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High carbon steel wire rods

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Reference number : JIS G 3506 : 2004 (E)

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 3506:1996 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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High carbon steel wire rods

Introduction This Japanese Industrial Standard has been prepared based on the first editions 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.

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

1 Scope This Japanese Industrial Standard specifies high carbon steel wire rods (hereafter referred to as “wire rod”) to be used for the manufacture of hard drawn steel wires, oil tempered steel wires, hard drawn steel wires for prestressed concrete, galvanized steel wire strands, wire ropes, etc. However, the piano wire rods shall be excluded.

Remarks 1 The purchaser may designate Special quality requirements in annex 1, in addition to the items specified in this text by preliminary agreement with the manufacturer.

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

In additions, Symbols which denote the degree of correspondence in the contents between the relevant International Standard and JIS are IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21.

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

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

3 Quality requirements based on International Standard shall be 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) indicated below shall be applied.

3 Classification and symbol The wire rod shall be classified into 21 grades, and the symbol shall be as given in table 1.

4 Chemical composition The wire rod shall be tested in accordance with 8.1, and the

cast analysis value shall be as given in table 1.

Table 1. Chemical composition

Unit: %

Symbol of grad	C	Si	Mn	P	S
SWRH 27	0.24 to 0.31	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 32	0.29 to 0.36	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 37	0.34 to 0.41	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 42A	0.39 to 0.46	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 42B	0.39 to 0.46	0.15 to 0.35	0.60 to 0.90	0.030 max.	0.030 max.
SWRH 47A	0.44 to 0.51	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 47B	0.44 to 0.51	0.15 to 0.35	0.60 to 0.90	0.030 max.	0.030 max.
SWRH 52A	0.49 to 0.56	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 52B	0.49 to 0.56	0.15 to 0.35	0.60 to 0.90	0.030 max.	0.030 max.
SWRH 57A	0.54 to 0.61	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 57B	0.54 to 0.61	0.15 to 0.35	0.60 to 0.90	0.030 max.	0.030 max.
SWRH 62A	0.59 to 0.66	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 62B	0.59 to 0.66	0.15 to 0.35	0.60 to 0.90	0.030 max.	0.030 max.
SWRH 67A	0.64 to 0.71	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 67B	0.64 to 0.71	0.15 to 0.35	0.60 to 0.90	0.030 max.	0.030 max.
SWRH 72A	0.69 to 0.76	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 72B	0.69 to 0.76	0.15 to 0.35	0.60 to 0.90	0.030 max.	0.030 max.
SWRH 77A	0.74 to 0.81	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 77B	0.74 to 0.81	0.15 to 0.35	0.60 to 0.90	0.030 max.	0.030 max.
SWRH 82A	0.79 to 0.86	0.15 to 0.35	0.30 to 0.60	0.030 max.	0.030 max.
SWRH 82B	0.79 to 0.86	0.15 to 0.35	0.60 to 0.90	0.030 max.	0.030 max.

Remarks : Carbon content may be specified so as to be within the range narrowed by 0.01 % each from the upper and the lower limits given in table 1, when agreed upon between the purchaser and manufacturer.

5 Physical properties

5.1 Decarburized depth The wire rod shall be tested in accordance with 8.2, and the average of the total decarburized depth shall be 0.20 mm or less. However, this test may be omitted unless especially designated by the purchaser.

Furthermore, the purchaser may designate Special quality requirements given in annex 1, provided that agreed between the purchaser and the manufacturer.

5.2 Austenitic grain size and non-metallic inclusions The purchaser may designate either or both of the austenitic grain size and non-metallic inclusions. According to the designation, either or both of tests specified in 8.3 and 8.4 shall be carried out, and the specified values shall be agreed between the purchaser and the manufacturer.

6 Dimensions The diameter and its tolerances and out-of-round ⁽¹⁾ of the wire rod

shall be as given in the following:

Note (1) Out-of-round is the difference between the maximum and minimum values of diameter on the same cross-section of the wire rod.

