BS EN 12276:2013

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Mountaineering equipment — Frictional anchors — Safety requirements and test methods

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National foreword

This British Standard is the UK implementation of EN 12276:2013. It supersedes BS EN 12276:1999 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee SW/136/5, Sports, Playground and other Recreational Equipment - Mountaineering Equipment.

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

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Foreword

This document (EN 12276:2013) has been prepared by Technical Committee CEN/TC 136 “Sports, playground and other recreational facilities and 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of an identical text or by endorsement, at the latest by May 2014, and conflicting national standards shall be withdrawn at the latest by May 2014.

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 12276:1998.

This document 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 document.

In relation to EN 12276:1998 the following main amendments have been made:

a) the passive strength has been added;

b) addition of test procedure for testing holding force and passive strength;

c) addition of pictograms for holding force and passive strength for the marking;

d) addition of a pictogram for reading the manufacturers information.

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1 Scope

This European Standard specifies safety requirements and test methods for frictional anchors for use in mountaineering including climbing.

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 565, *Mountaineering equipment - Tape - Safety requirements and test methods*

EN ISO 139, *Textiles - Standard atmospheres for conditioning and testing (ISO 139)*

ISO 7000, *Graphical symbols for use on equipment - Registered symbols*

3 Terms and definitions

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

3.1
frictional anchor
device, capable of self-expansion, which can be placed in a parallel-sided crack in the rock, and which, due to friction between the device and the rock, can withstand a load

Note 1 to entry: See Annex A for protection provided by frictional anchors.

3.2
means of attachment
part of the frictional anchor which allows the attachment of a connector

Note 1 to entry: Applies to connectors in accordance with EN 12275.

3.3
holding force
force necessary to cause the frictional anchor, or its means of attachment, to break or to be pulled through the test apparatus and determined in the strength test in accordance with 5.4.2.2

3.4
passive strength
force necessary to cause the frictional anchor, or its means of attachment, to break or to be pulled through the test apparatus and determined in the strength test in accordance with 5.4.2.3

3.5
operational range
range of the widths within which the manufacturer ensures the holding force will be at least the minimum holding force marked on the frictional anchor

4 Requirements

4.1 Design

4.1.1 Frictional anchors shall be fitted with a means of attachment to a connector. If the means of attachment is sewn, the stitching shall contrast in colour or surface appearance. If the mean of attachment is a tape, it shall comply with stability requirements of EN 565.

4.1.2 The means of attachment shall be large enough to accommodate a pin with a diameter of 15 mm.

4.1.3 All edges of the frictional anchor and the means of attachment that may come into contact with fingers or combinable components shall be free from burrs.

4.2 Strength

4.2.1 Holding force

When tested in accordance with 5.4.2.2, the holding force shall be at least the one marked on the frictional anchor and not be less than 5,0 kN.

4.2.2 Passive strength (if claimed)

When tested in accordance with 5.4.2.3, the passive strength shall be at least the one marked on the frictional anchor and not be less than 5,0 kN.

5 Test methods

5.1 Test samples

At least two frictional anchors shall be provided for testing; at least three friction anchors, if passive strength is claimed. If a frictional anchor is manufactured in different sizes, each size shall be tested.

5.2 Apparatus for strength test

5.2.1 Layout

The apparatus consists of two parallel, rigid steel supporting jaws for the adjustable parts of the frictional anchor and of a loading bar with a diameter of (10 ± 0,1) mm for the means of attachment; see Figure 2.

The static friction between the supporting jaws and the frictional anchor shall be great enough to prevent the frictional anchor from slipping through at the test load, but the maximal surface roughness of R_{max} shall not exceed 500 µm.

The surface of the loading bar shall have an arithmetical mean deviation of the profile of R_a = 0,8 µm and a maximal surface roughness of R_{max} = 6,3 µm.

There are no surface roughness requirements for the loading bar when the means of attachment is other than textile material.

