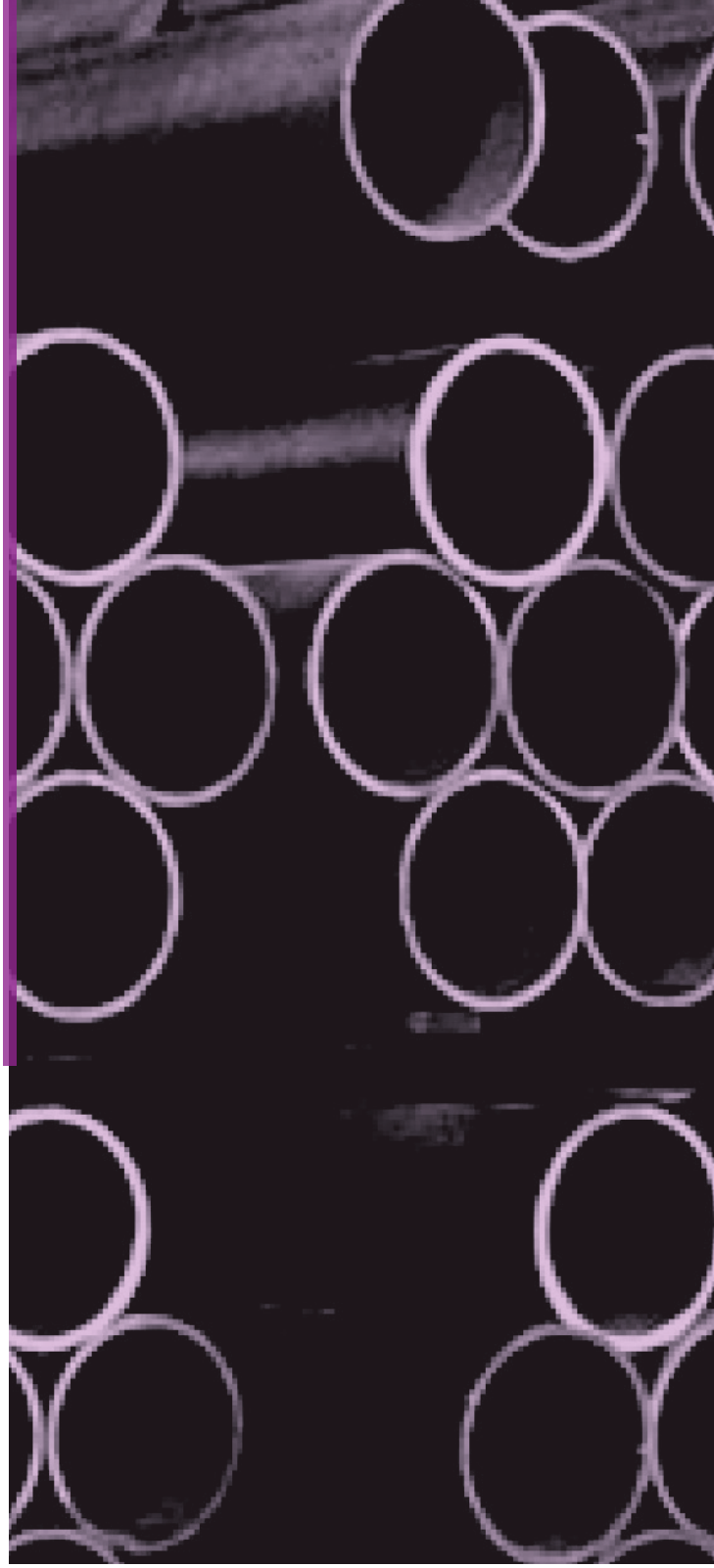
STEEL

PIPES



7h) Carbon Steel Pipes For Pressure Service

Japanese Industrial Standard (Extracts from JIS G 3454 : 2007)

General Information

This Japanese Industrial Standard specifies the carbon steel pipes, used for pressure service at an approximate maximum temperature of 350˚C. The dimension range in which this Standard shall apply is generally 10.5 mm to 660.4 mm in outside diameter.

Pipes shall be classified into two grades and designations of grade and manufacturing process and classification of zinc-coating shall be as given in Table 1.

Table 1. Designation of grade, manufacturing process and classification of zinc-coating

Designation Of Grade	Designation Of Manufacturing Process		Classification Of Zinc-coating
	Pipe Manufacturing Process	Finishing Method	
STPG 370	Seamless: S Electric resistance welded: E	Hot finished: H Cold finished: C As electric resistance welded: G	Black pipes: Not zinc-coated White pipes: Zinc-coated pipes
STPG 410			

Chemical Composition

The Chemical analysis of the steel shall comply with the requirement of Table 2.

