BS EN 1932:2013

BSI Standards Publication

External blinds and shutters — Resistance to wind loads — Method of testing and performance criteria

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National foreword

This British Standard is the UK implementation of EN 1932:2013. It supersedes BS EN 1932:2001 which is withdrawn.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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Compliance with a British Standard cannot confer immunity from legal obligations.

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Date	Text affected

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English Version

External blinds and shutters - Resistance to wind loads - Method of testing and performance criteria

Fermetures pour baies équipées de fenêtres et stores extérieurs - Résistance aux charges de vent - Méthodes d'essai et critères de performance

Abschlüsse und Markisen - Widerstand gegen Windlast - Prüfverfahren und Nachweiskriterien

This European Standard was approved by CEN on 14 December 2012.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 1932:2013) 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of an identical text or by endorsement, at the latest by December 2013, and conflicting national standards shall be withdrawn at the latest by 2014-12-10.

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 1932:2001.

The main changes incorporated in this revision are:

— A complete editorial review of the document has been carried out.

— Pergola awnings have been added in accordance with the modification of the scope of EN 13561.

— The possibility to apply a uniformly distributed load with a mattress has been added for some products (e.g. Awnings with lateral guiderail with fabric running into the lateral rails without tension system).

— The test method for External Venetian Blinds has been changed: the bar test has been replaced by a test with a pneumatic device.

This document is part of a series of standards dealing with external blinds and shutters fitted to buildings as defined in EN 12216.

The tests defined in this standard conventionally reproduce the positive and negative pressures due to the wind applied to external blinds and shutters.

Under these conditions, these tests allows the verification that external blinds and shutters as a whole fulfil the requirements specified in EN 13561 and EN 13659, namely:

— no unacceptable visual defects appears;

— the suitability for use is maintained;

— the safety of users is maintained.

This European Standard is one of a package of inter-related European Standards with a common date of withdrawal (dow) fixed on December 2013:

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

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

— EN 13561, *External blinds and awnings — Performance requirements including safety*;

— EN 13659, *Shutters and external venetian blinds — Performance requirements including safety*.

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.

1 Scope

The European Standard specifies the test methods to evaluate the wind resistance of external blinds and shutters to be fitted to buildings, in front of windows, doors or façades and delivered as a complete unit.

This European Standard applies to:

— shutters: roller shutter, external venetian blind, wing shutter, venetian shutter, concertina shutter, flat closing concertina shutter and sliding panel shutter (including those with projection systems);

— external blinds: folding arm awning, trellis arm awning, pivot arm awning, marquisolette, vertical awning, façade awning, conservatory awning, roof window awning, Pergola awning and insect screen

whatever the nature of the constituent materials, under normal operating conditions and installed in compliance with the manufacturer's installations instructions.

This European Standard does not cover non retractable shutters, external blinds and awnings such as Dutch awnings and brise-soleil as well as the structural part of Pergolas.

NOTE The wind resistance of such products can be evaluated by calculations.

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 12216, *Shutters, external blinds, internal blinds — Terminology, glossary and definitions*

EN 13561, *External blinds and awnings — Performance requirements including safety*

EN 13659, *Shutters and external venetian blinds — Performance requirements including safety*

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

EN ISO 2439, *Flexible cellular polymeric materials — Determination of hardness (indentation technique) (ISO 2439)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12216, EN 13561 and EN 13659 and the following apply.

3.1
test pressure
p
pressure exerted on the external or internal face of the test sample which represents the differential pressure (difference in pressure between the two faces) exerted by the wind on the external blind/awning or the shutter

3.2
nominal pressure
p_N
test pressure under which the test sample does not sustain deformation or deterioration detrimental to its correct operation

3.3
safety pressure
p_S
test pressure under which no deterioration which may be dangerous for the persons is observed

Note1 to entry: p_N and p_S are defined in the classification specified in EN 13561 and EN 13659.

3.4
nominal load
F_N
load applied to the test sample allowing the reproduction of the effects due to the uniform nominal pressure p_N exerted on the test sample

3.5
safety load
F_S
load applied to the test sample allowing the reproduction of the effects due to the uniform safety pressure p_S exerted on the test sample

4 Test conditions

4.1 General

The tests shall be carried out with the maximum dimensions defined by the manufacturer with the exception of External Venetian Blinds (see 8.2.3) in the most unfavourable configuration for each product type (see 4.2). The test results obtained can then be applied to all more favourable configurations and to all smaller dimensions in the particular product design.

NOTE For example, for the same dimensions, a conservatory awning with relieving rollers could be considered a better configuration than without relieving rollers, for the same product design.

4.2 Dimensions of test samples

4.2.1 General

The dimensional technical limits are the maximum dimensions for the width and height (L_{max} and H_{max}) associated with the maximum surface area (S_{max}) specified by the manufacturer.

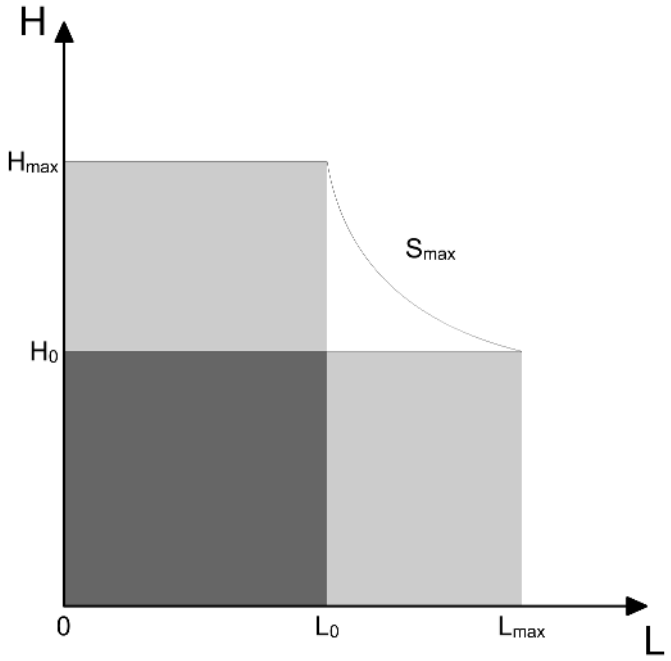


Figure 1 — Dimensions of test samples

To be representative of a range, the samples submitted for test shall be of the following dimensions (see Figure 1):

— the maximum width associated with the greatest height achievable with this width (L_{max} x H_0), and

— the maximum height associated with the greatest width achievable with this $heig_{ht}$ (L_0 x H_{max}),

the two tests being necessary for a same range.

In the case of folding and trellis arm awnings, the maximum width for one pair of arms is the basis of the test.

4.2.2 Characterisation of height H

In the case of awnings, H is the distance between the axis of the roller tube and the extremity of the front or bottom bar (see Figure 2 and Figure 3).

In the case the projection of the awning is made of two parts (e.g. for marquisolette), the height H is the sum of the vertical and the projected part: $H = H_1 + H_2$ (see Figure 3).

In the case of roller shutters and external venetian blinds, H is the height of the visible part of the curtain including the bottom lath (see Figure 4 and Figure 5).

In the case of others shutters, H is the height of the curtain.

In the case of conservatory blind with relieving roller(s), the height to be considered is either the distance between the roller tube and the first relieving roller, or between two relieving rollers, or between the last relieving rollers and the front profile, whichever is the maximum distance.

4.2.3 Characterisation of width L

In the case of awnings, L is the width of the fabric.

In the case of shutters, L is the visible width of the curtain.

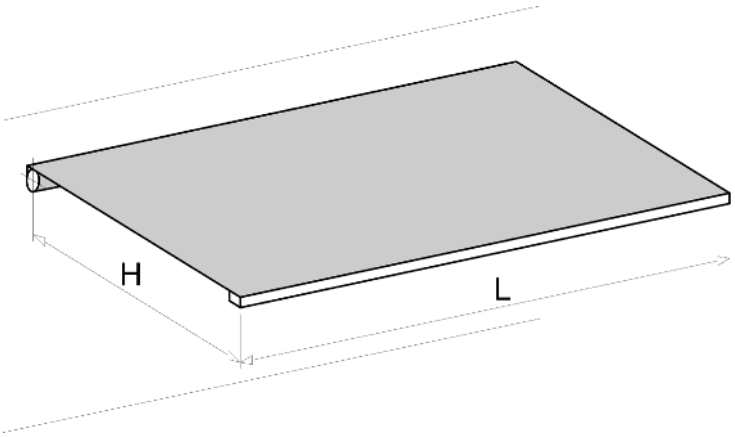


Figure 2 — Dimensions — Example of folding arm awning

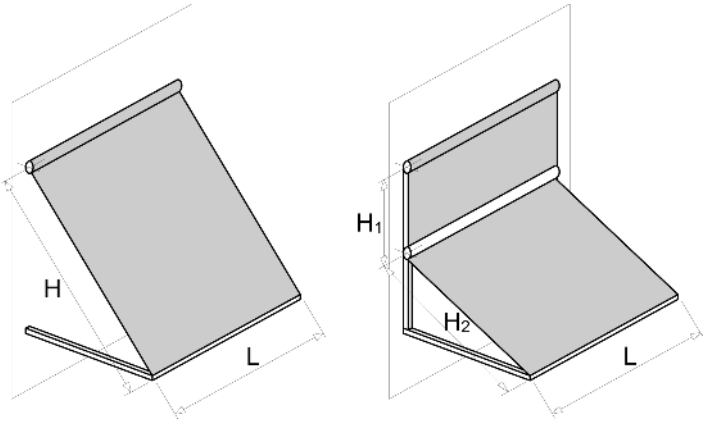


Figure 3 — Dimensions — Example of projection awning and marquisolette

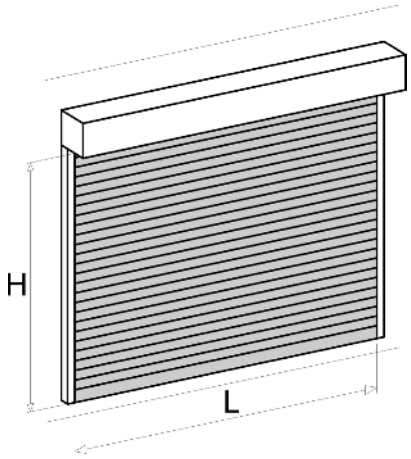


Figure 4 — Dimensions — Example of roller shutter

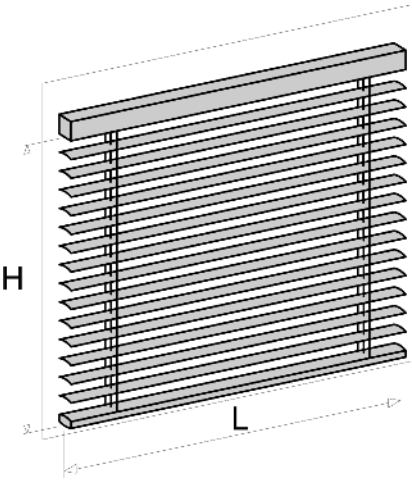


Figure 5 — Dimensions — Example of External venetian blind

4.3 Positioning of test samples

The test samples shall be fixed on a rigid frame by their brackets according to the manufacturer's installation instructions.

