BRITISH STANDARD

BS EN
12385-2:2002

Steel wire ropes — Safety —

Part 2: Definitions, designation and classification

The European Standard EN 12385-2:2002 has the status of a British Standard

ICS 77.140.65

BSI
British Standards

National foreword

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The UK participation in its preparation was entrusted to Technical Committee MHE/2, Wire ropes, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 53 and a back cover.

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Câbles en acier - Sécurité - Partie 2: Définitions, désignation et classification

Stahldrahtseile - Sicherheit - Teil 2: Begriffe, Bezeichnungen und Klassifizierung

This European Standard was approved by CEN on 10 October 2002.

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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

Contents

Foreword

This document (EN 12385-2:2002) 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of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.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 EU Directive(s).

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

The other parts of this European Standard are:

Part 1: *General requirements*

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*

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

This is the first edition of this Part.

Annexes A, B and C are informative.

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 support Parts 4 to 10 that concern themselves with the particular requirements for steel wire ropes for use in specific applications.

The rope designation system described in clause 4 is provided with the intention of it being used to describe the rope in the certificate or inspection document referred to in the other Parts.

The rope classification system described in clause 5 is provided to define which constructions apply to a specific rope class.

The designation and classification systems described in clauses 4 and 5 respectively may also be used for ropes not covered by the other parts of this standard.

1 Scope

This part of this European Standard defines terms, specifies designations and classifies steel wire ropes and is for use in conjunction with all other parts of this standard.

It applies to ropes that have been manufactured after the date of issue of the standard.

2 Normative references

Not applicable.

3 Terms and definitions

For the purposes of this part of EN 12385, the following terms and definitions apply.

3.1 Wires

3.1.1
outer wires
all wires positioned in the outer layer of a spiral rope or in the outer layer of wires in the outer strands of a stranded rope

3.1.2
inner wires
all wires of intermediate layers positioned between the centre wire and outer layer of wires in a spiral rope or all other wires except centre, filler, core and outer wires in a stranded rope

3.1.3
filler wires
wires used in filler constructions to fill up the interstices between wire layers, see Figure 8

3.1.4
centre wires
wires positioned either at the centre of a spiral rope or the centres of strands of a stranded rope

3.1.5
core wires
all wires of the core of a stranded rope

3.1.6
load-bearing wires
those wires in a rope which are regarded as contributing towards the breaking force of the rope

3.1.7
layer of wires
an assembly of wires having one pitch circle diameter. The exception is Warrington layer comprising large and small wires where the smaller wires are positioned on a larger pitch circle diameter than the larger wires. The first layer is that which is laid immediately over the strand centre

NOTE Filler wires do not constitute a separate layer.

3.1.8
stitching wire or strand
single wire or strand used for the stitching of flat ropes

3.1.9
serving wire or strand
single wire or strand used for making a close-wound helical serving to retain the elements of a rope in their assembled position

3.1.10
wire tensile strength grade (*R*)
a level of requirement of tensile strength of a wire and its corresponding range. It is designated by the value according to the lower limit of tensile strength and is used when specifying wire and when determining the calculated minimum breaking force or calculated minimum aggregate breaking force of a rope, expressed in N/mm^2

3.1.11
wire tensile strength (R_m)
the ratio between the maximum force obtained in a tensile test and the nominal cross-sectional area of the test piece, expressed in N/mm^2

3.1.12
finish and quality of coating
the condition of the surface finish of the wire e.g. uncoated (bright), zinc coated, zinc alloy coated or other protective coating and the class of coating, e.g. class B zinc coating, defined by the minimum mass of coating and the adherence of the coating to the steel below

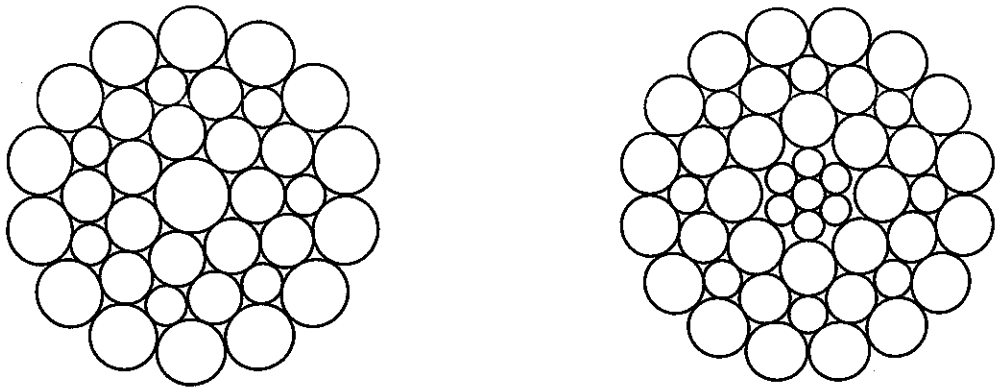
3.1.13
mass of coating
the mass of coating (obtained by a prescribed method) per unit of surface area of the uncoated wire, expressed in g/m^2

3.2 Strand types

3.2.1
strand
an element of rope consisting of an assembly of wires of appropriate shape and dimensions laid helically in the same direction in one or more layers around a centre

NOTE Strands containing three or four wires in the first layer, or certain shaped strands (e.g. ribbon) cannot have a centre.

3.2.2
round strand
a strand with a perpendicular cross-section which is approximately the shape of a circle, see Figure 1



a) Strand with one centre wire b) Strand with (1-6) built-up centre

Figure 1 — Round strand with different centres

3.2.3
triangular strand (*V*)
a strand with a perpendicular cross-section which is approximately the shape of a triangle, see Figure 2

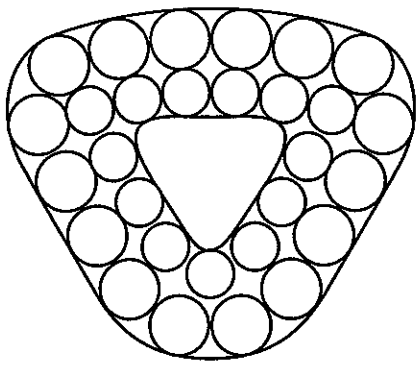


Figure 2 — Triangular strand with triangular (*V*) centre wire

NOTE Triangular strands can have built-up centres e.g. 3 × 2 + 3F, K1V-6, K3/9 etc.

3.2.4
oval strand (Q)
a strand having a perpendicular cross-section which is approximately the shape of an oval, see Figure 3

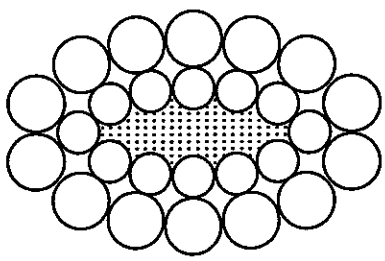


Figure 3 — Oval strand having oval shaped centre

3.2.5
flat ribbon strand (*P*)
a strand without a centre wire with a perpendicular cross-section which is approximately the shape of a rectangle, see Figure 4

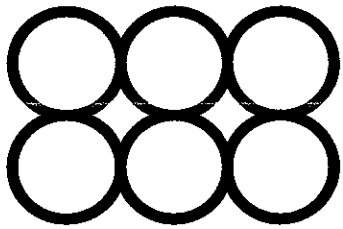


Figure 4 — Flat ribbon strand

3.2.6
single lay strand
strand which contains only one layer of wires, see Figure 5

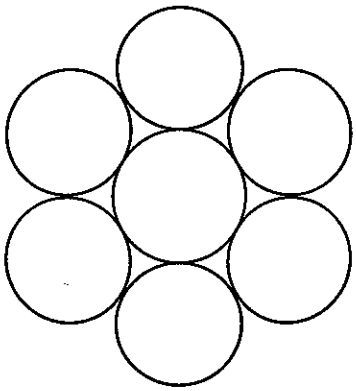


Figure 5 — Single lay strand

3.2.7
parallel lay strand
strand which contains at least two layers of wires, all of which are laid in one operation (in the same direction)

NOTE 1 Also known as equal lay.

NOTE 2 The lay length of all the wire layers are equal and the wires of any two superimposed layers are parallel resulting in linear contact.

3.2.8
Seale
parallel lay strand construction with the same number of wires in both layers, see Figure 6

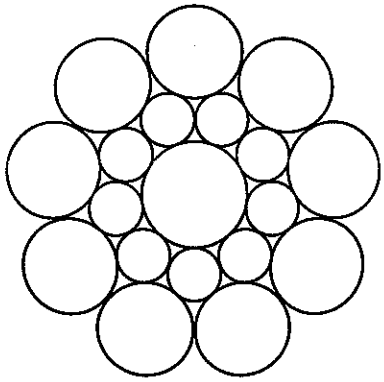


Figure 6 — Seale construction

3.2.9
Warrington
parallel lay strand construction having an outer layer containing alternately large and small wires and twice the number of wires as the inner layer, see Figure 7

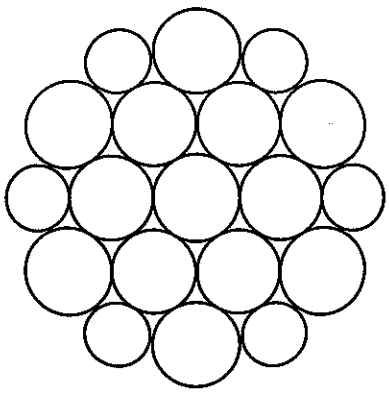


Figure 7 — Warrington construction

3.2.10
filler
parallel lay strand construction having an outer layer containing twice the number of wires than the inner layer, with filler wires laid in the interstices between the layers, see Figure 8

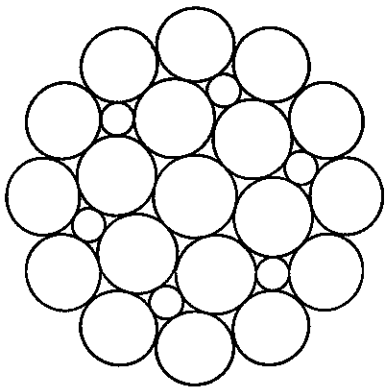


Figure 8 — Filler construction

3.2.11
combined parallel lay
parallel lay strand construction having three or more layers laid in one operation and formed from a combination of the strand types 3.2.8 to 3.2.10, see Figure 9.

