BS EN 12320:2012

BSI Standards Publication

Building hardware — Padlocks and padlock fittings — Requirements and test methods

raising standards worldwide™

National foreword

This British Standard is the UK implementation of EN 12320:2012. It supersedes BS EN 12320:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/538/4, Building hardware.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 67831 8

ICS 91.190

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2012.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12320

October 2012

ICS 91.190

Supersedes EN 12320:2001

English Version

Building hardware - Padlocks and padlock fittings - Requirements and test methods

Quincaillerie pour le bâtiment - Cadenas et porte-cadenas - Exigences et méthodes d'essai

Baubeschläge - Hangschlösser und Hangschlossbeschläge - Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 11 August 2012.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 12320:2012: E

Contents

Foreword

This document (EN 12320:2012) has been prepared by Technical Committee CEN/TC 33 “Doors, windows, shutters, building hardware and curtain walling”, the secretariat of which is held by AFNOR.

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 April 2013, and conflicting national standards shall be withdrawn at the latest by April 2013.

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 document supersedes EN 12320:2001.

The following is a list of technical changes since the previous edition:

- Limited manual attack
- Corrosion resistance
- Table 2 – security requirements
- Resistance to attack by plug/cylinder extraction
- Annex A, sampling and sequencing

The test methods are specified in detail to ensure reproducibility at any testing establishment within Europe, and the acceptance criteria are defined objectively to ensure consistency of assessment.

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, Former Yugoslav Republic of Macedonia, 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.

1 Scope

This European Standard applies to mechanical padlocks and padlock fittings used on buildings and general use and specifies the test methods to be used.

This European Standard specifies performance and other requirements for strength, security, durability, performance, and corrosion resistance of padlocks. It establishes one category of use, two categories of durability, six categories for corrosion resistance and six grades for security based on performance tests that simulate attack.

Limited manual attack testing is included in this European Standard because the machine testing does not replicate all known manual attacks.

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 1303:2005, *Building hardware – Cylinders for locks – Requirements and test methods*

EN 1670:2007, *Building hardware – Corrosion resistance – Requirements and test methods*

EN 10025-2, *Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels*

ISO 10899, *High-speed steel two-flute twist drills – Technical specifications*

3 Terms and definitions

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

3.1 Terms and definitions

3.1.1
cam
part of the key and cylinder mechanism which operates the locking mechanism

3.1.2
effective key differ
difference between the key mechanism of similar design, achieved only by the movable detainer, which allows each key mechanism to be operated only by its own key

Note 1 to entry: The number of effective differs is equal to the number of theoretical differs after deduction of the differs suppressed by the manufacturer due to technical constraints and those differs suppressed in accordance with the restraints of 4.5.1

3.1.3
hasp
part of the padlock fitting which goes over the staple.

3.1.4
key mechanism
part of the mechanism which recognises a correct key

3.1.5
locking mechanism
part of the mechanism which is operated by the key mechanism to lock/unlock the padlock

3.1.6
padlock
independent locking device comprising a body, a key mechanism, a locking mechanism and a shackle

3.1.7
padlock fitting
device fitted to the object which is to be locked with a padlock excluding cables and chains

3.1.8
shackle
part of the padlock which passes through and secures the padlock fitting

3.1.9
staple
part of the padlock fitting through which the padlock shackle is passed.

3.2 Symbols

Table 1

Symbol	Unit	Definition
d	mm	Diameter of shackle
F1	kN	Push/pull force on cylinder plug/locking mechanism
F2	kN	Pull force on shackle or staple
F3	kN	Cutting force on shackle or staple
F4	kN	Maximum possible push/pull force on cylinder plug/locking mechanism
h	mm	Height through which weight is dropped (impact test)
M1	Nm	Torque on key to test for interpassing
M2	Nm	Torque on cylinder plug/locking mechanism
M3	Nm	Twisting torque on shackle or staple
n		Minimum number of effective key differs
t	min	Drilling/sawing resistance time
T	°C	Temperature of product for impact testing
m	g	Drop mass for impact test

4 Requirements

4.1 General

The structure of this clause reflects the classification as given in Clause 6.

4.2 Category of use (first classification digit)

— Grade 1: according to requirements in 5.2

4.3 Durability (second classification digit)

— Grade 0: no requirements

— Grade 1: 10 000 cycles

When tested in accordance with 5.3 it shall be possible to operate the padlock.

The padlock fittings are excluded from the durability test.

4.4 Corrosion Resistance (third classification digit)

Products shall be classified in accordance with EN 1670.

— Grade 0: no defined corrosion resistance

— Grade 1: 24h $^{+1h/-0\ h}$;

— Grade 2: 48h $^{+1h/-0\ h}$;

— Grade 3: 96h $^{+1h/-0\ h}$;

— Grade 4: 240h $^{+1h/-0\ h}$;

— Grade 5: 480h $^{+1h/-0\ h}$;

After the corrosion test, the padlock shall operate using a maximum torque on the key of 2.5 Nm.

This corrosion test shall apply to the functionality only (not appearance).

4.5 Security (fourth classification digit)

4.5.1 General

Some of the requirements can be confirmed with a certificate and test report according to EN 1303.

In grades 4, 5 and 6 it shall not be possible to remove the key until the shackle is deadlocked in the closed position and the key retained in open position.

4.5.2 Minimum number of effective key differs

Padlocks shall have a minimum of n effective key differs (Table 2).

For a mechanical padlock, the maximum number of steps on the same level shall be 60 %, maximum two adjacent and a minimum of three levels.

4.5.3 Non-interpassing of keys with just one interval effective differ

When tested in accordance with 5.5.2, it shall not be possible to operate the padlock with keys differing from the correct key by one interval, i.e. the next closest key. The next closest key shall be defined by the manufacturer according to its key coding system.

4.5.4 Resistance to force on cylinder plug or locking mechanism

When tested in accordance with 5.5.3, the cylinder plug or the locking mechanism shall resist a force F1 (Table 2).

4.5.5 Resistance to torque on cylinder plug or locking mechanism

When tested in accordance with 5.5.4, the cylinder plug or the locking mechanism shall resist a torque M2 (Table 2).

