

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS G 3557 : 2016

(JWPA/JSA)

**Stainless steel wire ropes for
general purposes**

ICS 53.020.30;77.140.65

Reference number : JIS G 3557 : 2016 (E)

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Date of Establishment: 2004-08-20

Date of Revision: 2016-03-22

Date of Public Notice in Official Gazette: 2016-03-22

Investigated by: Japanese Industrial Standards Committee
Standards Board for ISO area
Technical Committee on Metal and Inorganic
Materials

JIS G 3557:2016, First English edition published in 2016-09

Translated and published by: Japanese Standards Association
Mita MT Building, 3-13-12, Mita, Minato-ku, Tokyo, 108-0073 JAPAN

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Printed in Japan

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Wire Products Association (JWPA)/ Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS G 3557:2004** is replaced with this Standard.

However, **JIS G 3557:2004** may be applied in the **JIS** mark certification based on the relevant provisions of Article 19 Clause 1, etc. of the Industrial Standardization Law until March 21, 2017.

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Stainless steel wire ropes for general purposes

1 Scope

This Japanese Industrial Standard specifies general stainless steel wire ropes used for machines, construction works, ships, fishery and the like (hereafter referred to as “ropes”).

It is not applicable to wire ropes for aircraft control, wire ropes for mechanical control and stainless steel wire ropes for structure.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7507 *Vernier, dial and digital callipers*

JIS G 0201 *Glossary of terms used in iron and steel (Heat treatment)*

JIS G 4308 *Stainless steel wire rods*

JIS Z 8401 *Guide to the rounding of numbers*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS G 0201**, and the following apply.

3.1 wire

stainless steel wires constituting the strand

3.2 strand

a constitutional element of a rope obtained by twisting multiple wires together

3.3 core

a generic term for fibre core, rope core and strand core

3.3.1 fibre core

a fibre rope which constitutes the centre of a rope

There are natural fibre cores and synthetic fibre cores.

3.3.2 rope core

a fibre rope constituting the centre of a rope, which has the 7×7 construction, designated with the symbol IWRC

3.3.3 strand core

a strand constituting the centre of a rope, which is constructed by laying 7, 19 or 37 wires

3.4 construction symbol

symbol for representing the construction of a rope by the combination of the number of strands and the number of wires in that rope, indicated (number of strands) × (number of wires)

For parallel lay strands, the strand cross-section symbol, Fi or WS, is indicated before (number of wires).

3.5 rope diameter

the diameter of a circle circumscribing an arbitrary cross-section of the rope

A distinction is made between the nominal rope diameter and the actual rope diameter.

3.6 lay length of rope

the pitch of an external strand measured parallel to the rope's longitudinal axis as it makes a complete spiral around the axis of the rope (Figure 1)

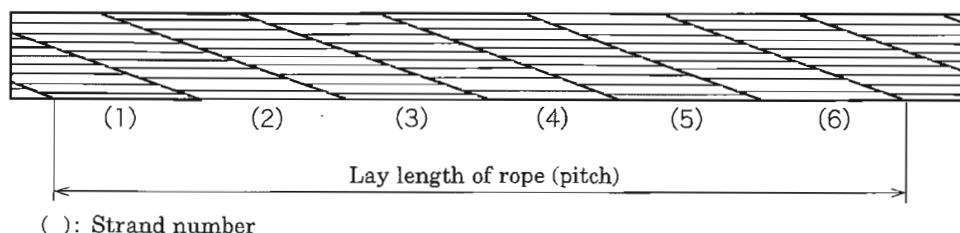


Figure 1 Lay length of rope (Example: In the case of 6 strand rope)

3.7 lay length of strand

the pitch of an external wire measured parallel to the strand's longitudinal axis as it makes a complete spiral around the axis of the strand

3.8 lay direction

the direction in which either the wires in a strand, or the strands in the rope, are laid in a helix

3.9 type of lay of rope

rope type classified by a combination of the lay direction of rope and that of strand

3.10 ordinary lay

type of lay of rope in which the direction of the lay of the wires in the strands is opposite to the direction of lay of the strands in the rope

There are ordinary Z lay and ordinary S lay (see Figure 2).

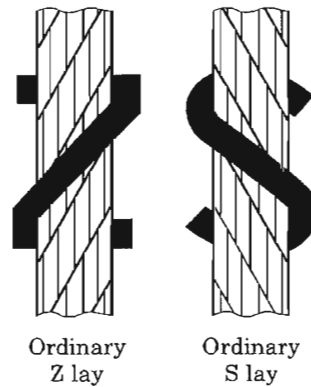


Figure 2 Type and direction of lay

3.11 type of lay of strand

arrangement of wires forming layers of the strand

3.11.1 cross lay

type of lay of strand in which the wires in different layers have different lay lengths, and make point contact with each other

7 wire strands categorize as cross lay.