Table 2. Chemical Composition

Unit: %

Letter Symbol Of Grade	C	Si	Mn	P	S
STPG 370	0.25 max.	0.35 max.	0.30 to 0.90	0.040 max.	0.040 max.
STPG 410	0.30 max.	0.35 max.	0.30 to 1.00	0.040 max.	0.040 max.

Mechanical Strength (Tensile Test)

The tensile strength, yield point or proof stress and elongation shall be as given in Table 3.

Table 3. Mechanical properties

Designation Of Grade	Tensile Strength N/mm²	Yield Points Or Proof Stress N/mm²	Elongation %			
			*No. 11 Test Piece Or *No. 12 Test Piece	*No. 5 Test Piece	*No. 4 Test Piece	
			Pipe Axis Direction	Right Angle To Pipe Axis Direction	Pipe Axis Direction	Right Angle To Pipe Axis Direction
STPG 370	370 min.	215 min.	30 min.	25 min.	28 min.	23 min.
STPG 410	410 min.	245 min.	25 min.	20 min.	24 min.	19 min.

Remark: For pipes whose nominal diameter is 25A or under, the elongation given in table 3 shall not apply.

When the tensile test is carried out for *No. 12 or *No. 5 test piece for pipes under 8 mm in wall thickness, the minimum value of elongation shall be as given in Table 4.

Table 4. Minimum elongation values for *No. 12 test piece (pipe axis direction) and *No. 5 test piece (right angle to pipe axis direction) taken from pipes under 8 mm in wall thickness

Unit: %

Designation Of Grade	Test Piece	Elongation Value By Thickness Division						
		Over 1mm up to and incl. 2mm	Over 2mm up to and incl. 3mm	Over 3mm up to and incl. 4mm	Over 4mm up to and incl. 5mm	Over 5mm up to and incl. 6mm	Over 6mm up to and incl. 7mm	Over 7mm to and excl. 8mm
STPG370	*No. 12 Test Piece	21	22	24	26	27	28	30
	*No. 5 Test Piece	16	18	19	20	22	24	25
STPG410	*No. 12 Test Piece	16	18	19	20	22	24	25
	*No. 5 Test Piece	11	12	14	16	17	18	20

* Please refer to Appendix 'A' Tension Test Pieces for Metallic Materials - JIS Z 2201 (pg153-155)

Bending Test

The bending test is designated instead of the flattening test for pipes of which nominal diameter is 40A or under, the test piece shall be free from the occurrence of flaws or cracks. In this care, the bending angle shall be 90° and the bending inside radius shall be 6 times the outside diameter of pipes.

Cold Flattening Test

A test piece 50 mm or over in length shall be cut off form the end of the pipe. For the electric resistance welded steel pipe, the weld shall be placed at right angles to the direction of compression, and the weld compressed up to *H=2/3 D* and the portion other than the weld when compressed up to *H=1/3 D* shall be examined. The pipe shall not generate flaws or cracks on its wall surface.

Hydrostatic Test

When the pipe is subjected to hydrostatic pressure and kept under the specified pressure, as given in Table 5. Its strength to withstand the pressure without leakage shall be examined.

Table 5. Hydrostatic Test Pressure

Unit: Mpa (kg/cm²)

Schedule Number Sch	10	20	30	40	60	80
Hydrostatic test pressure	2.0 (21)	3.5 (36)	5.0 (51)	6.0 (62)	9.0 (92)	12 (123)

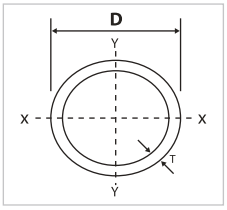
Tolerances On Dimensions and Mass

The tolerances on dimensions shall be as specified in Table 6.

Table 6. Tolerance on dimensions

Division		Hot-finished Seamless Pipe		Cold-finished Seamless Steel Pipe And Electric Resistance Welded Steel Pipe	
Outside Diameter		40 A or under	± 0.5 mm	25 A or under	± 0.3 mm
		50 A or over up to and incl. 125 A	± 1 %	32 A to 300 A	± 0.8 %
		150 A	± 1.6 mm	350 A or over	± 0.5 %
		200 A to 300 A	± 0.8 %		
		350 A or over	± 0.5 %		
Thickness		Under 4 mm	+ 0.6 mm - 0.5 mm	Under 3 mm	± 0.3 mm
		4 mm or over	+ 15 % - 12.5 %	3 mm or over	± 10 %
Length		Shall be not less than the specified length			
Straightness		Pipe shall be practically straight			
Out-of-roundness (*o*)		-			
Concavity / convexity		-			
Radius of Corners		-			
Squareness of side		-			
Twist		-			
Inner Flash		-			
End tolerance on diameter		-			
End Facing	Bevel angle	30° + 5°, - 0°			
	Root Face	2.4 mm max.			
Pipe End		Both ends shall be at a right angle to its axis			
Mass (*m*) per unit length		-			