4.5.6 Resistance to pulling of shackle or staple

When tested in accordance with 5.5.5, the shackle and the staple shall each resist a force F2 (Table 2).

4.5.7 Resistance to twisting of shackle or staple

When tested in accordance with 5.5.6, the shackle and the staple shall each resist a torque M3 (Table 2).

4.5.8 Resistance to cutting of shackle or staple

When tested in accordance with 5.5.7, the shackle and the staple shall each resist a force F3 (Table 2).

4.5.9 Resistance to impact on padlock body, shackle and staple at low temperature

When tested in accordance with 5.5.8, the padlock body, the shackle and the staple cooled to temperature T, shall each resist the blows from the steel pole with the mass m and from the height h (Table 2).

4.5.10 Resistance to drilling of padlock body, shackle and staple

When tested in accordance with 5.5.9, the padlock body, the shackle and the staple shall each resist drilling for a time t (Table 2).

4.5.11 Resistance to sawing of padlock body, shackle and staple

When tested in accordance with 5.5.10, the padlock body, the shackle and the staple shall each resist sawing for a time t (Table 2).

4.5.12 Attack resistance

When tested in accordance with 5.5.11, the padlock shall resist attacks with manual tools for a time t (see Table 2).

Table 2 — Security requirements

Require-ment clause number	Requirement	Test method clause number	Test parameter	Grade						Unit
				1	2	3	4	5	6	
4.5.1	Key retained in open position		yes / no	-	-	-	yes	yes	yes	
4.5.2	Minimum number of effective key differs	5.5.1	n	300	1 000	2 500	5 000	10 000	20 000	-
4.5.3	Non-interpassing of keys with just one interval differ - Torque on key	5.5.2	M1	1	1	1,5	1,5	1,5	1,5	Nm
4.5.4	Resistance to force on cylinder plug or locking mechanism	5.5.3	F1	-	-	4	5	10	15	kN
4.5.5	Resistance to torque on cylinder plug or locking mechanism	5.5.4	M2	-	2,5	5	15	20	30	Nm
4.5.6	Resistance to pulling of shackle and staple	5.5.5	F2	3	5	15	30	70	100	kN
4.5.7	Resistance to twisting of shackle and staple	5.5.6	M3	40	100	200	600	1 200	2 500	Nm
4.5.8	Resistance to cutting of shackle and staple	5.5.7	F3	6	15	25	45	70	100	kN
4.5.9	Resistance to impact on padlock body, shackle and staple at low temperature	5.5.8	T m h	- - -	- - -	- 20 1 250 800	- 20 3 050 1 000	- 40 6 550 1 400	- 40 7 150 1 500	°C g mm
4.5.10	Resistance to drilling of padlock body, shackle and staple	5.5.9	t	-	-	-	2	4	8	min
4.5.11	Resistance to sawing of padlock body, shackle and staple	5.5.10	t	-	-	-	2	4	8	min
4.5.12	Manual attack	5.5.11	t toolsets	-	-	-	3	5	10	min
NOTE Classification is in six grades where grade 1 has the lowest requirement.										

5 Test methods

5.1 General

5.1.1 Introduction

The manufacturer will provide assembly and component drawings to enable the tester to carry out a preliminary product assessment prior to testing.

The padlock shall be tested in the locked position with the key removed.

It is not necessary for the correct key to operate the padlock after testing.

Padlocks/ padlock fittings and their original keys shall be taken at random and submitted for each test.

In the event of one of the original two samples failing the test, the padlocks/ padlock fittings shall be deemed to have failed and a further two shall be tested, both of which shall pass the test.

If the parts to be tested are inaccessible when the product is correctly mounted in accordance with the manufacturer's instructions, the product shall be considered to have passed that test.

A padlock shall be deemed to have been opened when a bar, of equal cross-section to that of its shackle, can be released. Ability to open can be checked at any time during the test by manipulation with a screwdriver or similar implement (maximum length 200 mm) for a period of 5 s max.

5.1.2 Tolerances

Unless otherwise stated, the following tolerances shall apply :

— force ± 2 % ;

— torque ± 2 % ;

— mass/weight ± 2 % ;

— distance ± 2 % ;

— time ± 5 s ;

— temperature ± 2 °C.

Unless otherwise stated, the forces shall be applied progressively and without shock to the required load within 1 min.

5.1.3 Test environment

The ambient temperature of the test environment shall be controlled throughout the test to 20 °C ± 5 °C unless otherwise stated.

5.1.4 Test tools

Specification of steel for cutting and impact tests as required in 5.5.7.1 and 5.5.8. shall be structural steel E335 defined in EN 10025-2, heat treated to have a hardness of 60 HRC to 64 HRC.

5.1.5 Sampling

Test sampling and sequencing shall be in accordance with Annex A.

5.2 Category of use

5.2.1 Operational unlocking test.

Mount the padlock in a suitable holding fixture, and apply a torque to a fully inserted correct key using a torque-meter, as shown in Figure B.1. At no point between locked and unlocked shall the torque exceed 1 Nm.

5.2.2 Key strength

Requirements for key strength shall meet the requirements given in 5.2 of EN 1303:2005.

5.3 Durability

The durability test shall be carried out using suitable apparatus that allows the full operational locking and unlocking sequence of the padlock to include the release of the shackle. (It is not necessary for the shackle to be turned). Repeat the sequence at a speed of 5 to 20 cycles per minute

During the operational cycle the key may remain partially inserted in the locking mechanism but shall have cleared all movable detainers.

The key used for the durability test can be cleaned and the padlock shall be lubricated in accordance with the manufacturer's instructions at the start of the test and after each 5000 cycles using the lubricant recommended by the manufacturer.

After completing the required number of cycles the operation of the padlock shall be tested using a new original key. The rotation shall be achieved with a maximum torque of 1.5 Nm.

If the padlock should jam and cease to operate during the test, then provided the padlock continues to operate in the proper manner when released, the test shall be allowed to continue.

No durability requirements for padlock fittings.

