Pay and Display Ticket Machines

Requirements, classification and test methods

Draft

This draft of guidelines have been agreed upon with the public and may be immediately used as base for testing and certification. The final version may be subject to changes.

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VdS Guidelines for Physical Security Devices

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CONTENT

1 Foreword

Pay and display ticket machines serve for the automatic issue of chargeable parking permits. It is differentiated between pay and display ticket machines and decentralise systems.

Decentralise systems are used in constructional delimited park areas, e. g. car parks.

Pay and display ticket machines are predominantly used in public areas, e. g. park lanes or park areas for the rationing of parking space. Pay and display ticket machines consist of at least an input unit and insertion unit for means of payment, the parking permit printer, operating elements as well as control unit. After payment of a respective fee the parking permit is issued which proves the proper payment of the parking fee for using the park area for the indicated duration.

Experience has shown that pay and display ticket machines present a potential target for criminals which aim to take off the deposited cash.

1.1 Scope

The present guidelines contain minimum requirements on pay and display ticket machines for securing valuables (cash box) against unauthorised access.

The present guidelines consider exclusively those machines which do not dispose of banknote readers. Decentralise systems are not dealt with.

2 Validity

These guidelines are valid from 01.06.2010.

3 Normative references

These guidelines contain dated and undated references to other publications. The references are made in the respective clauses, the titles are listed hereafter. Changes or amendments of dated publications are valid only if having been published by change of these guidelines. For undated references the latest version is valid.

VdS 2156: Guidelines for Physical Security, Locking Cylinders with Individual Locking Function

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

VdS 2344: Procedure for Testing, Approval and Evaluation of Conformity of Equipment, Components and Systems for Fire Protection and Security Technologies

VdS 2396: Guidelines for Physical Security, High Security Locks

4 Terms

For the purpose of these guidelines the general terms as summarised in the guidelines VdS 2227 as well as the terms mentioned below.

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

Operator: The person who is responsible for the operation of the pay and display ticket machine.

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 and display ticket machine.

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

Pay and display ticket machine: Machine for prepayment of vehicle parking which, according to the amount paid, issues a proof of transaction (ticket) to the user and determines the authorised parking period.

Return cup: Receptacle which is able to take over the physical means of payment after cancellation of the payment procedure.

Service door: The service door renders access to further technical function units of the pay and display ticket machine possible.

Note*: A pay and display ticket machine may disposes of further doors.*

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

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

Escrow (interim cash box): A unit to accumulate and hold the combined total of cash, before confirmation or cancellation of the transaction.

Cash till: Unit for storing money that is arranged in the cash box but is removable from this.

Trapping (repeated trapping): Removal of money after its insertion, e. g. on its way from the insertion slot to the cash box.
Note: Trapping is only considered being a relevant attack if the normal function of the machine is not inhibited. This attack is reasonable only if more than one payment can be trapped.

5 Classification

VdS-approved pay and display ticket machines are classified according to their resistance against burglary in one of four pay and display ticket machine classes

- P 1
- P 2
- P 3
- P 4

The requirements regarding duration of a possible attack success and the effectivity of the used tools increase from class to class – from P 1 up to P 4.

The potential duration of unauthorised opening of an individual pay and display ticket machine with the aim to take out the money deposit is mainly depending on – besides the construction of the machine – the choice of the used burglar/breaking tool, the knowledge and experience of the offender as well as the time the single tools are used (intensity of the attack).

The alignment of classes, testing times and testing tools is made according to **table 6-1**, page 7.

6 Requirements

6.1 Documentation

The product documentation is to be handed over to VdS Schadenverhütung before begin of testing and shall contain the criteria as mentioned in the following.

6.1.1 General requirements on the documentation

The documentation contains the following indications:

- date of issue and name of manufacturer or name and function of the client who applies for testing
  - for written form: indication of these data on each page of the documentation
  - for hand-over of the data in form of files the data medium is authorised by the applicant; the alignment of printed versions to the data medium is made VdS internally (e. g. by including a watermark on each printed page, which indicated unambiguously the data medium)
- unambiguous indication on type of product as well as model number

Depending on the information contained in the respective documentation the test laboratory determines – if appropriate – on the design of the document.