5.2.2 Adjustment

The distance *s* between the supporting jaws shall be according to the following formulae:

Position 1: $s_1 = b_{min} + [(b_{max} - b_{min})/4]$ (1)

Position 2: $s_2 = b_{min} + [(b_{max} - b_{min})^{3}/_{4}]$ (2)

where

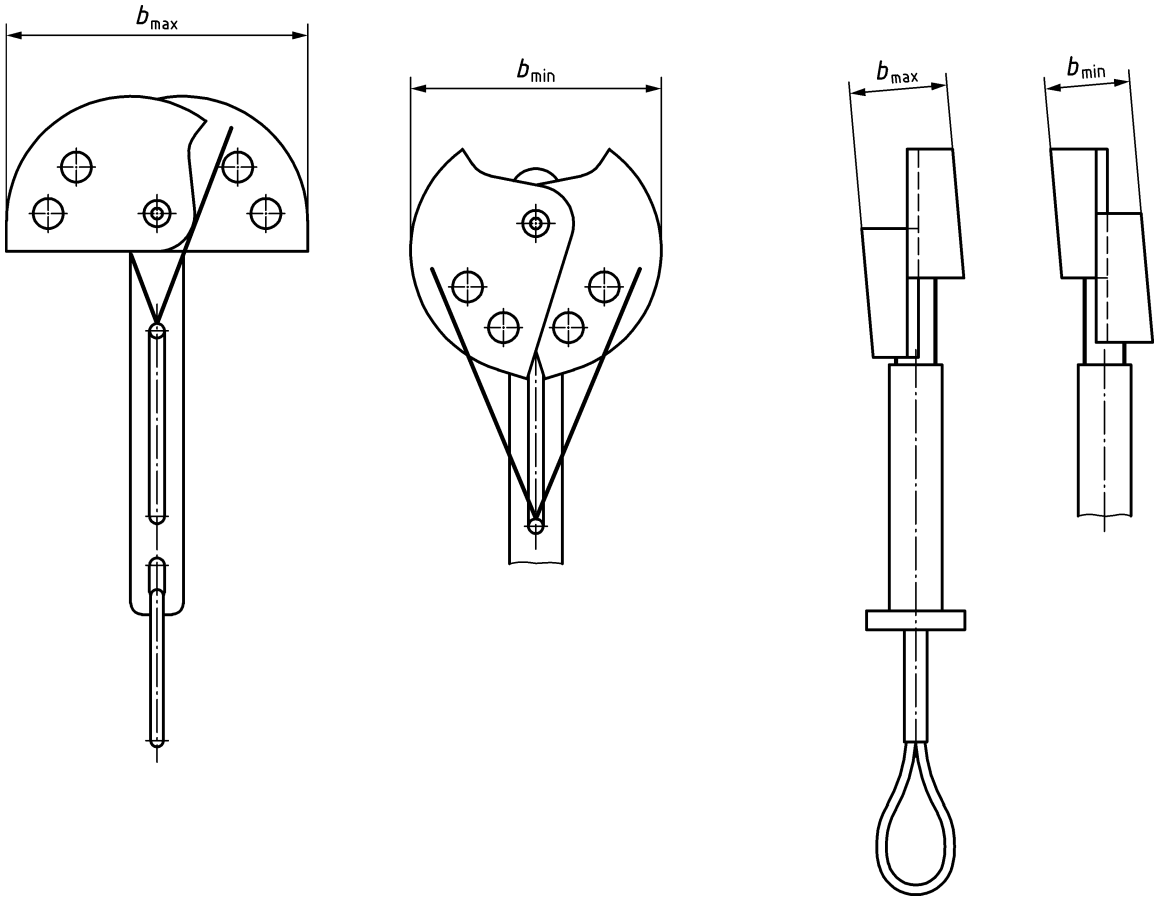
b_{min} is the minimum adjustable width, see Figure 1;

b_{max} is the maximum adjustable width, see Figure 1.

If the range between b_{max} and b_{min} is less than 5 mm, only one position according to the following formula shall be adjusted:

Position 3: $s_3 = b_{min} + [(b_{max} - b_{min})/2]$ (3)

Position 3 is also used for passive strength test for all frictional anchors, if claimed.