5.4 Corrosion resistance

5.4.1 Preparation

The padlock is locked on a staple which is mounted on a wooden block and placed in the chamber for salt spray test. The padlock without a key is oriented in the manner that it would assume to be in use.

The padlock shall be exposed to a neutral salt spray test in accordance with EN 1670.

— Grade 0: no defined corrosion resistance;

— Grade 1: 24h $^{+1h/-0\ h}$;

— Grade 2: 48h $^{+1h/-0\ h}$;

— Grade 3: 96h $^{+1h/-0\ h}$;

— Grade 4: 240h $^{+1h/-0\ h}$;

— Grade 5: 480h $^{+1h/-0\ h}$.

5.4.2 Test of padlock function after salt spray exposure

The evaluation shall be made in accordance with EN 1670:2007 Clause 5.3 only.

Test of function shall start within 5 minutes after the salt spray exposure is ended.

Insert the correct new key manually, and try to operate the padlock locking mechanism to the open position. A maximum torque of 2.5 Nm is permitted. The key may be inserted and rotation attempted several times within 2 minutes. If the padlock locking mechanism is opened but the shackle is not released, a maximum force of 250 N shall be applied to the shackle in the normal shackle opening direction. This shall be repeated until the shackle opens or when the maximum time of the test is used.

The maximum time allowed for this test, starting from trying to insert the key, is 5 minutes.

If the padlock is not opened in this first attempt, it shall be cleaned with fresh 20 °C ± 10 °C running water for maximum 5 minutes, and then cleaned with compressed air for 10 seconds.

Directly after cleaning, a second attempt to try to operate the padlock to the open position, using the above method, should be made. If the padlock does not open after the second attempt the padlock is deemed to have failed the test.

5.5 Security

5.5.1 Number of effective key differs

Check in accordance with 4.5.2 based on manufacturer's information.

The manufacturer shall provide information stating how the required number of effective key differs is achieved.

5.5.2 Non-interpassing of keys

A torque of M1 (Table 2) shall be applied to the bow of a fully inserted key selected by the test laboratory from the manufacturer's key coding system, which shall differ from the correct key by one effective differ. One key differing up and one key differing down shall be tested manually by using the specified torque.

5.5.3 Resistance to attack by plug/cylinder extraction (Requirement in 4.5.4)

This test shall only be applicable to padlocks in attack resistance grades 3, 4, 5 and 6 (Table 2)

The padlock shall be mounted in the test rig as shown in Figure B.2.

A self cutting traction screw in accordance to EN ISO 10666, 15480 - 15483, of a maximum diameter of 5.5 mm shall be screwed into the plug/cylinder and an attempt shall be made to withdraw the plug/cylinder by means of the appropriate maximum force specified in 4.5.4 applied progressively without shock within the time allowed.

Net time for the test is 5 minutes. The time starts when the screw touches the cylinder and ends when the maximum time is achieved. The time is stopped for attaching the pulling adapter, moving the test specimen between the place of attaching the screw and the pulling machine, and restarts when the pulling starts.

If the design of the padlock does not enable the force to be applied then it is deemed to have passed the test.

The washer or fixing tool for the pulling machine has to be designed in such a way that it can be used without unscrewing the screw. It is not allowed to drill or widen the diameter of the hole in order to place a screw with a bigger diameter than is possible to attach in the first attempt.

The pulling test is conducted with one screw only at the same time.

It is not allowed to lubricate the screw or the plug during the attempt to attach the screw.

For a screw which is attached into the plug, a pulling test shall be performed. The pulling test shall continue until either the:

- value in Table 2 for the grade has been reached; or
- whole cylinder or plug is removed; or
- screw breaks; or
- screw is completely withdrawn from the plug.

More than one pulling test is allowed on the same cylinder with different screw diameters within the required time for the test.

The time restarts when the pulling force starts to pull. The time will be stopped when the screw is out of the cylinder. If a second attempt with an additional screw is be made, the time shall restart when screwing in the additional screw.

The screw shall be applied axial (tolerance ± 5°) to the rotation of the cylinder plug.

The maximum screwing torque is 12 Nm.

The required pulling force shall linearly increase from 0 kN up to 15 kN within a period of 30 seconds ± 5 seconds. The maximum force shall be held for 5 seconds

After the test, in accordance with 5.5.3, the padlock should not open manually with a torque applied of maximum 5 Nm.

5.5.4 **Torque resistance of cylinder plug** (Requirements in 4.5.5)

Mount the padlock in a suitable holding fixture and apply a torque M2 (Table 2) by means of an appropriate tool (test tools 5.1.4) inserted into the keyway as shown in Figure B.1. The user shall attempt to insert the tool into the keyway with a maximum of five blows with a 300 g hammer. The torque shall be applied once in alternate directions.

If the torque test required cannot be applied, the padlock shall be deemed to have passed the test.

5.5.5 **Resistance to pulling of shackle and staple** (Requirements in 4.5.6)

Mount the padlock or staple in test-rigs as shown in Figure B.3 adapted to the form of the device under test, and apply a pull force F2 (Table 2) to the shackle/staple. This is to be achieved by means of a circular drawing bar with a diameter equal to maximum 80 % of the horizontal shackle clearance, or maximum 80 % of the internal diameter, or horizontal clearance of the staple.

5.5.6 **Resistance to twisting of shackle and staple** (Requirements in 4.5.7)

Mount the padlock or staple in test-rigs as shown in Figure B.4 adapted to the form of the device under test, and apply a torque M3 (Table 2) to the shackle/staple by means of a loading device which makes contact at points corresponding to half the internal height of the shackle/staple limited to 25 mm maximum.

Support the padlock body similarly at half its height.

5.5.7 **Resistance to cutting of shackle and staple** (Requirements in 4.5.8)

5.5.7.1 General

Where there is sufficient access, as indicated by the accessibility checks below, subject the shackle or the staple to a cutting force of F3 (Table 2) applied by means of special jaws as shown in Figure B.5. Where restricted access is indicated, the same test shall be carried out, with the force F3, reduced to that of a lower grade, as determined by the accessibility check. If there is less than a 7 mm of shackle/staple exposed during the accessibility check, the component is considered to have passed the cutting test, and no further assessment is necessary.

