BRITISH STANDARD

BS EN
13527:2000

Shutters and blinds — Measurement of operating force — Test methods

The European Standard EN 13527:1999 has the status of a British Standard

ICS 91.060.50

National foreword

This British Standard is the English language version of EN 13527:1999.

The UK participation in its preparation was entrusted by Technical Committee B/538, Doors, windows, shutters, hardware and curtain walling, to Subcommittee B/538/3, Domestic blinds and shutters, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

Cross-references

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 16, an inside back cover and a back cover.

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English version

Shutters and blinds - Measurement of operating force - Test methods

Fermetures pour baies équipées de fenêtres, stores intérieurs et extérieurs - Détermination de l'effort de manoeuvre - Méthodes d'essai

Zusätzliche Schutzeinrichtungen und Abschlüsse - Messung der Bedienkraft - Prüfverfahren

This European Standard was approved by CEN on 5 September 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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FOREWORD

This European Standard has been prepared by Technical Committee CEN/TC 33 "Doors, windows, shutters and building hardware", the Secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2000, and conflicting national standards shall be withdrawn at the latest by June 2001.

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

This document was submitted to enquiry as prEN 12046.

It is part of a series of standards on blinds and shutters for buildings as defined in standard prEN 12216.

The methods of testing are linked to the performance requirements for internal/external blinds and shutters, as defined in the standards prEN 13120, prEN 13561 and prEN 13659.

1 SCOPE

The present standard defines the test methods to be carried out to determine the operating force required for shutters and blinds.

It applies to the following products:

- **Internal blinds**: internal venetian, roller, vertical and pleated blinds.

- **External blinds**: Folding arm awning, trellis arm awning, vertical roller awning, pivot arm awning, marquisolette, façade awning, roof light awning, verandah awning or conservatory awning, Dutch awning, insect screen awning, louvre array.

- **Shutters**: External venetian blind, roller shutter (vertical or projected) venetian shutter (vertical or projected), flat-closing concertina shutter, concertina shutter, sliding panel shutter).

Shutters with a projection system are also covered.

The test described establish the effort or force necessary to result

- in the movement or displacement of the curtain during both extension and retraction
- to project shutters,
- to tilt laths.

2 NORMATIVE REFERENCES

The present European Standard incorportates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriated places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to the present European standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

prEN 12216 *Terminology and definitions for blinds and shutters*
prEN 13120 *Internal blinds - Performance requirements*

3 DEFINITIONS

For the purposes of this standard, the definitions in prEN 12216, prEN 13120, prEN 13561 and prEN 13659 apply, and as follows:

3.1 Operation of the curtain

Describes the following:

- **Movement of curtain**: retraction and extension of the curtain

- **Tilting of laths**: complete cycle of lath tilting mechanism from one extreme to the other and returning to the original position. With monocommand, the laths are tilted while the curtain is being extended/retracted and using the same mechanism.

- **Projection of curtain**: sloping position achieved starting from the extended position by projection means (camstay).

3.2 Angle of projection:

It is defined by:

- **the angle of curtain in the projected position:**

  - relative to the vertical for awnings fitted with arms pivoting around a fixed point - pivot arm awning, marquisolette, Dutch awning ;

  - relative to the horizontal for foldaway awnings ;
  - relative to the extended but not projected curtain for projectable shutters/awnings.

