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**Steel butt-welding pipe fittings for
ordinary use**

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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 Japan Pipe Fittings Association (JPFA)/Japanese Standards Association (JSA) 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 B 2311 : 2009** is replaced with this Standard.

However, **JIS B 2311 : 2009** may be applied in the **JIS** mark certification based on the relevant provisions of Article 19 Clause 1, etc. of the Industrial Standardization Law until January 19, 2016.

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Steel butt-welding pipe fittings for ordinary use

Introduction

This Japanese Industrial Standard was established in 1982 and has gone through six revisions up to the present. Since the previous revision made in 2009, there has been users' demands for revising some of the contents and also other related Japanese Industrial Standards have been revised. The revision at this time is made for corresponding to these situations.

No corresponding International Standard has been established at this point.

1 Scope

This Standard specifies the steel pipe fittings attached by butt-welding to ordinary pipings¹⁾ carrying steam, water, oil, gas, air, etc. of comparatively low working pressure (hereafter referred to as "pipe fittings").

Annex A specifies the pipe fittings of special shapes not given in the main body of this Standard, which may be designated upon agreement between the purchaser and the manufacturer, and Annex B shows matters related to the marking and report of the pipe fittings with special necks for informative reference.

Note ¹⁾ Pipings using carbon steel pipes for ordinary piping specified in **JIS G 3452** and pipings using arc welded carbon steel pipes for piping specified in **JIS G 3457**.

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) listed below shall be applied.

- JIS B 0151 *Iron and steel pipe fittings — Vocabulary*
- JIS G 0415 *Steel and steel products — Inspection documents*
- JIS G 3101 *Rolled steels for general structure*
- JIS G 3452 *Carbon steel pipes for ordinary piping*
- JIS G 3457 *Arc welded carbon steel pipes*
- JIS H 0401 *Test methods for hot dip galvanized coatings*
- JIS H 2107 *Zinc ingots*
- JIS Z 3040 *Method of qualification test for welding procedure*
- JIS Z 3801 *Standard qualification procedure for manual welding technique*
- JIS Z 3841 *Standard qualification procedure for semi-automatic welding technique*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS B 0151** apply.

4 Classification

The pipe fittings shall be classified as given in the following according to the shapes, materials and whether they are galvanized or not.

a) Classification of pipe fittings by shape and their symbols shall be as given in table 1.

Table 1 Classification by shape and symbols

Classification by shape			Symbol ^{a)}
Large classification	Small classification		
45° elbow	Long		45E(L)
	Short		45E(S)
90° elbow	Long		90E(L)
	Short		90E(S)
180° elbow	Long		180E(L)
	Short		180E(S)
Reducer ^{b)}	Concentric	Shape 1	R(C)1
		Shape 2	R(C)2
	Eccentric	Shape 1	R(E)1
		Shape 2	R(E)2
Tee	Straight		T(S)
	Reducing		T(R)
Cap	—		C
Notes ^{a)} The parentheses in the symbols may be omitted. Example : 45E(L) may be 45EL.			
^{b)} In the symbols [R(C)1] for concentric reducers of Shape 1, and [R(E)1] for eccentric reducers of Shape 1, the numeral “1”, denoting Shape 1, may be omitted.			

b) Symbols of grade according to materials, division and steel pipes to be connected shall be as given in table 2. According to whether the pipe fittings are galvanized or not, they are divided into white pipe fittings and black pipe fittings.

“Steel pipes to be connected” refers to the steel pipes of Japanese Industrial Standard which are generally connected with the pipe fittings in piping.

Table 2 Symbols of grade according to materials, divisions and steel pipes to be connected

Symbol of grade according to material	Division	Steel pipes to be connected
FSGP	White pipe fitting (galvanized pipe fitting)	SGP of JIS G 3452 STPY400 of JIS G 3457
	Black pipe fitting (non-galvanized pipe fitting)	
PY400	Black pipe fitting (non-galvanized pipe fitting)	

5 Materials

The materials of pipe fittings shall be steel pipes, steel plates, steel strips or other materials as given in table 3 or equivalent materials.

Equivalent materials shall be those which have been confirmed to meet the chemical composition and tensile strength requirements relevant to their forms as specified in the standards shown in table 3, and if it is steel pipes, confirmed to meet the hydrostatic test characteristics or non-destructive test characteristics requirements shown in table 3.

Table 3 Materials of pipe fittings

Symbol of grade according to material	Material	
	Steel pipe	Steel plate, steel strip or other steel material
FSGP	SGP of JIS G 3452	SS330 or SS400 of JIS G 3101
PY400	STPY400 ^{a)} of JIS G 3457	SS400 of JIS G 3101
Note ^{a)} Spiral seam welded pipes are excluded.		

6 Manufacturing method

6.1 Pipe fittings of FSGP

Pipe fittings of FSGP are manufactured from the material specified in clause 5, by hot or cold plastic working or by cutting work. However, the pipe fittings of FSGP shall not be manufactured by welding.

Further, the cap shall be seamless.

6.2 Pipe fittings of PY400

Pipe fittings of PY400 shall be as follows.

- The pipe fittings of PY400 shall be manufactured from the steel pipe specified in clause 5, by hot or cold plastic working, or from steel plate or steel strip by arc-welding the longitudinal seams.

The pipe fittings of PY400 do not include caps.

- b) The welding of the longitudinal seams may be made by both side welding of butt joint, or by one side welding of butt joint, which is considered equal or superior thereto.
- c) The welder to perform manual or semi-automatic welding shall have passed the standard qualification procedure for welding technique according to **JIS Z 3801** and **JIS Z 3841** or other qualification procedure for welding technique at least equal thereto and shall be a qualified person rated on the technical skills.

6.3 Heat treatment

The pipe fittings shall be subjected to heat treatment in accordance with table 4.

Table 4 Heat treatment of pipe fittings

Hot formed product	Cold formed products ^{a)}	
	Steel pipe	Steel plate, steel strip or other steel material
As manufactured	Normalized or annealed ^{b)}	As manufactured or annealed ^{b)}
Notes ^{a)} In the case of the cold formed cap, it shall be subjected to annealing.		
^{b)} Low temperature annealing or stress relieving annealing.		

6.4 White pipe fittings

White pipe fittings shall be obtained by cleaning the black pipe fittings before or after working of bevel end by shot blasting, pickling, etc., and then galvanizing them.

Zinc used for galvanizing shall be distilled zinc ingot class 1 specified in **JIS H 2107** or that having quality at least equal thereto.

7 Performance

7.1 Pressure resistance

The pipe fittings shall withstand the same pressure as required for the hydrostatic test characteristics specified in **JIS G 3452** and **JIS G 3457** without leakage.

7.2 Evenness of galvanization

White pipe fittings, when subjected to the test specified in clause 6 of **JIS H 0401**, shall withstand five times of dipping without reaching the end point.

7.3 Mechanical properties of welds

The mechanical properties of welds on pipe fittings manufactured from steel plates or steel strips by welding shall be as follows.

- a) The tensile strength of welds shall be as given in 6.2 of **JIS G 3457**.
- b) The guide bend resistance of welds shall be as given in 2.2 of Annex of **JIS Z 3040**.

8 Shapes and dimensions

The shapes and dimensions of the pipe fittings shall be as follows.

Further, nominal diameter A expresses millimetre system, and B, inch system.

- The outside and inside diameters and thickness of pipe fittings shall be as given in tables 5 and 6.
- The shape and dimensions of pipe fittings shall be as given in tables 7 to 11.
- The dimensional tolerances and permissible values of pipe fittings shall be as given in table 12.
- The permissible values of the off angle and off plane of pipe fittings shall be as given in table 13.
- The shape and dimensions of bevel ends shall be as shown in figure 1. However, pipe fittings with thickness less than 4 mm may be manufactured with plain ends.

Unit: mm

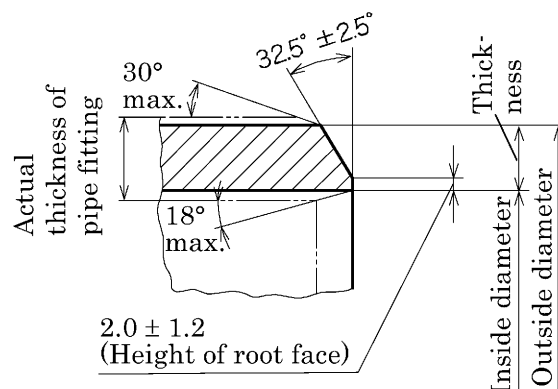


Figure 1 Shape and dimensions of bevel end

9 Appearance

The appearance of the pipe fittings shall be as follows.

- The pipe fittings shall be free from flaws, wrinkles and other defects which might be detrimental to service on the inside and outside surfaces.
- The appearance of the beads of pipe fittings manufactured by welding shall be smooth and free from unevenness detrimental to service.
- The pipe fittings surfaces may be repaired by grinding, machining or other methods, provided that the thickness after repair satisfies the specified thickness tolerances.
- The surface of the repaired part shall be smooth along the contour of the pipe fitting.
- The inside and outside surfaces of the pipe fittings to which galvanizing is applied

shall be smooth for practical service.

10 Tests

10.1 Pressure resistance test

Weld a steel pipe to a pipe fitting, apply hydrostatic pressure to the fitting gradually until the internal pressure reaches the test pressure specified for the hydrostatic test characteristics given in **JIS G 3452** and **JIS G 3457**, and hold the fitting under this pressure for 5 s or longer. Check if the fitting has withstood the pressure without any leakage.

10.2 Test of evenness of galvanization

The test of evenness of galvanization shall be as follows.

- a) **Test piece** Sampling and shape of test pieces shall be as given in 5.2.2 of **JIS H 0401**.
- b) **Test method** The test method shall be as given in clause 6 of **JIS H 0401**.

10.3 Mechanical test of welds

For welds of pipe fittings manufactured from steel plate or steel strip by welding, the manufacturer shall qualify the welding procedure in accordance with **JIS Z 3040**.

Further, the above-mentioned qualification test shall be carried out after giving the test material the heat treatment under the same heat treating condition as that for pipe fittings.

11 Inspection

11.1 Type of inspection and inspection items

The inspection of pipe fittings shall be the type inspection²⁾ and the acceptance inspection³⁾, each consisting of inspection items as shown below.

The sampling system for the acceptance inspection shall be as agreed between the purchaser and the manufacturer.

Notes ²⁾ An inspection to judge whether the quality of a pipe fitting product satisfies all the characteristics stated in the design.

³⁾ An inspection performed on acceptance of a product which is identical in design and manufacture to those already accepted in the type inspection to judge whether it satisfies the required characteristics.

a) Type inspection items

- 1) Pressure resistance
- 2) Evenness of galvanization
- 3) Mechanical properties of welds
- 4) Shape and dimensions
- 5) Appearance