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Building hardware — Hardware for sliding doors and folding doors — Requirements and test methods

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National foreword

This British Standard is the UK implementation of EN 1527:2013. It supersedes BS EN 1527:1998, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/538/4, Building hardware.

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

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Foreword

This document (EN 1527:2013) 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of an identical text or by endorsement, at the latest by July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

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 1527:1998.

A full contribution to the preparation of this document has been made by the European manufacturer's organisation "ARGE".

This document is part of a group of European Standards dedicated to building hardware products.

The main changes in this draft as compared with EN 1527:1998 are as follows:

— identification of grades for fire resistance (4^{th} digit) in 4.5;

— grade identified for the safety (5^{th} digit) in 4.6.

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1 Scope

This European Standard specifies requirements for the manual design system sliding doors and folding doors of the bi-fold type and multi-panel folding doors but excluding doors and panels. Cycle tests, static load, initial friction and corrosion resistance tests are included for fittings and track only.

This document covers door gear for all industrial and residential sliding doors and folding doors.

This document does not cover sliding corner doors and light bottom sliding doors.

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 1670, *Building hardware — Corrosion resistance — Requirements and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
aligner
fittings which retain a folding door in a flat and aligned closed position (see Figure 1)

3.2
bottom guide
fitting which, with a bottom guide channel, controls the lateral movement of a sliding or folding top hanging door

3.3
bottom guide channel
channel section fitted either to the base of a structure or the bottom edge of a door to accommodate the bottom guide

3.4
bottom pivot
axis fitted to the bottom of a folding door which turns in a bottom pivot socket (see Figure 1)

3.5
bottom pivot socket
fixed component in which the bottom pivot of a folding door is located (see Figure 1)

3.6
bottom track
track fixed to the base of a structure or floor, on which bottom rollers run

3.7
bottom roller
fitting attached to the bottom of a door which allows it to run on a bottom rail

3.8
folding door, bi-fold type
door formed by two panels connected by hinges and operating on pivots running in a top track with guide

3.9
heavy sliding door, bottom rolling
door of mass 100 kg or more with bottom rollers running on a bottom track fixed to the base of the structure or floor, and with a top guide

3.10
heavy sliding door, top hanging
door of mass 100 kg or more which is suspended by top hangers running in a top track fixed to an overhead structural component, and with a bottom guide

3.11
hinges
fittings connecting two panels of a folding door (see Figure 1)

3.12
light sliding door, top hanging
door of mass less than 100 kg which is suspended by top hangers running in a top track fixed to an overhead structural component, and with a bottom guide

3.13
multi-panel folding door
door formed by two or more panels connected by hinges and suspended by top hangers running in a top track fixed to an overhead structural component, or running on bottom rollers with a top guide in a top track

3.14
stop
fitting used to stop a sliding door at the end of its run

3.15
test cycle
all operations from the closed position, to open the test door to the required position and close it again to the closed position

3.16
top bracket
support used to carry a top track and secure it to the structure of a building

Note 1 to entry: Brackets can be side-wall fixing or ceiling fixing, adjustable or non-adjustable.

3.17
top guide
fitting which, with a top guide track, controls the lateral movement of a bottom rolling sliding door

3.18
top guide track
track fixed to the top of the structure in which a top guide runs

3.19
top hanger
roller fixed to a top hanging sliding door which allows it to move laterally

3.20
top pivot
axis fitted to the top of a folding door which turns in a top pivot socket (see Figure 1)

