



Locks for Bicycles and Motorcycles

Requirements and Test Methods

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VdS Guidelines for Physical Security Devices

Locks for Bicycles and Motorcycles

Requirements and Test Methods

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1 General

1.1 Scope

These guidelines describe the minimum requirements and test methods for bicycle and motorcycle locks. Bicycle and motorcycle locks can either be installed by the manufacturer, not being exchangeable by the consumer, or issued as an additional purchase.

VdS-approvals based on these guidelines are exclusively valid for the usage as bicycle or motorcycle locks. Single components of bicycle or motorcycle locks, e.g. padlocks or chains, may not be designated as VdS-approved as individual parts.

Note: Instead of "bicycle and motorcycle lock" the abbreviated term "lock" is used in the following.

1.2 Validity

These guidelines are valid from 01.05.2021; they replace version VdS 2597 : 2018-10 (02).

Note: This is a translation of the German guidelines. If there are any discrepancies, the German version shall be binding.

2 Normative References

These guidelines contain dated and undated references to other publications. The normative references are cited at the appropriate places in the clauses, the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to these guidelines only when announced by a change of these guidelines. For undated references the latest edition of the publication referred to applies.

DIN 338	Parallel shank twist drills
DIN 1412	Twist drills made of high-speed steel – Shapes of points
ISO 9227 : 1990-12	Corrosion tests in artificial atmospheres; salt-spray tests
VdS 2344en	Procedure for Testing, Approval and Certification of Products and Systems for Fire Protection and Security Technologies

3 Terms

Bolt element: Element of the lock producing, in active state, the connection between the main locking device and the other lock elements

Condition, locked: Closed condition of a lock in a way that it cannot be opened without the necessary key/code or damage. The main lock element (chain, shackle or comparable) is thereby connected to the other lock elements and the bolt element in the lock is activated.

Connection, non-detachable: Connection of elements, which cannot be released, at least not without destruction of one element

Main lock element: Element of the lock (e.g. shackle, chain) with which the positive locking connection of elements of the bicycle or motorcycle with each other or with fixed elements (e.g. lamp post) can be achieved

4 Classification

According to their performance characteristics, VdS-approved bicycle locks are classified into classes N, A and B. Class N locks are assigned to basic, class A locks to higher and class B locks to highest requirements. Products suitable for connecting the bicycle to a railing or similar, are identified by the additional character "+" (e.g. class B+). Locks of class N or A are recommended for the protection of bicycles, pederlecs, e-bikes and mopeds and class B for motorcycles.

5 Conditions and incoming tests

5.1 Conditions

5.1.1 Environmental conditions

All tests are carried out under indoor conditions unless otherwise stated.

5.1.2 Test samples

For the laboratory tests, the manufacturer must provide test samples in original packaging from series production with the corresponding accessories.

Seven test samples are required for brake disc locks, steering locks, chain locks and wire rope locks, nine test samples are required for shackle locks.

Accessories which are not supplied directly with the lock but which, according to the manufacturer's specifications can be optionally used with the lock must also be submitted for testing. Depending on the test procedure, further tests may be necessary, for which additional test samples may have to be provided by the applicant.

If the product is not yet in series production, the test can be carried out on prototypes. In this case, the final assessment requires a follow-up test on products from series production.

The (variants of) sales packaging(s) bearing the VdS end user marking in accordance with section 6.1.3 shall also be provided.

5.1.3 Documentation

The following documents are required for the tests:

- Operating instruction
- Mounting instruction (if required)
- Drawings of the lock with indication on tolerances and locking variations
- Parts lists
- Drawings of the cylinder with assembly diagram
- Specifications and attestations (if required, e.g. for use in special steel)

5.1.4 Tolerances

If not otherwise indicated, the tolerances as follows are admitted for the tests:

Force	$\pm 2 \%$
Torque	$\pm 2 \%$
Mass/weight	$\pm 2 \%$
Lengths	$\pm 2 \%$
Time	$\pm 5 \text{ s}$
Temperature	$\pm 2 \text{ }^{\circ}\text{C}$

5.1.5 Preparation for the test

The lock must be locked before each test. In the case of key locks, the key must be removed from the lock; in the case of combination locks, the combination must be discarded.