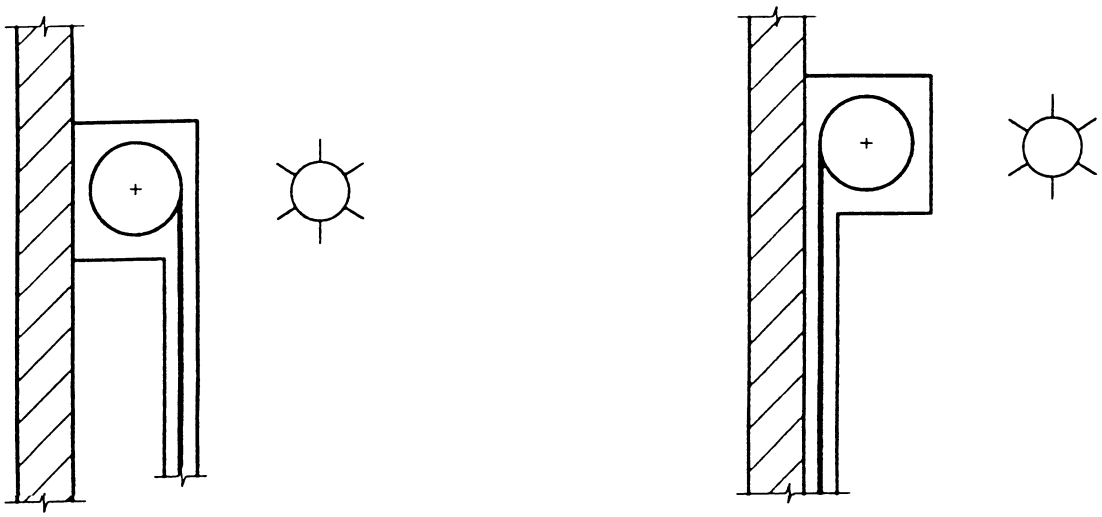
- **the angle of the roof, relative to the horizontal, for roof blinds/shutters and veranda awnings.**

3.3 Variations in operation

Mechanism with one or two cords (or with a gear) which can be fixed on the wall or headbox and allows the axis of the gear to be repositioned. It comprises an operating rod (handle side) and a joining piece (to the gear).

3.4 Direction of roll-up of curtain

Roll-up is internal when the roller tube is situated on the inside of the extended curtain (fig. 1a). The roll-up is external when the roller tube is situated on the outside of the extended curtain (fig. 1b).

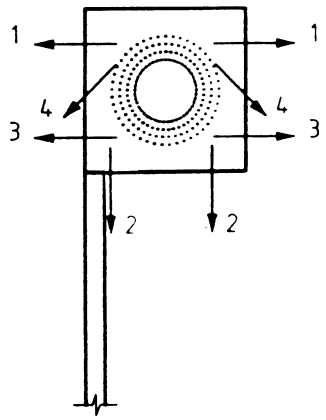


1a: internal roll-up **1b: external roll-up**

Figure 1: **Direction of rolling**

3.5 Position of exit of the operating mechanism (see figure 2)

The Exits of the mechanism can be horizontal at the top (position 1), horizontal at the bottom (position 3), vertical underneath (position 2), at an angle (position 4).



Position 1: exit box horizontally at top
Position 2: exit box underneath
Position 3: exit box horizontally at bottom
Position 4: exit box at an angle

Figure 2: **Exit positions from box**

3.6 Unlocking of folding and trellis arm awnings

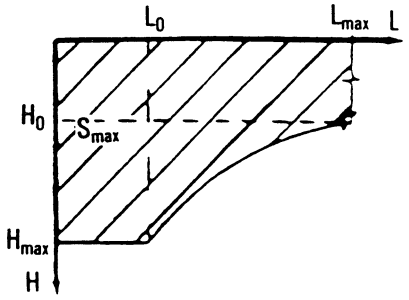
Part of retraction cycle during which the arms move from the fully extended position. This phase is characterised by a significant increase in the operating force.

4 TEST CONDITIONS

4.1 Specification of the samples

For testing a range of samples, the characteristics of the sample are established, for a given operation, supported by the technical data and the dimensional limits of the products and installation instructions supplied by the manufacturer taking into action the considerations defined in the following (exit positions from the box are described in paragraph 5 as a function of the type of operation).

Note: The technical dimensional limits of a product are the maximum dimensions for both width and height (L_{max} and H_{max}) associated with the maximum square surface area (S_{max}) as laid down by the manufacturer.



4.1.1 Size of the samples

In order to be representative of a range of samples, the sample product submitted for testing will have, according to the type of product, the following characteristics:

- ***L type sample***: the maximum width proposed associated with the height possible for this width. L type sample is defined by: L_{max} and S_{max} with $S_{max} = L_{max} \times H_o$.

(see figure 3a)

Products with a smaller width and a surface area less than the stated maximum, will be deemed to satisfy the test values for the operating force.

The samples type *L* are:

- **shuttters**: wing shutter;

- **external blinds**: roller blind without spring compensation (vertical or slopping, pivot arm awning, marquisolette, insect screen, louvre array;

- **internal blinds**: venetian blind (cord operation), roller blind without spring compensation, vertical blind, pleated blind.

