BRITISH STANDARD

BS EN
12275:1998

Mountaineering equipment — Connectors — Safety requirements and test methods

The European Standard EN 12275:1998 has the status of a British Standard

ICS 97.220.40

National foreword

This British Standard is the English language version of EN 12275:1998.

The UK participation in its preparation was entrusted by Technical Committee SW/136, Sports, playground and other recreational equipment, to Subcommittee SW/136/5, Mountaineering equipment, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 12, an inside back cover and a back cover.

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EUROPEAN STANDARD

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Descriptors: sports equipment, mountaineering, connectors, definitions, safety, specifications, equipment specifications, mechanical strength, tests, information, marking

English version

Mountaineering equipment — Connectors — Safety requirements and test methods

Equipement d'alpinisme et d'escalade — Connecteurs — Exigences de sécurité et méthodes d'essai

Bergsteigerausrüstung — Karabiner — Sicherheitstechnische Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 22 July 1998.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 12275:1998 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 136, Sports, playground and other recreational equipment, the Secretariat of which is held by DIN.

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 February 1999, and conflicting national standards shall be withdrawn at the latest by February 1999.

The text is based on UIAA-Standard C (Union Internationale des Associations d'Alpinisme), which has been prepared with international participation.

This standard is one of a package of standards for mountaineering equipment, see annex B.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

Annexes A, B and ZA of this European Standard are for information only.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

1 Scope

This standard specifies safety requirements and test methods for connectors for use in mountaineering including climbing.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 20139, *Textiles — Standard atmospheres for conditioning and testing.*
(ISO 139:1973).

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1

connector

openable device, which enables a mountaineer to link himself directly or indirectly to an anchor

3.2

self-closing connector

connector with a self-closing gate

3.3

basic connector (type B)

self-closing connector with adequate strength for use anywhere in a belay system, see Figure 1

3.4

HMS connector (type H)

self-closing connector — generally pear shaped — intended to be used primarily for dynamic belaying, for example using an "Italian hitch" (HMS), see Figure 2

3.5

Klettersteig connector (type K)

self-closing connector intended to be used primarily for linking a mountaineer to a Klettersteig anchor (via ferrata) system, see Figure 3

3.6

directional connector (type D)

self-closing connector, or a combination of one or more self-closing connectors and slings, designed to ensure loading in a predetermined direction, see Figure 4

3.7

specific anchor connector (type A)

self-closing connector designed only to be linked directly to a specific type of anchor, see Figure 5

3.8

screwed-closure connector (Quicklink; type Q)

connector which is closed by a screw-motion gate, which is a load bearing part of the connector when fully screwed up, see Figure 6

3.9

oval connector (type X)

self-closing connector designed for lower loads, which is not designed to give full protection in the event of a fall, see Figure 7

3.10

gate

part of the connector which can be moved to open it. The gate can move by pivoting about a hinge (hinged gate), or by a sliding motion (sliding gate) or by a screw motion (screw-motion gate)

3.11

self-closing gate

gate which moves automatically to the closed position when released from any open position, or when unlatched, if there is a gate-open latch

3.12

gate-locking device

mechanism which reduces the possibility of a closed gate being opened inadvertently. A gate-locking device can operate automatically (to the locked position) or be operated manually

3.13

gate-open latch

device which holds the gate in the fully-open position and is actuated by a deliberate manual action

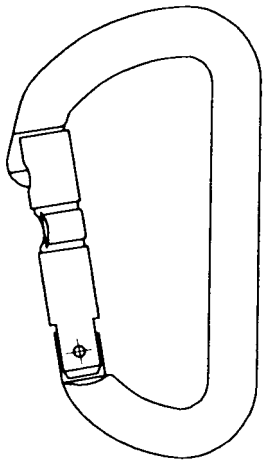


Figure 1 — Example of basic connector (type B)

