BRITISH STANDARD

BS EN
13126-8:2006

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

Part 8: Tilt&Turn, Tilt-First and Turn-Only hardware

The European Standard EN 13126-8:2006 has the status of a British Standard

ICS 91.190

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 13126-8:2006. It supersedes DD CEN/TS 13126-8:2004 which is withdrawn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, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep 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

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

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 does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 22, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2006

ISBN 0 580 48013 5

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13126-8

February 2006

ICS 91.190

Supersedes CEN/TS 13126-8:2004

English Version

Building hardware - Requirements and test methods for windows and doors height windows - Part 8: Tilt&Turn, Tilt-First and Turn-Only hardware

Quincaillerie pour le bâtiment - Exigences et méthodes d'essai des ferrures de fenêtres et portes-fenêtres - Partie 8 : Ferrures d'oscillo-battant, de battant-oscillant et d'ouvrant pivotant

Baubeschläge - Beschläge für Fenster und Fenstertüren - Anforderungen und Prüfverfahren - Teil 8: Drehkipp-, Kippdreh- und Dreh-Beschläge

This European Standard was approved by CEN on 28 December 2005.

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.

CEN members are the national standards bodies of Austria, Belgium, 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 United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 13126-8:2006: E

Contents

Page

Foreword

This European Standard (EN 13126-8:2006) 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 August 2006, and conflicting national standards shall be withdrawn at the latest by August 2006.

This European Standard supersedes CEN/TS 13126-8:2004.

A full contribution to the preparation of this European Standard has been made by the European manufacturers´ organization ‘ARGE’ and national standards bodies.

This European Standard is one of a series of European Standards for building hardware products. It is divided into seventeen parts incorporating all types of windows and balcony doors.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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 United Kingdom.

1 Scope

This European Standard specifies the requirements and test procedures for durability, strength, security and function of Tilt&Turn, Tilt-First and Turn-Only hardware components or sets for windows and balcony doors in accordance with common application as shown in Annex A of EN 13126-1.

By means of this European Standard, the user of recognized tested hardware can presume, that with correct usage, the Tilt&Turn, Tilt-First or Turn-Only hardware components or sets for windows and balcony-doors conforms to prescribed requirements.

NOTE To maintain the guaranteed characteristics during the utilization period, it is necessary to comply with the manufacturer's product information as well as the manufacturer's maintenance and service instructions in a manner that can be proven.

2 Normative references

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

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 12519:2004 and the following apply.

NOTE The following terms and definitions apply to windows and balcony-doors made of wood, PVC-U, aluminium or steel and their appropriate material combinations.

3.1
Tilt&Turn
Tilt&Turn hardware opens and locks windows and balcony-doors. Tilt&Turn hardware is used to enable windows and balcony-doors initially into the turning position (side-hung), and then into the tilting position by operating the handle. Tilt&Turn hardware in the sense of this European Standard is a one-hand-operation hardware for windows and balcony-doors for structural engineering, conforming to the test sizes stated in Table 1

3.2
Tilt-First
Tilt-First hardware is used to enable windows and balcony-doors initially into the tilting position, and then into the turning position (side-hung) by operating the handle. The definition of terms and demands made on Tilt&Turn hardware are also applicable to Tilt-First hardware

3.3
Turn-Only
Turn-Only hardware is used to enable windows and balcony-doors into a turning position (side-hung) by operating the handle. The definition of terms and demands made on Tilt&Turn hardware are also applicable to Turn-Only hardware

4 Classification

4.1 General

The classification for Tilt&Turn, Tilt-First or Turn-Only hardware shall be in accordance with the requirements of Clause 4 of 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)

Two grades shall be identified in accordance with 5.3 of this European Standard and 4.3 of EN 13126-1:2006:

— grade 4: 15 000;

— grade 5: 25 000.

4.4 Mass (3 – third digit)

The following grades shall be established in accordance with 4.4 of EN 13126-1:2006:

050, 060, 070, 080, 090, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190 and 200

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 shall be identified in accordance with 4.6 of EN 13126-1:2006:

— grade 1: The hardware shall conform to the requirements of parts 1 and 8 from this standard.

4.7 Corrosion resistance (6 – sixth digit)

Hardware shall conform in accordance with 5.7 of this European Standard and 4.7 of EN 13126-1:2006 to the grades listed in 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 Applicable part (8 – eighth digit)

The eighth digit shows “8” indicating the part of the standard which was used for testing the Tilt&Turn, Tilt-First and Turn-Only hardware components or sets in accordance with 4.9 of EN 13126-1:2006.

4.10 Test sizes (9 – ninth digit)

The ninth digit indicates the test sizes which were used for testing the Tilt&Turn, Tilt-First and Turn-Only hardware components or sets in accordance with Table 1, 5.1 of this European Standard and 4.10 of EN 13126-1:2006.

