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English Version

Building hardware - Cylinders for locks - Requirements and test methods

Quincaillerie pour le bâtiment - Cylindres de serrures - Exigences et méthodes d'essai

Schlösser und Baubeschläge - Schließzylinder für Schlösser - Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 19 March 2015.

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Foreword

This document (EN 1303:2015) 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of an identical text or by endorsement, at the latest by December 2015, and conflicting national standards shall be withdrawn at the latest by December 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1303:2005.

The European Federation of Associations of Lock and Builders Hardware Manufacturers, ARGE, collaborated in the drafting of this European Standard.

The main changes from the previous edition are to be found as follows:

a) Definition 3.7: New definition for "movable detainer";

b) Subclause 4.7.2: Temperature change from − 20 °C and + 80 °C to − 25 °C and + 65 °C;

c) Subclause 4.9.5: Plug extraction, two Grades A and B without extraction added; Grade C with 10 kN replaces grade 1; Grade D replaces grade 2;

d) Clause 5: Added headline: Test - General and test apparatus;

e) Subclause 6.9.4: Plug extraction test method developed;

f) Subclause 7.5: Grade 1 replaced with grade A and grade B (see Annex A);

g) Subclause 7.9: Additional grades for attack resistance introduced;

h) Subclause 7.9: New grading for attack resistance (0, A to D), see new Annex E;

i) Annex A: Suitability for use on fire/smoke resistant doors (normative);

j) Annex A: Grade A for smoke added. Grade 1 replaced with Grade B;

k) Annex B: Tables of test sequence (informative);

l) Annex C: Product information (informative);

m) Annex D: Manufacturers declaration (informative);

n) Annex E: Comparison table between EN 1303:2005 and EN 1303:2015 (informative).

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

Introduction

The aim of the test methods described in this standard is to keep human influence on the test results to a minimum, thus improving reproducibility.

The suitability of cylinders for use on fire or smoke-door assemblies is determined by fire performance tests conducted in addition to the performance testing required by this standard. Since suitability for use on fire doors is not essential in every situation the manufacturer has the option to state if the cylinder conforms to these additional requirements or not. If so claimed, cylinders will comply with the requirements in Annex A.

1 Scope

This European Standard applies to cylinders and their keys for such locks as are normally used in buildings and are designed to be used with cylinders, where the locks have an operational torque of maximum 1,2 Nm.

This European Standard specifies performance and other requirements for the strength, security, durability, performance and corrosion resistance of cylinders and their original keys. It establishes one category of use, three grades of durability, three grades for fire and four grades corrosion resistance all based on performance tests as well as six grades of key related security based on design requirements and five grades on performance tests that simulate attack.

This European Standard includes tests of satisfactory operation at a range of temperatures. It specifies test methods to be used on cylinders and their protective measures linked with these cylinders and recommended by the manufacturer.

Corrosion resistance is specified by reference to the requirements of EN 1670 on corrosion resistance of building hardware.

The suitability of cylinders for use on fire or smoke-door assemblies is determined by fire performance tests conducted in addition to the performance testing required by this standard. Since suitability for use on fire doors is not essential in every situation the manufacturer has the option to state if the cylinder conforms to these additional requirements or not. If so claimed, cylinders will comply with the requirements in Annex A.

On occasions there may be a need for additional functions within the design of the cylinder. Purchasers should satisfy themselves that the products are suitable for their intended use.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 636, *Plywood — Specifications*

EN 1634-1, *Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Part 1: Fire resistance test for door and shutter assemblies and openable windows*

EN 1634-2, *Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware - Part 2: Fire resistance characterisation test for elements of building hardware*

EN 1634-3, *Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Part 3: Smoke control test for door and shutter assemblies*

EN 1670, *Building hardware - Corrosion resistance - Requirements and test methods*

EN 1906:2012, *Building hardware - Lever handles and knob furniture - Requirements and test methods*

EN ISO 10666, *Drilling screws with tapping screw thread - Mechanical and functional properties (ISO 10666)*

EN ISO 15480, *Hexagon washer head drilling screws with tapping screw thread (ISO 15480)*

EN ISO 15481, *Cross recessed pan head drilling screws with tapping screw thread (ISO 15481)*

EN ISO 15482, *Cross recessed countersunk head drilling screws with tapping screw thread (ISO 15482)*

EN ISO 15483, *Cross recessed raised countersunk head drilling screws with tapping screw thread (ISO 15483)*

ISO 10899, *High-speed steel two-flute twist drills — Technical specifications*

3 Terms and definitions

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

3.1
cylinder
device, usually distinct from its associated lock or latch, operated by a key

3.2
cam
component of the cylinder to provide the movement to effect locking

3.3
effective differ
difference between cylinders of similar design, achieved only by the movable detainer, which allows each cylinder to be operated only by its own key

3.4
direct code
marking on the key where the key steps can be determined without reference to another data source

3.5
key
separate device corresponding to the cylinder, which can mechanically operate the cylinder

3.6
keyway
aperture extending along the whole or part of the length of the plug into which the key is inserted

3.7
movable detainer
permutable part of the mechanism of a cylinder which should first be moved by the key into a pre-determined position before the key and/or plug can move

3.8
plug
part of a cylinder that can be moved when the proper key is used

3.9
steps
characteristics of a key which operates movable detainers

4 Requirements

4.1 General

The structure of this clause reflects the classification in accordance with Clause 7.

4.2 Category of use — Key strength

The key shall not break under the applied torque of 2,5 Nm.

After the test, the key shall be capable of being removed from the cylinder and re-used to operate the same cylinder with a torque not exceeding 1,5 Nm.

Tested in accordance with 6.2.

4.3 Durability

It shall be possible to operate the cylinders with a new original key the number of test cycles specified in Table 1.

Tested in accordance with 6.3.

Table 1 — Number of cycles

Durability	Number of cycles
Grade 4	25 000
Grade 5	50 000
Grade 6	100 000

4.4 Door mass

There is no requirement on the cylinder related to the door mass.

4.5 Suitability for use on fire resistant / smoke control doors

The cylinder shall conform to the requirements of Annex A.

Verified in accordance with 6.5.

4.6 Safety

There is no requirement on the cylinder related to safety.

4.7 Corrosion resistance and operation at extreme temperatures

4.7.1 Corrosion resistance

It shall be possible to operate the cylinder with its proper key using a maximum torque of 1,5 Nm after tested according to grade 3 of EN 1670.

This corrosion test shall apply to the functionality only.

No distinction is made between the inside and the outside of cylinder and/or door.

Tested in accordance with 6.7.1.

4.7.2 Operation at extreme temperatures

It shall be possible to operate the cylinder with its proper key using a maximum torque of 1,5 Nm at both − 25 °C and + 65 °C.

Tested in accordance with 6.7.2

4.8 Key related security

4.8.1 Minimum number of effective differs

The number of effective differs is equal to the number of theoretical differs after deduction of the differs suppressed by the manufacturer due to technical constraints and those differs suppressed in accordance with the restraints of 4.8.3.

The minimum number of effective differs shall be as indicated in Table 2.

The number of effective differs shall be verified in accordance with 6.8.1.

4.8.2 Minimum number of movable detainers

A movable detainer shall have minimum 3 permutable characteristics (position, layer, height or other technical distinction).

The minimum number of movable detainers shall be as indicated in Table 2.

The number of movable detainers shall be verified in accordance with 6.8.2.

4.8.3 Maximum number of identical steps

The choice of key steps for movable detainer operation which have the same operating level shall be restricted as indicated in Table 2.

Maximum identical adjacent key steps are allowed as indicated in Table 2.

The requirements are related to one row only of movable detainers.

The number of identical steps shall be verified in accordance with 6.8.3.

4.8.4 Direct coding on key

Direct key coding shall not be permitted on keys for the key related security grades 3 to 6 as specified in Table 2.

4.8.5 Operation of security mechanism (inter-passing)

For the key related security grades 1, 2 and 3, it shall not be possible before the durability test to operate the cylinder with the next closest key to its own key using a torque of ($1{,}5\ ^{+0,2}_{0}$) Nm.

For the key related security grades 4, 5 and 6, it shall not be possible before and after the durability test to operate the cylinders with the next closest key to its own key using a torque of ($1{,}5\ ^{+0,2}_{0}$) Nm.

Tested in accordance with 6.8.5.

4.8.6 Torque resistance of plug/cylinder relevant to key related security

It shall not be possible to rotate the plug and/or cylinder in the key related security grades 1 to 6, using the specified applied torque as indicated in Table 2.

Tested in accordance with 6.8.6.

Table 2 — Summary key related security

Clause	Requirement	Test clause	Parameter	Grades						Unit
				1	2	3	4	5	6	
4.8.1	Min. number of effective differs	6.8.1	-	100	300	15000	30000	30000	100000	No
4.8.2	Min. number of movable detainers	6.8.2	-	2	3	5	5	6	6	No
4.8.3	Max. number of identical steps [c]	6.8.3	-	100	70	60	60	60	50	%
	Max number of identical adjacent steps		-	-	2	2	2	2	2	No
4.8.4	Direct coding on key	6.8.4	-	-	-	No	No	No	No	-
4.8.5	Operation of security mechanism (Interpassing)	6.8.5	Torque	1,5 [a]	1,5 [a]	1,5 [a]	1,5 [b]	1,5 [b]	1,5 [b]	Nm
4.8.6	Torque resistance of plug/cylinder	6.8.6	Torque	2,5	5	15	15	15	15	Nm

[a] Tested before the durability test.

