

# JIS

JAPANESE  
INDUSTRIAL  
STANDARD

Translated and Published by  
Japanese Standards Association

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JIS G 3113 : 2006

(JISF)

**Hot-rolled steel plate, sheet and strip  
for automobile structural uses**

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ICS 43.040.60:77.140.50

Reference number : JIS G 3113 : 2006 (E)

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G 3113 : 2006

Date of Establishment: 1970-01-01  
Date of Revision: 2006-10-20  
Date of Public Notice in Official Gazette: 2006-10-20  
Investigated by: Japanese Industrial Standards Committee  
Standards Board  
Technical Committee on Iron and Steel

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JIS G 3113 : 2006, First English edition published in 2007-02

Translated and published by: Japanese Standards Association  
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 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 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 3113: 1990** is replaced with this Standard.

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## Hot-rolled steel plate, sheet and strip for automobile structural uses

**1 Scope** This Japanese Industrial Standard specifies the hot-rolled steel plate, sheet and strip with improved formability to be used mainly for automobiles, electric equipment, construction materials and so on (hereafter referred to as “steel sheets and strips”).

**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 0320 *Standard test methods for heat analysis of steel products*

JIS G 0404 *Steel and steel products—General technical delivery requirements*

JIS G 0415 *Steel and steel products—Inspection documents*

JIS G 3193 *Dimensions, mass and permissible variations of hot rolled steel plates, sheets and strips*

JIS Z 2201 *Test pieces for tensile test for metallic materials*

JIS Z 2204 *Bend test pieces for metallic materials*

JIS Z 2241 *Method of tensile test for metallic materials*

JIS Z 2248 *Method of bend test for metallic materials*

**3 Classification, symbol and applicable thickness** The steel sheets and strips shall be classified into 4 classes and their symbols and applicable thicknesses shall be as given in table 1.

**Table 1 Classification symbol and applicable thickness**

Classification symbol	Applicable thickness mm
SAPH310	1.6 or over up to and incl. 14
SAPH370	
SAPH400	
SAPH440	

**4 Chemical composition** The steel sheets and strips shall be tested in accordance with 9.1 and the heat analysis values shall be as given in table 2.

**Table 2 Chemical composition**

Unit : %

Classification symbol	P	S
SAPH310	0.040 or under	0.040 or under
SAPH370		
SAPH400		
SAPH440		

**5 Mechanical properties** The steel sheets and strips shall be tested in accordance with 9.2 and the tensile strength, yield point or proof stress, elongation and bendability shall be as given in table 3.

For the bendability, no cracks shall be generated on the outside of the test piece. The mechanical properties shall not apply to the irregular portions at either end of the steel strip.

NOTE : See 9.2.3 for the bending test.

**Table 3 Mechanical properties**

Classification symbol	Tensile strength N/mm <sup>2</sup>	Yield point or proof stress N/mm <sup>2</sup>		Elongation %								Tensile test piece	Bending angle	Bendability		
		Thickness mm		Thickness mm										Inside radius		Bending test piece
		Under 6.0	6.0 or over to and excl. 8.0	8.0 or over up to and incl. 14	1.6 or over to and excl. 2.0	2.0 or over to and excl. 2.5	2.5 or over to and excl. 3.15	3.15 or over to and excl. 4.0	4.0 or over to and excl. 6.3	6.3 or over up to and incl. 14	Under 2.0			2.0 min.		
SAPH310	310 min.	(185) min.	(185) min.	(175) min.	33 min.	34 min.	36 min.	38 min.	40 min.	41 min.	No.5 test piece taken in rolling direction	180°	Flat on itself	Thickness × 1.0	No.3 test piece in transverse rolling direction	
SAPH370	370 min.	225 min.	225 min.	215 min.	32 min.	33 min.	35 min.	36 min.	37 min.	38 min.			Thickness × 0.5	Thickness × 1.0		
SAPH400	400 min.	255 min.	235 min.	235 min.	31 min.	32 min.	34 min.	35 min.	36 min.	37 min.			Thickness × 1.0	Thickness × 1.0		
SAPH440	440 min.	305 <sup>a)</sup> min.	295 <sup>b)</sup> min.	275 <sup>c)</sup> min.	29 min.	30 min.	32 min.	33 min.	34 min.	35 min.			Thickness × 1.0	Thickness × 1.0		

NOTE 1 Values in parentheses mean reference values.  
2 1 N/mm<sup>2</sup> = 1 MPa

Notes (a) The value may be 275 N/mm<sup>2</sup> or over according to the agreement between the purchaser and the supplier.  
(b) The value may be 265 N/mm<sup>2</sup> or over according to the agreement between the purchaser and the supplier.  
(c) The value may be 255 N/mm<sup>2</sup> or over according to the agreement between the purchaser and the supplier.

**6 Shape, dimension, mass and tolerance** The shapes, dimensions, mass and tolerances of steel sheets and strips shall conform to JIS G 3193.

Tolerances on width for cut edge, tolerances on length for steel sheets and tolerances on thickness shall be as follows.

- a) Tolerances on width for cut edge, unless otherwise specified, shall apply “normal cut edge A” specified in table 7 of **JIS G 3193**.
- b) Tolerances on length for steel sheet, unless otherwise specified, shall apply table 8 of **JIS G 3193**.
- c) The tolerances on thickness shall apply with table 4 of this Standard. The thickness tolerances for steel sheet of width over 2 300 mm shall be subject to the agreement between the purchaser and the supplier. However, the tolerances on thickness shall not apply to the irregular portions at either end of the steel strip.

The measuring points of thickness shall be in accordance with clause 5. a) of **JIS G 3193**.

**Table 4 Tolerances on thickness**

Unit : mm

Thickness	Width			
	Under 1 200	1 200 or over to and excl. 1 500	1 500 or over to and excl. 1 800	1 800 or over up to and incl. 2 300 <sup>a)</sup>
1.60 or over to and excl. 2.00	± 0.16	± 0.17	± 0.18	—
2.00 or over to and excl. 2.50	± 0.17	± 0.19	± 0.21	—
2.50 or over to and excl. 3.15	± 0.19	± 0.21	± 0.24	—
3.15 or over to and excl. 4.00	± 0.21	± 0.23	± 0.26	—
4.00 or over to and excl. 5.00	± 0.24	± 0.26	± 0.28	± 0.29
5.00 or over to and excl. 6.00	± 0.26	± 0.28	± 0.29	± 0.31
6.00 or over to and excl. 8.00	± 0.29	± 0.30	± 0.31	± 0.35
8.00 or over to and excl. 10.0	± 0.32	± 0.33	± 0.34	± 0.40
10.0 or over to and excl. 12.5	± 0.35	± 0.36	± 0.37	± 0.45
12.5 or over up to and incl. 14.0	± 0.38	± 0.39	± 0.40	± 0.50

Note <sup>a)</sup> The tolerances on thickness of the steel sheet which not manufactured from steel strip may be agreed between the purchaser and the supplier.

## 7 Descaling and oiling

**7.1 Descaling** After hot-rolling, the steel sheet and strips may be descaled with acid pickling or shot blasting according to the request of the purchaser.

**7.2 Oiling** Oiling shall be as follows. However, it may follow to the agreement between the purchaser and the supplier.

- a) Steel sheets and strips as rolled shall not be oiled.
- b) Descaled steel sheets and after rolling shall be oiled.

**8 Appearance** The appearance of the steel sheet and strip shall be in accordance with clause 7 of **JIS G 3193**. The welding repair of steel sheet shall not be performed.

## **9 Test**

### **9.1 Analysis test**

**9.1.1 General requirements and sampling method for analysis test** The chemical analysis for steel sheet and strip shall be conducted by heat analysis, and the general requirements for analysis test and the sampling method for analysis shall be in accordance with clause 8 of **JIS G 0404**.

**9.1.2 Analytical method** The method for heat analysis shall be in accordance with **JIS G 0320**.

### **9.2 Mechanical test**

**9.2.1 General requirements for mechanical test** The general requirements for the mechanical test shall be in accordance with clause 7 of **JIS G 0404**. In this case, the sampling method shall be as Class A in clause 7, and the number of test pieces and the sampling position shall be as follows.

#### **a) Number of test pieces for tensile test and bending test**

- 1) **Steel strip and cut sheet taken from steel strip** Take one test piece each for the tensile test and the bending test from the lot of the same heat and of the same thickness. For a lot over 50 t, take two specimen products from each one of which one test piece for tensile test and one for bending test shall be sampled.
- 2) **Steel sheet (excluding cut sheet taken from steel strip)** Take one test piece each for the tensile test and the bending test from the lot of the same heat and of such that the maximum thickness is within the twice of the minimum thickness. For a lot over 50 t, take two specimen products, from each one of which one test piece for tensile test and one for bending test shall be sampled.

**b) Sampling position and direction of tensile test piece and bending test piece** The centre of a test piece shall be at a quarter-width from the side edge, and the tensile test piece shall be taken in parallel with the rolling direction and the bending test piece shall be in transverse direction. However, when it is infeasible to observe the requirement of a quarter-width from the side edge, the sampling position should be as close to the specified position as possible.

**9.2.2 Tensile test** The tensile test shall be as follows.

a) No. 5 test piece specified in **JIS Z 2201** shall be used.

b) The test method shall be in accordance with **JIS Z 2241**.

**9.2.3 Bending test** The bending test shall be in accordance with a) and b).

The bending test may be omitted<sup>1)</sup>. However, when especially requested by the purchaser, the test shall be performed.



Note <sup>1)</sup> The test may be omitted by the manufacturer's decision, but it means that the bendability shall satisfy the specifications.

- a) No. 3 test piece specified in **JIS Z 2204** shall be used.
- b) The test method shall be in accordance with **JIS Z 2248**.

## 10 Inspection

**10.1 Inspection** The inspection shall be as follows.

- a) The general requirements for the inspection shall be in accordance with **JIS G 0404**.
- b) The chemical composition shall conform to the requirements of clause 4.
- c) The mechanical properties shall conform to the requirements of clause 5.
- d) The shapes, dimensions and mass shall conform to the requirements of clause 6.
- e) The appearance shall conform to the requirements of clause 8.

**10.2 Reinspection** The steel sheet and strip having failed to meet the requirements for tensile test and bending test may be subjected to a retest for final acceptance in accordance with 9.8 of **JIS G 0404**.

**11 Marking** The steel sheets and strips having passed the inspection shall be bundled and marked with the following items by suitable means. Unbundled steel sheet shall be marked one by one. According to the agreement between the purchaser and the supplier, a part of items may be omitted.

- a) Classification symbols
- b) Heat number or inspection number
- c) Dimensions
- d) Quantity or mass for each bundle
- e) Manufacturer's name or identifying brand

**12 Report** When requested by the purchaser in advance, the manufacturer shall submit an inspection document in accordance with clause 13 of **JIS G 0404**. The type of inspection document shall be, unless otherwise specified, standard designation 2.3 or 3.1.B in table 1 of **JIS G 0415**.

Errata for JIS (English edition) are printed in *Standardization Journal*, published monthly by the Japanese Standards Association, and also provided to subscribers of JIS (English edition) in *Monthly Information*.

Errata will be provided upon request, please contact:

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