

BS EN 1143-1:2012



BSI Standards Publication

Secure storage units —
Requirements, classification
and methods of test for
resistance to burglary
Part 1: Safes, ATM safes, strongroom doors
and strongrooms

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National foreword

This British Standard is the UK implementation of EN 1143-1:2012. It supersedes BS EN 1143-1:2005+A1:2009 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GW/2, Secure storage of cash, valuables and data media.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

**Secure storage units - Requirements, classification and methods
of test for resistance to burglary - Part 1: Safes, ATM safes,
strongroom doors and strongrooms**

Unités de stockage en lieux sûrs - Prescriptions,
classification et méthodes de test pour la résistance à
l'effraction - Partie 1: Coffres forts, distributeurs
automatiques de billets (DAB), portes fortes et chambres
fortes

Wertbehältnisse - Anforderungen, Klassifizierung und
Methoden zur Prüfung des Widerstandes gegen
Einbruchdiebstahl - Teil 1: Wertschutzschränke,
Wertschutzschränke für Geldautomaten,
Wertschutzraumtüren und Wertschutzräume

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Foreword

This document (EN 1143-1:2012) has been prepared by Technical Committee CEN/TC 263 "Secure storage of cash, valuables and data media", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2012, and conflicting national standards shall be withdrawn at the latest by October 2012.

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

This European Standard supersedes EN 1143-1:2005+A1:2009.

Compared with EN 1143-1:2005+A1:2009, the following changes were made:

- a) Addition of requirements and technical type testing criteria for the conduct of the additional gas test on ATM safes of resistance grades II to VIII (Table 2; Clauses 4, 10 and sub-clause 12.4);
- b) Optimisation of the requirements and technical type testing criteria for the anchoring test on ATM safes (Table 2; 8.2) as a basis of the use of fixed and flexible ATM bases;
- c) Modification of the requirements for the resistance value for the post-detonation test in the conduct of the additional test with explosives (EX). The previous criterion of complete access was deleted and replaced with partial access (Tables 1 and 2 and sub-clauses 5.8e, 6.1, 7.5.4.4, 7.6.13, 7.7 and 9.5.1);
- d) Editorial clarifications in sub-clauses 3.12, 4.2.3 and 8.2.3.1.

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

Introduction

Tests are made, the results of which are used to classify the resistance to burglary. The resistance classification can also be used for designing security systems with the provision that, depending on the criminal, the conditions at the place of the crime and the availability of tools, considerably longer times are likely to occur in real burglary attacks than in a test.

Manual tests are included, whose results and repeatability is dependant on the skill of the testing team. Machine-related tests are under development and may be included when this European Standard is revised.

1 Scope

This European Standard establishes the basis for testing and classifying free-standing safes, built-in safes (floor and wall), ATM safes and ATM bases, strongroom doors and strongrooms (with or without a door) according to their burglary resistance. This European Standard does not cover testing and classifying Deposit Systems and ATM systems.

2 Normative references

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

EN 1300, *Secure storage units Classification for high security locks according to their resistance to unauthorized opening*

3 Terms and definitions

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

3.1

safe

storage unit which protects its contents against burglary and when closed has at least one internal side $< \overline{1}$ m length

3.2

free-standing safe

safe whose protection against burglary depends only upon the materials and construction of its primary manufacture and not upon materials added or attached during installation

3.3

built-in safe

safe whose protection against burglary is partly dependent upon materials incorporated into it, or attached to it, during installation

Note 1 to entry: Under floor safes and wall safes are special types of built-in safes.

3.4

strongroom

storage unit which protects against burglary and when closed has internal side lengths in all directions > 1 m

Note 1 to entry: Strongrooms may be cast in-situ, constructed from pre-fabricated elements or a combination of both.

3.5

strongroom door

door with lock(s), boltwork and frame intended for giving access to a strongroom

3.6

ATM safe

safe forming part of an ATM system

3.7

ATM base

integral part of an ATM system located between the ATM safe and the surface to which the safe is to be anchored

3.8

internal space

part of the interior of an ATM safe which is bounded by the inside surfaces and the boltwork cover plate(s) of the door of the ATM safe body

3.9

ATM

automatic teller machine

means for holding and processing cash and/or valuables

Note 1 to entry: For the purpose of this standard, automated teller machines, currency exchange machines, currency recycling machines and machines such as teller assist machines are all considered types of ATM.

3.10

ATM-System

assembly of sub-units which provides an ATM function and affords security to cash and/or valuables stored within the ATM safe

Note 1 to entry: An example of an ATM system is shown in Figure 1.

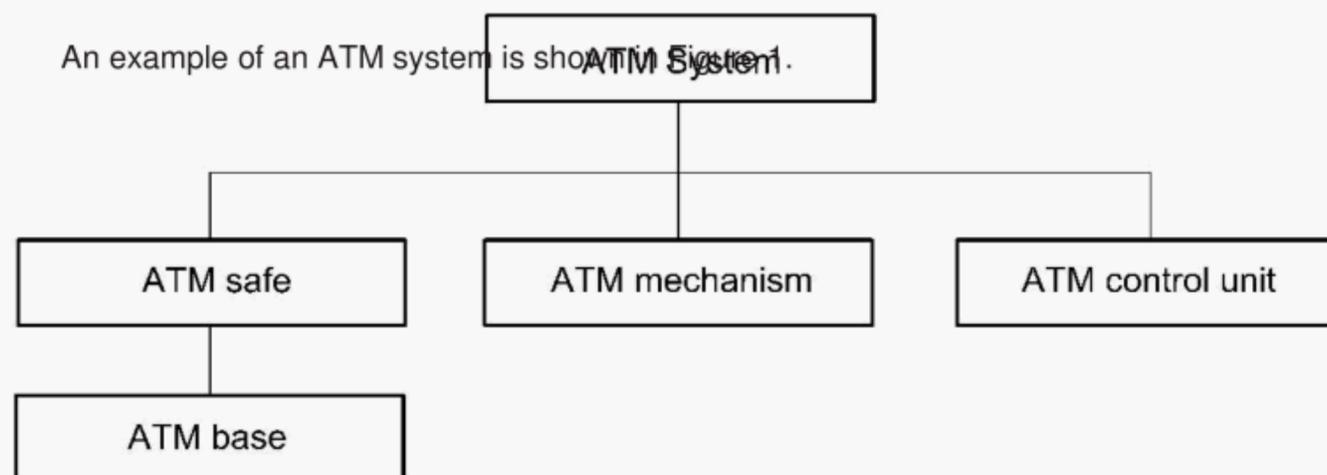


Figure 1 — Example of an ATM system

Note 2 to entry: Of the sub-units shown in Figure 1, the ATM mechanism and the ATM control unit are not tested according to this European Standard.

3.11

accessories

installations/devices which are part of the structure or which pass through the structure of the strongroom or strongroom door(s) for ventilation or for deposit of cash and valuables

Note 1 to entry: Accessories may be always open, usually open (but can be closed in case of emergency), or closed (but can be opened if necessary).

3.12

operating time

time during which a tool is used attempting to create a change in the test specimen

Note 1 to entry: In the context of this standard, there are also operating times considered during which no visible modifications/changes are caused to the test specimen.

3.13

resistance unit

RU

burglary resistance which results from one minute's use of a tool carrying the coefficient 1 and the basic value 0

3.14

resistance grade

classification designation for burglary resistance

3.15

resistance value

numerical value in resistance units calculated for each test

3.16

basic value

BV

number in resistance units allocated to a particular tool

Note 1 to entry: The basic value represents problems in obtaining, transporting, using and operating the relevant tool at the site in question, and the necessary knowledge and experience for its efficient use.

3.17

tool coefficient

number in resistance units per minute allocated to a group of tools

Note 1 to entry: The tool coefficient represents factors such as noise, smoke, fumes and other effects, which increase the likelihood of a burglary attack being detected.

3.18

boltwork

mechanism by which a closed door is held such that, until it is in the withdrawn position, the door cannot be opened

3.19

lock

device able to recognize a coded input and which performs a blocking function on the boltwork or the door

3.20

relocking device

system comprising blocking and detecting elements which will prevent the boltwork from being withdrawn if a burglary attack is detected

Note 1 to entry: A relocking device can be part of the locking mechanism (e.g. active or live relocker) or an independent unit (e.g. passive relocker).

3.21

to close

to move the door so it becomes possible to bolt it

3.22

to bolt

to throw the boltwork or the bolt of the lock (if there is no boltwork) to a position where it fixes the door in closed position

3.23

to lock

to block a thrown boltwork by action of a lock

4 Classification and requirements

4.1 Classification

Safes are classified to a resistance grade according to Table 1.

ATM safes are classified to a resistance grade according to Table 2.

Strongroom doors and strongrooms (with or without a door) are classified to a resistance grade according to Table 3.

All products shall meet general requirements (4.2) and products with EX, GAS and CD designation shall meet additional requirements (4.3, 4.4 and 4.5).

4.2 General requirements

4.2.1 Safes, strongroom doors and strongrooms

There shall be no holes through the protection material other than those necessary for locks, cables or anchoring, nor for the fitting of accessories to strongroom doors and strongrooms.

Cable openings in safes, strongroom doors and strongrooms (with or without a door) shall not exceed 100 mm. Unused cable entry openings shall be obstructed or plugged by the manufacturer by a means of which cannot be removed from the outside without leaving visible traces.

Free-standing safes with a mass of less than 1 000 kg shall have at least one hole by which they can be anchored. The anchoring assembly for each anchoring hole shall sustain the force given in Table 1.

