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**Standard qualification procedure for
gas pressure welding technique**

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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, and Minister of Land, Infrastructure and Transport through deliberations at the Japanese Industrial Standards Committee, as the result of proposal for revision of Japanese Industrial Standard submitted by the Japan Pressure Welding Society (JPWS)/the 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 Z 3881 : 1997** is replaced with this Standard.

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In the event of any doubts arising as to the contents,
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Standard qualification procedure for gas pressure welding technique

1 Scope This Japanese Industrial Standard specifies the standard qualification procedure for gas pressure welding technique by means of manual gas pressure welding, automatic gas pressure welding and gas pressure weld hot punching.

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 B 6801 *Manual blowpipes for oxyacetylene welding*

JIS G 3112 *Steel bars for concrete reinforcement*

JIS K 1101 *Oxygen*

JIS K 1902 *Dissolved acetylene*

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

JIS Z 3001 *Welding terms*

JIS Z 3062 *Methods and acceptance criteria of ultrasonic examination for gas pressure welds of reinforcing deformed bars*

3 Definitions For the purposes of this Standard the definitions given in **JIS Z 3001** and the following definitions apply:

- a) **test material** Steel bar prepared for testing;
- b) **manual gas pressure welding** Gas pressure welding using a manual gas pressure welding apparatus whose pressurizing process and burner driving operation are not controlled automatically;
- c) **automatic gas pressure welding** Gas pressure welding using an automatic gas pressure welding apparatus whose pressurizing process and burner driving are controlled automatically;
- d) **gas pressure weld hot punching** Method for punching out the convex of a welded part in a hot condition using a shearing knife after carrying out the gas pressure welding;
- e) **test specimen** Test material subjected to the pressure welding or hot punched test material;
- f) **test piece for ultrasonic examination** Test specimen prepared by carrying out the pressure welding;
- g) **test piece for bend test** Pressure welded part processed to the specified dimensions for the purpose of carrying out bend test or the hot punched test specimen itself;
- h) **pressure welded part** The whole welded joint part from the start to the end of the convex produced by pressure welding.

4 Classification of qualification tests The classification of qualification tests is as given in Table 1 according to the divisions of gas pressure welding.

Table 1 Classification of qualification tests

Classification of qualification tests	Test of specimen
Manual gas pressure welding Class 1, Class 2, Class 3, Class 4	Appearance test, ultrasonic examination and bend test
Automatic gas pressure welding Class 2, Class 3, Class 4	Appearance test, ultrasonic examination and bend test
Gas pressure weld hot punching Class 1, Class 2, Class 3, Class 4	Appearance test and bend test

5 Preparation of test specimen

5.1 General Any one of the following methods shall be used:

- a) Manual gas pressure welding
- b) Automatic gas pressure welding
- c) Gas pressure weld hot punching

5.2 Material used for test Deformed steel bars of SD345 specified in **JIS G 3112**.

5.3 Quantity of test material Designation, length and number of pieces of the deformed steel bars of test material SD345 shall be as given in Table 2 according to the divisions of gas pressure welding.

Table 2 Length and number of pieces of test material

Unit: mm

Classification of qualification tests	Class of qualification test	Designation of deformed steel bar	Length of test material	Number of pieces of test material	Number of pieces of test specimen to be prepared (informative)
Manual gas pressure welding	Class 1	D25	250 ± 10	10	5
	Class 2	D32	300 ± 10	10	5
	Class 3	D38	300 ± 10	10	5
	Class 4	D51	350 ± 10	10	5
Automatic gas pressure welding	Class 2	D25	250 ± 10	4	2
		D32	300 ± 10	4 Total 8	2 Total 4
	Class 3	D25	250 ± 10	4	2
		D32	300 ± 10	4	2
		D38	300 ± 10	4 Total 12	2 Total 6
	Class 4	D25	250 ± 10	4	2
		D32	300 ± 10	4	2
		D38	300 ± 10	4	2
		D51	350 ± 10	4 Total 16	2 Total 8
Gas pressure weld hot punching	Class 1	D25	250 ± 10	10	5
	Class 2	D32	300 ± 10	10	5
	Class 3	D38	300 ± 10	10	5
	Class 4	D51	350 ± 10	10	5

6 Gas used for test The gas shall conform to **JIS K 1902** and **JIS K 1101**.

7 Gas pressure welding apparatus used for test

7.1 Gas pressure welding apparatus used for manual gas pressure welding test The gas pressure welding apparatus and its auxiliary devices used for the test shall be as follows:

- a) An electric-operated pump having a pressurizing capacity of at least 30 MPa against the nominal cross section of the test material shall be used for the pressurizing device and an automatically controlled pressurizing devices shall not be used.
- b) The heating blowpipe is in conformity with **JIS B 6801**.

7.2 Gas pressure welding apparatus used for automatic gas pressure welding test The gas pressure welding apparatus and its auxiliary devices used for the test shall be as follows:

- a) An electric-operated pump having pressurizing capacity of at least 30 MPa against the nominal cross section of the test material is used for the pressurizing device.

- b) The automatic gas pressure welding apparatus automatically controls the pressurizing process and also automatically controls the burner driving operation.
- c) The heating blowpipe is in conformity with **JIS B 6801**.

7.3 Gas pressure welding apparatus used for gas pressure weld hot punching test The gas pressure welding apparatus and its auxiliary devices used for the test shall be as follows:

- a) An electric-operated pump having pressurizing capacity of at least 30 MPa against the nominal cross section of the test material is used for the pressurizing device.
- b) The heating blowpipe is in conformity with **JIS B 6801**.

8 Judging method Appearance test, ultrasonic examination and bend test shall be carried out and the test specimen given in Table 2 shall be prepared.

8.1 Test for judgement The judgement of manual gas pressure welding and automatic gas pressure welding is made by an appearance test, ultrasonic examination and a bend test. In addition, the judgement of gas pressure weld hot punching is made by an appearance test and a bend test.

8.2 Appearance test

8.2.1 Execution of test The appearance test is carried out on test specimen.

8.2.2 Items of judgement The following items are assessed by visual inspection or measurement.

- a) **Items of judgement in manual gas pressure welding and automatic gas pressure welding**
 - 1) Shape of convex of pressure welded part (defects in diameter or length)
 - 2) State of surface of the convex of pressure welded part (e.g. sagging and overheating)
 - 3) Position of pressurized surface of pressure welded part (e.g. displacement)
 - 4) Deformation of pressure welded part (e.g. bending and eccentricity)
- b) **Items of judgement in gas pressure weld hot punching**
 - 1) Shape of pressure welded part after punching (defects in length of pressure welded part)
 - 2) State of surface of pressure welded part after punching (e.g. cracks, concaves and overheating)
 - 3) Deformation of pressure welded part after punching (e.g. bending and eccentricity)

8.3 Ultrasonic examination

8.3.1 Execution of ultrasonic examination An ultrasonic examination shall be carried out on the test specimen.

8.3.2 Number of test pieces for ultrasonic examination The number of the test pieces for ultrasonic examination shall be determined as given in Table 3 in accordance with the division of gas pressure welding.

Table 3 Number of test pieces for ultrasonic examination

Unit: mm

Classification of qualification tests	Classes of qualification test	Designation of deformed steel bar	Length of test material	Number of test pieces for ultrasonic examination
Manual gas pressure welding	Class 1	D25	250 ± 10	5
	Class 2	D32	300 ± 10	5
	Class 3	D38	300 ± 10	5
	Class 4	D51	350 ± 10	5
Automatic gas pressure welding	Class 2	D25	250 ± 10	2
		D32	300 ± 10	2 Total 4
	Class 3	D25	250 ± 10	2
		D32	300 ± 10	2
		D38	300 ± 10	2 Total 6
	Class 4	D25	250 ± 10	2
		D32	300 ± 10	2
		D38	300 ± 10	2
		D51	350 ± 10	2 Total 8

8.3.3 Method of ultrasonic examination The ultrasonic examination shall be carried out in accordance with JIS Z 3062. The acceptable level shall be 30 dB higher than the reference level.

8.4 Bend test

8.4.1 Number of test pieces for bend test The number of test pieces for bend test shall be determined as given in Table 4 according to the divisions of gas pressure welding, i.e. manual gas pressure welding, automatic gas pressure welding or gas pressure weld hot punching.

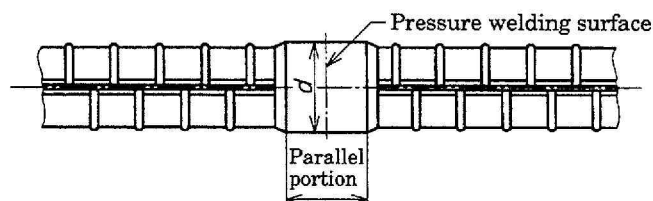
Table 4 Number of test pieces for bend test

Unit: mm

Classification of qualification tests	Classes of qualification test	Designation of deformed steel bar	Length of test material	Number of test pieces for bend test
Manual gas pressure welding	Class 1	D25	250 ± 10	5
	Class 2	D32	300 ± 10	5
	Class 3	D38	300 ± 10	5
	Class 4	D51	350 ± 10	5
Automatic gas pressure welding	Class 2	D25	250 ± 10	2
		D32	300 ± 10	2 Total 4
	Class 3	D25	250 ± 10	2
		D32	300 ± 10	2
		D38	300 ± 10	2 Total 6
	Class 4	D25	250 ± 10	2
		D32	300 ± 10	2
		D38	300 ± 10	2
		D51	350 ± 10	2 Total 8
Gas pressure weld hot punching	Class 1	D25	250 ± 10	5
	Class 2	D32	300 ± 10	5
	Class 3	D38	300 ± 10	5
	Class 4	D51	350 ± 10	5

8.4.2 Preparation of test pieces for bend test The test pieces for the bend test in manual gas pressure welding and automatic gas pressure welding shall be machined as shown in Table 5. In the gas pressure weld hot punching, the punched test specimen itself shall be used for the bend test.

Table 5 Dimensions of test piece for bend test in manual gas pressure welding and automatic gas pressure welding

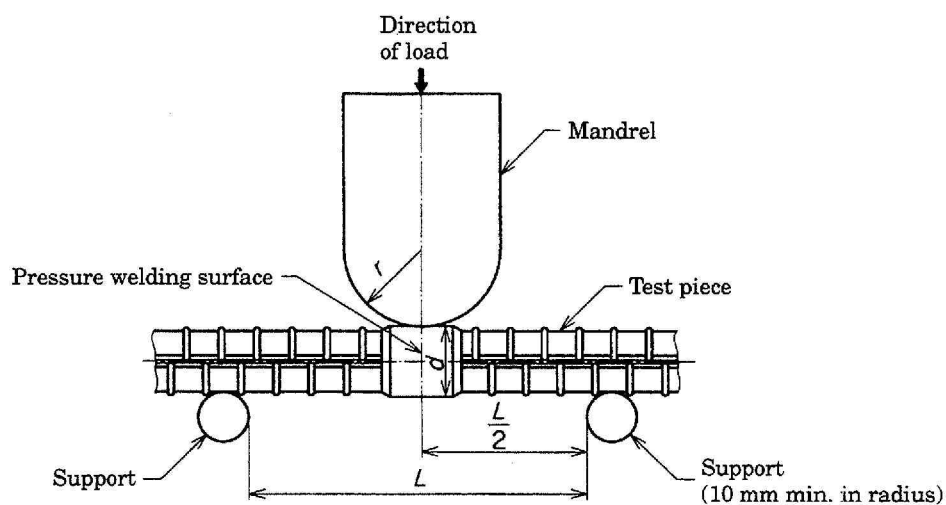


Unit: mm

Designation of test piece	Diameter of parallel portion d
D25	28.0 ± 0.1
D32	35.0 ± 0.1
D38	42.0 ± 0.1
D51	56.0 ± 0.1

8.4.3 Method of bend test The bend test shall be carried out in accordance with JIS Z 2248. The bending angle shall be 90.

8.4.4 Jig for bend test The jig used for bend test shall be as shown in Fig. 1. The bending diameter shall be as given in Table 6.



$$L = 2r + 3d$$

where, L : distance between two supports (mm);
 r : bend radius (mm);
 d : diameter of parallel portion (mm).

Fig. 1 Jig used for bend test

Table 6 Bend diameter

Unit: mm

Designation of test piece	Bend diameter $2r$
D25	100
D32	128
D38	152
D51	255

9 Criteria for acceptance

9.1 Judgement of acceptance In the test of manual gas pressure welding and automatic gas pressure welding, all of the acceptance criteria in the appearance test, ultrasonic examination, and bend test shall be satisfied. In addition, in the test of gas pressure weld hot punching, all of the acceptance criteria in the appearance test and the bend test shall be satisfied.

9.2 Acceptance criteria in appearance test If each item is noticeably defective, the result shall be noted as unacceptable.

9.3 Acceptance criteria in ultrasonic examination In the ultrasonic examination on both sides of the convex of the pressure welded part, if an echo equal to or higher than the level of acceptance specified in 8.3.3 is detected, the result shall be noted as unacceptable.

9.4 Acceptance criteria in bend test If any crack is observed with the naked eye on the outer surface of the bent pressure welded part, the result shall be noted as unacceptable.

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*.

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