BRITISH STANDARD

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Building hardware — Door and window bolts — Requirements and test methods

The European Standard EN 12051:1999 has the status of a British Standard

ICS 91.190

National foreword

This British Standard is the official English language version of EN 12051:1999.

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

— aid enquirers to understand the text;

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

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

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

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 18, an inside back cover and a back cover.

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Quincaillerie pour le bâtiment - Verrous de portes et de fenêtres - Prescriptions et méthodes d'essai

Baubeschläge - Tür- und Fensterriegel - Anforderungen und Prüfverfahren

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

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 12051:1999 E

Contents

Foreword

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

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of an identical text or by endorsement, at the latest by April 2000, and conflicting national standards shall be withdrawn at the latest by April 2000.

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

This European Standard is one of a series of European Standards dedicated to building hardware products.

Test methods are specified in detail to ensure reproducibility at any test establishment within Europe, and acceptance criteria are defined objectively to ensure consistency of assessment. No human intervention tests are included.

Normative annexes (A, B and C) and informative annex (D) to this European Standard are indicated in the contents.

Work is in progress to support the implementation of the European standards by evidence which demonstrates the conformity of the products to the technical requirements set out in those standards.

In order not to delay the publication of the present standard, those conformity assessment criteria related to door and window bolts will be published separately. They will be incorporated in this standard when next revised.

1 Scope

This European Standard specifies performance, security and safety requirements (including test methods) for single point bolts and their associated keeps, used to secure, or increase the security of, doors or windows in buildings; where operation is by lever, knob, slide, pull, etc, or removable implement (but not a multiple differ key) from the protected side of the leaf only. Spring engaging bolts, and bolts with locking facility are included if they are, by definition, bolts (see 3.1.1).

The following types are therefore included:

- barrel bolts, tower bolts;

- foot bolts, drop bolts, square spring bolts, garage door bolts;

- flush bolts (slide, knob, lever or automatic action);

- padlock bolts;

- locking bolts of the type where movement of the shoot is by hand, and action of the lock merely prevents withdrawal[1];

- privacy bolts;

- mortice bolts (operated by removable operating device, or fixed knob, lever etc).

This European Standard does not include Cremone/Espagnolette type bolts; nor does it include bolts used for emergency exit or panic devices.

2 Normative references

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

EN 1670	*Building hardware - Corrosion resistance - Requirements and test methods*.
prEN 1634-1	*Fire resistance test for door and shutter assemblies - Part 1: Fire doors and shutters.*
ISO 2336:1980	*Hand and machine hacksaw blades - Dimensions for lengths up to 450 mm and pitches up to 6,3 mm*

3 Definitions, symbols, and abbreviations

3.1 For the purposes of this standard, the following definitions apply:

3.1.1 bolt: A device for securing, or helping to secure, a door or window in the closed position, comprising a suitably guided moving member, operable from the protected side only by hand or foot, either directly using a knob or slide, or indirectly using a lever/handle or rack and pinion mechanism.

3.1.2 couple: Two equal and opposing linear forces that are parallel to, but not in line with each other.

3.1.3 cycle: The full range of movement from fully locked and secure to fully unlocked; and back to fully locked.

3.1.4 end: load: Load applied to the end of the shoot in the unlocking direction.

3.1.5 keep: The fitting (usually attached to the fixed outer frame or floor) which receives the shoot.

NOTE: For the purposes of this standard only, this term includes a locking plate, staple or socket where they perform the same function.

[1] Where there is a locking facility, the key recognition part of the mechanism is covered by prEN 12209-1 and/or EN 1303 as appropriate.

3.1.6 projection: The distance from the outer edge of the bolt housing to the end of the fully extended shoot, all clearance taken up in the inward direction.

3.1.7 resulting projection: Projection during or after the application of end load.

3.1.8 sawing: Attack method in which a hand-held saw is used in an attempt to cut through the shoot part of the bolt.

3.1.9 shoot: The sliding part of a door or window bolt.

