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**Carbon steel pipes for ordinary  
piping**



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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 3452:1997 is replaced with this Standard.

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 steel pipes for ordinary piping

**1 Scope** This Japanese Industrial Standard specifies carbon steel pipes (hereafter referred to as "pipes") used for the piping for conveying steam, water (except public water supply service), oil, gas, air, etc. at comparatively low working pressures.

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

**3 Classification and symbol** The pipes shall be classified into one grade and its symbol shall be as given in table 1.

In addition, they shall be divided into black pipes and galvanized ones according to the existence of zinc coating.

**Table 1 Symbol of grade**

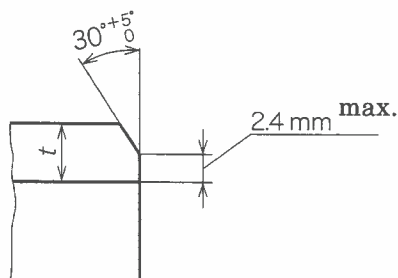
Symbol of grade	Division	Remarks
SGP	Black pipe	Pipe without zinc coating
	Galvanized pipe	Pipe with zinc coating

Remarks : Where it is necessary to identify galvanized pipe by the symbol of grade on the drawing and other documents, "ZN" shall be suffixed to the symbol of grade. This notation, however, shall not be applied to the product itself.

**4 Manufacturing method** The manufacturing method shall be as follows:

- The pipe shall be manufactured by butt welding or electric resistance welding.
- The pipe shall stay as manufactured. However, cold-finished pipe shall be annealed after manufacture.
- Both ends of the pipe of nominal size 300 A or smaller shall be threaded or plain-ended and those for 350 A or larger shall be plain-ended. When required by the purchaser, the pipe may be furnished with bevel ends (1).

Note (1) Unless otherwise specified, the shape of the bevel end shall be as shown in figure 1.



$t$ : thickness

**Figure 1 Shape of bevel end**



- d) For threaded pipe, taper threads <sup>(2)</sup> specified in **JIS B 0203** shall be applied on both ends, and a socket as in **JIS B 2302** or **JIS B 2301** shall be screwed into one end of the threads. The other end with a socket not screwed shall be provided with a thread protecting ring. For the smaller pipes this part may be protected by other suitable means. When specified by the purchaser, however, the threaded pipe may dispense with such a socket.

Note <sup>(2)</sup> The inspection of taper threads shall be in accordance with **JIS B 0253**.

- e) For galvanized pipe, the pipe and the socket shall be galvanized before threading. In this case, the black pipe and the socket that have passed inspection shall be thoroughly cleaned by sand blasting, pickling, etc. and then galvanized by a hot-dipped galvanizing process.
- f) The zinc used for galvanizing shall be at least equal to the distilled zinc metal Class 1 specified in **JIS H 2107**.

**5 Chemical composition** The pipe shall be subjected to the test of 11.2 and the resulting cast analysis values shall be as given in table 2.

**Table 2 Chemical composition**

Unit: %

Symbol of grade	P	S
SGP	0.040 max.	0.040 max.

## 6 Mechanical properties

**6.1 Tensile strength and elongation** The black pipe shall be subjected to the test of 11.3 and the resulting tensile strength and elongation shall be as given in table 3. When the tensile test is carried out for No. 12 or No. 5 test piece for the pipe under 8 mm in wall thickness, the minimum value of elongation shall be obtained by subtracting 1.5 % from the values of elongation given in table 3 for each 1 mm decrease in wall thickness, and rounding off to integers shall be in accordance with Rule A **JIS Z 8401**.

**Table 3 Mechanical properties**

Symbol of grade	Tensile strength N/mm <sup>2</sup>	Elongation %	
		No. 11 test piece No. 12 test piece	No. 5 test piece
		Longitudinal	Transverse
SGP	290 min.	30 min.	25 min.

Remarks 1 The values of elongation given in table 3 shall not be applied to the pipe whose nominal size is 32 A or smaller. However, the value of elongation shall be recorded.

- 2 In sampling the tensile test pieces, No. 12 or No. 5 test piece shall be taken from the portion not involving welded seams.

**Table 4 Elongation values for No. 12 test piece (longitudinal) and No. 5 test piece (transverse) taken from pipes under 8 mm in wall thickness**

Shape of test piece	Elongation values for wall thickness divisions %				
	Over 7 mm to and excl. 8 mm	Over 6 mm up to and incl. 7 mm	Over 5 mm up to and incl. 6 mm	Over 4 mm up to and incl. 5 mm	Over 3 mm up to and incl. 4 mm
No. 12 test piece	30	28	27	26	24
No. 5 test piece	25	24	22	20	19

**6.2 Flatness** Black pipes, when tested by 11.4, shall not generate flaws or cracks on its wall surface and in this case, the distance between the two plates shall be 2/3 of the outside diameter of the pipe.

**6.3 Bendability** For black pipes of nominal size 50 A or smaller, the purchaser may specify the bend test instead of the flattening test. In the test of 11.5, the pipe shall be free from the occurrence of flaws or cracks on its wall surface. In this case, the pipe shall be bent through 90° around an inside diameter that is 6 times its outside diameter.

**7 Uniformity of zinc coating** Galvanized pipes shall be tested by 11.6 and the number of immersions in the copper sulfate test as given in table 5. In this case, the pipe shall not show a fixed deposit of zinc even after the successive immersing operations of frequency given in table 5.

**Table 5 Uniformity test**

Symbol of grade	Number of immersions (One minute per dip)
SGP	5

**8 Hydrostatic test characteristics or nondestructive test characteristics** Black pipes shall be tested by 11.7 and the resulting hydrostatic characteristic or nondestructive characteristic shall conform to either of the followings. Though the preference depends upon the specification by the purchaser, when not specified by the purchaser, the preference shall be selected by the manufacturer.

- a) For hydrostatic test characteristics, when a hydrostatic pressure of 2.5 MPa is applied, black pipes shall withstand it without leakage.
- b) For nondestructive examination characteristics, a nondestructive examination by either an ultrasonic test or an eddy current test is carried out on black pipes, and there shall be no signal equivalent to or greater than those produced by the artificial defects of the reference test block of division UE of the working sensitivity specified in JIS G 0582 or of division EZ of the working sensitivity specified in JIS G 0583.

**9 Dimensions, weight, and dimensional tolerances** The dimensions, weight, and di-



dimensional tolerances of the pipes shall be as follows :

- a) The dimensions, weight, and dimensional tolerances of black pipes shall be as specified in table 6.

**Table 6 Dimensions, weights and dimensional tolerances**

Nominal diameter		Out-side diameter mm	Tolerances on outside diameter		Wall thick-ness mm	Tolerances on wall thickness	Unit mass excluding socket kg/m
A	B		Pipes to be cut in taper thread	Other pipes			
6	1/8	10.5	±0.5 mm	±0.5 mm	2.0	+ Not specified	0.419
8	1/4	13.8	±0.5 mm	±0.5 mm	2.3	-12.5 %	0.652
10	3/8	17.3	±0.5 mm	±0.5 mm	2.3		0.851
15	1/2	21.7	±0.5 mm	±0.5 mm	2.8		1.31
20	3/4	27.2	±0.5 mm	±0.5 mm	2.8		1.68
25	1	34.0	±0.5 mm	±0.5 mm	3.2		2.43
32	1 1/4	42.7	±0.5 mm	±0.5 mm	3.5		3.38
40	1 1/2	48.6	±0.5 mm	±0.5 mm	3.5		3.89
50	2	60.5	±0.5 mm	±1 %	3.8		5.31
65	2 1/2	76.3	±0.7 mm	±1 %	4.2		7.47
80	3	89.1	±0.8 mm	±1 %	4.2		8.79
90	3 1/2	101.6	±0.8 mm	±1 %	4.2		10.1
100	4	114.3	±0.8 mm	±1 %	4.5		12.2
125	5	139.8	±0.8 mm	±1 %	4.5		15.0
150	6	165.2	±0.8 mm	±1.6 mm	5.0		19.8
175	7	190.7	±0.9 mm	±1.6 mm	5.3		24.2
200	8	216.3	±1.0 mm	±0.8 %	5.8		30.1
225	9	241.8	±1.2 mm	±0.8 %	6.2		36.0
250	10	267.4	±1.3 mm	±0.8 %	6.6		42.4
300	12	318.5	±1.5 mm	±0.8 %	6.9		53.0
350	14	355.6	—	±0.8 %	7.9		67.7
400	16	406.4	—	±0.8 %	7.9		77.6
450	18	457.2	—	±0.8 %	7.9		87.5
500	20	508.0	—	±0.8 %	7.9		97.4

- Remarks 1 For the nominal size, either A or B shall be used, and the symbol of grade A or B shall be suffixed to the figures of nominal size to identify A or B series respectively.
- 2 For the pipe whose nominal size is 350 A or larger, the tolerances on the outside diameter may be determined by the measurement of the length of the circumference. In this case, the tolerance shall be ± 0.5 %.

In addition, when the length of the circumference is used in measuring the outside diameter, either the measured value of the length of circumference or the diameter derived from the measured value may be used as the criteria. In both cases, the same value (± 0.5 %) of tolerance shall be applied. The diameter ( $D$ ) and the length of circumference ( $I$ ) shall be calculated by transposition from the following formula:



$$l = \pi \cdot D$$

where,  $\pi = 3.1416$

- 3 In the case where the tolerances on wall thickness are confirmed to meet the specifications in table 6, the tolerances on outside diameter in table 6 shall not be applied to the local part being subjected to repair, etc.
- 4 The value of mass shall be calculated from the following formula assuming 1 cm<sup>3</sup> of steel to be 7.85 g and rounding it off to 3 significant figures in accordance with Rule A of JIS Z 8401.

$$W = 0.02466 t (D - t)$$

where,  $W$ : unit mass of pipe (kg/m)  
 $t$ : wall thickness of pipe (mm)  
 $D$ : outside diameter of pipe (mm)

- b) The length of each pipe shall, as a rule, be 5 500 mm or over. The purchaser, however, may specify a length 3 600 mm or over, as necessary.

**10 Appearance** The appearance shall be as follows:

- a) The pipe shall be practically straight, and both ends shall be at a right angle to its axis.
- b) The inside and outside surfaces of the pipe shall be well-finished and free from defects that are detrimental to practical use. Especially, the inside and outside surfaces of the galvanized pipe shall be practically smooth.

**11 Test**

**11.1 Sampling of test material and number of test pieces**

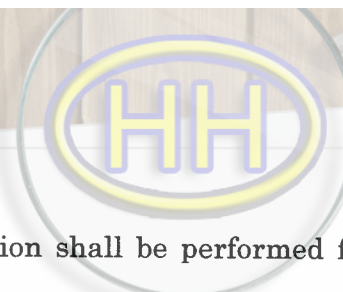
- a) The sampling of test specimen and the number of test pieces for the tensile test, the flattening test or bending test, and the zinc coating test shall be as follows: For the tensile test and the flattening test or bending test, take as test specimens as specified in table 7, and take one test piece from each test specimen.

**Table 7 Method of sampling specimen**

Division	Method of sampling specimen
Nominal size, 50 A or under	At least one pipe shall be taken from each group of 2 000 pipes or less of the same dimensions <sup>(3)</sup>
Nominal size, 60 A or over up to and incl. 125A	At least one pipe shall be taken from each group of 1 000 pipes or less of the same dimensions
Nominal size, 350 A or over up to and incl. 300A	At least one pipe shall be taken from each group of 500 pipes or less of the same dimensions
Nominal size, 350 A or over	At least one pipe shall be taken from each group of 300 pipes or less of the same dimensions

Note <sup>(3)</sup> The expression "same dimensions" means the same outside diameter as well as the same wall thickness.





- b) Either a hydrostatic test or a nondestructive examination shall be performed for each pipe.
- c) For the copper sulfate test, at least one pipe shall be taken as the test specimen from each 500 pipes or less of the same dimensions, from which each one set of test pieces (two) conforming to the specifications of clause 5 in JIS H 0401 shall be taken.

**11.2 Chemical analysis** The chemical analysis shall be as follows:

- a) General requirements common to chemical analysis and method of sampling specimen for analysis shall be in accordance with clause 8 in JIS G 0404.
- b) The analytical method shall be in accordance with any one of the following Standards:

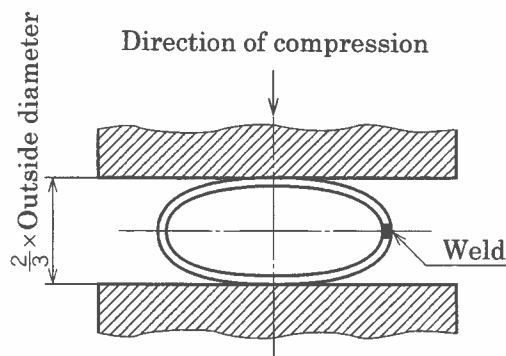
JIS G 1214, JIS G 1215, JIS G 1253

**11.3 Tensile test** The tensile test shall be as follows:

- a) The test specimen shall be No. 11, No. 12A, No. 12B, No. 12C or No. 5 test piece specified in JIS Z 2201 and shall be sampled from a pipe.
- b) The test method shall be in accordance with JIS Z 2241.

**11.4 Flattening test** The flattening test shall be as follows:

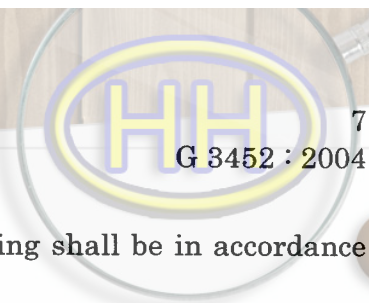
- a) A test piece 50 mm or over in length shall be cutoff from the end of a pipe.
- b) The test piece shall be placed between two flat plates at ordinary temperature and flattened by compression until the distance between the plates becomes the specified value, and shall be checked for the occurrence of flaws or cracks on its wall surface. In this case, the weld shall be placed at right angles to the direction of compression as shown in figure 2.



**Figure 2 Flattening test**

**11.5 Bend test** The bend test shall be as follows:

- a) A test piece with an appropriate length shall be cut off from the end of a pipe.
- b) The test piece shall be bent at ordinary temperature through the angle around a cylinder with the inside radius specified in 6.3, and shall be checked for the occurrence of flaws or cracks on its wall surface. In this case, the weld shall be placed at approximately 90° to the outermost bent portion.



**11.6 Zinc coating test** The copper sulfate test of zinc coating shall be in accordance with JIS H 0401.

**11.7 Hydrostatic test or nondestructive examination** The hydrostatic test or nondestructive examination shall be in accordance with either a) or b) below.

- a) When the pipe is subjected to hydrostatic pressure and kept under the specified pressure, its strength to withstand the pressure without leakage shall be examined.
- b) The test method of nondestructive examination shall be in accordance with either JIS G 0582 or JIS G 0583.

## 12 Inspection

**12.1 Inspection** The inspection shall be as follows:

- a) General matters common to inspection shall be in accordance with JIS G 0404.
- b) The chemical composition, mechanical properties, uniformity of zinc coating, hydrostatic characteristic or nondestructive characteristic, dimensions and appearance shall conform to the requirements of clause 4, 5, 6, 7, 8, 9 and 10.

**12.2 Reinspection** The pipe which fails to pass the mechanical test may be determined for final acceptance by a retest specified in 9.8 of JIS G 0404.

**13 Marking** Each pipe having passed the inspection shall be marked with the following items. However, the smaller pipes and other pipes specified by the purchaser may be bundled together and marked for each bundle by a suitable means. In both cases, the order of arranging the marked items is not specified. When approved by the purchaser, part of the items may be omitted.

- a) Symbol of grade
- b) Symbol denoting the manufacturing processes <sup>(4)</sup>
- c) Dimensions <sup>(5)</sup>
- d) Manufacturer's name or its abbreviation

Notes <sup>(4)</sup> The symbol indicating the manufacturing processes shall be as follows, the dash may be omitted leaving a blank.

Electric-resistance welded steel pipe other than hot finished or cold-finished ones—E—G

Hot-finished electric-resistance welded steel pipe—E—H

Cold-finished electric-resistance welded steel pipe—E—C

Butt-welded steel pipe—B

<sup>(5)</sup> The dimensions shall be expressed by the nominal size.

**14 Report** When previously required by the purchaser, the manufacturer shall submit the test report in accordance with clause 13 of JIS G 0404. However, unless otherwise specified by the purchaser, the type of inspection document shall be symbol 2.3 or



8.

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3.1.B in table 1 of JIS G 0415.

**Attached Table 1 Normative references**

- JIS B 0203 *Taper pipe threads*
- JIS B 0253 *Gauges for taper pipe threads*
- JIS B 2301 *Screwed type malleable cast iron pipe fittings*
- JIS B 2302 *Screwed type steel pipe fittings*
- JIS G 0404 *Steel and steel products—General technical delivery requirements*
- JIS G 0415 *Steel and steel products—Inspection documents*
- JIS G 0582 *Ultrasonic examination for steel pipes and tubes*
- JIS G 0583 *Eddy current examination of steel pipes and tubes*
- 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 H 0401 *Methods of test for hot dip galvanized coatings*
- JIS H 2107 *Zinc ingots*
- JIS Z 2201 *Test pieces for tensile test for metallic materials*
- JIS Z 2241 *Method of tensile test for metallic materials*
- JIS Z 8401 *Guide to the rounding of numbers*





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**Standardization Promotion Department, Japanese Standards Association**  
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN  
TEL. 03-3583-8002      FAX. 03-3583-0462

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