	yes	yes
Tola	Gosweilerodendron balsamiferum	GOXX	yes	yes	no
Tornillo (Cedrorana)	Cedrelinga cataniformis	CGCT	yes	yes	no
Wacapou	Vouacapoua spp.	VCXX	yes	yes	yes

Annex F
(informative)

Time limits for the application of the finish regarding temporary moisture-repellent protections

The temporary protection against moisture regains may be presented under one of the two different forms listed in 4.16.4.4. However, their respective efficiency and resistance are only indicated in a case when, pending layer(s) of external finish is/are applied, shutters will have been stored and installed in normal conditions of exposure and time limits.

As things stand at the present and considering the average quality of the products commercialised, it is advised not to exceed the indicated time periods stated hereafter, running from the moment when the protected shutters are placed in a humid atmosphere or exposed to bad weather and the moment they received the finish layer:

— After the temporary moisture-repellent protection – one layer: 2 months;

— After the temporary moisture-repellent protection – two layers: 6 months.

Annex G
(informative)

Determination of the moisture-repellent value of a temporary protection

G.1 General

As the target is the qualification of a finish in a broad sense of the word (not for a particular manufacturer), it results in a conventional method as for the selection of the wood and the making of test pieces.

G.2 Principle

To be immersed, according to given conditions:

— the wood of the tip of raw test pieces on one side;

— the wood of the tip of finished test pieces with the product which moisture-repellent value is to be assessed on the other side.

The moisture regain between the two types of test pieces is then compared.

G.3 Test method

G.3.1 Equipment

— An enclosure with a standard climate: (20 ± 2) °C and (65 ± 5) % of relative humidity;

— Two containers to contain water and the finish product to be controlled;

— An adequate device to hold the test pieces;

— A scales weighing within ± 0,01g;

— Paper roll.

G.3.2 Test pieces

G.3.2.1 Materials and supplies

— Wood: sapwood of fir-tree

— Supplies:

  — the finish product which moisture-repellent value is to be assessed,

  — distilled water.

— Geometry: sample workpiece planed 4 sides of (25 ± 1) mm by (25 ± 1) mm cutting and length of (300 ± 5) mm. The workpiece is sawn in the middle (to within about 5 mm). In this way, in the straight saw line, the reference cutting of each individual piece is obtained.

G.3.2.2 Selection of samples

— Wood: 10 workpieces for one finish product,

— Finish product: about 1 dm3 of ready-to-use product.

NOTE The procedure only applies to one sample of finish product, then it does not give any opinion on the representativeness of the batch of the finish product nor on the constancy of its moisture-repellent property in the long run.

G.3.3 Modus operandi

G.3.3.1 Conditioning of the master workpieces

The master workpieces, individually marked, are stored for at least a week in a standard climate of (20 ± 2) °C and (65 ± 5) % of relative humidity.

G.3.3.2 Confectioning the individual pieces

The master pieces are sawn up according to instructions in G.3.2.1. The reference cutting of each individual piece then obtained is planed with 120 tooth and dusted.

G.3.3.3 Application of the finish on individual pieces

From each sample workpiece, one of the two individual pieces receives the protection to be assessed. The method of application is defined by the purchaser, it has to correspond to a method commonly applied in the industry. For lack of instruction, it is taken and immersed, vertically, into the finish product by its reference cutting, (135 ± 5) mm deep, during (180 ± 5) s.

G.3.3.4 Final conditioning

The specimens which received such treatment and the raw pieces are stored in an enclosure in a standard climate for at least a week.

G.3.3.5 Reference weighing

Each individual piece is weighed with the precision allowed by a scale weighing at within about 0,01 g. *Rmi* is the reference mass of the specimen *i*.

G.3.3.6 Immersion test

Each specimen is immersed by its reference cutting (10 ± 1) mm deep in drinking water for (24 ± 0,5) h.

G.3.3.7 Final weighing

After the excess of water is dried with paper towel, each individual piece, raw and finished, is weighed within 5 min after it is taken out of the liquid, with the precision allowed by the scale (within about 0,01 g). *Fmi* is the final mass of the specimen *i*.

G.4 Exploitation of the results

For each specimen the water regain is calculated.

For the specimen *i*:

$$Ri = Fmi - Rmi$$

Then the moisture-repellent value is calculated with the following formula:

with

$$\frac{R_{fi}}{R_{ri}}$$

with

R_{ri} water regain of the raw individual piece i;

R_{fi} water regain of the finished individual piece i.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/101 “Doors, windows, shutters, gates and related building hardware” as amended by M/126 and M/130, given to CEN by the European Commission and the European Free Trade Association.