4.4 Laboratory conditions

The tests are carried out at room temperature of 23 °C ± 5 °C.

5 Methods of loading

5.1 General

Depending on the type of shutter or external blind tested, different methods of loading are applicable. These are:

— use of suspended weights on specific points of the test specimen with or without a test bar (see 5.2);

— use of a uniformly distributed load over the curtain of the test specimen (see 5.3);

— use of a pneumatic device reproducing a uniformly distributed pressure over the curtain of the test specimen, with or without a plastic film (see 5.4).

The test method(s) applicable is/are specified for each type of shutter and external blind in the relevant clause.

5.2 Method N°1: use of suspended weights

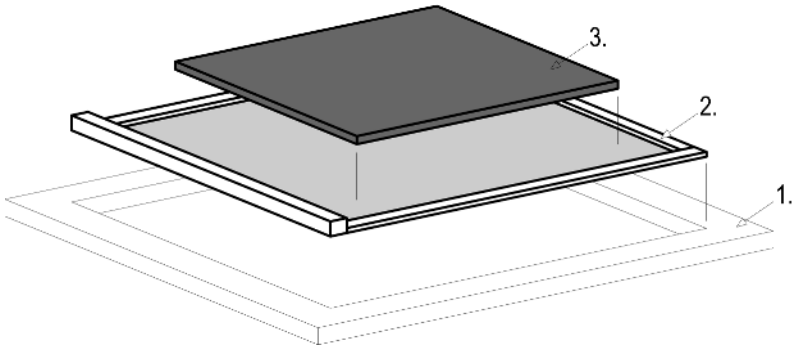
Test loads are obtained by using suspended weights (direct loading) and by using pulleys or another system for which the friction is negligible compared to the applied loads (reverse loading).

If the use of a test bar is required, it shall be at least as rigid as the roller tube of the test specimen.

5.3 Method N°2: use of a uniformly distributed weight

Test loads are obtained by using a mattress of 10 cm of thickness and adding the missing weight, distributed in a uniform way, over the mattress (see Figure 6).

The total weight applied shall be the test load reduced by the weight of the curtain. In the case the missing weight is applied of punctual loads, at least nine loads per m² shall be distributed at regular intervals on the mattress.



Key

1. rigid frame
2. awning
3. mattress

Figure 6 — Example of method of loading N°2 for a guided awning

The mattress width and height shall be 20 cm smaller than the width and the height of the visible part of the curtain in order to avoid blocks to the free movements of the curtain (see Figure 7).

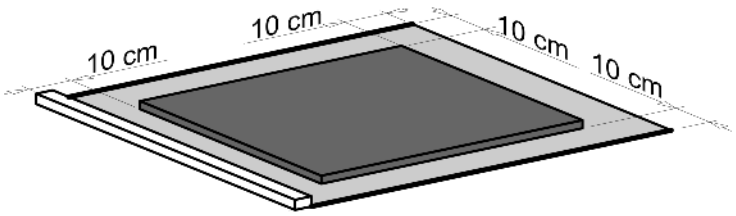


Figure 7 — Dimensions of mattress

The mattress used shall have the following characteristics:

— mass per unit area: 3 kg/m² ± 5 %,

— mass per unit volume: 30 kg/m^3 ± 2 kg/m^3,

— hardness: 170 ± 20 A40 according to EN ISO 2439.

5.4 Method N°3: use of a pneumatic device

The test pressures are obtained by using a pneumatic pressure equipment able to withstand the pressure of the class foreseen. The test apparatus shall be as follows (see Annex A):

— a solid wall with a frame allowing installation of the shutter; an opening shall allow the introduction or extraction of air,

— a device applying a controlled air pressure over the shutter,

— with an accuracy of ± 5 % of the measured pressure.

If specified, the test pressures may be achieved using an airtight non-elastic film, with a maximum friction coefficient of 0,50, which shall not contribute to the resistance of the test specimen. The film shall be sealed around the edges of the frame, loosely enough so that it will not be fully deployed once the pressure is applied.

In case of External Venetian Blinds, the dimensions of the film shall be determined as follows:

— the height H_f of the film shall fulfil the following condition:

$$Hf \geq H + 1\,250 + 2x$$

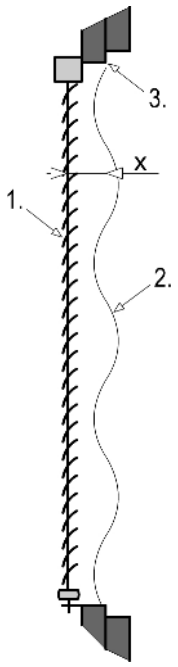
— the width L_f of the film shall fulfil the following condition:

$$Lf \geq L + 1\,000 + 2x$$

where

H is the height and L the width of the External Venetian Blind,

x is the distance between the fixing edge of the film and the axis of the curtain (see Figure 8).

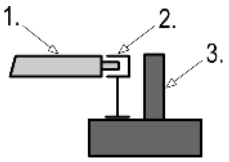


Key

1. external venetian blind
2. film
3. fixing edge of the film

Figure 8 — Dimensions of the film in case of External Venetian Blinds

In case of External Venetian Blinds using guide rails, a lateral protective frame shall be provided to prevent any pressure being applied to the guide rails (see Figure 9).

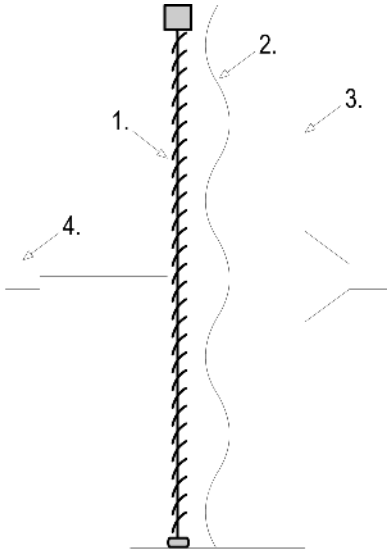


Key

1. bottom bar
2. guiderail
3. lateral protective frame

Figure 9 — Protection of the guiderail of External Venetian Blinds

In case the test pressure is obtained using an airtight film, the positive and negative pressures shall be obtained by reversing the sample. If such measurements are required, a measuring tool shall be used to measure the displacement of the curtain on a horizontal axis, (see Figure 10).



Key

1. external venetian blind
2. film
3. pressure chamber
4. measuring tool

Figure 10 — Example of method of loading N°3 for external venetian blinds

6 Test loads

In case the test loads are reproduced by applying punctual or distributed weights over the curtain of the external blind or the shutter, the test loads shall be calculated according to Table 1 for external blinds and awnings and to Table 2 for shutters.

Table 1 — External blinds and awnings — Calculation of test loads

Nominal load	Safety load
$F_N = \beta \times p_N \times L \times H$	$F_S = \gamma \times F_N$, with $\gamma = 1,2$

Table 2 — Shutters — Calculation of test loads

	Nominal load	Safety load
Non projected position	$F_N = p_N \times L \times H$	$F_S = \gamma \times F_N$, with $\gamma = 1,5$
Projected position	$F_N = 2 \times p_N \times L \times H$	

with:

a) L, H: respectively width and height of the test specimen as defined in Clause 3;

b) p_N: threshold value of nominal test pressure in N/m^2 corresponding to the class considered (see EN 13561 for external blinds and awnings and EN 13659 for shutters);

c) β: coefficient of conversion from distributed loads to test loads; it depends on the type of external blinds or awnings:

1) $\beta = 0,5$ in the case of folding arm awning, treillis arm awning, projecting awning and marquisolette,

2) β = 1 in the case of external blind with lateral guiderail with or without tension system;

d) γ: coefficient of transition from the nominal loads to the safety loads.

For external blinds and awnings, the value γ of 1,2 is judged to be representative of the extra load that the product shall be able to support between the appearance of allowable residual deformations (under the nominal load) and the risk of breaking. It takes into consideration that a retractable external blind or an awning is not supposed to be extended permanently and shall be retracted if the wind speed becomes higher than the value stated in the technical instructions of the manufacturer corresponding to the class of wind resistance of the blind.

7 External blinds and awnings

7.1 Folding arm and treillis arm awnings

7.1.1 Method of loading

The method of loading N°1 (see 5.2) shall be used. Test loads and application points are specified in Table 3 for each test sequence.

7.1.2 Test loads

The nominal and safety loads F_N and F_S shall be calculated according to Clause 6.

7.1.3 Positioning and dimensions of sample

Dimensions of the test sample shall fulfil 4.2. The fixing of the test sample shall fulfil 4.3.

For folding arm awning, the fixing shall be such that the awning extends horizontally (tolerance ± 5°).

7.1.4 Measurement of vertical displacements

The front bar shall be located according to a vertical reference. Displacements are measured at each front arm connection, noted Zl (left hand) and Zr (right hand).

The measurements are taken using a metre rule, with an accuracy of ± 5 mm.