6.1.2 Necessary documentation

The documentation contains the following records:

- 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
- detailed sketch of the cash till – if given
- detailed sketch of the assembly unit and if given the escrow
- detailed description of functions taking into consideration possible mechanical, electromechanical and/or electronic measures which may inhibit the trapping of payment
- documentation of circuits

6.1.3 Requirements for sketches

The technical documentation (sketches as well as other documents) shall show the following information:

- cross and vertical section
- number, arrangement and features of locks, bolt work etc.
- number, distances and arrangement of door latches, their dimensions (e. g. cross section), direction of latches/bolts and range of which the bold overlaps the locking plate as well as type of the bolts (e. g. movable or fix)
- position and construction of areas with special protection materials
- purpose, arrangement and dimensions of each opening with detailed illustration of protected zones
- specification of the used materials

6.1.4 Indications on dangerous materials

Details on materials which generate in case of attack gas, smoke, soot etc. and equipment which may generate dangerous materials during testing are explained.

6.2 Marking

Pay and display ticket machines are to be marked with

- indication on manufacturer or trade mark as well as
- the designation of type and
- the resistance class.

The marking shall be in durable manner and (if appropriate after opening of certain doors) visible.

Furthermore the products shall dispose of the VdS marking according to the VdS guidelines VdS 2344.

6.3 Resistance features

Table 6-1 precise the resistance times as well as the burglar/break-open tools which are admitted for usage in the frame of testing and assigns them to the classes of pay and display ticket machines.

Note: The test on requirements for anchoring of pay and display tickets machines on site is not object of these guidelines.

Class of pay and display ticket machine[1)]	**Resistance time**[2)]	**Set of tools**[3)]
P 1[4)]	3 min	basic set of tools, A, B
P 2	3 min	basic set of tools, A, B, C
P 3	5 min	basic set of tools, A, B, C
P 4	5 min	basic set of tools, A, B, C, D

1) The proof of optional protection against trapping of payments (compare with clause 6.3.2) may be given for all pay and display ticket machines. A special time parameter is valid for this proof.

2) The time during which a tool has contact with the specimen (compare with clause 7.3.2).

3) The set of tools are described in annex A.

4) An attack on the locking mechanism of the cash box door with tools is not admitted for class P 1.

Table 6-1: Requirements, overview

6.3.1 Access to the cash box (door)

The lock resp. locking mechanism of the access to the cash box shall at least correspond with the requirements for locking cylinders of class B according to the Guidelines for Locking Cylinders with Individual Locking Function, VdS 2156 or with locks of class 1 according to the Guidelines for High Security Locks, VdS 2396.

For the proof of class P 1 an attack on the locking mechanism of the cash box is not admitted.

For the proof of classes P 2 to P 4 an attack on the locking mechanism of the cash box is admitted according to **table 6-1.**

6.3.2 Protection against trapping of payments (option)

The lock resp. locking mechanism of the serviceable technical parts shall at least correspond with the requirements for locking cylinder of class A according to the Guidelines for Locking Cylinders with Individual Locking Function, VdS 2156. Equivalent constructions are admitted.

The pay and display ticket machine shall be constructed such that it is not possible to trapping payments between insertion slot and cash box (assembly unit and if given escrow) several times in 2 min by using the basic set of tools and the set of tools A (compare with annex A).

The pay and display ticket machine shall be operational after manipulation. The functional capability is considered to be given, if a receipt (ticket) on the settled fee is issued after payment of a fee (parking fee).

The proof on the protection against trapping of payments may be done for all pay and display ticket machines and will be especially set out in the certificate, if given.

Note: This test does not comprise the removal of payments out of the return cup after manipulation, e. g. of the coin scanner, which interferes with the functional capability of the pay and display ticket machine.

7 Tests

7.1 Preparation of tests

7.1.1 Test Team

The test team comprises:

- the test team leader
  he is responsible for planning, guidance and surveillance of the test
- the time keeper
  he is responsible for taking the times and issuing the test record
- the test engineers
  these perform on instructions of the test team leader the necessary works on the specimen

Note 1: If necessary the service of several time keepers is admitted.