- ***H type sample***: The maximum height proposed associated with the width possible for this height. H type sample is defined by: H_{max} and S_{max} with $S_{max} = H_{max} \times L_o$.

(See figure 3b)

Products with a smaller height and a surface area less than the stated maximum will be deemed to satisfy the test values for operating effort.

The samples type H are:

- **shutters**: roller shutter, external venetian blind, venetian shutter, flat closing concertina shutter, concertina shutter, sliding panel shutter;

- **external blinds**: roller blinds with spring compensation;

- **internal blinds**: venetian monocommand, roller blind with spring compensation (direct operation).

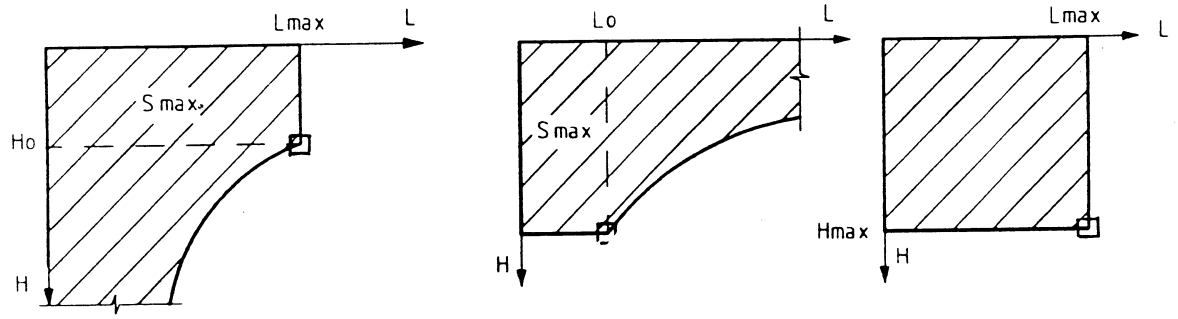
- ***H L type sample***: the maximum width associated with the maximum height (when the 2 values are at the maximum). H L type is defined by: H_{max} and L_{max} with $S_{max} = H_{max} \times L_{max}$

Products with a smaller high or width will be deemed to satisfy the test values for operating effort.

(see figure 3c)

The sample type H L are:

- **external blinds**: folding arm awning, trellis arm awning, Dutch awning.



Equal curve S
$S_{max} = L_{max} \times H_0$

Equal curve S
$S_{max} = L_0 \times H_{max}$

a) Sample type L **b)** Sample type H **c)** Sample type HL

Figure 3: Area of equal operating effort as a function of the dimensions of the test product

4.1.2 Angle of projection

According to the type of product the blind or shutter is tested:

- using the minimum projection angle for folding or trellis arm awnings;
- using the maximum projection angle for projecting shutters and roller blinds with projection;
- in the two extreme positions, for the maximum and minimum sloping angles for shutters and conservatory awning and roof light shutters.

4.1.3 Façade awnings

The product chosen for the test is type L presenting the greatest number of angles. The angles used are those which are the most acute.

4.1.4 Projecting arms

The tests shall be carried out with arms of maximum length.

4.2 Test Preparation

The sample product, blind or shutter, is submitted for test in its normal usage position, fully equipped, with the necessary operating systems and mechanisms, systems for guiding the curtain and projection system where applicable.

The complete assembly is mounted on a test rig according to recommendations in the installation instructions manufacturer, which consists of:

- for blinds and shutters with a vertical curtain, a rigid frame simulating the opening.

The frame allows, if necessary, locking of the curtain or its projection. The support piece must be horizontal.

- for projecting shutters with a vertical curtain, on a rigid support which simulates the wall, facade or roof, on which the test product is fixed using the positions recommended by the manufacturer and erected in compliance with the installation instructions (e.g. use of brackets) and according to the angle(s) defined in § 4.1.2.

- for sloping or horizontal products, on a rigid support, allowing it to be tilted to the minimum and maximum angles laid down specified by the manufacturer.

After the blind or shutter has been mounted, check that it is operating normally by carrying out a complete operation: extension, retraction, locking, tilting of the laths (where applicable) and all other options with which the product is equipped.

