SLOVENSKI STANDARD
SIST EN 892:1998

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Gorniġka oprema ï Dinamiļ no obremenjene gorniġke vrvi - Varnostne zahteve in preskusne metode

Mountaineering equipment - Dynamic mountaineering ropes - Safety requirements and test methods

Bergsteigerausrüstung - Dynamische Bergseile - Sicherheitstechnische Anforderungen und Prüfverfahren

Matériel d'alpinisme et d'escalade - Cordes dynamiques - Exigences de sécurité et méthode d'essai

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English version

Mountaineering equipment - Dynamic mountaineering ropes - Safety requirements and test methods

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Bergsteigerausrüstung - Dynamische Bergseile - Sicherheitstechnische Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 1996-06-20. 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.

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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

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of an identical text or by endorsement, at the latest by April 1997, and conflicting national standards shall be withdrawn at the latest by April 1997.

The text is based on UIAA-Standard B (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 A.

This European Standard has been prepared under a mandate given to CEN by the European Commision 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 and ZA of this European Standard are informative.

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

1 Scope

This standard specifies safety requirements and test methods for dynamic ropes (single, half and twin ropes) in kernmantel-construction 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)

ISO 1052
Steels for general engineering purposes

ISO 6487
Road vehicles – Measurement techniques in impact tests – Instrumentation

3 Definitions

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

3.1 dynamic mountaineering rope: Rope, which is capable of arresting the free fall of a person engaged in mountaineering or climbing with a limited impact force.

3.2 single rope: Dynamic mountaineering rope, capable of being used singly, as a link in the safety chain, to arrest a person's fall.

3.3 half rope: Dynamic mountaineering rope, which is capable, when used in pairs, as a link in the safety chain to arrest a person's fall.

3.4 twin rope: Dynamic mountaineering rope, which is capable, when used in pairs and parallel, to arrest a person's fall (see figure 1).

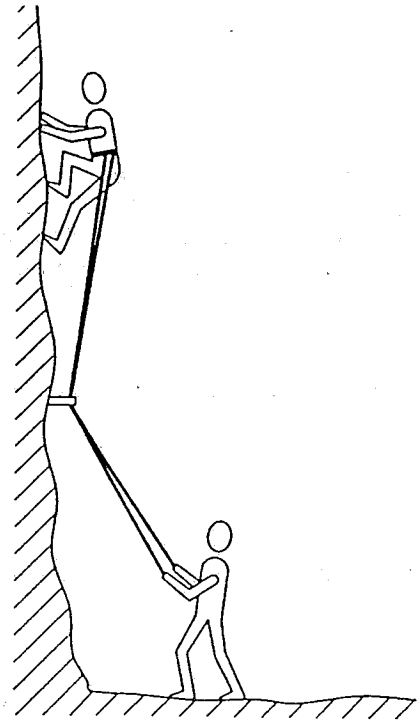


Figure 1: Use of twin rope

3.5 kernmantel rope: Rope, which is comprised of a core and a sheath.

4 Safety requirements

4.1 Construction

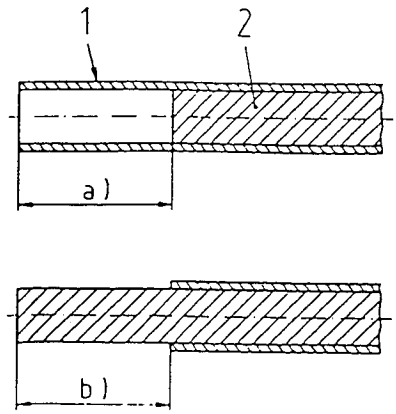
Dynamic ropes shall be made in a kernmantel construction, where the core shall have at least 50 % of the mass of the rope.

4.2 Knotability ratio *K*

When tested in accordance with 5.4, the flexibility of the rope shall be such that the knotability ratio *K* does not exeed 1,1.

4.3 Sheath slippage

When tested in accordance with 5.5, the sheath slippage in a longitudinal direction relative to the core (in positive or negative direction) shall not exceed 40 mm (see figure 2).



1 sheath
2 core
a) positive sheath slippage ≤ 40 mm
b) negative sheath slippage ≤ 40 mm

Figure 2: Sheath slippage

4.4 Elongation

When tested in accordance with 5.6, the elongation shall not exceed:

- 8 % in single ropes (single strand of rope);
- 10 % in half ropes (single strand of rope);
- 8 % in twin ropes (double strand of rope).

4.5 Fall arresting impact, number of drops

4.5.1 Impact force

When tested in accordance with 5.7, the impact force, in the first fall shall not exceed:

- 12 kN in single ropes (single strand of rope);
- 8 kN in half ropes (single strand of rope);
- 12 kN in twin ropes (double strand of rope).