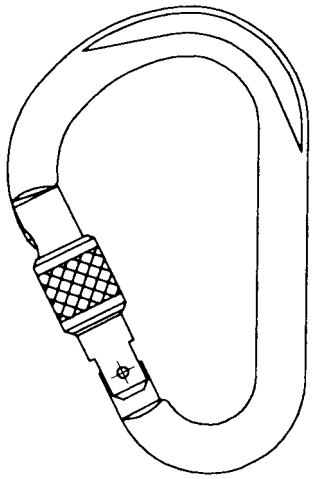


Figure 2 — Example of HMS connector (type H)

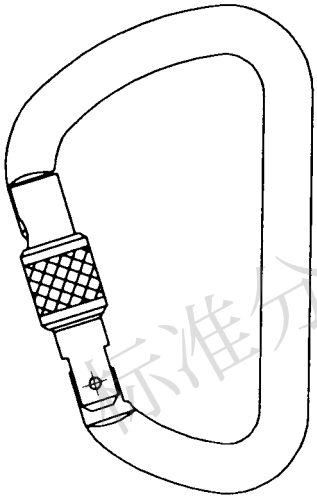


Figure 3 — Example of a Klettersteig connector (type K)

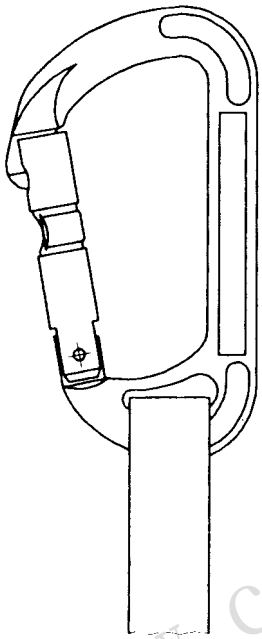


Figure 4 — Example of directional connector (type D)

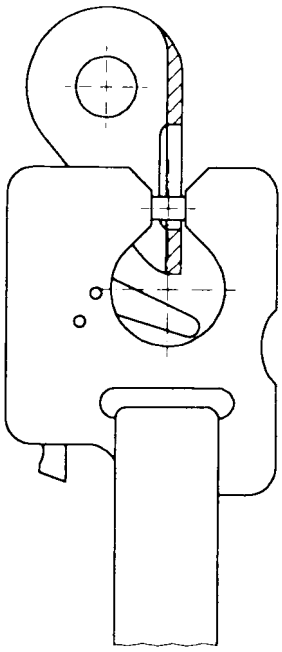


Figure 5 — Example of a specific anchor connector (type A)

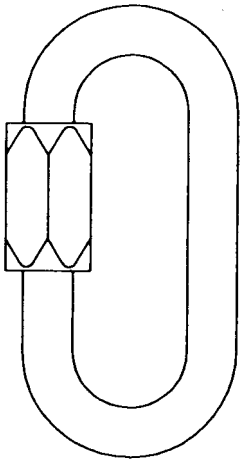


Figure 6 — Example of a screwed-closure connector (Quicklink; type Q)

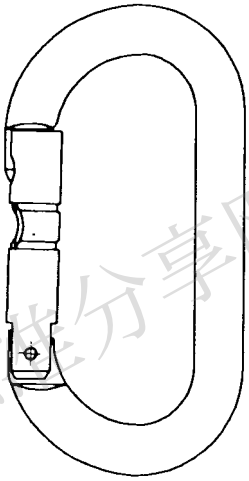


Figure 7 — Example of an oval connector (type X)

4 Safety requirements

4.1 Design

4.1.1 All edges of a connector that can come into contact with the user's hands and/or combinable components such as ropes, slings, accessory cords and harnesses, shall be free from burrs.

4.1.2 Connectors of type X shall be roughly symmetrical in outline about the longitudinal centre line. They shall have a minimum radius of curvature of 12 mm at the inner surface of the larger end.

4.1.3 Connectors of type H shall have a gate-locking device, but shall not have a gate-open latch.

4.1.4 Connectors of type K shall have an automatic gate-locking device.

4.1.5 Connectors of types A and D shall be so designed that the line of application of the load to the connector is uniquely defined.

