BRITISH STANDARD

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Building hardware — Requirements and test methods for windows and doors height windows —

Part 16: Hardware for Lift&Slide windows and doors

ICS 91.190

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British Standards

National foreword

This British Standard is the UK implementation of EN 13126-16:2008. It supersedes DD CEN/TS 13126-16:2004 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee B/538, Doors, windows, shutters, hardware and curtain walling, to Subcommittee B/538/4, Building hardware.

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.

Compliance with a British Standard cannot confer immunity from legal obligations.

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This European Standard was approved by CEN on 5 December 2007.

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Foreword

This document (EN 13126-16:2008) has been prepared by Technical Committee CEN/TC 33 “Doors, windows, shutters, building hardware and curtain walling”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2008, and conflicting national standards shall be withdrawn at the latest by July 2008.

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 CEN/TS 13126-16:2004.

A full contribution to the preparation of this European Standard has been made by the European manufacturer’s organisation ‘ARGE’ and National Standards institutions.

This European Standard is one of a series of European Standards dedicated to building hardware products. It is divided into seventeen parts to incorporate all types of windows and door height windows.

Informative Annex A of EN 13126-1:2006 depicts the “list of parts and titles and their reference to the relevant window types” of the seventeen parts of this European Standard.

Normative Annex B of EN 13126-1:2006 gives schedules of the elements of components used on the 21 types of window opening functions.

Normative and informative annexes to all parts of this European Standard are indicated in the content of the several parts.

The performance tests incorporated in this standard are considered to be reproducible and as such will provide a consistent and objective assessment of the performance of these products throughout CEN Member States.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

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

1 Scope

This part of EN 13126 provides requirements and test methods for durability, strength, security and function of hardware for Lift&Slide windows and door height windows, regardless of whether the hardware enables an additional tilt position.

NOTE This Standard is also applicable to hardware systems, whereby the sash itself is not lifted but a gasket mechanism is moved.

2 Normative references

The following referenced documents are indispensable for the application of this document. 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*

EN 12519:2004*, Windows and pedestrian doors – Terminology*

EN 13126-1:2006, *Building hardware - Requirements and test methods for windows and doors height windows - Part 1: Requirements common to all types of hardware*

ISO 4520, *Chromate conversion coatings on electroplated zinc and cadmium coatings*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13126-1:2006 and EN 12519:2004 and the following apply.

NOTE The following terms and definitions apply to Lift&Slide windows and door height windows made of timber, PVC-U, aluminium or steel and their appropriate material combinations.

3.1
roller
assembly of one or more rolls in a single or multiple casing which supports Lift&Slide windows and door height windows. These may be aligned in a straight line or rotate about an axis for Lift&Slide windows and door height windows. Otherwise known as a bogey

3.2
roll
singular wheel in a roller

3.3
lateral guide
hardware component which guides the lateral movement of the Lift&Slide windows and door height windows

3.4
guide track
track fixed on the top (top guide track) or bottom (bottom guide track) which enables a lateral guide to run

3.5
rail
rail fixed on the top (top rail) or bottom (bottom rail) which enables the rollers to run

3.6
positive control
sash operation via the hardware which enables the sash to be moved from the closed position into the tilted position, and from the tilted position into the closed position

NOTE The sliding position can also be reached by means of operating the hardware.

3.7
locked closed position
position in which the active sash is in the lowered position, the espagnolette side rests up against the frame, and the hardware is locked

3.8
lifting action
action in which the active sash is raised from the lowered position into the lifted position via the hardware

NOTE During this action the sash can be moved a limited distance away from the frame in the direction of the opening position.

3.9
closed position
position in which the active sash is forced into the raised position by the lifting action, and the hardware is unlocked

3.10
tilted position
position in which the rollers on the bottom of the active sash rest on the roller track. The top area is held in the final tilt position by means of the projecting mechanisms

3.11
sliding position
position in which the active sash is lifted, so that it can be moved in-line

3.12
opening position
position in which the active sash is at the end of the sliding position (the largest possible opening width)

4 Classification

4.1 General

The classification of hardware for Lift&Slide windows and door height windows shall be in accordance with the requirements of clause 4 EN 13126-1:2006.

4.2 Category of use (1 – first digit)

No marking is required for the category of use in accordance with 4.2 of EN 13126-1:2006.

4.3 Durability (2 – second digit)

Grades shall be in accordance with 4.3 of EN 13126-1:2006.

4.4 Mass (3 – third digit)

Grades shall be in accordance with 4.4 of EN 13126-1:2006.

4.5 Fire resistance (4 – fourth digit)

One grade shall be identified in accordance with 4.5 of EN 13126-1:2006.

— grade 0: no requirements.

4.6 Safety in use (5 – fifth digit)

One grade is identified in accordance with 4.6 of EN 13126-1:2006.

— grade 1: The hardware shall conform to the requirements of part 1 and part 16 of this standard.

4.7 Corrosion resistance (6 – sixth digit)

Grades shall conform to EN 1670, whereby grade 3 is the minimum requirement.

4.8 Security (7 – seventh digit)

No marking is required for the category of security in accordance with 4.8 of EN 13126-1:2006.

4.9 Application (8 – eighth digit)

The eighth digit shows “16” indicating the part of the standard which was used for testing the hardware for Lift&Slide windows and door height windows in accordance with 4.9 of EN 13126-1:2006.

