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 **JIS G 4401** : 2000

**Carbon tool steels**

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**ICS** 25.100.01; 77.140.35

**Descriptors** : tool steels, unalloyed steels

**Reference number** : JIS G 4401 : 2000 (E)

G 4401 : 2000

## Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. By this revision, **JIS G 4401 : 1983** was withdrawn and replaced by this Standard.

As the result of the investigation of JIS to harmonize with International Standard carried out in 1995 to 1997, **JIS G 4401** corresponding to International Standard, **ISO 4957 : 1980 Tool steels** was newly established in order to avoid confusion in the market and became double Standards for the same application. On the occasion of the publication of **ISO/FDIS 4957 : 1998** which was revised with Japanese proposal employed as the result of the subsequent activities of JIS to harmonize with International Standard, this revision is made for conformity with "Modified" level of **ISO/IEC Guide 21 : 1999 Adoption of International Standards as regional or national standards**, as well as for adaptation to the domestic market needs.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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## Carbon tool steels

**Introduction** This Japanese Industrial Standard has been prepared based on the corresponding International Standard, **ISO/FDIS 4957 : 1998 *Tool steels*** at the “Modified” level of **ISO/IEC Guide 21 : 1999** on the occasion of reviewing **JIS G 4401 : 1983** in accordance with **JIS Z 8301 *Rules for the drafting and presentation of Japanese Industrial Standards***.

**1 Scope** This Standard specifies the carbon tool steels (hereafter referred to as “steels”) manufactured by hot-rolling or forging.

Remarks : The International Standard corresponding to this Standard is as follows.

Designation indicating the degree of correspondence is IDT (identical), MOD (modified), and NEQ (not equivalent) in accordance with **ISO/IEC Guide 21**.

ISO/FDIS 4957 *Tool steels* (MOD)

**2 Normative references** The standards given 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 apply.

**3 Grade and designation** The steels shall be classified into 11 grades and the designation shall be as given in Table 1.

Informative reference : For SK75 (the old **JIS** designation, SK6) and SK65 (the old **JIS** designation, SK7), the transitional period for **ISO** harmonization is set as five years and after this period these are planned to be deleted.

**4 Method of manufacture** The method of manufacture shall be as follows:

- a) The steel shall be made of killed steel.
- b) Unless otherwise specified, the steel shall be rolled or forged with a forming ratio of 4S or over.

However, if this forming ratio is difficult to attain 4S owing to the dimension of the steel, it may be overcome by upset forging.

- c) Unless otherwise specified, the steel shall be subjected to annealing. The plate and sheet in coils and cut lengths, however, shall be as rolled, unless otherwise specified.

**5 Chemical composition** The chemical composition of the steel shall be determined by the test of 10.1 and the values obtained by the cast analysis shall conform to Table 1.

**Table 1 Designation of steel grade and chemical composition**

Unit : %

Designation of grade	Chemical composition					Example of application (informative)
	C	Si	Mn	P	S	
SK140 (SK1)	1.30 to 1.50	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Blade file and file set
SK120 (SK2) (TC120)	1.15 to 1.25	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Drill, small punch, razor, file, cutting tool, hacksaw and spiral spring
SK105 (SK3) (TC105)	1.00 to 1.10	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Hacksaw, bit, gauge, spiral spring, die for press, jig and tool and cutting tool
SK95 (SK4)	0.90 to 1.00	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Drill for wood working, hatchet, bit, spiral spring, pen nib, chisel, slitters knife, die for press, gauge and latch needle
SK90 (TC90)	0.85 to 0.95	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Die for press, spiral spring, gauge and needle
SK85 (SK5)	0.80 to 0.90	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Steel stamp, die for press, spiral spring, band saw, jig and tool, cutting tool, circular saw, gauge and needle
SK80 (TC80)	0.75 to 0.85	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Steel stamp, die for press and spiral spring
SK75 (SK6)	0.70 to 0.80	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Steel stamp, snap, circular saw, spiral spring and die for press
SK70 (TC70)	0.65 to 0.75	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Steel stamp, snap, spiral spring and die for press
SK65 (SK7)	0.60 to 0.70	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Steel stamp, snap, die for press and knife
SK60	0.55 to 0.65	0.10 to 0.35	0.10 to 0.50	0.030 max.	0.030 max.	Steel stamp, snap and die for press

Remarks : The contents of Cu, Cr and Ni for each grade shall not exceed 0.25 %, 0.30 % and 0.25 % respectively, as the impurities.

Informative references 1 SK75 and SK65 are planned to be deleted when reviewed in 5 years.

2 (SKxx) in parentheses indicates the designation of steel grade of the old JIS and (TCxx) in parentheses indicates the designation of steel grade in accordance with ISO/FDIS 4957 : 1998.

**6 Hardness in annealed condition** The annealed hardness for the steel shall conform to Table 2. Pertaining to the steel for which the measurement by Brinell hardness is difficult, however, it may be made by Rockwell B hardness or Vickers hardness. In this case, the value of Rockwell B or Vickers hardness shall be agreed upon between the purchaser and the manufacturer.

**Table 2 Annealed hardness of steel**

Designation of grade	Annealing temperature °C	Annealed hardness HB
SK140	750 to 780 slow cooling	217 max.
SK120	750 to 780 slow cooling	217 max.
SK105	750 to 780 slow cooling	212 max.
SK95	740 to 760 slow cooling	207 max.
SK90	740 to 760 slow cooling	207 max.
SK85	730 to 760 slow cooling	207 max.
SK80	730 to 760 slow cooling	192 max.
SK75	730 to 760 slow cooling	192 max.
SK70	730 to 760 slow cooling	183 max.
SK65	730 to 760 slow cooling	183 max.
SK60	730 to 760 slow cooling	183 max.

Remarks : For hot-rolled steel plate and sheet in coils and cut lengths, the hardness value as rolled or in annealed condition shall be agreed upon between the purchaser and the manufacturer.

**7 Hardness in quenched and tempered condition** The test piece which is the representative of the steel to be quenched and tempered shall be subjected to heat treatment at the temperature given in Table 3 and the hardness on the test piece in quenched and tempered condition shall conform to Table 3, provided that the allowable temperature range of the test piece shall be  $\pm 10$  °C of the temperature given in Table 3 for both quenching and tempering treatment.

The preferred range of heat treatment temperature by designation of grade shall be as given in Annex 1 (informative).

**Table 3 Quenched and tempered hardness of test piece**

Designation of grade	Heat treatment temperature °C		Quenched and tempered hardness HRC
	Quenching	Tempering	
SK140	780 water cooling	180 air cooling	63 min.
SK120	780 water cooling	180 air cooling	62 min.
SK105	780 water cooling	180 air cooling	61 min.
SK95	780 water cooling	180 air cooling	61 min.
SK90	780 water cooling	180 air cooling	60 min.
SK85	780 water cooling	180 air cooling	59 min.
SK80	790 water cooling	180 air cooling	58 min.
SK75	790 water cooling	180 air cooling	57 min.
SK70	800 water cooling	180 air cooling	57 min.
SK65	800 water cooling	180 air cooling	56 min.
SK60	810 water cooling	180 air cooling	55 min.

Remarks : For the steels which have not been annealed, it shall be subjected to annealing according to Table 2 and subsequently quenching and tempering.

## 8 Appearance, shape, dimensions and tolerances

### 8.1 Hot-rolled round steel bar

**8.1.1 Appearance** The hot-rolled round steel bar shall have a well workmanlike finish, and shall be free from defects that are detrimental to practical use. The machined product, ground, polished or finished, shall be free from surface defects and decarburization. When purchasing the hot-rolled or forged, or cold-drawn or coarse-machined product, the product with the adequate thickness including the extra thickness necessary for removing its surface defects shall be ordered. The inspection method of the extra thickness and appearance shall be agreed upon between the purchaser and the manufacturer.

**8.1.2 Standard dimension** The standard diameter of the hot-rolled round steel bar shall be as given in Table 4.

**Table 4 Standard diameter**

Unit : mm

10	20	30	50	100
11	21	32	55	110
12	22	34	60	120
13	23	36	65	130
14	24	38	70	140
15	25	40	75	150
16	26	42	80	
17	27	44	85	
18	28	46	90	
19	29	48	95	

**8.1.3 Dimensional tolerances** The tolerances on diameter for the hot-rolled round steel bar shall conform to Table 5.

**Table 5 Tolerances on diameter**

Unit : mm

Specified diameter	Tolerances on diameter	Allowable deviation on ovality
10 or over to and excl. 16	+0.6 -0.3	Up to and incl. 70 % of the full range of tolerance on diameter
16 or over to and excl. 30	+0.7 -0.3	
30 or over up to and incl. 150	+2.5 % -1.0 %	

Remarks : The tolerances on diameter for the round steel bar whose diameter is under 10 mm and over 150 mm shall be agreed upon between the purchaser and the manufacturer.

## 8.2 Hot-rolled steel plate and sheet in coils and cut lengths

**8.2.1 Appearance** The appearance of the hot-rolled steel plate and sheet in coils and cut lengths shall be in accordance with **6** in **JIS G 3193**.

**8.2.2 Standard dimension** The standard dimension of the hot-rolled steel plate and sheet in coils and cut lengths shall conform to **a)** and **b)** of the following:

- a) The standard thickness of the hot-rolled steel plate and sheet in coils and cut lengths shall be in accordance with **(1)** of **3** in **JIS G 3193**.
- b) The standard width and length of the hot-rolled steel plate and sheet in coils and cut lengths shall be in accordance with **(2)** and **(3)** of **3** in **JIS G 3193**.

**8.2.3 Tolerances on shape and dimension** The tolerances on shape and dimension for the hot-rolled steel plate and sheet in coils and cut lengths shall conform to **a)** and **b)** of the following:

- a) The tolerances on shape and dimension for the hot-rolled steel plate and sheet in coils and cut lengths shall conform to **4** in **JIS G 3193**. In this case, the thickness tolerances shall be applied to those under 160 mm in thickness, and for the plates 160 mm or over in thickness, it shall be agreed upon between the purchaser and the manufacturer.
- b) The upper limit of flatness for hot-rolled steel plate and sheet shall conform to **1)** and **2)** of the following:
  - 1) The tolerances for the steel plate and sheet under 160 mm in thickness shall conform to Table 6.
  - 2) The tolerances for the steel plate 160 mm or over in thickness shall be agreed upon between the purchaser and the manufacturer.

**Table 6 Upper limit of flatness for hot-rolled steel plate and sheet**

Unit : mm

Thickness	Width					
	Under 1 250	1 250 or over to and excl. 1 600	1 600 or over to and excl. 2 000	2 000 or over to and excl. 2 500	2 500 or over to and excl. 3 000	3 000 or over
Under 1.60	27	30	—	—	—	—
1.60 or over to and excl. 4.00	24	27	30	—	—	—
4.00 or over to and excl. 6.30	21	24	27	33	38	42
6.30 or over to and excl. 10.0	18	21	24	30	36	39
10.0 or over to and excl. 25.0	15	18	21	24	27	30
25.0 or over to and excl. 63.0	12	15	18	21	24	27
63.0 or over to and excl. 160	12	12	15	18	21	24

- Remarks
- 1 This table shall not apply to the steel plate and sheet supplied as stretcher leveled condition.
  - 2 This table shall be applied in any 4 000 mm length. When the length of the steel plate or sheet is under 4 000 mm, this table shall be applied to the whole length.
  - 3 The value of flatness shall be determined by subtracting the thickness of the steel plate or sheet from the maximum value of strain, and shall be applied to the upper surface of the steel plate or sheet.
  - 4 This table shall not apply to as-rolled (mill edged) steel plate and sheet.
  - 5 Measurement on flatness should be made, as a rule, on a flat horizontal plate.

**8.3** The appearance, dimensions and dimensional tolerances for the steels whose profiles are other than those specified in **8.1** and **8.2**, shall be agreed upon between the purchaser and the manufacturer.



**9 Decarburization** The steel shall be free from appreciable decarburization. In this case, the allowable limit of decarburized depth of the hot-rolled round steel bar shall conform to Table 7.

**Table 7 Decarburized depth of hot-rolled round steel bar**

Unit : mm

Specified diameter	Allowable limit
Under 15	0.30
15 or over to and excl. 25	0.50
25 or over to and excl. 50	0.80
50 or over to and excl. 75	1.10
75 or over to and excl. 100	1.40
100 or over to and excl. 130	1.80
130 or over to and excl. 135	2.00

Remarks : The allowable limit of decarburized depth for the steel plate and sheet in coils and cut lengths shall be agreed upon between the purchaser and the manufacturer.

## 10 Test

### 10.1 Chemical analysis

**10.1.1 General requirement for chemical analysis and sampling method of specimen for analysis** The chemical composition shall be determined by the cast analysis. The general requirement for chemical analysis and sampling method of specimen for analysis shall be in accordance with the specification of 8 in **JIS G 0404**.

**10.1.2** The analytical method shall comply with appropriate standard among the following ones:

**JIS G 1211, JIS G 1212, JIS G 1213, JIS G 1214, JIS G 1215, JIS G 1216, JIS G 1217, JIS G 1219, JIS G 1253, JIS G 1256, JIS G 1257**

### 10.2 Hardness test

**10.2.1** The measurement of hardness on the annealed steel shall be made at arbitrary place of the steel.

**10.2.2** Pertaining to the sampling plan, one test specimen for quenched and tempered hardness test shall be taken from each same heat of the steel, each same dimension, and each same heat treatment condition, provided that the thickness ratio within 1.5 is regarded as equivalent to the same dimension.

**10.2.3** The test piece for quenched and tempered hardness test shall be machined from the test specimen prepared according to **10.2.2** to furnish approximately 15 mm square or circle, and approximately 20 mm length. The test piece with thickness and diameter not more than 15 mm, respectively, shall be regarded as equivalent to diameter  $\times$  approximately 20 mm or thickness  $\times$  15 mm  $\times$  20 mm. When it is difficult to apply these dimensions of the test piece, it shall be agreed upon between the purchaser and the manufacturer.

**10.2.4** The test method shall conform to any one of the following standards:

**JIS Z 2243, JIS Z 2244, JIS Z 2245**

**10.3 Measurement of decarburized depth** The measurement of decarburized depth shall be made by the total decarburized depth (DM-T) according to **4.1** of **JIS G 0558**.

## **11 Inspection**

**11.1 Inspection** Inspection shall be as follows:

- a) General requirements given in **JIS G 0404** shall apply.
- b) Chemical composition shall comply with **5**.
- c) Annealed hardness of steel shall comply with **6**.
- d) Hardness in quenched and tempered condition shall comply with **7**.
- e) Appearance, shape, dimension and tolerances shall comply with **8**.
- f) The test result on decarburization shall comply with **9**.

**11.2 Other inspection** In addition to the inspection items specified in **11.1**, any necessary items among those special requirements as given in the following may be designated. In this case, the purchaser shall previously agree with the manufacturer on the inspection items, sampling method, test method and acceptance criteria.

Macro-structure examination

Micro-structure examination

Non-metallic inclusions examination

Macro-streak-flaw examination

Magnetic particle examination

Ultrasonic flaw detection examination

However, the sampling method of the test specimen, test piece, test method, etc. shall conform to the following standards:

**JIS G 0416, JIS G 0553, JIS G 0555, JIS G 0556; JIS G 0565, JIS Z 2344**

## **12 Marking**

**12.1 Steel bar, flat steel bar and steel wire rod** Pertaining to the marking on the steel bar, flat steel bar and steel wire rod, the following items shall be marked by suitable means on each steel product. However, the steel product whose diameter or width across flats is under 30 mm may be bundled, and the items may be marked on each bundle by suitable means. Furthermore, a part of the following items may be omitted, when approved by the purchaser.

- a) Designation of grade
- b) Heat number or alternative manufacturing (inspection) number
- c) Dimension
- d) Quantity or mass
- e) Manufacturer's name or identifying brand

**12.2 Steel plate and sheet in coils and cut lengths** Pertaining to the marking of the steel plate and sheet in coils and cut lengths the following items shall be legibly marked by suitable means on each steel product or each bundle. When approved by the purchaser, however, a part of the items may be omitted.

- a) Designation of grade
- b) Heat number or alternative manufacturing (inspection) number
- c) Dimension
- d) Quantity or mass
- e) Manufacturer's name or identifying brand

**13 Report** The manufacturer shall submit to the purchaser the report in which the designation of grade, heat number or alternative manufacturing number, chemical composition, dimension and delivery conditions for the steel are entered. However, pertaining to submission of the test results report prepared according to 11.2, it shall be agreed upon between the purchaser and the manufacturer.

**Attached Table 1 Normative references**

- JIS G 0404 *Steel and steel products—General technical delivery requirements*
- JIS G 0416 *Steel and steel products—Location and preparation of samples and test pieces for mechanical testing*
- JIS G 0553 *Macrostructure detecting method for steel*
- JIS G 0555 *Microscopic testing method for the non-metallic inclusions in steel*
- JIS G 0556 *Method of macro-streak-flaw test for steel*
- JIS G 0558 *Methods of measuring decarburized depth for steel*
- JIS G 0565 *Method for magnetic particle testing of ferromagnetic materials and classification of magnetic particle indication*
- 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 *Methods for determination of manganese in iron and steel*
- 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 1216 *Iron and steel—Methods for determination of nickel content*
- JIS G 1217 *Methods for determination of chromium in iron and steel*
- JIS G 1219 *Iron and steel—Methods for determination of copper 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 3193 *Dimensions, mass and permissible variations of hot rolled steel plates, sheets and strip*
- JIS Z 2243 *Brinell hardness test—Test method*
- JIS Z 2244 *Vickers hardness test—Test method*
- JIS Z 2245 *Rockwell hardness test—Test method*
- JIS Z 2344 *General rule of ultrasonic testing of metals by pulse echo technique*

## Annex 1 (informative)

### Preferred heat treatment temperature

This Annex 1 (informative) describes preferred heat treatment temperature, and does not constitute provisions of this Standard.

**1 Scope** The preferred heat treatment temperature range to be selected in accordance with use and dimension of product when the examples of application given in Table 1 of the body are subjected to heat treatment is as follows. However, all the conditions do not always satisfy hardness in quenched and tempered condition specified in Table 3 of the body.

**Annex 1 Table 1 Preferred heat treatment temperature**

Designation of grade	Preferred heat treatment temperature °C	
	Quenching	Tempering
SK140	750 to 810 water cooling	150 to 200 air cooling
SK120	750 to 810 water cooling	150 to 200 air cooling
SK105	750 to 810 water cooling	150 to 200 air cooling
SK95	750 to 810 water cooling	150 to 200 air cooling
SK90	750 to 810 water cooling	150 to 200 air cooling
SK85	750 to 810 water cooling	150 to 200 air cooling
SK80	760 to 820 water cooling	150 to 200 air cooling
SK75	760 to 820 water cooling	150 to 200 air cooling
SK70	770 to 830 water cooling	150 to 200 air cooling
SK65	770 to 830 water cooling	150 to 200 air cooling
SK60	780 to 840 water cooling	150 to 200 air cooling

**Annex 2 (informative)**  
**Comparison table between JIS and corresponding International Standard**

<b>JIS G 4401 : 2000</b>		<b>Carbon tool steels</b>		<b>ISO/FDIS 4957 : 1998</b>		<b>Tool steels</b>					
<b>(I) Content specified in JIS</b>		<b>(II) International Standard number</b>		<b>(III) Content specified in International Standard</b>		<b>(IV) Evaluation for each clause and content of technical difference between JIS and International Standard</b>		<b>(V) Reason why the conformity between JIS and International Standard is difficult and measures to be taken in the future</b>			
Clause number	Content	Clause number	Content	Evaluation for each clause	Content of technical difference						
1	Scope Steels manufactured by hot-rolling or forging • Carbon tool steels			1	Scope: Applies to hot-rolled, forged, cold-drawn or cold-rolled products. a) non-alloy cold-work tool steels b) alloy cold-work tool steels c) alloy hot-work tool steels d) high-speed tool steels	MOD/ deletion	JIS specifies alloy tool steels in <b>JIS G 4404</b> and high-speed tool steels in <b>JIS G 4403</b> . This comes from difference of Standard system.	This comes from the usability of Standard and does not give any problems when comparing difference between both Standards. For the time being difference should not be modified. This Table provides comparison focusing on carbon tool steels based on <b>JIS</b> .			

(I) Content specified in JIS		(II) International Standard number		(III) Content specified in International Standard		(IV) Evaluation for each clause and content of technical difference between JIS and International Standard		(V) Reason why the conformity between JIS and International Standard is difficult and measures to be taken in the future	
Clause number	Content	Clause number	Content	Evaluation for each clause	Content of technical difference				
4	Method of manufacture	5.1	<p>Manufacturing process</p> <p>a) The manufacturing process of the steels is left to the discretion of the manufacturer.</p> <p>b) When the purchaser so requests, he shall be informed what steel making process is being used.</p> <p>c) Unless otherwise specified in the order, the tool steels are delivered in the annealed condition except below.</p> <p>C45U, 35CrMo7, X38CrMo16, 40CrMnNiMo8-6-4, 55NiCrMoV7</p>	MOD/ addition	<p>• a) and b) of ISO are general and ordinary. They should be described in ISO 404. This idea will be proposed when reviewing ISO 404 next time.</p> <p>• Forming ratio in JIS should be specified in light of domestic needs although it is not strict and widely satisfied.</p> <p>• JIS specifies the plate and sheet in coils and cut lengths because they are not generally cut or cold-worked as they are. This will be also proposed when reviewing ISO next time.</p>	<p>The JIS description relating to forming ratio and supply of the plate and sheet in coils and cut lengths as rolled will be proposed when reviewing ISO next time.</p>			

(I) Content specified in JIS		(II) International Standard number	(III) Content specified in International Standard		(IV) Evaluation for each clause and content of technical difference between JIS and International Standard		(V) Reason why the conformity between JIS and International Standard is difficult and measures to be taken in the future
Clause number	Content		Clause number	Content	Evaluation for each clause	Content of technical difference	
5	Chemical composition	ISO/FDIS 4957	5.2	Chemical composition: Specifies 6 grades of steels by %C.	Combination of MOD/deletion and MOD/addition	5 grades in 6 grades of steels of ISO are adopted which are adaptable to domestic market needs. JIS-specific grades of steels widely used in the market are also specified.	Harmonization to ISO grades of steels will be promoted, while grades of steels indispensable for domestic market needs are left as they are. JIS-specific grades of steels will be proposed to be incorporated into ISO. However, 2 grades in 6 JIS-specific grades are planned to be deleted in 5 years.
6	Hardness in annealed condition			ISO/FDIS 4957	5.2	Mechanical properties: Specifies the maximum hardness in the usual annealed condition at delivery.	Combination of MOD/deletion and MOD/addition



(I) Content specified in JIS		(II) International Standard number	(III) Content specified in International Standard		(IV) Evaluation for each clause and content of technical difference between JIS and International Standard		(V) Reason why the conformity between JIS and International Standard is difficult and measures to be taken in the future
Clause number	Content		Clause number	Content	Evaluation for each clause	Content of technical difference	
7	Hardness in quenched and tempered condition	ISO/FDIS 4957	5.2	Hardness in quenched and tempered condition: Specifies the minimum hardness in the standard quenched and tempered condition.	Combination of MOD/deletion and MOD/addition	Specification is linked with grades of steels.	
8	Appearance, shape, dimension, and tolerances	ISO/FDIS 4957	5.4	Tolerances on shape and dimension: Subject to the agreement between the purchaser and the manufacturer.	MOD/addition	ISO does not provide any specification explicitly. JIS provides the specification satisfied with domestic market needs explicitly.	JIS specification satisfied with domestic needs is employed.
9	Decarburization	ISO/FDIS 4957	—	Not specified.	MOD/addition	For hot-rolled round steel bar, JIS specifies the concrete allowable limits of decarburized depth.	The conventional JIS specification is employed in accordance with market needs. The additional modification will be proposed when reviewing ISO next time.

Entire evaluation on the degree of correspondence between JIS and International Standard: MOD

Remarks 1 Symbols in sub-columns of evaluation for each clause in the above Table indicate as follows:

- MOD/deletion: Deletes some specified items and contents of International Standard.
  - MOD/addition: Adds the specified items and contents which are not included in International Standard.
- 2 Symbols in sub-columns of entire evaluation on the degree of correspondence between JIS and International Standard in the above Table indicate as follows:
- MOD: Modifies International Standard.

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