5.1.6 Study of the construction

Before the start of the practical test, the test team - consisting of at least two persons – familiarises itself with the design of the lock by means of the drawings and, if necessary, by dismantling the lock.

5.1.7 Non-feasible tests

The testing laboratory may classify certain tests - due to the design - as not feasible. Such a decision must be documented in the test report, and the certification body decides whether an approval can nevertheless be granted in the case of a positive test report.

5.1.8 Opening

The test specimen is considered to be opened or overcome when a cylindrical test gauge with a diameter of 5 mm can be moved through a resulting opening. Prior to this, the lock may be subjected to mechanical effects for a maximum of 5 s. The lock must not be fixed with tools during this test; locks that are not permanently mounted on the vehicle must be held in the hand. A screwdriver or pliers up to 200 mm in length may be used for treating the lock.

Do tests on the lock indicate that, in practice, forcible opening is likely to cause changes to a connected individual part of the vehicle (e.g. the wheel) that would prevent normal use of the vehicle, the lock shall be deemed not to have been defeated.

Example: The shackle of a shackle lock can be twisted by 180° before the shackle jumps out of the lock body or before the required load value is reached. In practice, such a treatment would not be possible without serious damage to the connected two-wheeler. The lock is therefore considered not to have been overcome.

5.1.9 Test schedule

The individual tests are carried out according to the test plan in Table 5-1. If a test sample fails during the tests, a decision must be made on a case-by-case basis, if necessary after consulting the manufacturer, whether and with which test step the test is to be continued.

Test step	Test	Acc. to clause	Sample								
			1	2	3	4	5	6	7	8	9
1	Completeness	5.2.1	x	x	x	x	x	x	x	x	x
2	Identity	5.2.2	x	x	x	x	x	x	x	x	x
3	Operation instruction	7.1.1	x								
4	Mounting instruction	7.1.2	x								
5	Marking	7.1.3	x								
6	Conclusions on key number/code	7.1.4	x								
7	Key locks	7.1.5	x								
8	Options	7.1.6	x								
9	Function	7.2.1	X								
10	Self-locking	7.2.2	X								
11	Forced closing process	7.2.3	X								
12	Lock components	7.2.4	x								
13	Effective locking varieties	7.2.5	x								
14	Corrosion protection	7.3	x								
15	Opening protection	7.4.1		x							
16	Code protection	7.4.2		x							
17	Delocking protection	7.4.3		x							
18	Protection against key copying	7.4.4		x							
19	Tensile/pressure load	7.4.5.1		x ¹⁾							
20	Torsion load	7.4.5.2			x ¹⁾						
21	Change of code	7.4.6.1		x ²⁾							
22	Traces of wear	7.4.6.2		x ²⁾							
23	Tensile load	7.5.1		x ³⁾	x ³⁾						
24	Torsion load, lock shackle	7.5.2.1				x ⁴⁾					
25	Torsion load, steering lock	7.5.2.2				x ⁴⁾					
26	Cutting load	7.5.3		x							
27	Sawing	7.5.4		x							
28	Drilling	7.5.5							x		
29	Attack with hand tools	7.5.6								x	
30	Other tests	7.6									x ⁶⁾

¹⁾ Tests only for key locks

²⁾ Tests only for combination locks

³⁾ Tensile load in resp. crosswise opening direction is made only if this makes sense regarding the construction (e.g. for simulation of an attack with a car jack)

⁴⁾ Test only at shackle locks resp. steering locks

⁵⁾ Not applicable for brake disc, steering, chain and wire rope locks

⁶⁾ Tests may be stipulated by considering the construction resp. the test course in single cases, samples may be requested later

The test person in single cases may vary the sequence of tests. Samples, which have already been used, may furthermore be used only if an interference by previous tests may be excluded.