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

Table 2. Standard diameters

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

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

Table 3. Tolerance and out-of-round

Unit: mm	
Tolerance	Out-of-round
± 0.40	0.64 max.

7 Appearance The wire rod shall be free from any defects that are detrimental to practical use. However, since generally it is difficult for the wire rod to be inspected to detect flaw(s) throughout its whole length and the wire rod is afforded no opportunity to remove defective portion(s), some irregular parts may be included. Accordingly, the disposition of such irregular parts shall be determined by agreement between the purchaser and the manufacturer.

8 Test

8.1 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 determined 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 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

8.2 Test on measurement of decarburized depth The test on measurement of decarburized depth shall be performed on request by the purchaser, and the measurement method shall be as given in the following:

- a) **Sampling method of test piece** One representative test piece shall be taken from one end of the coil of each lot of the same heat rolled to the same dimension.
- b) **Test method** The test method shall be in accordance with 4.1 of JIS G 0558. In this case, the average of total decarburized depth for the cross-section of the wire rod shall be measured at four positions where the circumference is equally divided

in reference to the position of the maximum total decarburized depth, and the average decarburized depth shall be obtained.

8.3 Austenitic grain size test The austenitic grain size test shall be performed on request by the purchaser, and the test method shall be as given in the following:

- a) Sampling method of test piece The sampling method of the test piece shall be agreed between the purchaser and the manufacturer.
- b) Test method The test method shall be in accordance with JIS G 0551. However, selection of applicable methods of the carburized grain size test method and the heat treated grain size test method specified in JIS G 0551 shall be agreed between the purchaser and the manufacturer.

8.4 Non-metallic inclusions test The non-metallic inclusions test shall be performed on request by the purchaser, and the test method shall be as given in the following:

- a) Sampling method of test piece The sampling method of the test piece shall be agreed between the purchaser and the manufacturer.
- b) Test method The test method shall be in accordance with JIS G 0555. However, selection of applicable methods of the standard drawing method specified in the text of JIS G 0555 and the point counting method shall be agreed between the purchaser and the manufacturer.

9 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 decarburized depth shall conform to the requirements of 5.1.
- d) The austenitic grain size shall conform to the requirements of 5.2.
- e) The non-metallic inclusions shall conform to the requirements of 5.2.
- f) The dimensions shall conform to the requirements of clause 6.
- g) The appearance shall conform to the requirements of clause 8.
- h) When "Special quality requirements" in annex 1 is designated to apply by agreement between the purchaser and the manufacturer, the wire rod shall conform to the requirements of clause 1 of annex 1.

10 Marking The wire rods 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 its abbreviation

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

Attached Table 1 Normative references

- JIS G 0404 *Steel and steel products—General technical delivery requirements*
- JIS G 0551 *Methods of austenite grain size determination for steel*
- JIS G 0555 *Microscopic testing method for the non-metallic inclusions in steel*
- JIS G 0558 *Methods of measuring decarburized depth for steel*
- 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 *Methods for determination of phosphorus in iron and steel*
- 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*
- ISO 16120-1 *Non-alloy steel wire rod for conversion to wire—Part 1: General requirements*

Annex 1 (normative) Special quality requirements

This Special quality requirements (including the marking system used at the time of application) shall be applied by agreement between the purchaser and the manufacturer, and it shall be performed by the manufacturer.

1 Decarburized depth When agreed between the purchaser and supplier, the purchaser may designate the following content:

Average of total decarburized depth: 0.15 mm max.

Annex 2 (normative) Quality requirements based on International Standard

This annex specifies the grades specified in ISO 16120-2: 2001, Non-alloy steel wire rod for conversion to wire—Part 2: Specific requirements for general purpose wire rod.

1 Scope Clause 2 of this annex may be applied in stead of clause 4 of the text according to the agreement between the purchaser and the manufacturer. Furthermore, when the grades in clause 2 of this annex are applied, whether the clauses from 3, 4 and 5 are applied or not shall be agreed between the purchaser and the manufacturer in advance.