3.2 For the purposes of this standard the symbols detailed in annex A apply.

4 Requirements

4.1 Category of use

Classification is in four grades, where grade 1 is the lowest, as follows:

- grade 1: light duty;
- grade 2: medium duty;
- grade 3: heavy duty;
- grade 4: extra-heavy duty.

When tested in accordance with 5.1, the category of use grading shall be determined by the amount of excess force (abuse) that can be resisted at the normal operating point of the lever, knob, etc, when the shoot is obstructed. Minimum forces for each grade shall be as shown in Table 1.

Table 1

Abuse forces		Grade				Unit
		1	2	3	4	
Linear force on end of exposed[1] lever, knob etc.	F1(1)	100	200	300	400	N
Linear force on restricted access Thumb slide, lever etc.	F1(2)	50	100	150	200	N
Force applied to extremities of Rotating knob, key etc.	C2	50	100	150	200	N
[1] "Exposed" means at least 10 mm between lever/knob and bolt body, otherwise F1(2) applies.						

4.2 Number of test cycles

Classification is in four grades, where grade 1 is the lowest.

When tested in accordance with 5.2, the product shall complete the following minimum number of cycles:

- grade 1: 2 500 cycles;

- grade 2: 5 000 cycles;

- grade 3: 10 000 cycles;

- grade 4: 50 000 cycles.

4.3 Door Mass

No requirement.

4.4 Fire safety

Classification is in two grades, as follows:

- grade 0: no fire safety requirement;

- grade 1: the product shall conform to the fire safety requirements detailed in annex B.

4.5 Safety in use

Classification is in two grades, as follows:

- grade 0: no safety in use requirement;

- grade 1: the product shall conform to the requirements detailed in 4.5.1 and 4.5.2.

4.5.1 Operation against a moderate side load

When tested in accordance with 5.5.1, the force required to withdraw the shoot, with side load applied, shall not exceed the appropriate value shown in Table 2.

4.5.2 Operation after a heavy side load

When tested in accordance with 5.5.2, the force required to withdraw the shoot, after a heavy side load has been applied, shall not exceed the appropriate value shown in Table 2.

Table 2

Normal operating forces	All grades	Unit
Linear force on end of exposed lever, knob etc F0(1)	100	N
Linear force on restricted access thumb slide, lever etc F0(2)	50	N
Force applied to extremities of rotating knob, key etc C1	50	N

4.6 Corrosion resistance

Classification is in five grades where grade 0 is the lowest (see Table 3).

4.6.1 Protection requirement

Products shall conform to the appropriate requirements of EN 1670 with corresponding gradings as shown in Table 3.

Table 3

Intended Use	Grade
Internal door	1
Inside of external doors	2
Outside of external door (normal environment)	3
Outside of external doors (extreme environment)	4
NOTE: Products which have no defined corrosion resistance are classified grade 0	

4.6.2 Test requirement

After testing in accordance with 5.6, operating forces shall not exceed the appropriate values shown in Table 2.

4.7 Security

Classification is in five grades, where grade 1 is the lowest (see Table 4).

The overall “security” grading is equal to the lowest individual grading.

4.7.1 Resistance to end load

When tested in accordance with 5.7.1, the bolt shall resist a minimum end load, applied to the shoot, of F2 (see Table 4) and still conform to 4.7.2.

4.7.2 Resulting projection

When tested in accordance with 5.7.2, the shoot projection shall not, at any time, be less than L1 (see Table 4).

4.7.3 Resistance to sawing

When tested in accordance with 5.7.3, the shoot shall resist sawing for a minimum time T2 (see Table 4) and afterwards conform to 4.7.4.

4.7.4 Resistance to side load

When tested in accordance with 5.7.4, the bolt shall resist a minimum side load, applied to the shoot, of F3 (see Table 4).

Table 4

Security requirement		Grade					Unit
		1	2	3	4	5	
4.7.1	Resistance to end load F2	0	1 500	3 000	4 000	5 000	N
4.7.2	Resulting projection L1	12	12	12	15	17	mm
4.7.3	Resistance to sawing for time T2	0	0	0	2	5	min
4.7.4	Resistance to side load F3	500	1500	4 500	7 000	10 000	N

5 Test Methods

Six test samples (of any bolt tested) shall be used for testing to this European Standard. Samples used in each test, and test sequences are shown in annex C.