4.2.2 ATM safes

ATM safes shall have means for plugging unused openings. These means shall be impossible to remove from the outside without leaving visible traces.

NOTE 1 Openings through the protection material for ATM functioning are permitted in ATM safes.

NOTE 2 Cable entry openings in ATM safes may be larger than 100 mm.

ATM safes, including optional ATM bases, shall have a fixing capability by which they can be anchored, and which shall sustain the required force given in Table 2.

4.2.3 Boltwork cover plate

Safes, ATM safes and strongroom doors shall have an internal boltwork cover plate that prevents unauthorized viewing of the locks and boltwork and access to them, when the door is open. Boltwork cover plates shall be secured so that they cannot be opened or removed by an unauthorized person without leaving visible traces.

4.2.4 Cable hole

Safes, strongroom doors and strongrooms of grade III and higher shall either have a hole for a cable or a preparation enabling a connection to be made to an alarm system after the secure storage unit has been installed.

4.2.5 User instructions

Safes, strongrooms and ATM safes shall be provided with operating and maintenance instructions, including instructions regarding the locks. Free-standing safes and ATM safes shall have instructions for anchoring. For built-in safes, strongroom doors and strongrooms, installation instructions shall be provided.

4.3 Additional requirements for EX designation

When tested in accordance with Clause 9, safes of resistance grades II to X designated 'EX' shall achieve the minimum post-detonation resistance values given in Table 1. EX designation is not applicable to safes of resistance grade 0 to I.

When tested in accordance with Clause 9, ATM safes of resistance grades II to VIII designated 'EX' shall achieve the minimum post-detonation resistance values given in Table 2. EX designation is not applicable to ATM safes of resistance grades L and I.

When tested in accordance with Clause 9, strongroom doors and strongrooms (with or without doors) of resistance grades II to XIII designated 'EX' shall achieve the minimum post-detonation resistance values given in Table 3. EX designation is not applicable to strongroom doors and strongrooms of resistance grades 0 and I.

When tested in accordance with Clause 9, the cable-entry openings of safes, strongroom doors and strongrooms (with or without a door) shall not permit the entry of explosives (e.g. fuses or charges).

4.4 Additional requirements for GAS designation

When tested in accordance with Clause 10, ATM safes of resistance grades II to VIII designated 'GAS' shall achieve the minimum post-detonation resistance values given in Table 2. 'GAS' designation is not applicable to ATM safes of resistance grades L and I.

4.5 Additional requirements for CD designation

When tested in accordance with Clause 11, safes of resistance grades IV to X designated 'CD' shall achieve the minimum resistance values given in Table 1. 'CD' designation is not applicable to safes of resistance grades 0 to III and ATM safes.

When tested in accordance with Clause 11, strongroom doors and strongrooms (with or without a door) of resistance grades VIII to XIII designated 'CD' shall achieve the minimum resistance values given in Table 3. 'CD' designation is not applicable to strongroom doors and strongrooms of resistance grades 0 to VII.

Table 1 Minimum requirements for classification of safes (excluding ATM safes) into resistance grades

Resistance grade	Tool attack test (Clause 7)		Anchoring strength ^a (Clause 8)	Locks		Additional requirements for EX designation (optional) (Clause 9)	Additional requirements for CD designation (optional) (Clause 11)
	Resistance value for			Quantity	Class according to EN 1300		
	partial access	complete access	Required force			Post-detonation resistance value ^d	Resistance value ^d
	RU	RU	kN			RU	RU
0	30	30	50	1	A	b	c
I	30	50	50	1	A	b	c
II	50	80	50	1	A	4	c
III	80	120	50	1	B	6	c
IV	120	180	100	2	B	9	1 000
V	180	270	100	2	B	14	1 000
VI	270	400	100	2	C	20	1 000
VII	400	600	100	2	C	30	1 000
VIII	550	825	100	2	C	41	1 000
IX	700	1 050	100	2	C	53	1 000
X	900	1 350	100	2	C	68	1 000

^a Applicable only to free-standing safes with a mass less than 1 000 kg.

^b EX designation is not permitted for resistance grades 0 and I.

^c CD designation is not permitted for resistance grades 0 to III.

^d Resistance value for partial access.

Table 2 — Minimum requirements for classification of ATM safes into resistance grades

Resistance grade	Tool attack test (Clause 7)		Anchoring strength (8.2)	Tool attack test on fixing attachment (Clause 7)	Additional requirements for post-anchoring forcing test (Clause 8)	Locks		Additional requirements for EX and GAS designation (optional) (Clauses 9 and 10)		
	Resistance value for					Quantity	Class according to EN 1300			
	partial access	complete access	Required force	Resistance value	Post-anchoring resistance value				Post-detonation resistance value ^d	
	general	used apertures ^b								
	RU	RU	RU	kN	RU	RU	RU			
L	body ^a	20	20	30	50	30	18	1	A	c
	door	30	30	50						
I	30	30	50	50	30	18	1	A	c	
II	50	35	80	50	50	22	1	A	4	
III	80	65	120	50	50	22	1	B	6	
IV	120	100	180	100	50	22	2	B	9	
V	180	145	270	100	50	22	2	B	14	
VI	270	220	400	100	70	22	2	C	20	
VII	400	350	600	100	120	22	2	C	30	
VIII	550	500	825	100	160	22	2	C	41	

^a Resistance values do not apply to the body of grade L ATM safes which fulfil the requirements of 7.5.5.

^b Applies only to apertures actually used; plugged and unused apertures shall satisfy the general values.

^c EX and GAS designation are not permitted for resistance grades L and I.

^d Resistance value for partial access.

Table 3 — Minimum requirements for classification of strongroom doors and strongrooms into resistance grades

Resistance grade	Tool attack test (Clause 7)	Locks ^a		Additional requirements for EX designation (optional) (Clause 9)	Additional requirements for CD designation (optional) (Clause 11)
		Resistance value for complete access	Quantity		
	RII			RII	RII
0	30	1	A	b	d
I	50	1	A	b	d
II	80	1	A	4	d
III	120	1	B	6	d
IV	180	2	B	9	d
V	270	2	B	14	d
VI	400	2	C	20	d
VII	600	2	C	30	d
VIII	825	2	C	41	10 000
IX	1 050	2	C	53	10 000
X	1 350	2	C	68	10 000
XI	2 000	3	C or	100	10 000
		2	D		
XII	3 000	3	C or	150	10 000
		2	D		
XIII	4 500	2	D	225	10 000

^a Not applicable for classification of strongrooms without a door.
^b EX designation is not permitted for resistance grades 0 and I.
^c Resistance value for complete access.
^d CD designation is not permitted for resistance grades 0 to VII.

5 Technical documentation

The technical documentation shall contain the following information:

5.1 The date of issue, the name of the manufacturer or the name of the applicant requesting the testing shall be on each page.

5.2 Statement of the type of product: free-standing safe, built-in safe (floor and wall), ATM safe, strongroom door or strongroom (with or without a door), together with a list of sizes covered by the same design.

5.3 Drawings of the test specimen showing the following:

- a) weight, outside and inside dimensions, and the manufacturing tolerances;
- b) horizontal and vertical cross sections;
- c) quantity, layout and features of locks, boltwork and relocking devices;
- d) quantity, pitch and position of door bolts, their dimensions (e.g. cross section), throw and engagements and their type (e.g. moving or fixed);
- e) location and design of any local areas of special protection materials;
- f) details of the fastening and/or fitting or anchoring of all elements relevant to physical security; e.g. construction and position of joints and connections, the means by which door and/or frames are joined to walls, the means by which prefabricated panels are joined;
- g) marking, position and dimensions of any holes which pass through the protection material with a detailed representation of specially protected areas;
- h) details of optional features, e.g. features for time locking and time delay locking;
- i) for ATM safes, the ATM base, if any, will be identified by the manufacturer.

5.4 List of all the locks that may be fitted, including the manufacturer and model number.

5.5 Specification of the materials of construction (if not contained in the drawings).

5.6 Statements of details of any materials or device(s) intended to generate gas, smoke, soot, etc. in the event of physical attack, or which could generate harmful substances during testing.

5.7 Statements of the nature and position of any cables and/or facilities for penetration of detection systems, for the mounting of electro-mechanical securing devices, alarm devices, etc.

5.8 Instructions for installation, giving at least the following details:

- a) method of anchoring free-standing safes with a mass less than 1 000 kg;
- b) method of encasing built-in safes, i.e. proportion of body which is to be encased; the minimum size and section thickness of the encasement; the minimum quality of encasement material; (types and proportions of aggregates, cement and any other constituents, flowability of the freshly prepared mass and the 28-day cube compression strength together with the relevant methods of test to define these features); any reinforcement or anchoring to be included within the encasing mass;
- c) method for the construction of monolithic cast in-situ strongrooms, including the following: minimum quality of concrete (types and proportions of aggregates, cement and any other constituents, flowability of the freshly prepared mass, and the 28-day cube compression strength together with the relevant methods of test to define

these features); reinforcement to be included in the strongroom, the means by which door and frame are joined to walls and the means by which armouring and anchoring are jointed to elements;

d) method for assembling pre-fabricated strongroom elements;

e) method by which:

1) the ATM safe is anchored to the floor or other surface;

2) the ATM safe is anchored to the ATM base and the ATM base is anchored to the floor or other surface.

6 Test specimen

6.1 The test specimen shall be a safe, an ATM safe, a strongroom door or a strongroom (with or without a door). The strongroom test specimen shall consist of elements representing all joints and assemblies essential for testing purposes. Optional features (see 5.3 h)) which could decrease the burglary resistance value shall be included in the test specimen. Optional features (see 5.3 h)) and accessories such as time locking and time delay locking which could increase the resistance value in the tool attack test shall be removed or made not operative during the tool attack test.