5.5.7.2 Shackle accessibility check

a) Mount the padlock on the standard staple shown in Figure B.6 unless it is designed for use only with its own special fitting, in which case, use that instead.

b) Determine by trial and error the largest of the six gauges shown in Figure B.8 that will enclose the shackle. The shackle is considered to be enclosed if it is between the edges of the gauge, and in contact with the inside back face Z (Figure B.7 dimension D).

c) Determine the maximum cutting force F3 in accordance with Table 3.

d) Compare F3 maximum (Table 3) with F3 (Table 2) and if F3 (Table 3) is less, use the force stated in Table 3.

Table 3 — Determination of maximum cutting force

Largest gauge that will enclose shackle/staple	Maximum possible cutting force F3 kN
A	6
B	15
C	25
D	45
E	70
F	100

5.5.7.3 Staple accessibility check

a) Mount the standard padlock shown in Figure B.7 on the staple.

b) Determine by trial and error the largest of the six gauges shown in Figure B.8 that will enclose the staple. The staple is considered to be enclosed if it is between the edges of the gauge, and in contact with the inside back face.

c) Determine the maximum cutting force F3 in accordance with Table 3.

d) Compare F3 maximum (Table 3) with F3 (Table 2) and if F3 (Table 3) is less, use the force stated in Table 3.

5.5.8 Resistance to impact at low temperature (Requirements in 4.5.9)

Before commencing impact testing, condition the padlocks or staples at low temperature T for a minimum of 3 h (Table 2). Mount them on suitable test-rigs as shown in Figure B.9, Figure B.10 and Figure B.11. Subject the padlock body, the padlock shackle, and the staple (in two positions) each to five blows with a mass m dropped from a height h (Table 2).

The testing shall start within 15 s of the product being removed from the conditioning chamber, and shall be completed within 60 s.

5.5.9 Drill resistance (Requirements in 4.5.10)

This test shall not be applicable to padlocks for security grades 1, 2 and 3. For security grades 4, 5 and 6, a maximum of two padlocks shall be tested in an apparatus as illustrated in Figure B.12.

Mount the padlock or the staple on to a suitable test-rig for use with a drilling machine as shown in Figure B.13. A 700 W +/- 10 % (input power) drilling machine with a speed of 500 rpm to 800 rpm shall be mounted on a sliding block. A force not exceeding 300 N shall be applied axially to the drill without shock.

High speed steel drills in accordance with ISO 10899 or equivalent shall be used with a maximum diameter of 12 mm. A maximum of three drills per padlock may be used. The drill shall not be additionally treated or coated for better penetration and it shall not be a self centring type.

By referring to assembly/component drawings (including material/heat treatment information), determine the most suitable drilling location(s). Using this information, carry out drilling on vulnerable areas for a time t, (Table 2), which shall include 15 s for each drill change (the number of changes are at the discretion of the tester (up to a maximum of three drills)), and time taken testing to see if security has been overcome. Conduct this final part of the test using simple implements only, e.g. paper clip, pliers, screwdriver under 150 mm long.

5.5.10 Sawing resistance (Requirements in 4.5.11)

Mount the padlock or the staple on to a suitable test-rig for use with a sawing machine as shown in Figure B.13. Saw blades used shall be bi-metal saw blade with 24 TPI (i.e. Sandflex 12"/300-10D, 3906-300-24 or similar), tensioned to 1 kN. The sawing machine shall make 60 complete 165 mm stroke cycles per minute, with an applied load of 90 N. Do not use any coolant or lubricant during the test.

By referring to assembly/component drawings (including material/heat treatment information), determine the most suitable sawing location(s). Using this information, sawing shall be carried out on vulnerable areas for a time t (table 2), which shall include 60 s for each blade change (number of changes at discretion of tester), and time taken testing to see if security has been overcome. Conduct this final part of the test using simple implements only, e.g. paper clip, pliers, screwdriver under 150 mm long.

5.5.11 Manual attack (Requirements in 4.5.12)

5.5.11.1 Manual attack resistance

When tested in accordance with 4.5.11, the padlock shall resist attacks with manual tools for a time t (see Table 2).

NOTE The purpose of this requirement is to make sure that the padlock cannot easily be opened in a way which is not covered by the other machine test requirements.

5.5.11.2 Preparation and Preliminary study

Before testing the design of the padlock shall be studied to find out if there are any weak points on the padlock which is not covered by other tests connected to the security requirements.

Manual attack testing can be applied by in any manner except where the same test is replicated by the machine test.

Preliminary tests may be carried out to explore weak points.

The possible attack-points, methods and tools shall be listed before the classification testing starts. The list shall be included in the test report.

Classification testing shall be applied to the critical weak points (sampled from the list) so the test results can be evaluated.

The padlock is to be locked to a fixing device in accordance with the Figure B6. "d" is equal to the diameter of the padlock shackle. The fixing device shall withstand the requirements. The fixing device shall be mounted at a minimum of 800 mm above ground level.

5.5.11.3 Attack tools

The following tools shall be available at the manual attack testing. A specific test may be done with all or a selection of the available tools as per picture below:

- Curved long nose pliers, long nose pliers and pliers: Maximum 300 mm
- Mandrel pin punch set (round section): Maximum length 150 mm and diameter 8 mm. Material: Chrome Vanadium Steel , hardened
- Chisels: Maximum length 300 mm and width 30 mm. Material: Chrome Vanadium Steel , hardened
- Pipe wrench: Maximum length 320 mm
- Screwdriver set: Maximum length 300 mm:
- Hammer: Maximum weight of 700 grams plus handle

Figure 1 — The tool set

If a tool breaks during the test it may be replaced.

5.5.11.4 Testing operators

Testing operators shall be experienced in testing locks and with this type of testing.

During testing only one person may work on the padlock.

5.5.11.5 Manual attack Operating time

The testing time starts when the first attack tool touches the padlock/fitting and continues non stop until the lock is released from the fixing device or the required time indicated in Table 4 is reached. The testing may be interrupted only for safety reasons.

Table 4 — Required time

Padlock/Fitting grade	Required time (minutes)
4	3
5	5
6	10

For the criteria of the test see 5.1.2.