Table 5-1: Test schedule

5.2 Incoming tests

5.2.1 Completeness

It is checked by visual test if the test samples are complete and handed in together with the associated keys and accessories and if all documents are available.

5.2.2 Identity

By visual check and measuring control it is verified if the test samples correspond with the manufacturer's indications.

The following tests are started only if no deviations were determined here.

6 Requirements

6.1 General requirements

6.1.1 Operation instruction

An operation instruction issued in German language shall be available for bicycle locks. This instruction shall reflect all operations, which are necessary for the user in a clear and understandable manner.

6.1.2 Mounting instruction

A mounting instruction in German language shall be available for bicycle locks or their components, which are mounted to the vehicle. This instruction shall reflect all important items in a clear and understandable manner.

6.1.3 Marking

Bicycle locks shall be marked with

- manufacturer or trade mark
- type designation
- approval number as well as
- lock class

The marking shall be durable and visible without the lock to be disassembled.

Sales packaging of VdS-approved bicycle locks shall and the approved products themselves should be furnished in addition with the following markings for a simplified communication towards the end-user:

Class	Marking packaging ¹⁾	Marking product ¹⁾
N		
A		
B		

¹⁾ The approval owner may order the logos as files (pixel or vector graphics) at VdS.

For the use of VdS end-user marking the regulations of VdS 2344 on marking with the VdS logo are valid in analogy.

6.1.4 Conclusions on key number/code

Bicycle locks shall not be equipped with a number or number combination from which the code or the key number may be concluded.

6.1.5 Keys

At least two keys shall be delivered for each key lock.

6.1.6 Options

Options shall not negatively influence the characteristics of bicycle locks. Options and their features shall be specified by the manufacturer.

6.2 Construction

6.2.1 Function

Bicycle locks shall be constructed such that locked vehicles cannot be normally used or pushed.

6.2.2 Self-locking

Bicycle locks shall not pose any danger. It shall be ensured that bicycle locks do not lock during the drive autonomously and such interfere with the normal function of the vehicle.

6.2.3 Forced closing process

The locking shall be inevitable. Bicycle locks shall be constructed such that the blocking element may be activated only if the main bolt element is in locked position, the lock is inevitably closed. This can be achieved by the fact that the key can only be removed in the locking position after locking or another locking element can only be moved in the locking position into the locking position.

Locking may only take place after a voluntary action.

6.2.4 Lock components

The lock components shall be designed such that locked bicycle locks form an inextricable connection with the vehicle. It shall be possible at least to securely inhibit the normal turning movement of the running wheels or the steering function of the vehicle. A demounting without destruction of the locked bicycle lock shall not be possible.

Bicycle locks of type shackle lock, chain lock or wire rope lock shall be able to encircle at least one running wheel and a fixed frame part of the vehicle.

The character “+” is issued if the product offers the possibility to encircle a corpus of at least 40 cm size.

6.2.5 Effective varieties

The minimum number of effective varieties for mechanical locks is for

- Class N 2,500
- Class A 5,000
- Class B 30,000

For key locks is valid, that the difference of the deepest key cut in row shall be at least three steps. The connection lines of the key cuts shall not form a straight line in the row with the highest number of pin tumblers. Not more than two neighboured cuts shall be made in the same depth. The key shall not have in at least one depth cut more than 60 % of the same cuts.

For electronic locks the minimum number of effective varieties is as follows:

- Class N 50,000
- Class A 100,000
- Class B 1,000,000

For combination locks the operation instruction shall contain the note that the use of simple codes – as e.g. 1-2-3-4-5 – is not admitted.

6.3 Corrosion protection

Bicycle locks shall not be negatively influenced in their function by corrosive influences. After a corrosive conditioning of a lock according to clause 7.3 it shall not easily be possible to open this other than with the associated key resp. code.