5.1 Category of use (abuse test)

5.1.1 The bolt shall be fitted to a wood block as recommended in manufacturer's instructions, and mounted in a test apparatus where the throwing movement of the shoot can be restricted.

5.1.2 With the shoot obstructed at a projection L2, of 6mm ± 0,5mm, a force F1(1), F1(2), or C2 as appropriate (see Table 1) shall gradually be applied (within 1 min) to the normal operating point on the lever, knob, etc (see Figure 1) and held for a time T1 of 60 s ± 3s.

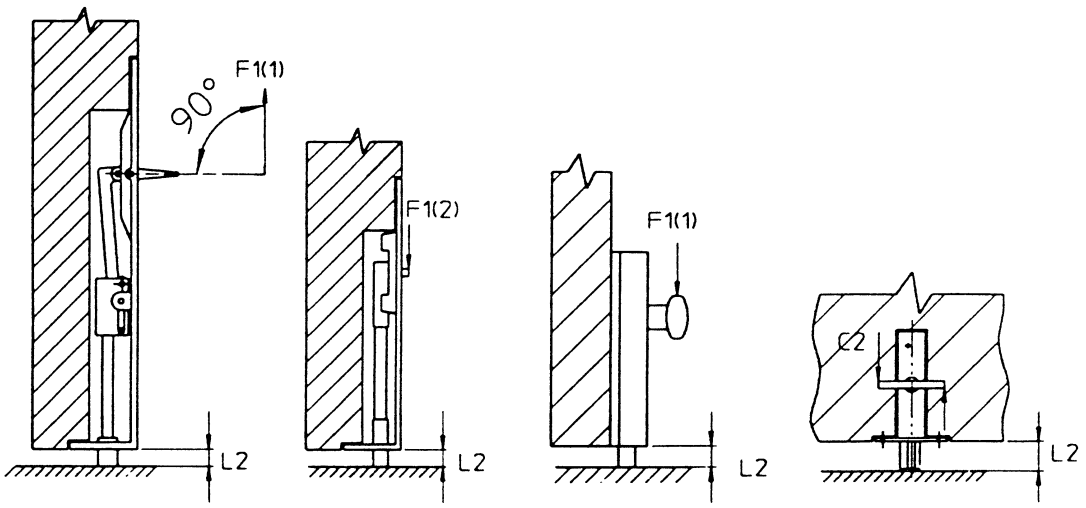


Figure 1

5.1.3 After the test, the shoot shall still be capable of moving through a normal operating cycle. At no point in the cycle shall the operating forces exceed F0(1), F0(2) or C1, as appropriate (see Table 2).

5.2 Number of test cycles

When installed in accordance with the manufacturer's instructions, and mounted in a suitable fixture, the bolt shall be operated using knob, handle, lever, etc, through the appropriate number of complete cycles, as specified in 4.2, at a speed not exceeding one cycle per second. No additional lubrication shall be permitted before or during the test.

5.3 Door Mass

No test.

5.4 Fire Safety

See annex B.

5.5 Safety in use

5.5.1 Operation against a moderate side load

The following test method shall apply:

a) The bolt and keep shall be mounted as for 5.7.4;

b) With the shoot fully extended, a side load F5 of 250 N ± 5 N acting at the edge of the moving leaf, and resisted at a distance L2, of 6 mm ± 0,5 mm shall gradually be applied (within 1 min) and held for the duration of the test;

c) With the side load on the bolt, an operating force shall be applied to withdraw the shoot, and at no point in the travel shall it exceed F0(1), F0(2) or C1 as appropriate (see Table 2 and Figure 2).

