BS EN 892:2012

BSI Standards Publication

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

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 892:2012. It supersedes BS EN 892:2004 which is withdrawn.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.

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

Published by BSI Standards Limited 2012

ISBN 978 0 580 74615 4

ICS 97.220.40

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 30 September 2012.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 892

August 2012

ICS 97.220.40

Supersedes EN 892:2004

English Version

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

Équipement d'alpinisme et d'escalade - Cordes dynamiques - Exigences de sécurité et méthodes d'essai

Bergsteigerausrüstung - Dynamische Bergseile - Sicherheitstechnische Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 13 July 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

Contents

Page

Foreword 3
Introduction 4
1 **Scope** 5
2 **Normative references** 5
3 **Terms and definitions** 5
4 **Safety requirements** 7
5 **Test methods** 8
6 **Marking** 24
7 **Information to be supplied by the manufacturer** 24
Annex A (informative) **Standards on mountaineering equipment** 26
Annex ZA (informative) **Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC Personal Protective Equipment** 27

Foreword

This document (EN 892:2012) 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 February 2013, and conflicting national standards shall be withdrawn at the latest by February 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 892:2004.

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.

The main changes compared to EN 892:2004 are:

a) editorial changes;

b) conditioning climate in 5.2 was changed;

c) dimension of the remaining tape for preparation of the sheath slippage test in 5.4.2 was changed;

d) allowed slippage of the rope in the drop test in 5.6.3.

According to the CEN/CENELEC Internal Regulations, the national standards organisations 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.

Introduction

The text is based on UIAA-Standard B (International Mountaineering and Climbing federation), which has been prepared with international participation.

This standard is one of a package of standards for mountaineering equipment, see Annex A.

1 Scope

This European 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

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 ISO 6508-1*, Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T) (ISO 6508-1)*

ISO 6487, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

3 Terms and definitions

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

3.1
dynamic mountaineering rope
rope, which is capable, when used as a component in the safety chain, of arresting the free fall of a person engaged in mountaineering or climbing with a limited peak force

3.2
single rope
dynamic mountaineering rope, capable of being used singly, as a link in the safety chain, to arrest a leader'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 the leader's fall

Note 1 to entry: See Figure 1.

3.4
twin rope
dynamic mountaineering rope, which is capable, when used in pairs and parallel, as a link in the safety chain to arrest a leader's fall

Note 1 to entry: See Figure 2.

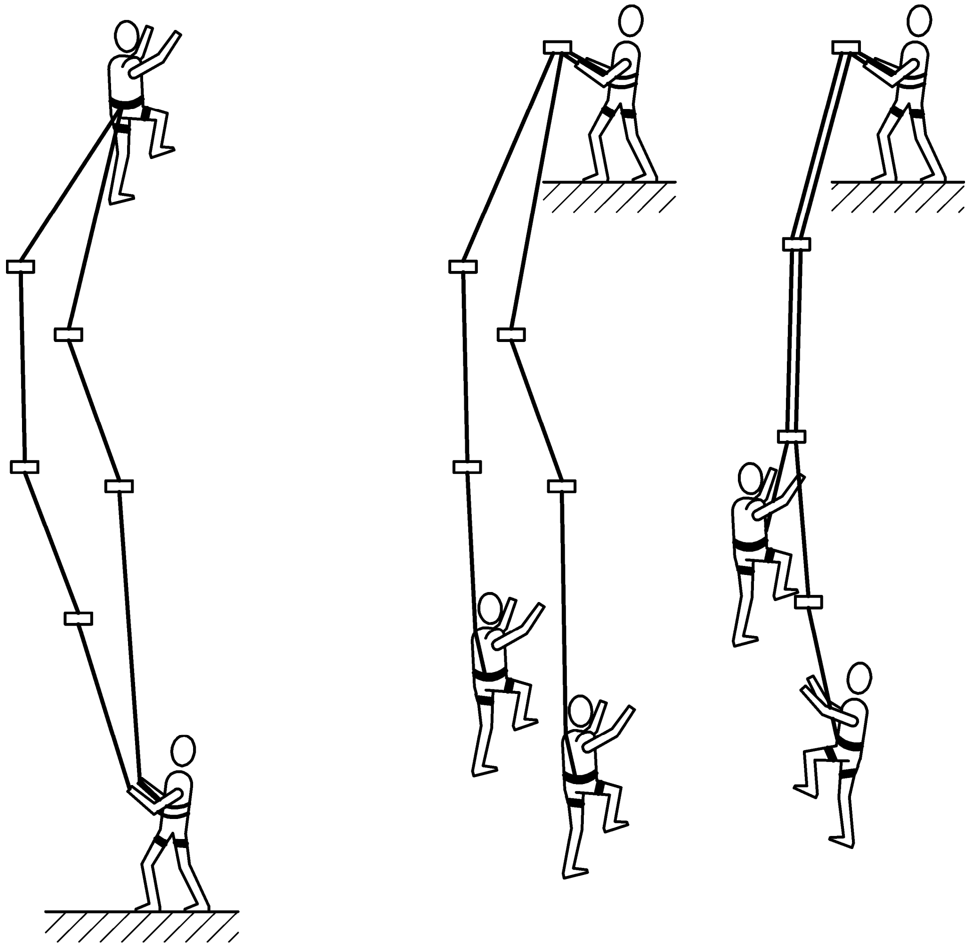


Figure 1 — Examples of use on half ropes

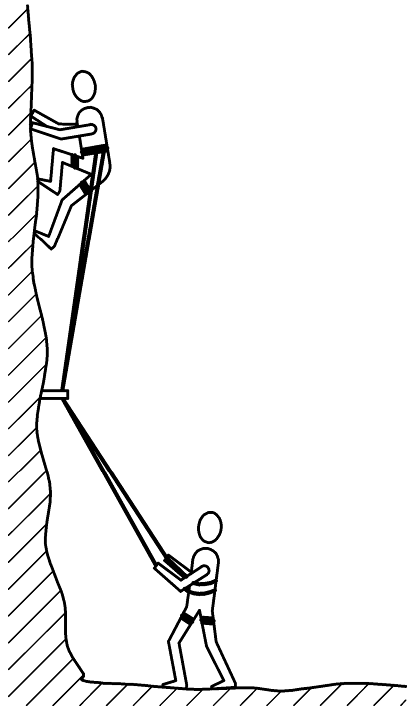


Figure 2 — Use of twin ropes

3.5
kernmantel rope
rope composed of a core and a sheath

3.6
safety chain
connection of linked elements which protects the climber or mountaineer against falls from a height

Note 1 to entry: The safety chain includes ropes connected to the anchors by connectors and to the climbers by harnesses.