6 Classification

6.1 General

Classification shall be in form of a four digit code as shown below:

Table 5 — Classification

1	2	3	4
Category of use	Durability	Corrosion resistance	Security

6.2 **Category of use** (first digit)

Grade 1: for use by people with a high incentive to exercise care and with a small chance of misuse.

6.3 **Durability** (second digit)

Grade 0: no requirements.

Grade 1: 10’000 cycles.

6.4 **Corrosion resistance** (third digit)

Padlocks and padlock fittings shall be classified in six grades

6.5 **Security** (fourth digit)

Padlocks and padlock fittings shall be classified in security grades 1 to 6, where 6 is the highest.

See also Table 2, Security requirements.

EXAMPLE

1	1	3	5

Box 1: Grade 1

Box 2: Durability grade (1)

Box 3: Corrosion grade (3)

Box 4: Security grade (5)

7 Marking

Each product in conformity with this European Standard and/or its literature/packaging, shall be marked with the following:

— manufacturer's name or trademark or other means of identification;

— product model identification

— classification according to Clause 6;

— the reference to this European Standard, i.e. EN 12320;

Annex A
(normative)

Sampling and sequencing - Tests on alternative design padlocks

A minimum of sixteen padlocks and/ or six padlock fittings shall be subjected to a sequence of tests as shown in Table A.1 and Table A.2 .

If any tested sample is to used for further testing the first test shall not weaken the sample so as to compromise any further tests.

NOTE Additional samples will be necessary as some tests prevent further testing on a particular sample.

Table A.1 — Tests on padlocks

Test	Samples 1 and 2	Samples 3 and 4	Samples 5 and 6	Samples 7 and 8	Samples 9 and 10	Samples 11 and 12	Samples 13, 14, 15 and 16
1	Shackle accessibility check 5.5.7.2	Number of effective key differs/interpassing of key checks 5.5.1/5.5.2	Torque resistance of cylinder plug 5.5.4	Durability test 5.3	Operational unlocking test 5.2.1.1		Preliminary study and test (samples 13 and 14)
2	Resistance to pulling of shackle 5.5.5	Pulling or pushing of cylinder plug or locking mechanism 5.5.3	Resistance to twisting of shackle 5.5.6	Impact at low temperature on body 5.5.8	Impact at low temperature on shackle 5.5.8	Corrosion resistance 5.4	Manual attack test 5.5.11 (samples 15 and 16)
3	Resistance to cutting of shackle 5.5.7				Sawing resistance 5.5.10	Drilling resistance 5.5.9	

Table A.2 — Tests on padlock fittings

Test	Samples 1 and 2	Samples 3 and 4	Samples 5 and 6
1	Corrosion resistance 5.4	Staple accessibility check 5.5.7.3	Resistance to pulling of staple 5.5.5
2	Impact at low temperature on staple 5.5.8	Resistance to twisting of staple 5.5.6	Sawing resistance 5.5.10
3	Drilling resistance 5.5.9	Resistance to cutting of staple 5.5.7	

Annex B
(normative)

Test rig illustrations

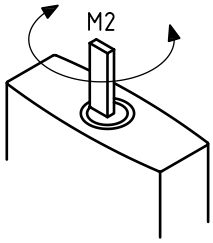
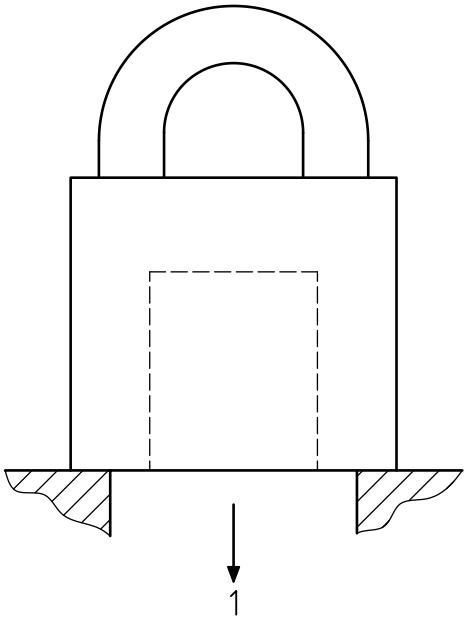


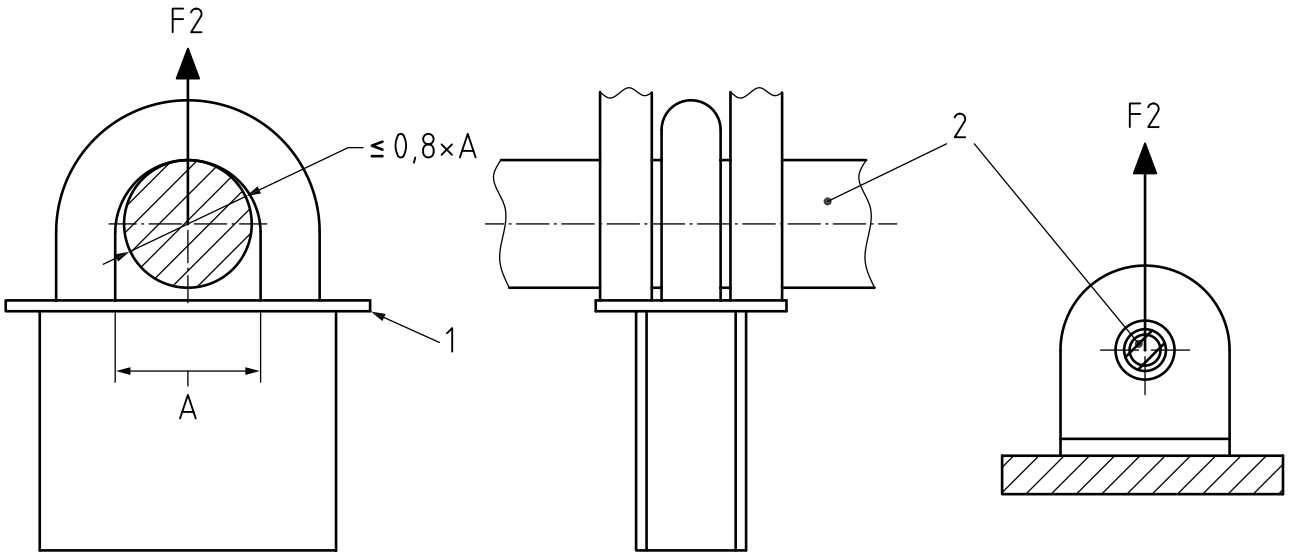
Figure B.1 – Cylinder plug or locking mechanism torque test