All sizes are stated in mm, S.R.W. = Sash Rebate Width, S.R.H. = Sash Rebate Height.

— 1 300 mm wide x 1 200 mm high (window mass ≤ 130 kg);

— 1 550 mm wide x 1 400 mm high (window mass > 130 kg);

— 900 mm wide x 2 300 mm high (balcony door size).

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

The manufacturer shall ensure, in accordance with the appropriate documentation, that for larger than recommended test-specimens the forces on the hardware do not exceed the test specimen forces.

4.11 Example of classification for Tilt&Turn hardware

1	2	3	4	5	6	7	8	9
-	**4**	**080**	**0**	**1**	**3**	**-**	**8**	**900/2300**

This denotes Tilt&Turn hardware, which has:

Digit 1 category of use - (no requirements)

Digit 2 durability grade 4 (15 000 cycles)

Digit 3 mass 80 kg

Digit 4 fire resistance grade 0 (no requirements)

Digit 5 safety in use grade 1

Digit 6 corrosion resistance grade 3

Digit 7 security - (no requirements)

Digit 8 applicable part tested according to this European Standard

Digit 9 test sizes S.R.W.[1)] = 900 mm, S.R.H.[2)] = 2 300 mm

[1)] S.R.W. = sash rebate width

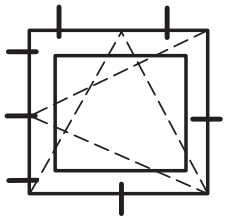
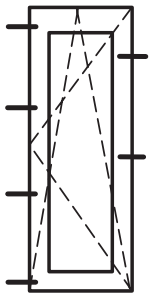
[2)] S.R.H. = sash rebate height

5 Requirements

5.1 General

The requirements for Tilt&Turn, Tilt-First or Turn-Only hardware shall be in accordance with Clause 5 of EN 13126-1:2006. Table 1 shows the test sizes.

Table 1 — Test sizes and minimum number of locking points

Test sizes S.R.W. X S.R.H. in mm[a]	Minimum number of locking points.	**Diagram showing locking point positions**
1 300 x 1 200 1 550 x 1 400	7	
900 x 2 300	6	
[a] S.R.W. = Sash Rebate Width, S.R.H. = Sash Rebate Height.		

In the case of a manufacturer choosing the option of fewer locking-points, the hardware shall be tested noting the number of locking-points in the test report.

5.2 Mechanical stability

5.2.1 Stability of the scissor stay

The scissors stay shall ensure that a sash, when operated incorrectly (mishandled), is securely held.

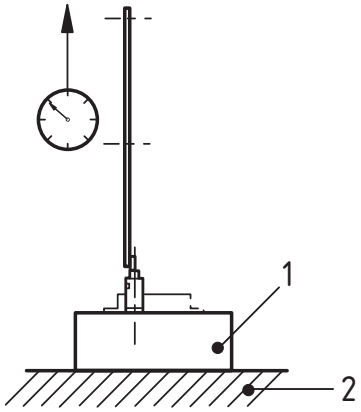
In this case (of mishandling), the hinges (scissor stay with stay bearing and corner pivot rest with sash hinge) shall still demonstrate a connection between the sash and the frame and afterwards function in its intended manner.

If the scissors stay does not fulfil this demand, a mishandling-device shall be installed. In this case the test takes place in accordance with Clause 7 with an installed mishandling-device.

5.2.2 Mechanical strength of hinges

Hinges that have a scissor stay with a stay bearing and corner pivot rest with sash hinge, shall guide the sash securely during every operating position.

Such hinges undergo supplementary static load tests, as described in the following Figures 1 and 2, which correspond to a 5-fold load value of the frame hinges under test procedures specified in Clause 7 (refer to load value "F" from the following Tables 2 and 3). The test comprises of testing 20 individual hardware components of each type of hinge.



Key

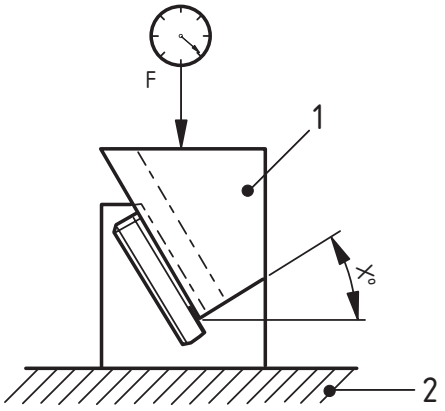
1 stay bearing test-rig is made of steel

2 clampable mounting board

Figure 1 — Sash stay bearing test rig, load tractive force F in accordance with Table 2

Table 2 — Static test for scissor stay with stay bearing 90° load-direction in opening in accordance with Figure 1