4 Safety requirements

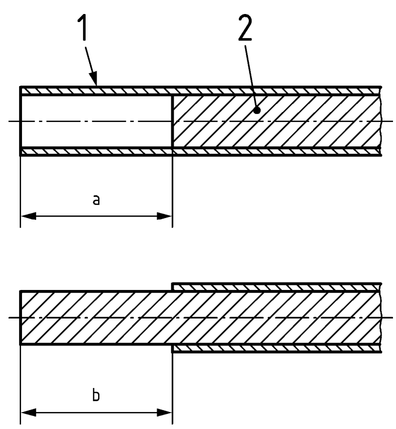
4.1 Construction

Dynamic ropes in accordance with this European Standard shall be made in a kernmantel construction. Diameter and mass per unit length are relevant characteristics. See test method in 5.3.

If the properties of the rope change along its length, for example: diameter, strength, markings, samples from each section shall be submitted for testing. The information to be supplied shall all correspond to the lowest performance section of the rope.

4.2 Sheath slippage

When tested in accordance with 5.4, the sheath slippage in a longitudinal direction relative to the core (in positive or negative direction) shall not exceed 1 % (20 mm) (see Figure 3).



Key
1 sheath
2 core
a positive sheath slippage ≤ 20 mm
b negative sheath slippage ≤ 20 mm

Figure 3 — Sheath slippage

4.3 Static elongation

When tested in accordance with 5.5, the static elongation shall not exceed:

- 10 % in single ropes (single strand of rope);
- 12 % in half ropes (single strand of rope);
- 10 % in twin ropes (double strand of rope).

4.4 Dynamic Elongation

When tested in accordance with 5.6, the dynamic elongation shall not exceed 40 % during the first drop for each test sample.

4.5 Peak force during fall arrest, number of drops

4.5.1 Peak force in the rope

When tested in accordance with 5.6, the peak force in the rope, during the first drop, for each test sample, 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 5.6, 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 rope;

shall be available for the tests.

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

Carry out the tests in accordance with 5.4 on two unused test samples with a length of (2 250 ± 10) mm.

Carry out the test in accordance with 5.5 on two unused test samples with a length of at least 1 500 mm.

Carry out the tests in accordance with 5.6 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

Dry the test samples for at least 24 h in an atmosphere of (50 ± 5) °C and less than 20 % relative humidity. Then condition these test samples in an atmosphere of (23 ± 2) °C and (50 ± 2) % relative humidity for at least 72 h. Then start testing these samples at a temperature of (23 ± 5) °C within 10 min.

5.3 Construction, diameter, and mass per unit length

5.3.1 Procedure

Clamp the test sample at one end.

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 1 200 mm from the clamp.

After applying the load for 60 s mark within the next 10 s a reference length of (1 000 ± 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.

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. If the rope cross section is not circular, the maximum and minimum diameter are to be determined in each section. 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.

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

Check that the construction of the rope is a kernmantel construction.

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.

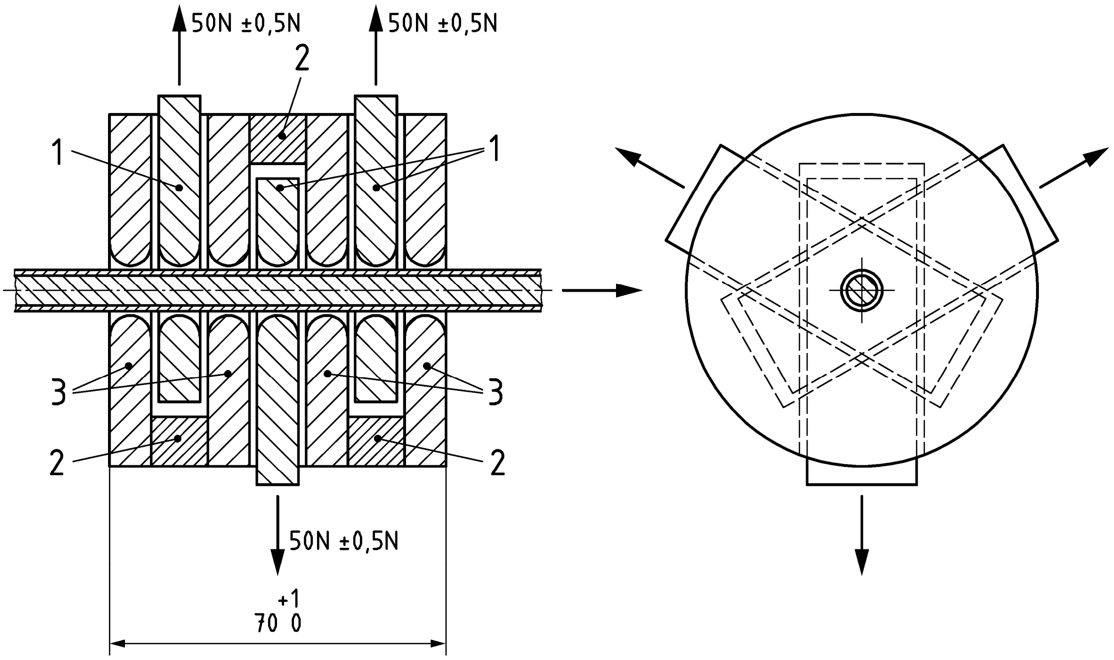
5.4 Sheath slippage

5.4.1 Principle

The rope is drawn through the apparatus illustrated in Figure 4, 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.