[b] Tested before and after the durability test.

[c] Rounded to the lower integer

4.9 Attack resistance

4.9.1 General

The cylinders, including any reinforcement or protection device supplied with them shall be tested as one unit.

In case of a double cylinder, it is assumed that the grades for the attack resistance apply to the attack side / outside of the cylinder. This side shall have a proper indication, either on the product or on the documents with the product. If both sides are identical, it is not necessary to put an indication on the product.

4.9.2 Resistance to attack by drilling

It shall not be possible to rotate the cam using a maximum torque of 5 Nm without the correct key, after the drilling time specified in Table 3.

It is not necessary for the correct key to operate the cylinder after testing.

Testing in accordance with 6.9.1.

4.9.3 Resistance to attack by chisel

It shall not be possible to rotate the cam using a maximum torque of 5 Nm without the correct key, after the number of blows specified in Table 3.

It is not necessary for the correct key to operate the cylinder after testing.

Testing in accordance with 6.9.2.

4.9.4 Resistance to attack by twisting

It shall not be possible to rotate the cam using a maximum torque of 5 Nm without the correct key, after the number of twists specified in Table 3.

It is not necessary for the correct key to operate the cylinder after testing.

Testing in accordance with 6.9.3.

4.9.5 Resistance to attack by plug / cylinder extraction

It shall not be possible to extract the plug or cylinder to rotate the cam or operate the lock with the requirements specified in Table 3.

It is not necessary for the correct key to operate the cylinder after testing.

Testing in accordance with 6.9.4.

4.9.6 Torque resistance of plug/cylinder relevant to attack resistance

It shall not be possible to rotate the plug and/or cylinder with a torque applied to the plug specified in Table 3.

Tested in accordance with 6.9.5.

Table 3 — Summary attack resistance

Clause	Requirement	Test clause	Parameter	Grades					Unit
				0	A	B	C	D	
4.9.2	Resistance to drilling	6.9.1	Time Net/Total	-	3/5	5/10	3/5	5/10	Min.
4.9.3	Resistance to attack by chisel	6.9.2	Blows	-	30	40	30	40	No
4.9.4	Resistance to attack by twisting	6.9.3	Twists	-	20	30	20	30	No
4.9.5	Resistance to attack by plug/cylinder extraction	6.9.4	Force Net/Total	-	-	-	10 5/15	15 5/15	kN min
4.9.6	Torque resistance of plug/cylinder	6.9.5	Torque	- [a]	20	30	20	30	Nm

[a] See requirement of key related security 4.8.6.

5 Test – General and test apparatus

5.1 General

In order to minimize the number of samples to be tested some samples may be used for several tests.

In the event of a test failure it shall not, at that point, be considered a failure to meet the standard. Two further cylinders, with the same design, shall be tested according to the failed test and both of them shall pass the test.

In case of a double cylinder, it is assumed that the grades for key related security apply to the attack side / outside of the cylinder. This side shall have a proper indication, either on the product or on the documents with the product. If both sides are identical it is not necessary to put an indication on the product.

Where a product range is submitted for evaluation the test authority shall consider each individual test for each cylinder type. Where (by engineering judgement) it can be shown that a weaker or equivalent cylinder type is to be evaluated then no further testing needs to be carried out.

Check the cylinders and keys conform to 4.8.1 to 4.8.6 before commencing the performance tests.

An example of a test sequence is shown in Annex B.

If additional instructions for testing are required, the manufacturer shall supply such additional instructions. These additional instructions shall be documented in the test report.

5.2 Test rigs and apparatus

The test rigs described in this document are examples of principal unless specific design or measures are shown in this standard.

The test apparatus shall be rigid enough to avoid influencing test measurements.

Instruments with an accuracy of ± 1,5 % of measured values, or better, shall be used for measurements in accordance with these test methods.

All durability testing equipment shall include means of recording the number of cycles attained.

6 Test methods – procedures

6.1 General

Cylinders and their original keys shall be taken at random and submitted for testing according to Annex B.

Throughout this European Standard, the following tolerances shall apply, unless otherwise specified:

— mass in kilograms or grams (kg or g): ± 5 %,

— length in millimetres (mm): ± 2 %,

— force in kilo Newton or Newton (kN or N): ± 2 %,

— torque in Newton metres (Nm): ± 5 %,

— time in seconds or minutes (s or min): ± 5 %,

— temperature in degrees Celsius (°C): ± 2 °C.

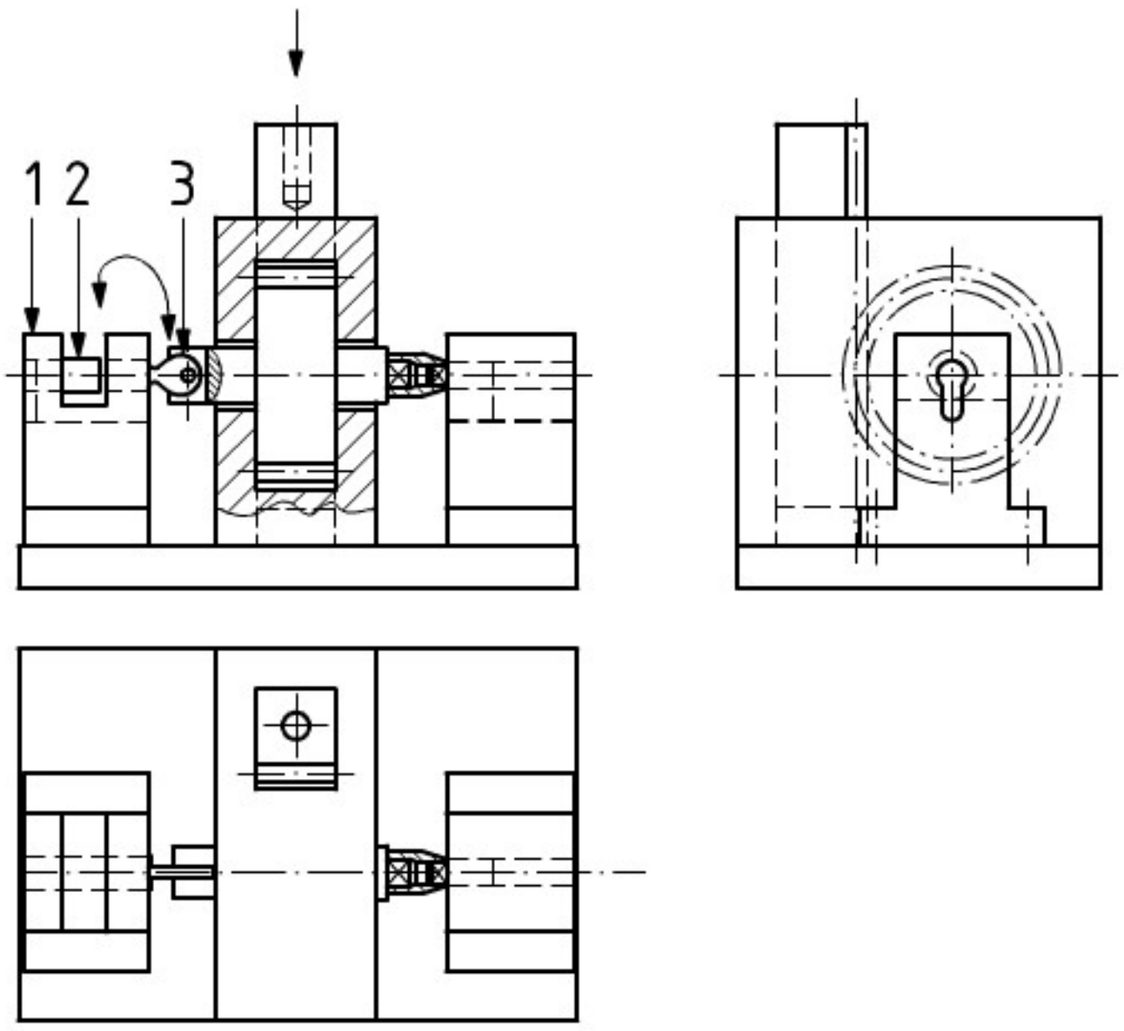
6.2 Key strength

The requirements of 4.2 shall be satisfied.

The cylinder shall be mounted, with the cam blocked against rotation, in the metal fixture illustrated in Figure 1. The correct key shall be fully inserted in the cylinder and a torque of (2,5 ± 0,1) Nm applied to it without shock for a period of $(5\ ^{+1}_{0})$ s.

The cam shall then be unblocked.