4.5.2 Number of drops

When tested in accordance with 5.7, each rope sample shall withstand at least 5, for twin ropes at least 12, consecutive drop tests without breaking.

5 Test methods

5.1 Test samples

A test sample with a length of:

- 40 m for single and half ropes;
- 80 m or 2×40 m for twin ropes

shall be available for the tests.

5.1.1 Carry out the tests in accordance with 5.3 on an unused test sample.

5.1.2 Carry out the tests in accordance with 5.4 on an unused test sample.

5.1.3 Carry out the tests in accordance with 5.5 on two unused test samples with a length of (2 250±10) mm.

5.1.4 Carry out the test in accordance with 5.6 on two unused test samples with a length of at least 500 mm.

5.1.5 Carry out the tests in accordance with 5.7 on three unused test samples with a minimum length of 5 m for single and half ropes, and 10 m for twin ropes, cut out of the available test sample.

5.2 Conditioning and test conditions

Condition the test samples in accordance with EN 20139.

Then test these samples at a temperature of (23±5) °C.

5.3 Construction

5.3.1 Procedure

5.3.1.1 Clamp the test sample at one end.

5.3.1.2 Load the test sample without shock with a mass[1]) of:

- (10±0,1) kg for single ropes;
- (6±0,1) kg for half ropes;
- (5±0,1) kg for twin ropes

at a distance of at least 600 mm from the clamp.

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[1]) The mass can be introduced by a corresponding force.

5.3.1.3 After applying the load for (60 ± 5) s mark within 1 min a reference length of (500 ± 1) mm on the test sample. The distance of the marking from the clamp or attachment for the test sample shall be at least 50 mm.

5.3.1.4 Within a further 3 min measure the diameter in two directions around the diameter starting at points 90° apart at each of three levels approximately 100 mm apart. The length of the contact areas of the measuring instrument shall be (50 ± 1) mm. The rope cross-sectional area shall not be subject to any compression during the measurement.

5.3.1.5 Then cut out the marked portion of the test sample and determine the mass to the nearest 0,1 g.

5.3.1.6 Check that the construction of the rope is a kernmantel construction (see 4.1) and ensure that the core is heavier than the sheath.

5.3.2 Expression of results

Express the diameter as the arithmetic mean of the six measurements to the nearest 0,1 mm.

Express the mass per unit length in ktex or g/m to the nearest 1 g.

5.4 Knotability ratio *K*

5.4.1 Procedure

5.4.1.1 Make two simple knots (see figure 3) in the test sample 250 mm apart in opposite directions.

5.4.1.2 Load the test sample without shock with a mass[1]) of (10 ± 0,1) kg and maintain the load for (60 ± 5) s.

5.4.1.3 Reduce the mass[1]) to 1 kg.

5.4.1.4 During the application of the load, measure the internal diameter of the knot to the nearest 0,5 mm (see figure 3), using a suitable measuring device such as a tapered plug gauge (see figure 4), without an alteration of the free width of the knot by the pressure of the measuring device.

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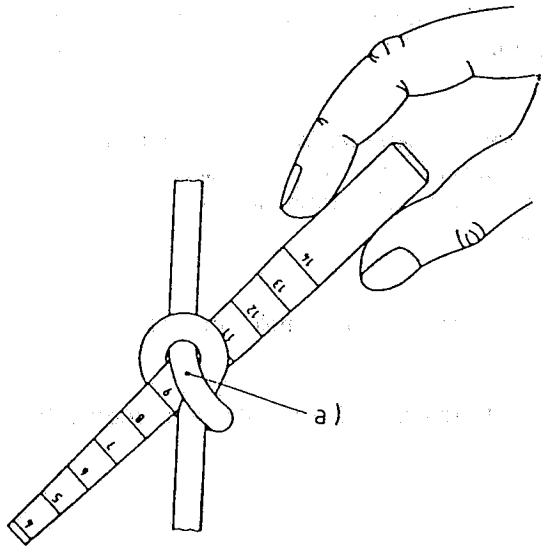
[1]) See 5.3.1.2