	For test size 900 mm x 2 300 mm		For test size 1 300 mm x 1 200 mm		For test size 1 550 mm x 1 400mm	
Grade	Sash mass kg	Tractive force F N	Sash mass kg	Tractive force F N	Sash mass kg	Tractive force F N
050	50	500	50	1 400	—	—
060	60	600	60	1 650	—	—
070	70	700	70	1 900	—	—
080	80	800	80	2 200	—	—
090	90	900	90	2 450	—	—
100	100	1 000	100	2 700	—	—
110	110	1 100	110	3 000	—	—
120	120	1 150	120	3 250	—	—
130	130	1 250	130	3 500	—	—
140	140	1 350	—	—	140	3 900
150	150	1 450	—	—	150	4 200
160	160	1 550	—	—	160	4 400
170	170	1 650	—	—	170	4 700
180	180	1 750	—	—	180	5 000
190	190	1 850	—	—	190	5 300
200	200	1 950	—	—	200	5 500



Key

1 corner pivot test-rig is made of steel

2 clampable mounting board (angle X in accordance with Table 3)

Figure 2 — Corner pivot rest test-rig, load compressive force F in accordance with Table 3

Table 3 — Static test for corner pivot rest with sash hinge load direction in accordance with Figure 2

Grade	For test size 900 mm x 2 300 mm X = 11°		for test size 1 300 mm x 1 200 mm X = 30°		for test size 1 550 mm x 1 400 mm X = 30°	
	Sash mass kg	Compressive force F N	Sash mass kg	Compressive force F N	Sash mass kg	Compressive force F N
050	50	2 550	50	2 850	—	—
060	60	3 050	60	3 400	—	—
070	70	3 550	70	4 000	—	—
080	80	4 000	80	4 550	—	—
090	90	4 600	90	5 100	—	—
100	100	5 100	100	5 700	—	—
110	110	5 600	110	6 250	—	—
120	120	6 100	120	6 800	—	—
130	130	6 600	130	7 400	—	—
140	140	7 150	—	—	140	8 000
150	150	7 650	—	—	150	8 550
160	160	8 150	—	—	160	9 150
170	170	8 650	—	—	170	9 700
180	180	9 150	—	—	180	10 300
190	190	9 700	—	—	190	10 850
200	200	10 200	—	—	200	11 450

5.3 Durability

Two grades are established:

— grade 4: 15 000 cycles (+ 1 %) (Tilt&Turn and Tilt-First hardware);

— grade 5: 25 000 cycles (+ 1 %) (Turn-Only hardware).

5.4 Admissible tolerances

5.4.1 Sash operation tolerance

The horizontal force in the vicinity of the sash support-component shall not exceed 120 N in order to close the sash from the turn-position.

5.4.2 Handle operation tolerance

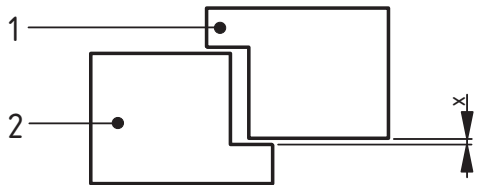
In conjunction with a counteracting force of $20\ ^{+1}_{0}$ N per locking point:

— maximum torque applied to the handle shall not exceed 10 Nm;

— maximum force applied to the handle shall not exceed 100 N.

5.4.3 Locking point variable tolerance

Before and after the durability test, the distance “X” between the frame surface and the sash-overlap-begin shall be measured in conjunction with a counteracting force of $20\ ^{+1}_{0}$ N per locking point. The results shall not differ by more than 1 mm (see Figure 3).



Key

1	frame
2	sash
X	measurement

Figure 3 — Measurement of locking point variable tolerance

5.5 Resistance to additional loading

During and after the additional loading test, the sash shall remain on its hinges.

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

5.6 Minimum closing device resistance

The closing device shall withstand a minimum of 25 Nm. Upon completion of this exerted torque, the closing device shall operate.

5.7 Corrosion resistance

Hardware shall conform to the grades listed in EN 1670, whereby grade 3 is the minimum requirement.

For zinc galvanized surfaces on iron or steel the specified thickness of 12 µm (class 3) or 16 µm (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 4520:1981 (µm = micrometre).

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

NOTE 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.

5.8 Resistance to other additional tests

After the additional reveal- and rebate-hindrance test the sash shall not drop. The hinges (scissor stay with stay bearing and corner pivot rest with sash hinge) shall still demonstrate a connection between the sash and the frame.

NOTE It is not necessary for the sash to operate.

6 Test equipment

The Tilt&Turn, Tilt-First or Turn-Only hardware shall be installed in the test specimen for testing as specified in Clause 6 of EN 13126-1:2006 in accordance with the manufacturer's fixing instructions.