7.1.5 Test sequence

The test sequence is the following:

— Sequence 1: half of the direct nominal load is applied and shared on each arm, the awning being extended at H/2;

— Sequence 2: no load is applied, the reference position is measured;

— Sequence 3: the nominal load is applied and shared on 6 points of the front bar;

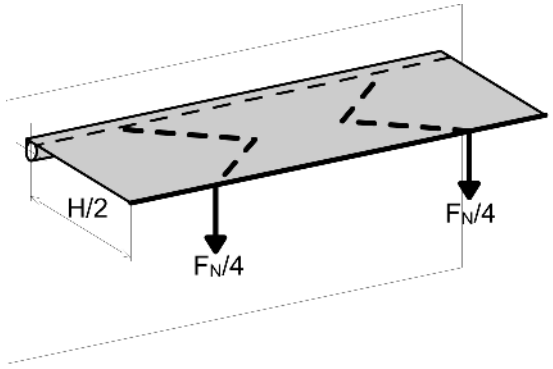
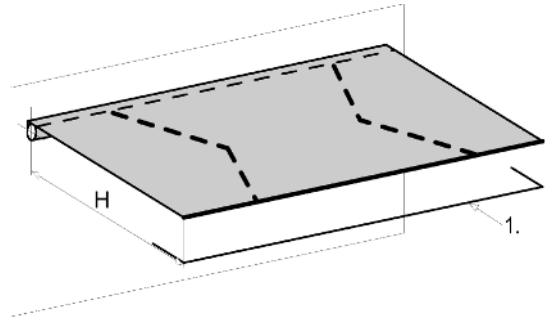
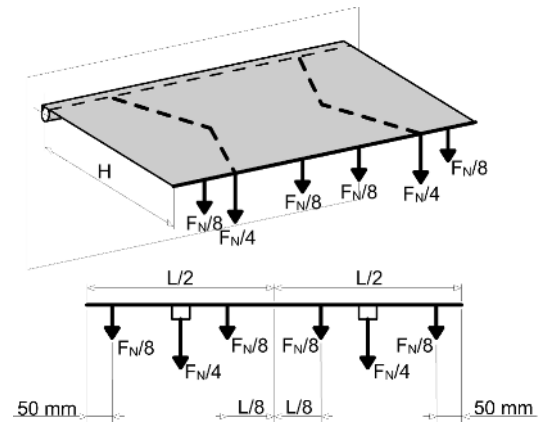
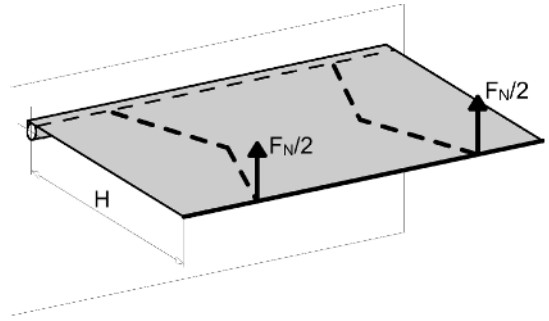
— Sequence 4: the reverse nominal load is applied and shared on each arm of the awning;

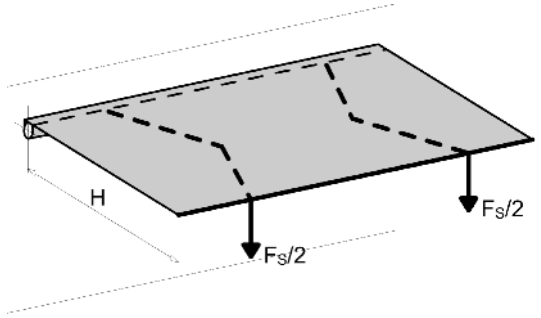
— Sequence 5: the safety load is applied and shared on each arm of the awning.

Actions specified in Table 3 for each sequence shall be carried out.

The loads shall be applied for 2 min. Measurements shall be taken 2 min after the load is released.

Table 3 — Folding arm awnings and trellis arm awnings — Test sequences

Sequences	Load applied	Displacement at each arm		Action
		Left	Right	
Sequence 1 Preload at H/2	 Direct half nominal load : 2 x F_N /4			Check of the horizontal positioning
Sequence 2 Reference at H	 No load applied	Zl_0	Zr_0	Measure of the reference: - Zl_0 - Zr_0
Sequence 3 Direct nominal loading	 Direct nominal load: (2 x F_N /4) + (4 x F_N /8)	Zl_1	Zr_1	Measure of the vertical displacement after loads are released: - $\lvert Zl_1 - Zl_0 \rvert$ - $\lvert Zr_1 - Zr_0 \rvert$ - $\lvert (Zl_1 - Zl_0) - (Zr_1 - Zr_0) \rvert$ Examination of the awning: - correct closing of the box[a]: ☐ yes ☐ no
Sequence 4 Reverse nominal loading	 Reverse nominal load: - F_N /2 on each arm	Zl_2	Zr_2	Measure of the vertical displacement after loads are released: - $\lvert Zl_2 - Zl_0 \rvert$ - $\lvert Zr_2 - Zr_0 \rvert$ - $\lvert (Zl_2 - Zl_0) - (Zr_2 - Zr_0) \rvert$ Examination of the awning: - correct closing of the box[(1)]: ☐ yes ☐ no

Sequence 5 Direct safety loading	 Direct safety load: F_S /2 on each arm			Examination of the awning: - any breaking: □ yes □ no
[a] For folding arm awnings with box only.				

7.1.6 Performance criteria

All following performance criteria shall be fulfilled by the awnings:

a) After application of the direct nominal load (Sequence 3), all following criteria shall be fulfilled:

1) $| Zl_1 - Zl_0 | \leq 15\ \%\ H$;

2) $| Zr_1 - Zr_0 | \leq 15\ \%\ H$;

3) $| (Zl_1 - Zl_0) - (Zr_1 - Zr_0) | \leq 1\ \%\ L$;

4) In case of folding arm awning with box, the correct closing of the box shall be ensured.

b) After application of the reverse nominal load (Sequence 4), all following criteria shall be fulfilled:

1) $| Zl_2 - Zl_0 | \leq 15\ \%\ H$;

2) $| Zr_2 - Zr_0 | \leq 15\ \%\ H$;

3) $| (Zl_2 - Zl_0) - (Zr_2 - Zr_0) | \leq 1\ \%\ L$;

4) In case of folding arm awning with box, the correct closing of the box shall be ensured.

c) After application of the direct safety load (Sequence 5):

1) There shall be no breakage.

7.2 Projecting awning and marquisolette

7.2.1 Method of loading

The method of loading N°1 (see 5.2) shall be used. Loads and application points are specified in Table 4 for each test sequence.

7.2.2 Test loads

The nominal and safety loads F_N and F_S shall be calculated according to Clause 6.

7.2.3 Positioning and dimensions of sample

Dimensions of the test sample shall fulfil 4.2. The fixing of the test sample shall fulfil 4.3.

The drop arms shall be perpendicular to the frame.

7.2.4 Measurement of vertical displacements

The front bar shall be located according to a vertical reference. Displacements are measured at the extremity of each arm, noted Zl (left hand) and Zr (right hand).

The measurements are taken using a metre rule, with an accuracy of ± 5 mm.

7.2.5 Test sequence

The test sequence is the following:

— Sequence 1: half of the nominal load is applied and shared on each arm of the awning, the reference position is measured;

— Sequence 2: the nominal load is applied and shared on each arm of the awning;

— Sequence 3: the reverse nominal load is applied and shared on each arm of the awning. The articulation of each arm shall be blocked;

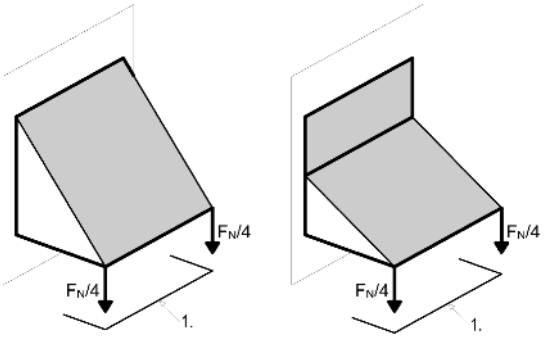
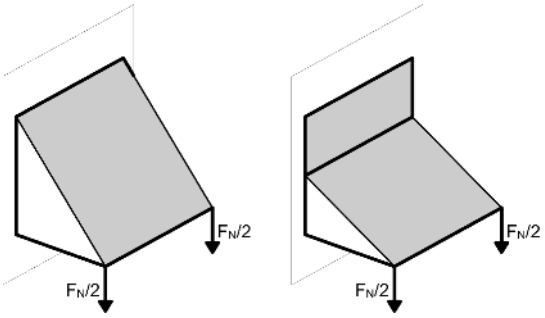
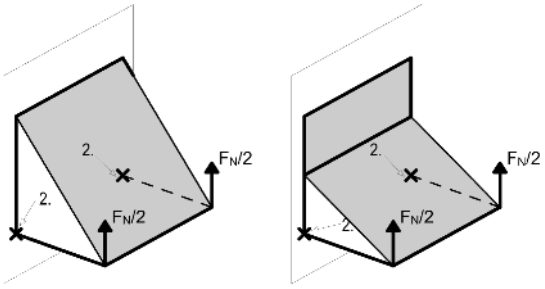
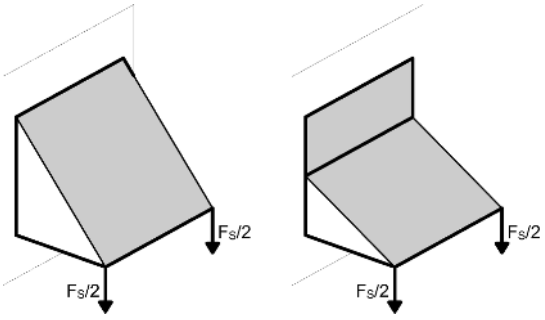
— Sequence 4: the safety load is applied and shared on each arm of the awning;

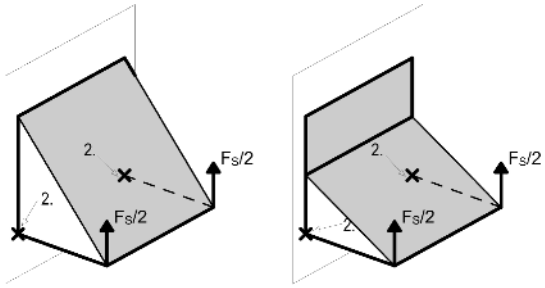
— Sequence 5: the reverse safety load is applied and shared on each arm of the awning. The articulation of each arm shall be blocked.

