



SLOVENSKI STANDARD
SIST EN 12385-4:2003
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Steel wire ropes - Safety - Part 4: Stranded ropes for general lifting applications

Drahtseile aus Stahldraht - Sicherheit - Teil 4: Litzenseile für allgemeine Hebezwecke

Câbles en acier - Sécurité - Partie 4: Câbles a torons pour applications générales de levage

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Ta slovenski standard je istoveten z: EN 12385-4:2002

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English version

Steel wire ropes - Safety - Part 4: Stranded ropes for general lifting applications

Câbles en acier - Sécurité - Partie 4: Câbles à torons pour applications de levage générales

Drahtseile aus Stahldraht - Sicherheit - Teil 4: Litzenseile für allgemeine Hebezwecke

This European Standard was approved by CEN on 12 November 2001.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 12385-4:2002) has been prepared by Technical Committee CEN/TC 168, "Chains, ropes, webbing, slings and accessories – Safety", the secretariat of which 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of an identical text or by endorsement, at the latest by April 2003, and conflicting national standards shall be withdrawn at the latest by April 2003.

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 EC Directive(s).

For relationship with EC Directive(s), see informative annex ZA, which is an integral Part of this document.

The other Parts of EN 12385 are:

- Part 1: General requirements
- Part 2: Definitions, designation and classification
- Part 3: Information for use and maintenance
- Part 5: Stranded ropes for lifts
- Part 6: Stranded ropes for mine shafts
- Part 7: Locked coil ropes for mine shafts
- Part 8: Stranded hauling and carrying-hauling ropes for cableway installations designed to carry persons
- Part 9: Locked coil carrying ropes for cableway installations designed to carry persons
- Part 10: Spiral ropes for general structural applications

Part 1 provides the general requirements of Parts 4 to 10.

This is the first edition of this Part.

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This Part of this European Standard has been prepared to be a harmonized standard to provide one means of complying with the essential safety requirements of the Machinery Directive.

This Part of this European Standard is a type C standard as stated in EN 292.

For the purposes of the Certificate referred to in clause 7, this Part assumes a working load limit based on a safety factor of 5. The safety factor and the required minimum breaking force of the rope for a given application is the responsibility of the manufacturer of the machine of which the rope forms a part.

During the preparation of this standard, it was assumed that a negotiation would take place between the purchaser and the manufacturer concerning the intended purpose of the rope.

Although tables of breaking forces and masses are provided for a number of the more common classes, diameters and rope grades, this Part of this standard is not limited to those given, providing all of the other requirements are met.

Specifiers, purchasers and users should recognise that some ropes are specially designed by the manufacturer to meet particular lifting machinery requirements.

1 Scope

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This Part of this European Standard specifies the particular materials, manufacturing and testing requirements for ropes for general lifting applications.

The particular hazards covered by this Part are identified in Clause 4.

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This Part of this European Standard does not establish requirements for information for use other than those given in clause 7 of Part 1. Neither does it cover the requirements for ropes fitted with terminations.

Minimum breaking force values for the more common classes, sizes and grades of rope are provided in tables 5 to 17.

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 (including amendments).

EN 10264-2, *Steel wire and wire products – Steel wire for ropes – Part 2: Cold drawn non-alloyed steel wire for ropes for general applications.*

EN 12385-1:2002, *Steel wire ropes – Safety – Part 1: General requirements.*

EN 12385-2:2002, *Steel wire ropes – Safety – Part 2: Definitions, designation and classification.*

ISO 4346, *Steel wire ropes for general purposes – Lubricants – Basic requirements.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions in EN 12385-2 apply.

4 Hazards

In addition to the general hazards identified in clause 4 of Part 1, Table 1 contains all the particular hazards which require action to reduce risk as being specific and significant for steel wire ropes for general lifting applications.