The hardware manufacturer shall provide test specimens for the testing institute. A drawing of the profile cross-section with relevant information shall be enclosed in the test application, which also contains the necessary hardware installation information for the windows and balcony doors.

The test shall be conducted on a test rig which corresponds in function and shape to the sash for which the hardware is intended. The dimensions of the test rig shall conform to 4.10 and Table 1. Instructions for the application of additional stays and other devices shall be observed. The hardware tested shall conform to the manufacturer's recommendations for size and mass of the test specimen.

In order to prevent distortion upon clamping the test specimen into the test rig, fix the window frame to a 19 mm ± 1 mm chipboard (or similar) before inserting it into the test rig. Clamp the frame securely in those areas where hardware is subjected to strain. All tolerances shall be 0 / +10 % unless otherwise specified.

7 Test procedures

7.1 Samples

Three samples shall be used for testing according to this European Standard:

sample A – performance tests (complete specimen);

sample B – corrosion tests (hardware set);

sample C – retained for reference control (hardware set).

NOTE 1 Sample B should only be necessary if no test report can be supplied from the manufacturer regarding the testing of the hardware component or set in accordance with EN 1670.

NOTE 2 Sample C should be retained by the test institute for the duration of the validity of the test report.

7.2 Stability of hinge

The results of the tests shall be submitted by the hardware manufacturer by a self declaration with supporting documentation to the test house in accordance with 5.2.2.

7.3 Durability test – Tilt&Turn

7.3.1 General

The Tilt&Turn hardware durability test consists of Tilt&Turn cycles (see 7.3.2) and Turn cycles (7.3.3).

7.3.2 Tilt&Turn cycles – Tilt-First cycles

7.3.2.1 General

A minimum of 15 000 total test cycles shall be performed in accordance with 5.3 (grade 4).

15 000 total test cycles on the test specimen comprise the following:

— 15 000 times Tilt;

— 15 000 times Lock;

— 15 000 times Turn (100 mm);

— 15 000 times Lock.

For both Tilt&Turn and Tilt-First hardware, the test cycle shall consist of the following movements:

— sash in the closed position, hardware locked;

— sash movement into the tilt position (or turn position – 100 mm);

— sash movement back to the closed position, hardware to be locked;

— sash movement into the turn position – 100 mm (or tilt position);

— sash movement back into the closed position, hardware to be locked.

The durability tests shall be performed at a rate of 250 $^{+25}_{-0}$ cycles/h in accordance with 8.2 of EN 13126-1:2006, except in the case of a manufacturer choosing the option of specifying a lower testing speed, e.g. to avoid any friction-material overheating. In this case the test report shall specify the testing-speed and the reasons for using the lower speed.

During the durability test, the test specimen shall be operated by use of a window-handle. The connection of the manipulator-rig (see Figure A.1 – Annex A) to the window-handle is to be set up in such a way, that only torque during closing, and tractive force during opening occur, which correspond to the strain in practice.

7.3.2.2 Tilt position

The sash is moved into the scissors-stay final-position (stopped by the stay arm/s allowing normal vibration to occur) through the test rig with a velocity of 0,50 m/s (± 10 %), which shall be 5 mm before reaching the final tilted position.

A spring-revert of the sash in the tilted position shall be possible – e.g. before the test sash reaches its maximum tilt position the pneumatic cylinder is released (valves open).

The succeeding movement shall commence after approximately 3 s.

7.3.2.3 Turn position (100 mm)

The handle side of the sash shall be moved approximately 100 mm away from the frame in the turn-position.

7.3.2.4 Closed position

The sash shall be stopped coming from both the tilt position as from the turn position, at a distance of 3 mm ± 1 mm from the final closed position (measured in the vicinity of the handle). A 20 N counter force shall

be exerted on every locking point. The sash is brought to the end (locked) position by turning the window-handle. The counter force of 20 N shall be valid for the entire duration of the test.

7.3.2.5 Lubrication and adjustment

The hardware shall be installed in the test specimen by the hardware manufacturer in accordance with Clause 6 of this European Standard and 7.1 of EN 13126-1:2006. The hardware is lubricated in accordance with the installation and product information (initial lubrication).

NOTE Before beginning the test, the smoothness of the test specimen should be checked by the testing institute, and if deemed appropriate, carries out adjustments according to the manufacturer's specifications. In this case the sash is supposed to close freely (force-free).

Adjustment of the test specimen is repeated during the endurance 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 and accessible sliding - and locking areas, unless, the manufacturer has specified the hardware as maintenance-free.

7.3.2.6 Acceptance criteria

The acceptance criteria shall be based upon completing a minimum of 15 000 cycles.

