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Low carbon steel wire rods

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Add: 8 Hoang Quoc Viet, Cau Giay, Ha Noi
Tel: (84-4) 7564268 - Fax: (84-4) 8361111
Website: www.tcvninfo.org.vn

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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 The Japan Iron and Steel Federation (JISF) 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 3505 : 1996** is replaced with this Standard.

This revision has been made based on **ISO 16120-1 : 2001 *Non-alloy steel wire rod for conversion to wire—Part 1 : General requirements*** and **ISO 16120-2 : 2001 *Non-alloy steel wire rod for conversion to wire—Part 2 : Specific requirements for general purpose wire rod*** for the purposes of making it easier to compare this Standard with International Standards; to prepare Japanese Industrial Standard conforming with International Standards; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Low carbon steel wire rods

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **ISO 16120-1** *Non-alloy steel wire rod for conversion to wire—Part 1: General requirements* and **ISO 16120-2** *Non-alloy steel wire rod for conversion to wire—Part 2: Specific requirements for general purpose wire rod* published in 2001 with some modifications of the technical contents.

Portions underlined with dots are the matters modified from the original International Standards. The list of modifications with their explanations is given in annex 3 (informative).

1 Scope This Standard specifies low carbon steel wire rods, (hereafter referred to as “wire rods”), to be used for the manufacture of the low carbon steel wire, zinc-coated low carbon steel wire, etc. However, the wire rods for core wire of electrode shall be excluded.

Remarks 1 The purchaser may designate a part of or all of clauses 1, 2 and 3 of special quality requirements in annex 1, in addition to the items specified in this text by preliminary agreement with the manufacturer.

Annex 1 1 Designation of low carbon steel

Annex 1 2 Designation of Mn

Annex 1 3 Dimensional tolerance and out-of-roundness

2 The International Standards corresponding to this Standard are as follows.

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**.

ISO 16120-1 : 2001 *Non-alloy steel wire rod for conversion to wire—Part 1: General requirements* (MOD)

ISO 16120-2 : 2001 *Non-alloy steel wire rod for conversion to wire—Part 2: Specific requirements for general purpose wire rod* (MOD)

3 Quality requirements given in the International Standard are specified in annex 2.

2 Normative references The standards listed in attached table 1 contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) shall be applied.

3 Grade and symbol The wire rod shall be classified into 8 grades, and the symbols shall be as given in table 1.

4 Chemical composition The wire rod shall be tested in accordance with 7.1, and the cast analysis value shall be as given in table 1.

Table 1 Chemical composition

Unit: %

Symbol of grade	C	Mn	P	S
SWRM 6	0.08 max.	0.60 max.	0.040 max.	0.040 max.
SWRM 8	0.10 max.	0.60 max.	0.040 max.	0.040 max.
SWRM 10	0.08 to 0.13	0.30 to 0.60	0.040 max.	0.040 max.
SWRM 12	0.10 to 0.15	0.30 to 0.60	0.040 max.	0.040 max.
SWRM 15	0.13 to 0.18	0.30 to 0.60	0.040 max.	0.040 max.
SWRM 17	0.15 to 0.20	0.30 to 0.60	0.040 max.	0.040 max.
SWRM 20	0.18 to 0.23	0.30 to 0.60	0.040 max.	0.040 max.
SWRM 22	0.20 to 0.25	0.30 to 0.60	0.040 max.	0.040 max.

Remarks : When killed steel is specified, the letter K shall be suffixed to the end of the symbol of grade.

Example : SWRM 10 K

5 Dimensions The diameter and its tolerances and out-of-roundness⁽¹⁾ of the wire rod shall be in accordance with the following.

Note (1) The out-of-roundness is the difference between the maximum and minimum values of diameter on the same section of the wire rod.

a) The standard diameters of the wire rod shall conform to table 2.

Table 2 Standard diameter

Unit: mm

5.5, 6, 6.4, 7, 8, 9, 9.5, 10, 11, 12, 13, 14, 15, 16, 17, 19

b) The tolerances of diameter and out-of-roundness of the wire rod shall conform to table 3.

Table 3 Tolerance and out-of-roundness

Unit: mm

Diameter	Tolerance	Out of roundness
15 or less	±0.40	0.64 max.
Over 15 up to and incl. 25	±0.50	0.80 max.
Over 25	±0.60	0.96 max.