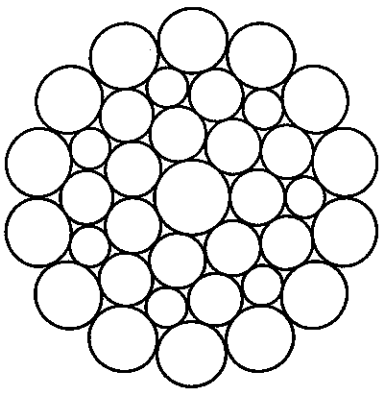


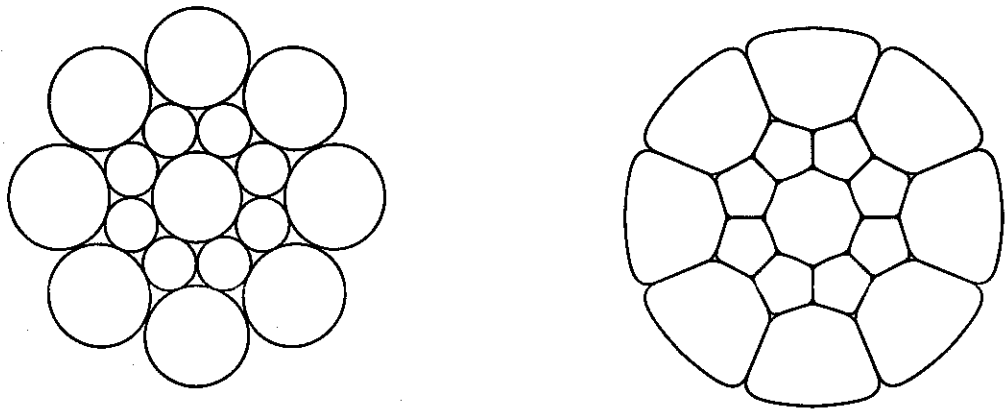
Figure 9 — Combined parallel lay, example: Warrington - Seale

3.2.12
multiple operation lay strand
construction containing at least two layers of wires in which successive layers are laid in more than one operation

3.2.13
cross-lay (*M*)
strand which contains more than one layer of wires, all laid in the same direction. The wires of superimposed wire layers cross one another and make point contact

3.2.14
compound lay (*N*)
strand which contains a minimum of three layers of wires, the outer layer of which is laid in a separate operation, but in the same direction as the others, over a parallel lay construction forming the inner layers

3.2.15
compacted strand (*K*)
a strand which has been subjected to a compacting process such as drawing, rolling or swaging whereby the metallic cross-sectional area of the wires remains unaltered whereas the shape of the wires and the dimensions of the strand are modified, see Figure 10



a) Strand before compacting

b) Strand after compacting

Figure 10 — Compacted round strand

3.3 Core types

3.3.1
core (*C*)
central element of a round rope around which are laid helically the strands of a stranded rope or the unit ropes of a cable laid rope

3.3.2
fibre core (*FC*)
core made from either natural fibres (NFC) or synthetic fibres (SFC)

NOTE Fibre cores are normally produced in the sequence fibres to yarns, yarns to strands and strands to rope.

3.3.3
steel core (*WC*)
core made from steel wires arranged as a wire strand (WSC) or as an independent wire rope (IWRC)

NOTE The steel core and/or its outer strands can also be covered with either fibre or solid polymer.

3.3.4
solid polymer core (*SPC*)
core consisting of a solid polymer material having a round shape or a round shape with grooves. It may also contain an internal element of wire(s) or fibre

3.4 Lubricants and preservation agents

3.4.1
rope lubricant
a material applied during the manufacture of a strand, core or rope for the purpose of reducing internal friction and/or assisting in providing protection against corrosion

3.4.2
impregnating agent
a material used in the manufacture of natural fibre cores, coverings and inserts for the purpose of inhibiting rotting and decay

3.4.3
preservation agent
a material, usually some form of blocking compound, applied during and/or after manufacture of the rope and/or to fibre inserts and coverings for the purpose of providing protection against corrosion

3.5
Insert (*I*)
fibre or solid polymers so positioned as to separate adjacent strands or wires in the same or overlying layers, or fill the interstices of the rope

3.6 Rope types

3.6.1 Stranded ropes

3.6.1.1
stranded rope
an assembly of several strands laid helically in one or more layers around a core (single-layer rope) or centre (rotation-resistant or parallel-closed rope).

NOTE Stranded ropes consisting of three or four outer strands can, or cannot, have a core.

3.6.1.2
single-layer rope
stranded rope consisting of one layer of strands laid helically around a core, see Figure 11

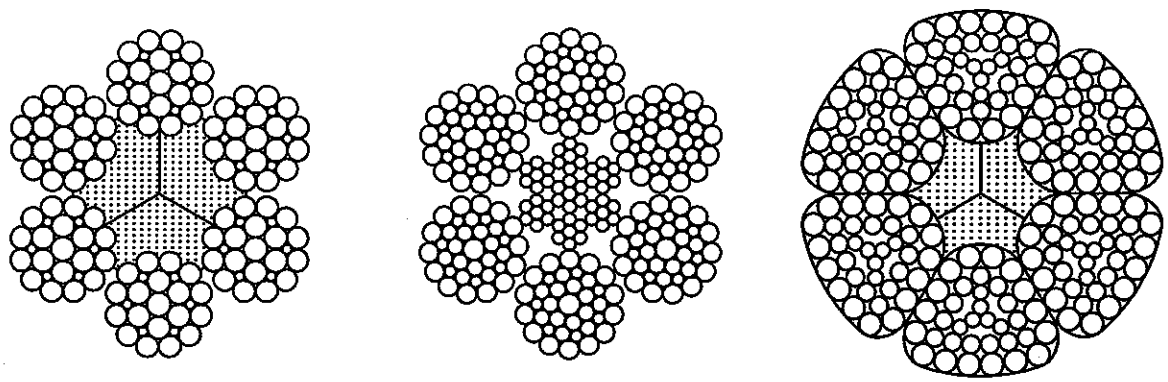


Figure 11 — Examples of single-layer stranded ropes

3.6.1.3
rotation-resistant rope
stranded rope designed to generate reduced levels of torque and rotation when loaded see Figure 12

NOTE 1 Rotation-resistant ropes generally comprise an assembly of at least two layers of strands laid helically around a centre, the direction of lay of the outer strands being opposite to that of the underlying layer.

NOTE 2 Ropes having three or four strands can also be designed to exhibit rotational-resistant properties.

NOTE 3 Rotation-resistant ropes have previously been referred to as multi-strand and non-rotating ropes.

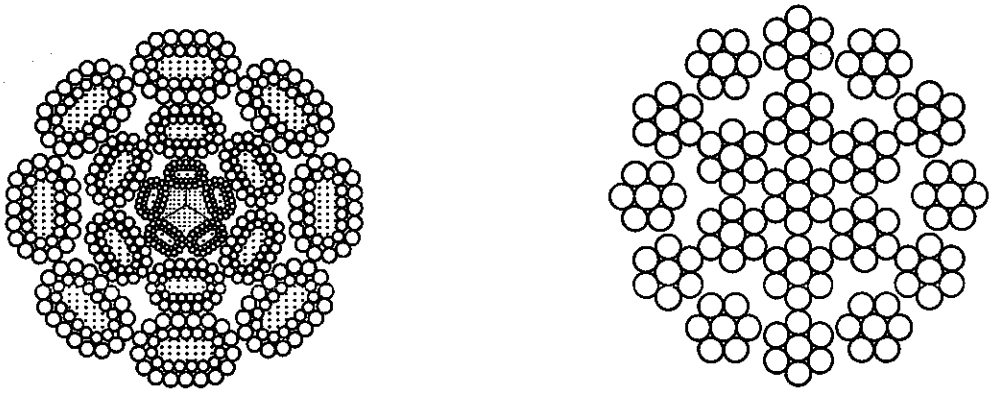


Figure 12 —Examples of rotation-resistant ropes

3.6.1.4
parallel-closed rope:
stranded rope consisting of at least two layers of strands laid helically in one closing operation around a strand or fibre centre, see Figure 13

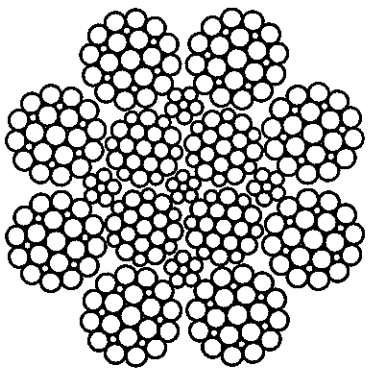


Figure 13 —Example of parallel-closed rope

3.6.1.5
compacted strand rope:
rope in which the strands, prior to closing of the rope, are subjected to a compacting process such as drawing, rolling or swaging

3.6.1.6
compacted (swaged) rope:
rope which is subjected to a compacting (usually swaging) process after closing the rope, thus reducing its diameter

3.6.1.7
cable-laid rope:
an assembly of several (usually six) round stranded ropes (referred to as unit ropes) closed helically around a core (usually a seventh rope), see Figure 14

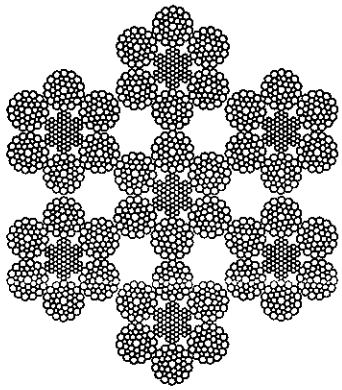


Figure 14 — Example of a cable-laid rope

3.6.1.8
braided rope
an assembly of several round strands braided in pairs, see Figure 15

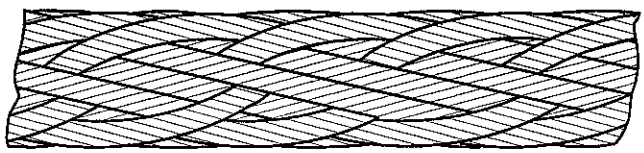


Figure 15 — Example of braided rope

3.6.1.9
electro-mechanical rope
a stranded or spiral rope containing electrical conductors, see Figure 16

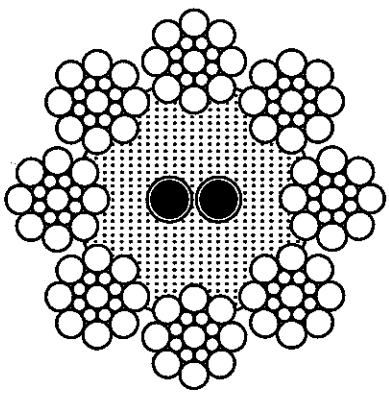
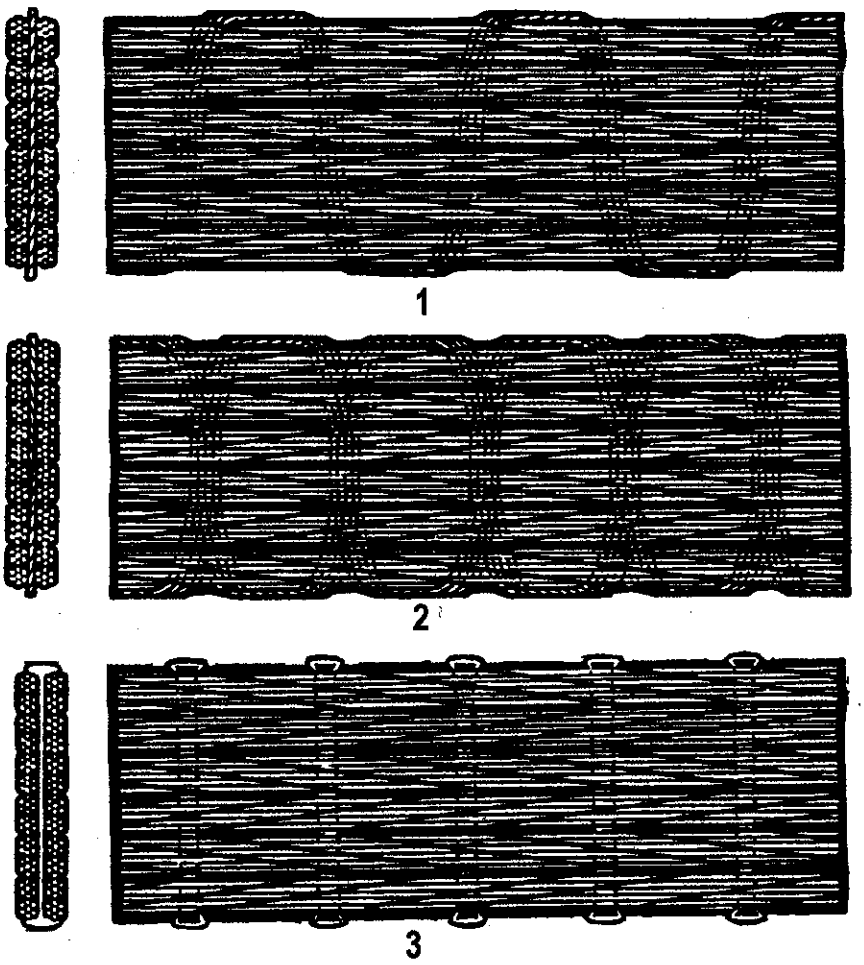


Figure 16 — Example of stranded rope with conductors

3.6.1.10
flat rope
an assembly of unit ropes known as reddies, each comprising four strands. Usually 6,8 or 10 reddies, alternating left and right direction of lay, are laid side by side and held in position by stitching wires, strands or rivets, see Figure 17



Key
1 Single stitched
2 Double stitched
3 Rivetted

Figure 17 — Example of flat rope with different stitching

3.6.2 Spiral ropes

3.6.2.1
spiral rope
an assembly of at least two layers of wires laid helically over a central round wire, built-up strand or parallel-lay strand. At least one layer of wires is laid in the opposite direction i.e. contra-lay, to that of the other layer(s) to optimise rotational characteristics,

3.6.2.2
spiral strand rope
spiral rope comprising only round wires, see Figure 18

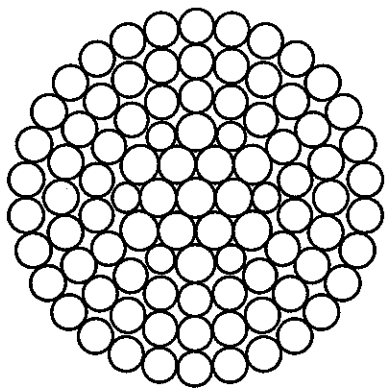


Figure 18 — Example of spiral strand rope

3.6.2.3
half-locked coil rope
spiral rope having an outer layer of alternate half-lock (H-shaped) and round wires, see Figure 19

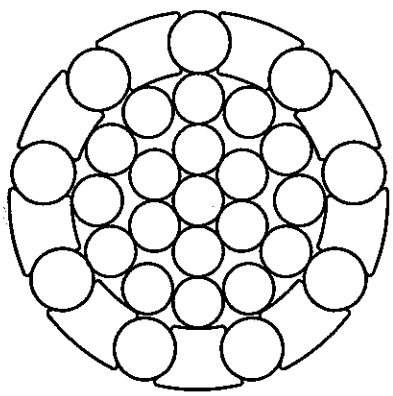


Figure 19 — Example of half-locked coil rope

3.6.2.4
full-locked coil rope
spiral rope having an outer layer of full-lock (Z-shaped) wires, see Figure 20

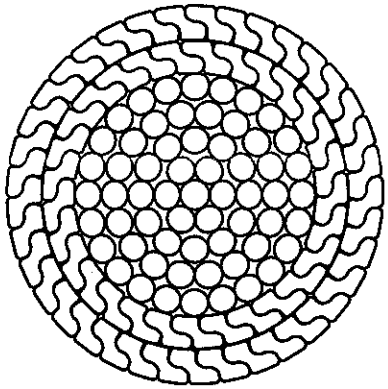


Figure 20 — Example of full-locked coil rope

3.6.3 Ropes with coverings and/or fillings

3.6.3.1
solid polymer covered rope
rope which is covered (coated) with a solid polymer

3.6.3.2
solid polymer filled rope
rope in which the free internal spaces are filled with a solid polymer. The polymer extends to, or slightly beyond, the outer circumference of the rope, see Figure 21

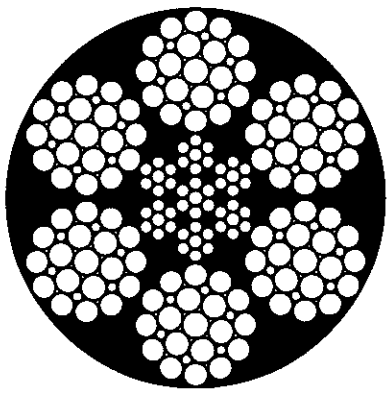


Figure 21 — Solid polymer filled rope

3.6.3.3
solid polymer covered and filled rope
rope which is covered (coated) and filled with a solid polymer

3.6.3.4
cushioned core rope
rope in which the core is covered (coated), or filled and covered (coated), with a solid polymer, see Figure 22

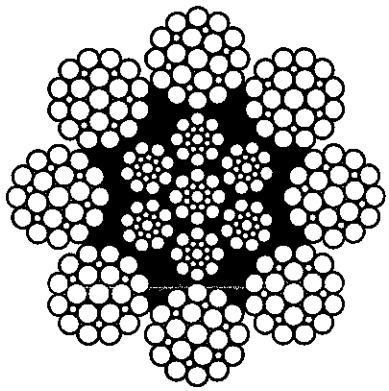


Figure 22 — Cushioned core rope

3.6.3.5
cushioned rope
rope in which the inner layers, inner strands or core strands are covered with solid polymers or fibres to form a cushion between adjacent strands or overlying layers

3.7 Dimensions

3.7.1
dimension of round wire
the diameter (δ) of the perpendicular cross-section of the wire

3.7.2
dimension of outer round wire
the diameter (δ_a) of the perpendicular cross-section of the outer wire

3.7.3
dimension of shaped wire
the height of the full-lock wire or the height and width of the half-lock wire, see Figure 23

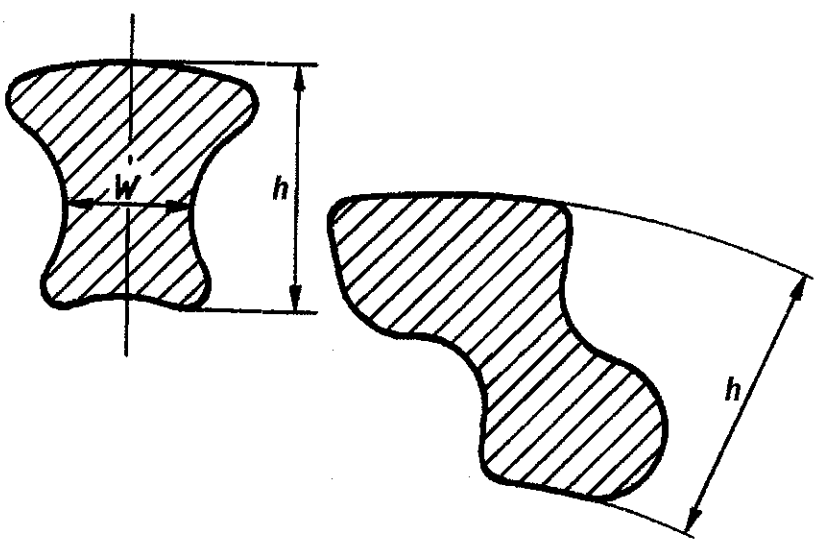


Figure 23 — Half-lock and full-lock wire sections

3.7.4
dimension of round strand
the diameter (d_s) of the perpendicular cross-section of the strand, see Figure 24

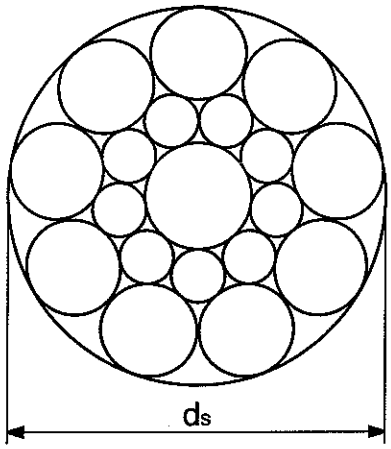
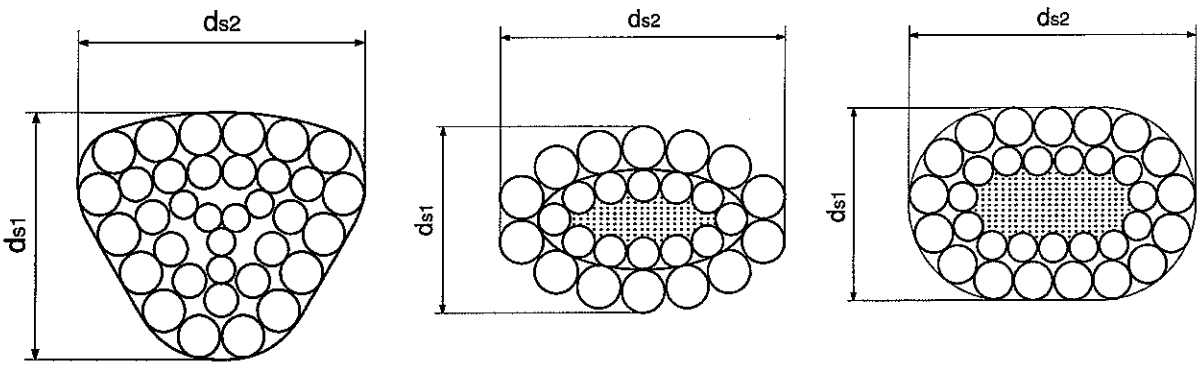


Figure 24 — Dimension of round strand

3.7.5
dimensions of shaped strand
the dimension of the height (d_{s1}) and its corresponding perpendicular width (d_{s2}), see Figure 25



a) Triangular strand b) Oval strand c) Ribbon strand

Figure 25 — Dimension of shaped strand

3.7.6
dimension of round rope
that diameter which circumscribes the rope cross-section, see Figure 26

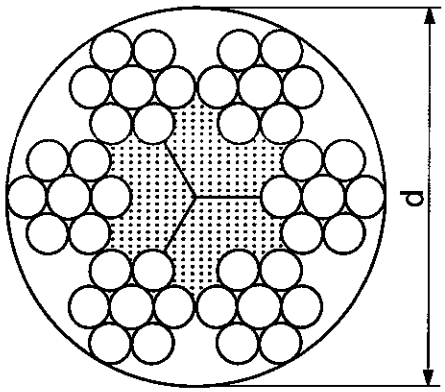


Figure 26 — Dimension of round rope

3.7.7
dimensions of flat rope
the width (w) and thickness (s) dimensions of the complete cross-section, including stitching or clamps, see Figure 27

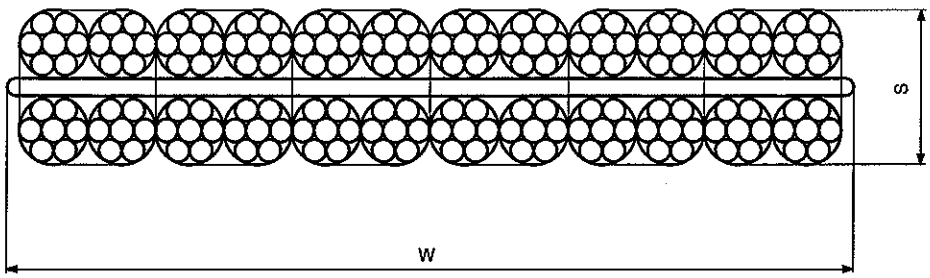


Figure 27 — Dimensions of flat rope

3.7.8
dimensions of covered round rope
the diameter which circumscribes the overall rope cross-section including the cover followed by the diameter which circumscribes the underlying rope (d), e.g. 16/13

3.7.9
dimensions of covered flat rope
the width and thickness dimensions of the complete cross-section including the cover followed by the width (w) and thickness (s) dimensions of the underlying cross-section envelope, including stitches or rivets, e.g. 68 × 24/56 × 12

3.7.10
strand lay length (h)
that distance (*h*) parallel to the longitudinal strand axis in which an outer wire makes one complete turn (or helix) about the axis of the strand, see Figure 28

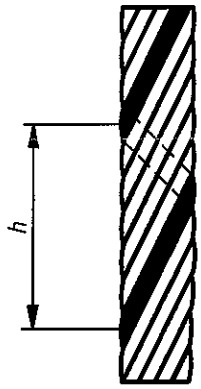


Figure 28 — Lay length - strand

3.7.11
rope lay length (H)
that distance (*H*) parallel to the longitudinal rope axis in which the outer wires of a spiral rope, the outer strands of a stranded rope or the unit ropes of a cable-laid rope make one complete turn (or helix) about the axis of the rope, see Figure 29

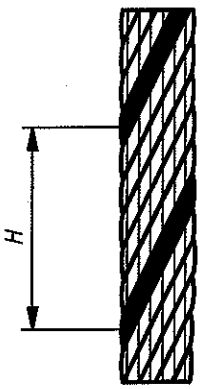


Figure 29 — Lay length – rope

3.7.12
measured rope length (L_m)
the length which corresponds to the actual length supplied using a prescribed method

NOTE The measured length can also be specified at a pre-determined load.

3.7.13
nominal rope length (L)
the length on which the order is usually based

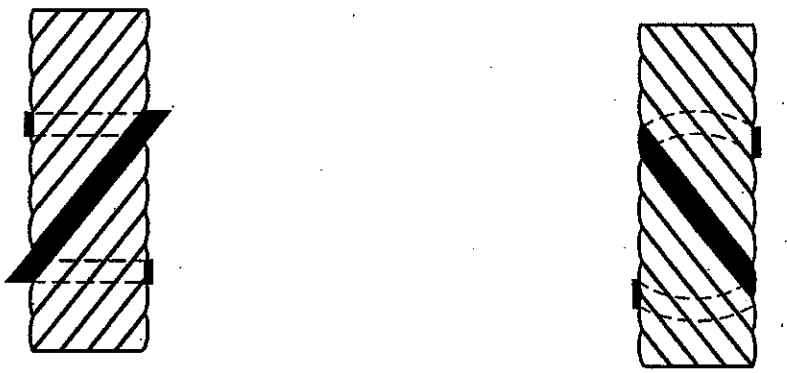
3.7.14
strand clearance (q_s)
the distance corresponding to the clearance (gap) between two adjacent strands in the same strand layer

3.7.15
production length of stranded rope
that length of finished rope produced from one loading of the closing machine

3.7.16
production length of spiral rope (spiral strand or locked coil)
that length of finished rope produced from one machine loading of outer wires laid over one continuous length of inner rope

3.8 Lay directions and types

3.8.1
lay direction of strand (z or s)
the direction right (z) or left (s) corresponding to the direction of lay of the outer wires in relation to the longitudinal axis of the strand, see Figure 30

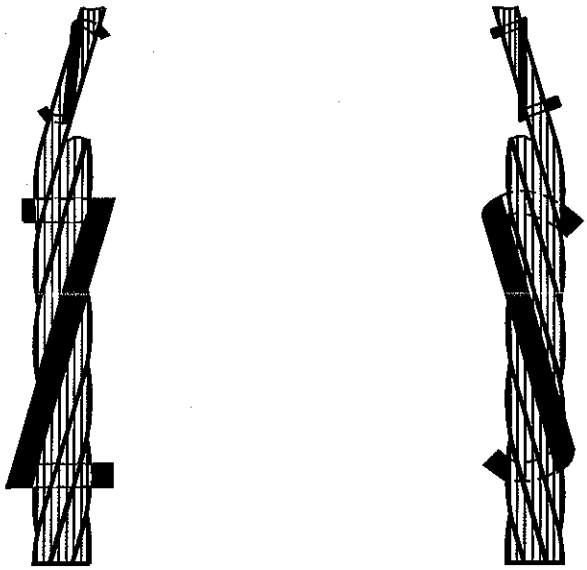


a) z (right lay) b) s (left lay)

Figure 30 — Lay direction of strands for stranded ropes

3.8.2
lay direction of rope (Z or S)
the direction right (Z) or left (S) corresponding to the direction of lay of the outer wires in a spiral rope, the outer strands in a stranded rope or the unit ropes in a cable-laid rope in relation to the longitudinal axis of the rope

3.8.3
ordinary lay (sZ or zS)
stranded rope in which the direction of lay of the wires in the outer strands is in the opposite direction to the lay of the outer strands in the rope, see Figure 31



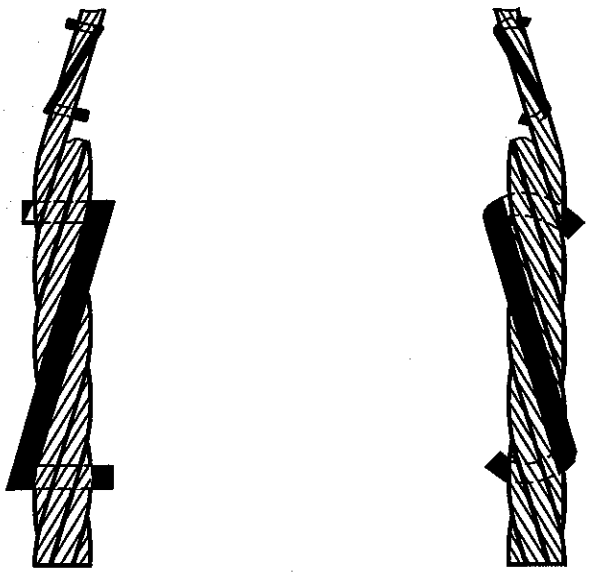
1 2

Right (sZ) Left (zS)

NOTE The first letter denotes strand direction; the second letter denotes rope direction.

Figure 31 — Ordinary lay

3.8.4
lang lay (zZ or sS)
stranded rope in which the lay direction of the wires in the outer strands is in the same lay direction as that of the outer strands in the rope, see Figure 32



1 2

Right (zZ) Left (sS)

NOTE The first letter denotes strand direction; the second letter denotes rope direction.

Figure 32 — Lang lay

3.8.5
alternate lay (aZ or aS)
stranded rope in which the direction of lay of the outer strands is alternatively left and right such that half of the rope is ordinary lay and the other half is lang lay. The lay direction of the rope will be either right (aZ) or left (aS)

3.8.6
contra-lay
rope in which at least one layer of wires in a spiral rope or one layer of strands in a stranded rope is laid in the opposite direction to the other layers

3.9 Values

3.9.1
nominal value
conventional value by which the property is designated

NOTE The symbol does not have a suffix.

3.9.2
minimum value
specified value, associated with a property, below which the measured value is not allowed to fall

NOTE The symbol has an inferior suffix "min".

3.9.3
calculated value
value obtained by calculation based on given or measured values and on conventional factors

NOTE The symbol has an inferior suffix "c".

3.9.4
manufacturer's design value
any value (e.g. wire size, lay length, calculated minimum breaking force, spinning loss) which is specified in a rope design

3.9.5
reduced value
value of area or breaking force taking into account the reduction corresponding to the area or strength otherwise contributed by the non-load bearing wires

NOTE The symbol has an inferior suffix "red".

3.9.6
measured value
value derived by direct measurement in the prescribed manner

NOTE The symbol has an inferior suffix "m".

3.10 Factors, areas, masses and breaking forces

3.10.1
fill factor (*f*)
the ratio between the sum of the nominal metallic cross-sectional areas of all the wires in the rope (A) and the circumscribed area (A_u) of the rope based on its nominal diameter (d)

NOTE This can be expressed as: $f = \frac{A}{A_u}$

3.10.2
nominal metallic cross-sectional area factor (*C*)
factor derived from fill factor and used in the calculation to determine the nominal metallic cross-sectional area of a rope

NOTE This can be expressed as: $C = f.\frac{\pi}{4}$

3.10.3
nominal metallic cross-sectional area (*A*)
the product of the nominal metallic cross-sectional area factor (C) and the square of the nominal rope diameter

NOTE This can be expressed as: $A = C.d^2$

3.10.4
calculated metallic cross-sectional area (A_c)
the design value obtained from the sum of the metallic cross-sectional areas of the wires in the rope based on their nominal diameters

$$A_c = \frac{\pi}{4}\sum_{1}^{n}\delta^2$$

3.10.5
measured metallic cross-sectional area (A_m)
the sum of the metallic cross-sectional areas of all the wires in the rope based on their measured diameters

$$A_m = \frac{\pi}{4}\sum_{1}^{n}\delta_m^2$$

3.10.6
rope length mass factor (*W*)
that factor which takes into account the mass of core and lubricant as well as the metallic elements

3.10.7
nominal rope length mass (*M*)
that value derived from the product of the length mass factor and the square of the nominal diameter

$$M = W.d^2$$

3.10.8
measured rope length mass (M_m)
the mass of 1 m of rope as determined by weighing

3.10.9
minimum breaking force factor (K)
an empirical factor used in the determination of minimum breaking force of a rope and obtained from the product of fill factor (f) for the rope class or construction, spinning loss factor (k) for the rope class or construction and the constant $\pi/4$

$$K = \frac{\pi f . k}{4}$$

NOTE K factors for the more common rope classes and constructions are given in the appropriate parts of this standard.

3.10.10
minimum breaking force (F_{min})
specified value in kN, below which the measured breaking force (F_m) is not allowed to fall in a prescribed breaking force test and normally obtained by calculation from the product of the square of the nominal diameter (d), the rope grade (R_r) and the breaking force factor (K)

$$F_{\min} = \frac{d^2 . R_r . K}{1000}$$

3.10.11
rope grade (R_r)
a level of requirement of breaking force which is designated by a number (e.g. 1770, 1960)

NOTE It does not imply that the actual tensile strength grades of the wires in the rope are necessarily of this grade.

3.10.12
calculated minimum breaking force ($F_{c.min}$)
value of minimum breaking force based on the nominal wire sizes, wire tensile strength grades and spinning loss factor for the rope class or construction as given in the manufacturer's rope design

3.10.13
measured breaking force (F_m)
breaking force obtained using a prescribed method

3.10.14
minimum aggregate breaking force ($F_{e.min}$)
specified value, in kN, below which the measured aggregate breaking force is not allowed to fall in a prescribed test and normally obtained by calculation from the product of the square of the rope diameter (d), the metallic cross-sectional area factor (C) and the rope grade (R_r)

$$F_{e.\min} = \frac{d^2 . C . R_r}{1000}$$

3.10.15
calculated minimum aggregate breaking force ($F_{e.c.min}$)
value of minimum aggregate breaking force obtained by calculation from the sum of the products of cross-sectional area (based on nominal wire diameter) and tensile strength grade of each wire in the rope, as given in the manufacturer's rope design

3.10.16
reduced minimum aggregate breaking force ($F_{e.red.min}$)
specified value below which the measured reduced aggregate breaking force is not allowed to fall and is obtained by calculation from the sum of the products of cross-sectional area (based on nominal wire diameter) and tensile strength grade of each agreed load bearing wire in the rope

3.10.17
measured aggregate breaking force ($F_{e.m}$)
the sum of the measured breaking forces of all the individual wires taken from the rope

3.10.18
measured reduced aggregate breaking force ($F_{e.red.m}$)
the sum of the measured breaking forces of the agreed load bearing wires taken from the rope

3.10.19
calculated measured breaking force ($F_{m.c}$)
the product of the sum of the measured breaking forces of individual wires after they have been taken out of the rope and the partial spinning loss factor obtained from the results of type testing

3.10.20
calculated measured aggregate breaking force ($F_{e.m.c}$)
the value obtained by dividing the measured breaking force (F_m) of the rope by the partial spinning loss factor obtained from the results of type testing

3.10.21
measured total spinning loss
the difference between the measured aggregate breaking force, before ropemaking, and the measured breaking force of the rope

3.10.22
measured partial spinning loss
the difference between the measured aggregate breaking force ($F_{e.m}$), after ropemaking, and the measured breaking force of the rope (F_m)

3.10.23
spinning loss factor (k)
the ratio between either the calculated minimum aggregate breaking force ($F_{e.c.min}$) and the calculated minimum breaking force ($F_{c.min}$) of the rope or the specified minimum aggregate breaking force ($F_{e.min}$) and the specified minimum breaking force (F_{min}) of the rope, as determined from the ropemaker's design

3.10.24
measured total spinning loss factor (k_m)
the ratio between the measured breaking force (F_m) of the rope and the measured aggregate breaking force of the rope, before ropemaking

3.10.25
measured partial spinning loss factor ($k_{p.m.}$)
the ratio between the measured breaking force (F_m) of the rope and the measured aggregate breaking force of the rope, after ropemaking ($F_{e.m}$)

3.10.26
outer wire factor (a)
factor used in the calculation of the approximate diameter of the outer wires of the outer strand layer

3.10.27
outer wire diameter (δ_a)
the value derived from the product of the outer wire factor and the nominal rope diameter

$$\delta_a = a.d$$

3.11 Rope characteristics

3.11.1
torque
torsional characteristic, the value of which is usually expressed in N.m, at a stated tensile loading and determined by test when both rope ends are prevented from rotating

NOTE Torsional characteristics can also be determined by calculation.

3.11.2
turn
rotational characteristic, the value of which is usually expressed in degrees or turns per unit length at a stated tensile loading and determined by test when one end of the rope is free to rotate

3.11.3
fully preformed rope
rope in which the wires in the strands and strands in the rope have their internal stresses reduced resulting in a rope which after removal of any serving, the wires and the strands will not spring out of the rope formation

3.12 Rope class and construction

3.12.1
rope class
a grouping of ropes of similar mechanical properties and physical characteristics

NOTE For classification details refer to clause 5.

3.12.2
rope construction
the detail and arrangement of the various elements of the rope

NOTE For designation details refer to clause 4.

4 Rope designation

4.1 General

The designation system for describing steel wire ropes shall be in accordance with 4.2 to 4.4.

NOTE 1 The system details the minimum amount of information that is required to describe a rope (e.g. when specifying or certifying).

NOTE 2 Features a) to f) of 4.2 can also be used for the purposes of rope identification.

NOTE 3 The system is capable of accommodating most rope constructions, grades, wire finishes and layers of steel wire ropes.

4.2 Format

The system shall consist of the following, also, see Figure 33, for examples:

a) dimension(s);

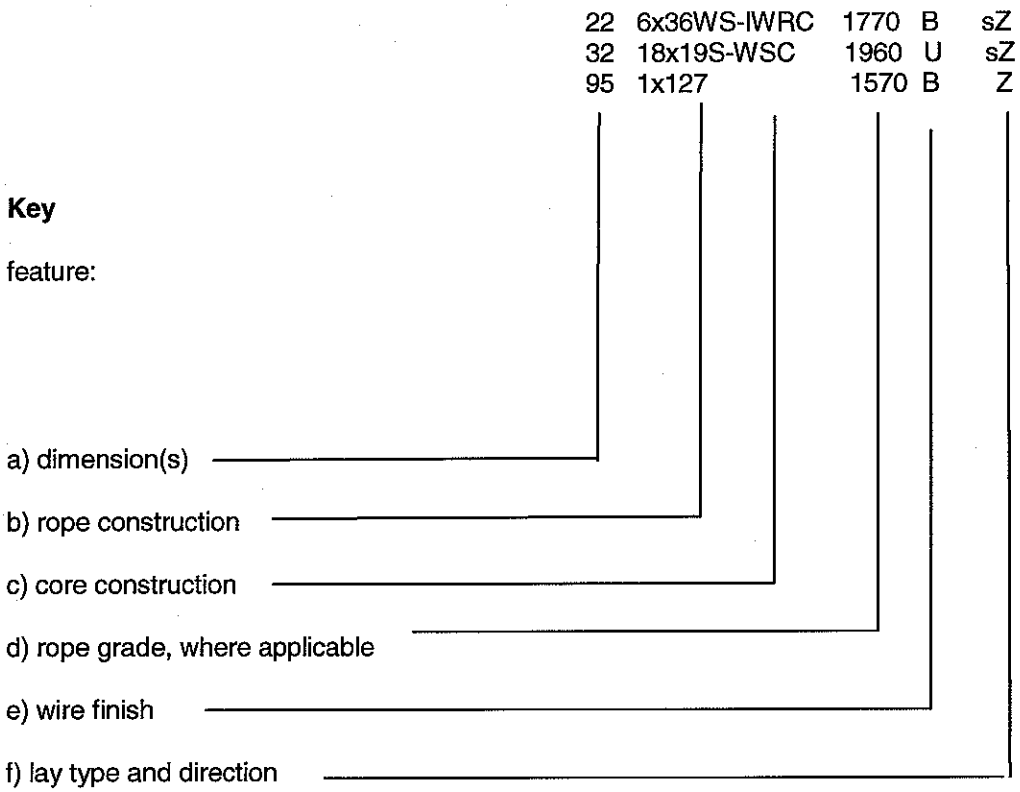
b) rope construction;

c) core construction;

d) rope grade, where applicable;

e) wire finish;

f) lay type and direction;



NOTE The spacings between the features in some of the examples given in the standard would normally be closed-up in practice, as shown above.

Figure 33 — Examples of the designation system

4.3 Symbols

4.3.1 Cross-sectional shape of wire, strand and rope

The symbols for cross-sectional shape shall conform to Table 1.

Table 1 — Cross-sectional shape symbols

Cross-sectional shape	Symbol		
	Wire	Strand	Rope
Round	No symbol	No symbol	No symbol
Triangular	V	V	-
Built-up centre[a]	-	B[1)]	-
Rectangular	R	-	-
Trapezoidal	T	-	-
Oval	Q	Q	-
Z-shaped	Z	-	-
H-shaped	H	-	-
Flat or ribbon	-	P	-
Compacted[b]	-	K[2)]	K[2)]
Braided	-	-	BR
Flat			P
- single stitching	-	-	PS
- double stitching	-	-	PD
- clamped	-	-	PN

[a] The symbol B indicates that the strand centre is built-up from a number of wires and succeeds the symbol for strand shape, e.g. a triangular strand of 25 wires with a built-up centre is designated as V25B.

[b] The symbol K indicates an additional compacting process and precedes the symbol for strand or rope shape, e.g. a compacted round strand or rope is designated as K and a compacted oval strand is designated as KQ.

4.3.2 Types of strand construction

The symbols for the more common types of round strand constructions shall conform to Table 2.

Table 2 —Symbols for the more common types of strand constructions

Construction type	Symbol	Examples of strand construction
Single lay	No symbol	6 i.e. (1-5) 7 i.e. (1-6)
Parallel lay		
Seale	S	17S i.e. (1-8-8) 19S i.e. (1-9-9)
Warrington	W	19W i.e. (1-6-6+6)
Filler	F	21F i.e. (1-5-5F-10) 25F i.e. (1-6-6F-12) 29F i.e. (1-7-7F-14) 41F i.e. (1-8-8-8F-16)
Combined parallel lay	WS	26WS i.e. (1-5-5+5-10) 31WS i.e. (1-6-6+6-12) 36WS i.e. (1-7-7+7-14) 41WS i.e. (1-8-8+8-16) 41WS i.e. (1-6/8-8+8-16) 46WS i.e. (1-9-9+9-18)
Multiple operation lay (round strand)		
Cross lay	M	19M i.e. (1-6/12) 37M i.e. (1-6/12/18)
Compound lay[a]	N	35NW i.e. (1-6-6+6/16)

[a] N is additional and precedes the basic type symbol, e.g. Compound Seale is NS and Compound Warrington is NW

For those strand constructions not covered by Table 2, strand designation shall be in accordance with the number of wires in the strand and the strand shape, examples of which are given in Table 3.

Table 3 — Examples of strand designation based on number of wires in the strand

Detailed strand construction	Strand designation
Round strand – parallel lay	
1-6-6F-12-12	37
1-7-7F-14-14	43
1-7-7-7F-14-14	50
1-8-8F-16-16	49
1-6/8-8F-16-16	49 or 55
1-8-8-8+8-16	49
1-6/8-8-8+8-16	49 or 55
1-9-9-9+9-18	55
1-6/9-9F-18-18	55 or 61
1-9-9-9F-18-18	64
Round strand – compound lay	
1-7-7+7-14/20-20	76
1-9-9-9+9-18/24-24	103
Triangular strand	
V-8	V9
V-9	V10
V-12/12	V25
B-12/12	V25B
B-12/15	V28B
Strand with fibre centre (as used in compacted/swaged 3 and 4 strand ropes)	
FC-9/15 (oval strand in centre of 12xP6:3xQ24FC)	Q24FC
FC-12-12 (fibre centre)	24FC
FC-15-15	30FC
FC-9/15-15	39FC
FC-8-8+8-16	40FC
FC-12/15-15	42FC
FC-12/18-18	48FC

4.3.3 Cores, centres of parallel-closed ropes and central elements of rotation-resistant rope

The symbols for cores of single layer ropes, the centres of parallel-closed ropes and the central elements of rotation-resistant ropes shall conform to Table 4.

Table 4 — Symbols for cores, centres of parallel-closed ropes and centres of rotation-resistant ropes

Item or element	Symbol
Single layer rope:	
Fibre core	FC
- Natural fibre core	NFC
- Synthetic fibre core	SFC
- Solid polymer core	SPC
Steel core	WC
Wire strand core	WSC
Independent wire rope core	IWRC
Independent wire rope core with compacted strands	IWRC(K)
Independent wire rope core covered with a polymer	EPIWRC
Parallel-closed rope:	
Parallel wire rope centre	PWRC
Parallel wire rope centre with compacted strands	PWRC(K)
Rotation-resistant rope:	
Central element	
- Fibre centre	FC
- Wire strand centre	WSC
- Compacted wire strand centre	KWSC

4.3.4 Conductors

The symbol for a conductor shall be the letter D and shall precede the designation for the element e.g. DC for the centre of the strand of a stranded rope.

NOTE Conductors can form a wire, strand centre or strand of a stranded rope, a wire or centre wire of a spiral rope, a centre of an electro-mechanical rope, or an insert in a stranded or spiral rope.

4.4 Designation of the various key features

4.4.1 General

The assembly of the designations of the key features shall be in the sequence of 4.4.2 to 4.4.7.

NOTE In addition, and where applicable, the manufacturer's unique identifier or brand name should also be stated and precede the designation of the rope.

4.4.2 Dimension(s)

For round rope and braided rope the nominal diameter shall be expressed in millimetres. For flat rope the nominal dimensions (width × thickness) shall be identified and expressed in millimetres.

NOTE For covered ropes, two values will be specified, via the outer and inner dimensions. For a round strand rope covered with a solid polymer, the outer diameter is separated from the inner diameter by an oblique stroke (/), e.g. 13,0/11,5.

4.4.3 Construction

The construction of stranded ropes shall be designated in the following sequences -

single layer rope:

a) the number of outer strands;

b) multiplication sign (x);

c) the number of wires in each of the outer strands and the corresponding strand designation;

d) connecting symbol dash (-); and

e) the core designation,

e.g. 6 × 36WS - IWRC. See also annex B for more examples.

parallel-closed rope:

a) the number of outer strands;

b) multiplication sign (×);

c) the number of wires in each of the outer strands and the corresponding strand designation;

d) connecting symbol dash (-); and

e) the designation of the rope centre indicating that it is laid parallel to the outer strands in one closing operation,

e.g. 8 × 19S - PWRC. See annex B for more examples.

rotation-resistant rope:

10 or more outer strands

a) either, the total number of strands in the rope excluding the central element; or, if the construction of the central element is the same as that of the outer strands, the total number of strands in the rope;

b) in brackets ( ) the designation corresponding to how the inner strands are laid up where there are more than two layers of strands;

c) multiplication sign (×);

d) the number of wires in each of the outer strands and the corresponding strand designation;

e) connecting symbol dash (-); and

f) the designation of the central element,

e.g. 18 × 7 - WSC or 19 × 7. See annex B for more examples.

8 or 9 outer strands

a) the number of outer strands;
b) multiplication sign (x);
c) the number of wires in each of the outer strands and the corresponding strand designation;
d) connecting symbol colon (:) signifying a contra-lay core; and
e) IWRC,
e. g 8x25F: IWRC

NOTE: These ropes have previously been referred to as spin-resistant rope.

The construction of spiral strand shall be designated in the following sequence:

spiral strand:

a) 1;
b) multiplication sign (×); and
c) the number of wires in the strand
e.g. 1 × 61

The construction for a locked coil rope shall be designated according to its application:

half-locked coil:
HLGR - for guide rope
HLAR - for aerial track rope

full-locked coil:
FLAR - for carrying rope
FLHR - for hoisting rope
FLBR - for bridge rope

4.4.4 Core construction

The core construction shall be designated in accordance with Table 4.

4.4.5 Rope grade

The rope grade shall identify the breaking force of the rope, e.g. 1770, 1370/1770.

NOTE Not all ropes are identified by a rope grade.

4.4.6 Surface finish of wire

The surface finish (of the outer wires) shall be designated using the following letter symbols:

Uncoated (or bright)	U
Zinc coated class B	B

Zinc coated class A	A
Zinc alloy coated class B	B(Zn/Al)
Zinc alloy coated class A	A(Zn/Al)

NOTE With other finishes it will be necessary to ensure that the meaning of any selected letter symbol used is identified.

4.4.7 Type of lay and direction

4.4.7.1 Spiral rope

The direction of lay shall be designated using the following letter symbols:

Right lay	Z
Left lay	S

4.4.7.2 Stranded rope

The type and direction of lay shall be designated using the following letter symbols.

Ordinary lay, right	sZ
Ordinary lay, left	zS
Lang lay, right	zZ
Lang lay, left	sS
Alternate lay, right	aZ
Alternate lay, left	aS

NOTE The first letter of the ordinary and Lang types denotes the direction of the wires in the strands and the second letter denotes the direction of the strands in the rope. The second letter of the alternate types denotes the direction of the strands in the rope.

5 Classification

For a given rope construction the manufacturer shall identify the related rope class by referring to the classification parameters as detailed in Tables 5 to 12.

NOTE Tables 5 to 12 give examples of the more common rope classes for each of the rope types.

Where the rope construction is not related to any of the rope classes listed in Tables 5 to 12, the manufacturer can establish the rope class by taking into account the rope type, the parameters indicated in the respective column headings of Tables 5 to 12 and the rope designation system as described in clause 4.

Table 5 — Examples of single layer rope classes

Class (excluding core)	Rope			Outer strand			
	Number of strands	Number of outer strands	Number of layers of strands	Number of wires	Number of outer wires	Number of layers of wires	Strand lay type
3 × 7	3	3	1	5-9	4-8	1	Single
3 × 19	3	3	1	15-26	7-12	2-3	Parallel
3 × 36	3	3	1	27-49	12-18	3	Parallel
3 × 19M	3	3	1	12-19	9-12	2	Multi op. cross
3 × 37M	3	3	1	27-37	16-18	3	Multi op. cross
3 × 35N	3	3	1	28-48	12-18	3	Multi op. compound
4 × 7	4	4	1	5-9	4-8	1	Single
4 × 19	4	4	1	15-26	7-12	2-3	Parallel
4 × 36	4	4	1	29-57	12-18	3-4	Parallel
4 × 19M	4	4	1	12-19	9-12	2	Multi op. cross
4 × 37M	4	4	1	27-37	16-18	3	Multi op. cross
4 × 35N	4	4	1	28-48	12-18	3	Multi op. compound
5 × 5	5	5	1	5	4	1	Single
5 × 7	5	5	1	7	6	1	Single
6 × 6	6	6	1	6	6	1	Single
6 × 7	6	6	1	5-9	4-8	1	Single
6 × 12	6	6	1	12	12	1	Single
6 × 19	6	6	1	15-26	7-12	2-3	Parallel
6 × 36	6	6	1	29-57	12-18	3-4	Parallel
6 × 61	6	6	1	61-85	18-24	3-4	Parallel
6 × 19M	6	6	1	12-19	9-12	2	Multi op. cross
6 × 24M	6	6	1	24	12-16	2	Multi op. cross
6 × 37M	6	6	1	27-37	16-18	3	Multi op. cross
6 × 61M	6	6	1	45-61	20-24	4	Multi op. cross
6 × 35N	6	6	1	28-48	12-18	3	Multi op. compound
6 × 61N	6	6	1	47-61	20-24	3-4	Multi op. compound
7 × 19	7	7	1	15-26	7-12	2-3	Parallel
7 × 36	7	7	1	29-57	12-18	3-4	Parallel

Table 5 - Examples of single layer rope classes *(continued)*

Class (excluding core)	Rope			Outer strand			
	Number of strands	Number of outer strands	Number of layers of strands	Number of wires	Number of outer wires	Number of layers of wires	Strand lay type
8 × 7	8	8	1	5-9	4-8	1	Single
8 × 19	8	8	1	15-26	7-12	2-3	Parallel
8 × 36	8	8	1	29-57	12-18	3-4	Parallel
8 × 61	8	8	1	61-85	18-24	3-4	Parallel
8 × 35N	8	8	1	28-48	12-18	3	Multi op. compound
8 × 61N	8	8	1	47-81	20-24	3-4	Multi op. compound
8 × 91N	8	8	1	85-109	24-36	4-6	Multi op. compound
Combined rope:							
4 × 6	4	4	1	6	6	1	Single
6 × 6	6	6	1	6	6	1	Single
6 × 12	6	6	1	12	12	1	Single
6 × 24	6	6	1	24	12-15	2	Multi op. cross
Triangular strand rope:							
6 × V8	6	6	1	8-9	7-8	1	Single
6 × V25	6	6	1	15-31	9-18	2	Multi op. cross

NOTE 1 When the centre wire of a strand is replaced by a centre strand manufactured in a separate stranding operation e.g. 1-6/ (in a round strand) or 3F + 3 × 2 (in a triangular strand), the centre strand may be counted as one wire.

NOTE 2 Rope construction 6 × 29F can be classified as either 6 × 19 or 6 × 36.

NOTE 3 Rope classes having 3 or 4 strands can also be designed and constructed to have resistance to rotation.

NOTE 4 For compacted strand ropes, the symbol K precedes the number of wires in the rope class designation, e.g. 6 × K36.

Table 6 — Examples of rotation-resistant rope classes

Class	Rope			Outer strand			
	Number of strands (excl. centre)	Number of outer strands	Number of layers of strands	Number of wires	Number of outer wires	Number of layers of wires	Strand lay type
Round strand:							
2 operation closing							
18 × 7	17-18	10-12	2	5-9	4-8	1	Single
18 × 19	17-18	10-12	2	15-26	7-12	2-3	Parallel
18 ×36	17-18	10-12	2	29-57	12-18	3-4	Parallel
2 operation closing							
23 × 7	21-27	15-18	2	5-9	4-8	1	Single
23 × 19	21-27	15-18	2	15-26	7-12	2-3	Parallel
2 operation closing							
24 × 7	19-28	11-12	3	5-9	4-8	1	Single
24 × 19	19-28	11-12	3	15-26	7-12	2-3	Parallel
3 operation closing							
34(M) × 7	34-36	17-18	3	5-9	4-8	1	Single
34(M) × 19	34-36	17-18	3	15-26	7-12	2-3	Parallel
34(M) ×36	34-36	17-18	3	29-57	12-18	3-4	Parallel
2 operation closing							
35(W) × 7	27-40	15-18	3	5-9	4-8	1	Single
35(W) × 19	27-40	15-18	3	15-26	7-12	2-3	Parallel
35(W) × 36	27-40	15-18	3	29-57	12-18	3-4	Parallel
2 operation closing							
8 × 7 :IWRC	14 - 16	8	2	5-9	4-8	1	Single
8 × 19 :IWRC	14 - 16	8	2	15-26	7-12	2 - 3	Parallel
8 × 36 :IWRC	14 -16	8	2	29-57	27-18	3 - 4	Parallel
9 × 7 :IWRC	18	9	2	5-9	4-8	1	Single
9 × 19 :IWRC	18	9	2	15-26	7-12	2 - 3	Parallel
9 × 36 :IWRC	18	9	2	29-57	27-18	3 - 4	Parallel
Shaped strand:							
2 operation closing							
10 × Q10	10-14	6-9	2	8-10	8-10	1	Single
12 × P6: 3 × Q24FC	15	12	2	6	6	1	Single
3 operation closing							
19(M) × Q12	19	8	3	10-12	10-12	1	Single
19(M) × Q26	19	8	3	24-28	14-16	2	Multi op. cross

NOTE For compacted strand ropes, the symbol K precedes the number of wires in the rope class designation, e.g.35(W) × K7.

Table 7 — Examples of parallel-closed rope classes

Class	No of strands (excl. centre)	No of outer strands	No of layers of strands	No of wires in outer strands	No of outer wires	No of layer of wires	Strand lay type
6 × 19 - PWRC	12	6	2	15-26	7-12	2-3	Parallel
6 × 36 - PWRC	12	6	2	29-57	12-18	3-4	Parallel
8 × 7 - PWRC	16	8	2	5-9	4-8	1	Single
8 × 19 - PWRC	16	8	2	15-26	7-12	2-3	Parallel
8 × 36 - PWRC	16	8	2	29-57	12-18	3-4	Parallel
9 × 7 - PWRC	18	9	2	5-9	4-8	1	Single
9 × 19 - PWRC	18	9	2	15-26	7-12	2-3	Parallel
9 × 36 - PWRC	18	9	2	29-57	12-18	3-4	Parallel

NOTE For compacted strand ropes, the symbol K precedes the number of wires in the rope class designation, e.g. 8 × K36WS - PWRC.

Table 8 — Examples of cable-laid rope classes

	Rope	Unit rope			Outer strand of unit rope			
Class (excluding core)	Number of unit ropes	Number of strands	Number of outer strands	Number of layers of strands	Number of wires	Number of outer wires	Number of layers of wires	Strand lay type
6 × 6 × 7	6	6	6	1	5-9	4-8	1	Single
6 × 6 × 19	6	6	6	1	15-26	7-12	2-3	Parallel
6 × 6 × 36	6	6	6	1	27-57	12-18	3-4	Parallel
6 × 6 × 61	6	6	6	1	61-73	20-24	3-4	Parallel
6 × 6 × 19M	6	6	6	1	12-19	9-12	2	Multi op. cross
6 × 6 × 37M	6	6	6	1	27-37	16-18	3	Multi op. cross
6 × 6 × 61M	6	6	6	1	45-61	20-24	4	Multi op. cross
6 × 6 × 35N	6	6	6	1	28-48	12-18	3	Multi op. comp.
6 × 6 × 61N	6	6	6	1	47-81	20-24	3-4	Multi op. comp.
6 × 6 × 91N	6	6	6	1	85-109	24-36	4-6	Multi op. comp.
6 × 8 × 19	6	8	8	1	15-26	7-12	2-3	Parallel
6 × 8 × 36	6	8	8	1	27-57	12-18	3-4	Parallel
6 × 8 × 61	6	8	8	1	61-73	20-24	3-4	Parallel
6 × 8 × 35N	6	8	8	1	28-48	12-18	3	Multi op. comp.
6 × 8 × 61N	6	8	8	1	47-81	20-24	3-4	Multi op. comp.
6 × 8 × 91N	6	8	8	1	85-109	24-36	4-6	Multi op. comp.
Spring lay:								
6 × 3 × 19	6	3	3	1	15-26	7-12	2-3	Parallel
6 × 3 × 19M	6	3	3	1	12-19	9-12	2	Multi op. cross

Table 9 — Examples of flat rope classes

Class	Rope	Unit rope			Outer strand of unit rope			
	Number of unit ropes	Number of strands	Number of outer strands	Number of layers of strands	Number of wires	Number of outer wires	Number of layers of wires	Strand lay type
P6 × 4 × 7	6	4	4	1	5-9	4-8	1	Single
P8 × 4 × 7	8	4	4	1	5-9	4-8	1	Single
P8 × 4 × 19	8	4	4	1	15-26	7-12	2-3	Parallel
P8 × 4 × 19M	8	4	4	1	12-19	9-12	2	Multi op. cross

Table 10 — Examples of spiral strand rope classes

Class	Number of wires	Number of outer wires	Number of layers of wires
1 × 19	17-37	11-16	2-3
1 × 37	34-59	17-22	3-4
1 × 61	57-85	23-28	4-5
1 × 91	86-114	29-34	5-6
1 × 127	>114	>34	>3

Table 11 — Examples of strand classes

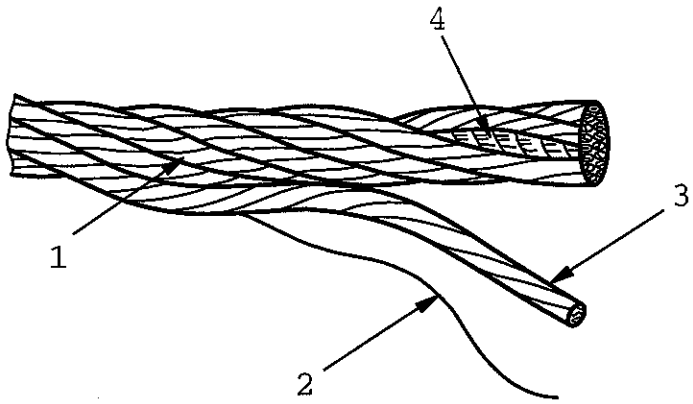
Class	Number of wires	Number of outer wires	Number of layers of wires	Strand lay type
1 × 7	5-9	4-8	1	Single
1 × 19	15-26	7-12	2-3	Parallel
1 × 19M	12-19	9-12	2	Multi op. cross
1 × 36	27-49	12-18	3	Parallel
1 × 37M	27-37	16-18	3	Multi op. cross

Table 12 — Examples of locked coil rope classes

Class	Number of layers of wires
Single layer of half lock wires	2 or more
Double layer of half lock wires	4 or more
Multiple layers of half lock wires	6 or more
Single layer of full lock wires	2 or more
Double layer of full lock wires	4 or more
Triple layer of full lock wires	4 or more
Multiple layer of full lock wires	8 or more

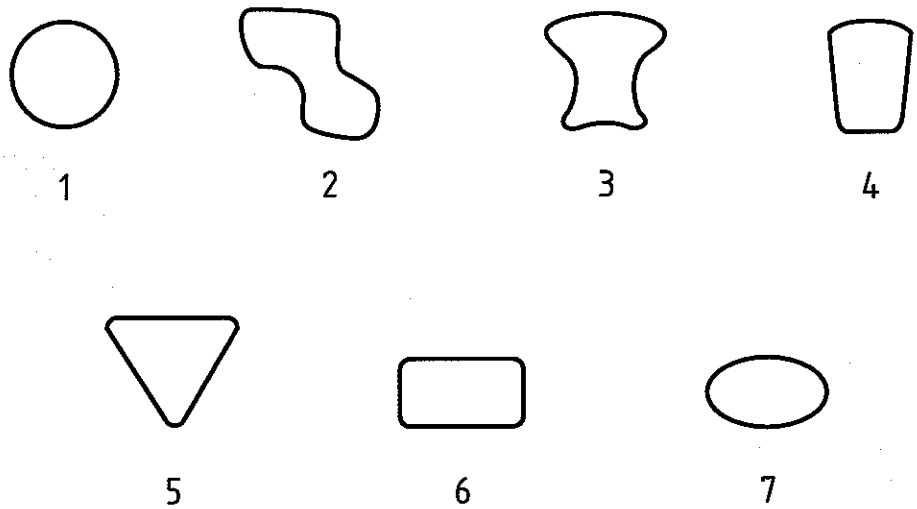
Annex A
(informative)

Elements of a rope



Key
1 Wire rope
2 Wire
3 Strand
4 Core

Figure A.1 —Stranded rope



Key
1 Round
2 Full-lock (Z)
3 Half-lock (H)
4 Trapezoidal (T)
5 Triangular (V)
6 Rectangular (R)
7 Oval (Q)

Figure A.2 — Examples of wire shapes

Annex B
(informative)

More examples of the designation system

B.1 Strand construction for stranded ropes

Examples:

i)	K	19	S
ii)	V	25	
iii)	V	25	B
iv)		24	FC
v)		36	WS

Elements:

a) symbol for shape of strand, where applicable

b) total number of wires

c) symbol for strand construction

A.2 Rope construction

B.2.1 Spiral strand

Examples:

i)	1 ×	19	M
ii)	1 ×	61	
iii)	1 ×	127	

Elements:

a) numeral "1" followed by multiplication sign

b) total number of wires

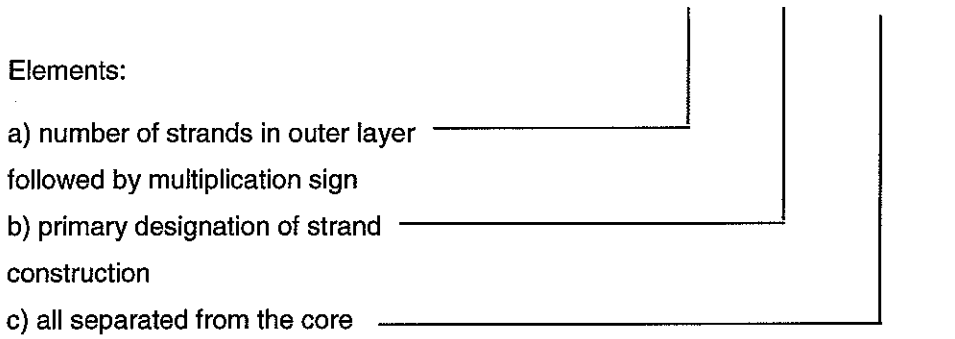
c) symbol for type of strand construction

B.2.2 Stranded rope

A.1.1.1 Single layer stranded rope

Examples:

i)	6 ×	36WS	-SFC
ii)	6 ×	V25	-SFC
iii)	8 ×	25F	-IWRC



Elements:

a) number of strands in outer layer followed by multiplication sign

b) primary designation of strand construction

c) all separated from the core construction by a dash (-)

B.2.2.2 Rotation-resistant rope

Examples:

i)	17	×		7	-SFC
ii)	18	×		7	-WSC
or, if the construction of the WSC is the same as the other strands,					
	19	×		7	
iii)	18	×		19S	-WSC
or, if the construction of the WSC is the same as the other strands,					
	19	×		19S	
iv)	34(M)	×		7	-SFC
v)	34(W)	×		7	-WSC
or, if the construction of the WSC is the same as the other strands,					
	35(W)	×		7	
vi)	34(W)	×	K	7	-WSC
vii)	39(W)	×		7	-WSC
or, if the construction of the WSC is the same as the other strands,					
	40(W)	×		7	
viii)	10	×	Q	10FC	-WSC
ix)	19(M)	×	Q	26FC	-WSC

Elements:

a) total number of strands

b) symbol for type of rope construction for underlying layers of strands, where applicable, in round brackets

c) multiplication sign

d) symbol for strand shape, where applicable

e) total number of wires in one outer strand and symbol for strand construction, where applicable

f) all separated from core construction by a dash (-)

B.2.2.3 Parallel-closed rope

Examples

i)	6	×	7	- PWRC
ii)	8	×	K7	- PWRC
iii)	8	×	19S	- PWRC
iv)	8	×	36WS	- PWRC
v)	8	×	K36WS	- PWRC
vi)	9	×	21F	- PWRC

Elements:

a) number of outer strands

b) multiplication sign

c) symbol for strand shape and outer strand construction

d) all separated from rope centre by a dash

B.2.3 Cable-laid rope

Examples:

i) 6 × [6 × 19S-IWRC] - [FC]
ii) 6 × [6 × 36WS-IWRC] - [6 × 36WS-IWRC]

Elements:

a) total number of unit ropes, followed by multiplication sign

b) primary designation unit rope construction, in square brackets

c) all separated by a dash (-) from primary designation of core rope construction, in square brackets

B.2.4 Braided rope

Examples:

i) BR 12 × 19S
ii) BR 12 × 36WS

Elements:

a) letter symbols for shape of rope

b) total number of strands followed by multiplication sign

c) primary designation of strand construction

B.2.5 Flat rope

Examples:

i)	PS	8 ×	[4 × 7]
ii)	PD	8 ×	[4 × 19M]

Elements:

b) symbols for type of stitching

c) total number of unit ropes followed by multiplication sign

d) primary designation of unit rope construction, in square brackets

Annex C
(informative)

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Annex ZA
(informative)
Relationship of this document with EC Directives

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) :

Machinery Directive 98/37/EC, amended by Directive 98/79/EC.

Compliance with this document provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

WARNING: Other requirements and other EC Directives may be applicable to the product(s) falling within the scope of this document.

Bibliography

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