If this European Standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the shutters and external venetian blinds intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses for shutters and external venetian blinds for external use in buildings and other construction works

Product: shutters and external venetian blinds Intended use: for external use in buildings and other construction works			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Resistance to wind loads	4.1	—	Class
Additional thermal resistance ΔR	4.14	—	Value
Total solar energy transmittance g_{tot}	4.15	—	Value

The declaration of the product performance related to certain characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option “No performance determined” (NPD) in the information accompanying the CE marking (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedure for AVCP of shutters and external venetian blinds

ZA.2.1 System(s) of AVCP

The AVCP system(s) of shutters and external venetian blinds indicated in Table ZA.1, established by EC Decision 1999/93/EC (OJEU L29 of 3.2.1999) as amended by EC Decision 2011/246 (OJEU L103 of 19.4.2011) is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es) of performance.

Table ZA.2 — System(s) of AVCP

Products	Intended use	Level(s) or Class(es) of performance	AVCP system(s)
Shutters and blinds (with or without related hardware)	External use	—	4
System 4: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.5			

The AVCP of shutters and external venetian blinds in Table ZA.2 shall be according to the AVCP procedures indicated in Table ZA.3 resulting from the application of clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3 — Assignment of evaluation of conformity tasks for shutters and external venetian blinds

Task		Content of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use	7.3
	Determination of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	7.2

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011:

In case of products under system 4

— the factory production control carried out by the manufacturer;

— the determination by the manufacturer of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product.

ZA.2.2.2 Content

The model of the DoP is provided in Annex III of the Regulation (EU) No 305/2011.

According to this Regulation, the DoP shall contain, in particular, the following information:

— the reference of the product-type for which the declaration of performance has been drawn up;

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

— the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;

— where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

a) the intended use or uses for the construction product, in accordance with the applicable harmonized technical specification;

b) the list of essential characteristics, as determined in the harmonized technical specification for the declared intended use or uses;

c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared;

e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

f) for the listed essential characteristics for which no performance is declared, the letters “NPD” (No Performance Determined).

Regarding the supply of the DoP, Article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for shutters for external use in buildings and other construction works

DECLARATION OF PERFORMANCE

No. 001CPR2013-12-17

1. Unique identification code of the product-type:

RS-ALU-12345

2 Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):

Roller shutter in aluminium ref. 12345

3. Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:

External use in buildings and other construction works

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5):

AnyCo SA,

PO Box 21

B-1050 Brussels, Belgium

Tel. +32987654321

Fax: +32123456789

e-mail: anyco.sa@provider.be

5. Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2):

Anyone Ltd

Flower Str. 24

West Hamfordshire

UK-589645 United Kingdom

Tel. +44987654321

Fax: +44123456789

e-mail: anyone.ltd@provider.uk

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

System 4

7. **Not applicable (no notified body involved in System 4)**

8. **Not applicable**

9. Declared performance

Essential characteristics	Performance	Harmonized technical specification
Resistance to wind loads	Class 3	EN 13659
Additional thermal resistance ΔR	0,15 m2.K/W	
Total solar energy transmittance g_{tot}	0,10	

10. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8.

    This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

    Signed for and on behalf of the manufacturer by:

    ……

    (name and function)

    ……..…… ……..……

    (place and date of issue) (signature)

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

— to the shutter and external venetian blind

or

— to a label attached to it

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:

— to the packaging

or

— to the accompanying documents.

The CE marking shall be followed by:

— the last two digits of the year in which it was first affixed,

— the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity,

— the unique identification code of the product-type

— the reference number of the declaration of performance

— the level or class of the performance declared

— the dated reference to the harmonized technical specification applied

— the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figures ZA.1 gives an example of the information related to products subject to AVCP under each of the different systems to be given on shutters and external venetian blinds.

CE	*CE marking, consisting of the "CE" symbol*
AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium **15** **001CPR2013–12–17**	*Name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 13659:2015 **RS-ALU-12345** **External use in buildings and other construction works** **Resistance to wind loads:** Class 3 **Additional thermal resistance ΔR:** 0,15 m^2.K/W **Total solar energy transmittance g_{tot}:** 0,10	*No. of European Standard applied, as referenced in OJEU* *Unique identification code of the product-type* *Intended use of the product as laid down in the European Standard applied* *Level or class of the performance declared*

Figure ZA.1 — Example CE marking information of products under AVCP system 4

Annex ZB
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive 2006/42/EC on machinery.

All power operated shutters and external venetian blinds fall in the scope of this European Directive.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard except 4.4, 4.5, 4.8, 4.9, 4.10, 4.11, 4.12, 4.14, 4.15, 4.16, 4.17, 4.18 and Clause 7 confers, within the limits of the scope of this standard, a presumption of conformity with the Essential Requirements of that Directive and associated EFTA regulations.

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this document.

Bibliography

[1] EN 12835, *Airtight shutters - Air permeability test*

[2] EN 13120, *Internal blinds - Performance requirements including safety*

[3] EN 14202, *Blinds and shutters - Suitability for use of tubular and square motorizations - Requirements and test methods*

[4] EN 14203, *Blinds and shutters - Capability for use of gears with crank handle - Requirements and test methods*

[5] EN 60335-1, *Household and similar electrical appliances - Safety - Part 1: General requirements (IEC 60335-1)*

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