Fuel Terminals

Requirements, classification and test methods

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VdS-Guidelines for Physical Security Devices

Fuel Terminals

Requirements, classification and test methods

These product guidelines are binding only if their application has been agreed between VdS and the applicant on an individual basis. Otherwise, an application of these product guidelines is non-binding; an agreement on the application of these product guidelines is purely optional. In individual cases, third parties may also accept other safety precautions or installation or maintenance companies under conditions that are defined at their sole discretion and that do not comply with these technical specifications.

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1 Introduction

1.1 General

Fuel terminals serve the automated sale of fuels for motor vehicles. The machines are mainly used in public areas. Fuel terminals consist of at least the input and retainer unit for cash, the receipt printer, controls, and a control unit. After paying an appropriate amount for the fuel output is provided.

Fuel terminals can be a potential target for criminals who intend to access embedded money holdings.

Note: These guidelines take into account only the range of fuel terminals that include banknote reader and collect notes regarding violent attacks. Manipulative attacks on systemic ports (fishing, trapping) and by use of the control electronics are not included.

Note: These guidelines do not take into account the range of fuel terminals where payment via debit card and entering of PIN codes, i.e. for this area neither phishing is considered.

1.2 Scope

These guidelines set out the minimum requirements for fuel terminals to secure the value ranges (cashbox) against unauthorized access. Protects against unauthorized removal of fuel is not the purpose of these guidelines.

2 Validity

These guidelines are valid starting from 01.10.2012.

Note: This is a translation of the German guidelines. In case of doubt, the German version shall be binding.

3 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.

VdS 2156-1en: Guidelines for Physical Security Devices, Locking Cylinders with Individual Locking Function

VdS 2227en: Guidelines for Intruder Alarm Systems, General Requirements and Test Methods

VdS 2344en: Procedure for the Testing, Approval, Certification and Conformity Assessment of Products and Systems for Fire Protection and Security Technololgies

VdS 2396en: Guidelines for Physical Security Devices, High Security Locks for Secure Storage Units, Requirements and Test Methods

4 Terms and definitions

For the purposes of these guidelines, the general terms as summarised in the guidelines VdS 2227 as well as the following terms are valid.

Assembly unit: The assembly unit connects the insertion slot over the coin scanner and the escrow with the cash-box.

Banknote scanner: Machine component which identifies the valid means of payment and rejects those payments the features of which have been identified as not valid.

Cash box: Receptacle for the permanent storage of coins and token coins until collection.

Cash box door: The door enables access to the cash box of the pay.

Note: The cash box door may be identical to the service door.

Control unit: All functions of the pay and display ticket machine are controlled via the control unit.

Fuelling terminal: Machine for prepayment of vehicle fuel which, according to the amount paid, issues the transfer of fuel to the user.

Operation unit: The operation unit enables to perform system functions.

Operator: The person who is responsible for the operation of the fuel terminals.

Service door: The service door renders access to further technical function units of fuel terminals possible.

Note: A fuel terminal may dispose of further doors.

5 Classification

VdS-approved fuel terminals are classified according to their resistance to burglary in one of four classes. These are

- T 1
- T 2
- T 3
- T 4

The requirements in terms of duration of a possible conquest and the effectiveness of the tools used increase from class to class – from T 1 to T 4.

The potential duration of the unauthorized opening of an individual fuel terminal with the objective of extracting money depends to the construction of the machine significantly as well as the choice of burglary tools and the professionalism and experience of the attacker, and the duration of use of the different tools (intensity of attack).

The assignment of classes, inspection test times and tools are shown in Table 6-1.

6 Requirements

6.1 Documentation

6.1.1 Delivery of the documentation

The product documentation is to be handed over to VdS prior to the test. The criteria set out below must be met.

6.1.2 General requirements for the documentation

The documentation must meet the following requirements:

- issue date and name of the manufacturer or the name and function of the applicant who commissioned the test
  - if written on paper: specification of the data on each page of documentation

  - if passing the data in digital form: authorization of the data media by the applicant; assignment of print media to the data media is done by VdS (e.g. by including a reproduced watermark which is printed on each page that identifies the exact media)
- clear indications regarding the nature of the product and the model number

Depending on the information contained in the document (e.g. schedule, technical drawing), the testing laboratory may possibly request a specific version of the document, the applicant shall comply with this requirement.

6.1.3 Required documents

The documentation must include the following:

- installation instruction of the product handed in for testing
- operators instruction for the product handed in for testing including the functions which may be performed via the operation unit
- operating instructions for the product handed in for testing including the functions which may be performed via the operation unit
- indication on products or components that have already been tested and approved (e.g. profile cylinders or the locking mechanism of a profile cylinder)
- detailed sketch of the cash box and service doors
- detailed sketch of the cash till, if given
- detailed description of the assembly unit and the temporary box
- documentation of circuits

6.1.4 Requirements for drawings

The technical documentation (drawings and other documents) must contain the following information:

- cross and vertical sections
- information regarding number, location and characteristics of locks, bolt work, etc.
- information regarding number, clearances and configuration of the door latch, their dimensions (e.g. cross sections), and bolt-mechanism and bolt types (e.g. movable or fix)
- information regarding location and design of areas with special protection measures
- information on purpose, arrangement and size of each opening including a detailed illustration of specially protected areas
- specifications of the materials used

6.1.5 Information on hazardous substances

Details of any materials and devices that produce in case of an attack gases, smoke, soot, etc. which can generate during the test hazardous substances must be be explained.