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

Dimensions in millimetres



Key

1 moving plates

2 spacers

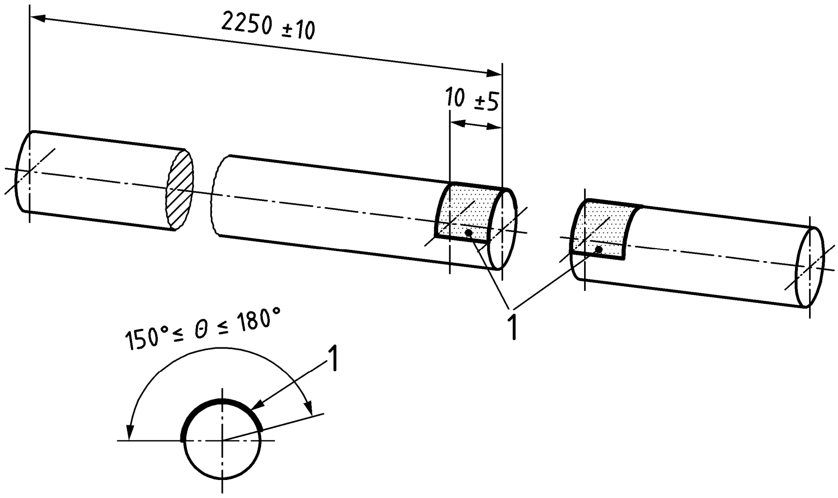
3 fixed plates

Figure 4 — Apparatus for testing the sheath slippage

5.4.2 Preparation of the test samples

Fuse one end of the sheath and core of each test sample together. Before cutting the other end of each test sample to size, apply a short length of adhesive tape around the rope, where it is to be cut, at right angles to the axis of the rope. The adhesive tape shall be at least 12 mm wide before cutting, and the angle of wrap around the rope, Θ, shall be $150° \leq \Theta \leq 180°$. After affixing the adhesive tape, cut the sample to a length of (2 250 ± 10) mm with a sharp knife, within the width of the tape, at right angles to the axis of the rope (see Figure 5) such that the adhesive tape remaining on the test sample has a width of (10 ± 5) mm. The characteristics of the adhesive tape and the method of application should be such as to reduce the extent to which the cut end of the sheath unravels during the test, whilst not interfering with the slippage taking place between the core and the sheath of the rope sample.

Dimensions in millimetres



Key
1 adhesive tape

Figure 5 — Sheath slippage test — Cutting the test sample to length

5.4.3 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 three inserted 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).

Each of the seven plates shall have an opening with a diameter of 12 mm; their internal surfaces shall be semitoroidal 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).

Dimensions in millimetres

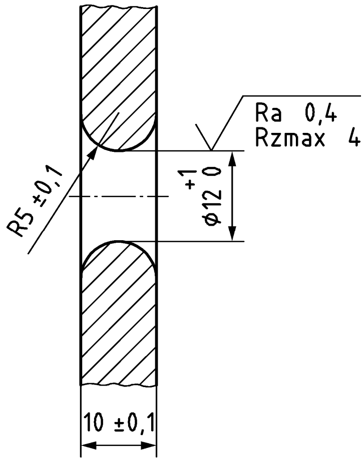


Figure 6 — Section through one of the plates

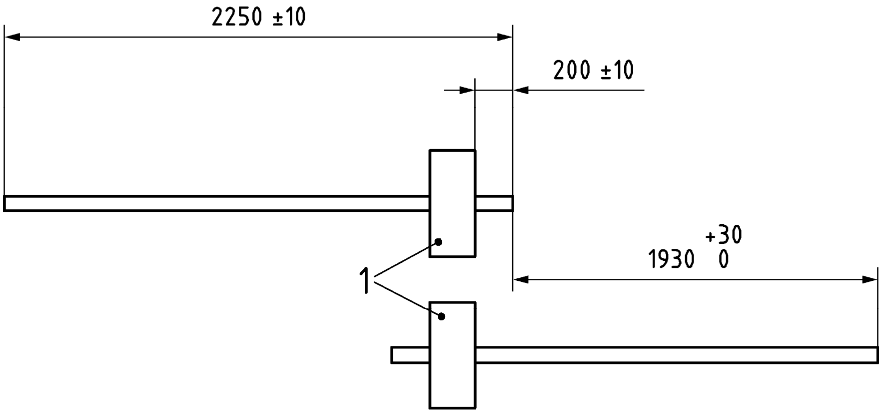
The moving plates shall have a locked position in which the openings in the fixed plates and the openings in the moving plates all lie in line along a central axis. When not in their locked position each of the moving plates shall apply a radial force of (50 ± 0,5) N to the test sample in the direction in which the plate moves. The test apparatus shall be rigidly mounted with its axis horizontal. Means shall be provided to support, on a smooth surface, the test sample in a horizontal position in line with the axis of the test apparatus, in both directions of travel.

5.4.4 Procedure

5.4.4.1 At the start of the test the moving plates shall be in their locked position.

5.4.4.2 Introduce the fused end of the test sample into the apparatus and pull to a length of (200 ± 10) mm through the test apparatus (see Figure 7). Ensure that the remainder of the test sample is not subjected to any load and lies in a horizontal position in a straight line.

Dimensions in millimetres



Key

1 sliding plates

Figure 7 — Layout of the test sample before and after sheath slippage test

5.4.4.3 Release the moving plates from their locked position and apply a force of (50 ± 0,5) N to the test sample via each of the three moving plates and pull the test sample through the apparatus at a rate of (0,5 ± 0,2) m/s for a distance of ($1\,930\ ^{+30}_{0}$) mm.

5.4.4.4 Remove the loads from the moving plates and return them to their locked position. Carefully get hold of the short end of the test sample and slowly and gently pull it back through the test apparatus to its initial position.

5.4.4.5 Repeat the procedure described in 5.4.4.3 and 5.4.4.4 three times. Then carry out the procedure described in 5.4.4.3 once more. Whilst the test sample is still in the test apparatus, and with the loads still applied to the moving plates, measure the relative slippage of the sheath along the core at the open end of the test sample (see Figure 3).

5.4.5 Expression of results

Calculate the sheath slippage in percentage of the sample length (2 000 mm).

Express the value for each test sample to the nearest 0,1 %.

5.5 Determination of static elongation

5.5.1 Procedure

Carry out the test on a:

- single strand of rope for single ropes;
- single strand of rope for half ropes;
- double strand of rope for twin ropes.

Clamp the test samples such that the free length between the clamps is ($1\,500\ ^{+100}_{-0}$) mm.

Load the test sample without shock within (10^{+5}_{-0}) s with a mass of (80 ± 0,1) kg and maintain this load for (180 ± 15) s.

Remove the load from the test sample and allow it to remain at rest for (10 ± 0,5) min.

Load the test sample without shock within (10^{+5}_{-0}) s with a mass of (5 ± 0,1) kg.

After applying the load for 60 s, mark within the next 10 s a reference length of (1 000 ± 1) mm.

Increase the load to (80 ± 0,1) kg without shock , within (10^{+5}_{0}) s and maintain this load for (60 ± 5) s.

Measure the new distance l_1 between the markings on the stressed test sample within the next 5 s.

5.5.2 Expression of results

Express the elongation as a percentage of the unloaded length: that is (l_1 – 1 000)/10. Express the results to the nearest 0,1 % for each test sample.

5.6 Drop test for determination of peak force, dynamic elongation and number of drops

5.6.1 Test conditions

Carry out the first drop test within 10 min of the respective test sample's removal from the conditioning atmosphere (see 5.2).

5.6.2 Drop test apparatus

5.6.2.1 General

The drop test apparatus shall be set up in accordance with Figures 8, 10, 11, 12 and 13, and shall consist essentially of a bollard and clamp, orifice plate, falling mass and guidance rails, means for measuring the peak force in the rope, and means for measuring the peak extension of the rope. In addition, there shall be a means for timing the descent of the mass to check that the guidance system is not interfering with the free fall of the mass. The apparatus shall be sufficiently precise and rigid as to achieve the required accuracy and reproducibility of the results.