The key shall than be removed, reinserted and shall operate the cylinder with a torque not exceeding 1,5 Nm without torque on the cam.



Key

1 fixture

2 cylinder

3 key

Figure 1 — Metal fixture for testing key strength, operation of security mechanism and torque resistance of plug and or cylinder

6.3 Durability tests — Standard test cycles

The cylinder shall conform to the requirements of 4.3.

The durability test shall be carried out on the cylinder using a test apparatus; see Figure 2. The apparatus shall incorporate means for carrying out the following standard test cycle:

a) insert the key;

b) rotate it clockwise to 360° or to the maximum rotation limit of the design; during the rotation, the key shall overcome a torque applied to the cam of $(0,15^{+0,15}_{-0,05})$ Nm at least once to ensure that the cam will drive the deadbolt;

c) withdraw the key;

d) insert the key;

e) rotate it anticlockwise to 360° or to the maximum rotation limit of the design. During the rotation, the key shall overcome a torque applied to the cam of $(0,15^{+0,15}_{-0,05})$ Nm at least once to ensure that the cam will drive the deadbolt;

f) withdraw the key.

The plug shall be free from torque during insertion and withdrawal of the key. The resistive torque shall not be applied before and after an angle of 15° from the position of the key extraction.

Repeat the sequence at a speed of five to 12 cycles per minute.

During the cycle test, the key may remain partly inserted in the cylinder but shall have cleared all movable detainers.

The keys used for the durability test can be cleaned and the cylinder shall be lubricated according to instructions of the manufacturer at the start of the test and after each 5 000 cycles or with a lower frequency agreed between the manufacturer and the test lab, using a lubricant recommended by the manufacturer.

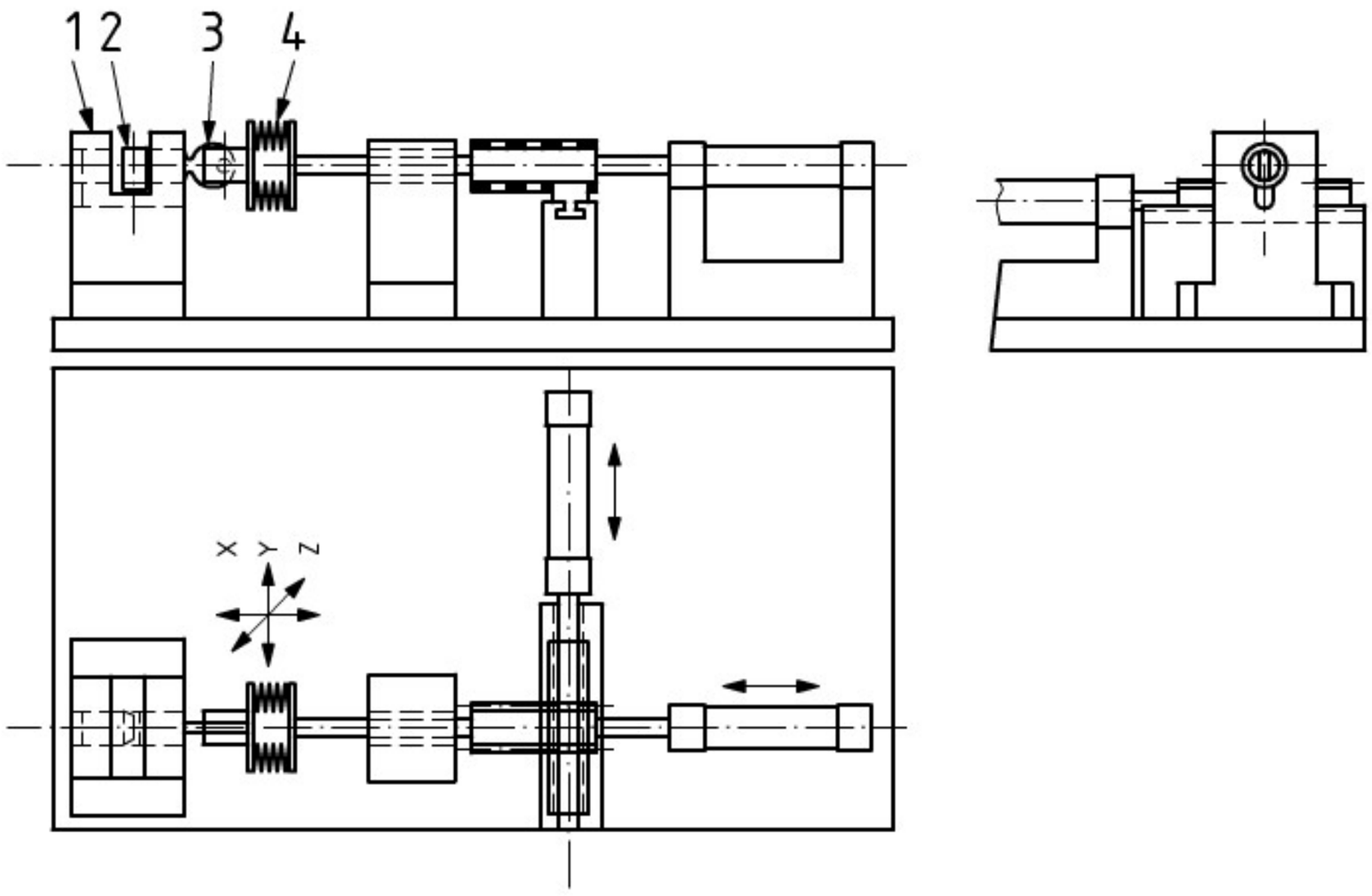
In cases where it is not possible to use the standard cycle sequence, the manufacturer shall, if so desired, specify an alternative sequence that conforms as closely as possible to the standard procedure. Subject to the approval of the testing authority the modified sequence shall then be used. The test report shall include a description of the special cycle used and the approval of the test authority.

If the cylinder should jam and cease to operate during the test, then providing the cylinder continues to operate in the proper manner when released, the test shall be allowed to continue.

After completion of the appropriate number of cycles the operation of the cylinders shall be tested using a new original key. The rotation shall be obtained with a maximum torque of 1,5 Nm without any load on the cam.

Where a cylinder is uniquely suitable for use with a particular lock unit, or where a cylinder is sold with and intended for use with a particular lock unit, then the cylinder shall be tested with the lock without applying the 0,15 Nm resistive torque in the test.

Insert the key to its correct position for operating the cylinder plug. Forces caused by misalignment should not result in the cylinder being damaged during the test.



Key

1 fixture

2 cylinder

3 key

4 flexible key guide

Figure 2 — Fixture for durability

6.4 Door mass

No tests.

6.5 Suitable for use on fire resistance / smoke control doors

Test methods reference is made to Annex A.

6.6 Safety

No tests.

6.7 Corrosion resistance and test of operation at extreme temperatures

6.7.1 Corrosion resistance

The cylinder shall be tested with a neutral salt spray in accordance with EN 1670 grade 3.

For this test the cylinder shall be mounted in a block in accordance with the manufacturer's instructions and placed in the cabinet that the cylinder is oriented in the manner that it would assume in use.

After the salt spray procedure, it shall be possible to operate the cylinder with the proper key using a maximum torque of 1,5 Nm within 5 min where the key may be inserted several times and/or moved in a rotating way.

This operational test shall be started within one min after completion of the salt spray test.

The cylinder may be lubricated before and/or during the operational test in accordance with the manufacturer’s instructions.

6.7.2 Test of operation at extreme temperatures

The cylinder and key shall be stabilized at room temperature (20 ± 5) °C for at least 24 h before the test.

The key shall be kept separately at the temperature mentioned above during the following tests.

Stabilize the cylinder in 20°C and 50 % RH for 1 h before lowering the temperature. The cylinder shall be cooled gradually by decreasing the temperature at a rate of (20 ± 1) °C per hour until a temperature of (- 25 ± 2) °C is attained. The test temperature shall be maintained for a minimum of 10 min and a maximum of 20 min, after which period the cylinder shall be operated with its correct key in the laboratory at ambient temperature at least once within 5 attempts within 5 min.

Stabilize the cylinder in 20°C and 50 % RH for 1 h before rising the temperature. The cylinder shall be heated gradually at a rate of (20 ± 1) °C per hour until a temperature of (65 ± 2) °C is attained. The test temperature shall be maintained for a minimum of 10 min and a maximum of 20 min after which period the cylinder shall be operated with its correct key in the laboratory at ambient temperature at least once within 5 attempts within 5 min.

6.8 Key related Security

6.8.1 Minimum numbers of effective differs

Check in accordance with manufacturer’s information.

6.8.2 Minimum number of movable detainer

Check in accordance with manufacturer's information.

6.8.3 Maximum number of identical steps

Check in accordance with manufacturer's information.

6.8.4 Direct coding on key

Check in accordance with manufacturer's information.

6.8.5 Operation of the security mechanism

The cylinders shall be fitted in a metal fixture as illustrated in Figure 1.

After verification of the function using the correct key, attempts shall be made to operate the cylinder in both directions by the next closest keys, according to the required security grade.

