
Vlaknene vrvi za vsakovrstno uporabo - Ugotavljanje nekaterih fizikalnih in mehanskih lastnosti

Fibre ropes for general service - Determination of certain physical and mechanical properties

Faserseile für allgemeine Verwendung - Bestimmung einiger physikalischer und mechanischer Eigenschaften

Cordages en fibres pour usages divers - Détermination de certaines caractéristiques physiques et mécaniques

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Ropes

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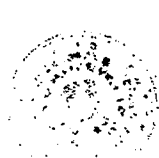
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Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 248 "Textiles and textile products", of which the secretariat is held by BSI.

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of an identical text or by endorsement, at the latest by February 1996, and conflicting national standards shall be withdrawn at the latest by February 1996.

According to the CEN/CENELEC Internal Regulations, 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

1.1 This European Standard specifies, for ropes of different kinds, a method of determining each of the following characteristics :

- net mass per metre;

- lay length;

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- plait pitch;

- elongation;

- tensile strength.

1.2 The first three characteristics (net mass per metre, lay length and plait pitch) are measured with the rope under a specified tension called the reference tension.

NOTE: Knowledge of the net mass per metre, measured in accordance with this European Standard, also makes it possible to calculate the net length (under reference tension) of a rope by dividing the total net mass of the rope (without lashings or packing material) by the mass per metre, both of these masses being measured after the same conditioning.

1.3 The fourth characteristic (elongation) corresponds to the measured increase in length of the rope when the tension to which it is subjected is increased from an initial value (reference tension) to a value equal to 75 % of the minimum specified breaking strength of the rope.

1.4 The fifth characteristic (tensile strength) is the maximum load registered (or reached) during a breaking test on the test piece, carried out on a tensile testing machine with constant rate of traverse of the moving element. The breaking strength values given in the tables of rope specifications are only valid when this type of testing machine is used.

NOTE: When it is not possible to test the whole section of rope, the method described in annex B can be used, subject to agreement between the parties involved.

2 Normative reference

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 Principle

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3.1 Calculation of the net mass per metre

The net mass per metre is obtained by measurement of the mass and length, under a reference tension, of a conditioned test piece (see 8.1.).

3.2 Measurement of the lay

This measurement is taken at the time of application of the reference tension.

3.3 Measurement of the elongation of the rope

This measurement is taken by comparing the lengths of a section of the test piece which has been subjected successively to

- the reference tension;
- a tension equal to 75 % of the minimum specified breaking load for the rope.

3.4 Measurement of breaking strength

This measurement is carried out by increasing the previous tension to breaking point.

4 Apparatus

4.1 Tensile testing machine, accommodating the assumed breaking strength of the rope, which allows a constant rate of traverse of the moving element as stipulated in 8.4 and measurement of breaking load to an accuracy of 1 %.

Different types of tensile testing machine may be used: a wedge grip testing machine, a pulley-type grips ("cors de chasse" testing machine), or a testing machine with bollards for eye splices. In the last case, the diameter of the bollards passing through the eye-spliced test pieces shall be at least twice the diameter of the rope to be tested.

In the case of the cors de chasse tensile testing machine, the diameter of the pulleys or catches holding down the test pieces shall be at least equal to 10 times that of the rope being tested.

4.2 Balance, of the appropriate capacity, allowing measurement of mass to an accuracy of 1 %.

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5 Sampling

5.1 Composition of the batch to be sampled

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Samples shall be taken from a homogeneous batch, i.e. consisting of ropes of the same size and same dimensions and which have been subject to the same series of manufacturing operations and the same test procedure.

5.2 Selecting the samples

Take at random from the batch the number of samples S obtained from the following equation :

$$S = 0,4\sqrt{N}$$

where N is the size of the batch expressed as the number of 220 metre coils.

Where the calculated value of S is not a whole number, the number obtained shall be rounded to the nearest whole number, for example 27,5 and 30,35 shall be rounded to 28 and 30, respectively. Where $S < 1$, take one sample length.

6 Test pieces

6.1 Length

The test piece shall be of adequate length to give an effective length (see 8.2) at least equal to the one given in table 1, when mounted on the tensile testing machine.

Table 1 : Effective lengths

Type of rope	Type of testing machine	Minimum effective length L_e necessary for testing mm
Man-made fibre ropes, reference number ≤ 10	All types	400
Man-made fibre ropes, reference number > 10	Wedge grip or "cors de chasse" machines	600
	Other types	1 800
Natural fibre ropes	All types	2 000

6.2 Number of test pieces

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Take a test piece from each sample.

6.3 Taking the test pieces

Take the test piece either from one end of the samples, or from the body of the samples if these are intended to be cut. Take all necessary steps to prevent unlaying. If necessary, remove slightly unlaid ends.

