JIS G3457 Arc Welded Carbon Steel Pipes

1. Scope

This Japanese Industrial Standard specifies the arc welded carbon steel pipes, hereinafter referred to as the "pipes". used for piping for steam, water, gas, air, etc. of comparatively low working pressure.

2. Grade and Designation

The pipes shall be classified into one grade and its letter symbol shall be as given in Table 1.

Table 1

Letter symbol of grade	(For reference) Traditional symbol
STPY400 (New)	STPY41

World Standard Comferens Table

KS		ASTM		JIS		DIN		BS	
Grade Number	GRADE	Grade Number	GRADE	Grade Number	GRADE	Grade Number	GRADE	Grade Number	GRADE
D 3583	SPW 400 (New) SPW 41 (Traditional)	A 134 A 134 A 139 A 36 A 283 A 285 A 370 A 37 A 570	Gr B Gr D Gr D	G-3457	STPY400 (New) STPY41 (Traditional)	1626	ust 37.0 st 37.0 st 44.0 st 52.0	3601	SAW410
		A 139	Gr A Gr C Gr D Gr E						

3. Chemical Composition

The pipes shall be tested in accordance with 9.1 and the resulting ladle analysis values shall conform to Table.

Letter symbol of grade	C	P	S
STPY400	0.25 max.	0.40 max.	0.040 max.

4. Mechanical Properties

4.1 Tensile Strength, Yield Point or Proof Stress and Elongation

The pipes or either the steel strips or steel plates used for the pipes shall be tested in accordance with 9.2 and the resulting tensile strength, yield point or proof stress and elongation shall comply with Table3.

4.2 Tensile Strength of Welds The welds of the pipes shall be tested in accordance with 9.3 and the resulting tensile strength shall comply with Table 3.

Letter symbol of grade	Table 3 Mechanical Properties		
	Tensile strength N/mm^2 {kgf/mm2}	Yield point or proof stress N/mm^2 {kgf/mm^2}	Elongation % No. 5 test piece, transverse
STPY400	400 {41}min.	255{23} min.	18 min.

Remarks

1. The minimum value of elongation for the pipes under 8mm in wall thickness shall be calculated by nominally subtracting 1.5 % from the elongation rates given in Table 3 for each decrease of 1mm from 8mm in wall thickness, and rounded off to an integer in accordance with JIS Z 8401. Calculation examples are given in Informative Reference Table.

2. The test piece shall be taken from the portion which does not involve welded seams.

Informative Reference Table Calculation Examples of Elongation of No. 5 Test Piece (Transverse) for Pipes under 8mm in Wall Thickness

Division of wall thickness	Over 7mm, up to 8mm	Over 6mm, up to and incl. 7mm	Over 5mm, up to and incl. 6mm
Elongation %	18	16	15

5. Hydrostatic Characteristic or Nondestructive Characteristic

The pipes shall be tested in accordance with 9.4 and the resulting hydrostatic characteristic or nondestructive characteristic shall conform to the following alternative, preference being committed either to the purchaser's designation or to the discretion of the manufacturer.

5.1 Hydrostic Characteristic When a hydrostatic pressure of 25 kgf/㎠ {25 bar} is applied, the pipes shall withstand it without leakage.

5.2 Nondestructive Characteristic The pipes shall be subjected to the nondestructive examination in the form of the ultrasonic test, and there shall be no signal greater than those produced by the artificial defects of the reference test block grade UY of the working sensitivity division specified in JIS G 0584.

6. Dimensions, Mass and Dimensional Tolerances

6.1 Dimensional and Mass The outside diameter, wall thickness and mass of the pipes shall be as specified in Attached Table .

6.2 Dimensional Tolerances The tolerances on outside diameter and wall thickness of the pipes shall be as specified in Table 4.

Table 4 Tolerances on Outside Diameter and Wall Thickness

Division		Tolerances %
Outside diameter		【0.5 Measurement based on the length of circumference.
Wall thickness	Nominal diameter Up to and incl. 450A	+15 / -12.5
	Nominal diameter over 450A	+15 / -10

Remarks

1. In determining the outside diameter, either the measured value of the length of circumference or the diameter derived from the measured value may be used. In this case, the outside diameter (D) and the length of circumference (l) shall be calculated reversibly from the following formula.