A torque of $(1,5^{+0,2}_{0})$ Nm shall be applied with a gentle increase of the torque and without shock to the bow of a fully and correctly inserted next closest key (one step up and one step down) taken from the manufacturer's chart which shall differ from the correct key by one-step at one position only.

During the test, the fixing in the test apparatus shall keep the next closest key fully inserted and maintained in that position. Clearances and tolerances between the key and cylinder shall be used in attempt to operate the cylinder with the torque above.

For security grades 1, 2 and 3, the tests shall be performed on new cylinders.

For security grades 4, 5 and 6, the tests shall be performed on cylinders that have first been subjected to the appropriate cycles for durability specified in 4.3.

The next closest keys, being different in one position only by one step, one step up and one step down defined by the manufacturer according to its key coding system as described for 4.8.5.

The choice of the code and the position shall be agreed between the lab and the manufacturer.

6.8.6 Torque resistance of plug and/or cylinder

All requirements of 4.8.6 shall be satisfied.

The cylinders shall be mounted in the metal fixture illustrated in Figure 1. A torque specified in Table 2 shall be applied to the plug by an appropriate tool. If the torque required cannot be applied, the cylinder shall be deemed to have passed the test.

6.9 Attack resistance

6.9.1 Resistance to drilling

The requirements of 4.9.2 shall be satisfied.

For attack resistance grades A, B, C and D, the cylinder shall be tested in an apparatus as illustrated in Figure 3.

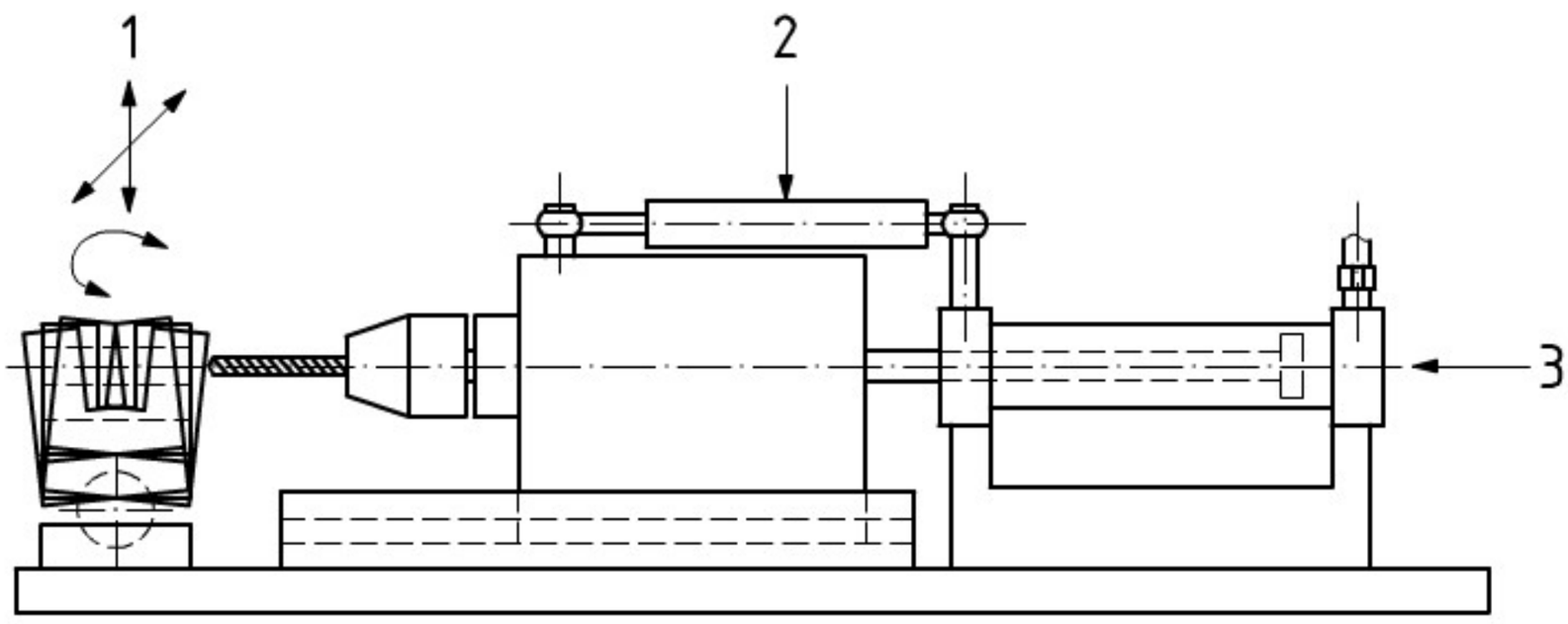
The cylinder, including any reinforcement or protection device(s) supplied with them, shall be mounted in a fixture with provision for the fitting of any necessary reinforcements or protection devices supplied with the cylinder. A 700 W ± 10 % (power consumption) drilling machine with a

speed of 500 r/min – 800 r/min shall be mounted on a sliding block. A force of (300 ± 25) N shall be applied axially to the drill without shock.

High speed steel drills (HSS) in accordance with ISO 10899 or equivalent shall be used with a maximum diameter of Ø12 mm. The test authority shall choose the actual diameter and the points of application to the face of the cylinder. A maximum of three drills per cylinder can be used. The drill shall not be a self-centring type.

After the angle is fixed between the drill and the cylinder, the drilling shall start and continue for the appropriate maximum net drilling time within the total time allowed for each test, including time taken to attempt rotation of the cylinder, as follows: within the allowed total test time, it shall not be possible to rotate the cam of the cylinder to the opening position for a lock case by means of a suitable tool using a maximum torque of 5 Nm.

Net time is the time during which the drill is in contact with the cylinder and need not be continuous. Total time starts when the drill first touches the cylinder and includes the drilling time and any time taken to operate the cylinder. After the cylinder has been installed, testing shall be carried out within the specified times. It shall not be possible to operate the cylinder within the total time.



Key

1 adjustable in x, y, z axis, maximum angles of ± 45°

2 shock absorber

3 pressure

Figure 3 — Test apparatus for resistance to drilling

6.9.2 Resistance to attack by chisel

The requirements of 4.9.3 shall be satisfied.

This test shall only be applicable to cylinders for attack resistance grades A, B, C and D.

The cylinders shall be tested in an apparatus as illustrated in Figure 4.

The test shall be carried out with a steel chisel (30 ± 1) mm wide, by (200 ± 20) mm long, with a bit angle of $(60\ ^{+5}_{0})°$ whose hardness is 52+6 Rockwell C.

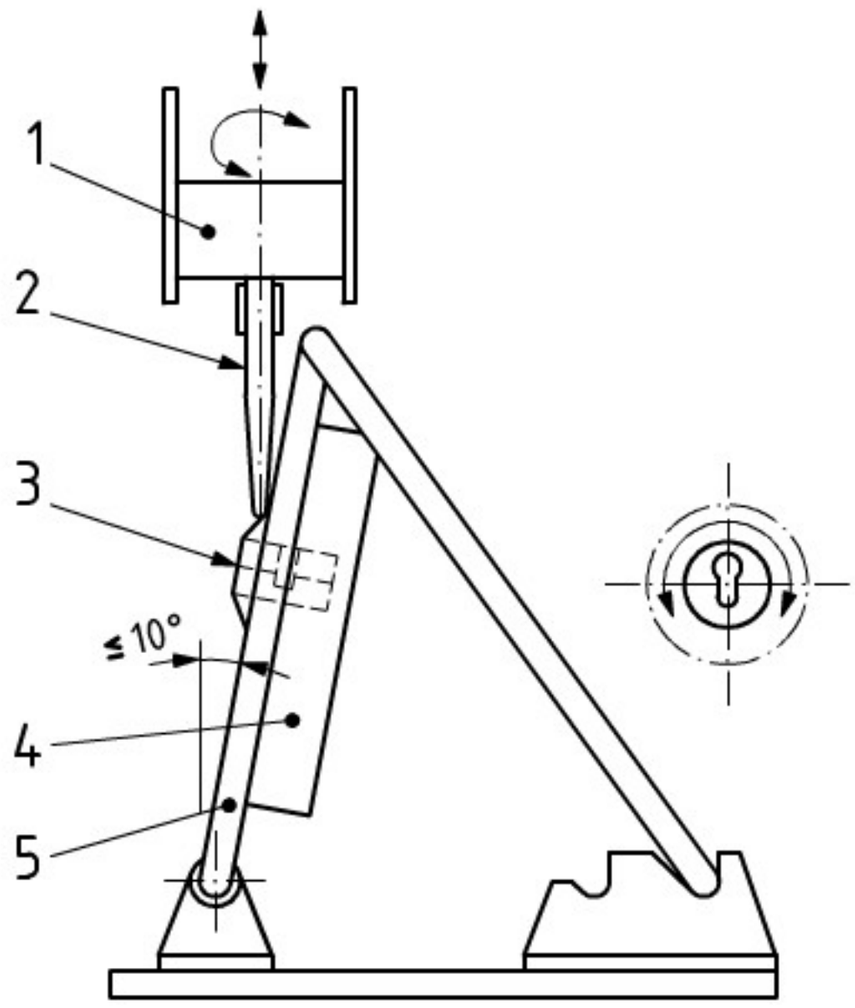
The cylinders, including any reinforcement or protection device supplied with them, shall be mounted on a wood test block to represent a door in accordance with the manufacturer's instructions, and the chisel applied to the protection or the cylinder at an angle not exceeding 10° from the plane of the surface of the test block. The wood test block shall be of laminated wood (bonding type, IF 20, quality II/II, EN 636, or similar) with the dimensions (100 ± 5) mm x (300 ± 5) mm x $(40\ ^{+2}_{0})$ mm. Thickness of the wood test block to be defined in accordance with the manufacturers mounting instructions. The

number of blows according to Table 3 shall be applied to the chisel by a drop hammer with a mass of (6 ± 0,25) kg and falling from a height of (700 ± 10) mm.