Pipes JIS G 3454



7h(i) Dimension and Unit Mass of Carbon Steel Pipes For Pressure Service

Japanese Industrial Standard (Extracts from JIS G 3454 : 2007)

Nominal Diameter		Outside Diameter	Nominal Wall Thickness (t)											
			Schedule 10		Schedule 20		Schedule 30		Schedule 40		Schedule 60		Schedule 80	
			Thick-ness	Unit Mass	Thick-ness	Unit Mass	Thick-ness	Unit Mass	Thick-ness	Unit Mass	Thick-ness	Unit Mass	Thick-ness	Unit Mass
A	B	D	t	W	t	W	t	W	t	W	t	W	t	W
mm	inch	mm	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m
6	1/8	10.5	-	-	-	-	-	-	1.7	0.369	2.2	0.450	2.4	0.479
8	1/4	13.8	-	-	-	-	-	-	2.2	0.629	2.4	0.675	3.0	0.799
10	3/8	17.3	-	-	-	-	-	-	2.3	0.851	2.8	1.00	3.2	1.11
15	1/2	21.7	-	-	-	-	-	-	2.8	1.31	3.2	1.46	3.7	1.64
20	3/4	27.2	-	-	-	-	-	-	2.9	1.74	3.4	2.00	3.9	2.24
25	1	34.0	-	-	-	-	-	-	3.4	2.57	3.9	2.89	4.5	3.27
32	1 1/4	42.7	-	-	-	-	-	-	3.6	3.47	4.5	4.24	4.9	4.57
40	1 1/2	48.6	-	-	-	-	-	-	3.7	4.10	4.5	4.89	5.1	5.47
50	2	60.5	-	-	3.2	4.52	-	-	3.9	5.44	4.9	6.72	5.5	7.46
65	2 1/2	76.3	-	-	4.5	7.97	-	-	5.2	9.12	6.0	10.4	7.0	12.0
80	3	89.1	-	-	4.5	9.39	-	-	5.5	11.3	6.6	13.4	7.6	15.3
90	3 1/2	101.6	-	-	4.5	10.8	-	-	5.7	13.5	7.0	16.3	8.1	18.7
100	4	114.3	-	-	4.9	13.2	-	-	6.0	16.0	7.1	18.8	8.6	22.4
125	5	139.8	-	-	5.1	16.9	-	-	6.6	21.7	8.1	26.3	9.5	30.5
150	6	165.2	-	-	5.5	21.7	-	-	7.1	27.7	9.3	35.8	11.0	41.8
200	8	216.3	-	-	6.4	33.1	7.0	36.1	8.2	42.1	10.3	52.3	12.7	63.8
250	10	267.4	-	-	6.4	41.2	7.8	49.9	9.3	59.2	12.7	79.8	15.1	93.9
300	12	318.5	-	-	6.4	49.3	8.4	64.2	10.3	78.3	14.3	107	17.4	129
350	14	355.6	6.4	55.1	7.9	67.7	9.5	81.1	11.1	94.3	15.1	127	19.0	158
400	16	406.4	6.4	63.1	7.9	77.6	9.5	93.0	12.7	123	16.7	160	21.4	203
450	18	457.2	6.4	71.1	7.9	87.5	11.1	122	14.3	156	19.0	205	23.8	254
500	20	508.0	6.4	79.2	9.5	117	12.7	155	15.1	184	20.6	248	26.2	311
550	22	558.8	6.4	87.2	9.5	129	12.7	171	15.9	213	-	-	-	-
600	24	609.6	6.4	95.2	9.5	141	14.3	210	-	-	-	-	-	-
650	26	660.4	7.9	127	12.7	203	-	-	-	-	-	-	-	-

Note: The unit mass value shall be calculated from the following formula assuming 1 cm^3 of steel to be 7.85g and rounded off to three significant figures in accordance with rule A of JIS Z 8401.

$W=0.02466t\,(D-t)$ where,

w = unit mass of pipe (kg/m)
t = wall thickness of pipe (mm)
D = outside diameter of pipe (mm)
0.02466 = conversion coefficient for obtaining W.