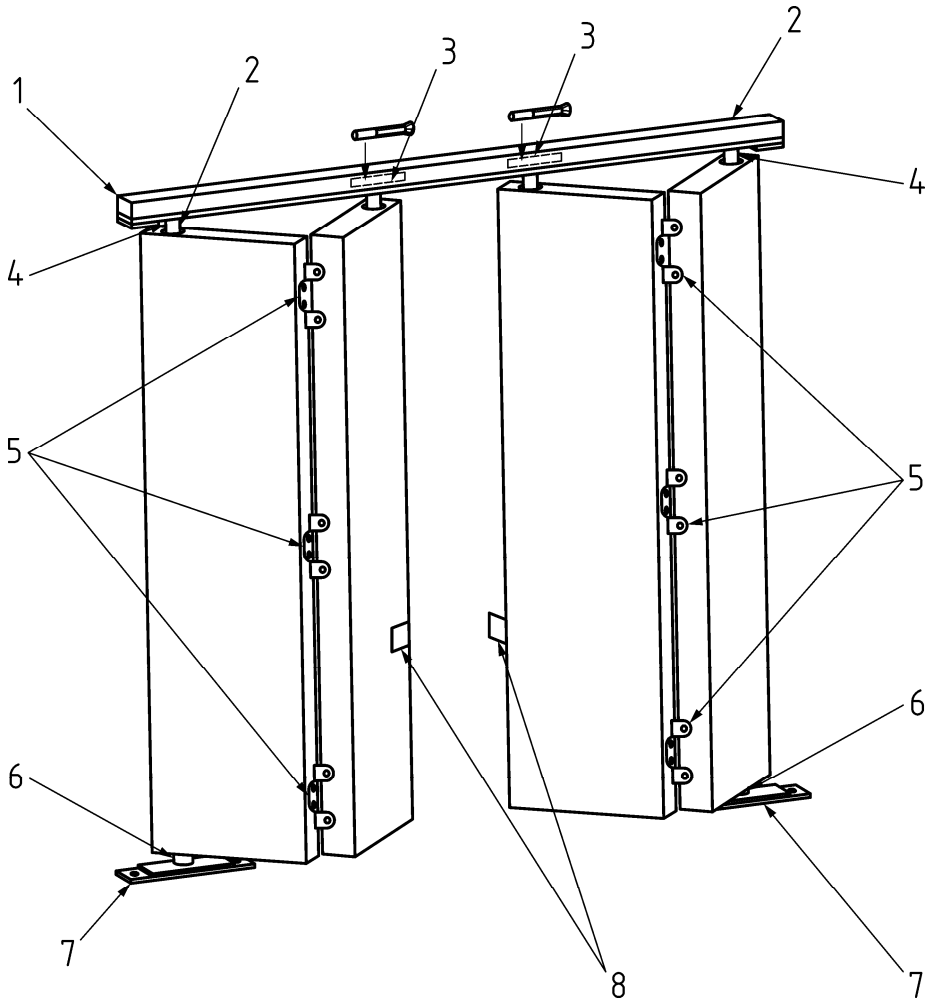
3.21
top pivot socket
fixed component in which the top pivot is located (see Figure 1)

3.22
top track
tubular section which carries the hangers of sliding and folding top hanging doors (see Figure 1)

3.23
design system
collection of components from which a "kit" may be created for subsequent installation in the works

Note 1 to entry: A "design system" can, for example, be presented in a supplier's catalogue, from which the purchaser/specifier can make a choice.

Note 2 to entry: A "design system" can give rise to one or many different "kits" (i.e. construction products, defined below). A "design system" cannot be a construction product, because it is possible only to buy one "kit" at a time from the "system"; the "system" itself cannot be bought.



Key

1 track
2 top pivot socket
3 sliders
4 top pivots
5 hinges
6 bottom pivots
7 bottom pivot sockets
8 aligners

Figure 1 — Definitions

4 Classification

4.1 General

For the purposes of this document, sliding doors and folding doors and their fittings shall be classified according to the nine digit coding system described in 4.2 to 4.10

4.2 Category of use (1st digit)

No grade identified for these products.

4.3 Durability (2nd digit)

Six grades of durability are identified for door fittings:

— grade 1 = 5 000 test cycles;

— grade 2 = 10 000 test cycles;

— grade 3 = 25 000 test cycles;

— grade 4 = 50 000 test cycles;

— grade 5 = 75 000 test cycles;

— grade 6 = 100 000 test cycles.

4.4 Door mass (3rd digit)

Four grades are identified for door mass:

— grade 1 = door up to 50 kg;

— grade 2 = door from 51 kg to 100 kg;

— grade 3 = door from 101 kg to 330 kg;

— grade 4 = door over 330 kg.

4.5 Fire resistance (4th digit)

No grade identified for these products.

4.6 Safety (5th digit)

All sliding design systems and sliding folding design systems conforming to this standard shall be classified as grade 1 for safety.

4.7 Corrosion resistance (6th digit)

Products are classified from 1 to 5 according to the six grades defined in EN 1670.

Grade 0 is for products not tested.

4.8 Security (7th digit)

No grade identified for these products.

4.9 Category of door (8th digit)

Three grades are identified:

— grade 1 = sliding door;

— grade 2 = folding door (bi-fold type);

— grade 3 = multi-panel folding door.