5 MEASUREMENT OF OPERATING FORCE OF EXTENSION/RETRACTION OF CURTAIN

The measurements are taken at the speed of operating mechanism given in table I. Tests are conducted at the ambient temperature of the laboratory, 23 °C ± 5 °C.

Type of operation	Test speed[(1)]
Gear with crank handle (T.O.) winch with handle	60 tr/min ± 10 tr/min
Cord or belt (open)	30 m/min ± 5 m/min
Cord or chan (endless)	30 m/min ± 5 m/min
Direct operation hand, wand, rod	30 m/min ± 5 m/min
[(1)] average speed of the operating mechanism, calculated on the last 0,40 m of displacement of the curtain	

Table I: Test speed by types of operation

5.1 Linear operation of the operating mechanism

One direction mechanism (belt, cord), and endless mechanism (cord, chain, cable).

5.1.1 Equipment

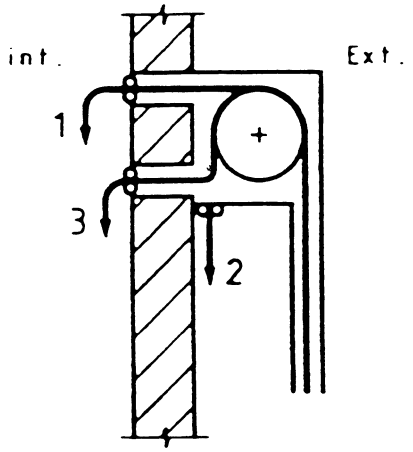
A dynamometer, ±3 % accuracy allows an effort to be applied to the operating mechanism in the direction of pull.

5.1.2 Exit positions from box

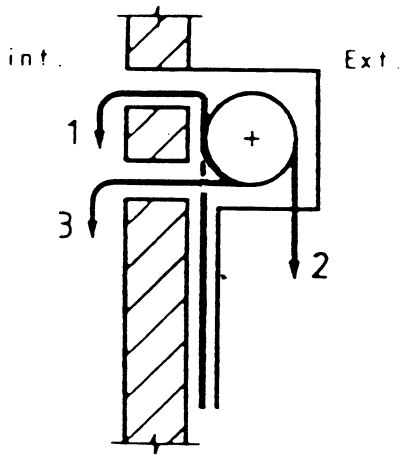
According to the arrangements proposed by the manufacturer, the operating force will be measured at its most unfavourable arrangement, namely:

- position 1, illustrated in figure 4b, when the roll up is external, or position 3, illustrated in figure 4a, when the roll up is internal.
- otherwise, position 3, illustrated in figure 4b, or position 1, illustrated in figure 4a.
- otherwise, position 2, illustrated figure 4a ou figure 4b.

Note: If the manufacturer proposes the positions 1, 2 and 3, the confirmaton of the position 1 (external roll up) or 3 (internal roll up) is de facto implied in the other positions.



4a: internal roll up



4b: external roll up

Figure 4: Illustration of the different box exit positions for a roller shutter for two box configurations

5.1.3 Test

The test is to be carried out:

- **effort on extension**: with the curtain retracted, force is applied in the direction of extension.

The maximum force applied throughout the curtain's movement to the fully extended position is recorded.

- **effort on retraction**: with the curtain extended, unlocked if necessary, force is applied in direction of retraction.

The maximum force applied throughout the curtain's movement to the fully retracted position is recorded.

The test is repeated twice.

5.1.4 Expression of results

The maximum force values on extension and retraction are the mean values of the three tests.

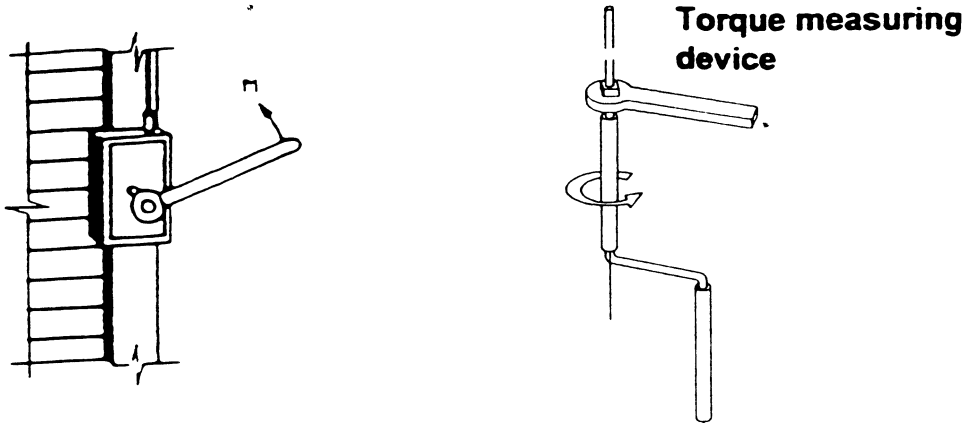
The value of the operating force is the greater of these mean values.