An ATM safe test specimen shall include an ATM base if this is required for any type of installation. If the ATM base is optional, the testing laboratory can choose whether to test with or without the ATM base.

6.2 Cable entrances for detection systems and/or accessories specified in the technical documentation shall be present in the test specimen.

6.3 Test specimens for built-in safes and cast in-situ strongrooms shall be constructed using the components supplied and following the instructions for installation, (see 5.8).

7 Tool attack test

7.1 Principle

The test serves to establish the complete access, and for safes and ATM safes also the partial access, minimum resistance values of the test specimen.

A testing team (see 7.2) examines a test specimen (see Clause 6) together with the technical documentation (see Clause 5) and devises a programme of attacking the test specimen. The testing team attacks the test specimen. The time taken to gain partial or complete access, assessed by inserting a test block, is recorded and then used to calculate a resistance value.

The tools and programme of attack used during testing shall be those most likely, in the opinion of the testing team, to result in the lowest resistance values. Exploratory tests may be made.

WARNING: Because some of the tests specified in this European Standard involve the use of processes imposing risk on the persons concerned, use only trained staff and ensure adequate supervision.

7.2 Testing team

The testing team shall comprise:

a) testing team leader who is responsible for the conduct of the test and whose function is to plan, direct and supervise the testing;

b) time keeper whose function is confined to timekeeping and the compiling of the event record;

- c) testing operatives whose function is to carry out the necessary tool attacks on the test specimen as directed by the testing team leader.

NOTE Testing should be carried out according to the current state of knowledge. To ensure maximum consistency in test results, testing laboratories should have EN ISO/IEC 17025 accreditation and should participate in audits, cooperative tests, experience-sharing events and other relevant training.

7.3 Apparatus

7.3.1 Attack tools

Any tool used for the testing shall be given a coefficient and basic value according to Annex A.

Tool category B includes tools of category A.

Tool category C includes tools of categories A and B.

Tool category D includes tools of categories A, B and C.

Tool category S includes tools of categories A, B, C and D.

Alterations to tools other than those permitted as 'specially made tools' shall not be made. For instance, it is not permitted to enlarge nozzles, lengthen electrodes, rods or levers etc.

SAFETY WARNING: Tool safety devices such as guards, fuses and other current limiting features and/or maximum speed controls, shall not be removed or altered.

To protect the operator(s), in the case of combined use of a hand impact tool and a chisel, a specially constructed chisel holder may be used. Such a chisel holder shall be regarded as a hand-gripping tool (see Table A.2).

NOTE Testing laboratories should maintain a list of their current tools, together with their categories in accordance with Annex A.

7.3.2 Clock

Clock to an accuracy of at least 0,05 min for each 10 min measuring period. The scaling shall be at least 0,01 min.

Clocks shall be visible to all observers, and the beginning and end of each operating time shall be indicated by an acoustic or optical signal.

7.3.3 Test blocks

7.3.3.1 General

The test blocks shall be made of a rigid material.

7.3.3.2 Test blocks to measure partial access

Three test blocks, each with a length of 150 mm, and the following cross sections:

- a) circle with 125 mm diameter;
- b) square with 112 mm side length; edges and corners rounded with $r = 5$ mm;
- c) rectangle with 100 mm x 125 mm side length; edges and corners rounded with $r = 5$ mm.

+ mm.
2

For all dimensions the tolerance shall be

0

7.3.3.3 Test blocks to measure complete access

Three test blocks, each with a length of 400 mm, and the following cross sections:

- a) circle with 350 mm diameter;
- b) square with 315 mm side length; corners rounded with $r = 10$ mm;
- c) rectangle with 300 mm x 330 mm side length; edges and corners rounded with $r = 10$ mm.

+ mm.

3

3

For all dimensions the tolerance shall be

0

7.4 Test criteria

The requirements for a fulfilled tool attack test are:

- a) for partial access that one of the test blocks defined in 7.3.3.2 can pass completely through the aperture created.
- b) for complete access that one of the following conditions is met:
 - 1) one of the test blocks defined in 7.3.3.3 can pass through the aperture created;
 - 2) door is removed or the door is opened to a clear width of at least 300 mm over at least 80% of the inside height of the storage volume;
- c) for tool attack on the ATM safe fixing attachments that the fixing attachments are completely severed.

In case of a built-in safe, its removal from the encasement is also regarded as a complete access.

Any tool attack test shall be continued until no more information necessary for determining the resistance grade can be reasonably expected. This can occur when the resistance value discovered in previous test attacks is exceeded.

An abandoned tool attack test shall count as one of the tests required in 7.5.

7.5 Testing programme

7.5.1 Free-standing safes

The tests shall comprise at least one tool attack test for:

- a) partial access against the area of the body wall or the door of the test specimen; and
- b) complete access against the body or the door.

Additional tool attack tests according to a) and b) are required against the wall, top, base or door if the test specimen has areas or zones of a different construction and for which the resistance value can be reasonably expected to be lower (e.g. in the area of pre-existing holes).

7.5.2 Built-in safes

The test shall comprise at least one tool attack test for:

- a) partial access against the door or lid (including the door frame and encasement, if appropriate); and
- b) complete access against the door and/or against the body to remove the built-in safe from its encasement.

Additional tool attack tests according to a) and b) are required if the test specimen has areas or zones of a different construction and for which the resistance value can be reasonably expected to be lower (e.g. in the area of pre-existing holes).

7.5.3 Strongrooms

7.5.3.1 General

The test shall comprise at least one tool attack test for complete access against the strongroom wall and one tool attack test against the strongroom door for complete access.

7.5.3.2 Strongroom without door

The test shall comprise at least one tool attack test for complete access.

Additional tool attack tests for the complete access are required against ceiling, base and wall segments if the construction of the strongroom has areas or zones of different construction and for which the resistance value can reasonably be expected to be lower (e.g. in the area of pre-existing holes).

7.5.3.3 Strongroom doors

The test shall comprise at least one tool attack test for complete access on the door (including frame and adjoining wall sections, if necessary).

Additional tool attack tests for the complete access are required if the test specimen has areas or zones of different construction and for which the resistance value can reasonably be expected to be lower (e.g. in the area of pre-existing holes).

7.5.4 Grades I to VIII ATM safes

7.5.4.1 General

Testing of grades I to VIII ATM safes shall comprise at least one tool attack test for:

- a) partial access against the body or door;
- b) complete access against the body or door;
- c) cutting or destroying the fixing by attack on any fixing attachment.

Additional tool attack tests according to a) and b) shall be made on any area or zone of the test specimen which has a different construction and for which the resistance value can be reasonably expected to be lower (e.g. in the area of pre-existing holes).

7.5.4.2 Partial access testing

Partial access testing of grades I to VIII ATM safes shall comprise:

- a) at least one tool attack test against body or door shall be made in such a way that pre-existing holes (plugged or unplugged) do not form part of a partial access penetration; the grade partial access requirements are those of the column of Table 2 headed "general";
- b) at least one tool attack test shall be made so as to create a partial access by enlarging an unplugged cash exit opening or an unplugged deposit opening (if such an opening is present in the test specimen); the grade partial access requirements are those of the column of Table 2 headed "used apertures";
- c) tool attack tests shall be made against plugged cash exit openings or plugged deposit openings (should a plugged opening be present in the test specimen); the grade partial access requirements are those of the column in Table 2 headed "general".

Additional partial access tool attack testing shall be made against any area, zone or feature of the test specimen, including different means of plugging unused openings, and for which the resistance value can reasonably be expected to be lower.

7.5.4.3 Complete access testing

Complete access testing of grade I to VIII ATM safes shall comprise a tool attack test against body or door. Additional complete access tool attack testing shall be made against any area or zone of the test specimen for which lower resistance values can be reasonably expected.

7.5.4.4 Attack against fixing testing

There shall be an attack against the fixing attachment of the ATM safes and/or the ATM base of grade I to VIII ATM safes by cutting or destroying the fixing of the ATM safe and/or the ATM base and/or the ATM base itself.

7.5.5 Grade L ATM safes

7.5.5.1 General

All grade L ATM safes shall be subject to at least one tool attack test for:

- a) partial access against the door;
- b) complete access against the door;
- c) cutting or destroying the fixing by attack on any fixing attachment.

Further testing of grade L ATM safes shall be carried out according to whether or not the construction requirements of 7.5.5.2 and 7.5.5.3 are met.

7.5.5.2 Body construction

The body of grade L ATM safes shall not be subject to partial access or complete access testing if 'a)' and 'b)' are satisfied:

- a) Body is constructed from steel of not less than ≥ 24 mm thickness which has an ultimate tensile strength in excess of 345 MPa, or from steel of not less than 12 mm thickness which has an ultimate tensile strength greater than 690 MPa.
- b) Body is joined along all sides in a manner not less strong than a continuous 6,4 mm penetration weld of steel with an ultimate tensile strength of 345 MPa.

If the body of a grade L ATM safe does not satisfy either 'a)' or 'b)', both partial access and complete access tests will be carried out against the body.

7.5.5.3 Aperture limitations

Testing to exploit the presence of apertures will not be carried out if the apertures in a grade L ATM safe satisfy both 'a)' and 'b)':

- a) all apertures have an area of less than 125 cm² or have at least one dimension less than 60 mm;
- b) wall thickness within 15 mm of the sides of an aperture is not less than 8 mm.

Grade L ATM safes will be subject to tool attack tests for partial access and complete access against any aperture which does not satisfy 'a)' and/or 'b)'.