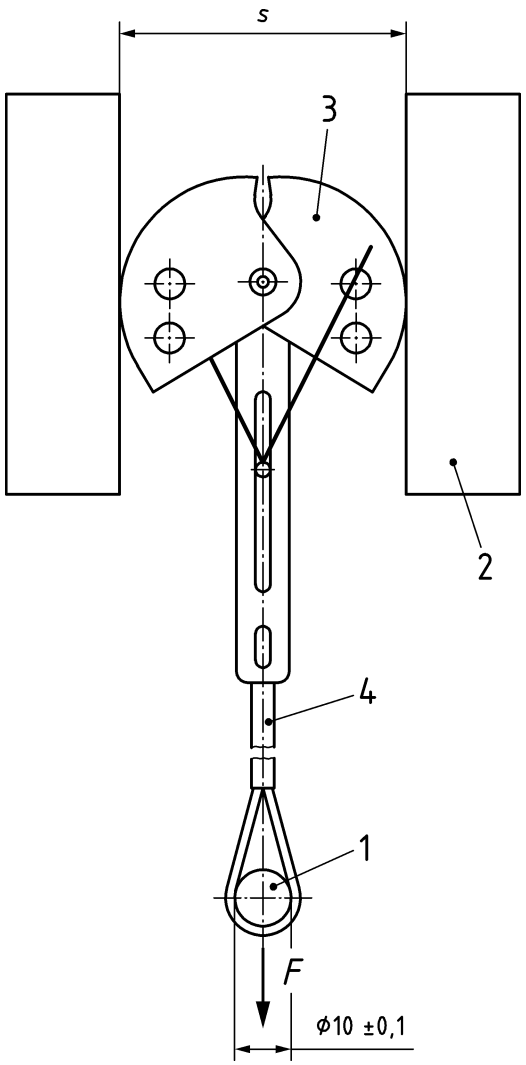
Key

b_{min} minimum adjustable width

b_{max} maximum adjustable width

Figure 1 — Example of frictional anchors

Dimensions in millimetres



Key

1 loading bar
2 supporting jaws
3 frictional anchor
4 means of attachment
s distance between supporting jaws
F applied Force

Figure 2 — Layout and adjustment of apparatus — test of holding force

5.3 Conditioning and test conditions

For the strength test according to 5.4.2, condition frictional anchors with textile means of attachment in accordance with EN ISO 139.

Carry out the strength test at a temperature of (23 ± 5) °C.

For frictional anchors with textile means of attachment, start the strength test within 5 min of removing them from the conditioning atmosphere.

5.4 Procedure

5.4.1 Design

5.4.1.1 Check by visual examination that the requirements according to 4.1.1 are met.

5.4.1.2 Test the unloaded eye of the means of attachment in accordance with 4.1.2, with a pin of (15 ± 0,1) mm diameter.

5.4.1.3 Check by visual examination and handling that the requirements according to 4.1.3 are met.

5.4.2 Strength

5.4.2.1 Rate of loading

— of 20 mm to 50 mm per minute if the frictional anchor does not contain textile elements;

— of 50 mm to 200 mm per minute if the frictional anchor contains a textile element, subjected to stress during the test.

5.4.2.2 Holding force

5.4.2.2.1 Load at least one test sample in each of positions 1 and 2, or, if the range between b_{max} and b_{min} is less than 5 mm, load at least one test sample in position 3, see Figure 2.

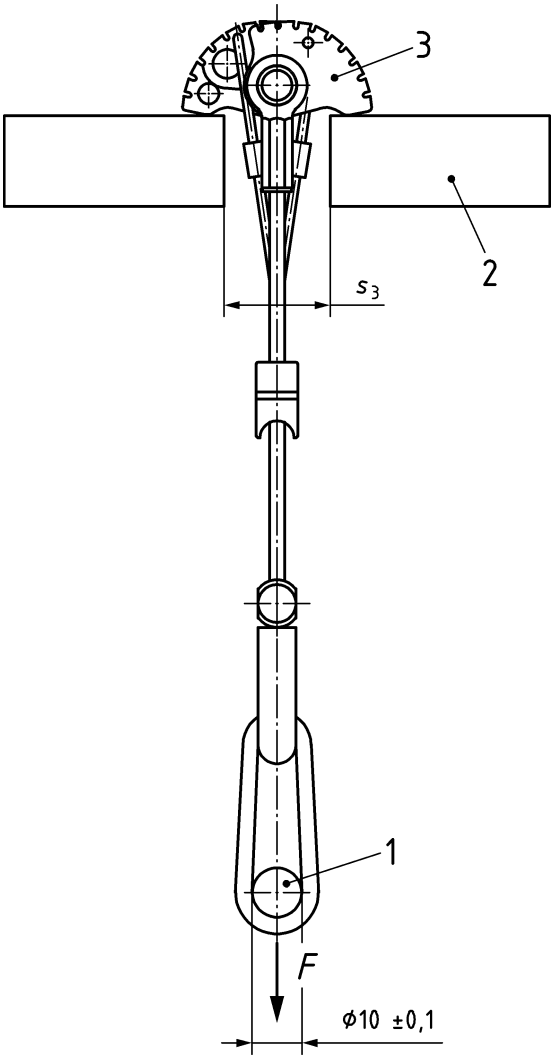
5.4.2.2.2 Apply a load to the means of attachment until the frictional anchor or its means of attachment break or until the frictional anchor is pulled through the apparatus.