Note 2: The test team leader may himself operate as test engineer and/or time keeper.

7.1.2 Time measuring

A watch is used, the measurement inaccuracy of which does not exceed 0.05 min (referred to 10 min) and allows a graduation of at least 0.01 min. If necessary, several watches are used.

7.1.3 Record

The main test is recorded according to clause 7.3. The record provides information on kind of tools and duration of their application.

7.2 Pretesting

Prior to the main test the steps as indicated in the following paragraphs are performed.

7.2.1 Check of documentation

A visual check of the documentation is made.

The following tests are performed only if all required documents according to clause 6.1 are available and fulfil the criteria mentioned there.

7.2.2 Preliminary inspection

Prior to performing the attack test with tools as well as issuing the test schedule the test team may perform preliminary inspections in order to become conversant with the construction of the specimen and – if given – detect possible weak points.

A documentation of preliminary inspection in the test report is not necessary.

Times for performing preliminary inspections are not added to the resistance time.

7.2.3 Test schedule

Prior to the main test (determination of the resistance time) the test team leader elaborates a test schedule. The compilation of the individual test schedule is made such that the shortest resistance time (referred to the seek resistance class for pay and display ticket machines and the set of tools to be used for this class) may be anticipated after evaluation of the test team leader and the test.

A documentation of the test schedule in the test report is not necessary.

Note: Depending on the construction of the presented specimen several tests (if appropriate also on several specimens) may be required.

7.2.4 Choice of tools

On base of the test schedule the tools to be used for the test are chosen. The choice comprises exclusively tools from the class of tools as indicated in table 6-1 and described in annex A for the seek class of pay and display ticket machine.

For tests within class P 4 by using hydraulic tools (specification according to annex B) the following is valid: The point at which the energy of the hydraulic tool is applied, shall not be changed during the test. A multiple application of the energy on that point is not admitted.

Note: The adapters which are required for applying the force are – individually manufactured – tuned to the specimen, if necessary. The time for manufacturing the adapter is not part of the resistance time.

7.3 Main test

The purpose of the main test is to determine if requirements on the product marking as well as constructional requirement of the specimen which influence its resistance against unauthorised access are fulfilled and if the cash box resp. the available cash till may be removed or if a possibility of removal of the potential content of the cash box resp. the available cash till is gained by using the set of tools within the resistance times as indicated in table 6-1, page 7.

The specimen is mounted according to the manufacturer’s installation instructions – if appropriate by assuming most unfavourable conditions for reaching the sufficient stability.

7.3.1 Marking

A visual check is made to verify if the marking corresponding with clause 6.2, page 7 is available.

Furthermore, e. g. by detaching, wiping with water soaked cloth or by simple rubbing it is checked if these markings are affixed in a stable manner.

The results of the test are recorded.

Note: If necessary, this test may also be performed after finalise of the main test at a manufactured product.

7.3.2 Time keeping

The times for reaching access on the valuables areas according to clause 7.3.5 reps. on the means of payment according to clause 7.3.4 are taken with watches as described in clause 7.1.2 and recorded. The times to be recorded begin with attaching the tool at the specimen and end with the strip-off of the tool. If the test is divided into several timely limited sections, the resistance time is the total of all individually measured application times.

The application times of the single tools are measured and recorded in the test report. The results of the single attacks may be recorded. The final result of the attacks (after reaching the indicated resistance time) is recorded.

7.3.3 Locking of the cash box

A visual check is made resp. a check of documentation and if necessary a test according to the guidelines as mentioned under clause 6.3.1 if the requirements on the locking mechanism of the cash container according to clause 6.3.1, page 8, are fulfilled.

The test on locking devices may be performed for classes P 2 to P 4 depending on the decision of the test team leader additionally by the use of tools of the respective class.

The result of the test is recorded.

7.3.4 Protection against trapping of cash (option)

If a proof is to be given that a protection against trapping of cash is available, it shall be confirmed after a visual check or a check of documentation and – if necessary – a test according to the guidelines as listed in clause 6.3.2, that the requirements for the locking mechanism of the serviceable technical parts according to clause 6.3.2 are fulfilled.