6.2 Marking (mandatory)

Fuel terminals must be marked with

- details regarding the manufacturer or a trademark and
- the type designation and
- the classification (resistance class).

The marking must be strongly made and (if necessary after opening certain doors) be visible.

In addition, the products must be provided with the VdS label according to VdS 2344.

6.3 Optional additional labelling

In the field of view VdS-approved fuel terminals should be provided with the following marking to uniformly illustrate the VdS-Certifcation.

class	marking [1)]
T1	VdS Security Class ★☆☆☆
T2	VdS Security Class ★★☆☆
T3	VdS Security Class ★★★☆
T4	VdS Security Class ★★★★

[1)] The logos can be purchased as file templates (pixel or vector graphics) from VdS by the owner of the approval. For the use of the optional additional labelling, regulations for marking written in VdS 2344 for the use of the VdS logo apply similar.

6.4 Resistance characteristics

Table 6-1 summarises the resistance times and the tool sets used for tests in respect of the individual class of the fuel terminal.

Note: The test of requirements for anchoring of the fuel terminal at its location is not part of the present guidelines.

class of fuel terminal	resistance time[1)]	tool set[2)]
T 1[3)]	3 min	basic tool set, A, B
T 2	3 min	basic tool set, A, B, C
T 3	5 min	basic tool set, A, B, C
T 4	5 min	basic tool set, A, B, C, D

[1)] Time during which a tool is in contact to the test specimen (cf. chapter 7.3.3).
[2)] The tool sets are described in Annex A.
[3)] An attack aiming on the locking solution of the cash box door is not permitted within class T 1.

Table 6-1 Requirements, overview

6.4.1 Access to the cash box (cash box door)

The closure or the closure techniques of the cash box door must at least meet the requirements of a locking cylinder of class B in accordance with the *Guidelines for Cylinders with Individual Locking Function*, VdS 2156 or locks of class 1 according to the *Guidelines for High-Security Locks*, VdS 2396.

For the proof of class T 1 an attack aiming on the locking solution of the cash box door is not permitted.

For the proof of classes T 2 to T 4 an attack aiming on the locking solution of the cash box door is permitted according to table 6-1.

Note: If the installation of the locking means used, e.g. locking cylinder of class B, does not fulfil the installation requirements this means for an attack on them the use of tools namend in guidelines mentioned above may be used analogously.

7 Tests

7.1 Preparation of the tests

7.1.1 Test team

The test team includes:

- the head of the test team
  he is responsible for planning, directing and controlling the test
- the time keeper
  he is responsible for the time keeping and generating the test protocol
- the test specialists
  these carry out the work required on the specimen directed by the head of the test team

Note 1: If necessary, the use of more than one time keeper is permitted.

Note 2: The head of the test team may also act as test specialist himself and/or as time keeper.

7.1.2 Timing

Used is a clock that holds a measurement uncertainty of 0.05 min or less (at 10 min) and a graduation of at least 0.01 min. If required multiple clocks are used.

7.1.3 Protocol

The main test regarding chapter 7.3 will be documented. The protocol informes inter alia on which tools were used for how long.

7.2 Preliminary tests

7.2.1 General

Before beginning the main test, the following series of steps are executed.

7.2.2 Test of the documentation

A visual inspection of the documentation is executed. A documentation as part of the test report does not take place.

The following tests only start when all required documentation in accordance with chapter 6.1 are present and the requirements mentioned there are met.

7.2.3 Preliminary tests

Before carrying out the attack with tools and before writing the test plan, the test team may perform preliminary tests on the specimen in order to familiarize themselves with the design and possibly to identify existing vulnerabilities.

Times to carry out preliminary tests are not allocated to the resistance time.

A documentation of the preliminary tests in the test report does not occur.

7.2.4 Test plan

Before beginning the main test (determination of resistance time) the head of the test team designs an individual test plan which describes the sequence of the test. The test plan is created in a way that by judgment of the test team leader and the test team the test (by using the tools meeting the intended class of the fuel terminal) the shortest resistance time is expected.

A documentation of the test plan in the context of the report does not take place.

Note: Depending on the design of the presented specimen, several tests (possibly at several specimens) may be required.

7.2.5 Selection of tools

The selection of tools for testing in practice is basing on the test plan. The selection includes tools shown in Table 6-1 and described in annex A, which are allowed for the examination within the desired fuel terminal class.

Apply to tests within class T 4 using the hydraulic tool (specification in annex B): The point at which the force of the hydraulic tool is set, must not be changed during the test. A multiple application of the force at this point is allowed.

Note: The adapter necessary for the application of the power adapters are made tailored to the specimen if necessary. The time required for preparation of the adapter(s) is not part of the resistance time.

