SLOVENSKI STANDARD
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Jeklene ǵiļ ne vrvi - Varnost - 1. del: Sploǵne zahteve

Steel wire ropes - Safety - Part 1: General requirements

Drahtseile aus Stahldraht - Sicherheit - Teil 1: Allgemeine Anforderungen

Câbles en acier - Sécurité - Partie 1: Prescriptions générales

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 12385-1

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English version

Steel wire ropes - Safety - Part 1: General requirements

Câbles en acier - Sécurité - Partie 1: Prescriptions générales

Drahtseile aus Stahldraht - Sicherheit - Teil 1: Allgemeine Anforderungen

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 12385-1:2002) 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of an identical text or by endorsement, at the latest by April 2003, and conflicting national standards shall be withdrawn at the latest by April 2003.

The other Parts of EN 12385 are:

- Part 2: Definitions, designation and classification
- Part 3: Information for use and maintenance
- Part 4: Stranded ropes for general lifting applications
- 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

This is the first edition of this Part.

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Introduction

This Part of this European Standard has been prepared to support Parts 4 to 10 that concern themselves with the particular requirements for steel wire ropes for use in specific applications. It cannot, therefore, exist alone.

The ropes concerned and the extent to which hazards are covered for specific applications are indicated in the scopes of Parts 4 to 10.

1 Scope

This Part specifies the general requirements for the manufacture and testing of steel wire rope, whose particular requirements are specified in the other Parts.

Annex A gives the type testing regimes for rope produced in series.

Annex B gives the testing requirements for wires taken from the rope when specified in other Parts of this standard.

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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 292-2:1991/A1:1995, *Safety of machinery — Basic concepts, general principles of design — Part 2: Technical principles and specifications.*

EN 1050:1996, *Safety of machinery – Principles for risk assessment.*

EN 10204:1991, *Metallic products — Types of inspection documents.*

EN 10244-2, *Steel wire and wire products – Non ferrous metallic coatings on steel wire – Part 2: Zinc or zinc alloy coatings.*

EN 10264-1:2002, *Steel wire and wire products — Steel wire for ropes — Part 1: General requirements.*

EN 10264-2:2002, *Steel wire and wire products – Steel wire for ropes – Part 2: Cold drawn non-alloyed steel wire for ropes for general applications.*

EN 10264-3, *Steel wire and wire products – Steel wire for ropes – Part 3: Cold drawn and cold shaped non-alloyed steel wire for heavy duty applications.*

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

prEN 12385-3, *Steel wire ropes — Safety — Part 3:Information of use and maintenance.*

EN 13411-4:2002, *Terminations for steel wire ropes — Safety — Part 4: Metal and resin socketing.*

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ISO 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines – Verification and calibration of the force-measuring system.*

ISO 4345:1988, *Steel wire ropes – Fibre main cores – Specification.*

3 Terms and definitions

For the purposes of this part of EN 12385, the terms and definitions in part 2 of EN 12385 shall apply.

4 List of hazards

The release of a load due to failure of steel wire ropes puts at risk directly or indirectly the safety or health of those persons within the danger zone.

In order to provide the necessary strength and durability of steel wire ropes, the other Parts of this standard lay down the particular requirements for the materials, manufacture, physical dimensions, mechanical properties and testing to ensure that specified levels of performance are met.

Fatigue failure has not been identified as a hazard for steel wire rope.

Since failure can be caused by the incorrect choice of specification of steel wire ropes, the other Parts of this standard, in association with this Part, give the particular requirements for marking and the information that is required to be stated on the manufacturer's certificate.

The particular hazards for the various rope applications are given in the other Parts.

5 Safety requirements and/or measures

5.1 Materials

5.1.1 Wire

5.1.1.1 Before ropemaking

All wires of the same size and shape in the same wire layer shall be of the same tensile strength grade.

For intermediate wire tensile strength grades the reverse bend and torsion properties shall be as for the next higher grade.

5.1.1.2 After ropemaking

When other parts of this standard require tests to be carried out on wires taken from the rope, sampling, test methods and acceptance criteria shall be in accordance with annex B.

5.1.2 Core

Fibre cores (FC) shall comply with ISO 4345 unless specified otherwise in the appropriate part of this standard.

Fibre cores (FC) for single layer stranded ropes larger than 8 mm diameter shall be doubly closed

Natural fibre cores (NFC) shall be treated with an impregnating compound to inhibit rotting and decay unless stated that the core is dry.

5.2 Rope manufacture

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5.2.1 Wire joints

When joints are necessary in wires over 0,4 mm they shall have their ends joined by brazing or welding.

For stranded ropes the minimum distance between joints within one strand shall be 18 × rope diameter (*d*).

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For spiral ropes the minimum distance between joints in any wire layer shall be 36 × diameter of the wire layer.

If twisting as a joint is performed on wires up to and including 0,4 mm during manufacture, the twist shall be removed from the finished rope.

NOTE 1 Wires up and including 0,4 mm can be joined by twisting or by the ends being simply inserted into the strand's formation.

NOTE 2 When joints in wires before closing are not accepted, this should be the subject of agreement (see introduction) between the purchaser and the manufacturer.

5.2.2 Preformation

Single layer and parallel-closed ropes shall be preformed unless stated by the manufacturer that the rope is non-preformed.

5.2.3 Wire finish

For ropes of bright wire finish, substitution of bright wires by zinc coated wires shall be limited to inner wires, centre wires, filler wires and core wires.

For stranded ropes of zinc coated wire finish, all of the wires shall be zinc coated, including those of any steel core.