After the durability test, the 20 N counter force is maintained. The acceptance criteria as mentioned in 8.4 of EN 13126-1:2006, in conjunction with the following shall be observed:

— test specimen shall be capable of functioning in the operating end positions (turning, tilting and closing);

— sash shall operate to a tolerance in accordance with 5.4.1;

— handle shall be operated in accordance with 5.4.2;

— locking point variable tolerance shall be in accordance with 5.4.3.

7.3.3 Turn cycles (into 90° turn position)

Before beginning the 90° turn position test, the test specimen is adjusted by the test house in accordance with the manufacturer's regulations.

The sash is moved into the 90° turn position by the test rig. The striking force occurs at a suitable location on the sash. In this test the sash is stopped approximately 50 mm before its final closed position.

The 90° turn position test shall be performed at a rate of 250 $^{+25}_{-0}$ cycles/h in accordance with 8.2 of EN 13126-1:2006, except in the case of a manufacturer choosing the option of specifying a lower testing speed, e.g. to avoid any friction-material overheating. In this case the test report shall state the testing-speed and the reasons for using the lower speed.

The number of cycles relating to the test sizes in accordance with 4.10 shall be as follows:

— 5 000 cycles for test size 1 300 mm wide × 1 200 mm high (window mass ≤ 130 kg);

— 5 000 cycles for test size 1 550 mm wide × 1 400 mm high (window mass > 130 kg);

— 10 000 cycles for test size 900 mm wide × 2 300 mm high (balcony door size).

7.3.4 Acceptance criteria

The acceptance criteria is based upon completing a minimum of 5 000 (10 000) cycles.

After carrying out the 90° turn position test, the 20 N counter force is maintained. The acceptance criteria as specified in 8.4 of EN 13126-1:2006, in conjunction with the following shall be observed:

— test specimen shall be capable of functioning in the operating end positions (turning, tilting and closing);

— sash operation tolerance in accordance with 5.4.1 shall be observed.

7.3.5 Additional loading test - 1 000 N

The sash is rotated into the 90° turn position and an additional vertical force of 1 000 N is applied near the window-handle and is maintained for 5 min.

In accordance with 5.5, during and after the additional loading test, the sash shall not drop. The hinge (scissor stay with stay bearing and corner pivot rest with sash hinge) shall still demonstrate a connection between the sash and the frame.

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

7.3.6 Reveal test for hardware without turn-restrictor

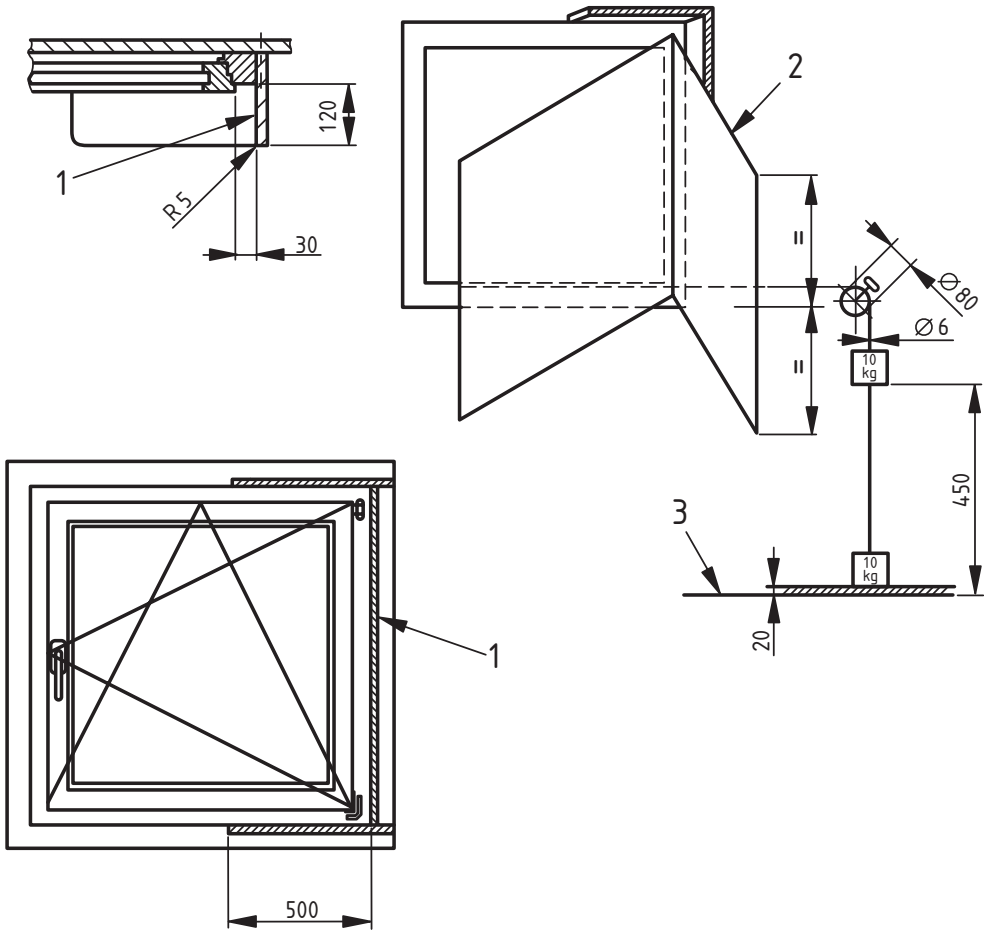
7.3.6.1 General

A turn restrictor shall be used if the mechanism does not allow the sash to touch the reveal.