The test shall be discontinued if failure to comply with 4.9.3 becomes obvious during the test.

If the cylinder is fitted with furniture in accordance with EN 1906:2012, Annex A, then the security furniture shall meet with the requirements of the appropriate class. It shall be the responsibility of the manufacturer to provide the test institute with associated security furniture.

If the manufacturer's combination of escutcheon / security furniture prevents the chisel from being applied then it is deemed to have passed the test.



Key

1 drop hammer
2 chisel
3 cylinder
4 wood test block
5 fixture

Figure 4 — Test apparatus for attack by chisel

6.9.3 Resistance to attack by twisting

The requirement of 4.9.4 shall be satisfied.

This test shall only be applicable to cylinders in attack resistance grades A, B, C and D.

The cylinders, including any reinforcement or protection device(s) supplied with them, shall be fitted to a test apparatus as described in 6.9.2 in accordance with the manufacturer's instructions. Any suitable tool can be used to grip the cylinders and/or the protection device and an attempt shall be made to break them by twisting using an applied maximum torque of 250 Nm. The torque shall be applied progressively and without shock in 5 s and sustained for 4 s.

If the cylinder and/or its protecting device cannot be gripped and the cylinder does not project beyond the protecting device and/or face of the door more than 3 mm, than the test is passed.

The maximum twists performed for each security grade are specified in Table 3, half in each direction clockwise and anticlockwise.

The test shall be discontinued if failure to comply with 4.9.4 becomes obvious during the test.

6.9.4 Resistance to attack by plug/cylinder extraction

The cylinder, including a specified reinforcement or protection devices supplied as a unit, shall be mounted in the metal fixture as illustrated in Figure 5, Figure 6 or Figure 7 in accordance with the manufacturer's instructions.

The testing device can be adapted in accordance with the design of the cylinder.

A self-cutting traction screw to EN ISO 10666, EN ISO 15480, EN ISO 15481, EN ISO 15482 and EN ISO 15483 of a maximum diameter of ø5,5 mm shall be screwed into the plug/cylinder and an attempt made to withdraw the plug/cylinder by means of the appropriate maximum force specified in Table 3 applied progressively without shock within the time allowed. The time allowance begins from commencing to insert the traction screw.

The washer or traction tool shall be designed in such a way that it can be used without unscrewing the screw.

The diameter of the hole shall not be pre-drilled or enlarged to insert a screw of larger diameter than that inserted in the first attempt. The load shall be applied without removing and re-inserting the screw.

The pulling test is conducted with one screw only at the same time.

The screw or the plug shall not be lubricated before or during the attempt to insert the screw.

Perform a pull test on a screw which is screwed into the plug. The pulling shall continue until either:

1) the pulling force in Table 3 for the grade has been reached and held for 5 s or;

2) the whole cylinder is removed or;

3) the plug is removed from the cylinder or;

4) the screw is completely withdrawn from the plug or;

5) the screw is broken.

6) if the screw cannot be inserted or does not grip in the plug.

More than one pulling test is allowed on the same cylinder with different or the same screw diameters within the time for the test according to the grade in Table 3.

The screw shall not reach the coupling area of the cylinder (to prevent damage to the housing).

The cylinder shall be put horizontally before applying the screw.

The screw shall be applied parallel to the rotation of the cylinder plug.

The use of an electric screwdriver with a torque of (12 + 3) Nm is allowed and shall be specified in the test report.

The net time is defined as the time required to insert the screws, the time required to apply the pulling force and the time required to apply the torque to the cam.

The time starts when the screw touches the cylinder and ends when:

a) the maximum time is achieved; or

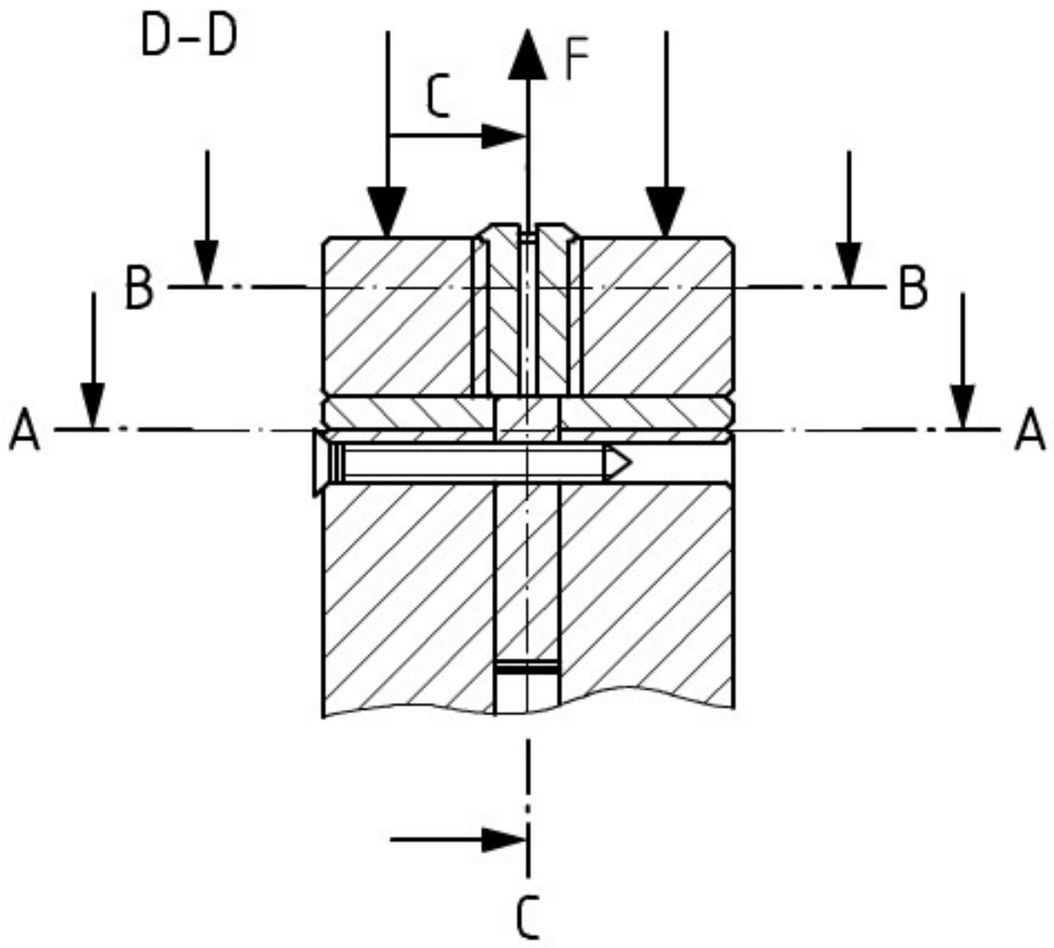
b) the cam turned with a torque of max 5 Nm in 360° or the angle corresponding to the normal turning of the cylinder; or

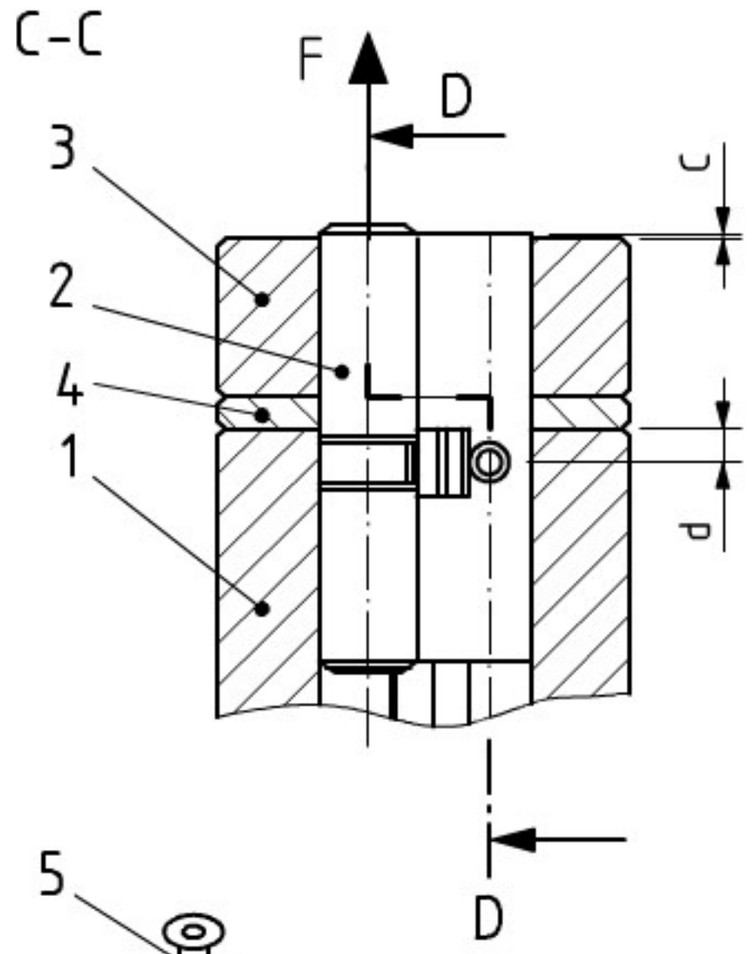
c) termination by the test operator.