6 Appearance The wire rod shall be free from any defects that are detrimental to practical use. However, since it is generally difficult to inspect the wire rod for detection of flaws throughout the whole length and no opportunity is afforded to remove the flaws, some imperfections may be included. Accordingly, the management of such imperfections shall be subject to the agreement between the purchaser and the supplier.

7 Test

7.1 Chemical analysis The chemical analysis shall be as follows:

- a) **General requirements for chemical analysis and sampling method of specimen for analysis** The chemical composition of the wire rod shall be obtained by cast analysis, and general requirements for chemical analysis and sampling method of specimen for analysis shall be as specified in clause 8 of JIS G 0404.
- b) **Method for chemical analysis** The method for chemical analysis shall conform to any one of the following standards.
JIS G 1211, JIS G 1212, JIS G 1213, JIS G 1214, JIS G 1215, JIS G 1253, JIS G 1256, JIS G 1257, JIS G 1258

8 Inspection The inspection shall be as given in the following.

- a) General requirements for inspection shall conform to JIS G 0404.
- b) The chemical composition shall conform to the requirements of clause 4.
- c) The dimensions shall conform to the requirements of clause 5.
- d) The appearance shall conform to the requirements of clause 6.
- e) When "Special quality requirements" in annex 1 are designated to apply by agreement between the purchaser and the supplier, the wire rod shall conform to the requirements of clauses 1, 2 and 3 of annex 1.

9 Marking The wire rod having passed the inspection shall be marked on each coil with the following particulars by suitable means. However, when approved by the purchaser, a part of them may be omitted.

- a) Symbol of grade
- b) Heat number or inspection number
- c) Diameter of the wire rod
- d) Manufacturer's name or identifying brand

10 Report The manufacturer shall submit to the purchaser the test results on the specified items when so requested by the purchaser.

If killed steel is specified, the silicon content shall be appended in the test results.

Attached Table 1 Normative references

- JIS G 0404 *Steel and steel products—General technical delivery requirements*
- JIS G 1211 *Iron and steel—Methods for determination of carbon content*
- JIS G 1212 *Iron and steel—Methods for determination of silicon content*
- JIS G 1213 *Iron and steel—Methods for determination of manganese content*
- JIS G 1214 *Iron and steel—Methods for determination of phosphorus content*
- JIS G 1215 *Iron and steel—Methods for determination of sulfur content*
- JIS G 1253 *Iron and steel—Method for spark discharge atomic emission spectrometric analysis*
- JIS G 1256 *Iron and steel—Method for X-ray fluorescence spectrometric analysis*
- JIS G 1257 *Iron and steel—Methods for atomic absorption spectrometric analysis*
- JIS G 1258 *Iron and steel—Methods for inductively coupled plasma atomic emission spectrometry*
- ISO 4948-1 *Steels—Classification—Part 1 : Classification of steels into unalloyed and alloy steels based on chemical composition*
- ISO 4948-2 *Steels—Classification—Part 2 : Classification of unalloyed and alloy steels according to main quality classes and main property or application characteristics*
- ISO 6892 *Metallic materials—Tensile testing at ambient temperature*

Annex 1 (normative)
Special quality requirements

These special quality requirements (including the marking system used at the time of application) shall be applied by agreement between the purchaser and the supplier, and the designated items shall be performed by the manufacturer.

1 Designation of low carbon steel When agreed between the purchaser and the supplier, the purchaser may designate the steel grade of low carbon given in annex 1 table 1.

Annex 1 Table 1 Chemical composition

Unit: %

Symbol of grade	C	Mn	P	S
SWRM 2	0.04 max.	0.60 max.	0.040 max.	0.040 max.
SWRM 4	0.06 max.	0.60 max.	0.040 max.	0.040 max.

2 Designation of Mn Only when the wire rod is intended for conversion to profile wires of high strength for welded steel wire fabrics, the following content may be designated by agreement between the purchaser and the supplier.

Mn : 0.60 % min. (preferably 0.60 % to 0.90 %)

3 Dimensional tolerances and out-of-roundness The purchaser may designate the requirements given in annex 1 table 2 by agreement between the purchaser and the supplier.

Annex 1 Table 2 Dimensional tolerances and out-of-roundness

Unit: mm

Diameter	Tolerance	Out of roundness
15 or less	±0.30	0.48 max.
Over 15 up to and incl. 25	±0.40	0.64 max.