$l = \pi \cdot D$ where $\pi = 3.1416$

2. To the portions under repaired and the like, the above tolerances on outside diameter shall not be actually applied provided it is confirmed that the wall thickness is withness is within the tolerance range.

6.3 Pipe Length The length of each pipe shall be 4000mm or over.

7. Appearance

The appearance of pipe shall be as follows

7.1 The pipe shall be straight for practical purposes, and its both ends shall be at right angles to its axis.

7.2 The inside and outside surfaces of the pipe shall be well-finished, and free form defects that are detrimental to practical use.

8. Method of Manufacture

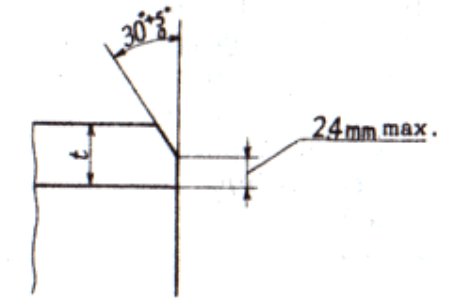
The method of manufacture of pipe shall be as follows

(1) The pipes shall be manufactured by the spiral seam or the straight seam welding. In either case, the internal and external surfaces of the pipe shall be automatic submerged arc welded in a butt joint.

(2) The pipes shall be either as welded or as cold-expanded after welding, and, as a rule, should not be subjected to heat treatments.

(3) Both ends of the pipe shall be finished plain ended or bevel ended (^{2}).

Note (^{2}) Unless otherwise specified, the shape of the bevel end shall be as shown in Figure.



9. Tests

9.1 Chemical Analysis

9.1.1 Chemical Analysis

General matters common to chemical analysis and method or sampling specimens for analysis shall be in accordance with 3. of JIS G 0303.

9.1.2 Analytical Method

The analytical method shall be in accordance with one of the following Standards

JIS G 1253

JIS G 1256

JIS G 1257

JIS G 1214

JIS G 1215

JIS G 1211

9.2 Tensile Test

9.2.1 Test Piece

The test specimen shall be No.5 test piece specified in JIS Z 2201 to be cut off from the pipe by either of the following methods.

(1) The test piece shall be cut off transversely from the pipes for cold expansion and finished into a flat piece.

(2) The test piece shall be cut off transversely from the pipes other than those for cold expansion and finished into a flat piece or cut off from the steel strip in coil or steel plate used for the pipe.

9.2.2 Test Method The test method shall be as specified in JIS Z 2241.

9.3 Tensile Test of welds

9.3.1 Test Piece

The test piece shall be No. 1 test piece specified in JIS Z 3121 to be cut off from the pipe or from the test specimen prepared from the end of the tubular one welded under the same conditions as the pipe itself, and shall be finished into a flat piece.

9.3.2 Test Method

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

9.4 Hydrostatic Test or Nondestructive Examination

Conduct either the hydrostatic test or the nondestructive examination in accordance with the respective requirements below

(1) The pipe is subjected to a hydrostatic pressure, kept under the specified pressure and checked for any leakage.

(2) The test method of the nondestructive examination shall be as specified in JIS G 0584.

10. Inspection

10.1 The inspection shall be as follows

(1) General matters of inspection shall be as specified in JIS G 0303.

(2) The chemical composition, mechanical properties, hydrostatic or nondestructive characteristic, dimensions and appearance of the pipes shall conform to 3., 4., 5., 6., and 7. However, for the cold-expanded pipes, commission of the tensile test for the welds may be agreed upon by the purchaser and the manufacturer.

(3) Either the hydrostatic test or the nondestructive examination shall be performed for each pipe.

(4) The method of sampling test specimens and the number of test piece for the tensile test and the tensile test for welds shall be as specified in Table 5 and Table 6.

Table 5 Method of Sampling Test Specimens and Number of Test Pieces (In Case of Tensile Test)

To be taken from the pipe	To be taken from the steel strip in coil	To be taken from the steel plate
Take one test specimen for each 1200m or its fraction from the pipes of the same dimensions ([3]), and then take one test piece from it.	Take one test specimen from each lot of the same heat and thickness, and take one test piece from it. However, take two test specimens from each lot exceeding 50 t.	Take one test specimen from each lot of the same heat of the maximum thickness of the plate within twice the minimum thickness. However, take two test specimens from each lot exceeding 50 t.