5.6.2.2 Bollard and clamp

The bollard shall consist of a steel bar with a diameter of (30 ± 0,1) mm and a surface roughness as follows:

— arithmetic mean deviation of the profile of $R_a \leq 0{,}8$ µm;

— surface roughness $R_{max} \leq 6{,}3$ µm.

The bar shall be fixed rigidly with its axis horizontal and without the possibility of rotation. To maintain rigidity, the bar shall be as short as reasonably practicable whilst allowing two twin ropes or one single rope each to be wound around its circumference three times. There shall be two clamps fixed rigidly in relation to the bollard in accordance with the dimensions in Figures 10 and 11, and capable of fixing the free end(s) of the rope(s).

5.6.2.3 Orifice plate

The orifice plate shall be manufactured from steel with a surface hardness of at least 52 HRC according to EN ISO 6508-1. There shall be a cylindrical hole machined through the orifice plate at right angles to its surface. The inside edge of the orifice shall be semi-toroidal in shape, with dimensions in accordance with Figure 8. The orifice plate shall be mounted vertically in the apparatus, and fixed rigidly in relation to the bollard in accordance with the dimensions in Figures 10 and 11.

There shall not be any structure below the orifice plate which might come into contact with the rope(s) during a drop. When fixed in position in the apparatus, the lower edge of the orifice plate shall be horizontal with a radius of at least 5 mm, and a dimension relative to the orifice as shown in Figure 8. The semi-toroidal surface of the orifice shall have a roughness as follows:

— arithmetic mean deviation of the profile of $R_a \leq 0{,}2$ µm;

— surface roughness $R_{max} \leq 2$ µm.

The surface of the orifice plate below the orifice (see Figure 8) shall have a roughness as follows:

— arithmetic mean deviation of the profile of $R_a \leq 0{,}4$ µm; surface roughness $R_{max} \leq 4$ µm.

Dimensions in millimetres

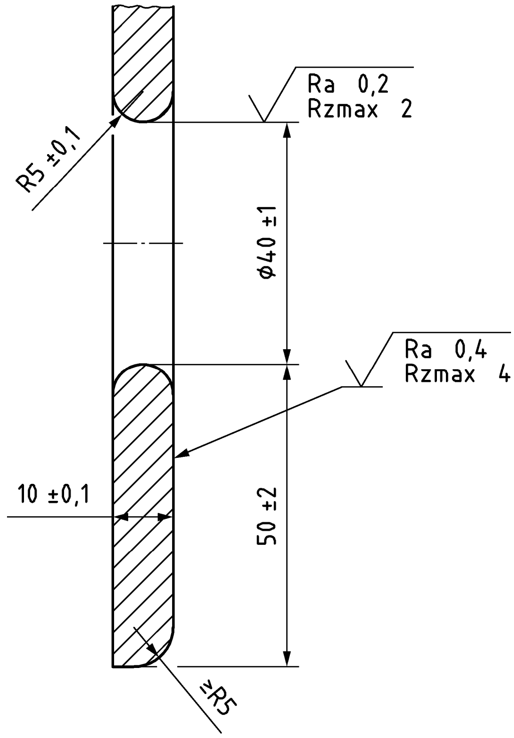


Figure 8 — Orifice plate

5.6.2.4 Falling mass and guidance rails

The falling mass shall be made of metal, and its fall shall be guided by two vertical rigid guidance rails. Apart from items of negligible mass, the system of falling mass and guidance rails shall have a common plane of symmetry midway between the guidance rails. The surface of the orifice plate shall be at right angles to this plane of symmetry, and the centre line of the orifice shall lie within ± 2 mm of the plane of symmetry. The falling mass and guidance system shall be positioned such that the horizontal distance between the centre-line of the orifice plate and the centre-point of the means for rope attachment to the falling mass is (80 ± 10) mm throughout the drop (see Figure 9).

The dimensions of the falling mass, and of the guidance rails are not defined, but there are constraints on some dimensions, on the design, and on the shape of the falling mass, as follows:

a) The falling mass shall be designed to fall freely with minimum contact with the guidance rails until the test sample comes under tension, when some contact with the guidance rails will occur. To keep the friction low between the falling mass and the guidance rails, the falling mass may be fitted with roller or ball bearings or plane bearings with low friction surfaces. In all cases there shall be free play between the falling mass and the guidance rails amounting to a maximum of 8 mm both in the plane of the guidance rails and at right angles to this. The minimum vertical distance between points on the falling mass which can come into contact with the guidance rails shall be defined as a distance B. The design of the falling mass shall be such that

   $$B \geq 1{,}10\ C,$$

   where C is the minimum distance between points of contact with the guidance rails (see Figure 12).

b) The falling mass shall be fitted with a means for attachment of the rope, which can take several forms, a U-bolt or a comparable construction which has a contact radius of (15^{+5}_{-0}) mm and a thickness of

(15 ± 0,1) mm, rigidly attached to the falling mass. The inner edge and the upper edge of the attachment shall have a semicircular profile of radius (7,5 ± 0,05) mm.

An essential requirement is that the metal cross-section above the highest part of the attachment shall be circular of diameter (15 ± 0,1) mm. Examples of forms for the means for attachment of the rope are shown in Figure 13.

The effective point of application of the force from the rope onto the falling mass (see point X in Figure 13) shall lie within 1 mm of the intersection of the following three planes:

1) a horizontal plane containing the highest points on the falling mass which can come into contact with the guidance rails;

2) the plane of symmetry of the falling mass;

3) a plane at right angles to the two previous planes, which lies equidistant between the points to the front of the falling mass which can come into contact with the guidance rails.

When the falling mass is hung from the means for attachment of the rope, and allowed to hang freely, the falling mass shall hang within 0,5° of its normal orientation measured in any vertical plane.

