



Container Protection Devices

Requirements and test methods

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VdS Guidelines for Physical Security Devices

Container Protection Devices

Requirements and test methods

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1 General

1.1 Scope

These guidelines include minimum requirements for container protection devices and corresponding test methods. Container protection devices can be both directly by the manufacturer, not user-replaceable mounted on the container, or constructed as a separately purchased part. They have the task to keep the gate of a container closed and prevent an unauthorised opening. Information to facilitate independently to the container protection device an evaluation of the container itself can be found in Annex A.

VdS approvals based on these guidelines are valid exclusively for the application as a container lock. Components of a security device, for example padlocks, chains or bolt components, shall not be designated separately as VdS approved.

Note: Instead of the term "container protection device" the term "protection device" or "security device" is used in the following.

1.2 Validity

The guidelines are valid from January 1st, 2012. They replace the issue VdS 3503 : 2006-06 (01).

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 will be applied.

- **DIN 338 : 1978-03** Kurze Spiralbohrer mit Zylinderschaft (short spiral drills with parallel shanks)
- **DIN 900 : 1967-08** Drehstifte für Steckschlüssel (rotary pins for socket keys)
- **DIN 6475 : 2000-09** Fäustel (club hammer)
- **DIN ISO 2936 : 2001-09** Schraubwerkzeuge, Winkelschraubendreher für Schrauben mit Innensechskant (screw tools, allen wrench for screws with hexagon socket)
- **DIN 1041 : 2001-02** Schlosserhämmer (locksmith's hammer)
- **DIN EN ISO 9227 : 1990-12** Korrosionstests in künstlichen Prüfatmosphären; Salzsprühprüfung (corrosion tests in artificial atmospheres, salt spray test)
- **VdS 2344** Procedures for Testing, Approval and Evaluation of Conformity of Equipment, Components and Systems for Fire Protection and Security Technologies.

3 Terms and definitions

Main bolt element: Element of the container protection device (e.g. lock shackle, chain), with which the form-fit assembly of components of the container to be secured is achieved.

Blocking device: Element of the container protection device that once activated establishes the connection among the main bolt element and the further lock elements.

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

State, locked: State in which the container protection device is bolted and locked so as it is not possible to open the device without the appropriate key/code or damage. The main bolt element (chain, lock shackle or the like) is connected to the further lock elements and the blocking device in the lock is activated.

4 Classification

Are the requirements of these guidelines met, the container protection devices may be approved. A classification is not made.

Note 1: Approved container protection devices allow for example, to hinder unauthorised access to containers used for storage of tools, machine tools, automobile tires, like new vehicle spare parts etc.

Note 2: This is a translation of the German guidelines; if there are any discrepancies, the German version shall be binding.

5 Requirements

5.1 General

5.1.1 Operating instructions

For container protection devices written operating instructions in German language shall be available. These have to describe all facts important for the user in a clear and understandable way.

Given that the devices are not intended for the German market, it is sufficient to provide the instructions in English.

5.1.2 Installation instructions

For container protection devices or their components to be mounted to containers or the transport vehicle installation instructions written in German language shall be available. These have to describe all facts important for the user in a clear and understandable way.

Given that the devices are not intended for the German market, it is sufficient to provide the instructions in English.

5.1.3 Marking

Container protection devices shall be designated with

- the manufacturer sign and trade mark
- type designation
- VdS-lable according to the VdS-guidelines VdS 2344.

5.1.4 Conclusions to a key number/code

Container protection devices shall not be provided with a number or number combination, from which the code or the code number can be derived.

5.1.5 Keys

If container protection devices come with key locks the delivery shall include at least two keys.

5.1.6 Options

Options shall not negatively affect the properties of container protection devices. Options and characteristics must be specified by the manufacturer.

5.2 Construction

5.2.1 Function

Container protection devices are to be constructed in a way that it is not easily possible to open containers without the associated key or code.

5.2.2 Components of container protection devices

The security components of container protection devices shall be designed that locked protection devices provide a permanent connection with the container respectively among one another so the container access is blocked effectively.

