

JAPANESE
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STANDARD

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☞ **JIS H 3401** : 2001
(JCDA/JSA)

**Pipe fittings of copper
and copper alloys**

ICS 23.040.40; 77.120.30

Descriptors : copper, copper alloys, pipe couplings

Reference number : JIS H 3401 : 2001 (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 Copper Development Association (JCDA)/the Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law. Consequently **JIS H 3401 : 1997** is replaced with this Standard.

This revision applies hydrostatic pressure test and effect to water quality test according to **JIS S 3200** not only for water supply service but also for all the pipe fittings specified.

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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Pipe fittings of copper and copper alloys

Introduction This Japanese Industrial Standard is formed by annexing **ISO 2061** : 1981 *Capillary solder fittings for copper tubes—Assembly dimensions and tests*, **ISO 274** : 1975 *Copper tubes of circular section—Dimensions*, **ISO 1337** : 1980 *Wrought coppers (having minimum copper contents of 99.85 %)—Chemical composition and forms of wrought products*, **ISO 426-1** : 1983 *Wrought copper-zinc alloys—Chemical composition and forms of wrought products—Part 1 : Non-leaded and special copper-zinc alloys* to the original **JIS H 3401**.

1 Scope This Standard specifies the copper and copper alloy pipe fittings to be inserted in the piping copper tubes and water supply copper tubes specified in **JIS H 3300** and the plastic covered copper tubes specified in **JIS H 3330** and capillary brazed or soldered (hereafter referred to as “pipe fittings”).

Remarks : The following standard is the corresponding International Standard to this Standard.

In addition, 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 2016 : 1981 *Capillary solder fittings for copper tubes—Assembly dimensions and tests* (MOD)

2 Normative references The following standards 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.

JIS H 0321 *General rules for inspection of non-ferrous metal materials*

JIS H 3300 *Copper and copper alloy seamless pipes and tubes*

JIS H 3330 *Plastic covered copper tubes*

JIS S 3200-1 *Equipment to water supply service—Test methods of hydrostatic pressure*

JIS S 3200-7 *Equipment for water supply service—Test methods of effect to water quality*

3 Definitions For the purposes of this Standard the following definitions apply:

- a) **T (tee)** The piping joint fitting of three-way branched form.
- b) **elbow** The piping joint fitting of L form.

4 Types and symbols The pipe fittings shall be classified into two types according to the dimensions and tolerances of the jointing part, and their types and symbols shall be as given in Table 1.

Table 1 Types and symbols

Type		Symbol	Jointing part	Figure shown for example
Type 1	Tee	①T	Socket	Fig. 1
	90° elbow A	①90EA	Socket	Fig. 2
	90° elbow B	①90EB	Socket and male end	Fig. 3
	90° elbow C	①90EC	Male end	Fig. 4
	45° elbow A	①45EA	Socket	Fig. 5
	45° elbow B	①45EB	Socket and male end	Fig. 6
	45° elbow C	①45EC	Male end	Fig. 7
Type 2	Tee	②T	Socket	Fig. 1
	90° elbow A	②90EA	Socket	Fig. 2
	90° elbow B	②90EB	Socket and male end	Fig. 3
	90° elbow C	②90EC	Male end	Fig. 4
	45° elbow A	②45EA	Socket	Fig. 5
	45° elbow B	②45EB	Socket and male end	Fig. 6
	45° elbow C	②45EC	Male end	Fig. 7

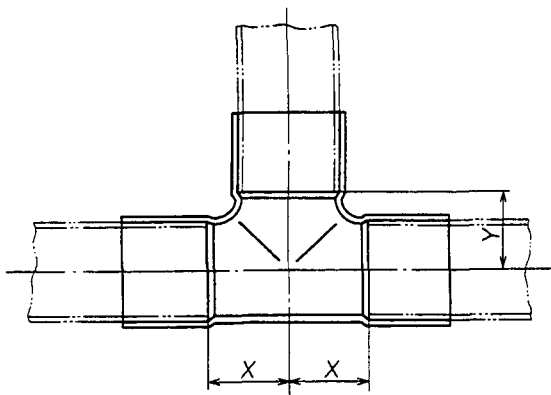


Fig. 1 T

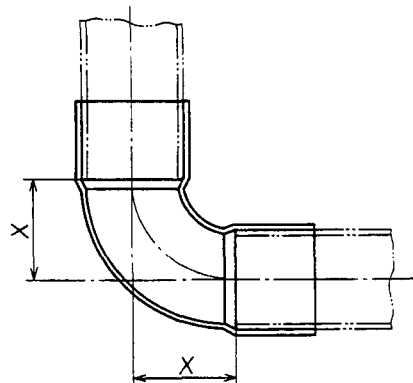


Fig. 2 90° elbow A

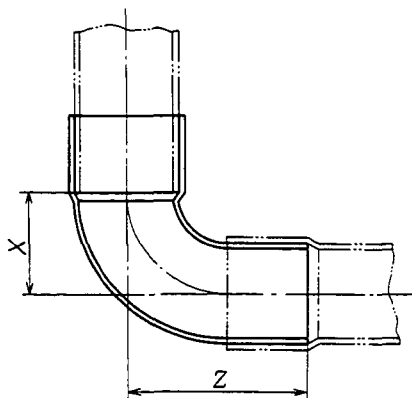


Fig. 3 90° elbow B

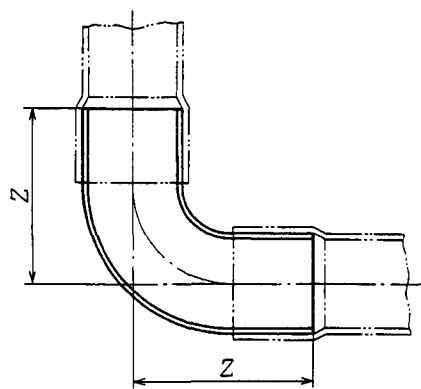


Fig. 4 90° elbow C

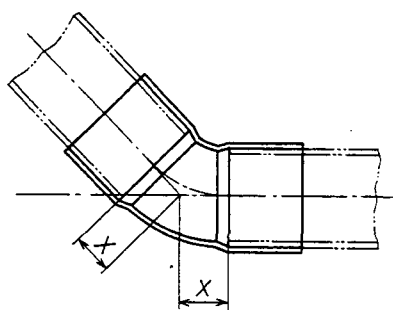


Fig. 5 45° elbow A

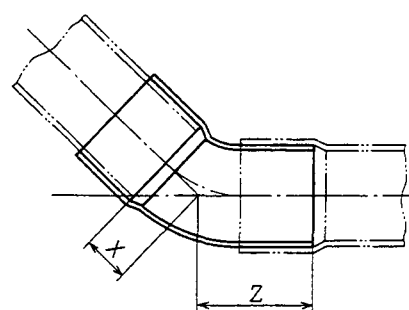


Fig. 6 45° elbow B

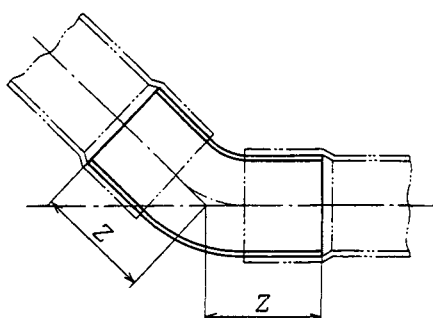


Fig. 7 45° elbow C

5 Performance

5.1 Airtight performance Pipe fittings, when subjected to the test of 11.1, shall be free from leaking.

5.2 Pressure resistance performance Pipe fittings, when subjected to the test of 11.2, shall be free from breakdown and other abnormalities.

5.3 Leaching performance Pipe fittings, when subjected to the test of 11.3, shall conform to the criteria of the leaching performance specified in Table 2.

Table 2 Criteria for acceptability of leaching performance

Alloy No.	Reference item	Unit	Criterion value	Test temperature
C 1220	Turbidity ⁽¹⁾	degree	2 max.	As specified in JIS S 3200-7
	Chromaticity ⁽¹⁾	degree	5 max.	
	Odor		Free from abnormality ⁽²⁾	
	Taste		Free from abnormality ⁽²⁾	
	Elusion amount of copper	mg/l	1.0 max.	

Notes (1) The turbidity and chromaticity of leaching performance shall be obtained from differences between the results in the test in 11.3 and in the blank test.

(2) There shall not be any odor and taste except of chlorine.

6 Appearance and shape

6.1 Appearance The appearance of fittings shall be smooth on the inside and outside surfaces, and free from defects such as flaw, crack, etc. that are detrimental to practical use.

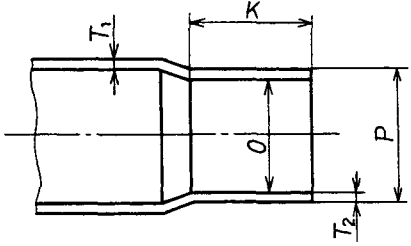
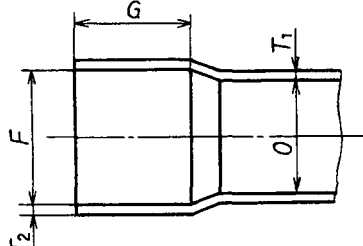
6.2 Shape Examples of the shape of a fitting joint are shown in Tables 3 and 4. Further, for the shape of pipe fittings, a practically regular circle section is provided, and both end faces thereof shall be almost normal to the axis of the pipe fitting. Examples of the shapes of respective grades are shown in Figs. 1 to 7.

7 Dimensions and their tolerances

7.1 Dimensions of type 1 and their tolerances The dimensions of pipe fittings type 1 and their tolerances shall be as given in Table 3.

Table 3 Dimensions of type 1 and their tolerances

Unit : mm

Joining part															
Male end								Socket							
															
Nominal diameter		Joining part												Minimum wall thickness	Minimum inside diameter
		Male end						Socket						T ₁ or T ₂	O
(A)	(B)	Basic major diameter P	Tolerance	Measured major diameter		Elliptical value	Min. length K	Basic minor diameter F	Tolerance	Measured minor diameter		Elliptical value	Min. depth G		
				Minimum value	Maximum value					Minimum value	Maximum value				
8	1/4	9.52	±0.03	9.45	9.59	0.08 max.	9	9.62	±0.03	9.55	9.69	0.08 max.	8	0.6	6
10	3/8	12.70		12.62	12.78	0.10 max.	10	12.81		12.73	12.89	0.10 max.	9	0.7	9
15	1/2	15.88		15.78	15.98	0.13 max.	12	16.00		15.91	16.09	0.12 max.	11	0.8	12
—	5/8	19.05		18.94	19.16	0.15 max.	16	19.19		19.08	19.30	0.16 max.	15	0.8	14
20	3/4	22.22		22.11	22.33	0.16 max.	18	22.36		22.25	22.47		17	0.9	17
25	1	28.58	±0.04	28.44	28.72	0.20 max.	22	28.75	±0.04	28.62	28.88	0.18 max.	21	1.0	23
32	1 1/4	34.92		34.76	35.08	0.24 max.	25	35.11		34.96	35.26	0.22 max.	24	1.2	28
40	1 1/2	41.28	±0.05	41.08	41.48	0.29 max.	28	41.50	±0.05	41.33	41.67	0.24 max.	27	1.3	34
50	2	53.98		53.77	54.19	0.32 max.	34	54.22		54.03	54.41	0.28 max.	33	1.5	45
65	2 1/2	66.68		66.43	66.93	0.40 max.	38	66.96		66.73	67.19	0.36 max.	37	1.7	55
80	3	79.38		79.13	79.63		43	79.66		79.43	79.89		42	2.0	67
100	4	104.78		104.47	105.09	0.52 max.	55	105.12		104.83	105.41	0.48 max.	54	2.4	90

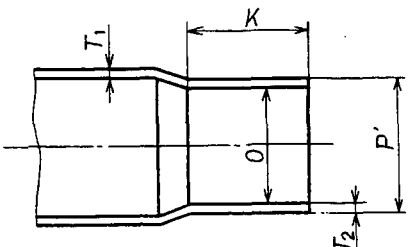
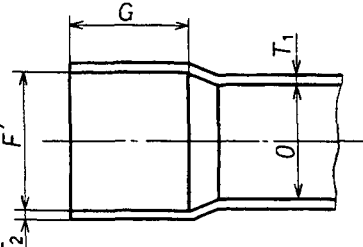
Remarks 1 As the nominal diameter, either (A) or (B) shall be used.

- The difference between the average value of the minimum major diameter (minimum minor diameter) and the maximum major diameter (maximum minor diameter) and the basic major diameter (basic minor diameter) measured at an optional section of the joining part of type 1 shall be within the range of the tolerances given in Table.
- The minimum major diameter (minimum minor diameter) and the maximum major diameter (maximum minor diameter) measured at an optional section of the joining part of type 1 shall be between the minimum value and the maximum value of the measured major diameter (measured minor diameter) given in the Table and, at the same time, the difference between the maximum major diameter (maximum minor diameter) and the minimum major diameter (minimum minor diameter) shall be within the range of the elliptical value given in the Table.
- P, K, F, G, T₁, T₂ and O given in the Table stand for the corresponding parts in the figure.

7.2 Dimensions of type 2 and their tolerances The dimensions of pipe fittings type 2 and their tolerances shall be as given in Table 4.

Table 4 Dimensions of type 2 and their tolerances

Unit : mm

Joining part													
Male end							Socket						
													
Nominal diameter		Joining part										Minimum wall thickness	Minimum inside diameter
		Male end					Socket					T_1 or T_2	O
(A)	(B)	Average major diameter P'		Measured major diameter		Minimum length K	Average minor diameter F'		Measured minor diameter		Minimum depth G		
		Minimum value	Maximum value	Minimum value	Maximum value		Minimum value	Maximum value	Minimum value	Maximum value			
8	$\frac{1}{4}$	9.47	9.55	9.29	9.65	9	9.58	9.68	9.38	9.78	8	0.6	6
10	$\frac{3}{4}$	12.62	12.73	12.38	12.86	10	12.75	12.85	15.52	12.98	9	0.7	9
15	$\frac{1}{2}$	15.80	15.90	15.54	16.06	12	15.93	16.03	15.67	16.19	11	0.8	12
—	$\frac{5}{8}$	18.97	19.08	18.67	19.27	16	19.10	19.20	18.81	19.30	15	0.8	14
20	$\frac{3}{4}$	22.15	22.25	21.83	22.47	18	22.28	22.38	21.96	22.60	17	0.9	17
25	1	28.50	28.63	28.08	28.92	22	28.65	28.75	28.26	29.04	21	1.0	23
32	$1\frac{1}{4}$	34.85	34.98	34.37	35.33	25	35.00	35.10	34.55	35.45	24	1.2	28
40	$1\frac{1}{2}$	41.17	41.33	40.60	41.74	28	41.35	41.48	40.81	41.89	27	1.3	34
50	2	53.87	54.03	53.17	54.57	34	54.05	54.18	53.38	54.72	33	1.5	45
65	$2\frac{1}{2}$	66.57	66.73	65.74	67.40	38	66.75	66.88	65.95	67.55	37	1.7	55
80	3	79.27	79.43	78.32	80.22	43	79.45	79.58	78.52	80.38	42	2.0	67
100	4	104.67	104.83	103.46	105.88	55	104.85	104.98	103.67	106.03	54	2.4	90

Remarks 1 As the nominal diameter, either (A) or (B) shall be used.

- The average value of the minimum major diameter (minimum minor diameter) and the maximum major diameter (maximum minor diameter) measured at an optional section of the joining part of type 2 shall be within the range of the average major diameter (average minor diameter) given in the Table.
- The minimum major diameter (minimum minor diameter) and the maximum major diameter (maximum minor diameter) measured at an optional section of the joining part of type 2 shall be between the minimum value and the maximum value of the measured major diameter (measured minor diameter) given in the Table.
- P' , K , F' , G , T_1 , T_2 and O in the Table stand for the corresponding joining parts given in the figure.

7.3 Tolerances on dimensions X, Y and Z The dimensions X, Y and Z in Figs. 1 to 7 shall be clearly stipulated in advance by the manufacturer, and their tolerances shall conform to Table 5. Where different nominal diameters are involved, the tolerances on the larger nominal diameter shall be applied.

Table 5 Tolerances on dimensions X, Y and Z

Nominal diameter		Tolerances mm
(A)	(B)	
8 or over up to and incl. 10	$\frac{1}{4}$ or over up to and incl. $\frac{3}{8}$	± 0.8
15 or over up to and incl. 20	$\frac{1}{2}$ or over up to and incl. $\frac{3}{4}$	± 1.0
25 or over up to and incl. 50	1 or over up to and incl. 2	± 1.2
65 or over up to and incl. 80	$2\frac{1}{2}$ or over up to and incl. 3	± 1.5
100	4 or over up to and incl. 6	± 2.0

7.4 Tolerances on angle The tolerances on the angles of T and elbow which are given in Figs. 1 to 7 shall be $\pm 20'$.

8 Combination according to nominal diameter of pipe fittings The combinations according to the nominal diameters of pipe fittings shall be those given in Tables 6 to 9.

Further, the order for arranging the nominal sizes of pipe fittings shall be as follows. However, when the nominal sizes are the same, one side may be omitted.

- a) The Tee, when an aperture (larger one) on the same central line is ①, and a head part (smaller one) is ②, is called in the order of ① and ②. However, in the case where the nominal diameters on the same central line are different, the arranging order shall not be specified.

Example : In the case where the nominal diameter on the same central line of Tee is $\frac{3}{4}$, and the nominal diameter of the head part is $\frac{1}{2}$, T $\frac{3}{4} \times \frac{1}{2}$

- b) The elbow, when the larger one of the aperture is ①, and the smaller one thereof is ②, is called in the order of ① and ②.

Example : In the case where the nominal diameters of the 90° elbow A are $\frac{3}{4}$ and $\frac{1}{2}$, 90EA $\frac{3}{4} \times \frac{1}{2}$