7 Conditioning

Ropes shall be tested in the ambient atmosphere, except in cases of dispute, when the test piece shall be placed in an atmosphere specified in EN 20139 for at least 48 h, immediately prior to testing.

8 Procedure

The following procedure shall be performed sequentially :

8.1 Initial measurements

Lay the test piece out straight without noticeable tension on a flat surface. Measure its length. Let L_0 be this length, expressed in metres to the nearest 1 %.

Make two marks on the test piece, spaced symmetrically with regard to its mid-point, and at a distance apart l_0 which is greater than 0,5 m.¹⁾

Determine the mass of the test piece. Let m be this mass, expressed in grams to the nearest 0,5 %.

NOTE : An alternative method for ropes sizes greater than reference number 70 is given in annex D.

8.2 Mounting the test piece on the testing machine

Fix the ends of the test piece between the wedge grips or on the cors de chasse or by its eye splices, depending on the type of testing machine used, in order to obtain the effective length of test piece specified in 6.1.

In the case of a test on splices, the eyes shall have an internal length of between 250 mm and 300 mm when closed; their production is left to the manufacturer's direction. In the case of man-made fibre ropes, it is recommended that the ends of the splices be tapered to finish.

Marks r limiting the section of the test piece in which rupture is considered as normal shall be positioned as shown in figure 3.a).

8.3 Measurement of lay and gauge length

Apply the reference tension specified for the type of rope being tested²⁾ to the test piece and measure

- the length of 10 lays or 10 plait pitches under the tension given in clause 3. Express the result in millimetres.

¹⁾ In the case of man-made fibre ropes with a reference number of ≤ 10 which have a test piece of effective length such that two marks cannot be made at a distance apart $l_0 \geq 0,5$ m and the distance l_2 between these marks cannot be measured as indicated in 8.3, the value l_0 may be obtained by placing 2 marks at least 0,5 m apart on a sample of rope laid out on a flat surface with no noticeable tension; the value l_2 is obtained by applying the appropriate tension by means of weights and a pulley.

²⁾ See annex A which gives the reference tension to be applied for each type of rope.

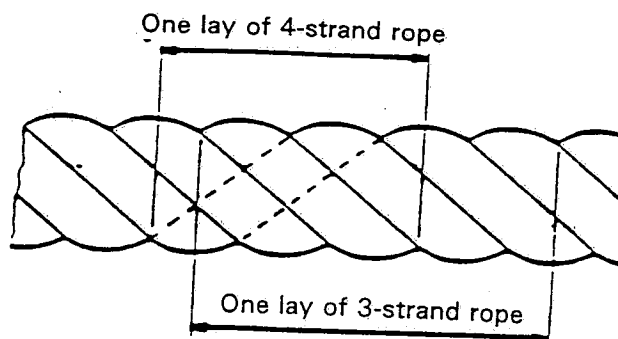


Figure 1 : Length of lay for laid ropes

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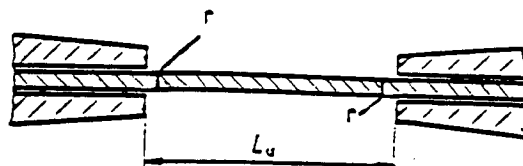
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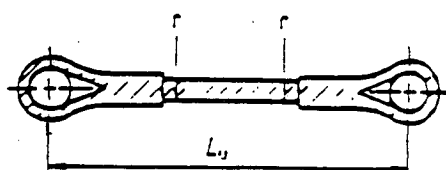
Figure 2 : Length of plait pitch for 8-strand rope

NOTE 1 : The length of lay for laid ropes and plait pitch for 8-strand rope are shown in figures 1 and 2 respectively.

- the distance between the two marks. Let l_2 be this distance, expressed in metres to the nearest 0,5 %.



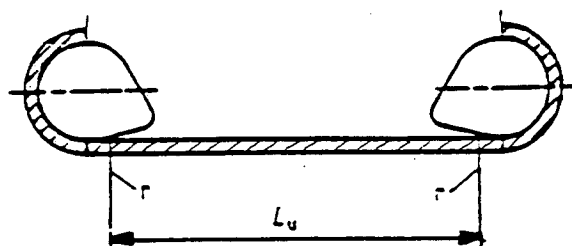
a) Wedge grip testing machine



b) Testing machines with bollards for eye splices

NOTE 2 : The marks r are situated 150 mm from the last ruck of the splice.

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NOTE 3 : The distance r , in millimetres, is three times the lay.

c) "cors de chasse" testing machine

r limiting marks for the standard test;

L_u effective length measured with no tension, the test piece simply being laid straight.

Figure 3: Effective length L_u for each type of testing machine