4.1.6 Connectors of types B, H, D and X shall have a gate opening of at least 15 mm.

4.1.7 Connectors of type K shall have a gate opening of at least 21 mm.

4.1.8 Connectors of types B, D, H and X shall be able to accommodate in region A in accordance with Figure 8 two ropes of 11 mm nominal diameter, without hindering the movement of the gate between the closed and fully open positions.

4.1.9 Connectors of type K shall be able to accommodate in region A in accordance with Figure 9 a metal rod of 21 mm nominal diameter, without hindering the movement of the gate between the closed and fully open positions.

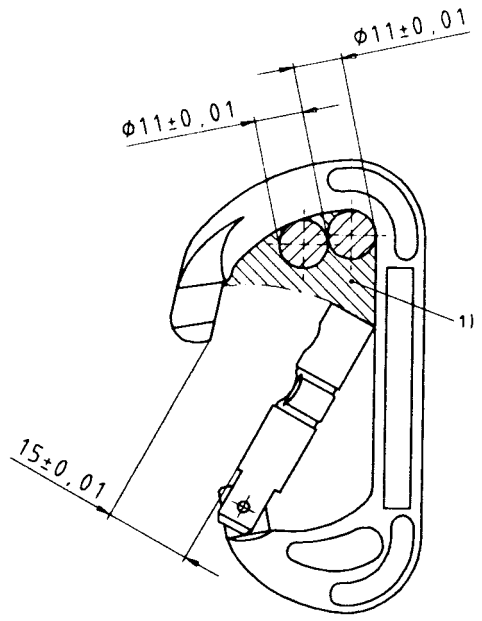
4.1.10 Connectors of type Q shall require at least four complete rotations of the screw-motion gate from the fully screwed up position to disengagement of the threads. There shall be a clearly visible indication if the gate is not in the fully screwed up position, for example by the visibility of threads or visibility of a contrasting coloured region.

4.1.11 Any hinged gate shall only open inwards, towards the body of the connector, but the gate can open at up to 20 degrees from the plane of the connector.

4.1.12 A gate-open latch shall be designed to latch the gate open, only in its fully open position. The latch shall unlatch the gate automatically, either by attachment of the connector to an anchor, or by loading the connector.

4.1.13 A manual gate-locking device shall require a deliberate manual action to lock the gate, and shall require at least two different actions to open the gate.

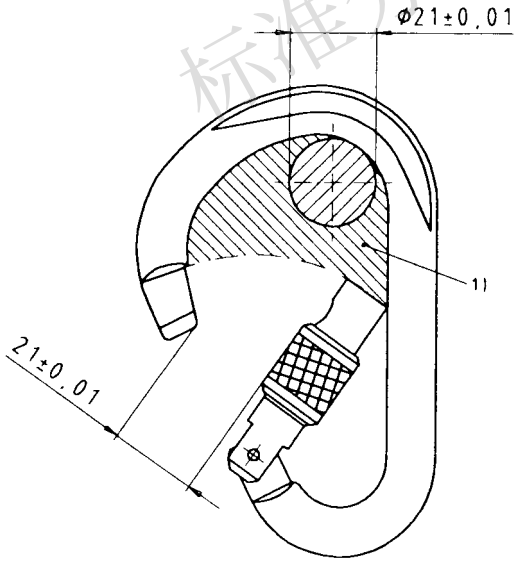
4.1.14 An automatic gate-locking device shall lock the gate automatically when the gate shuts, and shall require at least two different actions to open the gate.



Dimensions in millimetres

1) Region A

Figure 8 — Region A for types B, D, H and X



Dimensions in millimetres

1) Region A

Figure 9 — Region A for type K

4.2 Performance

4.2.1 *Static strength*

4.2.1.1 *Major axis with gate closed*

When tested in accordance with **5.3.2.1.3**, connectors, in the major axis with the gate closed, shall withstand the loads specified in Table 1 without breaking. Permanent deformation which affects the operation of the connector is acceptable.