6.4 Protection against unauthorised opening

6.4.1 Opening protection

It shall not be possible to easily open locks without associated key or code.

6.4.2 Code protection

Locks shall be designed such that it is not possible to read the associated code when the lock is closed.

6.4.3 Delocking protection

Locks shall be designed such that the opening with picking tools or similar tools within the times mentioned in Table 6-1 is not possible. The unlocking security may furthermore be reached by testable constructive features.

6.4.4 Protection against key copying

Key locks shall not be opened with the next closest key when applying a torque according to Table 6-1.

6.4.5 Attacks on the locking cylinder

6.4.5.1 Tensile/pressure load

Cylinder locks shall resist tensile/pressure load applied onto the cylinder according to Table 6-1 without an opening can be reached according to clause 5.1.8.

6.4.5.2 Torsion load

Cylinder locks shall resist torsion load onto the cylinder according to Table 6-1 without an opening can be reached according to clause 5.1.8.

6.4.6 Combination locks

6.4.6.1 Change of the code

It shall be possible for the user to change the code.

6.4.6.2 Traces of wear

It shall not easily be possible to determine the correct combination on base of wear marks etc.

6.5 Mechanical influences

6.5.1 Tensile load

Locks shall resist tensile load according to Table 6-1 along and across the opening direction without an opening according to clause 5.1.8 can be reached.

This requirement is not valid for steering locks.

6.5.2 Torsion load

6.5.2.1 Lock shackle

Shackles of shackle locks shall resist torsion loading according to Table 6-1 without an opening according to clause 5.1.8 can be reached.

6.5.2.2 Steering locks

Steering locks shall resist torsion loading at the steering shaft according to Table 6-1 without an opening according to clause 5.1.8 can be reached.

6.5.3 Cutting load

Locks shall resist cutting load according to Table 6-1 without an opening according to clause 5.1.8 can be reached.

This requirement is not applicable for steering locks.

6.5.4 Sawing

Locks shall resist sawing attacks within the times mentioned in Table 6-1 without an opening according to clause 5.1.8 can be reached.

This requirement is not applicable for brake disc and steering locks.

6.5.5 Drilling

Locks shall resist drilling attacks within the times mentioned in Table 6-1 without an opening according to clause 5.1.8 can be reached.

6.5.6 Attacks with manual tools

Locks shall resist attacks with manual tools as specified in Table 7-1 within the times mentioned in Table 6-1 without an opening according to clause 5.1.8 can be reached.

Type of attack/test feature	Requirements of class			Clause of test methods
	N	A	B	
Delocking protection	3 min	5 min	10 min	7.4.3
Protection against key copying (with next closest key)	1.5 Nm	1.5 Nm	1.5 Nm	7.4.4
Tensile/pressure load of the locking cylinder	7 kN	7 kN	7 kN	7.4.5.1
Torsion load of the locking cylinder	15 Nm	15 Nm	15 Nm	7.4.5.2
Tensile load in opening direction	15 kN	25 kN	35 kN	7.5.1
Tensile load crosswise to opening direction	10 kN	12 kN	15 kN	7.5.1
Torsion load of the lock shackle	200 Nm	250 Nm	500 Nm	7.5.2.1
Torsion load of the steering lock	200 Nm	250 Nm	500 Nm	7.5.2.2
Cutting load	30 kN	30 kN	40 kN	7.5.3
Sawing	2 min	3 min	4 min	7.5.4
Drilling	2 min	2 min	5 min	7.5.5
Attack with hand tools	3 min	5 min	5 min	7.5.6

Table 6-1: Requirements on the security against mechanical influences and manipulations

7 Tests

7.1 General tests

7.1.1 Operating instruction

A visual inspection is carried out to determine whether the operating instructions meet the requirements in accordance with section 6.1.1.

7.1.2 Mounting instructions

A visual inspection is carried out to determine whether the mounting instructions meet the requirements in accordance with section 6.1.2.