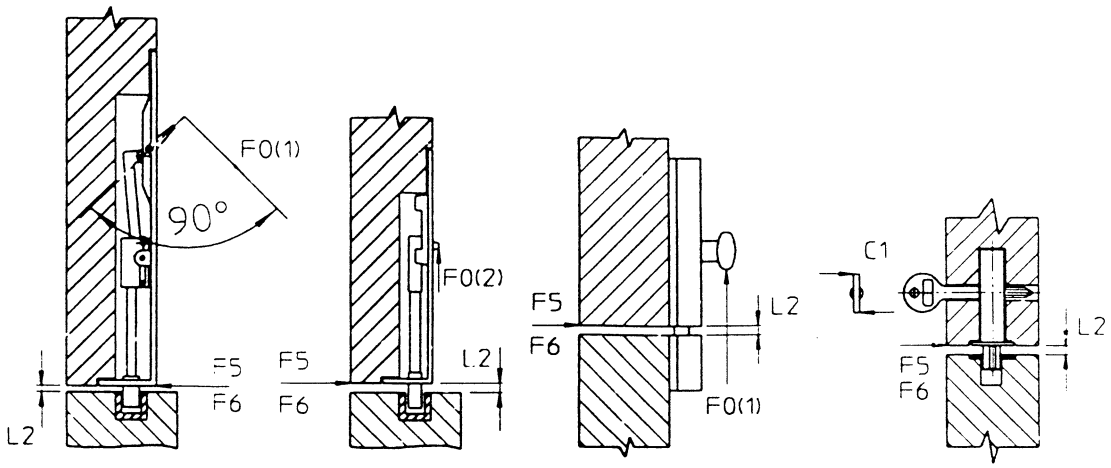


Figure 2

5.5.2 Operation after a heavy side load

The following test method shall apply:

a) The bolt and keep shall be mounted as for 5.7.4;

b) With the shoot fully extended, a side load F6 of 1 kN ± 10 N acting at the edge of the leaf, and resisted at a distance L2, of 6 mm ± 0,5 mm shall be applied gradually (within 1 min), and held for a T1 of 60 s ± 3 s;

c) An operating force shall then be applied to withdraw the shoot, and at no point in the travel shall the force exceed F0(1), F0(2), or C1 as appropriate (see Table 2 and Figure 2).

5.6 Corrosion resistance

Products shall be subjected to a neutral salt spray test as detailed in European Standard EN 1670, to determine their ability to operate after environmental exposure, the duration of the test being dependent on the grading number, as follows:

- grade 1: 24 h $\pm$ 1 h;
- grade 2: 48 h $\pm$ 1 h;
- grade 3: 96 h $\pm$ 2 h;
- grade 4: 240 h $\pm$ 2 h.

Lubrication is permitted at the start of the test as recommended by the manufacturer in the operating instructions, but no lubrication, or operation, shall be permitted during the test.

A drying out period of a minimum of 24 h shall be allowed before subjecting the product to an operation test which consists of operating the shoot through one complete cycle. At no point in the cycle shall the operating forces exceed F0(1), F0(2), or C1 as appropriate (see Table 2).

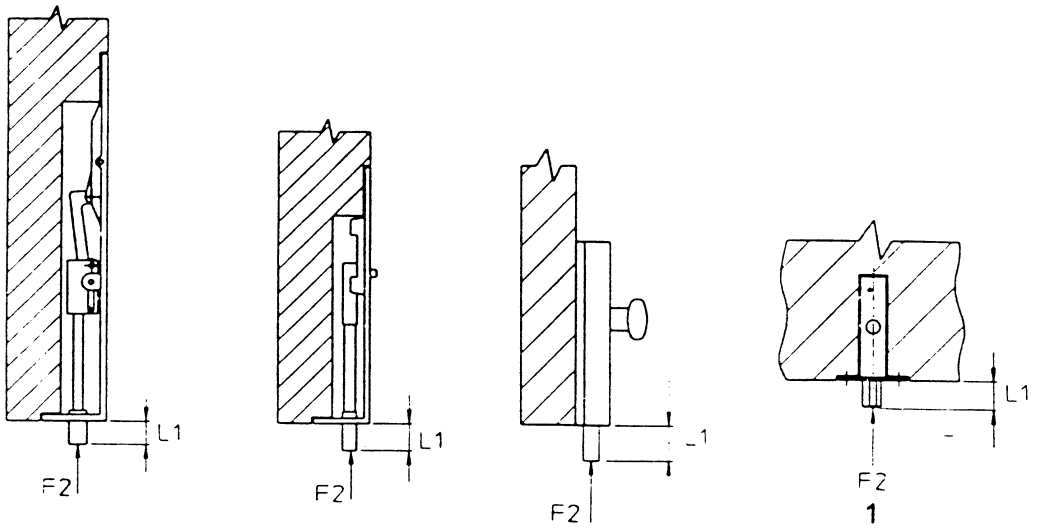
NOTE: For the purposes of this standard, the ability to operate after the test is the only criterion; appearance is irrelevant.