5.2.3 Locking varieties

The minimum quantity of effective varieties for mechanic locks for container protection devices is 30,000.

For key locks is required that the differences of the deepest key cuts in one row differs over three steps at least. The connection of the key cuts in the row with the largest number of pin tumblers shall not form a straight line. Not more than two adjacent cuts shall be designed with an equal depth. The key may have in at least one row of cuts not more than 60 % cuts of equal depth.

As effective varieties only those are counted that are blocking in both directions based on the open position and that are varying.

For combination locks the user instruction shall contain an advice that the use of simple codes is not acceptable (an iteration of figures or an even string of digits as e.g. 2-2-3-3-3, 1-2-3-4-5 or 1-2-3-2-1 shall be avoided).

5.3 Corrosion protection

Container protection devices shall not be affected significantly by corrosive influences. After the corrosive impact of a device it shall not be possible in a simple manner to open it in another way as by use of the appropriate key or code.

5.4 Circumvention protection

5.4.1 Opening protection

It shall not be possible to open protection devices in a simple manner without using the appropriate keys or codes.

5.4.2 Code protection

Protection devices shall be designed in a way that it is not possible to read-out the appropriate code when the protection device is locked.

5.4.3 Picking protection

Locking cylinders assembled with container protection devices shall have features of manipulation protection. It shall not be possible to pick the device by using common opening tools within 10 min.

An appropriate security level can be given, if the following features exist:

When using pin tumbler cylinders:

- The requirements of DIN 18252, clause 7.1.2 to 7.1.4 are fulfilled.
- At least two different housing pin elongations are used differing not less than two steps.
- The assembly with movable detainers is carried out in a way that during picking attempts at one or more detainers further detainers are influenced such that they block the cylinder.

When using disc cylinders:

- The closures are not linearly rising or falling.
- The number of adjacent closures is not more than two.
- The discs have fraud jags that aggravate picking.
- The assembly with movable detainers is carried out in a way that during picking attempts at one or more detainers further detainers are influenced such that they block the cylinder.

When using other constructions of locking cylinders:

- Constructive features are implemented that assure an adequate picking protection. The evaluation of the features happens during the test procedure.

Note: An exchange between manufacturer and testing laboratory regarding the evaluation of design features to ensure adequate picking protection previous to the testing procedure may be useful.

5.5 Physical impacts

Container protection devices shall have a sufficient resistance against manually driven hand tools. The devices shall not be overcome during the times shown in Table 5-1.

permitted tools	resistance time	overall test time
see Table 6-2 Tools	3 min	15 min

Table 5-1: Testing times

6 Tests

6.1 Conditions

6.1.1 Environmental conditions

All tests are performed at indoor temperature. Requirements regarding room temperature or air humidity are dispensed with.

6.1.2 Test specimen

The manufacturer has to provide original packed test specimen from the series production including the appropriate accessories for the laboratory technical tests.

Further such accessory shall be submitted that is not supplied directly with the protection device but can be optionally used according to manufacturer's instructions. Depending on the test procedure further tests may be necessary. If so, for these the applicant shall provide additional samples.

If the product is not manufactured in series production, the test can be performed on prototypes. In this case additional testing of the product from the series production is necessary for a final evaluation.

6.1.3 Documentation

For the tests the following documents are required:

- Operating instructions
- installation instructions
- parts lists
- specifications and certificates (if necessary, e.g. use of special purpose steel) and a statement of the cylinder manufacturer, that the cylinder design features in question (cf. clause 5.2.3) are met.

6.1.4 Tolerances

When evaluating the test times an uncertainty of measurement of ± 5 s is tolerable if not stated otherwise.

6.1.5 Studies of construction

Before beginning the practical test, the testing personnel familiarise themselves with the construction of the protection device with help of the technical drawings and by disassembling the device if applicable.

6.1.6 Test preparation

Before each test, the protection device will be assembled to a testing device in analogy to the mounting of the product during the normal use; it will be closed and locked. On key locks the key will be removed. On combination locks the combination will be scattered.

6.1.7 Non-feasible tests

The test personnel can classify certain tests – construction-conditioned – as not feasible. Such a decision will be documented in the test report.