7.1.3 Marking

A visual inspection is carried out to determine whether the locks are marked in accordance with the requirements of section 6.1.3.

All variant(s) of sales packaging bearing the VdS end-user marking in accordance with section 6.1.3 are checked for the correctness of the marking.

It is further checked whether all markings are sufficiently permanently affixed, e.g. by peel-off tests, wiping with cloth soaked in water and alcohol.

7.1.4 Conclusions on key number/code

By visual check of the locks it is ascertained if the requirements according to clause 6.1.4 are fulfilled. The key number resp. the code shall not be indicated solely neither as part of another number nor by lettering on the lock or the key.

7.1.5 Key locks

By visual check it is ascertained for key locks if the requirements according to clause 6.1.5 are fulfilled.

7.1.6 Options

By a visual check of the locks as well as the manufacturers documentation and – if necessary – by practical tests which are to be determined for single cases it is ascertained if the requirements according to clause 6.1.6 are fulfilled.

7.2 Construction

7.2.1 Function

By visual check of the locks as well as the construction sketches it is ascertained if the requirements according to clause 6.2.1 are fulfilled.

7.2.2 Self-locking

By visual check of the locks and the construction sketches as well as – if necessary – practical tests which are to be determined for single cases – it is ascertained if the requirements according to clause 6.2.2 are fulfilled.

7.2.3 Forced closing process

By a practical test it is ascertained if the requirements according to clause 6.2.3 are fulfilled.

7.2.4 Lock components

By visual check of the locks and the construction sketches as well as – if necessary – practical tests which are to be determined for single cases – it is ascertained if the requirements according to clause 6.2.4 are fulfilled.

If the product offers the possibility to surround a corpus of at least 40 cm size (the form of the corpus to be surrounded is not prescribed) the “+”-mark is granted in case of an approval.

7.2.5 Effective varieties

On base of the construction sketches it is ascertained if the requirements according to clause 6.2.5 are fulfilled.

7.3 Corrosion protection

A corrosion test in neutral salt spray according to ISO 9227:1990-12 according to NSS-test is performed.

After expiry of 96 hours conditioning the sample may dry for 30 min and is then washed under flowing clear water ($T \leq 40\text{ °C}$). When the lock is dry, it is greased according to the manufacturer's instructions.

The lock is opened with the associated key/code and locked. The test is passed if the lock may properly be operated and for key locks a following test of the copying of keys according to clause 6.3 does not lead to an opening.

7.4 Protection against unauthorised opening

7.4.1 Opening protection

By a visual check of the locks and the construction sketches and – if necessary by practical tests which have to be determined in single cases it is ascertained if the requirements according to clause 6.4.1 are fulfilled.

Especially it is checked if an overcoming of the test sample by using existing constructive factors (e.g. keyhole) is possible.

The test is passed if the lock cannot be opened without destruction.

7.4.2 Code protection

By visual check of the locks and the construction sketches and – if necessary – by practical tests which have to be determined in single cases it is ascertained if the requirements according to clause 6.4.2 are fulfilled.

Especially it is checked if reading the code by using existing constructive factors is possible.

7.4.3 Delocking protection

By a visual check and on base of construction sketches it is ascertained if the constructive features for guaranteeing a sufficient protection against delocking according to clause 6.4.3 is given. The evaluation of such features is made in individual cases.

Alternatively, it is practically tested if the requirements are fulfilled. By using picking tools or similar which may be obtained in relevant specialist trade or may be produced with simple means (e.g. wire hook) an experienced test person tries to open the locks. The sample may be fixed for testing at any random position.

The test is passed if the given constructive features are classified as sufficiently secure or if the lock has not been opened within the time as specified in Table 6-1.

7.4.4 Protection against key copying

It is checked if the requirements according to clause 6.4.4 are fulfilled. To this end, the lock is fixed and the next closest key is introduced in the locking channel. A torque is applied onto the key according to Table 6-1. The load is steadily increased by approx. 10 Nm/min up to the maximum value as indicated in Table 6-1 and kept for 1 min.