Actions specified in Table 4 for each sequence shall be carried out. Sequences 3 and 5 apply only when a locking function is present.

The loads shall be applied for 2 min. Measurements shall be taken 2 min after the load is released.

Table 4 — Projecting awning and marquisolette — Test sequence

Sequences	Load applied	Displacement at each arm		Action
		Left	Right	
Sequence 1 Reference	 F_N /4 on each arm	Zl_0	Zr_0	Measure of the reference after loads are released: - Zl_0 - Zr_0
Sequence 2 Direct nominal loading	 F_N /2 on each arm			Examination of the awning: - tearing in fabric: ☐ yes ☐ no - any breaking (stitching, frame,…): ☐ yes ☐ no
Sequence 3 Reverse nominal loading	 - F_N /2 on each arm	Zl_2	Zr_2	Measure of the vertical displacement after loads are released: - $\lvert Zl_2 - Zl_0 \rvert$ - $\lvert Zr_2 - Zr_0 \rvert$ - $\lvert (Zl_2 - Zl_0) – (Zr_2 - Zr_0) \rvert$ Examination of the awning: - tearing in fabric: ☐ yes ☐ no - any breaking (stitching, frame,…): ☐ yes ☐ no
Sequence 4 Direct safety loading	 F_S /2 on each arm			Examination of the awning: - tearing in fabric: ☐ yes ☐ no - any breaking (stitching, frame, …): ☐ yes ☐ no

Sequence 5 Reverse safety loading	 - F_S /2 on each arm			Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, frame,…): □ yes □ no
Key **1.** reference plane **2.** articulation blocked				

7.2.6 Performance criteria

All following performance criteria shall be fulfilled by the awnings:

a) After application of nominal loads (direct and reverse) and safety loads (direct or reverse), respectively Sequences 2, 3, 4 and 5, all following criteria shall be fulfilled:

1) There shall be no tearing in fabric,

2) There shall be no breakage (stitching, frame,…).

b) After application of the reverse nominal load (Sequence 3), all following criteria shall be fulfilled:

1) $| Zl_2 - Zl_0 | \leq 2\ \%\ H$ or $2\ \%\ H_2$;

2) $| Zr_2 - Zr_0 | \leq 2\ \%\ H$ or $2\ \%\ H_2$;

3) $| (Zl_2 - Zl_0) - (Zr_2 - Zr_0) | \leq 1\ \%\ L$.

NOTE H_2 is the height of the projected part of the awning, in case the projection is made of two parts (see Figure 3).

7.3 Awnings with lateral guiderail without fabric running into the lateral rails and without tension system

7.3.1 General

Awnings covered by this clause are for example vertical, façade and conservatory awnings.

This clause is applicable when guiding is performed only by the bottom rail.

7.3.2 Method of loading

The method of loading N°1 (see 5.2) shall be used with a test bar. Loads and application points are specified in Table 5 for each test sequence.

7.3.3 Test load

The nominal load F_N shall be calculated according to Clause 6.

7.3.4 Positioning and dimensions of sample

Dimensions of the test sample shall fulfil 4.2. The fixing of the test sample shall fulfil 4.3.

The awning shall be in the fully extended position.

7.3.5 Test sequence

The test sequence is the following:

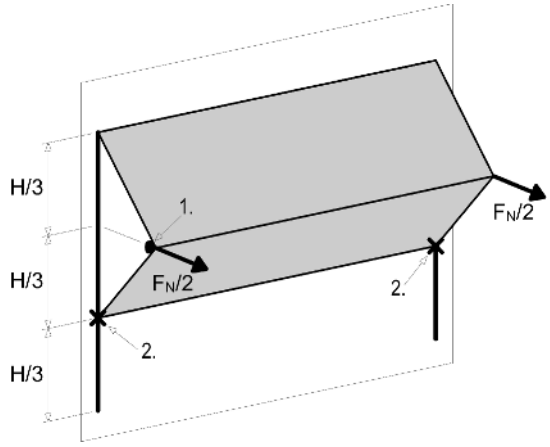
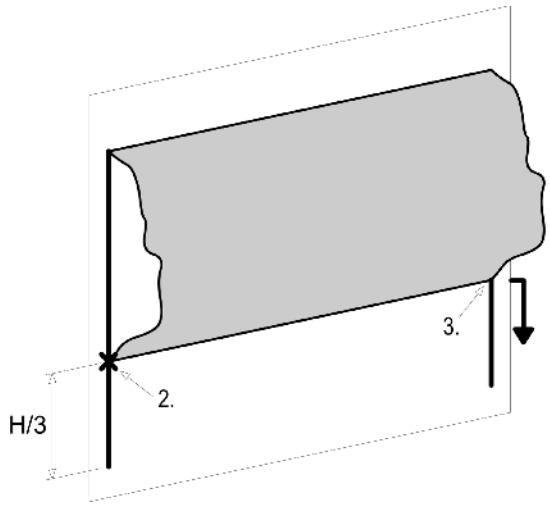
— Sequence 1: the front profile/bottom rail shall be raised to a height H/3 and fixed at the guide rails. The curtain shall be loaded across its width using a test bar producing horizontal force F_N midway between the roller tube and the front profile / bottom bar. Two horizontal loads $F_N/2$ shall be applied to each end of the test bar using return pulleys, so that the bar is displaced in a horizontal plane.

— Sequence 2: After having raised the bottom bar to the height H/3, one of its end shall be blocked in position. The other end shall be released. The test shall be repeated inversing the blocked and released ends. The blocked end shall not obstruct the movement of the bottom bar.

Actions specified in Table 5 for each sequence shall be carried out.

The loads shall be applied for 2 min. After release, the test bar shall be removed.

Table 5 — Awning with lateral guiderail without fabric running into the lateral rails and without tension system — Test sequence

Sequences	Load applied	Action
Sequence 1 Direct nominal loading	 $F_N/2$ on each end of the test bar	Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - permanent deformation: □ yes □ no - exit from guide rails: □ yes □ no
Sequence 2 Drop test		Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - permanent deformation: □ yes □ no - exit from guide rails: □ yes □ no
Key **1.** test bar **2.** end of the bottom bar blocked **3.** end of the bottom bar released		

7.3.6 Performance criteria

After application of the direct nominal load and after having carried out the drop tests (respectively Sequences 1 and 2), all following criteria shall be fulfilled:

— there shall be no tearing in fabric;

— there shall be no breakage (stitching, frame, guiding pins,…);

— there shall be no permanent deformation (profiles, rails, roller tube,…);

— there shall be no exit from guide rails.

7.4 Awnings with lateral guiderail with fabric running into the lateral rails without tension system

7.4.1 General

Awnings covered by this clause are for example vertical, façade awnings and insect screens

This clause is applicable when guiding is performed by the bottom rail and the fabric.

7.4.2 Method of loading

The curtain shall be loaded uniformly:

— In an horizontal position using the method of loading N°2 (see 5.3). Loads to be applied are specified in Table 6 for each test sequence.

Or

— In a vertical position using the method of loading N°3 (see 5.4). Pressures to be applied are specified in Table 7 for each test sequence. If necessary, the loading can be achieved with the help of a film as specified in 5.4.

7.4.3 Test load

In case the method of loading N°2 is used, the nominal and safety loads F_N and F_S shall be calculated according to Clause 6.

However, in the case the openness coefficient of the fabric Co, as determined according to EN 14500, is higher than 20 %, the nominal load to be considered in the tests, designated as $F_{N\text{-}Co>20\%}$, shall be equal to :

$$F_{N\text{-}Co>20\%} = F_N \times (1 - Co)$$

where

F_N nominal load calculated according to Clause 6;

Co openness coefficient of the fabric.

The safety load $F_{S\text{-}Co>20\%}$ is then equal to $F_{S\text{-}Co>20\%} = \gamma \times F_{N\text{-}Co>20\%}$, where γ is the value defined in Clause 6.

In case the method of loading N°3 is used, the same principle shall be applied.

7.4.4 Positioning and dimensions of sample

Dimensions of the test sample shall fulfil 4.2. The fixing of the test sample shall fulfil 4.3.

The awning shall be in the fully extended position.

If the product has a bottom bar blocking system, the bottom bar shall be blocked with its system. If the product has a free hanging bottom bar without a bottom blocking system, the bottom bar shall be blocked in at least two points to carry out the test.

7.4.5 Test sequence

The test sequence is the following:

a) Sequence 1: the safety load F_S (or $F_{S\text{-}Co>20\%}$ if the openness coefficient of the fabric is higher than 20 %) / pressure p_S is applied on one side of the awning.

b) Sequence 2: the safety load F_S (or $F_{S\text{-}Co>20\%}$ if the openness coefficient of the fabric is higher than 20 %) / pressure p_S is applied on the reverse side of the awning.

c) Sequence 3: this sequence is applicable to:

1) awnings with blocking systems on the bottom bar but have also the possibility to leave the bottom bar free hanging in intermediate position;

2) all awnings without blocking systems on the bottom bar.

It is not applicable to awnings for which the bottom bar is constantly blocked in each intermediate position and in the fully extended position.

In this sequence, the bottom bar shall be raised alternative one side and then the opposite side of a distance equal to 2 x d, where d is the maximum distance between the fabric and the glazing allowed by the manufacturer.

Sequence 3 does not apply in the in case the distance 2 x d cannot be reached because of the product design.

Actions specified in Table 6 or Table 7 for each sequence shall be carried out.

The loads shall be applied for 2 min. Examinations shall be made after release. After release, the mattress shall be removed.