The distance between the effective point of application of the force from the rope onto the falling mass (see point X in Figure 13) and the centre of gravity of the falling mass (A) shall be at least two thirds of the vertical distance between the highest point and the lowest point which can come into contact with the guidance rails (B) (see Figure 12). That is:

$A \geq 2\,B/3$

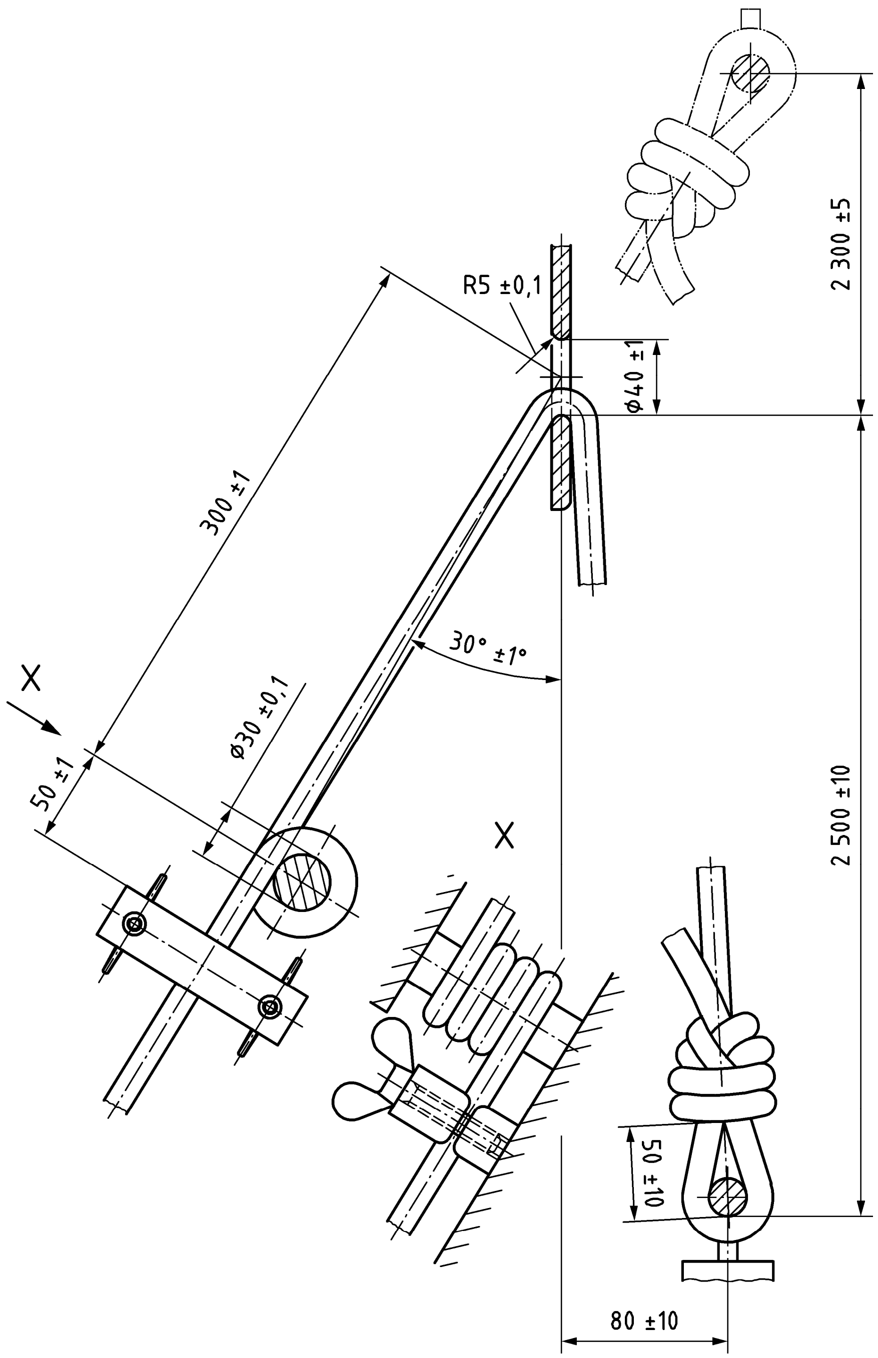
c) The falling mass, including the means for rope attachment, guidance bearings, and any other fixed attachments, shall weigh:

1) (80 ± 0,1) kg for single ropes;

2) (55 ± 0,1) kg for half ropes;

3) (80 ± 0,1) kg for twin ropes.

Dimensions in millimetres



Key
X top view of the fixation

Figure 9 — Layout of apparatus for single strand test (half ropes, single ropes)