The test is passed if during loading the cylinder does not turn and after end of the loading no opening according to clause 5.1.8 is reached.

7.4.5 Attacks on the locking cylinder

7.4.5.1 Tensile/pressure load

It is checked if the requirements according to clause 6.4.5.1 are fulfilled. To this end, the lock is mounted on a fix underlay which shows a gap being big enough for the locking cylinder. The gap is designed such that the lock is not supported at the fastening points of the cylinder.

The load according to Table 6-1 may be applied by an auxiliary drilling from the rear side. The auxiliary drilling shall not influence the fastening of the locking cylinder.

The load is steadily increased by approx. 10 kN/min up to the maximum value as indicated in Table 6-1 and kept for 1 min.

The test is passed if after end of the load no opening may be reached according to clause 5.1.8.

7.4.5.2 Torsion load

It is checked if the requirements according to clause 6.4.5.2 are fulfilled. To this end, the lock is fixed and a turnable tool, e.g. a steel blade or a key blank is introduced into the key channel. Here, the adjoining exterior key channel may be deformed. The drive for introducing the tool is limited for locks as follows:

- Class N to 9.81 J (kinetic energy of a mass of 1.25 kg falling from 0.8 m height)
- Class A to 30 J (kinetic energy of a mass of 2.927 kg falling from 1.044 m height)
- Class B to 60 J (kinetic energy of a mass of 4.363 kg falling from 1.402 m height)

The torsion load is steadily increased by approx. 10 Nm/min up to the maximum value specified in Table 6-1 and kept for 1 min.

The test is passed if during loading the cylinder does not turn and after end of the load no opening according to clause 5.1.8 may be reached.

7.4.6 Combination locks

7.4.6.1 Change of the code

On base of the operation instruction as well as by a function control it is ascertained if the requirements according to clause 6.4.6.1 are fulfilled.

7.4.6.2 Traces of wear

The lock is operated for 500 times. Then it is ascertained by a visual check if the requirements according to clause 6.4.6.2 are fulfilled. Optical auxiliaries (e.g. endoscope) are not used for this case.

Besides the visual check, it is ascertained if wear marks may be felt and if by this way overcoming of the locks may be possible.

The test is passed if respective wear marks neither are visible nor may be felt.

7.5 Mechanical influences

7.5.1 Tensile load

It is checked if the requirements according to clause 6.5.1 are fulfilled. To this end, the lock is fixed whereas the lock corpus leans against a fix abutment as shown in Figure 7-1. The counter holder shall be designed such that it does not negatively influence the test result.

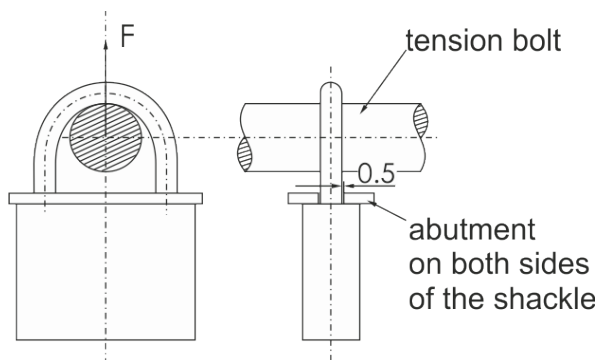


Figure 7-1: Tensile load in opening direction

The diameter of the tension bolt for loading in opening direction shall be at least 80 % of the clear width of the shackle. If the tension bolt of the required dimension cannot be used, the highest possible type shall be applied.

For determination of the load strength in opening direction a force with in strain/pressure equipment is applied as shown in Figure 7-1. The force is steadily increased by approx. 10 kN/min up to the maximum value as specified in Table 6-1 and kept for 1 min.