5.2 Operation by rotation of the operating mechanism

Operation by gear handle and revolving rod (T.O) and cable winch.

5.2.1 Equipment

A measuring device, 3 % accuracy coupled to the revolving rod, replacing the gear operating handle or cable, enables a torque force to be applied (see figure 5).



5a: Cable winch **5b: gear handle**

Figure 5: Operation by gear handle or cable - Measuring device

5.2.2 Arrangements accepted for the test

According to the arrangements proposed by the manufacturer, the operating effort will be measured for the most unfavourable arrangement, namely:

For T.O. operation (see figure 2):
- position 1 or position 3;
- otherwise, position 4;
- otherwise, position 2;

For the cable winch, the choice is made as indicated in paragraph 5.1.2.

5.2.3 Test

- Gear handle with revolving rod (T.O.):

The rod is operated in the vertical plane, orthogonal to the curtain, at an angle of 30° ± 2° from the vertical (see figure 6).

- Cable winch:

The operation is carried out using the measuring device.

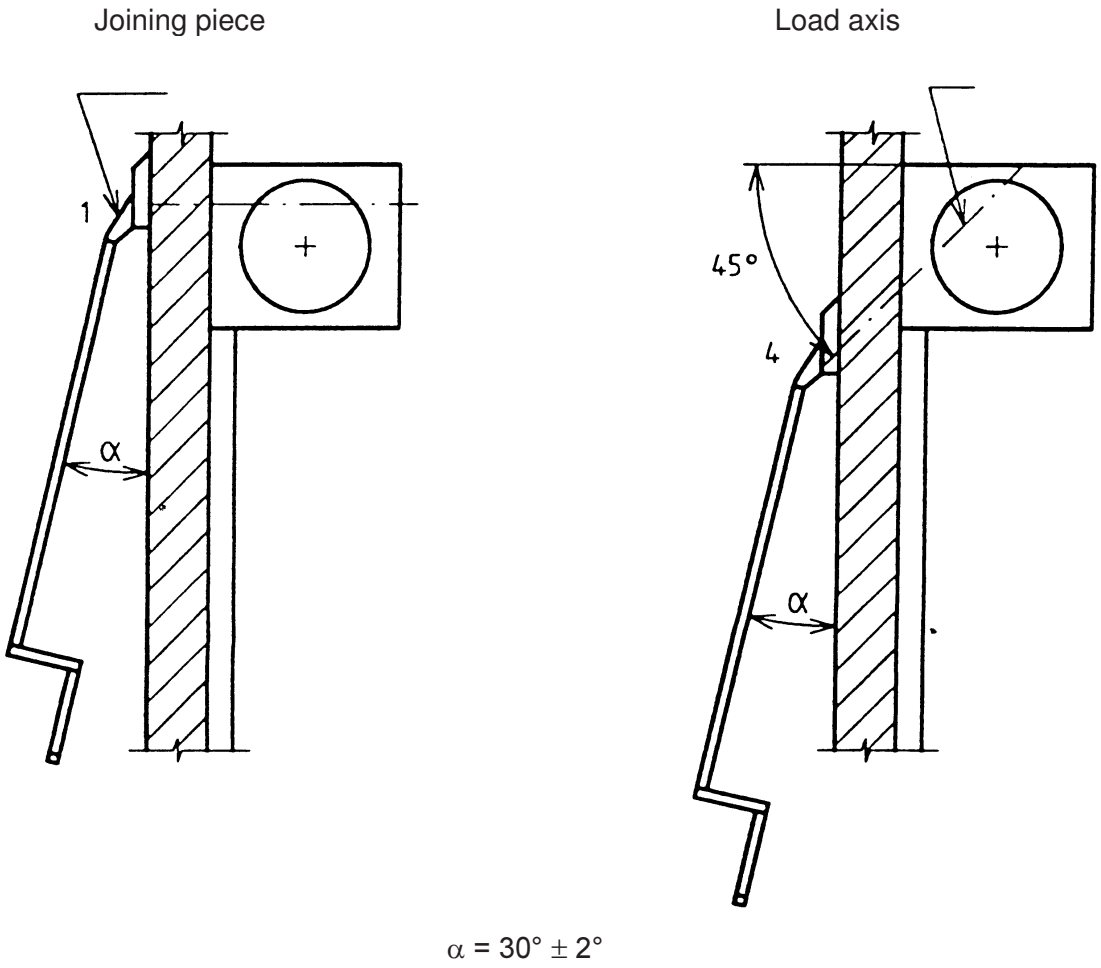


Figure 6: **Position 1 & 4 under test with T.O. -**
Illustration shows a roller shutter with external roll up

The test is carried out as follows:

- **Effort on extension**: with the curtain retracted, the torque is applied in the direction of extension.

The maximum torque applied to commence the mouvement and throughout the extension process is recorded.

- **Effort on retraction**: with the curtain extended, unlocked if necessary, the torque is applied in the direction of retraction.