Furthermore the test shall reveal that the trapping of cash is not possible under the conditions as indicated in clause 6.3.2.

The result of the test is recorded.

7.3.5 Access on valuables areas

It is checked by using the tools chosen according to clause 7.2.4 if the removal of the cash box resp. the available cash tills – if given – is possible and if a possibility is given to take off the content (payments) of the cash box resp. the available cash till. The use of operational openings which are in the specimen in the frame of the test, e. g. in order to gain access to payments, is admitted without restrictions.

The access on the cash box or the available cash till is deemed to be possible according to these guidelines, if an opening with a hole diameter of $\geq$ 42 mm has been reached.

Note 1: The times required according to clause 7.3.3 are added to the resistance times as indicated in table 6-1 which are admitted at maximum for the testing.

Note 2: The time which is necessary for removal of the payments from the cash box or the cash till is not added to the resistance time. If during testing, however, it is ascertained that for the removal of the large part of the payment deposited more than five times of the resistance time required for pay and display ticket machine as indicated in table 6-1 is necessary, the requirement is also deemed to be fulfilled.

The result of the test is recorded.

Annex A – Testing tools (normative)

Description	Type/specification
Basic set of tools	
Screw driver	Width of blade 6 mm
Long-nose pliers	Length at maximum 200 mm
Combination pliers	Length at maximum 200 mm
Drift punch	DIN 900
Drift punch	FL 25 x 6 Length at maximum 250 mm
Drift punch	Rd Ø 15 Length at maximum 250 mm
Locksmith's hammer	200 g according to DIN 1041
Allen key	Maximum length 120 mm; DIN 911
Screw wrench	Maximum length 180 mm
Tweezers	AM 160 mm
tightrope	Hemp trope
Steel wire	Tie wire
Hook	Welding rod curved
Torch light	Variable
Adhesive foil	Fabric tape
knife	Blade at maximum 120 mm
Industrial vacuum cleaner	Rated input 2000 W including optional suction adapter
Set of tools A	
Screw driver	Width of blade 10 mm
Screw driver	Width of blade 14 mm
Timber wedges	L/B/H 200/80/40 mm (max.)
Plastic wedges	L/B/H 200/80/40 mm (max.)
Multigrip pliers	Length 240 mm
Gas pipe pliers	Length 240 mm

Set of tools B	
Nail puller	Length 710 mm
Hammer	500 g according to DIN 1041
Set of tools C	
Club hammer	1.5 kg; length of shaft 400 mm
Axe/hatchet	Length 350 mm
chisel	variable dimensions
Hack saw	variable dimensions and blades
Metal shears	right; Length 260 mm
Gas pipe pliers	Length 410 mm
Bolt cutter	Length up to 750 mm
Drift punch	variable dimensions
Screw driver	variable dimensions
Steel wedges	variable dimensions
Electrical power source	variable
Set of tools D	
Drill machine	Rated input up to 600 W
Impact drilling machine	Rated input up to 600 W
Hydraulic tools	Up to 50 kN at maximum, optional adapter
Drilling HSS	variable
Carbide drill	variable
Solid carbide drill (jet drill)	variable
Hole saw	variable
Hole cutter	variable

Annex B – Specification of hydraulic tool (normative)

Description	Type/Specification
Piston pump with leverage actuation	
Manufacturer	Yale Industrial Products GmbH
Type	HPS – 1/0,7A
Tank capacity	0.7 l
Operating pressure	At maximum 700 bar
Measurement equipment	
Manufacturer	HBM (Höttinger Baldwin Messtechnik)
Type	Digibar II – K-PE 300
Mounting manometer	Kl. 0.15 (transposable to test load)
Measurement inaccuracy	± 0.15% of end value
Nominal size range	0…1000 bar
Hydraulic cylinder	
Universal cylinder Manufacturer Type	 Yale Industrial Products GmbH YS
Hollow piston cylinder Manufacturer Type	 Yale Industrial Products GmbH YCS

Note: Equivalent tools are admitted.