Note ([3]) The term "same dimensions" means the same wall thickness combined with the same outside diameter.

Table 6 Method of Sampling Test Specimens and Number of Test Piece (In the Case of Tensile Test of Welds)

To be taken from the pipe	To be taken from the end of tubular one welded under the same conditions as the pipe
Take one test specimen from each 1200m or its fraction of the pipes of the same dimensions ([3]), and then take one test piece for tensile test for welds from it.	Take one test specimen from each quantity equivalent to 1200m or its fraction of the pipes of the same dimensions ([3]), and take one test piece for tensile test for welds from it.

11. Marking

Each pipe having passed the inspection shall be marked with the following item. The order of arranging the items is not specified.

With the approval of the purchaser, the items may be partially omitted.

(1) Letter symbol of grade

(2) Dimensions ([4])

(3) Manufacturer's name or identifying brand

Note([4])

The dimensions shall be expressed as follows

Nominal diameter X wall thickness or outside diameter X wall thickness

Example : 400A × 6.4

12. Report

The manufacturer shall, as a rule, submit to the purchaser the report on the test results, ordered dimensions, quantity and work lot number traceable to the manufacturing conditions, etc.

Attached Table. Dimension and Unit Mass of arc Unit: kg/m

		Thickness mm	6.0	6.4	7.1	7.9	8.7	9.5	10.3	11.1	11.9	12.7	13.1	15.1	15.9
A	B	Outside diameter mm													
350	14	355.6	51.7	55.1	61.0	67.7									
400	16	406.4	59.2	63.1	69.9	77.6									
450	18	457.2	66.8	71.1	78.8	87.5									
500	20	508.0	74.3	79.2	87.7	97.4	107	117							
550	22	558.8	81.8	87.2	96.6	107	118	129	139	150	160	171			
600	24	609.6	89.3	95.2	105	117	129	141	152	164	175	187			
650	26	660.4	96.8	103	114	127	140	152	165	178	190	203			
700	28	711.2	104	111	123	137	151	164	178	192	205	219			
750	30	762.0		119	132	147	162	176	191	206	220	235			
800	32	812.8		127	141	157	173	188	204	219	235	251	258	297	312
850	34	863.6				167	183	200	217	233	250	266	275	316	332
900	36	914.4				177	194	212	230	247	265	282	291	335	352
1000	40	1016.0				196	216	236	255	275	295	314	324	373	392
1100	44	1117.6						260	281	303	324	346	357	411	432
1200	48	1219.2						283	307	331	354	378	390	448	472

1350	54	1371.6									399	426	439	505	532
1500	60	1524.0									444	473	488	562	591
1600	64	1625.6											521	600	631
1800	72	1828.8											587	675	711
2000	80	2032.0												751	791

Remarks

1. To indicate the nominal diameter of the pipe, either the letter A or B shall be used, A or B being suffixed to the figures of nominal diameter for identification.
2. The value of mass shall be calculated from the following formula assuming 1㎏ of steel to be 7.85 g and round off to 3 significant digits in accordance with JIS Z 8401. However, the value exceeding 1000 kg/m shall be rounded off to a whole number of kg/m.

$$w=0.024666\ t\ (D-t)$$

Where w: unit mass of pipe (kg/m)

T: wall thickness of pipe (mm)

D: outside diameter of pipe (mm)

3. When the dimensions not given in the above table are necessary, agreement shall be made between the purchaser and the manufacturer.

Material Comparison Tables (ASTM, KS, JIS, DIN, BS, NBN, NF, UNI)

ASTM Standard	UNS NO.	KOREA/JAPANES			GERMAN				BRITISH			FRENCH		
		KS/JIS Symbol	KS/JIS Number	Remarks	DIN Type	DIN Number	Material Number	Remarks	B.S Number	B.S Grade	Remarks	AFNOR Type	NF Number	Remarks
A 134 Electric-Fusion (Arc)-Welded Steel Pipe		SPW 400 / STPY 400	K3583 / G3457	(19)				(3)	3602	SAW 410				(3)

JIS Number and Corresponding Foreign Standards

JIS			ASTM			BS			DIN			NF			Index Number
Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	
G3457	STPY400 (STPT41)	C	A139	GrB	C	3601	SAW410	C							C005