5.4.2.3 Passive strength (if claimed)

5.4.2.3.1 Place a test sample in position 3, in its fully extended position, centrally between the jaws of the test apparatus, see Figure 3.

5.4.2.3.2 Apply a load to the means of attachment until the frictional anchor or its means of attachment break or until the frictional anchor is pulled through the apparatus.

Dimensions in millimetres



Key

1 loading bar
2 supporting jaws
3 frictional anchor
s_3 distance between supporting jaws
F applied force

Figure 3 — Layout and adjustment of apparatus — test of passive strength

6 Marking

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

a) name of the manufacturer or its authorized representative, [1];

b) the minimum holding force in “kN”, which the manufacturer ensures over the operational range of the device, as explained in 7e). Also, if passive strength is claimed, the passive strength in kN which the manufacturer ensures. The strength values shall be expressed as whole numbers of kN. If passive

strength is claimed, pictograms for holding force and passive strength shall be used (see Figures 4 and 5);

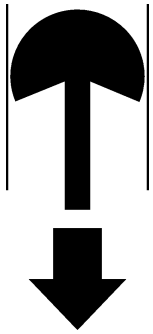


Figure 4 — Pictogram for holding force

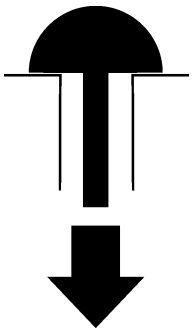


Figure 5 — Pictogram for passive strength

c) graphical symbol, which advises the user to read the information given by the manufacturer (see Figure 6);

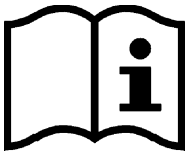


Figure 6 — Graphical symbol (according to ISO 7000, Symbol No. 1641)

d) year of manufacture, if the product contains non-metallic elements which are load bearing.

7 Information supplied by the manufacturer

The information supplied by the manufacturer shall contain at least the following elements:

a) name and address of the manufacturer or its authorized representative [1];

b) reference number of this European Standard: EN 12276;

c) the model (if more than one model is available);

d) the size (if more than one size is available), and the range of widths in mm (b_{max} and b_{min}, as defined in Figure 2);

e) explanation of operating range;

f) the meaning of any markings on the product;

g) the minimum holding force in kN, which the manufacturer ensures over the operational range of the device, as explained in e). Also, if passive strength is claimed, the passive strength in kN which the manufacturer ensures. The strength values shall be expressed as whole numbers of kN;

h) the use of the product and the protection which it can provide (see Annex A);

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

j) how to maintain and service the product;

k) the lifespan of the product or how to assess it and factors that affect the lifespan;

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

m) influence of wet and icy condition;

n) danger of sharp edges;

o) influence of storage and ageing.

Annex A
(informative)

Protection provided by Frictional Anchors

Even when used correctly, the protection provided depends on the holding force of the frictional anchors, and where it is used (see Table A.1).

The holding force depends on the rock type and its surface condition, and on the direction of the frictional anchor load in the event of a fall. The holding force may also be affected by the presence of humidity, ice, mud or sand on the rock.

The behaviour of a frictional anchor in rock, when loaded dynamically, is not fully predictable. At least two independent anchor points should always be used, each capable of providing adequate protection.