7.6 Test conditions

7.6.1 Prior to performing the tool attack test, exploratory tests can be carried out. These tests shall not affect the number of tests required according to 7.5.

7.6.2 Non-destructive lock manipulation or lock picking attacks are not permitted.

7.6.3 Any holes (other than those through the base of a safe that are provided for anchoring the safe) which are present in the test specimen may be exploited in the testing.

7.6.4 No mechanical advantage shall be derived from an artificial condition for the test specimen. For example, the tools shall not be used below the plane of the base of the free-standing safe when it has been elevated for test on bearers.

7.6.5 Safes and ATM safes shall only be tested with tools of categories A, B, C and D. Strongrooms and strongroom doors can be tested with tools of categories A, B, C, D and S.

7.6.6 During any one tool attack test, the following tools shall not be used simultaneously:

- a) two electric powered tools (see Tables A.7, A.8, A.9 and A.10);
- b) two thermal tools (see Table A.11);
- c) two hand hammering tools (see Table A.5);
- d) electric powered tool and a thermal tool;
- e) hand hammering tool and an electric powered tool;
- f) hand hammering tool and a thermal tool;
- g) two specially made electric powered tools (see Table A.6).

7.6.7 For hand hammering tools used with both hands, the number of blows is limited to 250 per tool attack test.

7.6.8 In any one tool attack test, only two operatives and the testing team leader are allowed to work on the test specimen. Only two persons are allowed to work on the test specimen at one time.

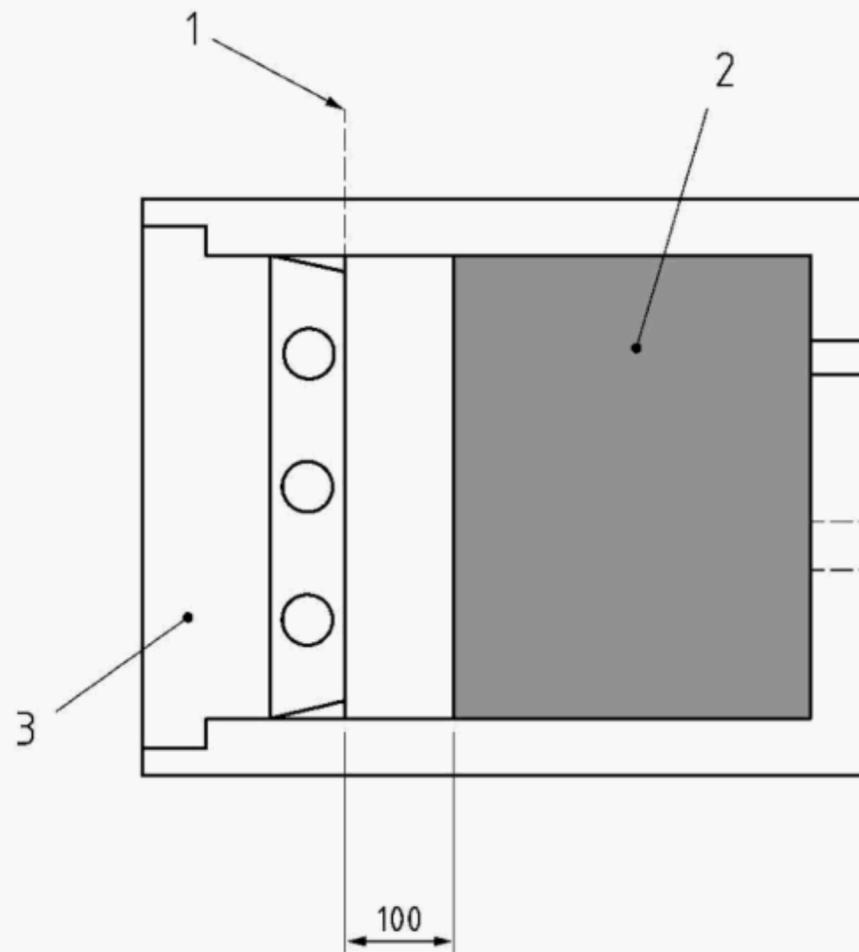
7.6.9 The use of balancers is not allowed in a tool attack test.

7.6.10 Dustcleaners and compressed air may be used for cleaning the test specimen.

7.6.11 Testing shall only be done in areas or against features which have not been weakened by earlier tests.

7.6.12 Tool attacks for the purpose of opening the door of an ATM safe shall not pass through any part of the internal space which is >100 mm from the plane of the boltwork cover plate (see Figure 2).

Dimensions in millimetres



Key

- 1 Plane of boltwork cover plate
- 2 Tool attack shall not pass through volume represented by shaded area
- 3 Door

Figure 2 — Schematic diagram showing the internal space of an ATM safe through which a door opening tool attack shall not pass

7.6.13 For a tool attack test on ATM safe fixing attachments and/or the ATM base fixing attachments and/or the ATM base itself, only tools of tool categories A, B, C and D may be used. Tools listed in Table A.6 shall not be used, neither shall the non-tools listed in Table A.14 be used.

Fixing bolts of the ATM safe and/or the ATM base may be attacked through the ATM base or through holes pre-existing in the ATM safe if the holes are within 250 mm of the bolt being attacked.

7.7 Procedure

Record the date of receipt of the test specimen (see Clause 6) and technical documentation (see Clause 5) together with the unique identification number.

Examine the test specimen (see Clause 6) and the technical documentation (see Clause 5) and ensure they correlate.

Prepare attack tools so that they are ready for immediate use. Set-up times for first assembly are included in the basic values and shall not be additionally added for the determination of the resistance value. For example, power drills shall be fitted with a drill bit, angle grinders fitted with a cutting disc, thermal tools fitted with the appropriate nozzles, drill stands attached to the sample, etc.

Close and lock the test specimen, if that will influence the test result.

For unclassified locks, the code or key shall be available.

At the start of a test, a free-standing safe or an ATM safe with or without an ATM base test specimen shall be positioned in its normal attitude on the floor, or simulated floor, and may be fixed to assist testing. Free standing safe or ATM safe test specimens need not be anchored for complete access testing or for partial access testing. During partial access testing, a free standing safe or ATM safe test specimen may be toppled so that any of the sides can be tested; the time taken for toppling shall be counted as operating time. ATM safe test specimens shall not be toppled for any door opening attack.

Carry out the tool attack test.

Record all events.

7.8 Operating time measuring

- a) Measure and record the operating time for each tool used. For each operation, start the clock as the tool touches the test specimen, stop the clock when the tool ceases to touch the test specimen.

Any time taken to position the tool inside the test specimen shall be measured as operation time.

The operating time recorded shall be rounded to the next complete 1/60 min or 1/100 min.

- b) If hand hammering tools (see Table A.5) are used with both hands, the operating time shall be calculated from the number of blows in accordance with the following:

Tools of category A:

- 1) 1/60 min per blow (when the tool impacts directly against the test specimen);
- 2) 1/40 min per blow (when accessories (see Table A.12) transmit the impact force to the test specimen).

Tools of category B:

- 3) 1/30 min per blow (when the tool impacts directly against the test specimen);
- 4) 1/15 min per blow (when accessories (see Table A.12) transmit the impact force to the test specimen).

If an attack uses a two-handed impact method, where the time is calculated from the number of blows, and at the same time uses another mechanical attack method, e.g. using a crowbar, then the time taken shall be the longer of the two times, i.e. either the actual operating time, or the operating time calculated from the number of blows.

- c) Operating time includes any time taken to extract tools (or parts of tools) whose removal is necessary to continue the test. The operating time also includes any time for repositioning the test specimen during a tool attack test.
- d) Operating time includes any time(s) in which a tool is removed from contact with the test specimen for a short period but which time cannot be avoided for the most effective continuation of the test attack (For example, when an electric hammer is removed from contact so that the point or angle of attack can be changed).
- e) Operating time does not include:
- 1) time taken to relocate the position of a tool stand, or remove it;
 - 2) time of a temporary interruption of a tool attack test, ordered by the testing team leader on the grounds of operative safety, due to the emission from the test specimen of excessive gas, smoke, soot, etc., or for cleaning or removing debris from the work area;
 - 3) any time the testing team leader authorizes for inspection/checks of the test specimen;
 - 4) use of non-tools (see Table A.14) and the dustcleaner or compressed air for cleaning.

7.9 Calculation of resistance values

For each tool attack test, calculate the resistance values V_R using the following formula:

$$V_R = \frac{\sum t \times c}{\sum BV} \quad (1)$$

where

$\sum t$ is the sum of all operating times in minutes;

c is the highest tool coefficient of the used attack tools (see Annex A);

$\sum BV$ is the sum of the basic values for all attack tools used.

The calculated value shall be rounded-up to the next full number: it represents the resistance value in resistance units (RU) for that tool attack test.

7.10 Test record

For each tool attack test, record at least the following information:

- a) test record reference number;
- b) testing laboratory name;
- c) date and place of the testing;
- d) composition of testing team, indicating who was the testing team leader, the time keeper and who were the testing operatives;
- e) names of testing observers, if any;
- f) type of product (see 5.2);
- g) identification of test specimen (see Clause 6);
- h) description of each tool attack test made (in chronological order), giving details of the point of attack, attack tools, measurements made and events, together with a record of all operating times and reference to any photographic or video records made;
- i) calculation of the resistance value (V_R) in resistance units (RU).