2 Chemical composition The chemical composition shall be as given in annex 2 table 1.

Annex 2 Table 1 Chemical composition (1)

Unit: %

Symbol of grade (2)	C(3)	Si(4)	Mn(5)	P	S	Cr max.	Ni max.	Mo max.	Cu(6) max.	Al(7) max.
C26D	0.24to0.29	0.10to0.30	0.50to0.80	0.030	0.030	0.20	0.25	0.05	0.30	0.01
C32D	0.30to0.35	0.10to0.30	0.50to0.80	0.030	0.030	0.20	0.25	0.05	0.30	0.01
C38D	0.35to0.40	0.10to0.30	0.50to0.80	0.030	0.030	0.20	0.25	0.05	0.30	0.01
C42D	0.40to0.45	0.10to0.30	0.50to0.80	0.030	0.030	0.20	0.25	0.05	0.30	0.01
C48D	0.45to0.50	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C50D	0.48to0.53	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C52D	0.50to0.55	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C56D	0.53to0.58	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C58D	0.55to0.60	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C60D	0.58to0.63	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C62D	0.60to0.65	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C66D	0.63to0.68	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C68D	0.65to0.70	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C70D	0.68to0.73	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C72D	0.70to0.75	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C76D	0.73to0.78	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C78D	0.75to0.80	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C80D	0.78to0.83	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C82D	0.80to0.85	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C86D	0.83to0.88	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C88D	0.85to0.90	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01
C92D	0.90to0.95	0.10to0.30	0.50to0.80	0.030	0.030	0.15	0.20	0.05	0.25	0.01

Notes (1) Elements not included in this table may not be added intentionally to the steel without the agreement of the purchaser, except those intended for finishing the heat. The addition of microalloying elements may be agreed upon between the manufacturer and purchaser at the time of ordering.

(2) Normal carbon steel complying with ISO 4948-1 and ISO 4948-2.

- (3) For steels C32D2 to C98D2, the carbon range may be enlarged by 0.01 % by agreement between the purchaser and the manufacturer, respectively.
- (4) For wire rod intended for galvanizing, the required lower limit of silicon content should be specified at the time of ordering.
- (5) For the manganese content, a different range from the one indicated in annex 2 table 1 can be agreed upon at the time of ordering with a maximum not exceeding 1.20 % and a minimum not lower than 0.30 %.
- (6) The Cu content may be 0.20 % by agreement between the purchaser and the manufacturer. Furthermore, in the range from C48D to C92D, Cu + Sn \leq 0.25 % shall apply.
- (7) By agreement between the purchaser and the manufacturer the value for aluminium can be fixed at 0.01 % to 0.06 %. The value for silicon can then be fixed at \leq 0.10 % on request.

3 Surface quality test The depth of defect shall be determined by the file test. One coil per each 10 t of a test unit with a minimum of three test pieces shall be taken. The sampling position of a test piece shall be not less than 300 mm from an end of the wire rod. The testing procedure shall be as given in the following:

- a) Measure the diameter of the test piece.
- b) Filing shall be carried out until the surface defects are no longer visible without the aid of magnifying instruments.
- c) Determine the depth of the defect by measuring the difference in diameter before and after filing. The tolerance shall not exceed the values given in annex 2 table 2.

Annex 2 Table 2 Permissible depth of flaws

Unit: mm	
Diameter d_N	Maximum permissible depth of flaws
$5 \leq d_N \leq 12$	0.20
$12 \leq d_N \leq 18$	0.25
$18 \leq d_N \leq 30$	0.30

4 Core segregation test The test method for core segregation shall be based on annex A of ISO 16120-1.

The evaluation of core segregation of grades of this annex 2 including C of at least C60 D shall not exceed 20 % of number of test specimens with the evaluation point 4 unless otherwise agreed upon between the purchaser and the manufacturer. Furthermore, the evaluation point 5 shall not be permitted.

5 Tensile test If requested from the purchaser at the time of order, the manufacturer shall perform the test in accordance with ISO 6892, and submit the tested values of tensile strength.

Annex 3 (informative) Comparison Table between JIS and corresponding International Standard

JIS G 3506: 2004 High carbon steel wire rods		ISO 16120-1 Non-alloy steel wire rod for conversion to wire — Part 1: General requirements		ISO 16120-2 Non-alloy steel wire rod for conversion to wire — Part 2: Specific requirements for general purpose wire rod	
(I) Requirements in JIS		(II) International Standard number	(III) Content specified in International Standard	(V) Justification for the technical deviation and future measures	
Clause	Content	Clause	Content	Classification by clause	Content of technical difference
1 Scope	Piano wire rods to be used for the manufacture of hard drawn steel wires, oil tempered steel wires, hard drawn steel wires for prestressed concrete, galvanized steel wire strands, wire ropes, etc. (excluding piano wire rods)	1	General-use wire rods for drawing and/or cold rolling.	MOD/deletion	In JIS, wire rods are classified into 3 categories of soft steel wires (low and middle carbon steel), general-use wire rods of hard drawn steel wires (middle and high steel) and piano wire rods of high class wire rods (high carbon steel), and in ISO standard, wire rods are classified into 2 categories of general-use wire rods (ISO 16120-2) including steel from low carbon steel to high carbon steel, and high class wire rods (Special applications: ISO 16120-4). Thus, the classification differs between JIS and ISO standard. Here, wire rods in ISO 16120-2 corresponding to hard drawn steel wires in JIS are specified. Wire rods corresponding to soft steel wires in JIS were made to be specified in JIS G 3505, and wire rods corresponding to piano wire rods of high class wire rods in ISO 16120-4 were made to be specified in JIS G 3502.

Annex 3 (informative) (continued)

(I) Requirements in JIS		(II) International Standard number		(III) Content specified in International Standard		(IV) Classification and details of technical difference between JIS and the International Standard by clause		(V) Justification for the technical deviation and future measures	
Clause	Content	Clause	Content	Classification by clause	Content of technical difference	Location of deviation: text, annex	Indication method: dotted underlines		
2 Normative references	Related JISs are referred to. (attached table 1)	2	Related ISO standards are referred to.	—	—	—	—	—	—
3 Classification and symbol	21 grades and their symbols of JIS classification.	3	30 grades of ISO standard and their symbols (table 1).	MOD/deletion	21 grades of middle and high carbon steel in ISO standard are for use of hard drawn steel wires.	—	—	—	—
4 Chemical composition	The chemical composition of 21 grades is specified.	3.2	The chemical composition of 30 grades (from low carbon steel to high carbon steel) is specified. (table 1)	MOD/deletion	22 grades of middle and high carbon steel in ISO 16120-2 correspond to hard drawn steel wires in chemical composition. In ISO standard, Cr, Ni, Mo, Cu, Al which are not specified in JIS are specified.	—	—	Hard drawn steel wires in ISO standard almost correspond to those in JIS G 3506. Furthermore, 22 grades of middle and high carbon steel in ISO standard which correspond to JIS were specified in annex 2 as they are. Grades of low carbon steel were specified in soft steel wire rods (JIS G 3505).	—

Annex 3 (informative) (continued)

(I) Requirements in JIS		(II) International Standard number	(III) Content specified in International Standard		(IV) Classification and details of technical difference between JIS and the International Standard by clause Location of deviation: text, annex Indication method: dotted underlines	(V) Justification for the technical deviation and future measures	
Clause	Content		Clause	Content			
5 Physical properties	5.1 Decarburized depth	ISO 16120-1		In ISO standard, decarburized depth, austenitic grain size, and non-metallic inclusions for general-use wire rods are not especially specified. On the other hand, the following items not specified in JIS are specified in ISO standard. — Tensile strength (specified in ISO 6892) — Surface discontinuities — Core segregation — Criteria sample of core segregation	It is specified in ISO standard that the test is performed when agreed upon between the purchaser and the manufacturer for core segregation, and when requested at the time of ordering for tensile strength. (especially, the C level with regard to segregation level of at least C60D is specified) On the other side, in JIS, core segregation and tensile strength are not specified. In ISO standard, permissible values of surface discontinuities are specified	Since in Japan the 100 % continuous casting is performed, wire rods at the level of core segregation such as specified in annex A in ISO 16120-1 do not occur. Furthermore, since variation of tensile strength is small for the same reason, tensile strength is not especially specified. Furthermore, data of tensile strength of steel material is for wire rods, and values of tensile strength of wires are only for reference because values of tensile strength of wires become different due to the subsequent secondary working and heat treatment. Deletion of tensile strength test will be proposed to ISO. Whether the permissible depth of flaws which is not specified in the hard drawn steel wires of JIS should be specified as specified in ISO standard or not is a subject to be studied in the future.	
	5.2 Austenitic grain size and non-metallic inclusions						9.5.2
							9.5.3
							9.5.7
		annex A					

Annex 3 (informative) (continued)

(I) Requirements in JIS		(II) International Standard number	(III) Content specified in International Standard		(IV) Classification and details of technical difference between JIS and the International Standard by clause Location of deviation: text, annex Indication method: dotted underlines	(V) Justification for the technical deviation and future measures	
Clause	Content		Clause	Content			
6 Dimensions	a) Standard diameters of the wire rod (table 2) b) Tolerances on diameters and out-of-round of the wire rod (table 3)	ISO 16120-1		Standard diameter, dimensional tolerances, mass are specified. In ISO standard, out-of-round of the wire rod is not specified.	MOD/deletion	In ISO standard, mass is also specified. Standard diameters: JIS: 5.5 mm ϕ to 19 mm ϕ ISO standard: 5 mm ϕ to 30 mm ϕ Dimensional tolerances: In JIS, tolerances differ according to grades (soft steel wires, hard drawn steel wires, piano wire rods). In ISO standard, tolerances are fixed irrespective of grades. Tolerances of hard drawn steel wires which are reduced compared with those in JIS are fixed (± 0.40 mm) irrespective of dimensions, but differ according to diameters.	In JIS, mass is specified in common requirements in JIS G 3194, and it is not necessary to specify it in this JIS. Standard diameters depend on the capacity of equipment. Dimensional tolerances should be specified by grades, and the improved draft of ISO/DIS 16124 (old ISO 8457-1) is under review.
7 Appearance	Free from any defects that are detrimental to practical use.	ISO 16120-2	3.3	Internal soundness and surface quality. Portions which are not normal are not specified.	MOD/deletion	In JIS, the requirement of internal soundness is not touched upon.	—

Annex 3 (informative) (continued)

(I) Requirements in JIS		(II) International Standard number	(III) Content specified in International Standard		(IV) Classification and details of technical difference between JIS and the International Standard by clause	(V) Justification for the technical deviation and future measures
Clause	Content	Clause	Content	Classification by clause	Content of technical difference	
8 Test	<p>8.1 Chemical analysis</p> <p>a) General requirements for chemical analysis and sampling method of specimens for analysis in accordance with JIS G 0404</p> <p>b) Method for chemical analysis</p> <p>8.2 Test on measurement of decarburized depth</p> <p>8.3 Austenitic grain size test</p> <p>8.4 Non-metallic inclusions test</p>	9.4.1 9.5.1	<p>The samples are taken in accordance with ISO 14284.</p> <p>The chemical composition is determined with the test method described in ISO/TR 9769.</p> <p>Not specified in ISO standard.</p> <p>Not specified in ISO standard.</p> <p>The following items not specified in JIS are specified in ISO standard.</p>	IDT	<p>It is specified in ISO standard that the test is performed when agreed upon between the purchaser and the manufacturer for core segregation, and when requested at the time of ordering for tensile strength.</p> <p>In JIS, core segregation and tensile strength are not specified.</p> <p>In ISO standard, permissible values of surface discontinuities are specified</p>	<p>ISO standard is for general-use wire rods, and various tests of hard drawn steel wires specified in JIS are excluded in ISO standard. This difference is considered to be a difference in the quality requirement level. (a difference between low class grades in ISO standard and high-quality general-use grades in JIS)</p>

Annex 3 (informative) (continued)

(I) Requirements in JIS		(II) International Standard number	(III) Content specified in International Standard		(IV) Classification and details of technical difference between JIS and the International Standard by clause Location of deviation: text, annex Indication method: dotted underlines	(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content		
8 Test			9.5.2 9.5.3 9.5.7 annex A	<ul style="list-style-type: none"> - Tensile strength (specified in ISO 6892) - Surface discontinuities (depth of flaws) - Core segregation - Criteria sample of core segregation 	<ul style="list-style-type: none"> MOD/deletion MOD/deletion MOD/deletion MOD/deletion 	
9 Inspection	Inspection conditions are described.	ISO 16120-1	9	Inspection Identical with JIS. The decarburized depth, austenitic grain size, and non-metallic inclusions not specified in ISO standard are added.	<ul style="list-style-type: none"> MOD/deletion MOD/addition 	<p>Equal to the reason in clause 4 Chemical composition.</p> <p>See "(V) The justification for the technical deviation" in clause 8 Test.</p>
10 Marking	The result report is described.	ISO 16120-1	10	Identical with JIS.	IDT	-
11 Report	The test results are submitted.	ISO 16120-1	9.1	Identical with JIS.	IDT	-

Annex 3 (informative) (continued)

(I) Requirements in JIS		(II) International Standard number		(III) Content specified in International Standard		(IV) Classification and details of technical difference between JIS and the International Standard by clause		(V) Justification for the technical deviation and future measures	
Clause	Content	Clause	Content	Classification by clause	Content of technical difference	Justification for the technical deviation and future measures	Classification by clause	Content of technical difference	Justification for the technical deviation and future measures
Annex 1	1 Decarburized depth	—	—	—	—	—	MOD/addition	—	In Japan, there exist user needs which must be responded with the special quality requirements. Special requirements which are taken into consideration the actual trade circumstances will be proposed to ISO.
Annex 2	22 grades in ISO 16120-2 which correspond to hard drawn steel wires are specified. 2 Chemical composition	3.2	Chemical composition: Among grades of ISO 16120-2, 22 grades from C26D to C92D which correspond to hard drawn steel wires in the carbon level are specified as grades equivalent to hard drawn steel wires.	MOD/deletion	The upper limit of Cr, Ni, Mo, Cu, Al which are not specified in JIS are specified. The requirement for surface quality test is added to permissible depth of flaws in ISO standard.	In JIS, the requirements are specified based on the an assumption that minor elements are not added. On the other hand, in ISO standard, the upper limits of minor elements are specified, and the basic point of view in both standards does not differ.	MOD/deletion	—	In ISO standard, the inspection method is selected by the manufacturer, and there is not a substantial difference between JIS and ISO standard.
	3 Surface quality test (permissible depth of flaws) 4 Core segregation test	3.4 3.5	Surface quality test (permissible depth of flaws) Core segregation test	MOD/addition IDT	—	—	—	—	—

Annex 3 (informative) (concluded)

(I) Requirements in JIS		(II) International Standard number	(III) Content specified in International Standard		(IV) Classification and details of technical difference between JIS and the International Standard by clause Location of deviation: text, annex Indication method: dotted underlines	(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Content of technical difference
Annex 2	5 Tensile test		3.6	Tensile test	IDT	The depth of decarburization, austenitic grain size test and non-metallic inclusions test are not specified in ISO standard, which is because the quality requirement level differ between ISO standard and JIS. When the above-mentioned tests are requested, the requirements in the text are applied.
Annex 3	Comparison table between JIS and corresponding International Standard		—	—	—	—

Designated degree of correspondence between JIS and International Standard: MOD

Remarks 1 Symbols in sub-columns of classification by clause in the above table indicate as follows:

- IDT: Identical in technical contents
- MOD/deletion: Deletes specification item(s) or content(s) of International Standard.
- MOD/addition: Adds the specification item(s) or content(s) which are not included in International Standard.

2 Symbol in columns of designated degree of correspondence between JIS and International Standard in the above table indicates as follows:

- MOD: Modifies International Standard.

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