Table 6 — Awnings with lateral guiderail with fabric running into the lateral rails without tension system — Test sequence with method of loading N°2

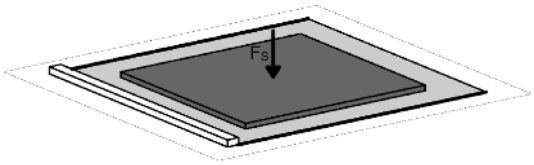
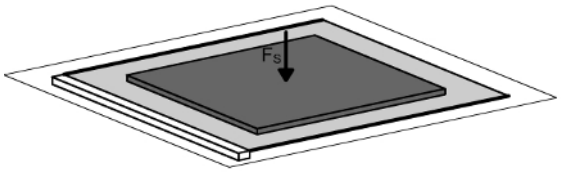
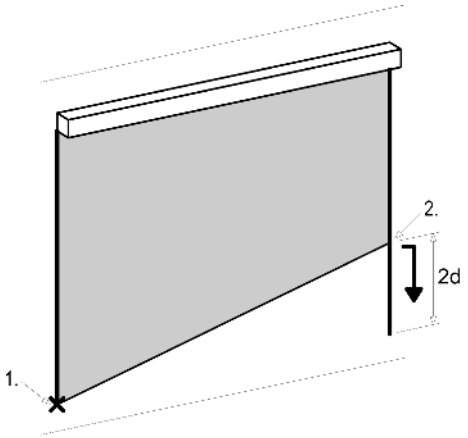
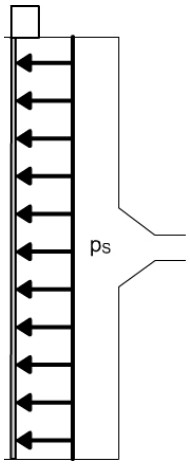
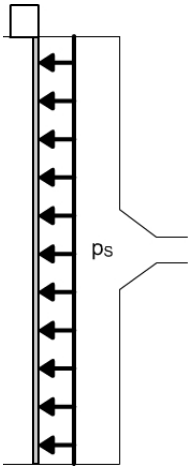
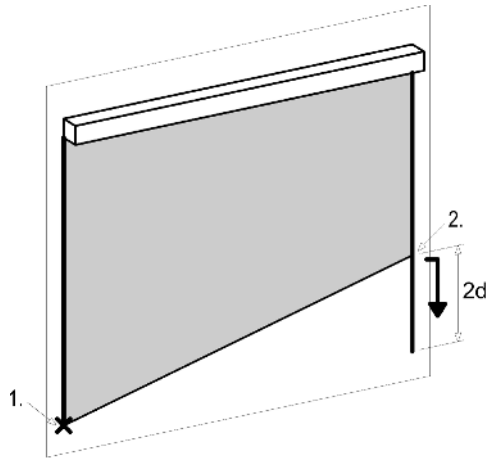
Sequences	Load applied	Action
Sequence 1 Direct safety loading	 Direct safety load F_S (or $F_{S\text{-}Co>20\%}$ if the openness coefficient of the fabric is higher than 20 %).	Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - permanent deformation (bottom bar, guide rail,…): □ yes □ no - exit from guide rails: □ yes □ no
Sequence 2 Reverse safety loading	 Reverse safety load $-F_S$ (or $-F_{S\text{-}Co>20\%}$ if the openness coefficient of the fabric is higher than 20 %).	Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - permanent deformation (bottom bar, guide rail,…): □ yes □ no - exit from guide rails: □ yes □ no
Sequence 3 Drop test	 	Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - permanent deformation (bottom bar, guide rail,…): □ yes □ no - exit from guide rails: □ yes □ no
Key **1.** end of the bottom bar blocked **2.** end of the bottom bar released		

Table 7 — Awnings with lateral guiderail with fabric running into the lateral rails without tension system — Test sequence with method of loading N°3

Sequences	Load applied	Action
Sequence 1 Direct safety loading	 Direct safety pressure p_S	Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - permanent deformation (bottom bar, guide rail,…): □ yes □ no - exit from guide rails: □ yes □ no
Sequence 2 Reverse safety loading	 Reverse safety pressure -p_S	Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - permanent deformation (bottom bar, guide rail,…): □ yes □ no - exit from guide rails: □ yes □ no
Sequence 3 Drop test		Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - permanent deformation (bottom bar, guide rail,…): □ yes □ no - exit from guide rails: □ yes □ no

Key

1. end of the bottom bar blocked
2. end of the bottom bar released

7.4.6 Performance criteria

After each sequence, all following criteria shall be fulfilled:

— there shall be no tearing in fabric;

— there shall be no breakage (stitching, guiding pins,…);

— there shall be no permanent deformation (profiles, rails, roller tube,…);

— there shall be no exit from guide rails.

7.5 Awning with lateral guiderail with tension system

7.5.1 General

Awnings covered by this clause are for example façade, conservatory and roof light awnings.

This clause is applicable when guiding is performed only by the bottom rail.

7.5.2 Method of loading

The method of loading N°1 (see 5.2) shall be used with a test bar. Loads and application points are specified in Table 8 for each test sequence.

The curtain shall be loaded across its width using the test bar producing a vertical force midway between the roller tube and front rail. The test bar shall be placed horizontally.

Two vertical loads $F_N/2$ shall be applied to each end of the test bar so that the bar is displaced in a vertical plane.

7.5.3 Test load

The nominal load F_N shall be calculated according to Clause 6.

7.5.4 Positioning and dimensions of sample

Dimensions of the test sample shall fulfil 4.2. The fixing of the test sample shall fulfil 4.3.

7.5.5 Test sequence

The test sequence is the following:

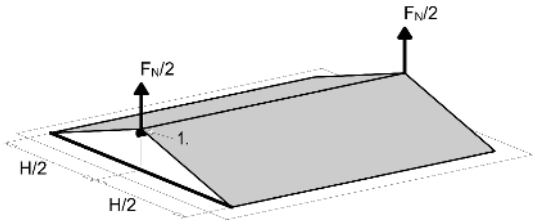
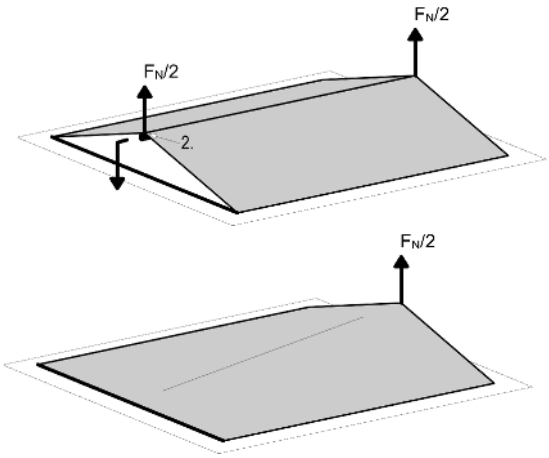
— Sequence 1: the nominal load is applied and distributed on each end of the bar test.

— Sequence 2: half of the nominal load is applied to each end of the bar test, then one end of the test bar is released. The test shall be carried out on one end of the bar and then on the other.

Actions specified in Table 8 for each sequence shall be carried out.

The loads shall be applied for 2 min. After release, the test bar shall be removed.

Table 8 — Blinds with lateral guiderail with tension system — Test sequence

Sequences	Load applied	Action
Sequence 1 Direct nominal loading	 $F_N/2$ on each end of the test bar	Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - permanent deformation: □ yes □ no - exit from guide rails: □ yes □ no
Sequence 2 Drop test	 $F_N/2$ on each end of the test bar, then one end released.	Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - permanent deformation: □ yes □ no - exit from guide rails: □ yes □ no - sliders or rollers blocked: □ yes □ no
Key **1.** test bar **2.** end of the test bar that is released during the sequence		

7.5.6 Performance criteria

All following performance criteria shall be fulfilled by the awnings:

a) After application of the direct nominal load (Sequence 1), all following criteria shall be fulfilled:

1) there shall be no tearing in fabric;

2) there shall be no breakage (stitching, frame, guiding pins,…);

3) there shall be no permanent deformation (profiles, rails, roller tube,…);

4) there shall be no exit from guide rails.

b) After having carried out the drop tests (Sequence 2), all following criteria shall be fulfilled:

1) there shall be no tearing in fabric;

2) there shall be no breakage (stitching, frame, guiding pins,…);

3) there shall be no permanent deformation (profiles, rails, roller tube,…);

4) there shall be no exit from guide rails;

5) there shall be no blocking of the moving part in guide rails.

7.6 Pergola awning

7.6.1 General

The pergola awning is an exterior product. The awning has two or more guides and can be manufactured and installed in different ways:

— Supported by an existing structure and fitted over or under this structure;

— With a proper structure fixed on one side to the building and having in front two or more columns;

— With a self independent structure having front and rear columns for each of the guides (this product is not covered by this standard since it is not fixed to the building).

The fabric is supported by intermediate bars, these bars are linked to the guides through carriers. The bars support the fabric and can be completely collected in the upper part of the structure.

The fabric when collected and in the intermediate positions of use is usually lose, in the final extended position in some cases is lose, in some other the fabric is tensioned. The system is moved using one or more belts linked to the first moving bar (carrier).

This European Standard is used to test the awning part while the structure has to verify using the relevant calculation methods such as Eurocodes.

7.6.2 Method of loading

The method of loading N°1 (see 5.2) shall be used.

The loads shall be evenly distributed along the length and shall be applied in the middle of the fold between the intermediate bars with a minimum distance of 100 mm from the intermediate bars and a maximum distance between them of 500 mm. Loads to be applied are specified in Table 9 for each test sequence.

7.6.3 Test load

The nominal load F_N shall be calculated according to Clause 6.

7.6.4 Positioning and dimensions of sample

The fixing of the test sample shall fulfil 4.3.

Dimensions of the sample shall fulfil 4.2 so that:

— the sample to be tested can be the greatest folding awning having two guides, or

— since the product is modular, the sample to be tested can be the widest product having at least four sections of fabric, each section being the longest length possible between the intermediate bars, according to manufacturer specification.