The certification body will decide whether an approval can nevertheless be pronounced.

6.1.8 Opening

The specimen is considered to be overcome if the container simulating test construction can be opened after completion of the physical stress.

6.1.9 Test matrix

The individual tests are carried out according to the sequence as in the following test matrix (Table 6-1). If one sample fails or becomes damaged during the test it shall be decided on individual basis, following the consultation with the manufacturer where appropriate, whether and with which step the test program will be continued.

test step	test	accord-ing to clause	test specimen			
			1	2	3	4
1	Completeness	6.2.1	x	x	x	x
2	Identity	6.2.2	x	x	x	x
3	Operating instructions	6.3.1	x			
4	Installation instructions	6.3.2	x			
5	Marking	6.3.3	x			
6	Conclusions to a key number/code	6.3.4	x			
7	Key locks	6.3.5	x			
8	Options	6.3.6	x			
9	Function	6.4.1	x			
11	Components of container protection devices	6.4.2				
12	Locking varieties	6.4.3	x			
13	Corrosion protection	6.5	x			
14	Opening protection	6.6.1	x	x		
15	Code protection	6.6.2		x		
16	Picking protection	6.6.3		x		
17	Physical impacts	6.7			x	
18	Further tests	6.8				x

The sequence of tests may change for individual cases. Already used test specimen can only be used for further tests if earlier tests guaranteed that they did not influence the further tests.

Table 6-1: Test matrix

6.2 Receiving inspection

6.2.1 Completeness

A visual test determines if the test specimen are complete and, if necessary, supplied with the appropriate keys and accessories and if all necessary documents are available.

6.2.2 Identity

A visual check and a dimensional measuring is used to determine whether the samples correspond to the manufacturer's specifications.

All other tests are performed only if the tests above do not show any discrepancies.

6.3 General tests

6.3.1 Operating instructions

A visual inspection will determine whether the operation manual meets the requirements of clause 5.1.1.

6.3.2 Installation instructions

A visual inspection will determine whether the installation instructions meet the requirements of clause 5.1.2.

6.3.3 Marking

A visual inspection will determine whether the locks are marked in accordance with the requirements under clause 5.1.3.

Furthermore it is tested, whether the markings are sufficiently steady, e.g. by peeling, wiping with a moist cloth or by simple scraping.

6.3.4 Conclusions to a key number/code

A visual check of the locks will determine whether the requirements are met in accordance with clause 5.1.4. The key number or code shall neither be given separately nor as part of another number or label on the lock or the key.

6.3.5 Key locks

A visual check of key locks will determine whether the requirements are met in accordance with clause 5.1.5.

6.3.6 Options

A visual check of the locks and the manufacturer's documentation and, if required, individually configured practical tests will determine whether the requirements are met in accordance with clause 5.1.6.

6.4 Construction

6.4.1 Function

A visual check of the locks and the technical documentation will determine whether the requirements are met in accordance with clause 5.2.1.

6.4.2 Components of container protection devices

A visual check of the locks and the technical documentation and, if required, individually configured practical tests will determine whether the requirements are met in accordance with clause 5.2.2.

6.4.3 Locking varieties

On base of the construction documentation and the manufacturers declaration it is determined whether the requirements are met in accordance with clause 5.2.3.

6.5 Corrosion protection

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

After a 96-hour exposure the specimen is allowed to dry 30 minutes, subsequently rinsed under running clean water ($T \leq 40^\circ\text{C}$). After the lock is dried, it is lubricated according to manufacturer's instructions.

The lock is opened and locked with appropriate key/code. The test is deemed passed when the lock can be operated properly.

6.6 Circumvention protection

6.6.1 Opening protection

A visual check and, if required, individually configured practical tests will determine whether the requirements are met in accordance with clause 5.4.1

The test is deemed passed if a simple, non-destructive opening of the lock without using the appropriate key or code is not possible.

6.6.2 Code protection

A visual check of the locks and the technical documentation and, if required, individually configured practical tests will determine whether the requirements are met in accordance with clause 5.4.2. In particular, it is checked whether a possible read-out of the code is possible by using existing structural conditions.