3.11.2 parallel lay

type of lay of strand in which the wires in different layers have the same lay length, and make linear contact with each other

Parallel lay strands are divided into types such as Filler Wire or Warrington Seale according to the geometric arrangement of the wires in the strand.

3.12 filler wire

wires that fill the gaps between the internal and external layer wires within a strand of a Filler Wire rope

3.13 breaking load

the maximum load at which the test piece reaches the breaking point in the breaking test

3.14 aggregate breaking load

the sum of the breaking loads of all individual wires constituting the rope

3.15 grade

grade of rope according to its breaking load

3.16 lot

a series of ropes manufactured consecutively from the same wires with the same machine

3.17 free length between grips

distance between the inner ends of test piece grips such as chucks, applicable to the breaking test for wires or breaking test for ropes

3.18 red grease

a petrolatum grease not containing harmful acidity or harmful alkalinity

4 Classification

The classification of ropes shall be as follows.

- a) **Classification by construction** Ropes shall be classified, as given in Table 1, into 17 grades according to the construction designation, construction symbol and cross-section.

Table 1 Construction

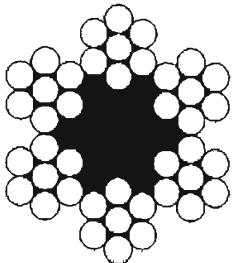
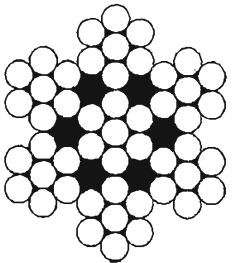
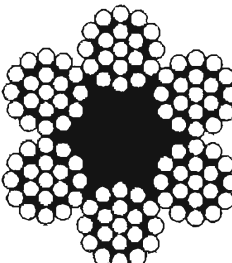
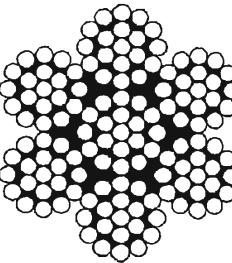
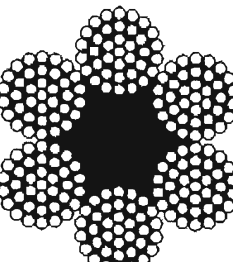
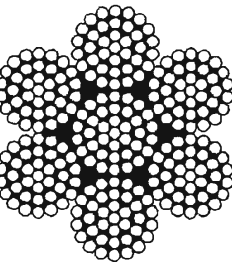
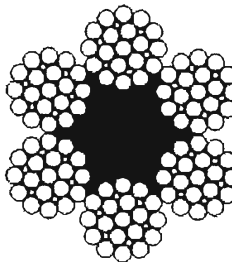
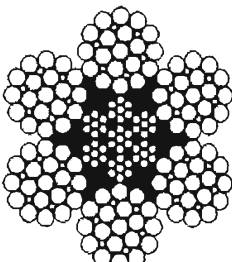
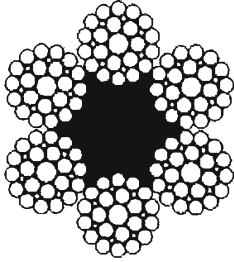
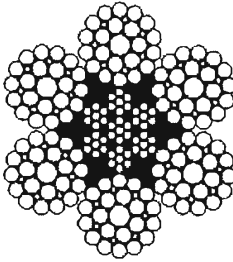
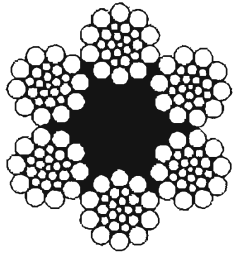
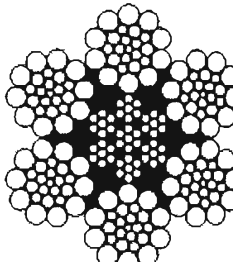
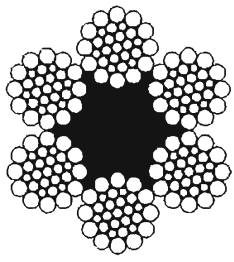
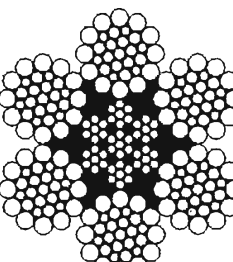
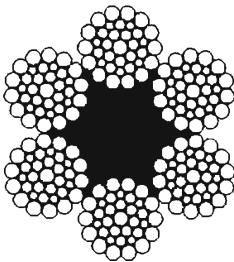
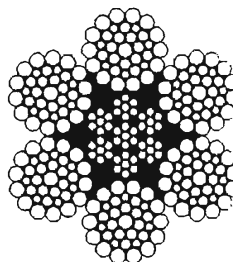
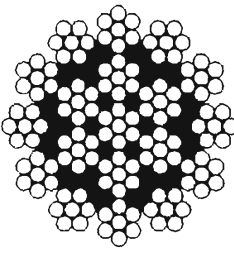
Construction designation	6 strands of 7 wires	7 strands of 7 wires	6 strands of 19 wires	7 strands of 19 wires
Construction symbol	6 × 7	7 × 7	6 × 19	7 × 19
Cross-section				
Construction designation	6 strands of 37 wires	7 strands of 37 wires	Filler Wire 6 strands of 25 wires	Filler Wire 6 strands of 25 wires with rope core
Construction symbol	6 × 37	7 × 37	6 × Fi (25)	IWRC 6 × Fi (25)
Cross-section				