Key

1 F1 = pull

Figure B.2 – Cylinder locking mechanism actual pull test

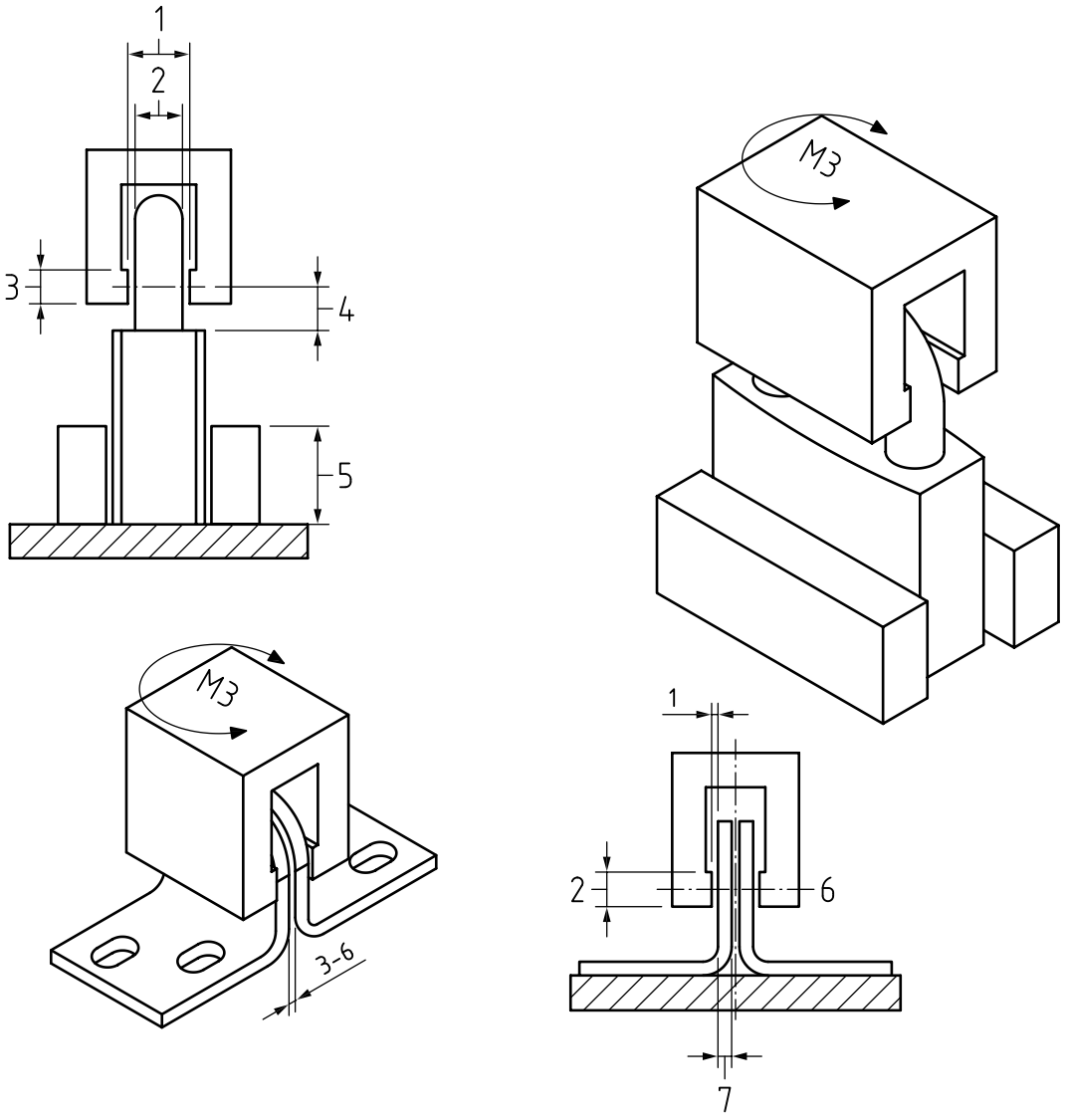


Key

1 Clamping device

2 Drawing punch

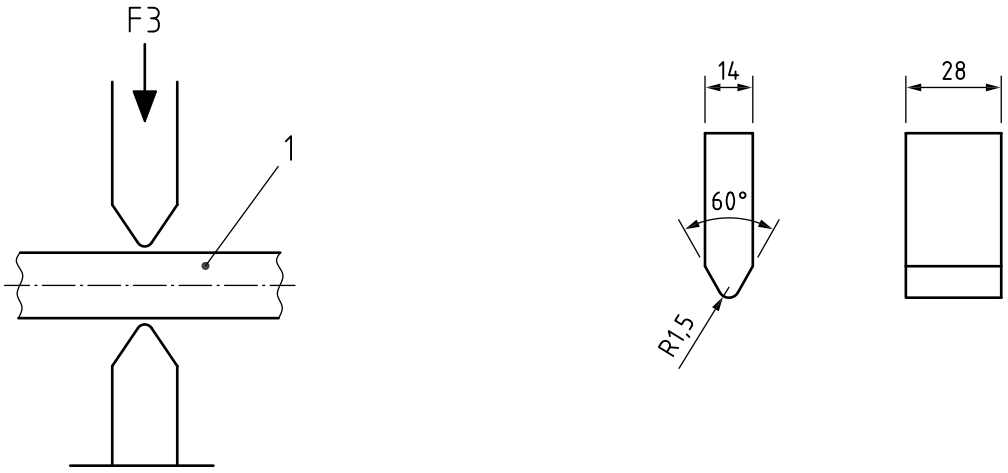
Figure B.3 – Shackle / staple pulling test