For determination of the strain strength crosswise the opening direction a force is applied in a distance of 30 mm to the lock case as shown in Figure 7-2 in rectangular opening direction and along the space being surrounded by the shackle. The determination of the strain strength rectangular to the opening direction is made only if attacks with a car jack or similar are possible. The lock may be fixed during loading to inhibit tilting of the lock resp. slipping of the loading equipment. The force is steadily increased by a strain/pressure equipment by approx. 10 kN/min up to the maximum value specified in Table 6-1 and kept for 1 min.

The test is passed if after end of the loading no opening according to clause 5.1.8 may be reached.

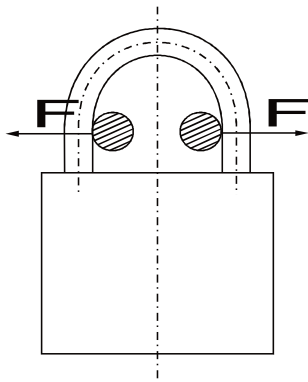


Figure 7-2: Tensile load crosswise the opening

7.5.2 Torsion load

7.5.2.1 Lock shackle

It is checked if the requirements of clause 6.5.2 are fulfilled.

The lock corpus is fixed for the test and the lock shackle is loaded according to Figure 7-3 and Table 6-1. The torque is applied in a distance of 30 mm to the lock housing and steadily increased by approx. 200 Nm/min up to the maximum value specified in Table 6-1 and kept for 1 min.

The test is passed if after end of the loading no opening according to clause 5.1.8 may be reached.

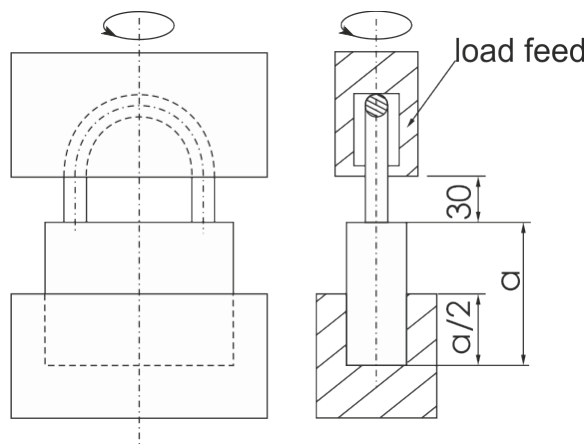


Figure 7-3: Torsion load

7.5.2.2 Steering lock

For the test of steering locks the lock is mounted in analogy to its later mounting situation and the steering column is loaded according to Table 6-1. The applied torque is steadily increased by approx. 200 Nm/min up to the maximum value specified in Table 6-1 and kept for 1 min.

The test is passed if during resp. after end of loading the steering shaft is not freely turnable.

7.5.3 Cutting load

It is checked if the requirements according to clause 6.5.3 are fulfilled. To this end, the lock is loaded at a position freely selectable by the test person according to Figure 7-4 and Table 6-1. The cutting edge of the loading equipment consists of a material the deformation of which may be neglected to the deformation of the bolt. The loading is increased by approx. 10 kN/min up to the maximum value specified in Table 6-1 and kept for 1 min.

The test is passed if after loading no opening according to clause 5.1.8 may be reached.

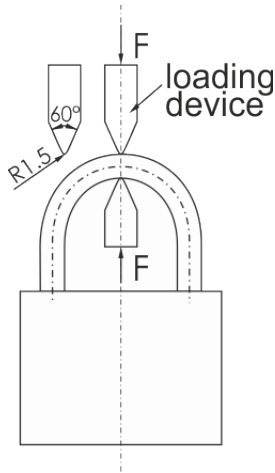


Figure 7-4: Cutting load

7.5.4 Sawing

It is checked if the requirements according to clause 6.5.4 are fulfilled. To this end, the lock and parts of the lock are mounted in a sawing equipment and sawed by hand. A common metal hacksaw (length 330 ± 30 mm) with sawing blades (24 teeth/inches) is used. Only one sawing blade per sawing trial is used.