4.10 Initial friction maximum permitted value (9th digit)

Three grades are identified, as shown in Table 1.

Table 1 — Initial friction maximum permitted value

Door mass	From 0 kg to 50 kg	From 51 kg to 100 kg	From 101 kg to 330 kg	Over 330 kg
Grade 1	50 N	80 N	100 N	5 % of the mass
Grade 2	40 N	60 N	5 % of the mass	4 % of the mass
Grade 3	30 N	40 N	4 % of the mass	3 % of the mass

4.11 Example of classification

---	3	2	**---**	**1**	0	**---**	1	2

This denotes a sliding door with a mass between 51 kg and 100 kg, of which initial friction is equal or less than 60 N, tested to 25 000 cycles, classified as grade 1 for safety and not tested for corrosion resistance.

5 Requirements

5.1 Criteria for assessing performances

Performance and finishing requirements for sliding doors and folding door fittings shall be assessed according to:

— static load capacity;

— effort required to overcome initial friction;

— durability of fittings;

— smoothness of operation (bi-fold doors);

— ability to maintain adjustments (bi-fold doors);

— corrosion resistance.

A sample tested according to this document is considered acceptable if it meets the performance requirements stated in this document.

5.2 General

Each test panel shall be made in order to meet the following requirements for:

— Static load test: two times rating of the hangers or bottom rollers;

— Initial friction test: mass of the door shall be in accordance with the manufacturer's specifications for hangers or bottom rollers;

— Durability test: mass of the door shall be in accordance with the manufacturer's specifications for hangers or bottom rollers.

Throughout the durability test, all parts shall remain in serviceable condition and shall not require any adjustment. Fittings shall satisfy the requirements of the initial friction test before and after the durability test.

Each hanger shall be supplied with assembly accessories and shall be supplied "ready to be mounted" with the mechanism oiled inside.

5.3 Performance requirements for sliding doors and folding door fittings

Sliding doors and folding door fittings shall meet the performance requirements given in Table 2.

Table 2 — Performance requirements for sliding and sliding and folding door fittings

Test Type of door	Static load test	Initial friction test	Durability test	Smoothness test	Ability to maintain adjustments test	Fire resistance test	Corrosion resistance test
Heavy sliding doors, top hanging	6.3.1.1.1	6.3.1.1.2 Grade 1 to 3	6.3.1.1.3 Grade 3 to 6			No Grade	6.3.2 Grade 2
Heavy sliding doors, bottom rolling		6.3.1.2.1 Grade 1 to 3	6.3.1.2.2 Grade 3 to 6			No Grade	6.3.2 Grade 2
Light sliding doors, top hanging	6.3.1.3.1	6.3.1.3.2 Grade 1 to 3	6.3.1.3.3 Grade 3 to 6			No Grade	6.3.2 Grade 2
Folding doors, bi-fold type		6.3.1.4.2 Grade 1 to 3	6.3.1.4.3 Grade 1 to 3	6.3.1.4.1	6.3.1.4.4		6.3.2 Grade 2
Multi-panel folding doors			6.3.1.5 Grade 1 to 3				6.3.2 Grade 2 for external doors Grade 1 for internal doors
Brackets and fixing accessories							6.3.2 Grade 2 for external doors Grade 1 for internal doors
NOTE This table is in accordance with the classification described in Clause 4.							

6 Test methods

6.1 Test apparatus

6.1.1 Preparation of the test frame

The frame shall be structurally sound and constructed according to the sizes given in 6.2.1. It shall be braced to prevent any movement of the test structure. Where fitted, the jambs of the frame shall be plumb, parallel and at right angles to the transom.

The threshold shall be level and shall not interfere with the operation of the test panel.

The transom shall be suitable for the door widths and mass required, and can be replaceable.

The fixed part which supports the track or top guide shall be straight and level within 1 % of the frame width.

A suitable base, satisfying the manufacturer's requirements shall be provided for testing the bottom roller of the design system.

6.1.2 Test apparatus

The test apparatus shall include:

— an accurate scale for mass measurement;

— hand tools as required for fixing fittings and hangers;

— weights;

— actuators for operating doors;

— a cycle counter.

6.2 Preparation and installation of the fittings for tests

6.2.1 Preparation of the test panels

For light doors (≤ 100 kg) the test panel size shall be 2 m high by 0,80 m wide.

For heavy doors (> 100 kg) the test panel size shall be 2 m high by 2 m wide.