4.2.1.2 *Major axis with gate open*

When tested in accordance with **5.3.2.1.3**, connectors, in the major axis with the gate open, shall withstand the loads specified in Table 1 without breaking. Permanent deformation which affects the operation of the connector is acceptable.

NOTE In practice, if loaded with the gate open, connectors can fail at a lower load than that obtained by the method of test specified in **5.3.2.1.3**. Further information on this is given in annex A.

For connectors with automatic gate-locking devices, and for screwed-closure connectors (type Q), there is no requirement for this test.

4.2.1.3 *Minor axis*

When tested in accordance with **5.3.2.1.4**, connectors, in the minor axis with the gate closed, shall withstand the loads specified in Table 1 without breaking.

For connectors of types D and A, there is no requirement for this test.

4.2.2 *Gate forces*

4.2.2.1 *Self-closing gates*

When tested in accordance with **5.3.2.2**, the force required to open the gate to give a 3 mm opening, shall be greater than 5 N.

When released from any open position, or unlatched if there is a gate-open latch, the gate shall return to the fully closed position.

4.2.2.2 *Gate-open latches*

When tested in accordance with **5.3.2.2.3.1**, the minimum force required to latch the gate open shall not be less than 10 N.

When tested in accordance with **5.3.2.2.3.2** the force required to be applied to the connector to unlatch the gate shall not be greater than 15 N.

4.2.2.3 *Gate performance under load*

For connectors of types B, D and X, not fitted with a device intended to lock the gate closed under load, when tested in accordance with **5.3.2.2.4**, under a nominal major axis load of up to 800 N, it shall be possible to open the gate fully by hand, and, when released, the gate shall return to the fully closed position.

Table 1 — Minimum static strength requirements for connectors

Type	Description	Major axis Gate closed kN	Major axis Gate open kN	Minor axis kN
B	Basic connector	20	7[a]	7
H	HMS connector	20	6[a]	7
K	Klettersteig connector	25	—	7
A	Specific anchor connector	20	7[a]	—
D	Directional connector, excluding anchor connectors	20	7[a]	—
Q	Screwed closure connector (Quicklink)	25	—	10
X	Oval connector	18	5[a]	7

[a] No requirement if fitted with an automatic gate-locking device.

5 Test methods

5.1 Apparatus

Conventional tensile testing machine.

5.2 Preparation of test samples

For the static strength test in accordance with **5.3.2.1**, condition the test samples as follows.

a) For test samples containing a textile element, condition the textile element in accordance with EN 20139. Tests may then be done outside the conditioning room, but the temperature shall be (23 ± 5) °C and the tests shall begin within 5 min of removal from conditioning.

b) Test samples without a textile element shall be tested without conditioning.

5.3 Procedure

5.3.1 *Design*

5.3.1.1 *General*

Check that connectors, in accordance with the definitions of clause **3**, meet the requirements of **4.1.1** to **4.1.5** and **4.1.10** to **4.1.14** by visual examination and simple check measurements.

5.3.1.2 *Gate opening*

The subsequent tests apply to connectors of types B, H, K, D and X.

5.3.1.2.1 For connectors of types B, H, D and X, pass a bar of diameter (15 ± 0,01) mm through the opened gate of the connector.

5.3.1.2.2 For connectors of type K, pass a bar of diameter (21 ± 0,01) mm through the opened gate of the connector. With the bar in region A in accordance with Figure 9, check that the gate can be opened and closed fully without making contact with the bar.

5.3.1.2.3 For connectors of types B, H and X, place two bars each of diameter (11 ± 0,01) mm in region A in accordance with Figure 8, touching each other and the inner surface of the connector. Check that the bars can be positioned such that the gate can be opened and closed fully without making contact with either bar.

5.3.2 *Performance*

5.3.2.1 *Static strength tests*

5.3.2.1.1 *Rate of loading*

In the tensile tests, during loading the crosshead velocity shall lie within the range of:

— 50 mm to 200 mm per minute if the connector contains a textile element subject to stress during the test; or

— 20 mm to 50 mm per minute otherwise.