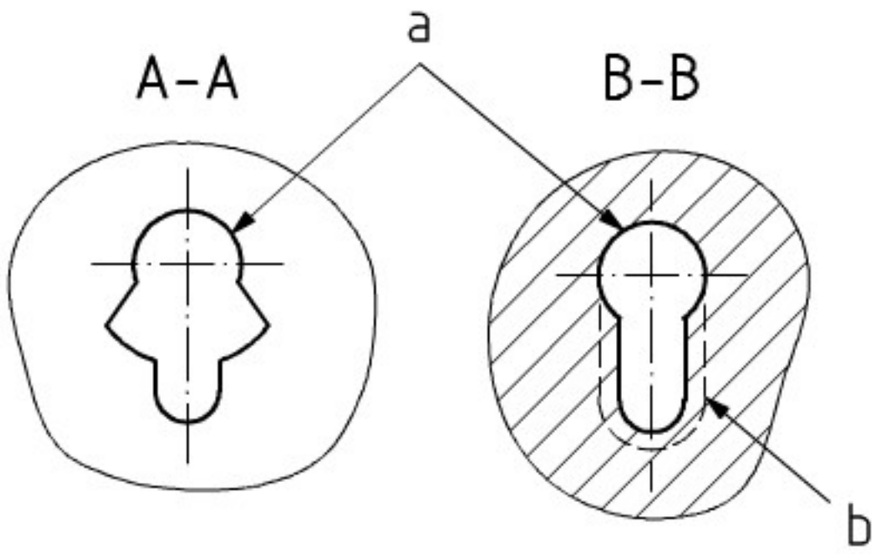
The time continues when the pulling force starts to pull. The time will be stopped when the screw is out of the cylinder. If a second attempt with an additional new screw will be made, the time shall continue when screwing in the additional screw.

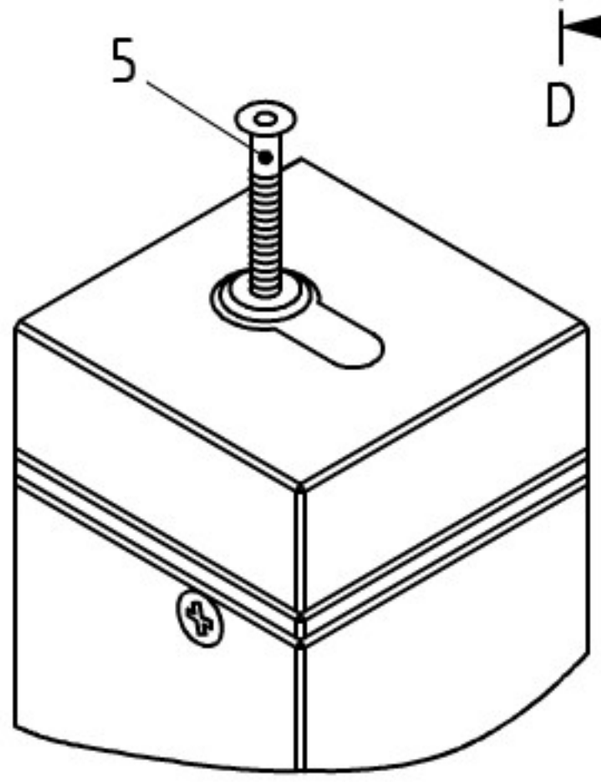
The pulling force shall linearly increase from 0 kN to the value in Table 3 within a period of (30 ± 5) s. The maximum force shall be held for 5 s.

The test is deemed to have been passed if the screw cannot be inserted.









Key

1 fixture base

2 cylinder

3 fixture top

4 distance for different cylinder length

5 traction screw

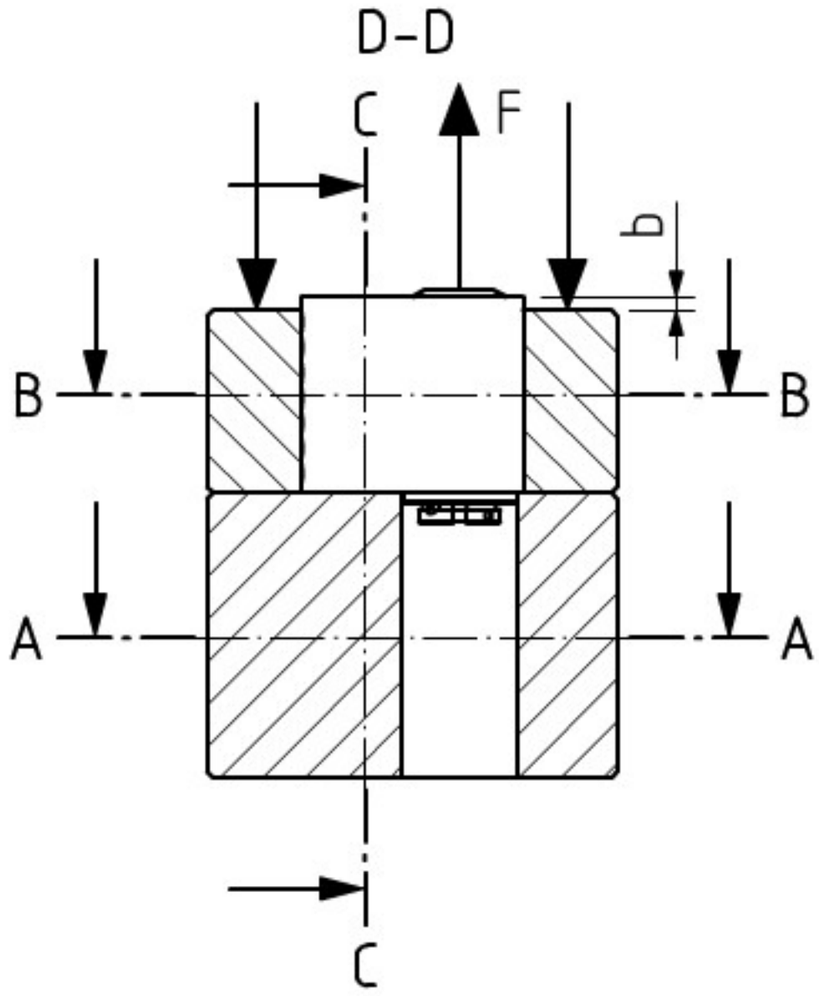
a gap $(0,2^{+0,1}_{0})$ mm to max cylinder and cam dimension for all parts (position 1, 2 and 3)

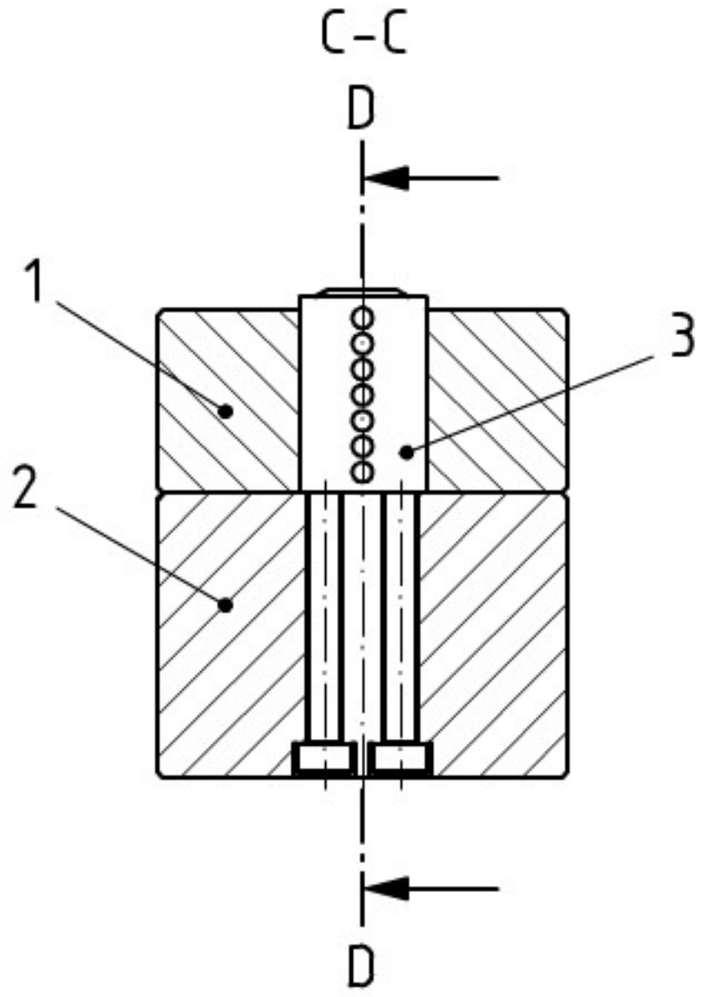
b cut out for additional fixations according manufacturers specification