8 Anchoring strength test

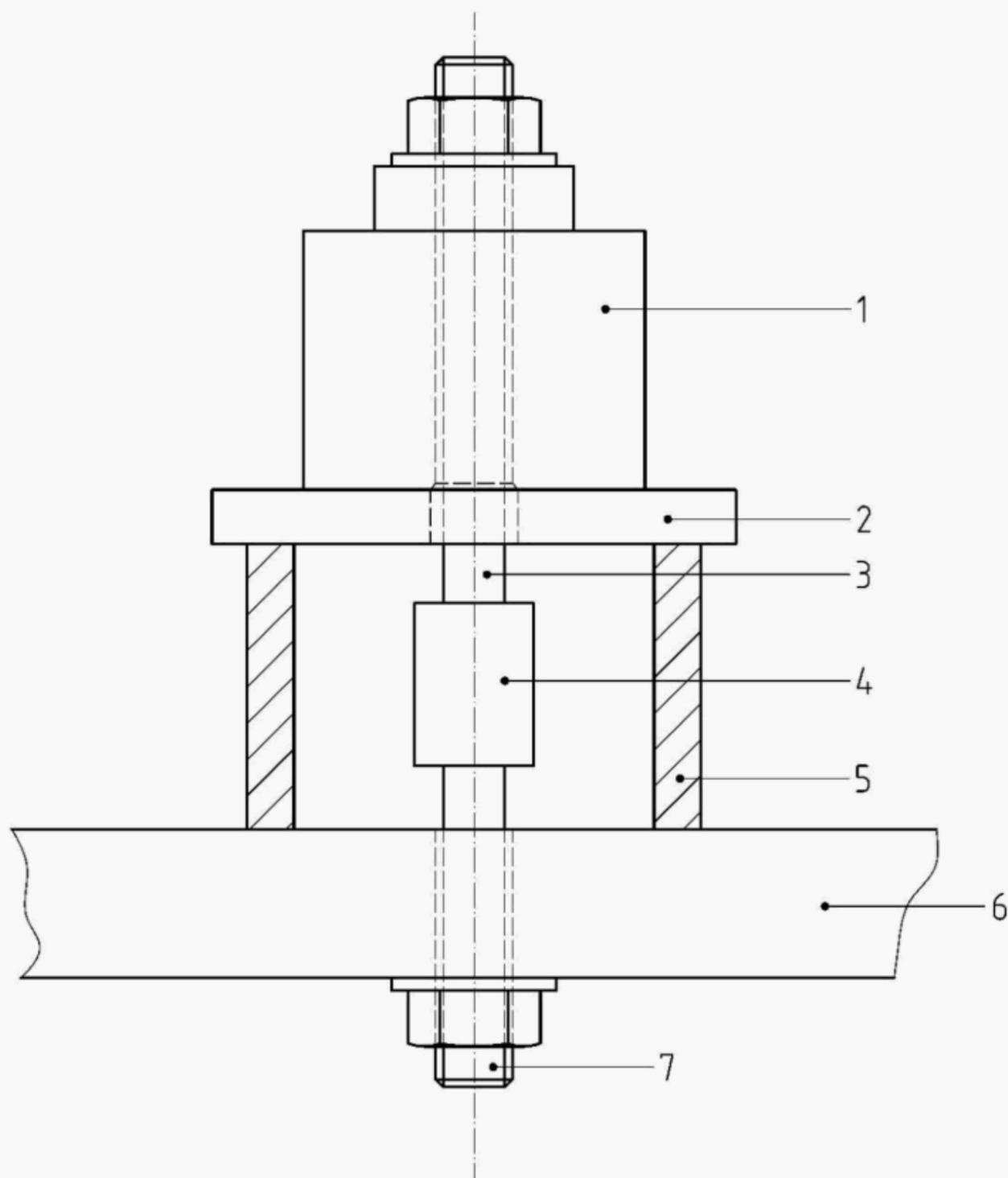
8.1 Free-standing safes

8.1.1 Principle

The strength of the anchoring system for free-standing safes is assessed by applying a load according to Figure 3.

8.1.2 Loading equipment

Tensile test equipment shall have a capacity of at least 100 kN. The load shall be applied in principle as shown in Figure 3. Measurements of an applied load shall be made to an accuracy within + 5% of the applied load.



Key

- 1 Hydraulic jack
- 2 Steel plate support
- 3 Anchoring assembly
- 4 Adaptor and load measuring unit
- 5 Cylinder support with an inside diameter of $(2,5 \pm 0,5) d$ ($d =$ wall thickness)
- 6 Safe wall with thickness d in mm and with an anchoring hole
- 7 Anchoring components as described in the installation instructions

Figure 3 Example of loading equipment

8.1.3 Procedure

8.1.3.1 Preparation

Attach the test specimen for free-standing safes to the loading equipment by an anchoring assembly through one of the anchoring holes, according to the installation instructions (see 5.8).

8.1.3.2 Loading

The required force (see Table 1) shall be applied in a direction that attempts to pull the assembly through the safe's wall or base.

Apply the load smoothly up to the force required within 2 min to 3 min. Hold the load at this level for 1 min, and then release.

8.1.4 Expression of test results

The applied force shall be given, together with a statement as to whether the force was sustained without the bolt failing or without the bolt head being pulled through the wall or base of the safe.

8.1.5 Test criteria

The anchoring assembly shall not fail or be pulled through the wall or base when tested.

8.2 ATM safes

8.2.1 Principle

The strength of anchoring of ATM safes is assessed by applying a horizontal force to the test specimen.

8.2.2 Loading equipment

8.2.2.1 Means for applying a horizontal force of at least 100 kN to the sample and which is able to measure the applied force with an accuracy within $\pm 5\%$.

8.2.2.2 Steel plate to which the ATM safe (or ATM safe with ATM base) shall be anchored and which is capable of withstanding the full test force.

8.2.3 Procedure

8.2.3.1 Preparation

For the anchoring test of an ATM safe without an ATM base, the ATM safe shall be fixed to the steel plate using the fixing method the manufacturer recommends for anchoring.

For the anchoring test of an ATM safe with an ATM base, the ATM safe shall be attached to the ATM base by welding or screwing according to manufacturer's instructions; and the ATM base shall be attached to the steel plate by the means the manufacturer recommends for anchoring.

For wall mounted ATM safes, the safe shall be turned through 90° and attached to the horizontal steel plate so that the steel fixing plate simulates the vertical mounting wall.

New fixing bolts and associated items shall be used for each anchoring strength test.

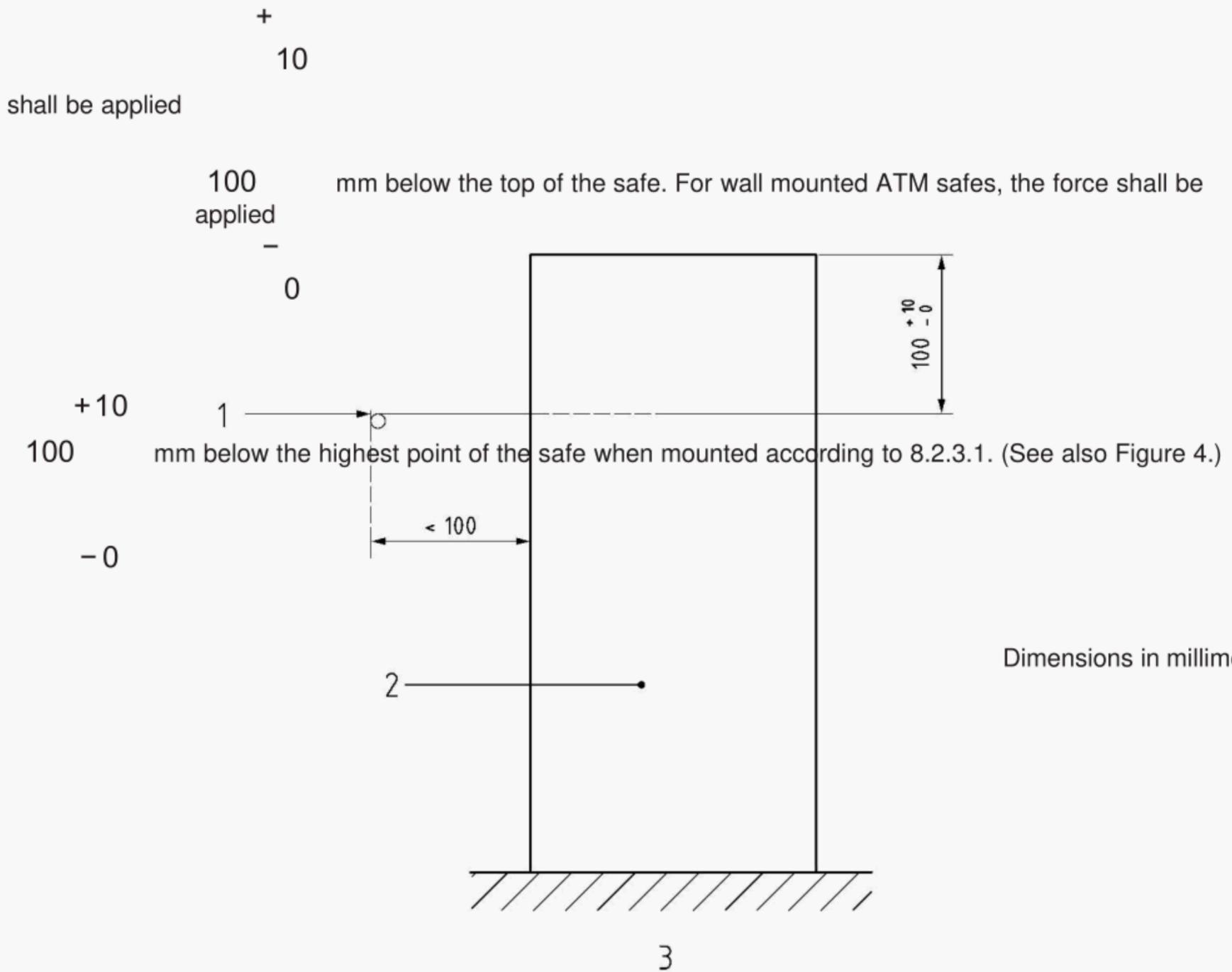
Components may be added to the ATM safes to facilitate the application of the required test force; for instance by welding either a steel bar to the ATM safe against which a jack can be applied or an attachment on which to pull.