5.3.2.1.2 *Test measurements*

Continue each test until the connector breaks or distorts to an extent that the pins are released. Measure and record the maximum applied force during the test.

5.3.2.1.3 *Major axis testing*

Mount the connector in a conventional tensile testing machine and apply the load by means of two pins of diameter (12 ± 0,01) mm, which are arranged to be perpendicular to the major axis. It is important that the connector shall be free to locate itself on the pins at the start of the test and as the load is applied; a universal joint in one arm of the testing machine is useful and the pins shall be well coated with a molybdenum based grease where they come into contact with a metal part of the test sample.

Apply a small force to the connector at right angles to the direction of loading to bias the gate away from the pins initially. This is particularly important during gate-open testing. The bias force shall be equal to the gravitational weight of the connector.

Alternatively the connector may be tested in a horizontal axis test machine, with the connector positioned in a vertical plane with the gate downwards.

Specific anchor connectors shall be connected to an anchor, supplied by the manufacturer, which shall be capable of being loaded in an appropriate direction by one of the pins, or otherwise connected to one of the jaws of the test machine. If a directional connector has a captive sling, which is intended to be loaded directly, apply the test load to the sling by a pin ($10 \pm 0{,}1$) mm in diameter, with an arithmetical mean deviation of the profile of R_a = 0,8 μm and a maximum surface roughness of R_{max} = 6,3 μm. Where a directional connector has provision for a semi-captive sling, the manufacturer shall supply a suitable short sling for testing purposes.

When testing with the gate closed, connectors fitted with a manually operated gate-locking device shall be tested with the gate-locking device in the unlocked position.

5.3.2.1.4 *Minor axis testing*

Carry out the minor axis test in a similar manner to **5.3.2.1.3**, but the loading pins shall have a diameter of ($10 \pm 0{,}01$) mm and they shall not be coated with grease. The loading direction shall be in accordance with Figure 10.

In order to avoid movement of the loading pins during the test, grooves may be made in the body, the gate and/or the gate-locking device to sufficient depth to ensure location of the pins (in accordance with Figure 10). These grooves shall not be subsequently the cause of failure. Alternatively clamps may be used to ensure the location of the pins.

Connectors fitted with manually operated gate-locking devices shall be tested with the gate-locking device in the unlocked position. If this is not practical, the gate locking device may be removed.

5.3.2.2 *Testing of gate forces*

5.3.2.2.1 *Hinged gate*

With the connector unloaded along the major axis, apply a force of ($5 \pm 0{,}1$) N to the gate in accordance with Figure 11. The direction of the force shall be along a line at 90° to a straight line from the axis of the gate hinge to the mid-point of the latch-end of the gate, when the gate is in the closed position.

Check that the gate has not opened sufficiently for a bar of diameter ($3 \pm 0{,}01$) mm to pass through the gate opening. Check that the gate can be opened fully by hand and that the gate closes fully when released from any open position, or from a latched-open position.

5.3.2.2.2 *Sliding gate*

With the connector unloaded along the major axis, apply a force of ($5 \pm 0{,}1$) N to the point which actuates the opening of the gate, in the direction which has maximum effectiveness.

Check that the gate has not opened sufficiently for a bar of diameter ($3 \pm 0{,}01$) mm to pass through the gate opening. Check that the gate can be opened fully by hand and that the gate closes fully when released from any open position, or from a latched-open position.

5.3.2.2.3 *Gate-open latch*

5.3.2.2.3.1 With the gate initially almost fully open, apply a force to the gate to latch it open. Check that the gate cannot be latched open by a force less than 10 N applied anywhere on the gate.

5.3.2.2.3.2 Consult the manufacturer's instructions regarding how the gate is to be unlatched in use. If the connector unlatches when used with a particular type of anchor, the manufacturer shall supply a suitable anchor for this test. Check that the gate can be unlatched by applying a force not greater than 15 N to the connector in a direction in accordance with the manufacturer's instructions.