Key

1	D + 2mm	5	½ padlock body height
2	D	6	Shackle hole D in staple
3	Shackle diameter, D	7	t
4	½ internal shackle height up to maximum of 25 mm		

Figure B.4 – Shackle / staple twisting test



Key

1 Exposed section of shackle / staple

Figure B.5 – Shackle / staple cutting test

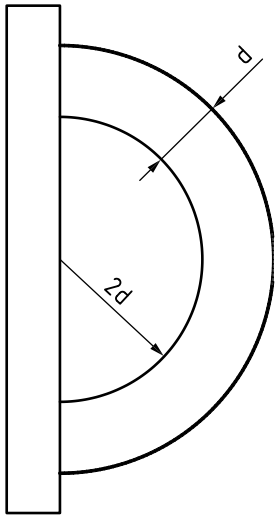


Figure B.6 – test staple for shackle accessibility check

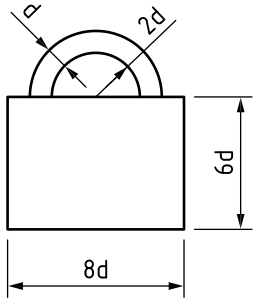


Figure B.7 – Test padlock for staple accessibility check

Table B.1 - B and D dimensions

Gauge	B dimension	D dimension
A	6 mm	9 mm
B	7 mm	11 mm
C	9 mm	13 mm
D	10 mm	15 mm
E	12 mm	17 mm
F	14 mm	21 mm

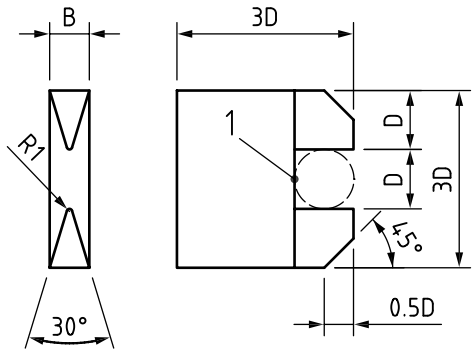
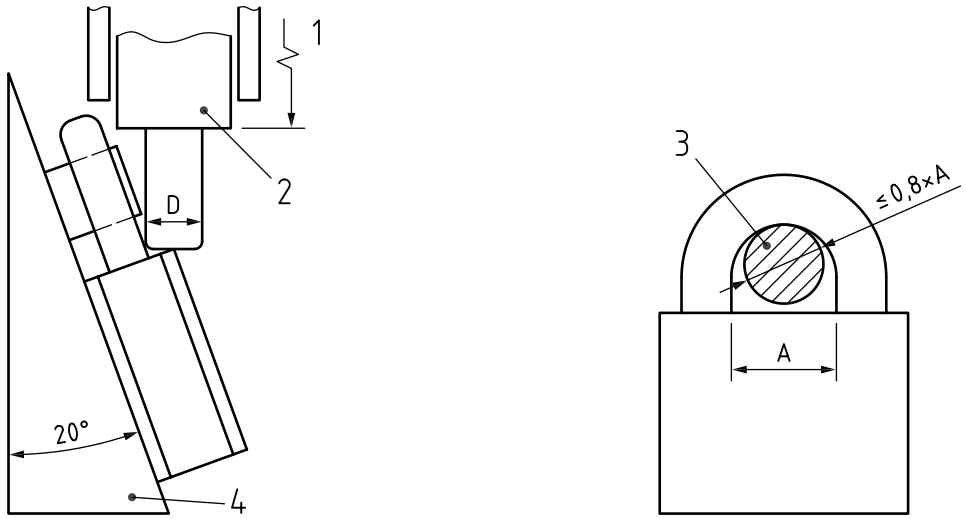