7.3.6.2 Test setup

Refer to Figure 4 for test setup information on the reveal test.

Dimensions in millimetres



Key

1	rigid metal
2	let the sash swing to a halt
3	deflection of reveal (turn-restrictor)

Figure 4 — Reveal test for hardware without turn-restrictor

7.3.6.3 Test implementation

To test the hardware during the reveal test, measure the sash from one position, 450 mm from the end position (= position of the sash in the reveal), through which a falling test mass of 10 kg accelerates.

The test mass shall be connected by a cable to the test specimen near the window-handle. The cable length shall be selected so that the test mass comes to a halt 20 mm before the sash reaches its final position and collides with the obstacle. After every test the sash shall be left to swing to a halt.

The specimen shall be tested 3 times.

7.3.6.4 Acceptance criteria

In accordance with 5.8, after the additional reveal test the sash shall not drop. The hinge (scissor stay with stay bearing and corner pivot rest with sash hinge) shall still demonstrate a connection between the sash and the frame.

NOTE It is not necessary for the sash to operate after the reveal test.

7.3.7 Test for hardware with turn-restrictor

When using hardware with a turn-restrictor, the sash shall be held in a variable final turning position by the turn-restrictor.

NOTE For this reason the sash should be held in the final turning position by the turn-restrictor independent of the reveal as specified in 7.3.6.2. Then the simulated reveal as shown in the Figure 4 is not used for this test.

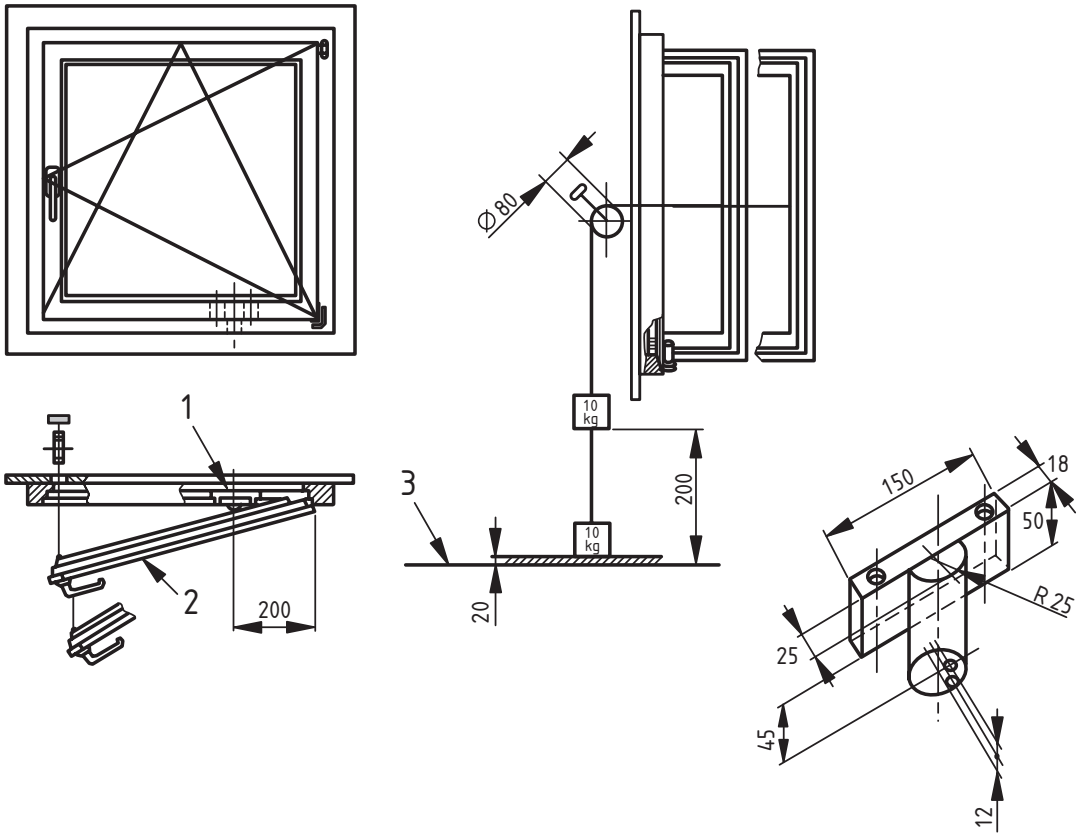
The turn restriction is tested in a similar manner as specified in 7.3.6, however the dropping of the sash shall be measured from one position, 200 mm from the end position (= final turning position of the turn-restrictor), through which a falling test mass of 10 kg accelerates.