5.3.2.2.4 *Gate performance under load*

With the connector in the tensile testing machine and with an applied major axis load of (800 ± 10) N, check that the gate opens and closes without undue resistance.

6 Information to be supplied

a) the name or trademark of the manufacturer, importer or supplier;

b) the number of this European standard: EN 12275;

c) the meaning of any markings on the product;

d) on the use of the product;

e) if the connector cannot be opened when fitted with a device intended to lock the gate closed under load;

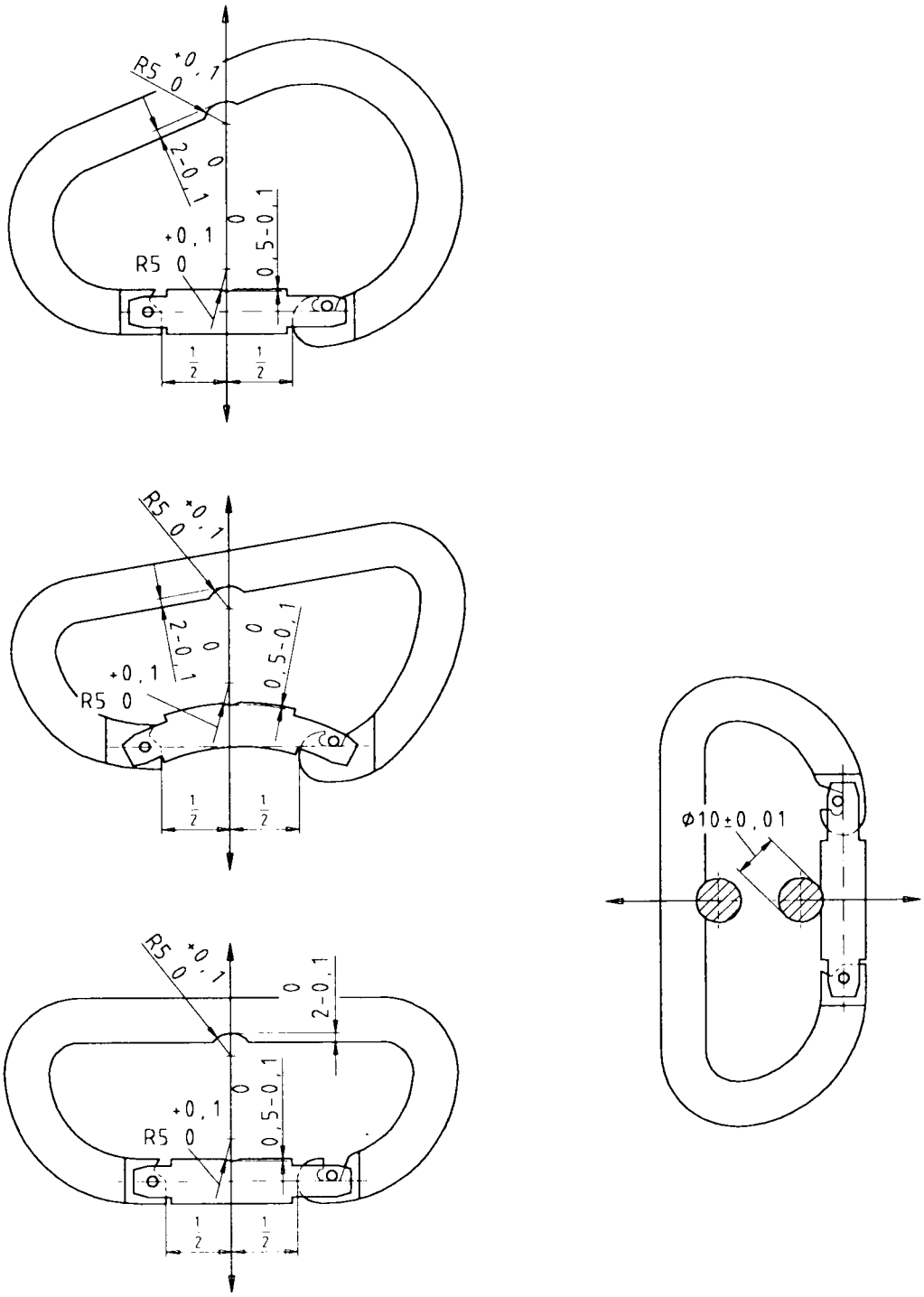
f) on how to choose other components for use in the system;

g) on how to maintain and service the product;

h) on the lifespan of the product or how to assess it;