7.6.5 Test sequence

The test sequence is the following:

— Sequence 1: no load is applied. The awning is fully extended, the reference height H_0 is measured in the middle of the awning at the intermediate moving bar.

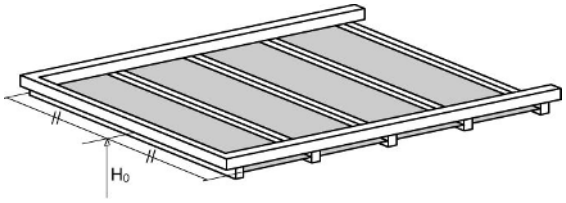
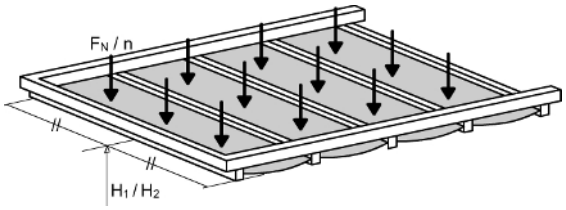
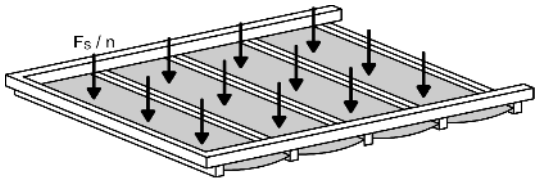
— Sequence 2: the nominal load is applied on the top side. The height H_1 is measured in the middle of the awning at the intermediate moving bar. The awnings that can be manufactured with more than two guides shall be loaded in the same way but with an extra load of 50 % applied to the curtain nearest to one of the lateral guides. The height H_2 is measured in the same way.

— Sequence 3: the safety load is applied on the top side. The awnings that can be manufactured with more than two guides shall be loaded in the same way but with an extra load of 50 % applied to the curtain nearest to one of the lateral guides.

Actions specified in Table 9 for each sequence shall be carried out.

The loads shall be applied for 5 min. The measurements shall be taken 2 min after the loads have been released.

Table 9 — Pergola awnings — Test sequence

Sequences	Load applied	Action
Sequence 1 Measurement of reference height	 No load applied	Measure of the reference height H_0
Sequence 2 Nominal load	 F_N applied with n distributed loads.	Measure of the height H_1 or H_2 (depending on the product type) Examination of the awning: - tearing in fabric: □ yes □ no - any breaking (stitching, guiding pins,…): □ yes □ no - exit from guide rails: □ yes □ no - sliders or rollers blocked: □ yes □ no
Sequence 3 Safety load	 F_S applied with n distributed loads.	Examination of the awning: - any breaking: □ yes □ no

7.6.6 Performance criteria

All following performance criteria shall be fulfilled by the awnings:

a) After application of the nominal load (Sequence 2), all following criteria shall be fulfilled:

1) there shall be no tearing in fabric;

2) there shall be no breakage (stitching, frame, guiding pins,…);

3) there shall be no permanent deformation : $H_0 – H_1$ (or $H_0 – H_2$) shall be less than 0,4 % of the width of the bar;

4) there shall be no exit from guide rails;

5) there shall be no blocked sliders or rollers.

b) After application of the safety load (Sequence 3):

1) There shall be no breakage of any components.

8 Shutters

8.1 Roller shutter, wing shutter, venetian shutter, flat closing concertina shutter, concertina shutter, sliding panel shutter

8.1.1 Method of loading

The curtain shall be loaded uniformly:

— In an horizontal position using the method of loading N°2 (see 5.3): loads to be applied are specified in Table 10 for each test sequence.

Or:

— In a vertical position using the method of loading N°3 (see 5.4): pressures to be applied are specified in Table 11 for each test sequence. If necessary, the loading can be achieved with the help of a film as specified in 5.4.

8.1.2 Test loads

In case the method of loading N°2 is used, the nominal and safety loads F_N and F_S shall be calculated according to Clause 6.

In case the method of loading N°3 is used, the nominal and safety pressures p_N and p_S of the class foreseen shall be directly applied.

8.1.3 Positioning and dimensions of sample

Dimensions of the test sample shall fulfil 4.2. The fixing of the test sample shall fulfil 4.3.

The curtain shall be in the complete extended position and, for projecting shutters, in the non-projected position.

In case of roller shutters, the curtain shall be completely moved to one side,

The maximum play specified by the manufacturer shall be respected, with a minimum value of 4 ‰ of the width L.

8.1.4 Test sequence

The test sequence is the following:

— Sequence 1: the nominal load / pressure is applied over the external face of the curtain;

— Sequence 2: the nominal load / pressure is applied over the internal face of the curtain;

— Sequence 3: the safety load / pressure is applied over the external face of the curtain;

— Sequence 4: the safety load / pressure is applied over the internal face of the curtain.

Actions specified in Table 10 or Table 11 for each sequence shall be carried out.

The loads shall be applied for 1 min. Examinations shall be made after release.

Table 10 —Shutters — Test sequence with method of loading N°2

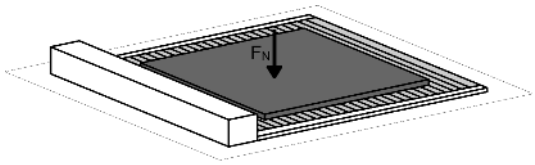
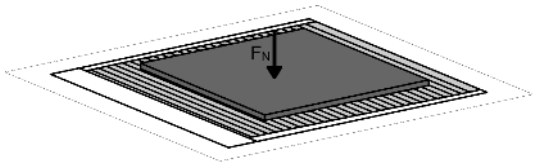
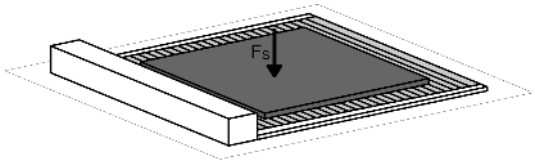
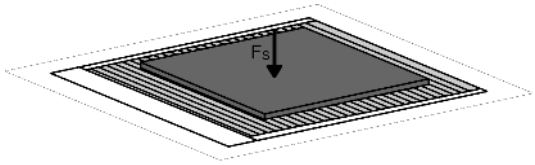
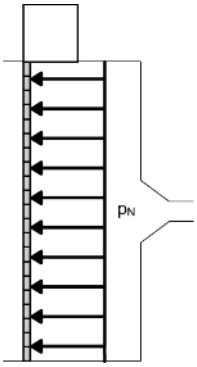
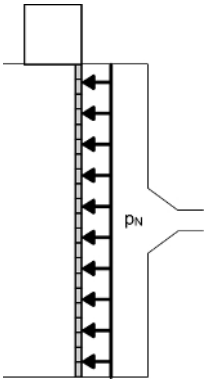
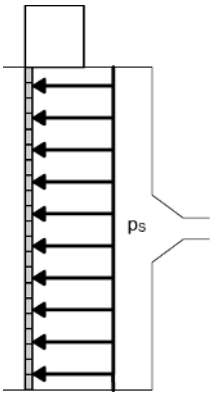
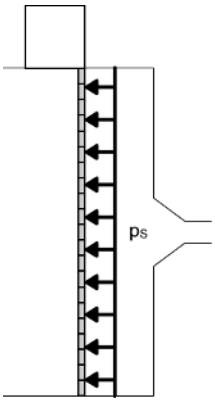
Sequences	Load applied	Action
Sequence 1 Direct nominal loading	 Direct nominal load F_N	Examination of the shutter: - permanent deformations of the curtain, locking device(s) or guide rail: □ yes □ no - permanent deformations of the frame parts of the shutters (e.g. roller tube, brackets, fixings,…): □ yes □ no
Sequence 2 Reverse nominal loading	 Reverse nominal load $-F_N$	Examination of the shutter: - permanent deformations of the curtain, locking device(s) or guide rail: □ yes □ no - permanent deformations of the frame parts of the shutters (e.g. roller tube, brackets, fixings,…): □ yes □ no
Sequence 3 Direct safety loading	 Direct safety load F_S	Examination of the shutter: - exit of the curtain from its fixings, locking devices(s) or guide rail: □ yes □ no - breaking of the curtain, fixings, locking device(s) or guide rail: □ yes □ no
Sequence 4 Reverse safety loading	 Reverse safety load $-F_S$	Examination of the shutter: - exit of the curtain from its fixings, locking devices(s) or guide rail: □ yes □ no - breaking of the curtain, fixings, locking device(s) or guide rail: □ yes □ no

Table 11 — Shutters — Test sequence with method of loading N°3

Sequences	Load applied	Action
Sequence 1 Direct nominal loading	 Direct nominal pressure p_N	Examination of the shutter: - permanent deformations of the curtain, locking device(s) or guide rail: □ yes □ no - permanent deformations of the frame parts of the shutters (e.g. roller tube, brackets, fixings,…): □ yes □ no
Sequence 2 Reverse nominal loading	 Reverse nominal pressure $-p_N$	Examination of the shutter: - permanent deformations of the curtain, locking device(s) or guide rail: □ yes □ no - permanent deformations of the frame parts of the shutters (e.g. roller tube, brackets, fixings,…): □ yes □ no
Sequence 3 Direct safety loading	 Direct safety pressure p_S	Examination of the shutter: - exit of the curtain from its fixings, locking devices(s) or guide rail: □ yes □ no - breaking of the curtain, fixings, locking device(s) or guide rail: □ yes □ no
Sequence 4 Reverse safety loading	 Reverse safety pressure $-p_S$	Examination of the shutter: - exit of the curtain from its fixings, locking devices(s) or guide rail: □ yes □ no - breaking of the curtain, fixings, locking device(s) or guide rail: □ yes □ no

8.1.5 Performance criteria

All following performance criteria shall be fulfilled by the shutters:

a) After application of the direct and reverse nominal loads F_N and $–F_N$ or the direct and reverse nominal pressures p_N and $–p_S$ (Sequences 1 and 2):

   1) There shall be no visible deterioration of the curtain, of the fixing and locking devices and of the guide rail.

b) After application of the direct and reverse safety loads F_S and $–F_S$ or the direct and reverse safety pressures p_S and $-p_S$ (Sequence 3 and 4):

   1) There shall be no breakage, and

   2) the curtain shall not come out of its fixing or locking device(s).