4.10 Test Sizes (9 – ninth digit)

The ninth digit shows the test sizes (active sash) in accordance with 4.10 of EN 13126-1:2006 as follows:

S.W.[1)] in mm / S.H.[2)] in mm – tolerance ± 5 mm.

— 1 200 mm S.W[1)] x 2 000 mm S.H[2)]

The stated sizes are test sizes only. They do not relate to the maximum or minimum sizes to which a window may be fabricated.

NOTE 1 The manufacturer’s product-documentation should advise that in daily use windows, smaller or larger than those tested, should not be subjected to stronger forces than those for the specified test size.

In the case of not being capable of manufacturing the specified test size due to the fact that the hardware field of application is smaller than these specified test sizes, smaller test sizes shall be used. In this case the window shall be tested in accordance with the largest possible S.W.[1)] (or S.H.[2)]) as specified by the hardware manufacturers appropriate documentation and a S.H.[2)] (or S.W.[1)]) in a ratio of 2 000/1 200 mm (factor ≈ 1,67).

NOTE 2 This means that if the specified test sizes are larger than those which can be manufactured, the test specimens shall be tested using the largest possible S.W.[1)] or S.H.[2)] in accordance with the manufacturer's documentation and using a S.H.[2)] to S.W.[1)] ratio of 2 000/1 200 mm (factor ≈ 1,67).

Example 1	largest possible S.W.[1)]	=	800 mm	=	S.W.[1)] of the test specimen
	800 mm X 2 000/1 200	=	1 333 mm		
	S.H.[2)]	=	1 333 mm	=	S.H.[2)] of the test specimen

Example 2 largest possible S.H.[1)] = 1 600 mm = S.H.[1)] of the test specimen

1 600 mm X 1 200/2 000 = 960 mm

S.W.[2)] = 960 mm = S.W.[2)] of the test specimen

[1)] S.W. = sash width

[2)] S.H. = sash height

NOTE 3 The missing dimensions in each case (S.H[1)] or S.W[2).]) should be calculated in accordance with example 1 or example 2 with the objective of establishing the maximum test-format, which lies within the hardware manufacturers application range.

4.11 Example of classification for hardware for Lift&Slide windows and doors

Table 1 – Example of classification for hardware for Lift&Slide windows and doors

1	2	3	4	5	6	7	8	9
-	**4**	**250**	**0**	**1**	**4**	**-**	**16**	**1 200 / 2 000**

This denotes hardware for Lift&Slide windows and door height windows, which have:

Digit 1 category of use - (no requirements)

Digit 2 durability grade 4 (15 000 cycles)

Digit 3 mass 250 kg

Digit 4 fire resistance grade 0 (no requirements)

Digit 5 safety in use grade 1

Digit 6 corrosion resistance grade 4

Digit 7 security - (no requirements)

Digit 8 applicable part tested according to part 16 of this standard

Digit 9 test sizes S.W.[1)] = 1 200 mm, S.H.[2)] = 2 000 mm

[1)] S.W. = sash width

[2)] S.H. = sash height

5 Requirements

5.1 General

Hardware for Lift&Slide windows and door height windows shall conform to clause 5 of EN 13126-1:2006.

5.2 Additional requirements

5.2.1 Handle operation tolerance

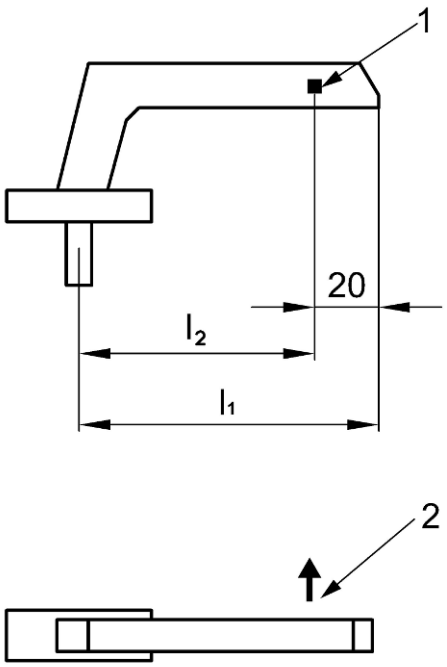
The maximum torque $T_{h,}$ which is the result of a force of 100 N applied at a distance of 20 mm from the end point of the handle, shall not be exceeded.

NOTE 1 The length of the handle used during the test or the length of the handle intended for the hardware set shown in the hardware manufacturer's documentation shall be recorded in the test report.

NOTE 2 The torque T_h resulting from the length of the used handle (key 3 in Figure 1 minus 20 mm) and the force of 100 N shall be calculated and recorded in the test report.

For example: length of the handle	=	250 mm	
operative length (key 4, Figure 1)	=	250 mm – 20 mm	= 230 mm
torque T_h = operative length X force F	=	230 mm X 100 N	= 23 Nm

Dimensions in millimetres



Key

1	location for the force
l_1	length of the handle
l_2	operative length
2	force F = 100 N

Figure 1 — Handle length

5.2.2 Sliding operation crash-tests

After the sliding operation crash, test in accordance with 7.4.1 and 7.4.2:

— active sash shall not drop and shall still be constrained by its fixings;

— active sash shall function correctly.