8.2.3.2 Loading

The test shall be carried out with the ATM safe closed and locked.

Before any force is applied, an attempt shall be made to remove or weaken any external fixings. This shall be done using category A hand (dis)assembling tools (see Table A.1) for a maximum of 50 RU or 30 RU in the case of a grade L ATM safe.

The force shall be applied horizontally at the commencement of the test. For floor-mounted ATM safes, the force



Key

- 1 Force
- 2 Test specimen
- 3 Steel plate

Figure 4 — Application of the force

For ATM safes fitted with an ATM base, the load will be applied in a pushing direction and will continue to be applied from the initial point of contact while the ATM safe tilts, effectively changing the height of the force

application relative to the base of the test equipment. Alternatively, pulling equipment may be used. Additional test equipment (such as welded-on or clamped brackets) shall be utilised for such pulling equipment however, to ensure that the application of the force is compressive onto the safe. If during the test the angle from horizontal of the applied force exceeds $\pm 15^\circ$, the fixed mounted point of the load mechanism shall be repositioned to restore the horizontal force.

Apply the load smoothly up to the force required within 2 min to 3 min. Hold the load at this level for 1 min and then release.

The testing team leader will choose the direction of the forcing test.

A post-anchoring forcing test will be carried out after the applied forces have been reduced to zero. This will apply whether or not the ATM safe has been tested with an ATM base fixed in place. The purpose of this test will be either to completely sever the ATM safe from the anchoring test equipment, to completely sever the ATM safe from the ATM base, or to completely sever the ATM base from the anchoring test equipment. Use of the tools for a post-anchoring forcing test shall follow the test conditions of 7.6.5, 7.6.6, 7.6.7, 7.6.8, 7.6.9, 7.6.10, 7.6.11 and 7.6.13. Attacks to open the ATM safe door to gain access to the anchoring bolts are not allowed. Attacks to anchoring bolts within the safe via access holes in the safe are not allowed.

Further forcing and post-anchoring forcing testing will be allowed on similar untested or undamaged sample ATM bases in a different direction, if it is supposed that an alternative forcing direction may cause the ATM safe and ATM base to fail the test.

The testing team leader may choose to stop the pushing force test earlier than the completion of the required force criterion (irrespective of the 1 min duration force criterion) to initiate the post-anchoring forcing test if he considers that a lower RU for the post-anchoring forcing test may be achieved by that method.

8.2.4 Expression of results

The test report shall record for each individual anchoring test: the direction through which the forces were applied, the operating times for each tool used during the post-anchoring resistance tests, and the calculation of the resistance value V_R for the post-anchoring resistance test according to 7.9.

8.2.5 Test criteria

The ATM safe and/or ATM base with ATM safe will be deemed to have passed the anchoring test if the required force and the post-anchoring forcing requirements according to Table 2 are achieved prior to completely severing the fixing attachments.

9 Explosive test

9.1 Principle

The test is done for the purpose of determining the resistance against attacks with explosives. The test is only carried out, if the applicant applies for EX designation.

An explosive charge is detonated. A tool attack test is then made to measure the remaining resistance value.

9.2 Test specimen

The test specimen shall be the same design as that used in the tool attack test (see Clause 7).

Test an undamaged empty test specimen. A test specimen which has previously been subjected to the tool attack test (see Clause 7) may be used if that test will not influence the result of the explosive test.

The internal capacity of ATM safes to be tested shall be in the range of 300 dm³ to 400 dm³. If no safe in a model series will reach such a volume, the nearest existing size shall be chosen.

9.3 Explosives

The charge shall be of pentaerythritol tetranitrate (PETN) with the following properties:

density	(1,500 ± 50) kg/m ³ ;
specific energy	(5,000 ± 500) J/g;
detonation velocity	(7,000 ± 500) m/s.

9.4 Determination of explosive charge mass

The mass of the explosive charge shall be in accordance with Table 4:

Table 4 — Explosive charge mass for resistance grades II to XIII

Explosive charge mass (g) - tolerance ± 1 g			
Resistance grade	Safes	ATM Safes	Strongroom doors and strongrooms
II, III and IV	70	70	70
V, VI and VII	100	100	125
VIII	200	200	250
IX and X	200	not applicable	250
XI, XII and XIII	not applicable	not applicable	375

9.5 Conditions for explosive attack test

9.5.1 Safes and ATM safes

Position the explosive charge in a compact shape at the geometric centre of the storage volume of the safe. Close and lock the door and detonate the charge.

After detonation, the tool attack shall be continued until partial access (as defined in 7.4.a)) is achieved, or until the required post-detonation resistance value (for safes see Table 1; for ATM safes see Table 2) is reached. The continuation of the tool attack shall be recorded as a post-detonation tool attack.

This post-detonation tool attack is limited to the use of attack tool categories A, B, C and D. Any post-detonation tool attack shall be continued until no more information necessary for determining the post-detonation resistance value can be reasonably expected.

9.5.2 Strongroom doors and strongrooms

Preparatory tool attacks may be undertaken and shall follow the tool attack test (see Clause 7) to create holes into which the explosive charge can be placed. This preparatory work is limited to 25% of the minimum resistance value in RU (for the complete access) of the resistance grade to which the test specimen previously has been classified (see Table 3), and limited to the use of attack tool categories A, B, C and D. The calculation of the resistance value for this preparatory work shall be done in accordance with 7.9.

The charge is placed, stemmed, and detonated.

After detonation, the tool attacks shall be continued until complete access (as defined in 7.4 b)) or the required post-detonation resistance value in accordance with Table 3 has been achieved. These remaining tool attacks are recorded as post-detonation tool attacks.

This post-detonation tool attack is limited to the use of attack tool categories A, B, C and D.

Any post-detonation tool attack shall be continued until no more information necessary for determining the post-detonation resistance value can be reasonably expected.

9.6 Calculation of resistance values for the post-detonation tool attack

Calculate the resistance value for the tool attack using the following formula:

$$RV_{PD} = \left(\sum t_{PD} \cdot c \right) + \sum BV_{PD} \quad (2)$$

where

RV_{PD} is the post-detonation resistance value;

$\sum t_{PD}$ is the sum of all operating times for the post-detonation tool attacks;

c is the highest tool coefficient of the attack tool used in the post-detonation tool attacks (see Annex A);

$\sum BV_{PD}$ is the sum of basic values for all attack tools used only in the post-detonation tool attacks. This sum is limited to basic values for attack tools not used in the preparatory tool attacks.

The calculated value shall be rounded-up to the next full number: it represents the resistance value in RU for the post-detonation work.

9.7 Test record

For the post-detonation tool attack test, record in chronological order at least the following details:

- point of attack;
- tools used;
- record of all operating times;
- measurements made and events;
- reference to any photographic or video records made;
- resistance value in RU.

10 GAS explosive test

10.1 Principle

The gas attack test determines the resistance against attacks with gas. The test is only made if the applicant applies for 'GAS' designation. A gas charge is introduced into the ATM safe and detonated. A tool attack test is then made to measure the remaining resistance value.

10.2 Test specimen

The test specimen shall be undamaged and of the same design (including apertures (see 4.2.2)) as used in the tool attack test (see Clause 7). The storage volume of the specimen shall be empty (i.e. no cash equipment installed). Unused apertures that are normally not blocked shall be open during the test. A test specimen previously subjected to a tool attack test may be used if that test will not influence the result of the gas attack test.

10.3 Gas

The charge shall be gas (acetylene C_2H_2 + oxygen O_2) with a stoichiometric and homogeneous mixture ($1 C_2H_2 + 2.5 O_2$), with a gas component purity of > 99.0%.

The C₂H₂ and O₂ volumes shall be corrected to conditions of 20°C and 1 013 hPa, and shall have a tolerance of ± 5 %.

10.4 Determination of gas charge volume

The gas volume charge shall be calculated using the following formula:

$$V_{\text{Charge}} = 50 \text{ l} < 50\% V_{\text{internal space}} < 100 \text{ l}$$

NOTE Internal space is defined in 3.8.

The calculated volume shall be rounded-up to the next full number.

10.5 Test equipment for gas attack testing

Gas flow/charge measuring equipment capable of reaching the requirements of 10.3 (with volumes within the tolerance and homogeneity). For the storage of the gas volume, the laboratory shall use a flexible container(s). The properties of the flexible container(s) in respect to the dimensions, material and stability shall be chosen so that these will not influence the results of the gas attack test (e.g. back pressure < 1 hPa, no absorption of energy).

10.6 Procedure for gas attack testing

For reasons of worst case test conditions and reproducibility, the ignition device and the flexible container(s) for the gas charge shall be positioned near the middle of the internal space of the ATM safe (see 3.8). The sequence of the procedure is as follows:

Fill the gas charge container(s) with air or inert gas to check it for leakage and position;

Empty the gas charge container(s);

Close and lock the door;

Fill the flexible container(s) with the stoichiometric and homogenous gas charge;

Ignite the charge.