Figure B.8 – Gauges for accessibility



Key

1 Drop height h

2 Steel mass M (dropped five times)

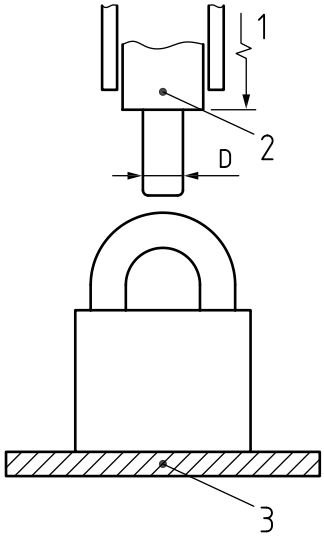
3 Steel hanging device

4 Rigid steel structure

Figure B.9 – Impact test on padlock body

Table B.2 - Diameter of mass tip, Figure 10, Figure 11 and Figure 12

Grade	D dimension mm
1	-
2	-
3	10
4	12
5	16
6	20



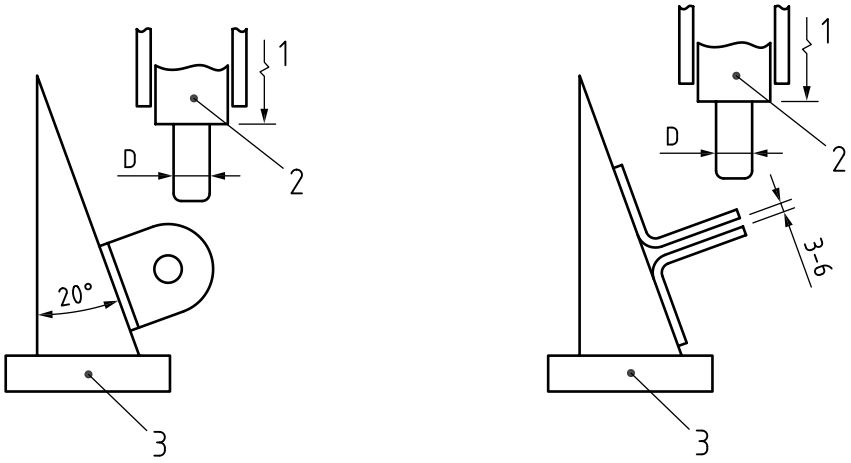
Key

1 Drop height h

2 Steel mass m (dropped five times)

3 Flat solid bed of steel

Figure B.10 – Impact test on padlock shackle



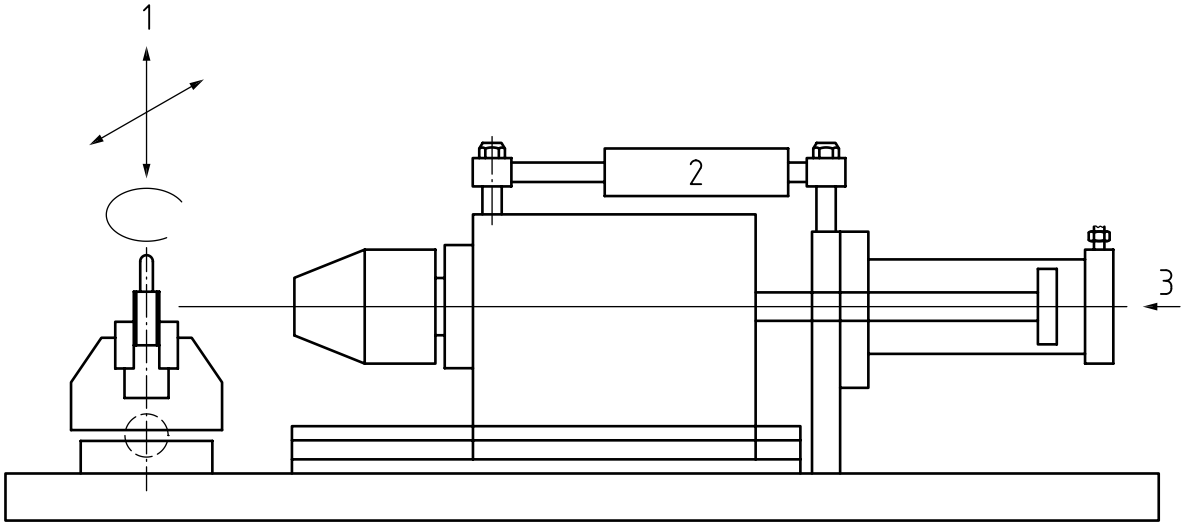
Key

1 Drop height h

2 Steel mass m (dropped five times)

3 Rigid steel structure

Figure B.11 – Impact test on staple



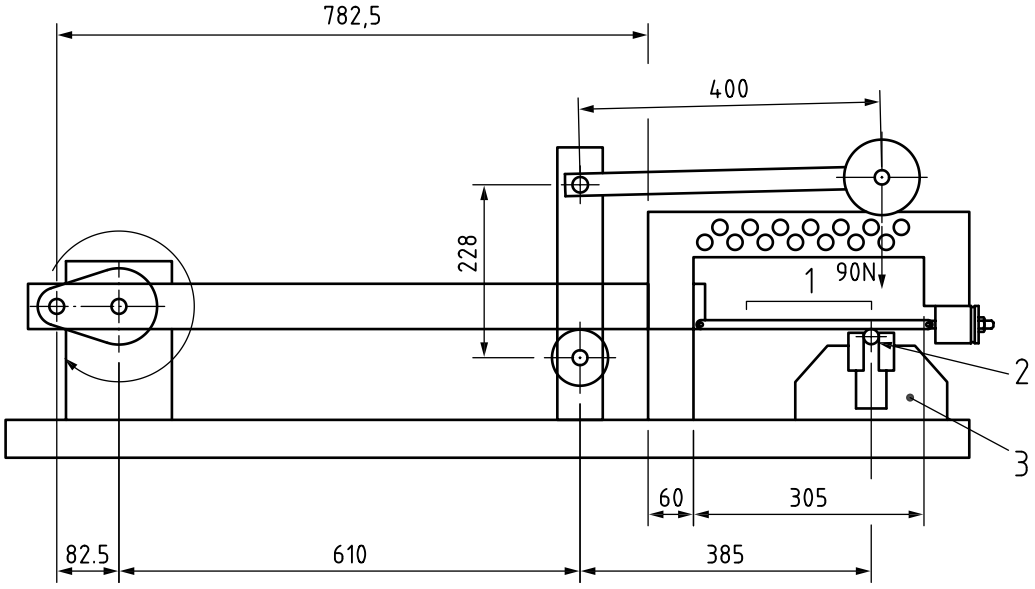
Key

1 Adjustable in x, y and z axis

2 Shock absorber

3 Pressure

Figure B.12 – Drilling test



Key

1 165 mm stroke

2 Product under test

3 Holding fixture

Figure B.13 – Sawing tests

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the independent national body responsible for preparing British Standards and other standards-related publications, information and services. It presents the UK view on standards in Europe and at the international level.

BSI is incorporated by Royal Charter. British Standards and other standardisation products are published by BSI Standards Limited.

Revisions

British Standards and PASs are periodically updated by amendment or revision. Users of British Standards and PASs should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using British Standards would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Similary for PASs, please notify BSI Customer Services.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001

BSI offers BSI Subscribing Members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of British Standards and PASs.

Tel: +44 (0)20 8996 7669 Fax: +44 (0)20 8996 7001
Email: plus@bsigroup.com

Buying standards

You may buy PDF and hard copy versions of standards directly using a credit card from the BSI Shop on the website **www.bsigroup.com/shop.** In addition all orders for BSI, international and foreign standards publications can be addressed to BSI Customer Services.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001
Email: orders@bsigroup.com

In response to orders for international standards, BSI will supply the British Standard implementation of the relevant international standard, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Knowledge Centre.

Tel: +44 (0)20 8996 7004 Fax: +44 (0)20 8996 7005
Email: knowledgecentre@bsigroup.com

BSI Subscribing Members are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.

Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001
Email: membership@bsigroup.com

Information regarding online access to British Standards and PASs via British Standards Online can be found at **www.bsigroup.com/BSOL**

Further information about British Standards is available on the BSI website at **www.bsi-group.com/standards**

Copyright

BSI

389 Chiswick High Road London W4 4AL UK

Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/standards

raising standards worldwide™