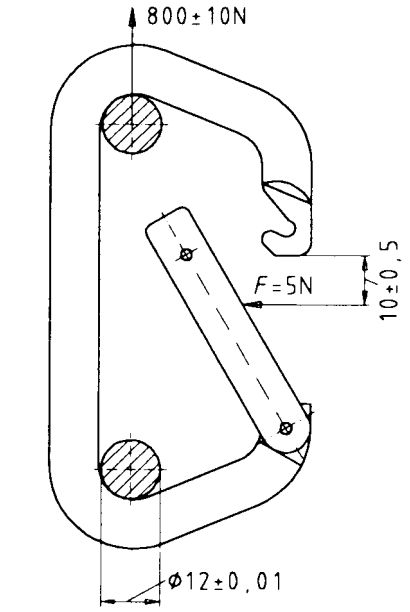
i) on the effects of chemical reagents and temperature on the product;

j) on the effects of storage and ageing.



Dimensions in millimetres

Figure 10 — Test of the minor axis



Dimensions in millimetres

Figure 11 — Testing of the gate

7 Marking

Connectors shall be marked clearly, indelibly and durably with at least the following information:

a) the name or trademark of the manufacturer, importer or supplier;

b) the connector type letter in accordance with clause **3** surrounded by a circle, for type H, type K and type X connectors;

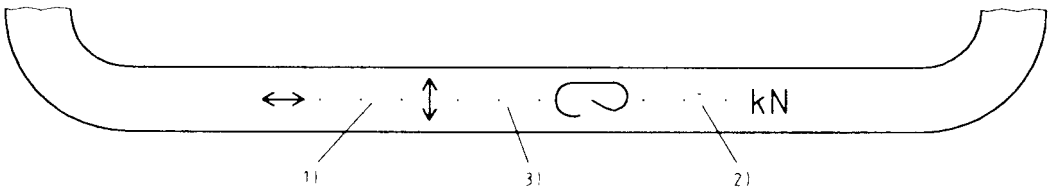
c) the minimum strength values in kN to the nearest whole number below the value guaranteed by the manufacturer, for the following modes of loading (where there is a test requirement):

— major axis gate-closed;

— major axis gate-open;

— minor axis.

The markings shall take the form in accordance with Figure 12 together with the marking “kN” either at the beginning or at the end. The marked strength shall be a whole number of kN.



1) Major axis — gate closed
2) Major axis — gate open
3) Minor axis

Figure 12 — Example of marking

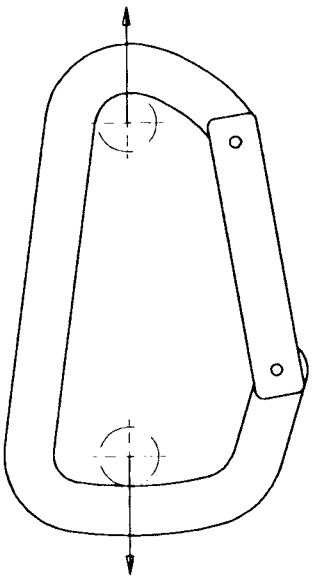
Annex A (informative)