NOTE After the sliding operation crash-test all adjustment possibilities may be used to operate the sash.

5.2.3 Minimum closing device resistance

5.2.3.1 Hardware without tilt function

The closing device shall withstand a torque T_{hr}, which is the threefold torque T_h as calculated and recorded in accordance with 5.2.1.

For example:	length of the handle	= 220 mm	
	operative length (key 4, Figure 1)	= 220 mm – 20 mm	= 200 mm
	torque T_h = operative length X force F	= 200 mm X 100 N	= 20 Nm
	torque T_{hr} = 3 X T_h	= 3 X 20 Nm	= 60 Nm

NOTE Hardware with tilt function without positive control should also conform to this requirement.

Upon completion of the test in accordance with 7.5.1, the closing device shall operate.

5.2.3.2 Hardware with tilt function and with positive control

The hardware shall withstand a torque T_{hr}, which is the threefold torque T_h as calculated and recorded in accordance with 5.2.1.

For example:	length of the handle	= 220 mm	
	operative length (key 4, Figure 1)	= 220 mm – 20 mm	= 200 mm
	torque T_h = operative length X force F	= 200 mm X 100 N	= 20 Nm
	torque T_{hr} = 3 X T_h	= 3 X 20 Nm	= 60 Nm

Upon completion of the test in accordance with 7.5.2.1 and 7.5.2.2, the closing device shall operate.

5.2.4 Resistance to additional loading

After the additional loading test in accordance with 7.6 the active sash shall not drop and shall still be constrained by its fixings.

NOTE It is not necessary for the sash to operate during and after the additional loading test.

5.2.5 Static endurance test at ambient temperature

An additional endurance test at ambient temperature in accordance with 7.7 is required.

Before and upon completion of the endurance test in accordance with 7.7, no roll shall deviate by more than 0,5 % of its initial diameter.

6 Test equipment

6.1 General

The specimen shall be installed in a test rig for testing as specified in Figure A.1 in accordance with the manufacturer's fixing instructions.

All tolerances shall be $^{+3}_{-0}\,\%$ unless otherwise specified.

6.2 Specimen

Hardware sets for Lift&Slide windows and door height windows shall be mounted on the specimen in accordance with the manufacturer's instructions. Gaskets shall be used.

The hardware manufacturer should provide test specimens for the testing institute. A drawing of the profile cross-section with relevant information should be enclosed in the test application, which also contains the necessary hardware installation, information for the Lift&Slide windows and door height windows. The manufacturer shall provide the following information in addition to the installation information with the supporting documentation to the test house:

— maximum sash mass (in accordance with the manufacturer's product documentation);

— maximum sash dimensions (in accordance with the manufacturer's product documentation)

— number and location of locking points.

The specimen to be tested shall correspond in function, shape and material for which the hardware is intended.

The dimensions of the specimen shall conform to 4.10.

The hardware tested should be in accordance with the manufacturer's recommendations for size and mass of the test specimen.

7 Test procedure

7.1 Samples

Four samples shall be tested in accordance with this part of this European Standard:

sample A1 – durability test

sample A2 – static endurance test at ambient temperature

sample B – corrosion test

sample C – retained for reference control

NOTE 1 Alternatively sample A1 and A2 may be the same.

NOTE 2 Sample B should only be necessary if no test report can be supplied by the manufacturer regarding the testing of the hardware component or set in accordance with EN 1670.

NOTE 3 Sample C should be retained by the test institute for the duration of the validity of the test report.

7.2 Procedure

Use sample A1. Inspect the rolls for surface imperfections. Inspect and ensure that the installed hardware set is in accordance with the manufacturer's instructions.

Install the hardware for Lift&Slide windows and door height windows, in the test specimen for testing, as specified in clause 6.2 and in accordance with the manufacturer's fixing instructions.

Install the specimen in the test rig in accordance with clause 6 and apply the mass in accordance with 4.4 and 7.3 of EN 13126-1:2006.

Lubricate the hardware in accordance with the installation and product information (initial lubrication).

NOTE 1 Before beginning the test, the smoothness of the test specimen should be checked by the testing institute, and if deemed appropriate, adjustments should be made in accordance with the manufacturers' specifications.

Repeat adjustment of the test specimen during the durability test after every 5 000 test cycles if required.

Also after every 5 000 test cycles, lubrication by the test institute may be repeated on all built-in & accessible sliding - and locking areas, unless the manufacturer specifies that the hardware is maintenance-free.

Measure and record the length of the handle, calculate and record the handle operation torque T_h in accordance with 5.2.1. Check that the specimen functions correctly, whereby the calculated torque T_h shall not be exceeded.

NOTE 2 In general, all tests should be with the handle designated by the hardware manufacturer.

NOTE 3 In design-related exceptions, a test tool instead of the hardware-manufacturer designated handle can be used, as long as this engages directly into the espagnolette.

Cycle the hardware in accordance with the description of the cycles in 7.3.1 and in accordance with one of the following grades:

— grade 3: 10 000 cycles (+ 1 %) cycles

— grade 4: 15 000 cycles (+ 1 %) cycles

— grade 5: 25 000 cycles (+ 1 %) cycles

NOTE 4 A reference velocity of 0,5 (± 0,05) m/s in accordance with EN 1191 is not required.

