

**SLOVENSKI STANDARD**  
**SIST EN 12385-4:2003+A1:2008**  
**01-junij-2008**

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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 à torons pour applications de levage  
générales

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**Ta slovenski standard je istoveten z: EN 12385-4:2002+A1:2008**

[SIST EN 12385-4:2003+A1:2008](https://standards.iteh.ai/catalog/standards/sist/ed7a5ddd-2d33-4cd0-9c8c-88ab977200d/sist-en-12385-4-2003a1-2008)

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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, includes Amendment 1 approved by CEN on 14 February 2008 and includes Corrigendum 1 issued by CEN on 19 October 2005.

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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 Management Centre has the same status as the official versions.

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## Contents

	page
Foreword.....	3
Introduction .....	4
1 Scope .....	4
2 Normative references .....	4
3 Terms and definitions .....	5
4 Hazards .....	5
5 Safety requirements and/or measures .....	5
6 Verification of safety requirements and/or measures.....	8
7 Information for use .....	8
Annex A (normative) Calculation of minimum breaking force for those ropes covered by Tables 5 to 17 .....	22
Annex B (normative) Summary of factors for calculations .....	23
Annex C (informative) Calculation of approximate nominal length mass of ropes over 60mm diameter .....	24
Annex D (informative) Information which should be provided with an enquiry or an order .....	25
Annex ZA (informative)  Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC .....	26
Annex ZB (informative)  Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC .....	27
Bibliography .....	28

SIST EN 12385-4:2003+A1:2008  
<https://standards.iteh.ai/catalog/standards/sist/ed7a5ddd-2d33-4cd0-9c8c-88abf977200d/sist-en-12385-4-2003a1-2008>

## Foreword

This document (EN 12385-4:2002+A1:2008) 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 September 2008, and conflicting national standards shall be withdrawn at the latest by September 2008.

This document includes Amendment 1, approved by CEN on 2008-02-14 and includes Corrigendum 1 issued by CEN on 19 October 2005.

This document supersedes EN 12385-4:2002.

The start and finish of text introduced or altered by amendment is indicated in the text by tags  $\boxed{A_1}$   $\boxed{A_1}$ .

The modifications of the related CEN Corrigendum have been implemented at the appropriate places in the text and are indicated by the tags  $\boxed{AC}$   $\boxed{AC}$ .

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 Annexes ZA and ZB, which are integral parts of this document.

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The other Parts of EN 12385 are:

Part 1: General requirements

[SIST EN 12385-4:2003+A1:2008](https://standards.iteh.ai/catalog/standards/sist/en-12385-4-2003a1-2008)

Part 2: Definitions, designation and classification

<https://standards.iteh.ai/catalog/standards/sist/en-12385-4-2003a1-2008>

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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and 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 <sup>2</sup>	
	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.

### 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	
	Rope 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.

## 7 Information for use

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

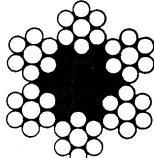
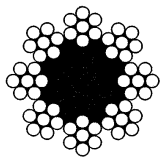
<div>Construction cross section example</div> <div></div> <div>6x7-FC</div>	Construction of rope		Construction of strand					
	Item		Quantity		Item		Quantity	
	Strands		6		Wires		5 to 9	
	outer strands		6		Outer wires		4 to 8	
	layers of strands		1		Layers of wires		1	
	Wires in rope (excluding metallic core)		30 to 54					
	Typical example				No. of outer wires		Outer wire factor <sup>1)</sup>	
	Rope		Strand		Total		per strand	
6x7		1-6		36		6		
Min. breaking force factor:				$K_1 = 0,332$		$K_2 = 0,359$		
Nominal length mass factor <sup>1)</sup> :				$W_1 = 0,345$		$W_2 = 0,384$		
Nominal metallic cross-sectional area factor <sup>1)</sup>				$C_1 = 0,369$		$C_2 = 0,432$		

Table 6 — Class 8x7

<div>Construction cross section example</div> <div></div> <div>8x7-FC</div>	Construction of rope		Construction of strand				
	Item		Quantity		Item		Quantity
	Strands		8		Wires		5 to 9
	outer strands		8		Outer wires		4 to 8
	layers of strands		1		Layers of wires		1
	Wires in rope (excluding steel core)		40 to 72				
	Typical example				No. of outer wires		Outer wire factor <sup>1)</sup>
	Rope		Strand		Total	per strand	
8×7		1-6		48	6	0,087	
Min. breaking force factor				K <sub>1</sub> = 0,291	K <sub>2</sub> = 0,359	K <sub>3</sub> = 0,404	
Nominal length mass factor <sup>1)</sup> :				W <sub>1</sub> = 0,327	W <sub>2</sub> = 0,391	W <sub>3</sub> = 0,464	
Nominal metallic cross-sectional area factor <sup>1)</sup>				C <sub>1</sub> = 0,335	C <sub>2</sub> = 0,439	C <sub>3</sub> = 0,379	
Nominal rope diameter	Approximate nominal length mass <sup>1)</sup> 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	6	7 <sup>2)</sup>	
2	1,31	1,56	2,06	2,54	2,28	2,81	
3	2,94	3,52	4,64	5,72	5,13	6,33	
4	5,23	6,26	8,24	10,2	9,13	11,3	
5	8,18	9,78	12,9	15,9	14,3	17,6	
6	11,8	14,1	18,5	22,9	20,5	25,3	
7	16,0	19,2	25,5	31,1	27,9	34,5	
8	20,9	25,0	33,0	40,7	38,6	45,0	
9	26,5	31,7	41,7	51,5	46,2	57,0	
10	32,7	39,1	51,5	63,5	57,0	70,4	
11	39,6	47,3	62,3	76,9	69,0	85,1	
12	47,1	56,3	74,2	91,5	82,1	101	
13	55,3	66,1	87,0	107	96,4	119	
14	64,1	76,6	101	125	112	138	
16	83,7	100	132	163	146	180	
18	106	127	167	206	185	228	
20	131	156	206	254	228	281	
22	158	189	249	308	276	341	
24	188	225	297	366	329	405	
26	221	264	348	430	386	476	
28	256	307	404	498	447	552	
32	335	400	527	651	584	721	
36	424	507	668	824	739	912	
40	523	626	824	1 020	913	1 130	
<sup>1)</sup> Informative only							
<sup>2)</sup> For small diameter ropes (2 mm to 7 mm) with wire strand core (WSC), K <sub>3</sub> 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).							