The test is deemed passed if the read-out of the code in accordance with clause 5.4.2 is not possible.

6.6.3 Picking protection

A visual examination of specimen and on the basis of the technical documentation it is determined whether a sufficient manipulation protection is given according to clause 5.4.3. As a sufficient protection against manipulation are considered among others design features, e.g. mushroom shaped pins and pins with fraud jags.

The evaluation of such features is done individually.

6.7 Physical impacts

It is checked weather the requirements are met in accordance with clause 5.5. For this purpose, using the tools listed in Table 6-2, it will be tried to overcome the protecting device.

description	type/specification
metal shears	right, length 260 mm
drills	max. diameter 10 mm, HSS
pin punch	DIN 900
electric drilling machine	Fein DSkeu 636 ki
club hammer	1.25 kg; DIN 6475
flat chisel	blade width 30 mm, lenth 250 mm
catch	bent welding wire
timber wedge	length/width/hight 200/80/40 mm (max.)
allen wrench for screws with hexagon socket	length max. 120 mm; DIN ISO 2936
adhesive tape	fabric tape, carton sealing tape
slitting saw	with HSS saw blades
combination pliers	length 200 mm max.
plastic wedge	length/width/hight 200/80/40 mm (max.)
knife	blade length max. 120 mm
hacksaw	with HSS saw blades
nail puller	length 710 mm
pair of tweesers	AM 160 mm
pipe wrench	length 240 mm
locksmith's hammer	200 g; DIN 1041
long-nose pliers	length 200 mm max.
screw-driver	blade width 6 mm
screw-driver	blade width 10 mm
screw-driver	blade width 14 mm
wrench	length max. 180 mm
rope	manila rope
steel wire	binding wire
mortise chisel	blade width 20 mm, lenth 350 mm
torch	batterie driven, e.g. with 2 round cells R 6
multigrip pliers	length 240 mm

Table 6-2: Tools

Only tools according to Table 6-2 shall be used, if applicable also simultaneously or alternately. A broken tool given, the tool may be replaced by a new tool.

The protection device is treated by one person only during the test. A second person may fix the device – in build-in conditions – with a pipe wrench with of a maximum length of 700 mm.

The attack time starts running as soon as a tool, except the pipe wrench to fix the device, touches the lock for the first time and then continue running without interruption until the lock is opened or the maximum attack time is reached.

The test is deemed passed if during the resistance time or overall test time according to clause 5.5. no opening can be achieved as described in clause 6.1.8.

6.8 Further tests

New constructions or manufacturing procedures or new unlocking devices or methods might indicate that further tests are required.

Annex A

Stability of the container (informative)

In many cases, containers which were originally intended for maritime transport of goods, are used as stationary storage rooms.

For the maritime transport are common:

- 20' container with an exterior length of 6,060 mm
- 40' container with an exterior length of 12,192 mm
- 45' container with an exterior length of 13,716 mm

The size of the 20' container is also called TEU (twenty foot equivalent). The width of the containers is 2,438 mm (8'), the height is 2,591 mm (8½').

The main requirements for these containers are meeting their proper duties as a transport container and are not tailored to the burglary protection. Also, containers that are already on the land transport by truck, are not uncommon, for example overnight, unattended outdoors.

The use of an approved protection device according to these guidelines improves the burglar protection of transport containers as well as containers used stationary significantly. However, this should not obscure the fact that the actual container may have other weaknesses that should be considered in the selection of goods that may be stored.

Weaknesses of containers may for example be:

- poorly developed hinges
- externally accessible/vulnerable hinges
- other means of access (in addition to the main door/main shutter), e.g. wicket doors (possibly additionally), vents or windows
- generally weak wall structure.

As part of the installation instructions the users should be recommended to ensure all existing vulnerabilities – in addition to the main access to the container.

Installers of mechanical security systems can perform appropriate consultation and technical security improvements.

Annex B

Changes to the Prior Version (informative)

- adoption of the correction to VdS 3503 in the guidelines
- adaptation of clause 5.4.3 to new cylinder constructions
- editorial changes