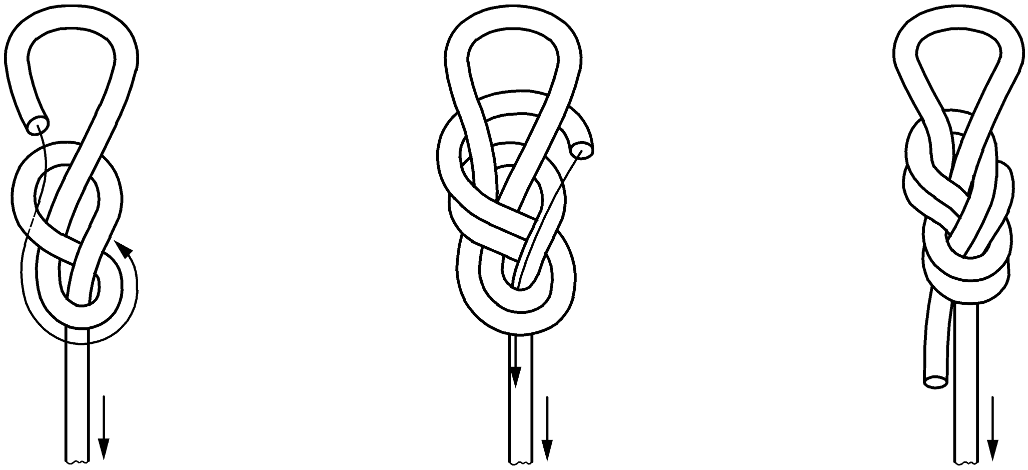


Figure 10 — Illustration of the figure-of-eight knot

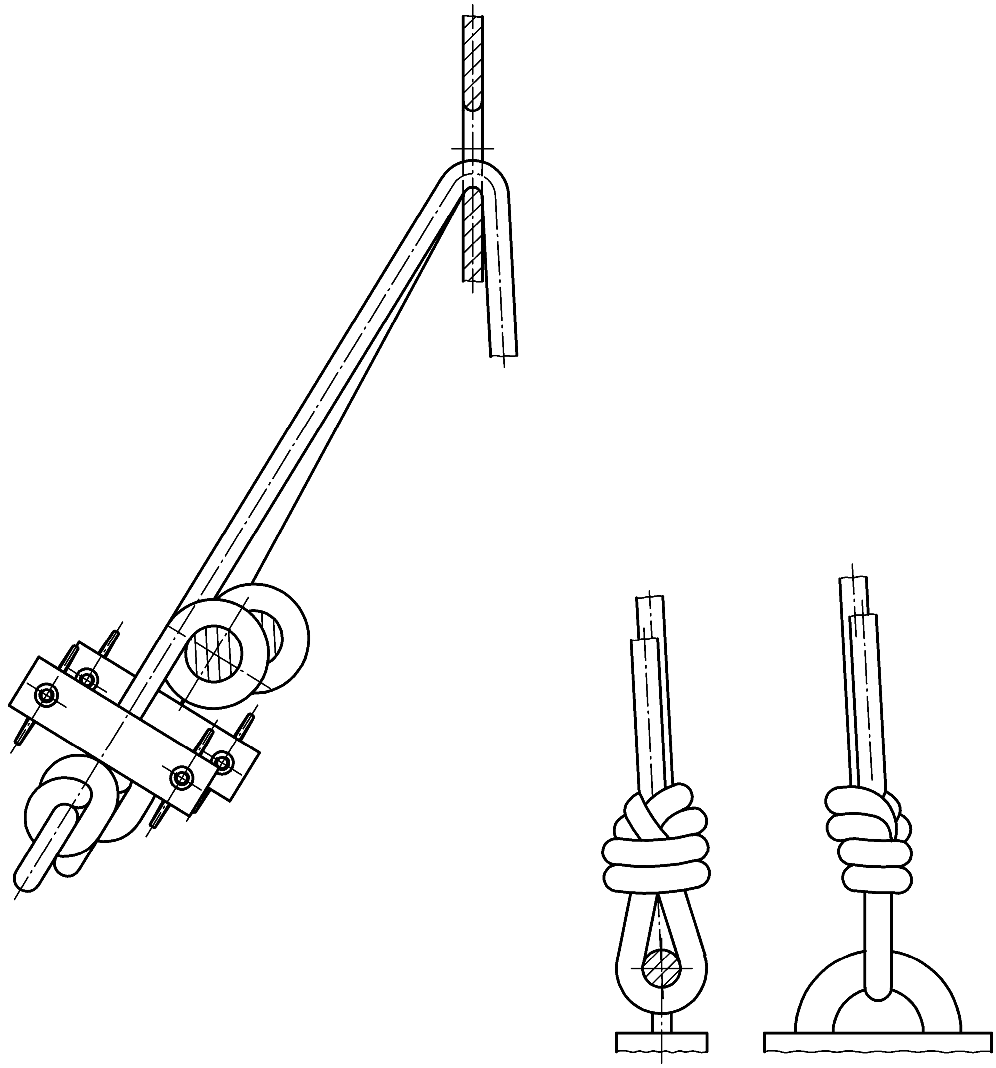
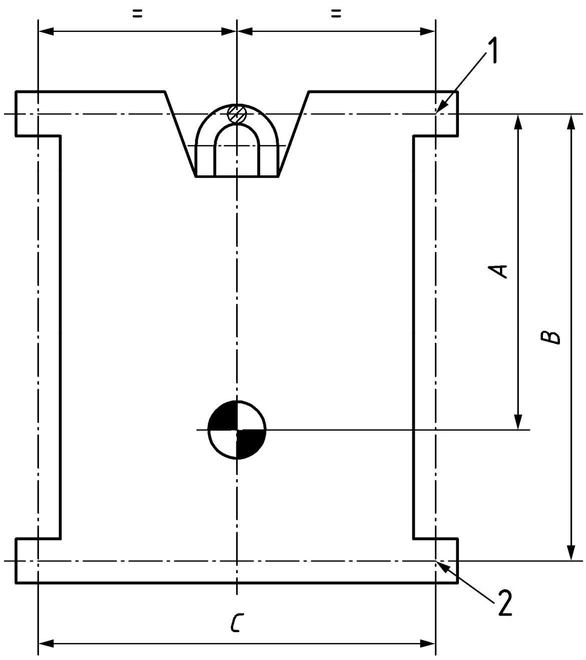


Figure 11 — Layout of apparatus for double strand test (twin ropes)

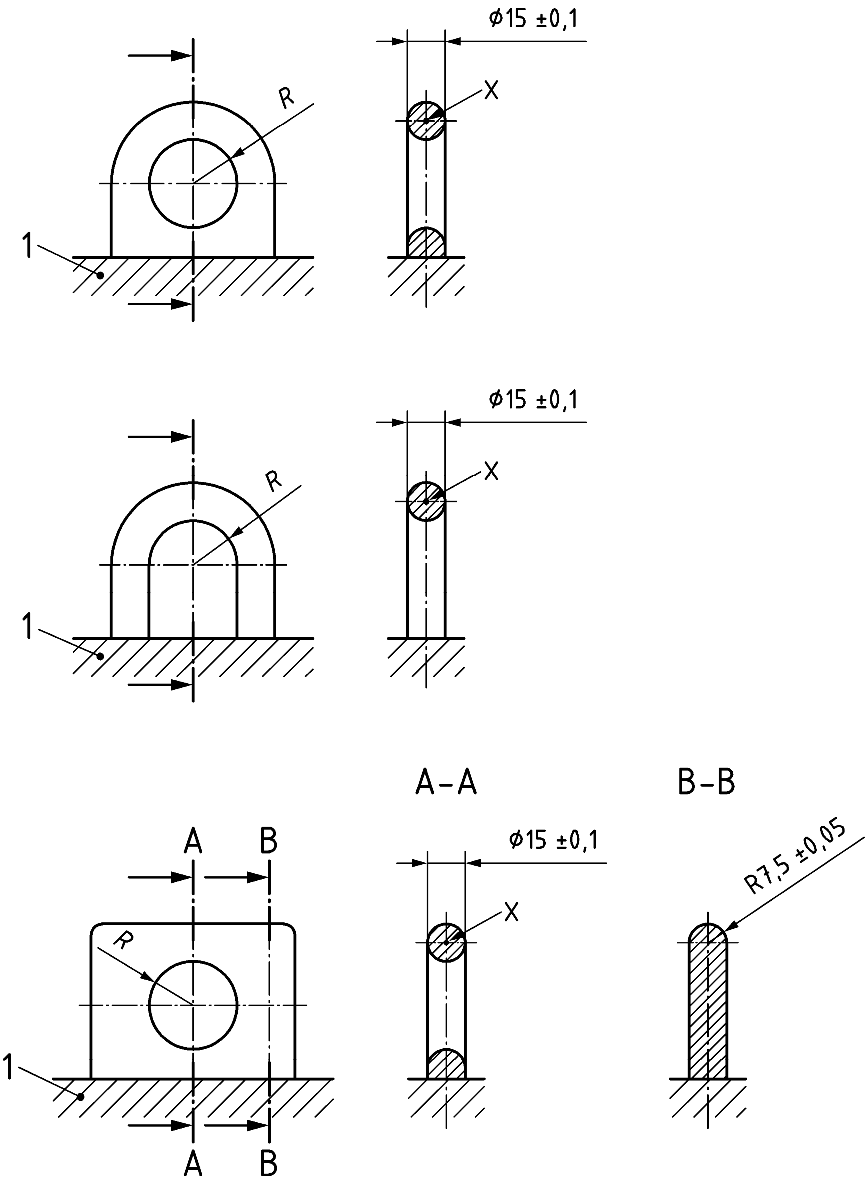
All other dimensions see Figure 9.