Table 1- Hazards and associated requirements

Hazards identified in annex A of EN 1050:1996		Relevant clause of annex A of EN 292-2:1991/A1:1995	Relevant clause of this standard
27.4	Mechanical hazard from insufficient strength of parts	4.1.2.3	5 and 6
27.6	Mechanical hazard from inadequate selection of ropes and their inadequate integration into the machine	4.3.1	7

NOTE For the purposes of this Part of EN 12385, insufficient strength of parts means failure to achieve the minimum breaking force of the rope.

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5 Safety requirements and/or measures

5.1 General

In addition to the requirements given 5.2 to 5.5, the requirements shall also conform to those given in EN 12385-1.

5.2 Materials

5.2.1 Wire

Wires, before ropemaking, shall conform to EN 10264-2.

For those ropes where a rope grade is applicable, e.g. Tables 5 to 16, the tensile strength grades of the wires shall be subject to the limits given in Table 2.

For those ropes where a rope grade is not applicable, e.g. large diameter ropes, the tensile strength grades of the wires shall be one or a combination of those given in EN 10264-2.

Table 2 — Wire tensile strength grades excluding centre and filler wires for given rope grades

Rope Grade	Wire tensile strength grades N/mm ²	
	Minimum	Maximum
1770	1570	1960
1960	1770	2160
2160	1960	2160

5.2.2 Core

The core shall be one of the following types:

- a) fibre;
- b) steel, as an independent wire rope (IWRC) or wire strand (WSC);
- c) composite (e.g. steel and fibre or steel and solid polymer);
- d) cushion core; or
- e) solid polymer.

5.2.3 Lubricant

The lubricant shall comply with ISO 4346.

5.3 Rope manufacture

5.3.1 Lubrication

At least the strands shall be lubricated.

5.3.2 Construction

The rope construction shall be either:

- a) one of those covered by Tables 5 to 17; or
- b) another single layer or parallel-closed or rotation-resistant rope construction as specified by the manufacturer and covered by the respective classes in EN 12385-2.

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5.3.3 Rope grade

For rope sizes up to and including 60 mm diameter, the rope grade shall be 1770, 1960 or 2160 or an intermediate grade as specified by the manufacturer, but not exceeding 2160.

NOTE Ropes larger than 60mm diameter may not have a rope grade.

5.4 Diameter

5.4.1 Tolerances

When measured in accordance with 6.3.1 of EN 12385-1:2002, the measured diameter shall not vary from the nominal diameter by more than the values given in Table 3. For ropes with diameters from 2 mm to 5 mm inclusive, the tolerance shall be rounded up to the nearest 0,05 mm.

Table 3 — Tolerances on rope diameter

Nominal rope diameter mm	Tolerance as percentage of nominal rope diameter
From 2 to < 4	+8 0
From 4 to < 6	+7 0
From 6 to < 8	+6 0
8 and greater	+5 0

5.4.2 Differences between diameter measurements

The difference between any two of the four measurements taken in accordance with 6.3.1 of EN 12385-1:2002 and expressed as a percentage of the nominal rope diameter, shall not exceed the values given in Table 4.

Table 4 — Differences between diameter measurements

Nominal rope diameter mm	Difference between measurements as percentage of nominal rope diameter	
	Ropes with strands that are exclusively of wire or incorporate solid polymer	Ropes with strands that incorporate fibre centres
From 2 to < 4	7	-
From 4 to < 6	6	8
From 6 to < 8	5	7
8 and greater	4	6

NOTE The values in the table apply irrespective of the type of core in the rope.

5.5 Breaking force

The breaking force shall be specified only as minimum breaking force.

The values of minimum breaking force for the more common classes and grades of ropes shall be not less than those given in Tables 5 to 16. For intermediate rope diameters, the values shall be not less than those obtained using the formula in annex A with the factors given in annex B.

The values of minimum breaking force for large diameter ropes are given in Table 17. For intermediate rope diameters, the values shall be not less than those obtained using the formula in annex A.