The maximum torque applied to commence the mouvement and throughout the retraction process is recorded and in the case of folding arm or trellis awnings, the maximum torque to unlock the arms is also recorded.

The test is repeated twice.

5.2.4 Expression of results

The maximum torque values on extension and retraction are the mean values of the three tests.

Note the operating torque as the greatest torque of the two mean values and, in the case of folding arm or trellis arm awning, the mean value of the torque to unlock the arms.

From the maximum torque value *M*, one determines the operating force *F*, expressed in newtons, for the gear handle *R* provided for by the manufacturer.

$$F = \frac{M}{R} \qquad [N]$$

5.3 Direct operation (hand or rod)

5.3.1 Equipment

The test equipment is a function of the four types of movement identified as the following (see figure 7):

- product H: horizontal product with horizontal extension;
- product V: vertical product with vertical extension;
- product S: vertical product with horizontal extension;
- product P: vertical product pivoting around a vertical axis.

Note: **1)** H and V apply to roller blinds/shutters

2) Products which combine several movements will be submitted to each of the tests concerned.

The forces are applied using a dynamometer, 3% accuracy:

- for products H,L,V parallel to the position of the curtain (see figures 7a to 7c);

- for product P (see figure 7d):

  - on extension, at an angle of 10 degrees (see figure 8a);

  - on retraction, perpendicular to the plane of the curtain on the panel adjacent to the joint cover (see figure 8b).