Quality B coating as given in EN 10244-2 shall be used for zinc coated wires unless specified otherwise in the appropriate part of this standard.

5.2.4 Rope ends

Rope ends that have no end fittings shall be so secured as to maintain the integrity of the rope and prevent its unlaying.

5.3 Physical dimensions

5.3.1 Diameter or width and thickness

The nominal diameter for round ropes or the nominal width and thickness for flat ropes shall be the dimension(s) by which the rope is designated.

5.3.2 Tolerances

When measured in accordance with 6.3 the measured diameter or the measured width and thickness shall not vary from the nominal by more than the tolerance(s) specified in the appropriate part of this standard.

5.4 Breaking force

5.4.1 General

The minimum breaking force F_{min} or, where specified in the other parts of this standard, the minimum aggregate breaking force $F_{e.min}$ for a given size, grade (where applicable) and construction or class of rope shall be either,

a) in accordance with the value or calculation given in the appropriate part of this standard; or

b) as stated by the manufacturer.

When tested in accordance with Method 1 as described in 6.4.1 the measured breaking force F_m shall be equal to or greater than the minimum breaking force F_{min}.

When tested in accordance with Method 2 as described in 6.4.2 the measured aggregate breaking force $F_{e.m}$ shall be equal to or greater than the minimum aggregate breaking force $F_{e.min.}$

When tested in accordance with Method 3 as described in 6.4.3 the calculated measured (post-spin) breaking force $F_{m.c}$ shall be equal to or greater than the minimum breaking force F_{min}.

Unless specified otherwise in the appropriate part of this standard, breaking force testing shall be in accordance with Table 1.

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NOTE The requirements for breaking force testing take into account (i) the rope size, (ii) whether or not ropes are produced in series i.e. repeatedly produced, (iii) whether or not the minimum breaking force factor is consistent throughout a sub-group of rope diameters and (iv) whether or not the manufacturer is operating a quality system in accordance with EN ISO 9001 certified by an accredited third party certification body, see 5.4.2.

5.4.2 Ropes produced in series – manufacturer operating a quality system in accordance with EN ISO 9001 certified by an accredited third party certification body

The manufacturer shall record the results from testing in accordance with the sampling and acceptance criteria as detailed in annex A.

Additional production lengths of rope from any size grouping shall be deemed to comply with the breaking force requirements when the manufacturer has satisfactorily completed a) the appropriate type tests, refer annex A and b) a periodic test (see Table 1) in accordance with Method 1 or alternatively, Method 3, as described in 6.4, on a sample from every twentieth production length or after re-starting of production, whichever is the sooner.

If any rope subject to the periodic test fails to meet or exceed the minimum value, testing of a sample from each production length shall continue until the manufacturer satisfies the type testing requirements.

Any increase in breaking force factor for a particular construction shall also require that the type tests are repeated on the modified ropes for each of the size bands. It shall not be necessary to repeat the tests if the same breaking force factor is used for ropes using wires of a lower grade.

Table 1 — Breaking force testing requirements

Rope diameter	Minimum breaking force factor	Manufacturer operating a quality system in accordance with EN ISO 9001 certified by an accredited third party certification body	Manufacturer **NOT** operating a quality system in accordance with EN ISO 9001 certified by an accredited third party certification body
Up to and including 60 mm	Same factor throughout a sub-group of rope diameters	Breaking force test in accordance with Method 1 on a sample from each production length; or, if produced in series, Type testing in accordance with A.1.1 plus periodic breaking force test in accordance with Method 1 or Method 3 on a sample from every twentieth production length relating to the sub-group of rope diameters	Breaking force test in accordance with Method 1 on a sample from each production length
	Different factor throughout a sub-group of rope diameters	Breaking force test in accordance with Method 1 on a sample from each production length; or, if produced in series, Type testing in accordance with A.1.2 plus periodic breaking force test in accordance with Method 1 or Method 3 on a sample from every twentieth production length of a given rope diameter and construction	
Over 60 mm		Breaking force test in accordance with Method 1, Method 2 or Method 3 on a sample from each production length, or, either a) if produced in a series, type testing in accordance with A.2 plus periodic breaking force test in accordance with Method 1, Method 2 or Method 3 on a sample from every twentieth production length; or b) if produced for supply as a set of ropes of the same design for a specific installation the alternative breaking force testing and sampling as also given in A.2.	Breaking force test in accordance with Method 1 or Method 2 on a sample from each production length

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NOTE Breaking force type testing demonstrates that a steel wire rope produced in series and certified by the manufacturer as conforming to one of the other parts, possesses the minimum breaking force stated by the manufacturer. The purpose of these tests is to prove the design, material and method of manufacture.

5.5 Length

For those ropes not intended by the manufacturer to form part of an assembly, the measured length of rope supplied shall, under no load, be the nominal length subject to the following tolerances:

a) Up to and including 400 m:	0 % to + 5 %
b) Over 400 m up to and including 1 000 m:	0 m to + 20 m
c) Over 1 000 m:	0 % to + 2 %

6 Verification of safety requirements and/or measures

6.1 Materials

6.1.1 Wire

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

6.1.2 Core

Compliance with the material and type of core shall be through a visual verification of the inspection documents supplied with the core.

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6.2 Rope manufacture

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6.2.1 Wire joints

Compliance with the requirements for wire joints shall be through a visual verification.

6.2.2 Preformation

Compliance with the requirements for preformation shall be through a visual verification.

6.2.3 Wire finish

Compliance with the requirements for wire finish shall be through a visual verification.

6.2.4 Rope ends

Compliance with the requirements for the rope ends shall be through a visual verification.