NOTE To obtain a homogeneous gas charge, the mixing of the gas components can either be done before (e.g. mixing by devices such as a nozzle) or after (e.g. mixing by a circulation pump) filling into the flexible container(s). A webcam may be used to check for leakage and container position.

After detonation, the tool attack shall be performed until partial access (as defined in 7.4.a)) is achieved, or until the required post-ignition resistance value (see Table 2) is reached. The tool attack shall be recorded as a post-detonation tool attack.

This post-detonation tool attack is limited to the use of attack tool categories A, B, C and D.

Any post-detonation tool attack shall be continued until no more information necessary for determining the post-detonation resistance value can be reasonably expected.

10.7 Calculation of resistance values for the post-detonation tool attack

Calculate the resistance value for the tool attack using the following formula:

$$RV_{PD} = \left(\sum_{PD} t_{PD} \cdot c_{PD} \right) + \sum_{PD} BV_{PD} \quad (3)$$

where

- RV_{PD} is the post-detonation resistance value;
- $\sum t_{PD}$ is the sum of all operating times for the post-detonation tool attacks;
- c is the highest tool coefficient of the attack tool used in the post-detonation tool attacks (see Annex A);
- $\sum BV_{PD}$ is the sum of basic values for all attack tools used only in the post-detonation tool attacks.

The calculated value shall be rounded-up to the next full number: it represents the resistance value in RU for the post-detonation work.

10.8 Test record

Before the ignition:

Record observations, volumes, gas charge and mixing procedure.

After the ignition:

Record observations describing the effect on the test specimen.

For the post-detonation tool attack test, record in chronological order at least the following details:

- point of attack;
- tools used;
- record of all operating times;
- measurements made and record of events;
- reference to any photographic or video records made;
- resistance value in RU.

10.9 Marking

If the requirement (e.g. ATM safe III GAS) is met, the product may be marked with the letters 'GAS' after the grade number. Products shall not be marked with a grade number which is higher than that achieved in the tool attack tests (see Clause 7).

11 Core drilling test

11.1 Principle

The test establishes the resistance to a burglary attack using core drilling equipment as the principle tool. The test applies only to safes, strongroom doors and strongrooms, and is carried out only if the applicant wishes to claim CD designation.

11.2 Test specimen

The core drilling test may be carried out on the test specimens used for tool attack tests. Alternatively, if agreed by the testing laboratory, another panel whose construction is identical with that of the test specimen used for the tool attack may be used.

11.3 Apparatus

11.3.1 Safes

Testing shall be carried out with electric power tools of category D in accordance with Table A.10, and with core bits of (150 ± 5) mm diameter of category D or S in accordance with Table A.12. Preparatory work prior to core drilling is permitted with tools of categories B and C in accordance with Table A.11. The use of these tools is limited to 150 RU. The resistance value for this preparatory work shall be calculated in accordance with 7.9.

11.3.2 Strongroom doors and strongrooms

Testing shall be carried out with electric power tools of tool category S in accordance with Table A.10, and with core bits of (150 ± 5) mm diameter or (400 ± 10) mm diameter of category S in accordance with Table A.12. It is not allowable to change the diameter of core drills after the test has commenced.

The following ancillary tools are permitted to assist in the core drill test:

thermal tools (see Table A.11, tool category C) or grinding/slitting tools (see Table A.10, tool category C);

hammer with a head weight of 1,5 kg (see Table A.5, tool category A);

any number of screwdrivers and chisels (see Table A.1, tool category A).

The resistance value from the use of the ancillary tools is calculated according to 7.9 with the respective basic values and tool coefficient of 35 RU/min. The use of these tools is limited to 800 RU. The calculated resistance value of the ancillary tools adds to the resistance value of the core drill equipment.

11.4 Test method

Core drilling shall be used to create a partial access (as defined in 7.4 a)) through the test specimen of safes as well as a complete access (as defined in 7.4 b)) through the test specimen of strongroom doors and strongrooms. During the test, the core bit may be changed.

The core drilling test may be terminated, and the requirements for CD designation deemed to have been achieved; if the tester decides that, because of slow penetration, or because the drilling is repeatedly halted or the bit damaged, there is sufficient evidence to suggest that the resistance value requirement in accordance with Table 1 (safes) respectively Table 3 (strongroom doors and strongrooms) would be achieved.

NOTE 1 For positioning the test equipment and fixing it to the test specimen, other tools can be used, but they should be used only for this purpose and should not otherwise influence the time of penetration.

NOTE 2 A complete access (test blocks in accordance with 7.3.3) on strongroom doors and strongrooms can be achieved by a single penetration or several overlapping penetrations.

11.5 Calculation of resistance value

The resistance value for making a partial access on safes as well as a complete access on strongroom doors and strongrooms shall be calculated according to 7.9.

Basic values for tools used for fixing or positioning of the core drilling equipment shall not be included in the calculation; neither shall the time taken for positioning or fixing be included in the operating time. Time used to 'sharpen' or otherwise treat a core bit to restore its cutting ability shall be counted as operating time.

11.6 Marking

If the requirement (e.g. safe V CD, strongroom door XII CD) is met, the product may be marked with the letters 'CD' after the grade number. Products shall not be marked with a grade number which is higher than that achieved in the tools attack tests (see Clause 7).

12 Test report

12.1 Allocate a unique identification number to the test report.

12.2 When no EX and no GAS attack tests have been made, report the following:

- a) name of manufacturer and place and year of manufacture;
- b) technical documentation supplied in accordance with Clause 5; and, in the case of a built-in safe or cast in-situ strongroom, the quality of the encasement work done at the test site;
- c) manufacturer's identification of the test specimen;
- d) description and result of any exploratory access made;
- e) testing programme developed on the basis of the initial examination;
- f) date and place of testing;
- g) composition of the testing team, the names of the testing team leader, the time keeper and the testing operatives; names of any independent technical experts consulted;
- h) specifications of the attack tools used;
- i) calculated resistance value for each tool attack test;
- j) applied force in kilonewtons (kN) from the anchoring strength test and a description of any deformation or failure in the safe wall or base (if applicable).

12.3 When an EX attack test has been made, report the following in addition to 12.2:

- a) description and result of any exploratory access made;
- b) testing programme developed on the basis of the initial examination;
- c) date and place of explosive test;
- d) composition of the testing team, the names of the testing team leader, the time keeper and the testing operatives;
- e) specifications of the attack tool used;
- f) trade mark and type of explosives, charge mass and a description of the location of the charge;
- g) description of the post-detonation tool attack and calculation of the resulting resistance value.

12.4 When a GAS attack test has been made, report the following in addition to 12.2:

- a) description and result of any exploratory access made;
- b) testing programme developed on the basis of the initial examination;

- c) date and place of gas attack test;
- d) composition of the testing team, the names of the testing team leader, the time keeper and the testing operatives;
- e) calculation of the internal space and calculation of the charge and a description of the location of the flexible container(s) in the internal space;
- f) specifications of the attack tool used;
- g) description of the post-detonation tool attack and calculation of the resulting resistance value.

NOTE The test report should contain a statement that the results obtained relate only to the sample tested, and should be regarded only as the basis for certification. The test report itself should not be considered to be a Certificate of Conformance.

13 Marking

The product for which a resistance grade is stated shall be marked with reference to the classification according to this European Standard.

The marking (metal plate) shall be indelible and securely fixed on the inside face of the door, in the locking chamber or on the face of the prefabricated element for a strongroom.

The marking shall comprise:

- a) manufacturer's name or identification code;
- b) standard designation and resistance grade;
- c) EX designation (if applicable);
- d) GAS designation (if applicable);
- e) CD designation (if applicable);
- f) year of manufacture;
- g) product type (see 5.2).

Additional marking may comprise:

- h) type, model number, designation or size;
- i) serial number.

Annex A (normative)

Attack tools

In this annex, tool coefficients and basic values are given for each tool (see Tables A.1 to A.14) and tool category (A, B, C, D and S) which are allowed to be used in the tool attack test. In addition, the intended use of the tool is described.

NOTE In some cases, the basic value also will vary within a tool category.

Tools of Tables A.1 to A.6 are only used manually, and without an external power supply. Tools of Tables A.7 to A.10 are used with external supply terminals and usually (with the exception of tool category A) depend on external sources of power. Tools of Tables A.7, A.8 and A.10 can be used with cutting and/or cooling fluids.

Tools shall be used for the purpose for which they are designed. If a tool replaces another type of tool, the coefficient of the replaced or simulated tool (if higher) is applicable.

EXAMPLE If a screwdriver is used as a punch then it shall not be regarded as a hand (dis)assembling tool but as a tool specific accessory with a basic value of 1 resistance unit (RU).

Table A.1 Hand (dis)assembling tools

TOOL CATEGORY					(BV = Basic Value in RU)
A	B	C	D	S	
Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:	
5 RU/min	7.5 RU/min	10 RU/min	15 RU/min	35 RU/min	
weight ≤ 1,5 kg and length ≤ 400 mm	weight ≤ 3,0 kg and length ≤ 1,500 mm	---	---	---	
BV: 0		BV: 5			
<p>NOTE These tools are used for non-destructive assembling and disassembling of detachable elements, e.g. to detach screws, pins or bolts, spring clips.</p> <p>EXAMPLES Screwdrivers, fork/ring wrenches.</p>					

Table A.2 Hand gripping tools

TOOL CATEGORY					(BV = Basic Value in RU)
A	B	C	D	S	
Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:	
5 RU/min	7.5 RU/min	10 RU/min	15 RU/min	35 RU/min	
weight ≤ 1,5 kg and length ≤ 400 mm	length ≤ 1,500 mm	---	---	---	
BV: 0		BV: 7			
<p>NOTE These tools are used for the gripping (lever transmission) of tools and materials, e.g. fixing/holding of a chisel.</p> <p>EXAMPLES Universal pliers, wrenches, chisel holders, forge tongs.</p>					

EXAMPLES Universal pliers, wrenches, chisel holders, forge tongs.