7.3.8 Rebate-hindrance test

7.3.8.1 Test setup

Refer to Figure 5 for test setup information on the rebate-hindrance test.

Dimensions in millimetres



Key

1 hindrance
2 let the sash swing to a halt
3 obstruction end position

Figure 5 — Rebate hindrance test

7.3.8.2 Test implementation

To test the hardware during the rebate-hindrance test, measure the sash from one position, 200 mm before the end position (= position of the sash at the rebate-hindrance), through which a falling test mass of 10 kg.

The test mass shall be connected by a cable to the test specimen near the window-handle. The cable length shall be selected so that the test mass comes to a halt 20 mm before the sash reaches its final position and collides with the obstacle. After every test the sash shall be permitted to swing to a halt.

The specimen shall be tested 3 times.

7.3.8.3 Acceptance criteria

In accordance with 5.8, after the additional rebate-hindrance test the sash shall not drop. The hinges (scissor stay with stay bearing and corner pivot rest with sash hinge) shall still demonstrate a connection between the sash and the frame.

NOTE It is not necessary for the sash to operate after the rebate-hindrance test.

7.4 Durability test – Turn-Only hardware

In accordance with 5.3 (grade 5) 25 000 total test cycles are carried out.

NOTE If a test report in accordance with 7.3 can be supplied by the manufacturer, a test is not necessary.

Durability is tested in a similar manner as specified in 7.3.3 and 7.3.4, however with 25 000 cycles.

Turn-Only hardware shall be tested additionally in accordance with 7.3.5 to 7.3.8

7.5 Minimum closing device resistance test

The results of the tests in accordance with 5.6 shall be submitted by the hardware manufacturer by a self declaration with supporting documentation to the test house.

The locking mechanism (espagnolette, window handle, handle-lever) 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 a torque of $25\ ^{+1}_{0}$ Nm to the locking mechanism – maintain this torque for $60\ ^{+10}_{0}$ s.

Upon completion of this exerted torque, the closing device shall operate.

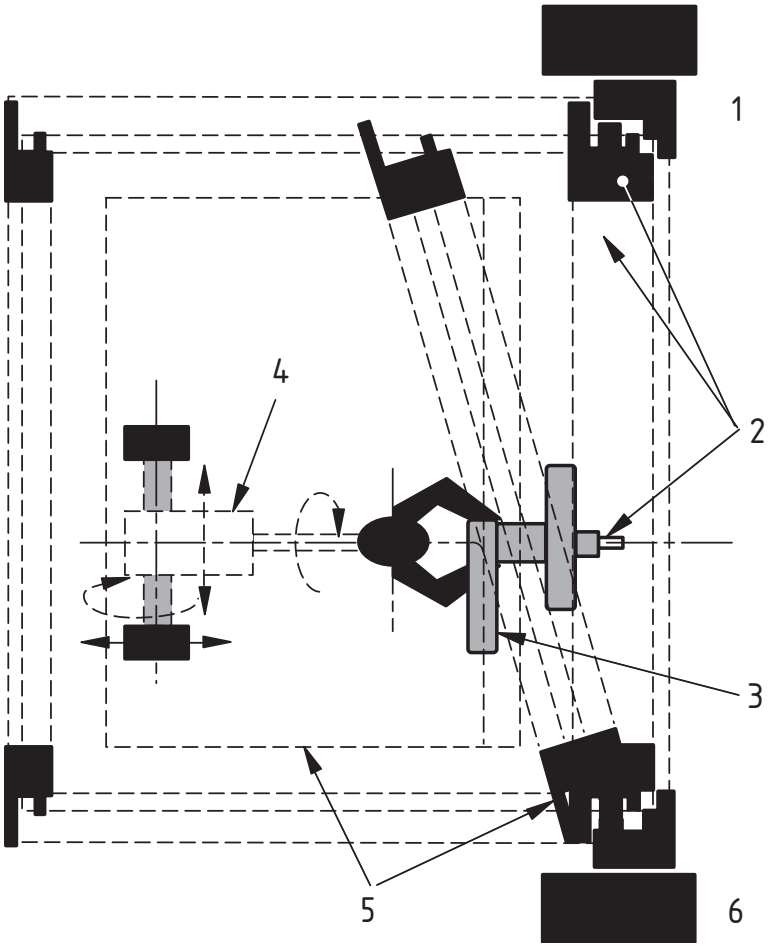
7.6 Corrosion resistance

NOTE If no test report in accordance with EN 1670 can be supplied by the manufacturer, a test is necessary.