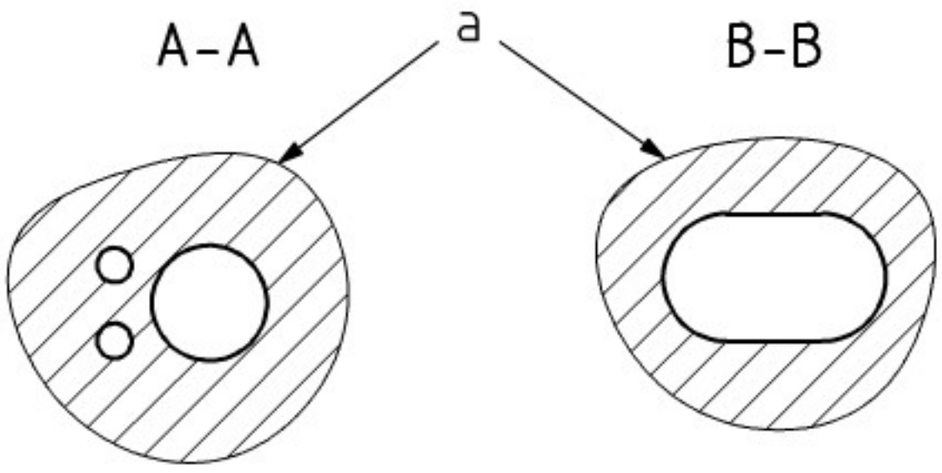
c max 3 mm overlap

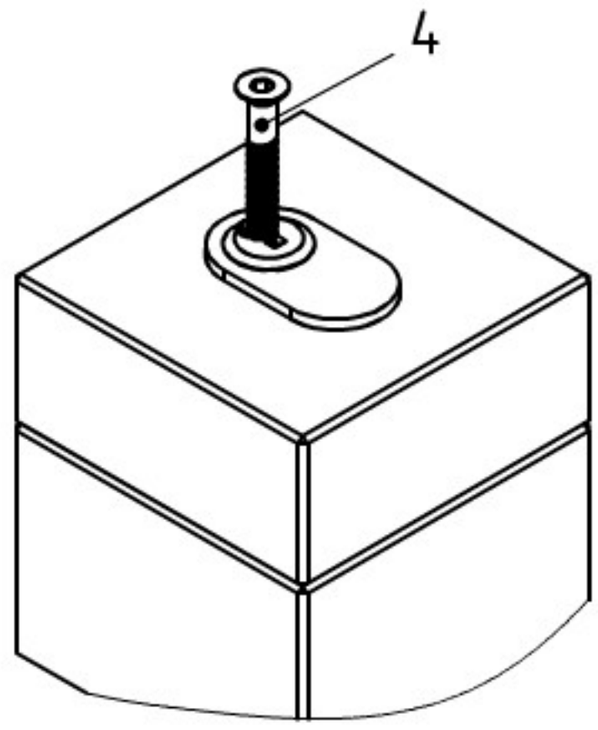
d 5,5 mm

Figure 5 — Fixture for resistance to attack by plug/cylinder extraction “Euro profile”









Key

1 fixture base

2 fixture top

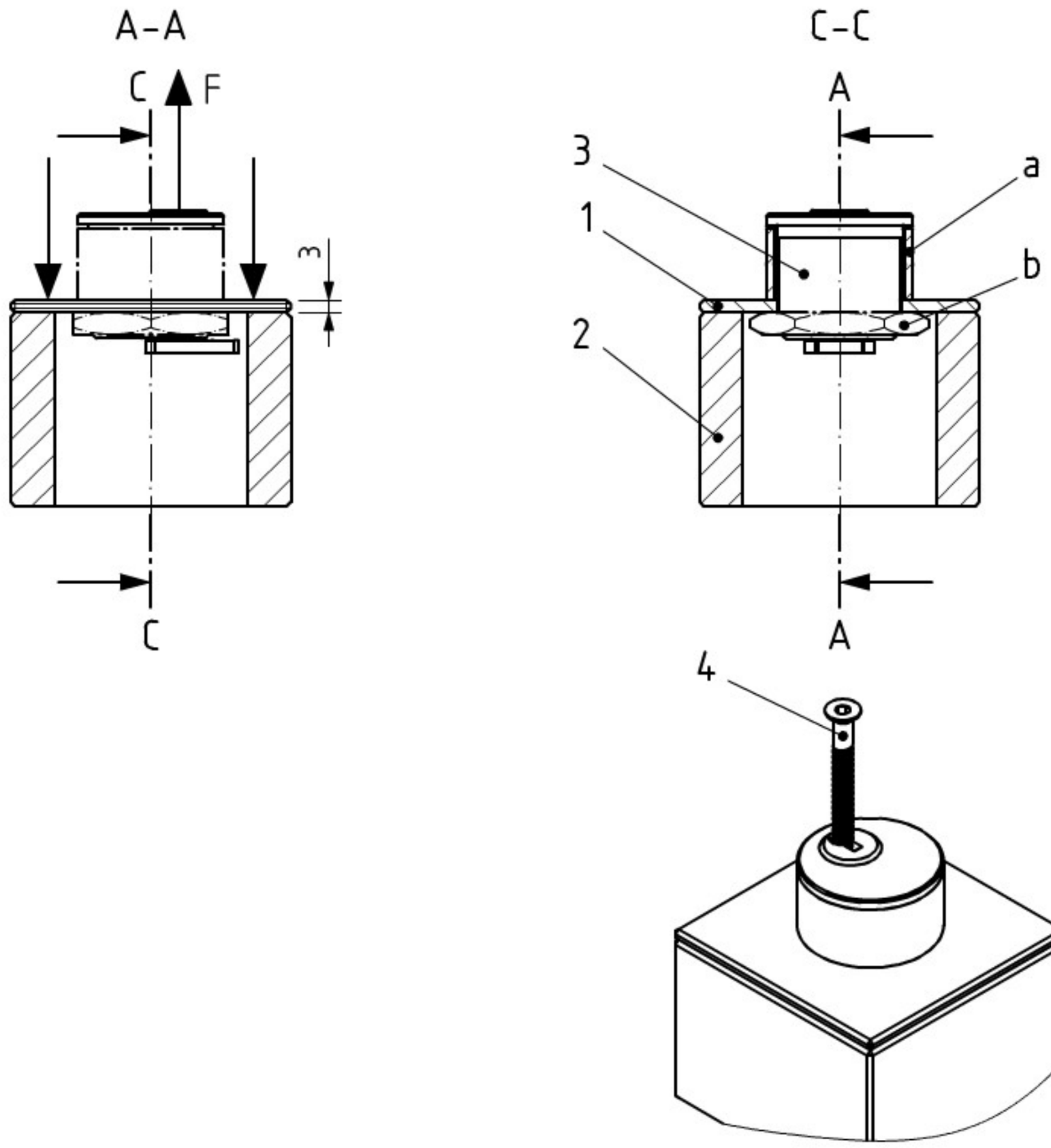
3 cylinder

4 traction screw

a gap $(0,2^{+0,1}_{0})$ mm to max cylinder and cam dimension for all parts (position 1 and 2)

b max 3 mm overlap

Figure 6 — Fixture for resistance to attack by plug/cylinder extraction “Scandinavian cylinder”



Key

1 fixture top

2 fixture base

3 cylinder

4 traction screw

a sleeve according installation instruction

b alternative fixation with nut

Figure 7 — Fixture for resistance to attack by plug/cylinder extraction “Screw in or cam cylinder”

NOTE The testing device can be adapted in accordance with other shapes of cylinders.

6.9.5 Torque resistance of plug/cylinder relevant to attack resistance

All requirements of 4.8.6 shall be satisfied.

The cylinders shall be mounted in the metal fixture illustrated in Figure 2.

A torque specified in Table 3 with tolerance – 0 % / + 10 % shall be applied to the plug by an appropriate tool. If the torque required cannot be applied, the cylinder shall be deemed to have passed the test.

7 Classification

7.1 General

Classification shall be in accordance with the eight digit coding system as shown in Table 4 and described in 7.2 to 7.9.