5.7 Security

5.7.1 Resistance to end load

5.7.1.1 With the shoot fully thrown, a force F2 (see Table 4) shall gradually be applied (within 60 s) to the end, in the direction of unlocking (see Figure 3), and held for a time T1 of 60 s $\pm$ 3 s.

5.7.1.2 After the test, the resulting projection shall be as specified in 4.7.2, and the bolt shall still operate with forces less than F0(1), F0(2) or C1, as appropriate (see Table 2).



1. key removed

Figure 3

5.7.2 Resulting projection

Readings of shoot projection shall be taken during and after test 5.7.1, and the lowest reading noted.

5.7.3 Resistance to sawing

The following test method shall apply:

a) The bolt shall be mounted in a suitable holding fixture for use with a sawing machine, as shown in Figure 4, with the shoot fully extended;

b) Saw blades used shall be to the ISO 2336:1980 or equivalent;

c) Tension on the blade shall be 1 000 N $\pm$ 50 N;

d) The saw blade shall be applied to the shoot within a region corresponding to the door/window gap;

e) Sawing shall be continued for a time T2 (see Table 4);

f) Applied force on saw blade shall be 90 N $\pm$ 5 N;

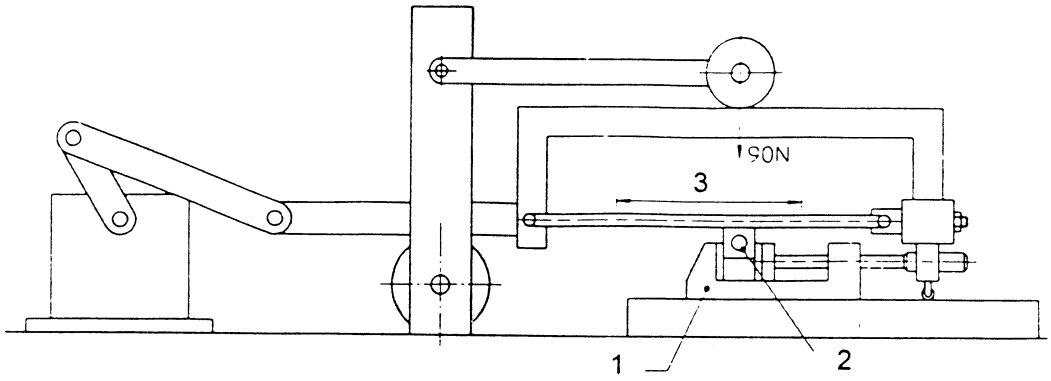
g) Sawing speed shall be 60 $\pm$ 5 strokes per minute;

h) The length of stroke shall be $165\ ^{+5}_{0}$ mm;

i) 1 minute shall be allowed for every blade change;

j) There shall be a maximum of two blade changes;

k) After this test the bolt shall pass the corresponding side load test (see 5.7.4).