8.2 External venetian blind (EVB)

8.2.1 Method of loading

The method of loading N°3 (see 5.4) shall be used with a plastic film. Test pressures to be applied at each test sequence are specified in Table 12 (cable guided EVB) and Table 13 (rail guided EVB).

8.2.2 Test loads

As the method of loading N°3 shall be used, the nominal and safety pressures p_N and p_S of the class foreseen shall be directly applied.

8.2.3 Positioning and dimensions of sample

The sample shall be placed vertically with the headrail and guides attached to a rigid frame. The curtain shall be fully extended and the slats tilted vertically.

The sample shall have the following dimensions:

— Width: L=2,0 m;

— Height: H=2,5 m.

NOTE These dimensions have been defined because external venetian blinds can be of big dimensions (e.g. 6 m width or 5 m height) which are not compatible with most of existing test equipment.

8.2.4 Measurement of horizontal displacement

During each loading sequence, the maximum horizontal displacement of the curtain shall be measured. The displacement is the difference between the distance measured when applying the load and the one measured with the initial pressure.

The measurement of D_0 shall be performed in the middle of the curtain or at the maximum point of deformation. The measurements D_1 to D_4 shall be performed at the maximum point of deformation.

NOTE The maximum horizontal displacement will often occur in the middle of the curtain, but that is not always the case and depends on the type of blinds.

8.2.5 Test sequence

The pressure level shall be raised gradually to the desired value (no surge). Each load shall be applied for at least 1 min, and the measurement shall only be performed once the blinds have stabilised. Both external and internal sides of the EVB shall be tested.

The following test sequence shall be followed for cable guided EVB (see Table 12):

— Sequence 1: a load of 25 Pa is applied to measure the reference position of the curtain,

— Sequence 2: the nominal pressure p_N is applied,

— Sequence 3: a preload of 25 Pa is applied,

— Sequence 4: the safety pressure p_S is applied.

The following test sequence shall be followed for rail guided EVB (see Table 13):

— Sequence 1: no load is applied to measure the reference position of the curtain,

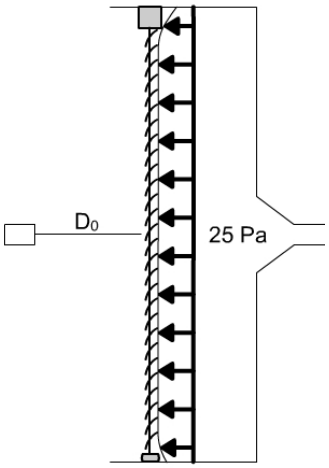
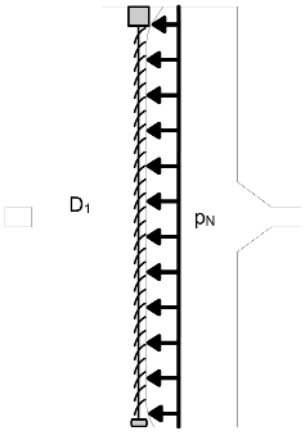
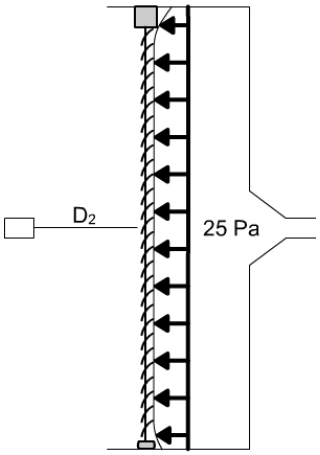
— Sequence 2: the nominal pressure p_N is applied,

— Sequence 3: the safety pressure p_S is applied.

Examinations shall be made after each load is released.

In case of EVB with guiderails and additional cable(s), tests shall be carried out according to rail guided EVB (Table 13) taking into account the criteria of cable guided EVB (see Table 12).

Table 12 — Cable guided EVB — Test sequence

Sequences	Load applied	Action
Sequence 1 Preloading	 25 Pa applied	Measurement of the horizontal position of the curtain D_0
Sequence 2 Nominal loading	 Nominal pressure p_N	Measurement of the horizontal position of the curtain D_1 Examination of the EVB: - permanent deformation of slats: □ yes □ no - permanent deformation of the headrail: □ yes □ no - permanent deformation of the cable lock: □ yes □ no
Sequence 3 Preloading	 Preload of 25 Pa	Measurement of the horizontal position of the curtain D_2

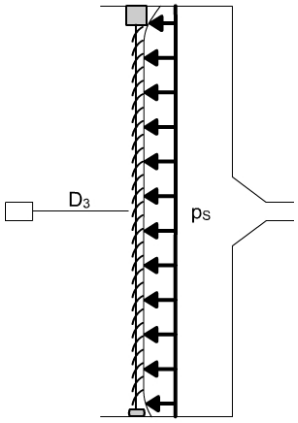
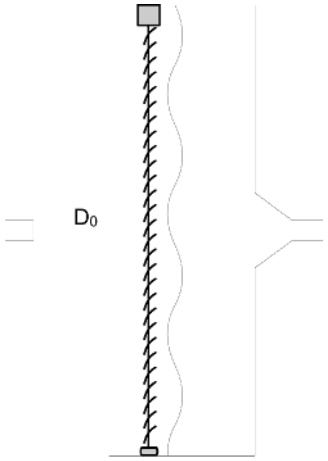
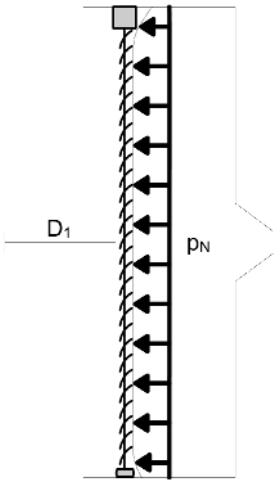
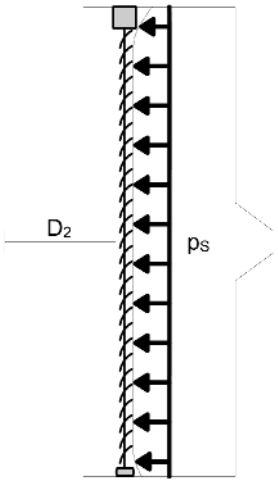
Sequence 4 Safety loading	 Safety pressure p_S	Examination of the EVB: - any breakage: □ yes □ no - tearing or displacement of a ladder or lift tape: □ yes □ no - loss of cable tension: □ yes □ no

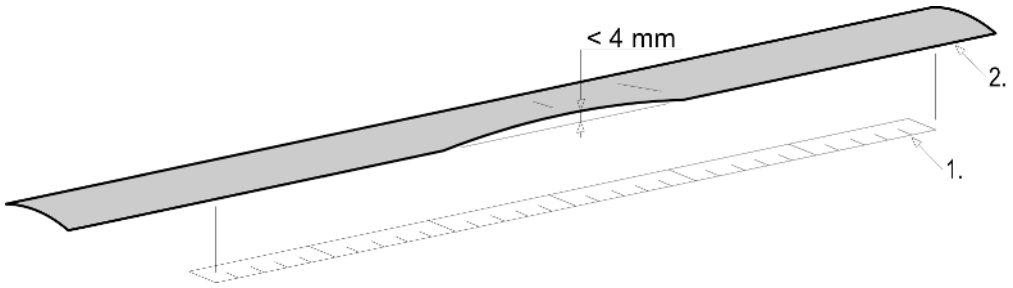
Table 13 — Rail guided EVB — Test sequence

Sequences	Load applied	Action
Sequence 1	 No load applied	Measurement of the horizontal position of the curtain D_0
Sequence 2 Nominal loading	 Nominal pressure p_N	Measurement of the horizontal position of the curtain D_1 Examination of the EVB: - permanent deformations of slats: □ yes □ no - permanent deformations of the headrail: □ yes □ no - permanent deformations of the guiderail: □ yes □ no
Sequence 3 Safety loading	 Safety pressure p_S	Examination of the EVB: - exit of the curtain from its fixings, locking devices(s) or guide rail: □ yes □ no - any breakage: □ yes □ no - tearing or displacement of a ladder or lift tape: □ yes □ no

8.2.6 Verification of permanent deformation

The permanent deformation of the slats shall be measured using two rulers. A 300 mm ruler shall be placed along the edge of the slat and another one shall be used to measure the deformation, perpendicularly to the slat's longitudinal axis (see Figure 11).

The deformation shall not exceed 4 mm.



Key

1 ruler
2 slat

Figure 11 — Verification of permanent deformation

8.2.7 Verification of loss of tension of the guiding cable(s)

For cable guided EVB, the loss of tension in the guiding cables is evaluated comparing the displacement of the curtain when applying the safety load to the displacement when applying the nominal load. The reference of the displacement is the position of the curtain when a preload of 25 Pa is applied. The increase in the displacement shall not exceed 50 %:

$$(D_3 - D_2) < 1{,}5 \times (D_1 - D_0)$$

8.2.8 Performance criteria

All following performance criteria shall be fulfilled by the external venetian blinds:

a) The endurance class of the external venetian blind shall be at least Class 1 (see EN 13659).

b) For cable guided external venetian blinds:

1) Under the application of the nominal pressure p_N (Sequence 2), the horizontal displacement shall not exceed 10 % of the width of the curtain:

$$D_1 - D_0 < \frac{L}{10}$$

2) After the application of the nominal pressure p_N (Sequence 2):

i) there shall be no permanent deformation of slats,

ii) there shall be no permanent deformation of the headrail,

iii) there shall be no permanent deformation of the cable lock.

3) After the application of the safety pressure p_S (Sequence 4):

i) there shall be no breakage,

ii) there shall be no tearing or displacement of ladders or lift tapes,

iii) there shall be no loss of tension in the guiding cable.

c) For rail guided external venetian blinds:

1) Under the application of the nominal pressure p_N (Sequence 2), the horizontal displacement shall not exceed 10 % of the width of the curtain:

$$D_1 - D_0 < \frac{L}{10}$$

2) After the application of the nominal pressure p_N (Sequence 2):

i) there shall be no permanent deformation of slats,

ii) there shall be no permanent deformation of the headrail,

iii) there shall be no permanent deformation of the guiderail.