Table 4 — Classification

1	2	3	4	5	6	7	8
Category of use	Durability	Door mass	Fire resistance	Safety	Corrosion resistance and temperature	Key related Security	Attack resistance

7.2 Category of use (1st digit)

— Grade 1: for use by people with a high incentive to exercise care and with a small chance of misuse.

7.3 Durability (2nd digit)

Three grades of durability are identified as follows:

— grade 4: 25 000 test cycles;

— grade 5: 50 000 test cycles;

— grade 6: 100 000 test cycles.

7.4 Door mass (3rd digit)

Only one grade of door mass is identified as follows:

— grade 0: no door mass requirement.

7.5 Suitable for use on fire resistant / smoke control doors (4th digit)

Three grades of suitability for use on fire resistant / smoke controlled doors are identified:

— grade 0: not approved for use on fire resistant / smoke control door assemblies;

— grade A: suitable for use on smoke control door assemblies;

— grade B: suitable for use on fire resistant and smoke control doors.

7.6 Safety (5th digit)

Only one grade of safety is identified:

— grade 0: no safety requirement.

7.7 Corrosion resistance and temperature (6th digit)

Four grades of corrosion resistance and temperature requirement are identified:

- grade 0: no corrosion requirement; no temperature requirement;
- grade A: high corrosion resistance; no temperature requirement;
- grade B: no corrosion requirement; temperature requirement: from – 25 °C to + 65 °C;
- grade C: high corrosion resistance; temperature requirement: from – 25 °C to + 65 °C.

7.8 Key related security (7th digit)

Six grades of key related security are identified in accordance with Table 2:

- grade 1: 100 Min. number of effective differs / 2 Min. number of movable detainers;
- grade 2: 300 Min. number of effective differs / 3 Min. number of movable detainers;
- grade 3: 15 000 Min. number of effective differs / 5 Min. number of movable detainers;
- grade 4: 30 000 Min. number of effective differs / 5 Min. number of movable detainers;
- grade 5: 30 000 Min. number of effective differs / 6 Min. number of movable detainers;
- grade 6: 100 000 Min. number of effective differs / 6 Min. number of movable detainers.

7.9 Attack resistance (8th digit)

Five grades of resistance against drilling and mechanical attack are identified in accordance with Table 3:

- grade 0: no resistance against drilling;
  no resistance against mechanical attack;
- grade A: 3 / 5 min resistance against drilling;
  resistance against mechanical attack except plug/cylinder extraction;
- grade B: 5 / 10 min resistance against drilling;
  resistance against mechanical attack except plug/cylinder extraction;
- grade C: 3 / 5 min resistance against drilling;
  resistance against mechanical attack;
- grade D: 5 / 10 min resistance against drilling;
  resistance against mechanical attack.

8 Marking

The classification in Clause 7 shall be quoted in the accompanying documents relevant to the cylinder, on its labelling or packaging and/or by marking the product itself or by more than one of these methods.

If the cylinder is combined in a unit with a specific escutcheons or protective security furniture in order to meet a grade claimed by the manufacturer, then this should be stated on the fixing instructions or other literature, which should be provided by the manufacturer.

Annex A
(normative)

Cylinders suitable for use on fire resistant / smoke control doors

A.1 Three grades of fire/smoke resistance are identified:

— Grade 0: not approved for use on fire/smoke door assemblies;

— Grade A: suitable for use on smoke control door assemblies, based on the requirements of A.2;

— Grade B: suitable for use on fire resistant /smoke control door assemblies in accordance with the requirements in A.3.

A.2 Products for grade A shall fulfil one of the following requirements:

— A smoke door set incorporating a cylinder shall be subjected to a smoke test in accordance with EN 1634-3;

or

— The material for the parts of the cylinder which are responsible for preventing any leakage of smoke shall have a melting point of not less than 300°C.

A.3 Products for grade B shall fulfil one of the following requirements:

a) Products for grade B representative of their type shall have been subjected to a successful fire test, in accordance with EN 1634-1 or EN 1634-2, to prove the effect of the product on the fire resistance of the complete door assembly.

It is not necessary for the product to be operable after such a fire test.

In addition to the fire test the following information shall be included in the product information:

1) reference to the fire test report;

2) type of test door for the product family (wood, metal sheet, etc.);

or

b) The material for the parts of the cylinder which are responsible for preventing the spread of fire shall have a melting point of not less than 840°C.

Annex B
(informative)

Tables of test sequence

Table B.1 — Test sequence

Test cylinder number			1	2	3	4	5	6	7	8
Number of authorized keys			[a]	1	1	1	1	1	1	1
Number of keys with one differ wrong			2							
Clause	**Test clause**	**Test**	**Sequence**							
4.3	6.3	Durability test	x							
4.7.1	6.7.1	Corrosion resistance test		x						
4.7.2	6.7.2	Test of operation at extreme temperatures			x					
4.8.5	6.8.5	Operation of security mechanism	x							
4.8.6	6.8.6	Torque resistance of plug and/or cylinder				x				
4.9.2	6.9.1	Resistance to drilling					x			
4.9.3	6.9.2	Resistance to attack by chisel						x		
4.9.4	6.9.3	Resistance to attack by twisting							x	
4.9.5	6.9.4	Resistance to attack by plug /cylinder extraction								x
4.9.6	6.9.5	Torque resistance of plug/cylinder relevant to attack resistance				x				
4.2	6.2	Key strength			x					

[a] Number of keys follow the delivery of cylinder specified by the manufacturer, minimum two keys.

The sequence of the tests and the number of samples may vary depending on the design and function of the cylinder.

Annex C
(informative)

Product information

A cylinder and its keys manufactured to this European Standard should have clear and detailed instructions in its product documentation and/or product information for its installation operation and maintenance.

These instructions shall at least include the following

a) The limitations on its intended use, such as the limitation of the temperature range, environment etc.

b) The following warning in a prominent position: “The product should not be modified in any way except in accordance with those modifications described in the instructions.”’

c) Installation and fixing instructions to ensure that the cylinder can achieve the performance requirements in this document, including any restriction in use, for example conditions under which the cylinder and its key could be rendered inoperable.

d) Maintenance and operation instructions to ensure that the cylinder and its key continues to achieve the performance declared by the manufacturer.

e) A list of all elements that are tested and approved for use with this cylinder and which may be packaged separately, e.g. cylinder accessories, etc.

f) Information about the following product features:

If the cylinder is combined in a unit with a specific escutcheons or protective security furniture in order to meet a grade claimed by the manufacturer, then this should be stated on the fixing instructions or other literature, which should be provided by the manufacturer.

NOTE There are different ways of supporting/distributing this information.

Annex D
(informative)

Manufacturer's declaration of compliance

We declare that the following product:

has been successfully tested to EN 1303:

with the following classification:

1	2	3	4	5	6	7	8

Box	Classification	Grade or category
1	Category of use	1
2	Durability	4, 5 or 6
3	Door mass	0
4	Suitable for use on fire resistance / smoke control door	0, A or B
5	Safety	0
6	Corrosion and temperature	0, A, B or C
7	Key related security	1 to 6
8	Attack resistance	0, A to D

and the following others requirements not indicated in this standard:

[specify:.....]

when used for the following purpose:

Evidence of standards compliance:

□ Type testing by Manufacturer

□ Type testing by Manufacturer to EN ISO/IEC 17025

□ Type testing by accredited laboratory *[Lab. ref:.....]*

□ Regular audit testing by Manufacturer

□ Regular audit testing by Manufacturer to EN ISO/IEC 17025

□ Regular audit testing by accredited laboratory *[Lab. ref:.....]*

□ Other *[specify:.....]*

Evidence of quality compliance :

□ Manufacturer's own quality system

□ Manufacturer's quality system to EN ISO 9001

□ Manufacturer's quality system to EN ISO 9001 with Independent quality assessment *[3rd Party ref: …… .....]*

□ Other *[specify:.....]*

Evidence of marking compliance :

□ None

□ Quality label *[specify: .....]*

□ Other *[specify:.....]*

CE marking not applicable

Signature: Date:

Position:

Annex E
(informative)

Comparison table between EN 1303:2005 and EN 1303:2015

Table E.1

Attack resistance (8th digit)		
	EN 1303:2015, 7.9	EN 1303:2005, 6.9
Grades	**0**	**0**
	A	**1** based on pulling protection through security door furniture [c]
	B	**2** based on pulling protection through security door furniture [c]
	C [a]	**1** [b]
	D	**2**

[a] Pulling force 10 kN.

[b] Pulling force 15 kN.

[c] Combination stated in test report and certificate.

Classification for attack resistance grade 1 or grade 2 in EN 1303:2005 based on a cylinder in combination with any classified security furniture with integrated pulling protection will in EN 1303:2015 be grade A or grade B.

Classification for attack resistance grade 1 or grade 2 in EN 1303:2005 based on a cylinder in combination with specified classified security furniture with integrated pulling protection as a unit will in EN 1303:2015 be grade C or grade D.

Bibliography

[1] EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025)*