1. Holding fixture
2. Product under test
3. 165 mm stroke

Figure 4: Typical test apparatus (sawing test)

5.7.4 Resistance to side load

The following test method shall apply:

a) The bolt and keep shall be tested in combination (as they would be applied in a normal situation);

b) Both parts shall be screwed to 40 mm thick, oak or equivalent, hardwood blocks, using the screws supplied by the manufacturer;

c) Hardwood blocks to be at least 50 mm larger, all round than the product being tested;

d) Where the application allows loading in more than one direction, (e.g. open in, open out, face fixing, edge fixing) a separate test shall be carried out for each direction;

e) Wood blocks shall be clamped as shown in Figure 6, restrained in such a manner as to allow appropriate relative movement;

f) The gap between the wood blocks shall be maintained at a distance L2 of 6 mm $\pm$ 0,5 mm;

g) With the shoot fully extended, a side load F3 (see Table 4) acting at the edge of the leaf in the door opening direction, shall gradually be applied (within 1 min) and held for a time T1 of 60 s $\pm$ 3 s (see Figure 5);

NOTE 1: Side load F3 is applied via wood block (see Figure 6).

h) After the test, the shoot shall still maintain a locking projection.

NOTE 2: The shoot does not have to work after this test.

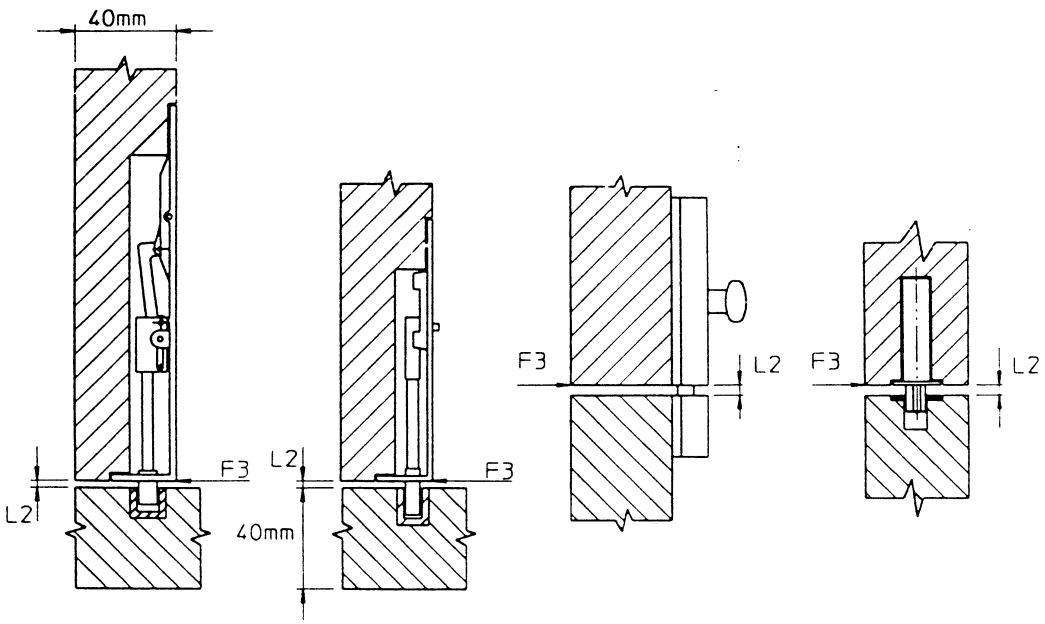
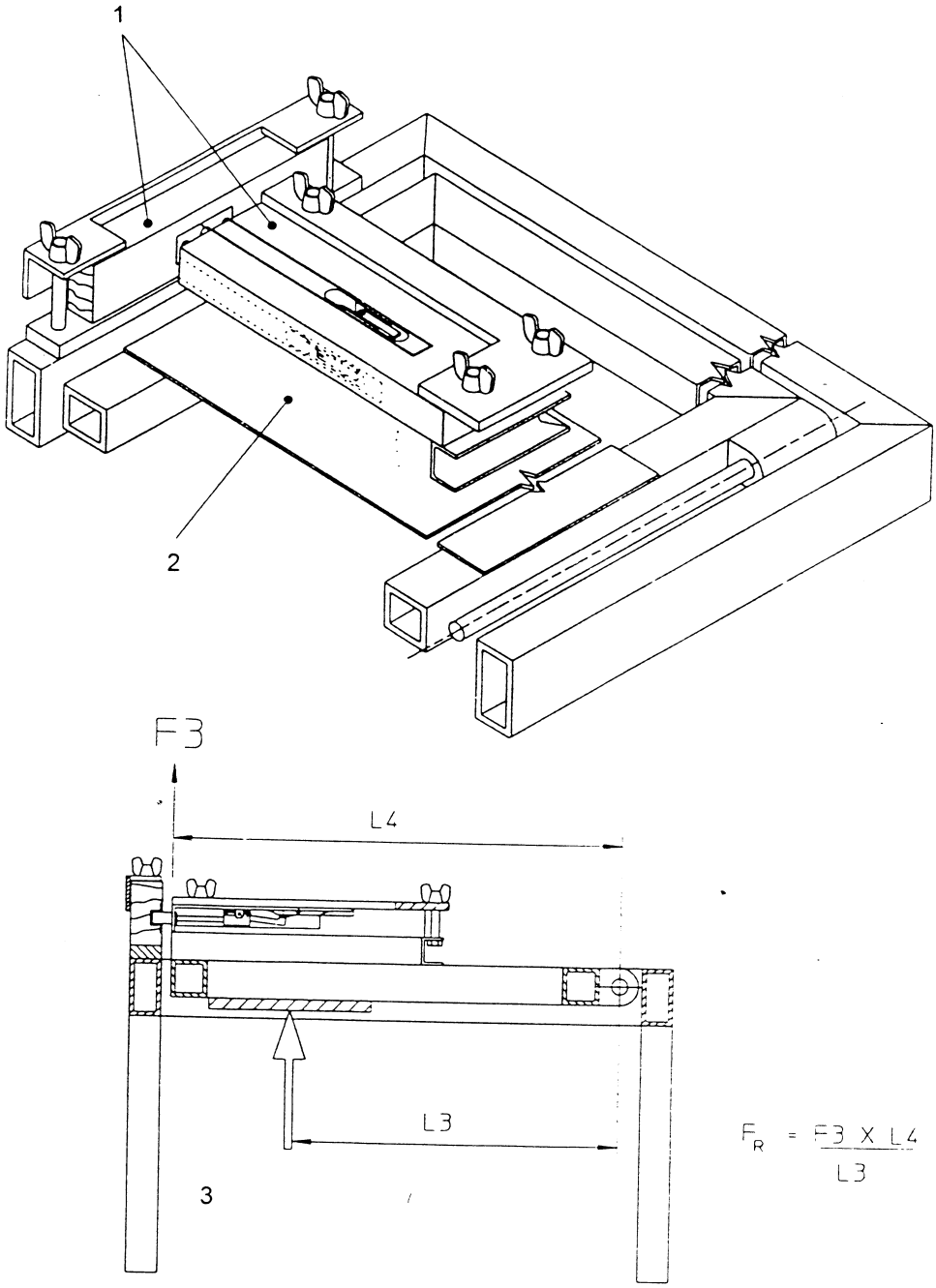