For bi-fold folding doors, the test panels size shall be 2 m high by 0,50 m wide.

For multi-panel folding doors, the test panels size shall be 2 m high by 0,75 m wide.

The weights shall be added to locate the centre of gravity at the geometrical centre of the panel and they shall be firmly attached to prevent any movement as the panel opens and closes.

NOTE For the purpose of testing, a panel can be a skeleton frame, weighted as required, to test door fittings of different capacities.

These panels shall meet the general requirements of 5.2.

6.2.2 Installation of the fittings

6.2.2.1 Top hung sliding door and multi-panel folding door

Install the top track and brackets in the frame in a horizontal position and in accordance with the manufacturer's instructions.

Install the panel in the opening and make any necessary adjustments to ensure free movement. Provide a guide to the bottom of the panel to maintain it in a vertical position.

NOTE During the test, lubricants can be applied as recommended in the manufacturer's maintenance instructions.

6.2.2.2 Bottom rolling sliding door

Install the bottom track in the frame in a horizontal position and in accordance with the manufacturer's instructions.

Install the top guide track and the top guide in accordance with the manufacturer's instructions.

Install the panel in the opening and make any necessary adjustments to ensure free movement.

NOTE During the test, lubricants can be applied as recommended by the manufacturer's maintenance instructions.

6.2.2.3 Folding door (bi-folding type)

Install the fittings, according to the manufacturer's instructions using only the fasteners furnished with the set.

Assemble the door panels and install the door in the frame, making any necessary adjustments to ensure free movement, all in accordance with the manufacturer's fixing instructions.

Mark the pivot in such a way that any vertical movement can be easily identified and recorded.

Install the aligner in the position specified by the manufacturer, if supplied.

NOTE During the test, lubricants can be applied as recommended by the manufacturer's maintenance instructions.

6.3 Test methods

6.3.1 Performance tests

6.3.1.1 Heavy sliding doors, top hanging

6.3.1.1.1 Static load test

Install the top track with brackets spaced along the track according to the manufacturer's recommended spacing.

The static load test shall consist of two parts:

— one test with a hanger located midway between two brackets;

— the other test with that hanger located directly under a bracket.

The hangers, track and brackets shall resist, without permanent deformation, a static load equal to twice their maximum rated capacity for a period of not less than 10 min (see Figure 2).

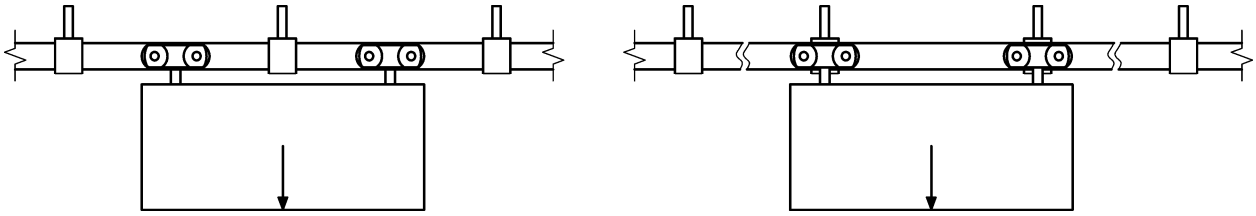
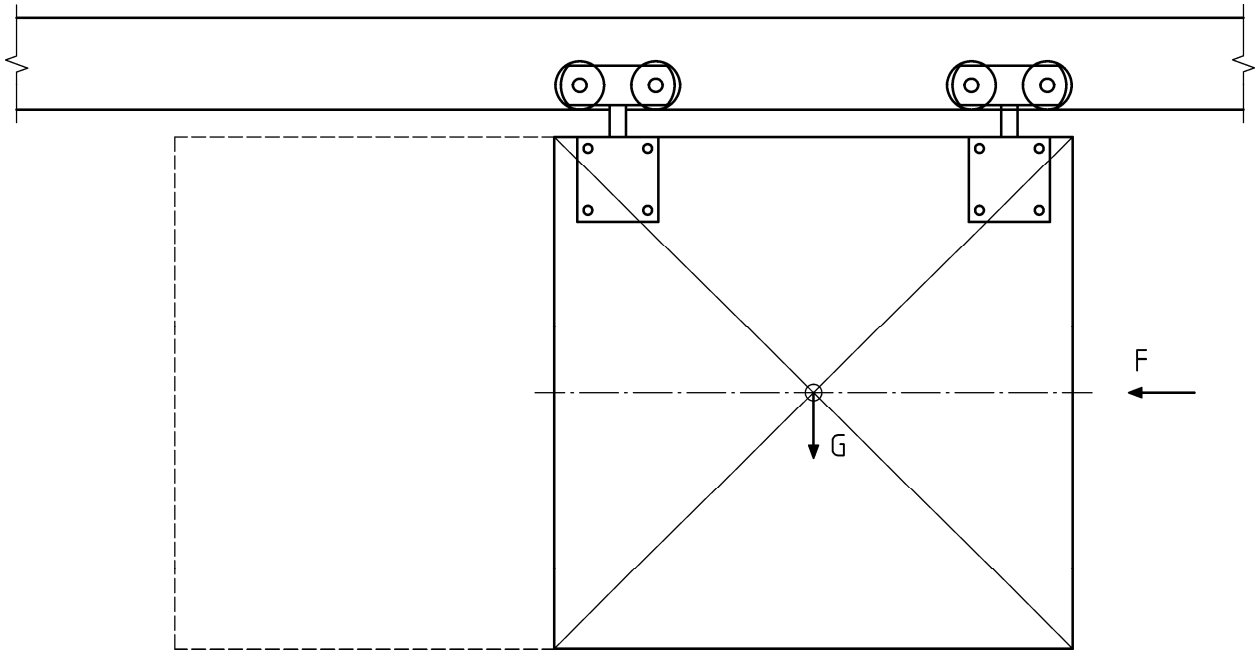