Key
1 upper point of contact with guidance rails
2 lower point of contact with guidance rails
$A \geq 2\ B/3$
$B \geq 1{,}10\ C$
C minimum distance between points of contact with the guidance rails

Figure 12 — Dimensional constraints on the falling mass

Dimensions in millimetres



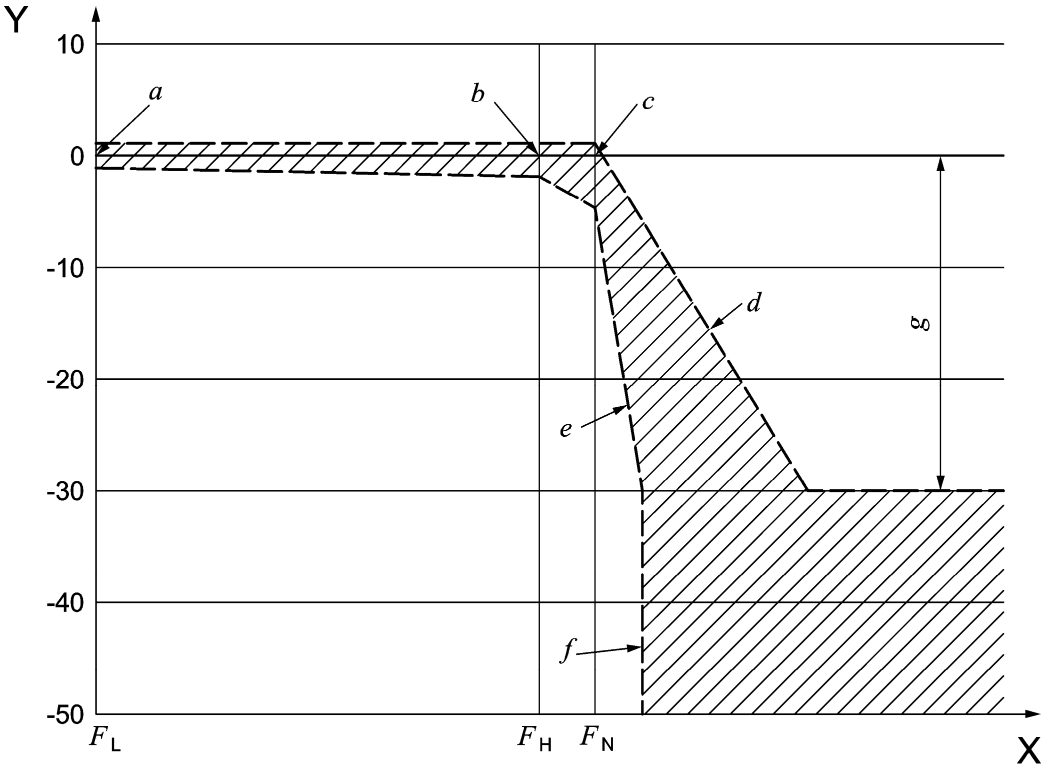
Key

1 clamping surface

R = (15^{+5}_{0}) mm

X effective point of application of the force

Figure 13 — Examples of forms for the means for attachment of the ropes to the falling mass



Key

Y 20 lg $\left(\frac{\text{sensitivity coefficient}}{\text{calibration factor}}\right)$

X frequency, in Hz

Figure 14 — CFC30 frequency response limits (according to ISO 6487)

Table 1 — CFC and logarithmic scale for the frequency response limits (according to ISO 6487)

CFC	F_L Hz	F_H Hz	F_N Hz
30	≤ 0,1	30	50

Logarithmic scale	
a	± 0,5 dB
b	+ 0,5; – 1 dB
c	+ 0,5; – 4 dB
d	– 9 dB/octave
e	–24 dB/octave
f	∞
g	– 30 dB

5.6.2.5 Means for measuring the peak force in the rope

The measurements obtained have to equal the force which the rope(s) applies to the falling mass.

If the device is interposed between the falling mass and the means for attachment of the rope, it shall be sufficiently rigid that the requirements of 5.6.2.4.b) are met.

The apparatus for measuring and recording the force in the rope shall correspond with ISO 6487, channel frequency class (CFC) 30 (see Figure 14 and Table 1). The sampling frequency shall be at least 1 kHz.

The force transducer, in its operating position, shall not have a resonant frequency below 150 Hz.

The channel amplitude class (CAC) as defined in ISO 6487 shall be at least 20 kN.

The error in the measurement and recording of force in the rope shall be less than 1 % in accordance with ISO 6487.

5.6.2.6 Means for measuring the peak extension of the rope

The measurement obtained has to equal the peak downward movement of any reference point on the falling mass during the drop, measured from an initial datum point. The initial datum point shall be the position of said reference point when the mass is hanging from the end of the test sample, and the end of the test sample is a nominal 2 500 mm below the lowest edge of the orifice. The peak extension shall be measured with an accuracy of ± 5 mm.

5.6.2.7 Means for timing the descent of the falling mass

Means shall be provided for measuring the time at which the falling mass passes two timing points, referred to respectively as the upper and lower timing points. The position of the upper timing point shall correspond with the position of the falling mass when it has fallen (3 000 ± 2) mm from its initial pre-release position. The position of the lower timing point shall be (1 000 ± 2) mm vertically below the upper timing point. The timing means are not described in greater detail, but the accuracy shall be such that the time interval between passing the upper timing point and passing the lower timing point can be obtained to within ± 0,25 ms.

5.6.2.8 Rigidity of the apparatus

The mounting of the orifice plate shall be sufficiently rigid that the following requirement is satisfied. Pass a rope through the orifice in the orifice plate, wind it three times around the bollard, and fix it at the clamp. Apply a static load of (16 ± 0,5) kN to the free end of the rope, downwards within 2° of vertical. The movement of any part of the orifice plate from its initial unloaded position shall not exceed 1 mm in each of the X- Y- and Z-directions.

5.6.2.9 Checks and calibration of the apparatus

In addition to the normal checks and calibrations carried out on test equipment, the following shall be carried out during commissioning of the test apparatus, and repeated at intervals of not more than 12 months.

a) Change the positions of the upper and lower timing points for timing the descent of the falling mass, as follows: the position of the upper timing point shall correspond with the position of the falling mass when it has fallen (4 500 ± 2) mm from its initial pre-release position. The position of the lower timing point shall be (1 000 ± 2) mm vertically below the upper timing point. Release the falling mass from its normal release position, but without any rope attached. Check that the time interval between the falling mass passing the upper and lower timing points is within the range ($101,1^{+1,3}_{-0,3}$) ms.

b) With the rope configuration used in 5.6.2.8 apply a controlled load to the free end of the rope, downwards within 2° of vertical, with an accuracy better than ± 1 %. Vary the applied load at least over the range 2 kN to 13 kN, and use this load to calibrate the means for measuring the peak load in the rope.

c) Increase the applied load and check the rigidity of the apparatus in accordance with 5.6.2.8.