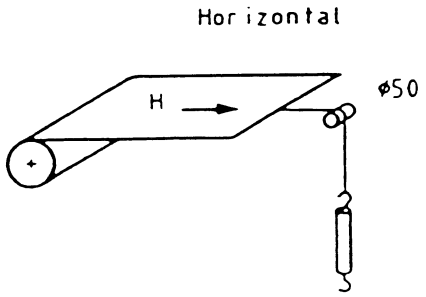


Figure 7a

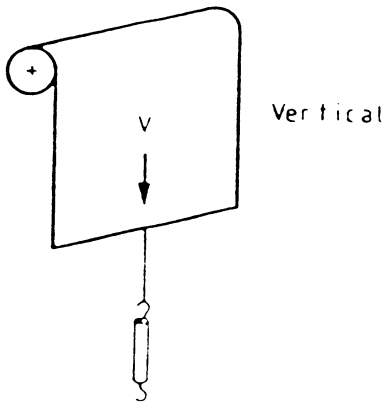


Figure 7b

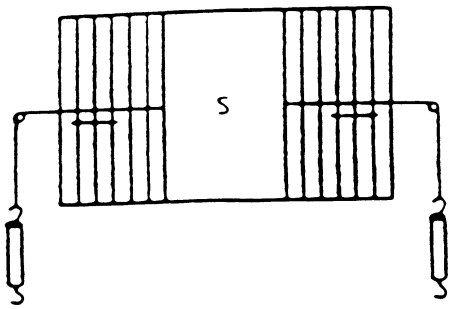


Figure 7c

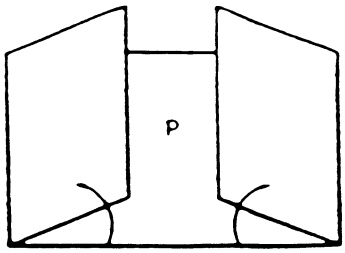


Figure 7d

Figure 7: **Test arrangement according to the types of movement V,H,S & P**

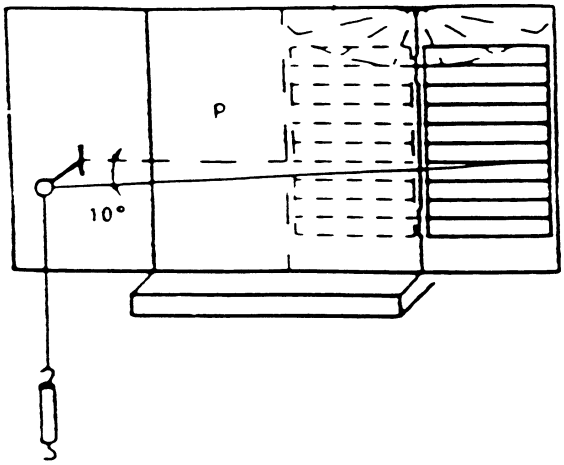


Figure 8a: **Force required for extension (shutter retracted)**

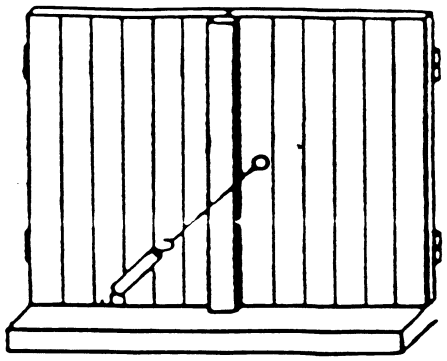


Figure 8b: **Force required for retraction (shutter extended)**

Figure 8: **Test arrangement for type P**

5.3.2 Test

- **effort on extension**: with the curtain fully retracted, the force is applied according to the principle in figure 7a or 8a.

The maximum force applied throughout its movement to the fully extended position is recorded.

- **effort on retraction**: with the curtain fully extended, the force is applied according to the principle in figure 7c or 8b.

The maximum force applied throughout its movement to the fully retraction position is recorded.

The test is repeated twice.

5.3.3 Expression of results

Note the maximal force on extension and retraction as the mean values of the three tests. The value of the operating force is the greater of these two mean values.

6 MEASUREMENT OF FORCE OF TILTING LATHS

- For monocommand systems, the test of measurement of force of tilting laths is carried out with the test on moving the curtain.

- In other cases, the force of tilting laths is measured according to the test methods described previously as a function of the type of mechanism used.

A full cycle of opening/closing the laths must be carried out in the limits of movement allowed as illustrated in figure 9.

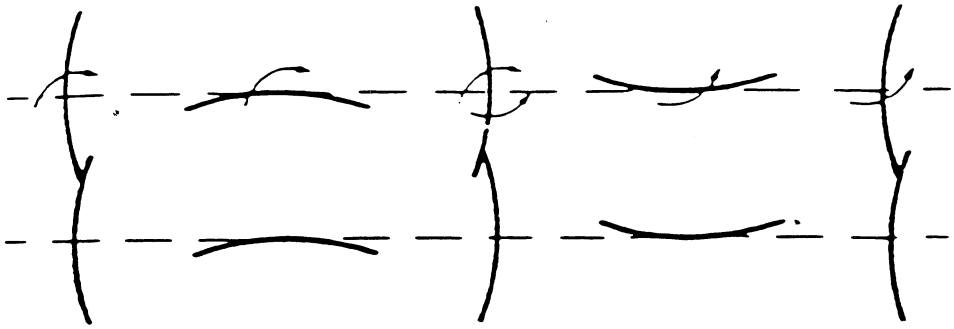


Figure 9: **Measure of the effort of tilting laths - completion of a cycle**

- For knob or tilting rod

A torque wrench is substituted for the knob or attached to the rod.