Table 1 (concluded)

Construction designation	Filler Wire 6 strands of 29 wires	Filler Wire 6 strands of 29 wires with rope core	Warrington Seale 6 strands of 26 wires	Warrington Seale 6 strands of 26 wires with rope core
Construction symbol	6 × Fi (29)	IWRC 6 × Fi (29)	6 × WS (26)	IWRC 6 × WS (26)
Cross-section				
Construction designation	Warrington Seale 6 strands of 31 wires	Warrington Seale 6 strands of 31 wires with rope core	Warrington Seale 6 strands of 36 wires	Warrington Seale 6 strands of 36 wires with rope core
Construction symbol	6 × WS (31)	IWRC 6 × WS (31)	6 × WS (36)	IWRC 6 × WS (36)
Cross-section				
Construction designation	Herkules 19 strands of 7 wires			
Construction symbol	19 × 7			
Cross-section				

- b) **Type and direction of lay** The ropes shall be of either ordinary Z lay or ordinary S lay (see Figure 2).
- c) **Grade** The ropes shall be classified into Grade SA and Grade SB according to their breaking load and nominal diameter (see Table 4 to Table 20).

- d) **Combination** The combination that constitutes rope construction shall be as given in Table 2.

Table 2 Combination

Strand			Classification of core	Constructional symbol	Grade	
Number of layers	Type of lay	Number of strands			Grade SA	Grade SB
Single layer	Cross lay	6	Fibre core	6 × 7	○	○
				6 × 19	○	○
				6 × 37	○	○
			Strand core	7 × 7	○	○
				7 × 19	○	○
				7 × 37	○	○
	Parallel lay	6	Fibre core	6 × Fi (25)	○	○
				6 × Fi (29)	○	○
				6 × WS (26)	○	○
				6 × WS (31)	○	○
				6 × WS (36)	○	○
			Rope core	IWRC 6 × Fi (25)	○	○
				IWRC 6 × Fi (29)	○	○
				IWRC 6 × WS (26)	○	○
				IWRC 6 × WS (31)	○	○
				IWRC 6 × WS (36)	○	○
Multiple layer	Cross lay	18	Strand core	19 × 7	○	○

5 Material

5.1 Wire material

The material used for manufacture of Grade SA and Grade SB steel wires shall conform to **JIS G 4308** and the applicable steel grades shall be as shown in Table 3.

Table 3 Applicable grades of stainless steel wire material

Grade	Grade of stainless steel wire material
Grade SA	SUS316, SUS304
Grade SB	SUS304

5.2 Fibre core

The fibre used for fibre core shall be good synthetic or natural fibres, impregnated with grease if requested by the purchaser.

5.3 Rope grease

Where the rope or core is to be coated or impregnated with rope grease (hereafter referred to as “grease”), red grease shall be used.

6 Manufacturing method

6.1 Wire

The wires shall be cold worked after solution heat treatment. In the case of using solution heat treated wires or wire materials as a wire material, the solution heat treatment before cold working may be omitted.

6.2 Rope

6.2.1 Laying

Laying of strands, strand core and rope core and rope shall be as follows.

- a) **Strands, strand core and rope core** Wires specified in 6.1 shall be twisted together so that the diameter and the length of lay are uniform through the length of the strand. The lay direction of the strand core shall be equal to that of the rope. When the connection of wires is required in the process of laying the strand, the wires may be welded or spliced together, but at not more than one position per 10 m length of one strand.
- b) **Rope** Strands and core shall be twisted together so that the rope diameter and the length of lay are uniform through the length of the rope. The lay direction of the rope shall normally be ordinary Z lay.

6.2.2 Grease

The rope shall not be greased unless requested by the purchaser.

6.2.3 Lubricant

The lubricant shall not be applied to rope unless the manufacturer finds it necessary in the laying operation.

7 Mechanical properties

The breaking load shall be as follows.

- a) **Wire** Wires of the same grade and diameter, taken after being twisted into a rope excluding the core wires of the strand and filler wires, shall be tested in accordance with 10.2.3, and the maximum test load shall not differ from the average value by more than $\pm 8\%$.
- b) **Rope** The rope shall be tested in accordance with 10.3.3, and its breaking load shall not be less than the values given in Table 4 to Table 20. The approximate unit mass values of ropes are also shown in Table 4 to Table 20 for information.