The user of this standard is allowed to copy this table for the means of information supplied by the manufacturer.

Table A.1 — Protection provided by frictional anchors

Holding force S	**At a Stance**	**As a Running Belay**
S ≥ 20 kN	If used correctly, sufficiently strong to withstand the highest conceivable forces generated in a fall.	If used correctly, sufficiently strong to withstand the highest conceivable forces generated in a fall.
20 > S ≥ 12 kN	If used correctly, sufficiently strong to withstand the highest conceivable forces generated in a fall.	If used correctly, sufficiently strong to withstand the highest conceivable forces generated in a fall, provided a dynamic belay is in use and effective.
12 > S ≥ 7 kN	Not recommended for use on its own, since it will not withstand the highest conceivable force. It may be used as one component of a belay system where the force of a fall is shared between the components.	If used correctly, sufficiently strong to withstand typical forces generated in a fall, provided a dynamic belay is in use and effective. It cannot be relied upon to withstand the highest forces that could be generated in a fall.
S < 7 kN	Only to be used as part of a multicomponent belay system where the force of a fall will be shared between several components.	Even if used correctly, and with a dynamic belay in use, it cannot be relied upon to withstand typical forces generated in a fall. Wherever possible, it should be backed up with one or more devices of similar strength, in such a way as to share the load.
General	The behaviour of a frictional anchor in rock, when loaded dynamically, is not fully predictable. At least two independent anchor points should always be used, each capable of providing protection as above	

Annex B
(informative)

Standards on mountaineering equipment

Table B.1 — List of standards on mountaineering equipment

No	Document	Title
1	EN 564	Mountaineering equipment — Accessory cord — Safety requirements and test methods
2	EN 565	Mountaineering equipment — Tape — Safety requirements and test methods
3	EN 566	Mountaineering equipment — Slings — Safety requirements and test methods
4	EN 567	Mountaineering equipment — Rope clamps — Safety requirements and test methods
5	EN 568	Mountaineering equipment — Ice anchors — Safety requirements and test methods
6	EN 569	Mountaineering equipment — Pitons — Safety requirements and test methods
7	EN 892	Mountaineering equipment — Dynamic mountaineering ropes — Safety requirements and test methods
8	EN 893	Mountaineering equipment — Crampons — Safety requirements and test methods
9	EN 958	Mountaineering equipment — Energy absorbing systems for use in klettersteig (via ferrata) climbing — Safety requirements and test methods
10	EN 959	Mountaineering equipment — Rock anchors — Safety requirements and test methods
11	EN 12270	Mountaineering equipment — Chocks — Safety requirements and test methods
12	EN 12275	Mountaineering equipment — Connectors — Safety requirements and test methods
13	EN 12276	Mountaineering equipment — Frictional anchors — Safety requirements and test methods
14	EN 12277	Mountaineering equipment — Harnesses — Safety requirements and test methods
15	EN 12278	Mountaineering equipment — Pulleys — Safety requirements and test methods
16	EN 12492	Mountaineering equipment – Helmets for mountaineers – Safety requirements and test methods
17	EN 13089	Mountaineering equipment — Ice-tools – Safety requirements and test methods
18	EN 15151–1	Mountaineering equipment — Braking devices — Part 1: Braking devices with manually assisted locking, safety requirements and test methods
19	EN 15151–2	Mountaineering equipment — Braking devices — Part 2: Manual braking devices, safety requirements and test methods

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 89/686/EEC on the approximation of the laws of the member states relating to personal protective equipment.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 89/686/EEC

Clause(s)/sub-clause(s) of this EN	Essential Requirements (ERs) of Directive 89/686/EEC	Qualifying remarks/Notes
4.1.3, 5.4.1.3	1.2.1.2 Innocuousness	
Clause 6, Clause 7	1.4 Information supplied by the manufacturer	
	3.1.2.2 Protection against falls from heights	Frictional anchors according to this standard are only one part of the safety chain and should be used in conjunction with other compatible equipment.

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

Bibliography

[1] Regulation 765/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93

[2] EN 12275, *Mountaineering equipment - Connectors - Safety requirements and test methods*

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