- For handle

The axis of the handle is replaced by an axis which has a pulley of radius *r*, with teeth allowing the handle to be moved as illustrated in figure 10 under the action of the appropriate load *P* in one direction and then in the other.

l being the length of the handle, the operating force is given by:

$$F_M = \frac{P\,x\,r}{l}$$

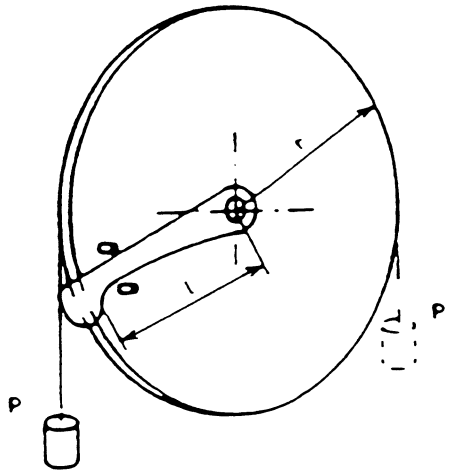


Figure 10: **Measurement of operating force of a handle**

The test is repeated twice.

The value of force tilting laths is the mean value of the three maximal forces recorded.

7 MEASUREMENT OF FORCE FOR THE PROJECTION OF PROJECTING CURTAINS

7.1 Projection

The force required to project the curtain is applied to the middle of the final lath using a return pulley so that in its final position (where the force is at its greatest) the suspension cord is perpendicular to the plane of the curtain as illustrated in figure 11.

The test is repeate twice. The force for the projection is the average of the three values recorded.

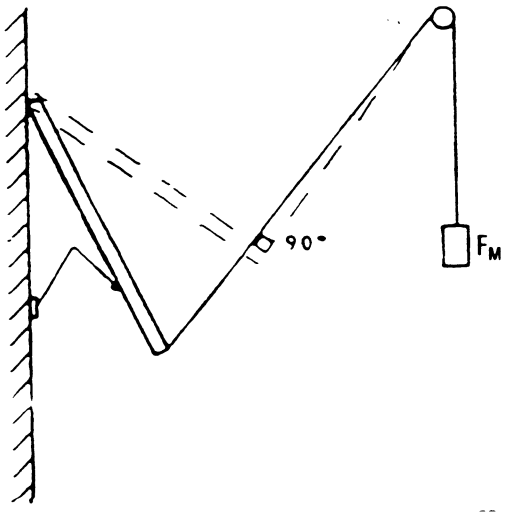


Figure 11: **Projecting curtain - measurement of projection effort - principle of test**

7.2 Unlocking of arms

The load required to unlock the arms is applied to one and then the other arm at the level of central articulation using return pulleys as illustrated in figure 12.

The test is repeated twice. The unlocking force is the highest of the two mean values obtained.

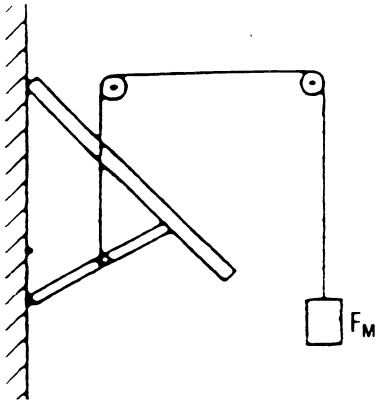


Figure 12: **Projecting curtain - Measurement of force of unlocking arms Principle of test**

8 TEST REPORT

The test report contains the following information:

a) the name and address of testing laboratory and location where the test was carried out when different from the address of testing laboratory;
b) the number, title and date of issue of this standard;
c) unique identification of the report and of each page, and total number of pages of the report;
d) name and address of client;
e) date of test;
f) details of the test method and any deviation from this standard;
g) all necessary details to identify the blind or shutter;
h) all relevant details concerning the type, specified dimensions, materials, form and construction of the blind or shutter, and its conformity with drawings provided by the manufacturer;
i) full details of the test specimen's hardware and their fittings and fixings;
j) product's dimensional specifications (width, height, surface area, angles of slope...) - positions of possible operations;
k) dimensions of the product tested;
l) the type or types of operation tested together with the positions tested;
m)the value of the operating force and the class thus obtained, the value of the maximum torque in the case of gear and handle operation;
n) should the case arise:
- the value of operating force or torque required to tilt the laths and the class obtained;
- the value of operating force required to project the curtain;

o) other specific tests carried out.

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London
W4 4AL