5.6.3 Procedure

When testing single and half ropes, attach the test sample to the means for rope attachment to the falling mass by means of a figure-of-eight knot (see Figure 10) with an internal loop length of (50 ± 10) mm. Tighten the knot by hand, pulling each strand of rope alternately, using pliers to grip the short end as necessary. Ensure that the two strands of rope are parallel and equally tight throughout the knot. When testing twin ropes, attach to the means for rope attachment to the falling mass in the middle of the rope with a single figure-of-eight knot (see Figure 10). Pass the test sample, both strands of rope in a double strand test, through the orifice in the orifice plate, wind each strand three times round the bollard, and secure using the clamp(s) (see Figure 11).

Load the test sample with the falling mass as a static load for a period of (60^{+15}_{-0}) s, and then adjust the clamp(s) until the free length of rope(s) from the lowest edge of the orifice to the attachment point is (2 500 ± 10) mm (see Figure 9). In a two strand test ensure that the tensions in the two strands of rope are similar.

Mark the rope at the clamp (when testing double strands, mark at both clamps).

Before each drop, raise the falling mass to a height at which the centre-point of the means for rope attachment is (2 300 ± 5) mm above the lowest edge of the orifice (see Figure 9). Release the falling mass.

On the first drop, record the peak force in the rope(s) attached to the falling mass. Also record the peak extension of the rope during the drop.

There should be no external influence on the free fall of the mass onto the rope. On every drop, record the time interval between the falling mass reaching the upper timing point and reaching the lower timing point. Check that this time interval is ($121^{+1,9}_{-0,4}$) ms. If it is outside this tolerance, the fall energy is incorrect and the test is invalid. In this case the test shall be repeated starting with a new test sample. If the time interval is repeatedly outside the above tolerance, the test apparatus requires attention.

After each drop, remove the load from the rope(s) within 60 s.

The interval from one drop to the consecutive drop on the same test sample shall be (300 ± 15) s from release to release.

Continue testing until the sample breaks completely. If breakage occurs at the knot, the test is declared invalid, and the test shall be repeated starting with a new test sample. If further test samples break at the knot, the fact shall be recorded, but the test results stand. Only one repeat test due to breakage at the knot is allowed.

When a test sample has broken, check whether the rope(s) has slipped through the clamp(s). If any rope has slipped by more than 5 mm the test is invalid. In this case the test shall be repeated starting with a new test sample.

Record the number of drops sustained by each test sample without breaking and whether breakage has occurred at the knot.

5.6.4 Expression of results

For each valid test sample, express the peak force during the first drop to the nearest 0,1 kN.

For each valid test sample, calculate the dynamic elongation by expressing the peak extension of the rope during the first drop as a percentage of 2 800 mm, to the nearest 1 %.

State the number of drops sustained without breaking for each valid test sample.

6 Marking

Ropes shall have durable bands at both ends with a maximum width of 30 mm (measured along the length of the rope).

The bands shall be marked clearly, indelibly and permanently with at least the following information:

a) name of the manufacturer or his authorised representative;

NOTE For a definition of manufacturer and authorised representative see Regulation 765/2008.

b) diameter (which is ± 0,2 mm of the rope diameter specified in 5.3.2.);

c) the corresponding graphical symbol as specified in Figure 15;

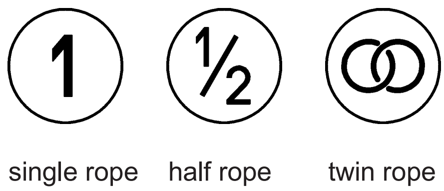


Figure 15 — Graphical symbols for ropes

d) the year of manufacture of the rope;

e) the length of the rope.

7 Information to be supplied by the manufacturer

The information shall contain at least the following:

Stated values shall be the values which the manufacturer ensures at the date of production and shall not exceed.

a) name of the manufacturer or his authorised representative;

b) the number of this European Standard: EN 892;

c) the length of the rope in metres;

d) diameter (which is ± 0,2 mm of the rope diameter specified in 5.3.2.);

e) the model name and type (single, half or twin rope) as defined in 3;

f) the year of manufacture of the rope;

g) the mass per unit length of the rope as specified in 5.3.2;

h) static elongation expressed as a percentage to the nearest 0,1 %, not less than the largest value obtained in 5.5, and which the manufacturer guarantees will not be exceeded at the date of production;

i) dynamic elongation expressed as a percentage to the nearest 1 %, not less than the largest value obtained in 5.6.4, and which the manufacturer guarantees will not be exceeded at the date of production;

j) peak force expressed in kN to the nearest 0,1 kN not less than the largest value obtained in 5.6.4, and which the manufacturer guarantees will not be exceeded at the date of production;

k) number of drops sustained without breaking, not more than the smallest value obtained in 5.6.4, and which the manufacturer guarantees will be achieved at the date of production;

l) the sheath slippage expressed as a percentage to the nearest 0,1 % not less than the largest value obtained in 5.4.5, and which the manufacturer guarantees will not be exceeded at the date of production;

m) the meaning of any markings on the product;

n) how to use the product (e. g. single, half or twin ropes);

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

p) how to maintain/service the product, on the effects of chemical reagents and how to disinfect the product without adverse effect;

q) the lifespan of the product and how to assess it and that after a serious fall the rope should be withdrawn from use as soon as possible;

r) influence of wet and icy conditions;

s) danger of sharp edges;

t) influence of storage and ageing due to use.

Annex A
(informative)

Standards on mountaineering equipment

Table A.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 Personal Protective Equipment

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 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 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 — Correspondence between this European Standard and Directive 89/686/EEC Personal Protective Equipment

Clause(s)/sub-clause(s) of this EN	**Essential Requirements (ERs) of Directive 89/686/EEC Personal Protective Equipment**	**Qualifying remarks/Notes**
4.1, 4.3	1.2.1 Absence of risks and other inherent nuisance factors	
4.4, 4.5, 4.6	1.3.2 Lightness and design strength	
7	1.4 Information supplied by the manufacturer	
6	2.12 Markings	
4.5	3.1.2.2 Prevention of falls	Dynamic ropes 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.

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

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

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

bsi.

...making excellence a habit.™