All corrosion tests shall be carried out on original new samples (Tilt&Turn hardware, espagnolettes etc.). Any frangible positioning lugs holding components together (for cam centre positioning) shall be broken.

Annex A
(informative)

Typical test equipment



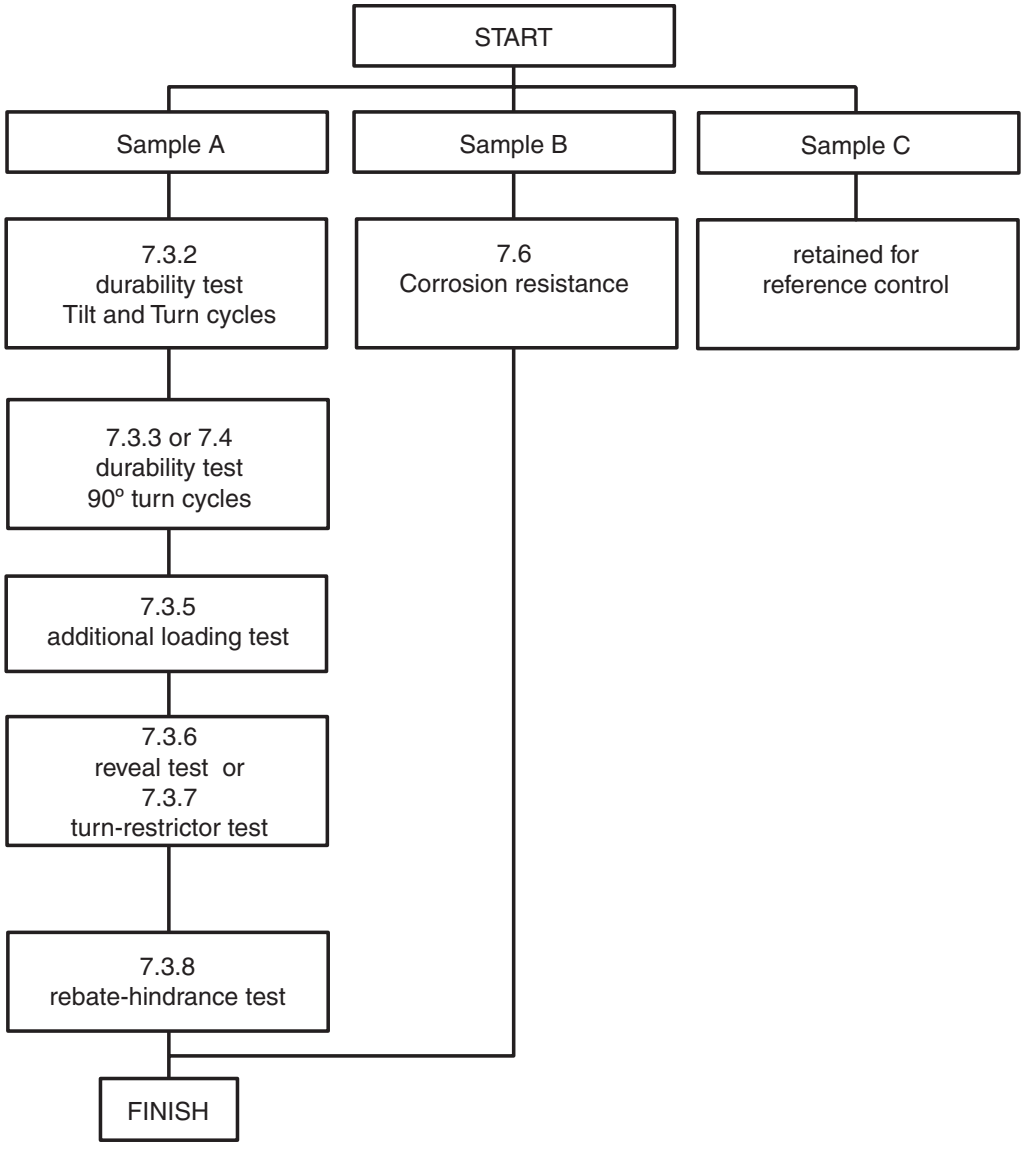
Key

1 frame head
2 hardware specimen
3 window handle
4 handle and sash movement manipulator test-rig
5 sash
6 frame threshhold

Figure A.1 — Typical test equipment

Annex B
(normative)

Flow chart of test procedures



Bibliography

[1] ISO 4520:1981, *Chromate conversion coatings on electroplated zinc and cadmium coatings*

blank

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL