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Steel wire ropes — Vocabulary, designation and classification

Câbles en acier — Vocabulaire, désignation et classification

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Foreword

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ISO 17893 was prepared by Technical Committee ISO/TC 105, *Steel wire ropes*.

Introduction

This International standard was developed in response to a worldwide demand for a specification covering terms and definitions associated with the design, manufacture and testing of steel wire rope, for a designation system which would provide manufacturers, purchasers and end users with a common method of describing a rope, and for a classification system which would enable ropes of similar construction and mechanical properties to be grouped together.

The designation and classification systems established here can be used for designating and classifying any steel wire rope construction.

Steel wire ropes — Vocabulary, designation and classification

1 Scope

This International Standard defines terms, and specifies a designation system and a classification system, for steel wire ropes.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1 Wires

2.1.1 Outer wires

2.1.1.1
outer wire
⟨spiral rope⟩ wire positioned in the outer layer of a rope

2.1.1.2
outer wire
⟨stranded rope⟩ wire positioned in the outer layer of wires in the outer strands of a rope

2.1.2 Inner wires

2.1.2.1
inner wire
⟨spiral rope⟩ wire of the intermediate layers of a rope positioned between the centre wires and outer layer

2.1.2.2
inner wire
⟨stranded rope⟩ any wire of a rope other than its centre wires, filler wires, core wires or outer wires

2.1.3
filler wire
comparatively small wire used in filler constructions to fill up the interstices between layers of wires

See Figure 8.

2.1.4 Centre wires

2.1.4.1
centre wire
⟨spiral rope⟩ wire positioned at the centre of a rope

2.1.4.2
centre wire
⟨stranded rope⟩ wire positioned at the centre of the strands of a rope

2.1.5
core wire
wire of the core of a stranded rope

2.1.6
load-bearing wire
wire in a rope regarded as contributing towards the breaking force of the rope

2.1.7
layer (of wires)
assembly of wires having one pitch circle diameter, the first layer being that laid immediately over the strand centre

NOTE 1 The exception is the Warrington layer, comprising large and small wires, where the smaller wires are positioned on a pitch circle diameter which is larger than that of the larger wires.

NOTE 2 Filler wires do not constitute a separate layer.

2.1.8
stitching wire
stitching strand
single wire or strand used for the stitching of flat ropes

2.1.9
serving wire
serving strand
single wire or strand used for making a close-wound helical serving to retain the elements of a rope in their assembled position

2.1.10
wire tensile strength grade
R
level of requirement of tensile strength of a wire and its corresponding range, designated by the value according to the lower limit of tensile strength and used when specifying wire and when determining the calculated minimum breaking force or calculated minimum aggregate breaking force of a rope

NOTE It is expressed in newtons per square millimetre.

2.1.11
measured wire tensile strength
R_m
ratio between the maximum force obtained in a tensile test and the nominal cross-sectional area of the test piece

NOTE It is expressed in newtons per square millimetre.

2.1.12
finish and quality of coating
condition of the surface finish of the wire, e.g. bright (uncoated), zinc coated, zinc alloy coated or other protective coating and the class of coating, such as Class B zinc coating, defined by the minimum mass of coating and the adherence of a coating to the steel below

2.1.13
mass of coating
mass of coating (obtained by a prescribed method) per unit of surface area of the uncoated wire

NOTE It is expressed in grams per square metre.

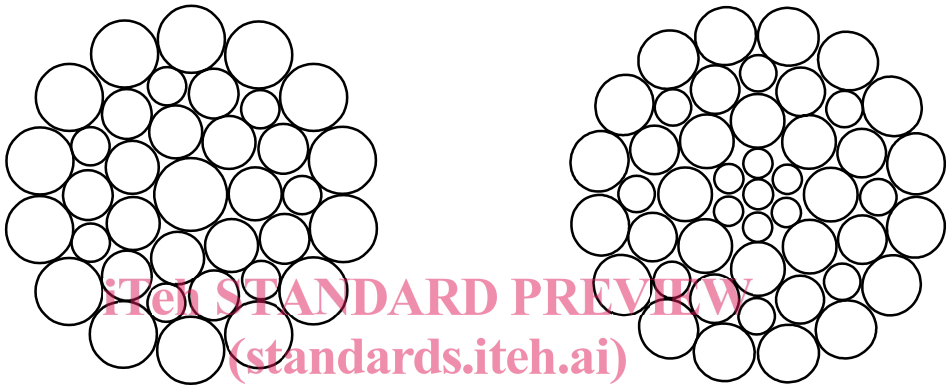
2.2 Strands and strand types

2.2.1
strand
element of rope normally 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), might not have a centre.

2.2.2
round strand
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

2.2.3
triangular strand
V
strand with a perpendicular cross-section which is approximately the shape of a triangle

NOTE Triangular strands can have built-up centres.

See Figure 2.

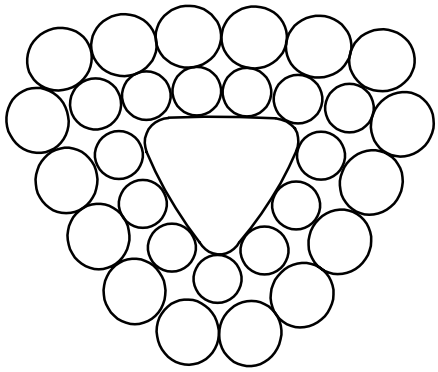


Figure 2 — Triangular strand with triangular (V) centre wire

2.2.4
oval strand
Q
strand having a perpendicular cross-section which is approximately the shape of an oval

See Figure 3.

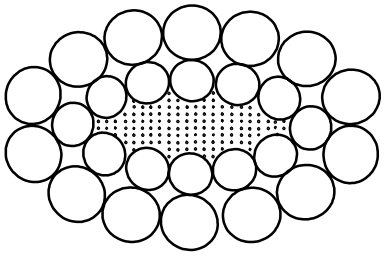


Figure 3 — Oval strand

2.2.5
flat ribbon strand
P
strand without a centre wire, having a perpendicular cross-section which is approximately the shape of a rectangle

See Figure 4.

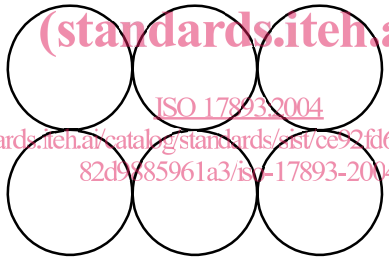


Figure 4 — Flat ribbon strand

2.2.6
single lay strand
strand which contains only one layer of wires

See Figure 5.

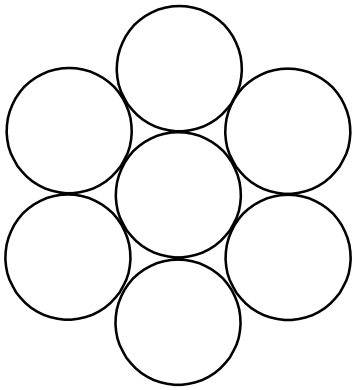


Figure 5 — Single lay strand

2.2.7
parallel lay strand
equal lay
strand which contains at least two layers of wires, all of which are laid in one operation (in the same direction)

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

2.2.8
Seale
parallel lay strand construction with the same number of wires in both layers

See Figure 6.

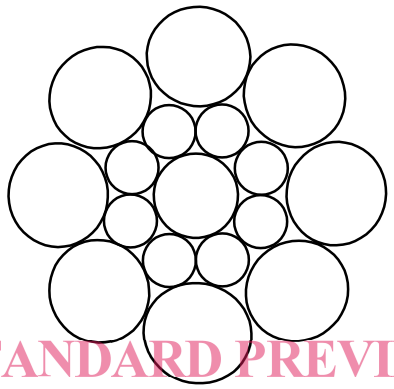


Figure 6 — Seale construction

2.2.9
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.

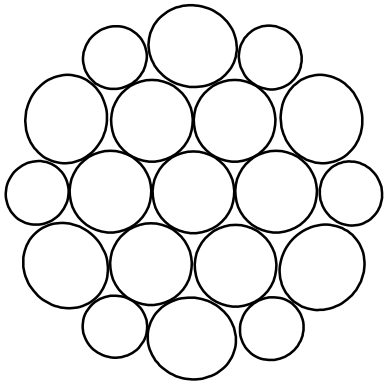


Figure 7 — Warrington construction

2.2.10
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.

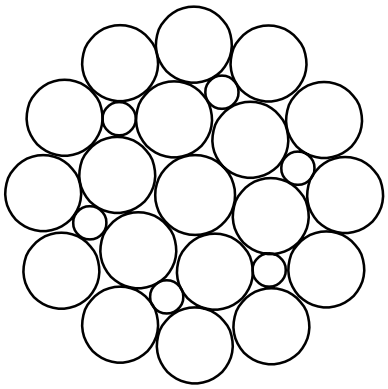


Figure 8 — Filler construction

2.2.11
combined parallel lay
parallel lay strand construction having three or more layers laid in one operation and formed from a combination of strand types **Warrington** (2.2.9) and **Seale** (2.2.8)

See Figure 9.

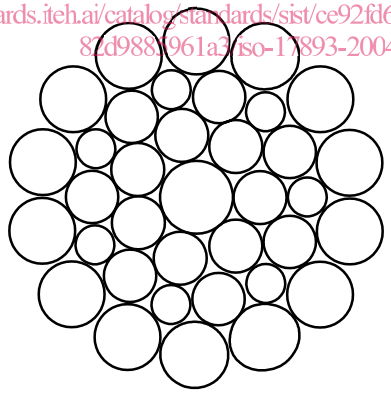


Figure 9 — Example of Warrington-Seale combined parallel lay

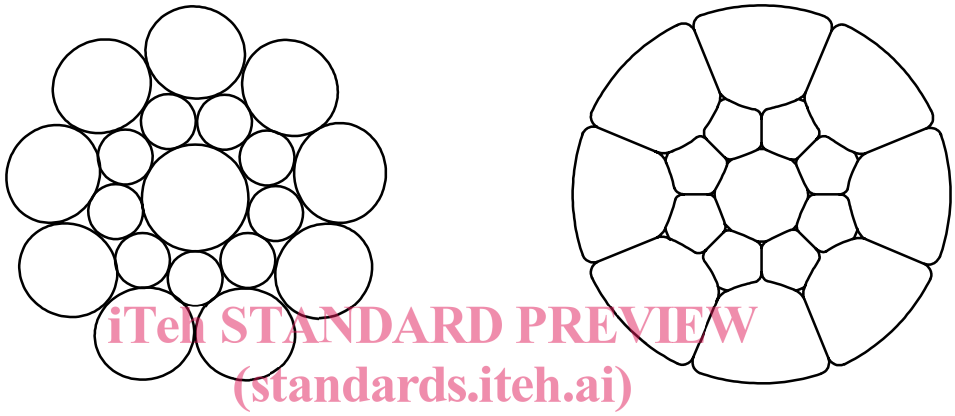
2.2.12
multiple operation lay strand
construction containing at least two layers of wires in which successive layers are laid in more than one operation

2.2.13
cross-lay
M
strand which contains more than one layer of wires, all laid in the same direction, the wires of superimposed wire layers crossing one another and making point contact

2.2.14
compound lay
N
strand which contains a minimum of three layers of wires where the outers layer is laid in a separate operation, but in the same direction as the others, over a parallel lay construction forming the inner layers

2.2.15
compacted strand
K
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

2.3 Cores and core types

2.3.1
core
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

2.3.2
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.

2.3.3
steel core
WC
core made from steel wires arranged as a wire strand (WSC) or as an independent wire rope (IWRC)

NOTE 1 The steel core and/or its outer strands can also be covered with either fibre or solid polymer.

NOTE 2 The stranded rope core is normally made as a separate unit, the exception being where the core is closed in parallel with the outer strands, designated PWRC.

2.3.4
solid polymer core
SPC
core consisting of a solid polymer material having a round shape or a round shape with grooves, and which can also contain an internal element of wire(s) or fibre

2.4 Lubricants and preservation agents

2.4.1
rope lubricant
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

2.4.2
impregnating agent
material used in the manufacture of natural fibre cores, coverings or inserts for the purpose of assisting in inhibiting rotting and decay

2.4.3
preservation agent
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 assisting in providing protection against corrosion

2.5
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

2.6 Ropes and rope types

2.6.1 Stranded ropes

2.6.1.1
stranded rope
assembly of several strands laid helically in one (single-layer rope) or more (rotation-resistant or parallel-closed rope) layers around a core or centre

NOTE Stranded ropes consisting of three or four outer strands might, or might not, have a core.

2.6.1.2
single-layer rope
stranded rope consisting of one layer of strands laid helically around a core

See Figure 11.

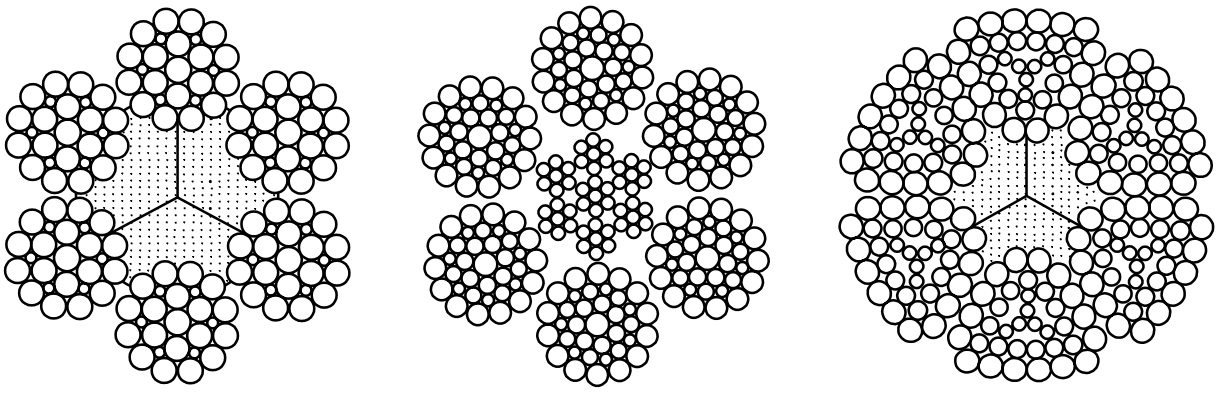


Figure 11 — Examples of single-layer stranded ropes

2.6.1.3
rotation-resistant rope
multi-strand rope (superseded)
non-rotating rope (superseded)
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.

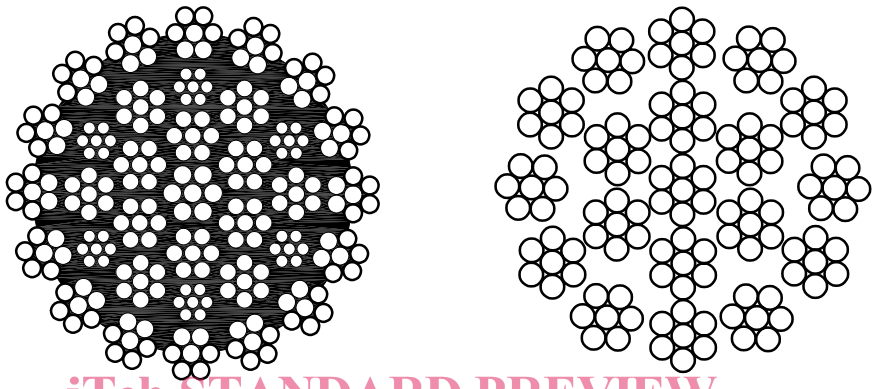


Figure 12 — Examples of rotation-resistant ropes

2.6.1.4
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.

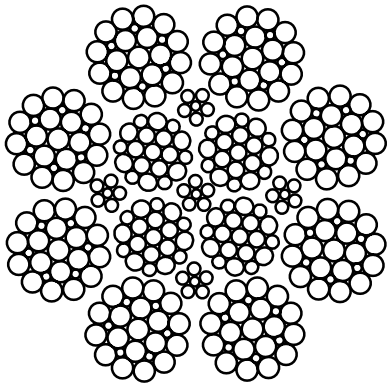


Figure 13 — Example of parallel-closed rope

2.6.1.5
compacted strand rope
stranded rope in which the strands, prior to closing of the rope, are subjected to a compacting process such as drawing, rolling or swaging