Figure 2 — Static load test

6.3.1.1.2 Initial friction test

The point of force application shall be in accordance with Figure 3. The panel shall be weighted to its maximum mass (i.e. in accordance with the manufacturer's specifications).

Using a force gauge, determine the force required to start the movement of the panel being tested when hangers are midway between track supports.



Key

F Force

G Gravity

Figure 3 — Point of force application

The average of three tests in each direction (total six) shall be the initial friction. The initial friction shall conform to the values given in 4.10.

6.3.1.1.3 Durability test

Install the fittings on the test panel as shown in Figure 3. The panel mass shall be in accordance with the manufacturer's recommended capacity. The panel shall automatically traverse the test frame at a frequency not exceeding five cycles per minute.

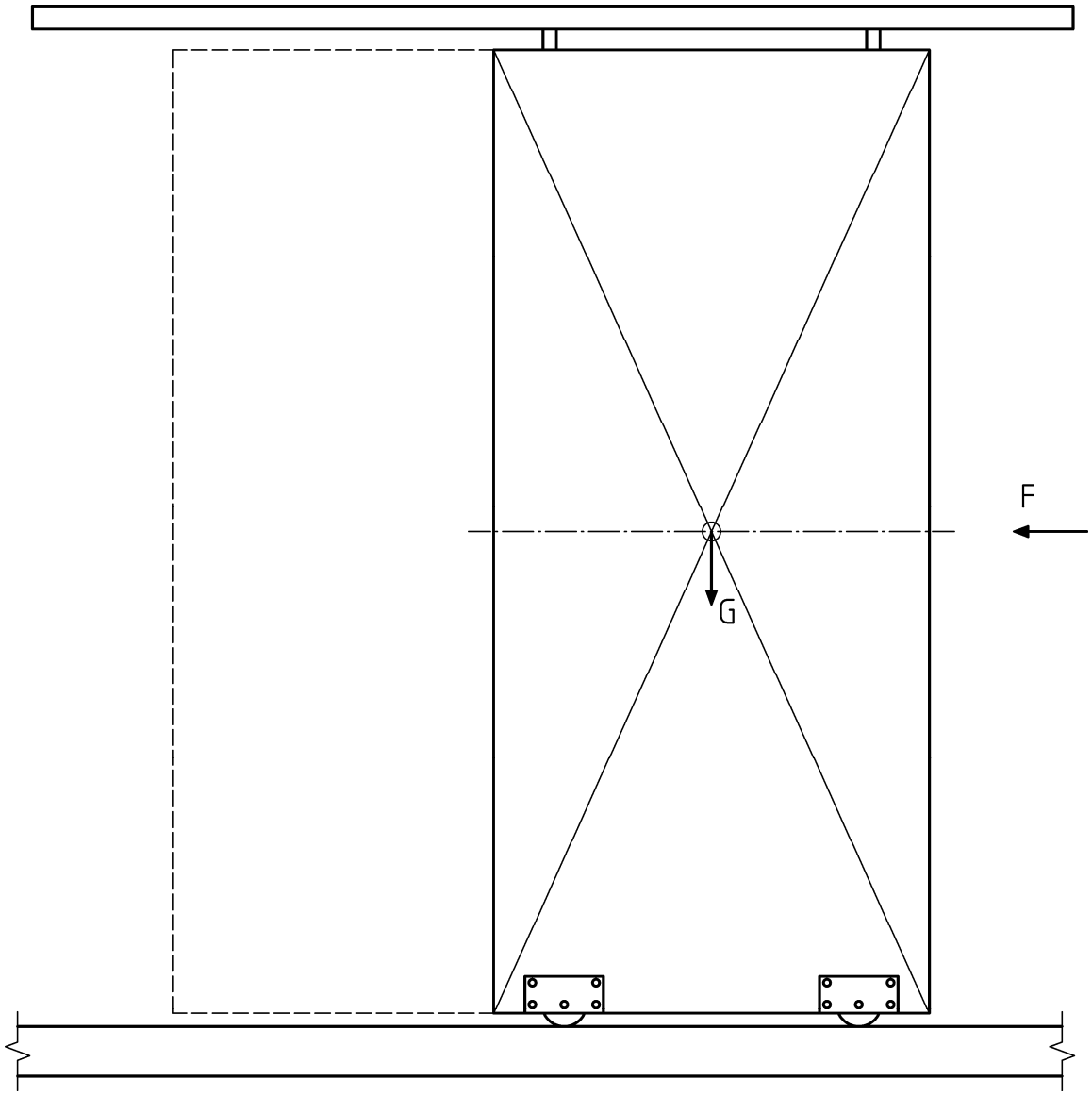
6.3.1.2 Heavy sliding doors, bottom rolling

6.3.1.2.1 Initial friction test

The point of force application shall be in accordance with Figure 4. The panel shall be weighted to its maximum mass (i.e. in accordance with the manufacturer's specifications).

Using a force gauge, determine the force required to start the movement of the panel being tested.

The average of three tests in each direction (total six) shall be the initial friction. The initial friction shall be in conformity with the values given in 4.10.



Key

F Force

G Gravity

Figure 4 — Point of force application

6.3.1.2.2 Durability test

Install the fittings on the test panel as shown in Figure 4. The panel mass shall be in accordance with the manufacturer's recommended capacity. The panel shall automatically traverse the test frame at a frequency not exceeding five cycles per minute.

6.3.1.3 Light sliding doors, top hanging

6.3.1.3.1 Static load test

The doors shall be static load tested in accordance with 6.3.1.1.1.

6.3.1.3.2 Initial friction test

Using force gauge at 1 000 mm from bottom of the panel, determine the maximum force required to start movement of each panel being tested in each direction.

Initial friction shall conform to the values given in 4.10.

6.3.1.3.3 Durability test

Install the door actuator in such a manner that it will completely open and close the panel at least five times, but not more than seven times per minute, with a maximum dwell of one second at the open and closed positions (see Figure 5). The actuator shall engage the panel at a point 1 000 mm from the bottom of the panel and 40 mm from the edge.

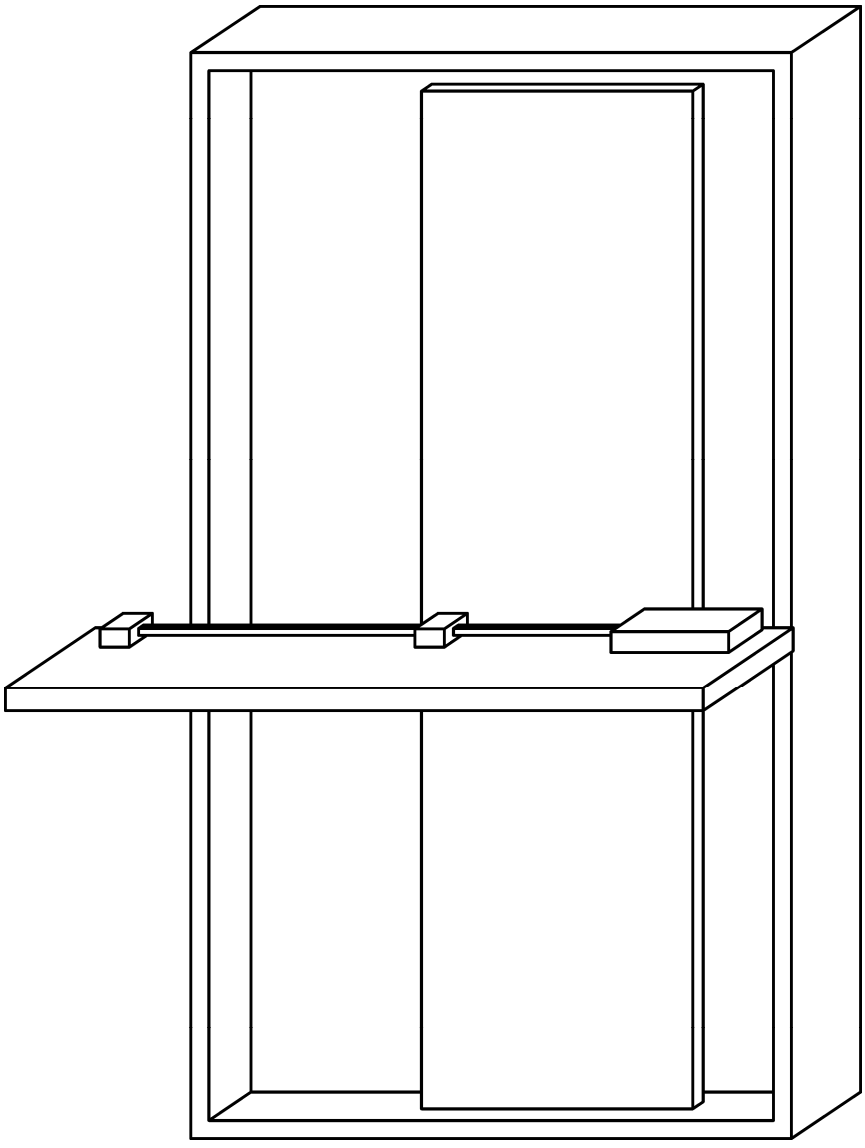


Figure 5 — Durability test — Actuator

6.3.1.4 Folding doors, bi-fold type

6.3.1.4.1 Smoothness test

Insert a screw eye mark at the point recommended by the manufacturer for the location of the knob. Open the panels. Using a force gauge hooked in the screw eye, push or pull the panels as slowly as possible until the forward edge of the lead panel is within 50 mm of the fully closed position. Record the force required.

Using the force gauge, slowly move the panel to the open position. Record the force required.

The panels shall glide smoothly with no discernible "Stop-Go" action or chatter. The force gauge reading shall not vary more than 9 N whilst the panels are in motion in either direction.

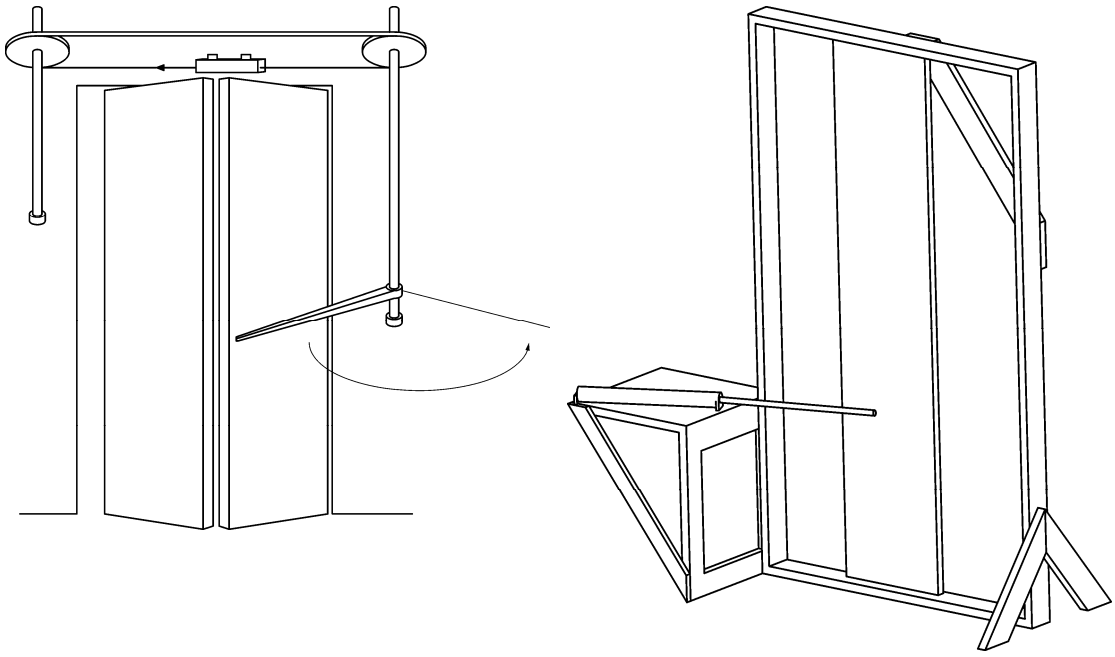


Figure 6 — Durability test

6.3.1.4.2 Initial friction test

Use the same test apparatus as for 6.3.1.4.1.

Open and close the doors with the force gauge hooked in the screw eye. Record the initial maximum force required to open and close the panels until the forward edge of the lead panel is within 50 mm from the fully closed position and open until the pivot panel is about 80° to the track.

Initial friction shall conform to the values given in 4.10.

6.3.1.4.3 Durability test (see Figure 6)

Attach a mechanical device in such a manner that it will open the pivot panel to 80° and close the panel until the forward edge of the lead panel is within 50 mm of the fully closed position. The frequency shall be at least five times but not more than seven times per minute.

The actuator should attach to, or engage with, the panel at the point the manufacturer recommends for the location of the knob.

6.3.1.4.4 Ability to maintain adjustment test

At the end of 6.3.1.4.3, remove the panels and accurately measure the bottom pivot extension (if adjustable) of the panels being tested and check the marks. Record any changes.

Check the clearance of the slider and the pivot.

The bottom pivot and the top pivot socket shall not have moved during the test.

6.3.1.5 Multi-panel folding doors - Durability test

Install a four panel assembly (see Figure 7). Each panel shall be to the manufacturer's maximum stated mass capacity.

Panel movement shall be between open and partially closed where the angle between any two adjacent door panels is between 110° and 120° during the test.

The actuator movement shall be designed to prevent undue lateral loads on the fittings.

Test cycles shall be run not less than one cycle or more than two cycles per minute.

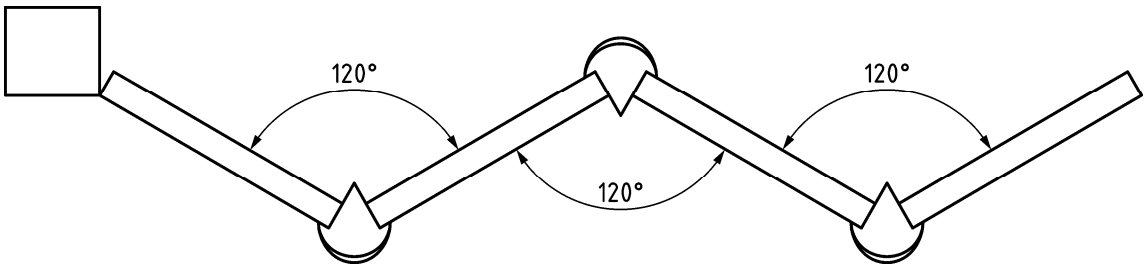


Figure 7 — Example of four panel assembly

6.3.2 Corrosion resistance test

The sliding doors and sliding folding doors fittings shall be corrosion resistance tested in accordance with EN 1670.

7 Interchangeability

Only interchangeability of a complete design system is permitted.

8 Obligations of the manufacturer

All instructions shall be communicated in the brochures, catalogues or technical documents accompanying the product, in order to permit safe exchange of components during repair or maintenance operations.

9 Marking

Hangers manufactured in accordance with this document shall display a readily identifiable mark. Where this is not possible, the mark shall appear on the packaging.

A mark according to the classification of Clause 4 can be also indicated as follows:

1	2	3	4	5	6	7	8	9

where

digit 1 is the category of use, no grade identified ;

digit 2 is the durability, grades 1 to 6 ;

digit 3 is the door mass, grades 1 to 4 ;

digit 4 is the fire resistance, no grade identified ;

digit 5 is the safety, grade 1 ;

digit 6 is the corrosion resistance, grades 0 to 5 ;

digit 7 is the security, no grade identified ;

digit 8 is the category of door, grades 1 to 3 ;

digit 9 is the initial friction, grades 1 to 3 ;

See the example proposed in 4.11.

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