The duration of the sawing test is specified in Table 6-1.

The test is passed if after end of the loading no opening according to clause 5.1.8 may be reached.

7.5.5 Drilling

It is ascertained if the requirements of clause 6.5.5 are fulfilled. To this end, the lock is fastened in a drilling equipment as shown in Figure 7-5. A shaft drilling machine is used the rotation speed of which is 1400 U/min. The feeding force of the drill is limited to 200 N.

HSS-drills with a diameter of 3 to 12 mm according DIN 338, type N are used. The grinding is made in accordance with DIN 1412, grinding A. Coolant and cutting fluids are not used. The number of drills is not limited; the drill diameter, however, shall not be changed during the test.

As drilling times are calculated:

- Time during which the drill touches the sample or rotates
- 15 s for each exchange of the drill
- Cleaning times

The cleaning of the lock from drilling chips or other material which hinders the drilling, may be made by tweezers, watchmakers screwdriver, cleaning needles as well as small pliers.

The test is passed if after end of the loading no opening according to clause 5.1.8 may be reached.

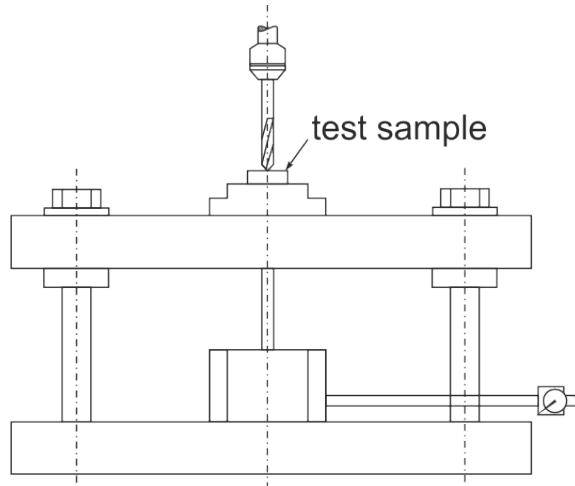


Figure 7-5: Drilling

7.5.6 Attack with manual tools

It is checked if the requirements according to clause 6.5.6 are fulfilled. To this end, it is tried to make an opening according to clause 5.1.8 by using the tools specified in Table 7-1 within the times mentioned in Table 6-1.

Tool	Specification
Hammer	Mass 700 g at maximum
Screwdriver	300 mm length at maximum
Chisel	300 mm length at maximum
Spike	300 mm length at maximum
Water pump pliers	300 mm length at maximum
Grip pliers	300 mm length at maximum
Pincers	300 mm length at maximum
Bolt cutter	300 mm length at maximum
Wire rope shears	300 mm length at maximum
Adjustable wrench	300 mm length at maximum
Pipe wrench	301 mm length at maximum
Knife	160 mm length at maximum
Lighter	disposable product

Table 7-1: Tools

Only tools as specified in Table 7-1 shall be used, if given simultaneously or alternating. In case of tool breach or defect, the tool may be exchanged by a new tool.

The lock is treated during the test only by one person. A second person may fix the lock with a pipe wrench with a length of 700 mm at maximum in any position.

The attack time starts as soon as a tool touches the lock for the first time – except the pipe wrench for fixing – and runs without interruption until the lock is opened or the time specified in Table 6-1 is reached.

The test is passed if no opening according to clause 5.1.8 can be reached.

7.6 Other tests

New constructions or manufacturing processes resp. new opening tools or methods may require additional tests.

8 Changes

Compared to the previous version of these guidelines the following changes were made

- Determination of gender neutrality
- Forced locking new defined, more flexible, section 6.2.3
- Sawing time for class N reduced, Table 6-1
- Sawing test is performed with hand saw, newly defined; section 7.5.4
- Dynamic test is completely omitted