3) After the application of the safety pressure p_S (Sequence 3):

i) there shall be no exit of the curtain from its fixings, locking devices(s) or guide rail,

ii) there shall be no breakage,

iii) there shall be no tearing or displacement of ladders or lift tapes.

8.3 Resistance of projection systems

8.3.1 General

This clause is applicable for projecting shutters such as roller shutters, venetian shutters, flat closing concertina shutters and concertina shutters (the list is not exhaustive). The aim is to evaluate the performance of the projection systems, the shutters being in the projected position.

8.3.2 Method of loading

The method of loading N°1 (see 5.2) shall be used. Test loads and application points are specified in Table 14 for each test sequence.

8.3.3 Test loads

The nominal load F_N and the safety load F_S shall be calculated according to Clause 6.

8.3.4 Positioning and dimensions of sample

The shutter is mounted in the vertical position on a rigid frame, equipped with its brackets and projection systems conforming to the manufacturer's installation instructions.

The curtain shall be in the fully extended position and, depending on the test sequence, either in the projected or the non-projected position.

Dimensions of the sample shall fulfil 4.2.

8.3.5 Test sequence

The test sequence is the following:

— Sequence 1: the shutter is in the projected position, the safety load F_S is applied to the internal face of the curtain;

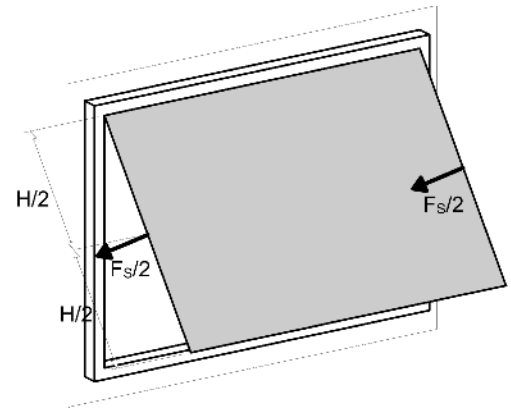
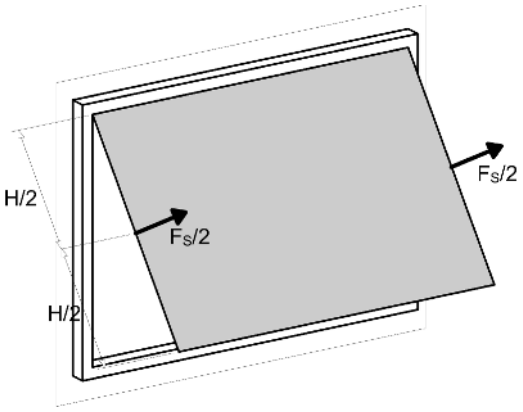
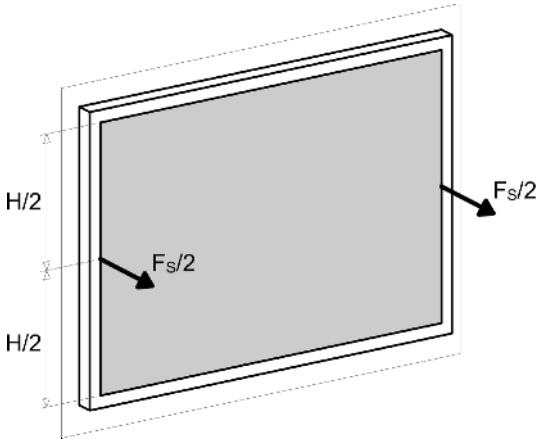
— Sequence 2: the shutter is in the projected position, the safety load F_S is applied to the external face of the curtain;

— Sequence 3: the shutter is in the non-projected position, the safety load F_S is applied to the external face of the curtain.

Actions specified in Table 14 for each test sequence shall be carried out.

The loads shall be applied for 2 min. Verifications shall be made after release.

Table 14 — Projection systems of shutters — Test sequence

Sequences	Load applied	Action
Sequence 1 Direct safety loading in the projected position	 Direct safety load F_S	Examination of the projection system: - the curtain remains in the fully projected position: □ yes □ no - permanent deformations or breaking of the projection system: □ yes □ no
Sequence 2 Reverse safety loading in the projected position	 Reverse safety load $-F_S$	Examination of the projection system: - the curtain remains in the fully projected position: □ yes □ no - permanent deformations or breaking of the projection system: □ yes □ no
Sequence 3 Reverse safety loading in the non-projected position	 Reverse safety load $-F_S$	Examination of the projection system: - the projection system remains locked: □ yes □ no - permanent deformations or breaking of the projection system: □ yes □ no

8.3.6 Performance criteria

After each test sequence, all following criteria shall be fulfilled:

— The curtain remains in the fully projected position, and

— there shall be no permanent deformation or breaking of the projection system.

9 Test report

The test report shall contain at least the following information:

a) the manufacturer's technical description including the product's dimensional limits, the available exit positions of the operating mechanisms or the various types of operation proposed, the possible options and their technical limits,

b) the necessary details for identification of the product (list of components of the product, type of laths, etc.),

c) the relevant details of the type, dimensions, constituent materials, the form and make-up of the product and its conformity to the drawings supplied by the manufacturer,

d) the complete details of fixings, operating mechanisms,

e) the dimensional limits of the product (width, height, surface area, slope, etc.),

f) the dimensions of the product tested,

g) the values of the test pressures and the class obtained,

h) the different values of displacement in case such measurements are required by the test sequence,

i) the behaviour of the product in case of breaking,

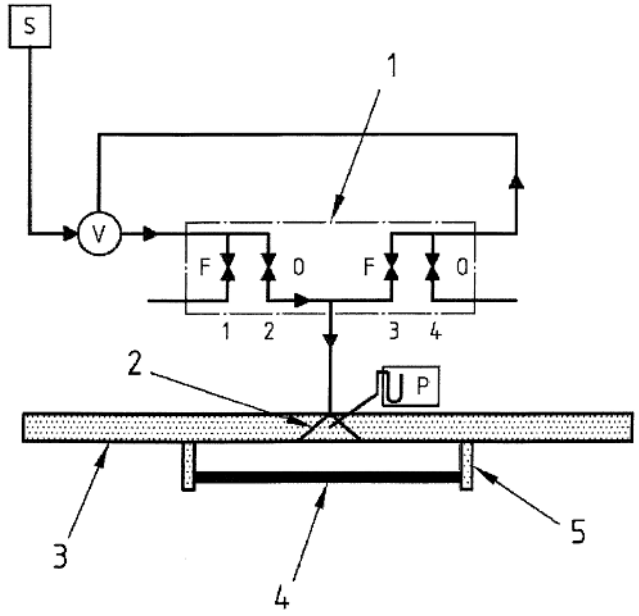
j) the name of the test laboratory (or company) and name of the person responsible for the test,

k) the date of test,

l) the reference to the present standard.

Annex A
(informative)

Example of a test apparatus for the method of loading N°3



Key

1 4 way gate
2 opening
3 partition/wall
4 shutter
5 box/caisson

Figure A.1 — Lay-out of the apparatus

Partition/wall: brick wall or 22 mm wooden partition with reinforcements

Opening: diameter 250 mm with an air or vent opening allowing the measurement of the pressure p in a zone of still air (see details of the air or vent opening)

V: centrifugal ventilator, output 2 500 m^3/h under 1 000 Pa

4 way gate: allowing achievement in the box of a direct pressure or a reverse pressure

Pressure: (1+3) closed, (2+4) opened

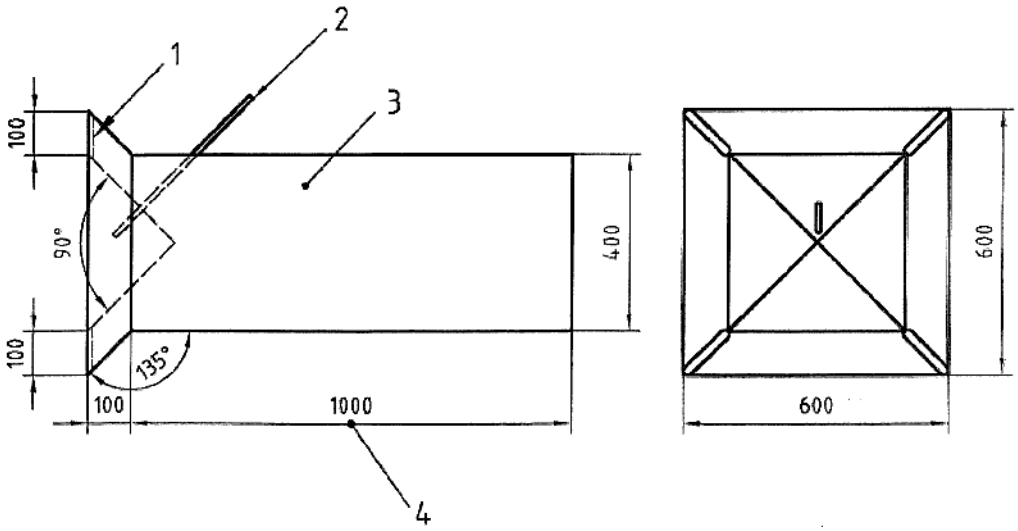
Reverse pressure: (1 + 3) opened, (2+4) closed

Box/Caisson: at the periphery of the shutter. It shall be sufficiently deep to allow the deflection of the curtain under reverse pressure and airtight to reduce the loss of the necessary air flow rate

P: manometer for the measurement of pressure/reverse pressure

The measuring gauge is located in the area of still air (see Figure A.2).

S: silencer (to be advised)



Key

1 pyramid frame
2 tube Ø 6 mm for pressure measurement
3 square tube 400 mm
4 maximum tube length for a non turbulent air flow

Figure A.2 — Detail of air vent opening

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