Table A.3 Hand levering

tools				
TOOL CATEGORY				
(BV = Basic Value in RU)				
A	B	C	D	S
Tool coefficient: 5 RU/min length ≤ 750 mm	Tool coefficient: 7.5 RU/min length ≤ 1,500 mm	Tool coefficient: 10 RU/min ---	Tool coefficient: 15 RU/min ---	Tool coefficient: 35 RU/min ---
BV: 5		BV: 7		
NOTE These tools transmit physical force by a lever, e.g. prise-up a door, deform or fracture weak pieces.				

EXAMPLES Screwdriver, tyre levers, hand levers, crowbars.

Table A.4 Hand sawing/filing/cutting and drilling

tools				
TOOL CATEGORY				
(BV = Basic Value in RU)				
A	B	C	D	S
Tool coefficient: 5 RU/min weight ≤ 1,5 kg and length ≤ 400 mm	Tool coefficient: 7.5 RU/min ---	Tool coefficient: 10 RU/min ---	Tool coefficient: 15 RU/min ---	Tool coefficient: 35 RU/min ---
BV: 0				
NOTE These tools are used for manual grinding, cutting and detaching of various materials without additional electric means of propulsion, e.g. sawing steel sheets.				

EXAMPLES Hand drills, saws, files, side cutters, bolt croppers, plate shears, steel cutters.

Table A.5 Hand hammering

tools				
TOOL CATEGORY				
(BV = Basic Value in RU)				
A	B	C	D	S
Tool coefficient: 5 RU/min head weight ≤ 1,5 kg and moment ≤ 10 Nm and length ≤ 750 mm	Tool coefficient: 7.5 RU/min head weight ≤ 3,0 kg and moment ≤ 25 Nm and length ≤ 1,000 mm	Tool coefficient: 10 RU/min ---	Tool coefficient: 15 RU/min ---	Tool coefficient: 35 RU/min ---
BV: 5		BV: 7		

NOTE These tools are used to break up various materials and to propel different accessories such as chisels, drift punches and wedges.

EXAMPLES Hammers, hand axes, pick axes.

Table A.6 Specially made

tools				
TOOL CATEGORY				
(BV = Basic Value in RU)				
A	B	C	D	S
Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:
5 RU/min	7.5 RU/min	10 RU/min	15 RU/min	35 RU/min
power consumption ≤ 500 W	power consumption ≤ 800 W	---	---	---
length ≤ 400 mm and	length ≤ 750 mm and			
weight ≤ 1,5 kg	weight ≤ 3,0 kg			
BV: 18	BV: 28			

NOTE These tools are tools which are usually not commercially available but are conceived or provided specially for certain purposes at the test. If appropriate, sources of electricity not exceeding the working voltage (max. 240 V) may be used for attacks dealt to electro-mechanical security devices.

Table A.7 Electric powered tools, without impact				
TOOL CATEGORY				
(BV = Basic Value in RU)				
A	B	C	D	S
Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:
5 RU/min	7.5 RU/min	10 RU/min	15 RU/min	35 RU/min
weight ≤ 3,0 kg and	power consumption ≤ 800 W	power consumption ≤ 1,350 W	---	---
power consumption ≤ 500 W				
BV: 7	BV: 11	BV: 25		
		plus an addition for a drilling rig		
		BV: 11		

NOTE These tools are used to drill or cut (without an impacting option) and their working energy is supplied by a source of electricity.

Table A.8 Electric powered rotary tools, with impact option				
TOOL CATEGORY				
(BV = Basic Value in RU)				
A	B	C	D	S
Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:
5 RU/min	7.5 RU/min	10 RU/min	15 RU/min	35 RU/min
---	power consumption ≤ 800 W	power consumption ≤ 1,350 W	---	---
	and single blow energy ≤ 6 J	and single blow energy ≤ 15 J		
	BV: 11	BV: 25		

NOTE These tools are electric drilling machines that can be used with or without an impacting option.

EXAMPLES Hammer drills, jack hammers, concrete breakers.

Table A.9 Electric power impacting machine tools, without

rotation				
TOOL CATEGORY				
(BV = Basic Value in RU)				
A	B	C	D	S
Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:
5 RU/min	7.5 RU/min	10 RU/min	15 RU/min	35 RU/min
---	power consumption ≤ 800 W and single blow energy ≤ 6 J	power consumption ≤ 1,350 W and single blow energy ≤ 20 J	---	---
BV: 11		BV: 25		
NOTE	These tools are used for hammering, breaking up or deforming.			

EXAMPLES Building hammers.

Table A.10 Electric power grinding/slitting machine tools

TOOL CATEGORY				
(BV = Basic Value in RU)				
A	B	C	D	S
Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:
5 RU/min	7.5 RU/min	10 RU/min	15 RU/min	35 RU/min
---	power consumption ≤ 800 W BV: 14	power consumption ≤ 2,300 W and with: abrasive disc or BV: 25 diamond disc	power consumption ≤ 2,300 W and with: a rig and a drill with length ≤ 450 mm BV: 49 or length ≤ 1,000 mm BV: 63	power consumption ≤ 11,000 W and with: a drill with length ≤ 450 mm BV: 245 or length ≤ 1,000 mm BV: 300
BV: 35			or wall saw BV: 245	
NOTE	These tools are used for cutting or abrasion.			

EXAMPLES Electric disc cutters, diamond core drills.

Table A.11 Thermal cutting/melting tools

tools				
TOOL CATEGORY (BV = Basic Value in RU)				
A	B	C	D	S
Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:	Tool coefficient:
5 RU/min ---	7.5 RU/min oxygen consumption ≤ 50 l/min ^a BV: 14	10 RU/min oxygen consumption ≤ 250 l/min ^a BV: 28	15 RU/min oxygen consumption ≤ 750 l/min ^a BV: 42 plus an addition for the power source current < 350 A	35 RU/min oxygen consumption ≤ 1,500 l/min ^a BV: 70
BV: 25				
^a At standard ambient temperature and pressure with a purity >99,0%.				
NOTE These thermal tools receive the necessary energy either from an exothermic chemical reaction (heating/cutting gas, solid material/cutting gas) or from arc cutting.				

EXAMPLES Gas cutting and welding, oxygen lance, electric cutting and welding.

Table A.12 Accessories for tools of Tables A.1 up to A.11				
TOOL CATEGORY (BV = Basic Value in RU)				
A, B, C, D or S HSS-drill ^a	B, C, D or S HSS/carbide tipped drills	C, D or S HSS/carbide tipped drills	D or S rod with Ø ≤ 16 mm	S 3,0 m oxygen lance
BV: 1	BV: 2	BV: 3	BV: 6/m	BV: 32
saw blade	BV: 2	BV: 4	Lances/electrodes Ø with out-side ≤ 6,5 mm and length ≤ 1200 mm	diamond core drill with length ≤ 450 mm BV: 70
chisel	BV: 1	BV: 3	BV: 10	diamond core drill with
wedge	BV: 1	disc Ø ≤ 230 mm and thickness ≥ 2,5 mm	Lances/electrodes with out-side	length ≤ 1,000 mm
punch	and thickness ≥ 2,5 mm BV: 1	BV: 5	Ø ≤ 7,0 mm	BV: 140
		BV: 4	in-side Ø ≤ 3,5 mm Ø ≤ 230 mm	disc for wall saw length ≤ 450 mm
	nozzle	BV: 14		BV: 70
			BV: 8	

BV: 4 nozzle

BV: 5 nozzle

BV: 6

diamond core drill
with length \leq 450
mm

BV: 14

diamond core drill
with length \leq 1,000
mm

BV: 28

^aHSS = High speed steel

NOTE These tools include drills, saw blades, abrasive discs, nozzles, electrodes. They are consumable and/or replaceable objects, used together with tools of Tables A.1 up to A.11. Their use is represented by a basic value.

Table A.13 Miscellaneous "tools"

TOOL CATEGORY					(BV = Basic Value in RU)
A	B	C	D	S	
Tool coefficient: 5 RU/min	Tool coefficient: 7.5 RU/min	Tool coefficient: 10 RU/min	Tool coefficient: 15 RU/min	Tool coefficient: 35 RU/min	
hook	---	acids / alkali fluids	---	---	
	BV: 1	per litre used:			
line	BV: 1		BV: 7		
wire	BV: 1				
commercial fishing device					
	BV: 5				
NOTE This group includes tools, special procedures and devices that cannot be subsumed into the categories of defined tools but still are to be taken into account. Their use is timed.					
EXAMPLES Battery lamps, cooling/cutting agents, chemicals, hydraulic equipment, fibre optic and electronic devices, hooks, fishing devices.					

Table A.14 Non-tools

TOOL CATEGORY	(BV = Basic Value in RU)
EQUIPMENT	BV
measuring equipment	0
torch	1
mastic/foam per used 300 ml	7
jack \leq 30 kN	7
rigid endoscope	14
flexible endoscope	35
hydraulic equipment \leq 200 kN and for each pressure application	35
NOTE These are tools used to enhance testing work. Their use is not timed but represented only by a basic value.	
EXAMPLES Torches, endoscopes, electronic devices.	

Bibliography

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

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