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Wire ropes for aircraft control

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In the event of any doubts arising as to the contents,
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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 3535**: 1998 is replaced with this Standard.

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Wire ropes for aircraft control

Introduction

This Japanese Industrial Standard has been prepared based on the first editions of **ISO 2020-1** and **ISO 2020-2** published in 1997 with some modifications of the technical contents.

The portions given sidelines or dotted underlines are the matters in which the contents of the corresponding International Standards have been modified. A list of modifications with the explanations is given in Annex JA.

1 Scope

This Standard specifies the wire ropes of carbon steels and stainless steels (hereafter referred to as "ropes") mainly used for aircraft controls in the temperature range of $-54\text{ }^{\circ}\text{C}$ to $+121\text{ }^{\circ}\text{C}$.

NOTE : The International Standards corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 2020-1 : 1997 *Aerospace — Preformed flexible steel wire rope for aircraft controls — Part 1 : Dimensions and loads*

ISO 2020-2:1997 *Aerospace — Preformed flexible steel wire rope for aircraft controls — Part 2 : Technical specification* (Overall evaluation: MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standards and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

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 G 3502 *Piano wire rods*

JIS G 3506 *High carbon steel wire rods*

JIS G 4308 *Stainless steel wire rods*

JIS H 0401 *Test methods for hot dip galvanized coatings*

JIS Z 8401 *Guide to the rounding of numbers*

3 Terms and definitions

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

3.1 wire

steel wires constructing the strand

There are the zinc-coated carbon steel wires and the stainless steel wires.

3.2 strand

an element of rope constructing an assembly spun helically with plural wires

3.3 wire strand core

strand to be the centre of rope

The construction shall be same as that of the strand of outer layer of rope.

3.4 rope diameter

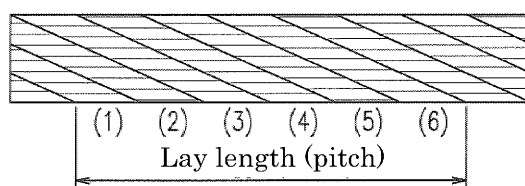
diameter of circumscribed circle at an optional cross-section of rope

There are the nominal diameter and the actual diameter.

3.5 lay length

3.5.1 rope lay length

pitch of the helix of the strand of outer layer of rope (see figure 1)



() : No. of strand

Figure 1 Lay length (informative example: the case of 6-strand rope)

3.5.2 strand lay length

pitch of the helix between the most outer layer wire and the inner layer wire of strand

3.6 lay direction

direction in which the wire is stranded or the strand is closed

There are Z-lay and S-lay (see figure 2).

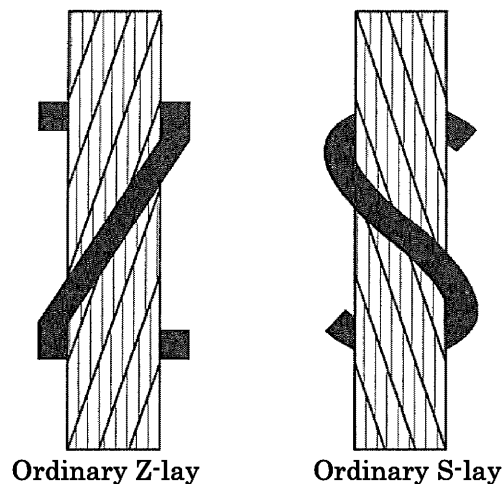


Figure 2 Lay direction and lay type

3.7 lay type

3.7.1 lay type of rope

combination of lay directions in stranding and in closing the rope (see figure 2)

3.7.1.1 ordinary lay

lay type of rope in which lay directions in stranding and in closing the rope are opposite each other

3.7.2 lay type of strand

combination of wires in each layer of the strand

3.8 non-resilience

characteristics preliminarily processed on the rope to prevent strands or wires from ravelling when cut

3.9 seizing

tightly wrapped wires, etc. on the rope end to prevent it from ravelling when cut

3.10 measured breaking force

maximum testing force by which the test piece reaches to breakage in the breaking test

NOTE : The breaking load in the previous revision of this Standard is altered to the breaking force.

3.11 lot

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

They are regarded as in the same lot even if divided into several number of ropes.

3.12 free length between grips

distance between the inner ends of test piece grips such as chucks in the breaking test

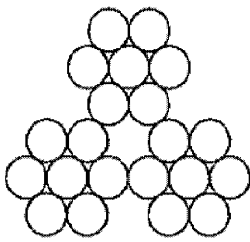
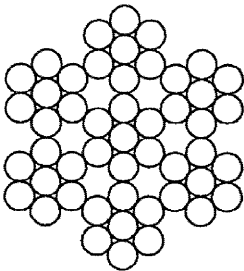
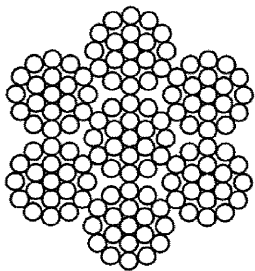
of rope

4 Classification

4.1 Construction

The ropes shall be classified into three categories according to the construction of group code, designation, constructional symbol and cross section as given in table 1.

Table 1 Construction

Group code	A1	A2	A3
Designation	3 strands of 7 wires	6 strands of 7 wires with wire strand core	6 strands of 19 wires with wire strand core
Constructional symbol	$A3 \times 7$	$A7 \times 7$	$A7 \times 19$
Cross section			

4.2 Type of material

The type of materials shall be the carbon steels or the stainless steels.

4.3 Lay direction and lay type

The lay direction and the lay type shall be as given in figure 2.

5 Material

5.1 Wire rod

Materials used for the manufacture of wires shall be as follows.

- The carbon steels shall be those conforming to **JIS G 3506** or **JIS G 3502**, wire rods at least equal to those, or materials subjected to heat treatment (in-line patenting or patenting).
- The stainless steels shall be those conforming to SUS302 or SUS304 of **JIS G 4308** or wire rods at least equal to those.

5.2 Lubricant

Lubricants to be applied to the ropes at the manufacture shall have the properties of