Effect of connector shape on major axis gate-open strength

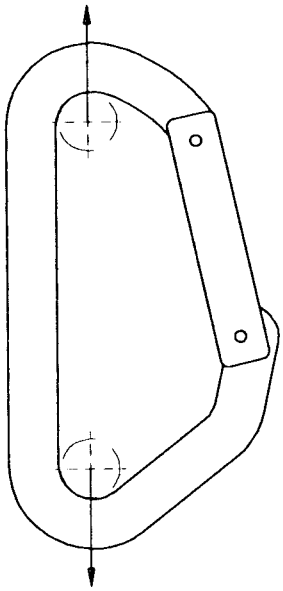
It should be noted that the method of test specified in **5.3.2.1.3** loads the connector, with the gate open, in its strongest configuration. This method of test is specified as it gives the most consistent test results. In practice, in the event of a fall, connectors can be loaded dynamically away from the backbar. It is desirable that when the load comes onto the rope or sling, the rope or sling slips into the same position as that in which the load is applied in the test in accordance with **5.3.2.1.3**. If this does not happen in practice, the connector will fail at a lower load than measured in the major axis gate-open test. It has not been possible to specify a satisfactory test to ensure that the rope or sling does slip into the desired position.

Whether this happens or not in practice is affected by the shape of the connector, the coefficient of friction between the rope or sling and the connector material, and the surface finish. Manufacturers of connectors are hereby advised to take note of this problem and try to minimise its effect, most particularly for connectors of types B and D, by suitable choice of connector shape, material and surface finish.

Examples of good and bad shape, with regard to this characteristic, are given below.



Shape which does not relocate the rope



Shape which locates the rope in the same position as the test pins

Figure A.1 — Different shapes of connectors

Annex B (informative)
Standards on mountaineering equipment

Table B.1 — List of standards on mountaineering equipment

No.	Document	Title
1	EN 892	*Mountaineering equipment — Dynamic mountaineering ropes — Safety requirements and test methods*
2	prEN 12275	*Mountaineering equipment — Connectors — Safety requirements and test methods*
3	prEN 13089	*Mountaineering equipment — Ice-tools — Safety requirments and test methods*
4	prEN 12277	*Mountaineering equipment — Harnesses — Safety requirements and test methods*
5	prEN 12492	*Mountaineering equipment — Climbers safety helmets — Safety requirements and test methods*
6	EN 564	*Mountaineering equipment — Accessory cord — Safety requirements and test methods*
7	EN 565	*Mountaineering equipment — Tape — Safety requirements and test methods*
8	EN 566	*Mountaineering equipment — Slings — Safety requirements and test methods*
9	prEN 12276	*Mountaineering equipment — Frictional anchors — Safety requirements and test methods*
10	prEN 12270	*Mountaineering equipment — Chocks — Safety requirements and test methods*
11	EN 567	*Mountaineering equipment — Rope clamps — Safety requirements and test methods*
12	EN 958	*Mountaineering equipment — Energy absorbing systems for use in klettersteig (via ferrata) climbing — Safety requirements and test methods*
13	EN 959	*Mountaineering equipment — Rock anchors — Safety requirements and test methods*
14	EN 568	*Mountaineering equipment — Ice anchors — Safety requirements and test methods*
15	EN 569	*Mountaineering equipment — Pitons — Safety requirements and test methods*
16	prEN 893	*Mountaineering equipment — Crampons — Safety requirements and test methods*
17	[a]	*Mountaineering equipment — Descenders — Safety requirements and test methods (00136079)*
18	prEN 12278	*Mountaineering equipment — Pulleys — Safety requirements and test methods*

[a] In preparation.

Annex ZA (informative)
Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive 89/686/EEC.

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

The following clauses of this standard are likely to support requirements of Directive 89/686/EEC:

EU Directive 89/686/EEC, Annex II	Clause/subclause of this standard
1.1 Design principles	**4.1**, **5.3.1**
1.2 Innocuousness	**4.1.1**, **5.3.1**, **4.2.2**, **5.3.2.2**
1.3.2 Lightness and strength	**4.2.1**, **5.3.2.1**
1.4 Information supplied by the manufacturer	**6**, **7**
3.1.2.2 Prevention of falls from a height	**4**, **5**, **6**

Compliance with the clauses of this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

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