a) test location

Figure 3: Determination of knotability ratio K

Dimensions in millimetres

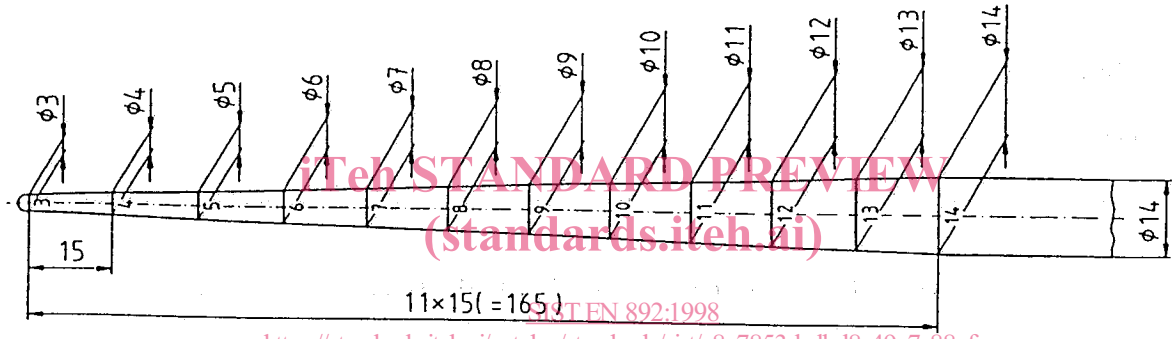


Figure 4: Gauge for determining knotability ratio K

5.4.2 Expression of results

Calculate the average of the internal diameters of both knots.

Thus calculate the knotability ratio K from:

$$K = \frac{\text{average internal diameter of the knots}}{\text{actual diameter of rope in accordance with 5.3.2}}$$

5.5 Sheath slippage

5.5.1 Principle

The rope is drawn through the apparatus illustrated in figure 5, where the movement is restricted by radial forces. The resulting frictional force on the sheath causes slippage of the sheath relative to the core. The extent of this slippage is measured.

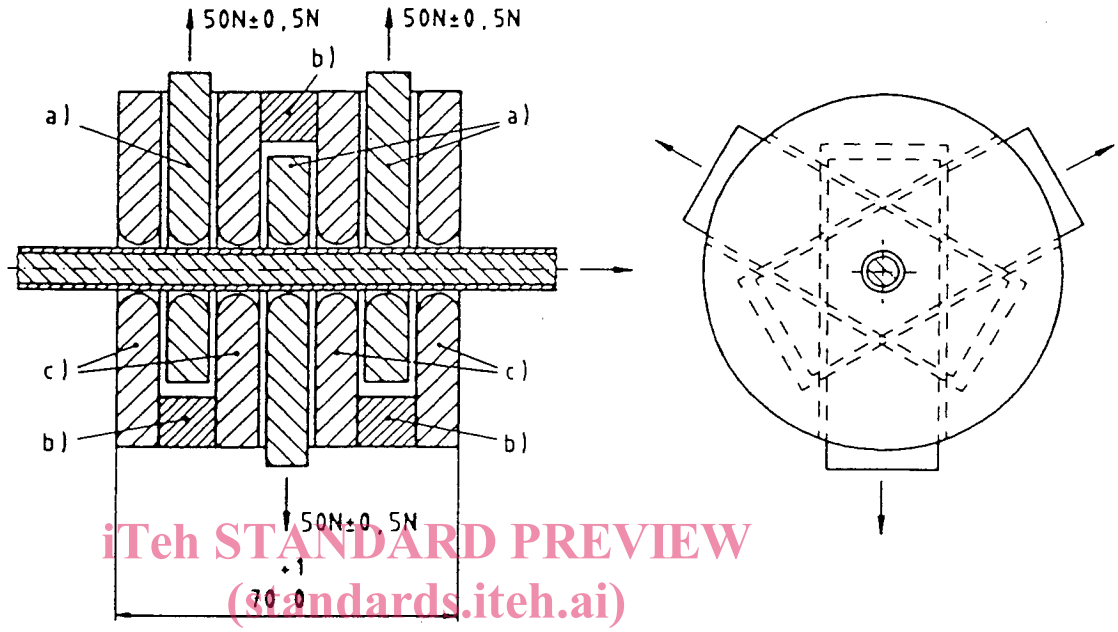
5.5.2 Preparation of the test samples

Fuse one end of the sheath and core of each test sample together. Cut the other end at right angles to the axis of the rope.

5.5.3 Apparatus

The apparatus shall consist of a frame made out of four steel plates each 10 mm thick, kept equal distances apart by three spacers. These spacers shall have rectangular slots in which the steel plates are able to slide in a radial direction. The spacers shall be arranged in such a way as to allow each of the three inserted plates to slide at an angle of 120° (see figure 5).

Dimensions in millimetres



a) 3 moving plates

b) spacers

c) 4 fixed plates

Figure 5: Apparatus for testing the sheath slippage

Each of the seven plates shall have an opening with a diameter of 12 mm; their internal surfaces shall be semi-toroidal and have a radius of 5 mm. The polished surfaces of the semi-torus shall show

- an arithmetical mean deviation of the profile of R_a = 0,4 μm and
- a surface roughness of R_{max} = 4 μm (see figure 6).

In the unloaded position the openings in the fixed plates and in the moving plates shall lie along a central axis. Each of the moving plates shall apply a radial force of (50 ± 0,5) N to the test sample in the direction in which it moves.