7.3 Main test

7.3.1 General

The aim of the main test is to determine whether requirements for product labeling and structural requirements of the sample affecting its resistance against unauthorized access, are fulfilled and whether during the restistance time named in Table 6-1 by using the specified tool sets therein, the cash box or the optionally present temporary box can be removed or a possibility is given to remove the potential capacity of the cash box or of the temporary box.

The specimen is mounted to obtain reasonable stability against tilting analogous to the installation instructions of the manufacturer, assuming most unfavorable conditions.

7.3.2 Labelling

A visual inspection is done whether the labelling is existing as mentioned in chapter 6.2.

Furthermore, it is examined whether this is appropriate sufficiently stable e.g. by trying of tearing off the label, by wiping with a watered cloth or by simple scraping.

The result of the test is documented.

Note: If necessary, this test may also be done after the main test on a completed series product.

Is a label applied according to chapter 6.3 by the approval holder, this is also checked for accuracy.

7.3.3 Time keeping

The time segments necessary for obtaining access to the value areas are recorded with the stop watches described in chapter 7.1.2 and documented. The information to be documented start with the application of a tool to the sample and end with the withdrawal of the tool. If the test is devided in several time-sections these individually measured times are added to the overall resistance time.

The operating times of the individual tools are measured and documented in the test report. The results of each attack can be documented. The final result of the attack (after reaching the predetermined resistance time) is documented.

7.3.4 Locking of the cash box

There is a view or document review and if necessary an examination following the guidelines named in chapter 6.4.1, if the requirements for the closure techniques of the cash box are met in accordance with chapter 6.4.1.

In the classes T 2 to T 4, the inspection of the locking may be carried out depending on the decision of the test team leader by the use of tools in each class aditionally.

The result of the test is documented.

7.3.5 Access to the value areas

Using the selected tools according to 7.2.5 it is checked whether the removal of the cash box or of the optionally present temporary box is possible or whether a possibility can be provided to extract the contents (cash) of the cash box or the optionally present temporary box. The use of the existing specimen (systemic) openings in the examination, e.g. to gain access to cash, is permitted without restriction.

The result of the test is documented.

Note 1: The time spent in accordance with chapter 7.3.4 is counted against the maximum allowable resistance as shown in table 6-1.

Note 2: The time required for a withdrawal of cash from the cash box or the temporary box is not added to the resistance time. However, if the test shows that the removal of a large part of the stored payment takes more than five times of the time which is required for the fuel terminal class according regarding to table 6-1, the request is also considered met.

Annex A Test tools (normative)

description	type/specification
basic tool set	
screw driver	width 6 mm
long-nose pliers	length 200 mm max.
combination pliers	length 200 mm max.
pin punch	DIN 900
pin punch	FL 25 x 6, length 250 mm max.
pin punch	diameter Ø 15 mm, length 250 mm max.
locksmith's hammer	200 g according to DIN 1041
socket head wrench	length 120 mm max.; DIN 911
spanner	length 180 mm max.
tweezers	160 mm
rope	manila rope
steel wire	binding wire
hook	bent welding wire
torch	arbitrary
tape	duct tape, fabric tape
knife	blade length 120 mm max.
industrial vacuum cleaner	rated input 2000 W; including arbitrary adapter
tool set A	
screw driver	width 10 mm
screw driver	width 14 mm
wooden wedge	l/w/h 200/80/40 mm (max.)
plastic wedge	l/w/h 200/80/40 mm (max.)
multi slip-joint gripping pliers	length 240 mm
pipe wrench	length 240 mm

description	**type/specification**
tool set B	
nail puller	length 710 mm
hammer	500 g according to DIN 1041
tool set C	
club hammer	1.5 kg; shaft length 400 mm
axe	length 350 mm
chisel	arbitrary
hack saw (for metal)	arbitrary dimensions and blades
metal shears	right; length 260 mm
pipe wrench	length 410 mm
bolt cutter	length 750 mm max.
pin punch	arbitrary dimensions
screw driver	arbitrary dimensions
steel wedges	arbitrary dimensions
electric power supply	arbitrary
tool set D	
drilling machine	rated input 600 W max.
hammer drill	rated input 600 W max.
hydraulic tools	50 kN max, arbritrary adapters
high speed drills	arbitrary
carbide drills	arbitrary
solid carbide drills	arbitrary
hole saw	arbitrary
hole cutter	arbitrary

Annex B Specification of hydraulic tools (normativ)

description	**tpye/specification**
lever driven piston pump	
manufacturer	Yale Industrial Products GmbH
typ	HPS – 1/0.7A
tank capacity	0.7 l
working pressure	700 bar max.
mesuring equipment	
manufacturer	HBM (Höttinger Baldwin Messtechnik)
type	Digibar II – K-PE 300
attached pressure gauge	Kl. 0.15 (changeable to test load)
uncertainty of measurement	± 0.15 % of terminal value
nominal effecitve range	0…1000 bar
hydraulic cylinder	
universal cylinder manufacturerer typ	 Yale Industrial Products GmbH YS
trunk piston cylinder manufacturer typ	 Yale Industrial Products GmbH YCS

Note: Equivalent tools are permitted.