Figure 5



1. 40 mm wooden test blocks
2. Steel supporting structure
3. F_R (force on ram)

Figure 6: Typical test apparatus (side load test)

6 Classification

Classification shall be in the form of a seven digit code as shown in the following example:

3	3	-	0	1	3	4

The digits in each box represent the gradings for different attributes, as follows:

- box 1: category of use 1, 2, 3 or 4
- box 2: number of test cycles 1, 2, 3 or 4
- box 3: door mass (no requirement)
- box 4: fire resistance 0 or 1
- box 5: safety in use 0 or 1
- box 6: corrosion resistance 0, 1, 2, 3 or 4
- box 7: security 1, 2, 3, 4 or 5

7 Marking

The product and/or its literature, packaging etc (where indicated) shall be marked with the following:

a) Manufacturer's name or trademark, or other means of positive identification;

b) Classification according to clause 6 of this standard (may also be on the product's literature, labelling or packaging);

c) Number and date of this European Standard;

d) The month and year of final assembly by the manufacturer e.g. 0194 (= January 1994).

Annex A (Normative)

Symbols and applications

Table A.1 Symbols and applications

Symbol	Definition	Value (s)	Tolerance	Unit
C1	Force applied to extremities of rotating knob/key etc to operate bolt against F5, or after F2, F6, corrosion, or abuse test	50	Maximum	N
C2	Abuse force applied to extremities of rotating knob/key etc (category of use test 5.1)	(refer to Table 1)	Minimum	N
F0(1)	Linear force on end exposed [1] lever/knob, to operate bolt against F5, or after F2, F6, corrosion or abuse test	100	Maximum	N
F0(2)	Linear force on restricted access thumb slide/lever etc, to operate bolt against F5, after F2, F6, corrosion or abuse test	50	Maximum	N
F1(1)	Abuse force on end of exposed lever/knob (category of use test 5.1)	(refer to Table 1)	Minimum	N
F1(2)	Abuse force on restricted access thumb slide/lever etc (category of use test 5.1)	(refer to Table 1)	Minimum	N
F2	Side load on bolt (security test 5.7.1)	(refer to Table 4)	Minimum	N
F3	Side load on bolt (security test 5.7.4)	(refer to Table 4)	Minimum	N
F5	Side load on bolt during safety in use test 5.5.1	250	$\pm$ 5	N
F6	Side load on bolt during safety in use test 5.5.2	1 000	$\pm$ 10	N
L1	Resulting projection during/after application of force F2	(refer to Table 4)	Minimum	mm
L2	Door gap (tests 5.1, 5.5.1, 5.5.2, and 5.7.4)	6	$\pm$ 0,5	mm
T1	Duration of applied loads F1(1), F1(2), F2, F3, F6, and C2	60	0	s
T2	Sawing time (security test 5.7.3)	(refer to Table 4)	Minimum	min

[1] Exposed means at least 10 mm between lever/knob and bolt body for finger /thumb access, otherwise F0(2) or F1(2) applies

Annex B (normative)

Additional requirements for bolts intended for use on fire/smoke door assemblies

The bolt representative of its type, shall be subjected to a valid fire test, according to prEN 1634-1 to prove the effect of the bolt on the fire resistance of the complete door assembly. (See also, annex D.)

NOTE: It is not considered necessary for the bolt to be operable following such a fire test.

Annex C (normative)

Test sampling and sequencing

Six test samples (marked A, B, C, D, E and F) shall be subjected to a sequence of tests, as shown in the following table:

Table C.1

	Samples A and D	Samples B and E	Samples C and F
First Test	Corrosion test	Excess force (abuse) test	Operation with side load test
Requirement reference	4.6.2	4.1	4.5.1
Test reference	5.6	5.1	5.5.1
Second test	Durability test	Durability test	Operation after heavy side load test
Requirement reference	4.2	4.2	4.5.2
Test reference	5.2	5.2	5.5.2
Third test	Sawing test	Sawing test	End load test
Requirement reference	4.7.3	4.7.3	4.7.1
Test reference	5.7.3	5.7.3	5.7.1
Fourth test	Side load test	Side load test	Side load test
Requirement reference	4.7.4	4.7.4	4.7.4
Test reference	5.7.4	5.7.4	5.7.4

Annex D (informative)

Relationship of bolts to fire resisting doors

The design and construction of fire doors and their hardware are very specialized and many combinations of door construction and hardware are possible. To avoid the risks of incorrect use of bolts, it is suggested that the following information be taken into consideration.

D1. Bolts on fire resisting doors can be made of metals with a sufficiently high melting point to survive periods of raised temperature in fires or fire tests, but the position they occupy on a door, and the construction of the door, can have a critical effect on the fire resistance of the door assembly.

D2 Bolts morticed into the door can gain protection from the surrounding wood, but the substitution of wood with a metallic object, could reduce the “burn through” resistance of the leaf.

D3. The construction of fire resisting doors includes wood, steel, plastic etc. A bolt which has passed on one material will not, pass on another.

D4. The thickness of the door leaf directly affects the fire performance, as does the provision of any intumescent, or other protective material, to the bolt or door.

D5. The material, dimensions, and fixing of keeps can also have an effect on the fire performance.

NOTE: Until a European Standard for fire testing is available, existing national regulations for fire testing can be used.

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