7.3 Durability test

7.3.1 Description of the cycles

7.3.1.1 Tilt cycles on hardware with tilt function

7.3.1.1.1 Tilt function with positive control

Tilt cycles for hardware with tilt function and with positive control shall be at a rate (rate) of 200 cycles/h; the procedure is as follows:

— initial position of the active sash is the locked closed position.

— hardware is moved jerk and jolt-free into an operating position, in which the tilted position is reached. In this position the sash remains for 1 s so that it can settle.

— hardware is brought back to the initial position; this is the locked closed position. Then the hardware remains in this initial position for 1 s and can settle before the next test cycle is started.

NOTE The velocity with which the hardware is operated results from the predetermined rate of 200 cycle/h, the indicated interval times and the jerk and jolt-free initiation of all movements.

7.3.1.1.2 Tilt cycles on hardware without positive control

Tilt cycles for hardware with tilt function and without positive control shall be at a rate (rate) of 200 cycles/h; the procedure shall be as follows:

— initial position of the active sash is the locked closed position.

— hardware is moved into an operating position, in which the tilted position can be enabled.

— active sash is moved jerk and jolt-free into the tilting position from the closed position. The sash shall freefall into the tilt position; (for example the pneumatic cylinder is decoupled or the valves open before the final tilt position). 5 mm before the final tilt position, the velocity shall be 0,5 m/s (± 10 %). In the tilt position the active sash is held by the scissors-stay arm(s). The sash remains for 1 s in this position to allow it to settle.

— active sash is brought back to the initial position, whereby the locked closed position is reached again; the initiation of movement shall be jerk and jolt-free. The hardware then remains in the initial position for 1 s before the next test cycle is started.

NOTE Unless otherwise stated, the velocity with which the hardware is operated results from the predetermined rate of 200 cycle/h, the indicated interval times and the jerk and jolt-free initiation of all movements.

7.3.1.2 Lifting cycles

Lifting cycles shall be at a rate of 200 cycles/h; the procedure shall be as follows:

— active sash shall be in the locked closed position.

— lifting action is started via the hardware in a jerk and jolt-free manner, whereby the active sash is brought into the sliding position. The sash remains in this position for 1 s, so that it can settle.

— active sash is moved in the sliding position in the direction of the opening position in such a manner that it comes to a halt 3 mm before the locking position. The sash remains in this position for 1 s, so that it can settle.

— active sash is brought back to the initial position via the hardware, in doing so the locked closed position is reached again; the initiation of movement shall be jerk and jolt-free. The hardware then remains in the initial position for 1 s, before the next test cycle is started.

NOTE 1 Unless otherwise stated, the velocity with which the hardware is operated results from the predetermined rate of 200 cycle/h, the indicated interval times and the jerk and jolt-free initiation of all movements.

NOTE 2 Hardware systems, where the sash itself is not lifted but a gasket mechanism is moved, should be tested with the gasket mechanism moved.

7.3.1.3 Sliding cycles

Sliding cycles shall be at a rate of 200 cycles/h; the procedure shall be as follows:

— initial position of the active sash is in the closed position.

— movement range results from the sash width of the testing-element minus 200 mm (for example: a sash width of 1 200 mm results in a movement range of 1 000 mm).

— active sash is moved along a predetermined movement range while in the sliding position, and remains there for 1 s at the end of the movement range. Both the acceleration from the initial sliding position, as well as braking at the end of the movement range shall be in a jerk and jolt-free manner.

— active sash is brought back to the initial position, whereby the closed position is reached again; the initiation of movement shall be jerk and jolt-free. The sash shall freefall into the locked position; (for example: the pneumatic cylinder is decoupled 100 mm before the final tilt position / or the valves open). The hardware then remains in the initial position for 1 s, allowing it to settle before the next test cycle is started.

NOTE The velocity with which the hardware is operated results from the predetermined rate of 200 cycle/h, the indicated interval times and the jerk and jolt-free initiation of all movements.

7.3.1.4 Total cycles (lifting and sliding cycles)

7.3.1.4.1 General

Lifting cycles in accordance with 7.3.1.2 and sliding cycles in accordance with 7.3.1.3 may be combined to result in total cycles. No individual steps should be repeated during the total cycles.

7.3.1.4.2 Description of the Total cycles (lifting and sliding)

Total cycles shall be at a rate of 100 cycles/h. The procedure shall be as follows:

— initial position of the active sash is the locked closed position.

— lifting action shall be initiated by the hardware, whereby the active sash is brought into the locking position in a jerk and jolt-free manner. In this position the sash remains for 1 s so that it can settle.

— movement range results from the sash width of the testing-element minus 200 mm (for example: a sash width of 1200 mm results in a movement range of 1000 mm).

— active sash is moved along a predetermined movement range in the sliding position, and remains there for 1 s at the end of the movement range. Both the acceleration from the initial sliding position, as well as braking at the end of the movement range shall be in a jerk and jolt-free manner.

— active sash is moved back in the direction of the closed position so that it comes to a halt 3 mm before the closed position in a jerk and jolt-free manner. The initiation of movement shall also be in a jerk and jolt-free manner.

— active sash is brought back to the initial position via the hardware, whereby the locked closed position is reached again; the initiation of movement shall be jerk and jolt-free. The hardware then remains in the initial position for 1 s, before the next test cycle is started.

NOTE The velocity with which the hardware is operated results from the predetermined rate of 100 cycle/h, the indicated interval times and the jerk and jolt-free initiation of all movements.

7.3.2 Acceptance criteria

7.3.2.1 Handle operation tolerance

Check that the specimen functions correctly in accordance with 5.2.1, whereby the calculated torque T_h shall not be exceeded.

NOTE In general, torques are measured during normal hardware operation. During the durability tests, higher torques may be necessary due to the higher operating velocity

7.3.2.2 Further acceptance criteria

The active sash shall function correctly

NOTE In general, these two acceptance criteria (7.3.2.1 and 7.3.2.2) should be checked after each 5 000 cycles, and upon completion of the tilting cycles in accordance with 7.3.1.1, the lifting cycles in accordance with 7.3.1.2 and the sliding cycles in accordance with 7.3.1.3. or the total cycles in accordance with 7.3.1.4.

7.4 Sliding operation crash-tests

7.4.1 Procedure – into the closed position

Use sample A1. The active sash mass shall be reduced to 50 % of the maximum test mass.

Move the active sash away from the opening position towards the closed position, whereby the acceleration shall be in a jerk and jolt-free manner. 100 mm before reaching the closed position, the active sash shall have a velocity of 0,8 m/s.

After having reached the closed position, the active sash is allowed to settle.

Test the sash 3 times.

NOTE 1 After having reached the closed position, the sash can be in the sliding, tilted or closed position while settling.

NOTE 2 If the hardware is equipped with a brake mechanism, the velocity of the active sash while moving the 100 mm up to the closed position may be reduced during cycling.

NOTE 3 If the active sash reaches the tilted position instead of the closed position, it should be tested in accordance with the previous procedure. In this case the closed position should be replaced by the tilted position.

7.4.2 Procedure – into the opening position

Use sample A1. This procedure shall use an active sash test mass of 50 % of the maximum test mass.

The active sash is moved away from the closed position towards the opening position, whereby the acceleration shall be in a jerk and jolt-free manner to 100 mm before reaching the opening position. The active sash shall have a velocity of 0,8 m/s. The sash shall collide with the buffer stop at a speed of 0,8 m/s (see Figure A.2).

After the active sash collides with the buffer stop, the active sash is allowed to settle.

Test the sash 3 times.

NOTE If the hardware is equipped with a brake mechanism, the velocity of the active sash while moving the 100 mm up to the opening position may be reduced during cycling.

7.4.3 Acceptance criteria

Upon completion of the test in accordance with 7.4.1 and 7.4.2, the hardware shall conform to 5.2.2 and the following:

— active sash shall not drop and shall still be constrained by its fixings;

— active sash shall function correctly.

NOTE After the sliding operation tests all adjustment possibilities may be used to operate the sash.

7.5 Minimum closing device resistance test

7.5.1 Hardware without tilt-function

The locking mechanism (espagnolette, window handle, handle-lever, gear) shall be inserted in a testing-rig that blocks the locking mechanism transmission. For example in the case of an espagnolette, the face-plate and runner-bead shall be blocked using a clamping-device.

Exert the torque $T_{hr,}$ calculated and recorded in accordance with 5.2.3.1, on the locking mechanism and maintain it for 10 s $^{+2}_{0}$ s.

Upon completion of this exerted torque, the closing device shall operate in accordance with 5.2.3.1.

NOTE 1 If handles are used that can only transmit a certain limited torque (i.e. equipped with breaking point, spindle twists etc.), they should be tested at the maximum operational torque for which they have been designed.

NOTE 2 The results of the tests should be submitted by the hardware manufacturer by a self declaration with supporting documentation to the test house.

7.5.2 Hardware with tilt-function with positive control

7.5.2.1 Procedure - in the tilted position

Use sample A1. The active sash is blocked on top in the tilt position in accordance with Figure A.3, so that the active sash cannot freefall back into the locking position. Apply the torque T_{hr} ,calculated and documented in accordance with 5.2.3.2, to the espagnolette and maintain it for 10 s $^{+2}_{0}$.

Upon completion of this force and removal of the blocking, the hardware shall function correctly in accordance with 5.2.3.2.

NOTE If handles are used that can only transmit a certain limited torque (i.e. equipped with breaking point, spindle twists etc.), they should be tested at the maximum operational torque for which they have been designed.

7.5.2.2 Procedure - in the closed position

Use sample A1. The active sash is blocked on top in the locked position in accordance with Figure A.4, so that the active sash cannot freefall back into the tilted position. Apply the torque T_{hr} calculated and documented in accordance with 5.2.3.2 to the espagnolette and maintain it for 10 s $^{+2}_{0}$.

Upon completion of this force and removal of the blocking, the hardware shall function correctly in accordance with 5.2.3.2.

NOTE If handles are used that can only transmit a certain limited torque (i.e. equipped with breaking point, spindle twists etc.), they should be tested at the maximum operational torque for which they have been designed.

7.6 Additional loading test

7.6.1 Procedure

Use sample A1. Apply the mass in accordance with 4.4 and 7.3 of EN 13126-1:2006 to reach the maximum mass again.

Apply an additional force F = 1 000 N $^{+50}_{0}$ N in the middle (centre of the infilling) of the active sash in accordance to Figure A.5 while the active sash is in the sliding position. The additional force shall be maintained for 5 minutes.

7.6.2 Acceptance criteria

Upon completion of the additional loading test and after the additional load has been removed, the active sash shall not drop and shall still be constrained by its fixings in accordance with 5.2.4.

7.7 Static endurance test at ambient temperature

Use sample A2 for the static endurance test at ambient temperature in accordance with Figure A.6.

Inspect the rolls for surface imperfections. Measure and record the initial diameter of each roll at the contact point of the roll and the corresponding rail. Mark the contact point on each roll.

Install the specimen in the test rig in accordance with clause 6 and apply the mass in accordance with 4.4 and 7.3 of EN 13126-1:2006 for 240 $^{+24}_{0}$ h.

Remove the load from the specimen / roller. Immediately upon removing the load, measure and record the final diameter of each roll at the pre-marked contact points. The difference between any initial and final dimension shall not deviate by more than 0,5 % in accordance with 5.2.5.

NOTE An alternative test rig that provides the same loads resulting from the test rig mentioned in Figure A.6 may be used.

7.8 Corrosion resistance

NOTE 1 This test is necessary if the manufacturer cannot provide a test report in accordance with EN 1670.

All corrosion tests shall be on original new samples. For Zinc galvanized surfaces on iron or steel the specified thickness of 12 µ (class 3) or 16 µ (class 4) is not necessary if other surface protection methods are used to conform to the requirements (Minimum time to formation of white corrosion products) of ISO 4520 (µ = micrometre).

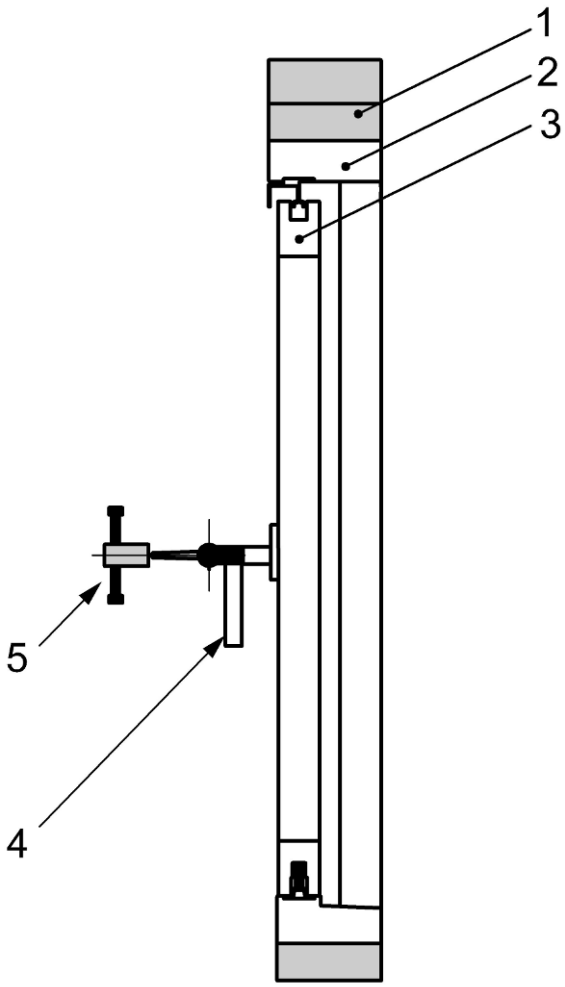
Unless a test report can be provided by the manufacturer, the hardware shall be tested in accordance with EN 1670.

NOTE 2 The evaluation of the corrosion resistance is limited to the essential areas (as a rule, the visible surfaces of the installed hardware).

Exempt from the corrosion resistance evaluation are:

- rivet locations;
- locations of later processing (for example: cleaved surfaces that result from cropping the hardware components, millings etc.);
- non surface-treated parts/surfaces, provided they are not in the visible vicinity of the hardware (for example: screw guide-holes made of zinc die-cast etc.);
- welding joints and their immediate surroundings.

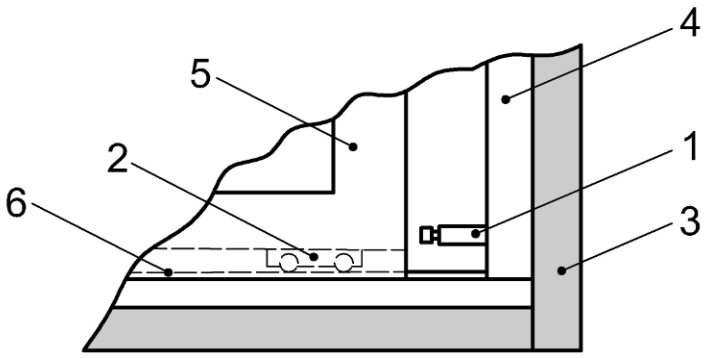
Annex A
(informative)
Test assembly



Key

1 part of the test rig (example)
2 specimen
3 active sash
4 handle
5 handle and sash movement manipulator test-rig

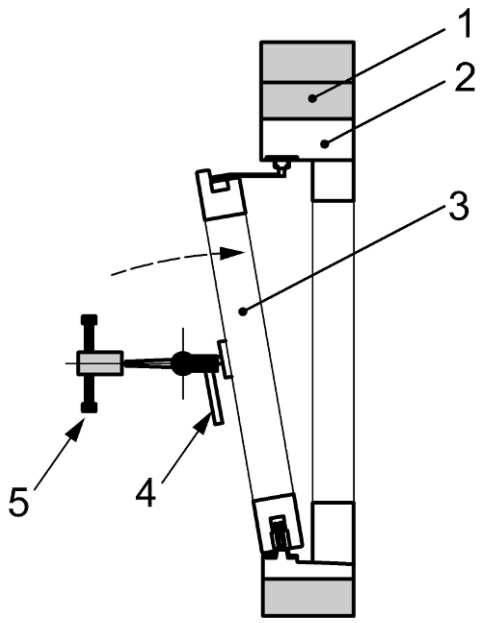
Figure A.1 — Test rig for Durability test



Key

1	buffer stop
2	roller
3	part of the test rig (example)
4	specimen (frame)
5	active sash
6	rail

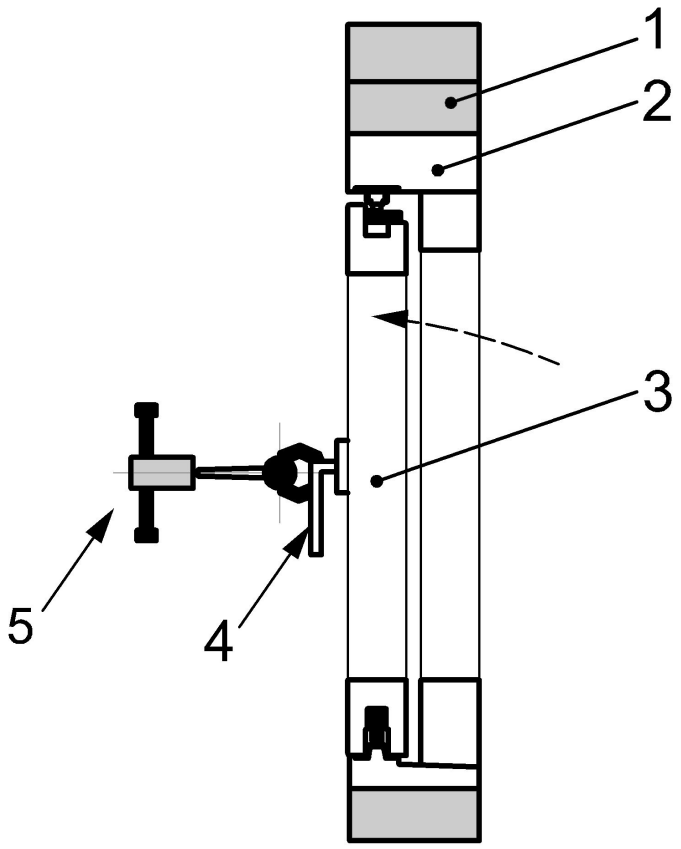
Figure A.2 — Sliding operation crash-test (into the opening position)



Key

1	part of the test rig (example)
2	specimen
3	active sash
4	handle
5	handle and sash movement manipulator test-rig

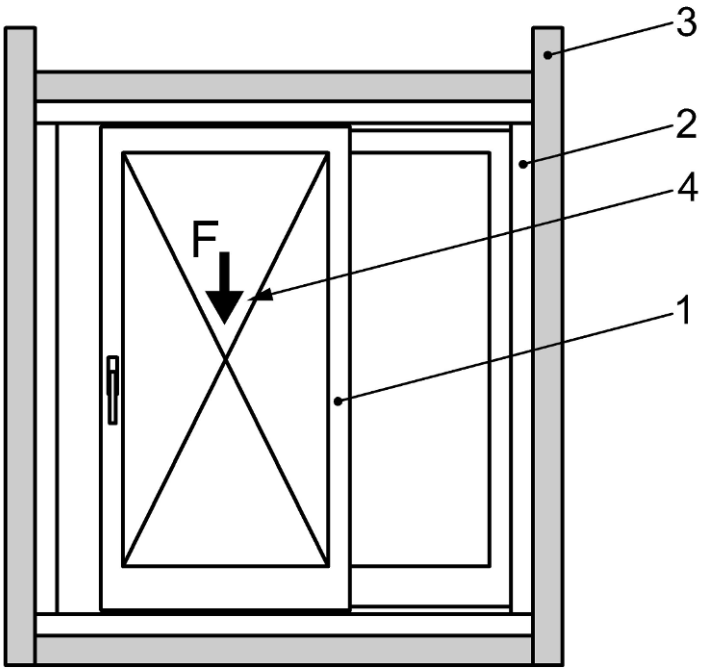
Figure A.3 — Minimum closing device resistance test – Procedure - in the tilted position



Key

1	part of the test rig (example)
2	specimen
3	active sash
4	handle
5	handle and sash movement manipulator test-rig

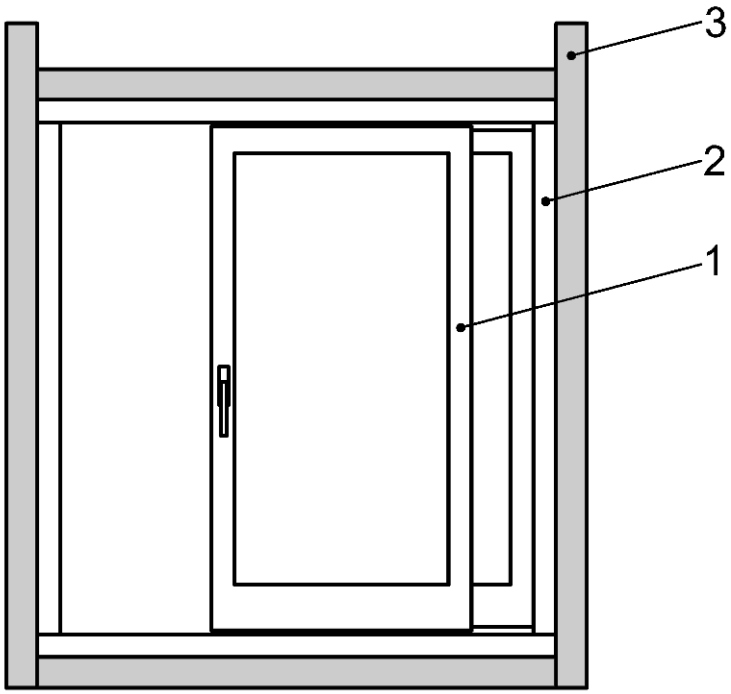
Figure A.4 — Minimum closing device resistance test – Procedure - in the closed position



Key

1 active sash
2 specimen
3 part of the test rig
4 additional force F = 1 000 N

Figure A.5 — Additional loading test



Key

1 active sash
2 specimen
3 part of the test rig

Figure A.6 — Static endurance test at ambient temperature

Annex B
(normative)
Flow chart of test procedure

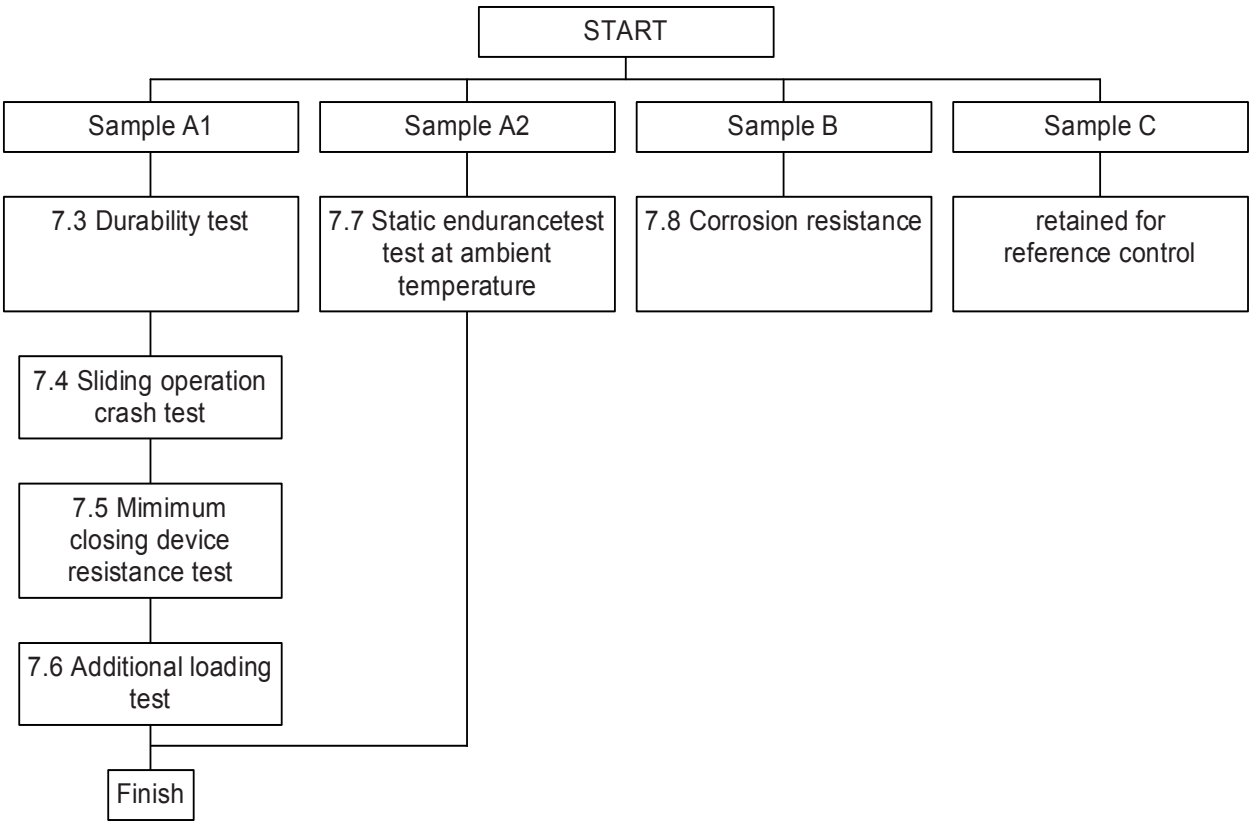


Figure B.1 – Test procedure

NOTE Alternatively A1 and A2 may be the same sample.

Bibliography

[1] EN 1191, *Windows and doors — Resistance to repeated opening and closing — Test method*

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