NOTE Refer to the definitions given in EN 12385-2 for derivation of the formula for calculation of minimum breaking force.

5.6 Designation and classification

Rope designation and classification shall conform to EN 12385-2.

6 Verification of safety requirements and/or measures

6.1 General

Verification of safety requirements and/or measures shall be in accordance with that given in clause 6 of EN 12385-1 and the additional verification given in 6.2 to 6.5 below.

6.2 Lubricant

Compliance with the lubricant requirements shall be through a visual verification of the inspection documents supplied with the lubricant.

6.3 Lubrication

Compliance with the lubrication requirements shall be through a visual verification.

6.4 Construction

Compliance with the construction requirements shall be through a visual verification.

6.5 Rope grade

Compliance with the rope grade requirements shall be through a visual verification of the inspection documents supplied with the wire in relation to the minimum breaking force value of the rope.

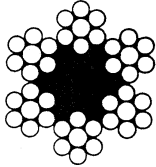
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7 Information for use

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In addition to conforming to clause 7 of Part 1, the Certificate (see 7.2.1 of Part 1) shall also include either an example of the maximum working load to which the rope shall be subjected in service at a given factor of safety or the working load limit when the intended use is known.

Table 5 — Class 6x7

Construction cross section example	Construction of rope		Construction of strand			
	Item	Quantity	Item	Quantity		
 <p>6x7-FC</p>	Strands	6	Wires	5 to 9		
	outer strands	6	Outer wires	4 to 8		
	layers of strands	1	Layers of wires	1		
	Wires in rope (excluding metallic core)	30 to 54				
	Typical example		No. of outer wires	Outer wire factor ¹⁾		
	Rope	Strand	Total	per strand		
	6x7	1-6	36	6		0,106
Min. breaking force factor:			$K_1 = 0,332$	$K_2 = 0,359$	$K_3 = 0,388$	
Nominal length mass factor ¹⁾ :			$W_1 = 0,345$	$W_2 = 0,384$		
Nominal metallic cross-sectional area factor ¹⁾			$C_1 = 0,369$	$C_2 = 0,432$		
Nominal rope diameter	Approximate nominal length mass ¹⁾ kg/100 m		Minimum breaking force kN			
	Fibre core	Steel core	Rope grade 1770		Rope grade 1960	
mm			Fibre core	Steel core	Fibre core	Steel core
1	2	3	4	5 ²⁾	6	7 ²⁾
2	1,38	1,54	2,35	2,54	2,60	2,81
3	3,11	3,46	5,29	5,72	5,86	6,33
4	5,52	6,14	9,40	10,2	10,40	11,3
5	8,63	9,60	14,7	15,9	16,3	17,6
6	12,4	13,8	21,2	22,9	23,4	25,3
7	16,9	18,8	28,8	31,1	31,9	34,5
8	22,1	24,6	37,6	40,7	41,6	45,0
9	27,9	31,1	47,6	51,5	52,7	57,0
10	34,5	38,4	58,8	63,5	65,1	70,4
11	41,7	46,5	71,1	76,9	78,7	85,1
12	49,7	55,3	84,6	91,5	93,7	101
13	58,3	64,9	99,3	107	110	119
14	67,6	75,3	115	125	128	138
16	88,3	98,3	150	163	167	180
18	112	124	190	206	211	228
20	138	154	235	254	260	281
22	167	186	284	308	315	341
24	199	221	338	366	375	405
26	233	260	397	430	440	476
28	270	301	461	498	510	552
32	353	393	602	651	666	721
36	447	498	762	824	843	912
40	552	614	940	1 020	1 040	1 130
¹⁾ Informative only						
²⁾ For small diameter ropes (2 mm to 7 mm) with wire strand core (WSC), K_3 may be used for the calculation of breaking forces. The values given in columns 5 and 7 are based on ropes with independent wire rope cores (IWRC).						