JIS G3471 Corrugated steel pipes and sections

1. Scope

This Japanese Industrial Standard specifies corrugated steel pipes and sections, and bolts, nults, washers and coupling bands for joints for the use of water channel, passageway and other various constructions.

Remark

The corrugated pipes include those of the spiral type which are made in advance in the form of pipe by the manufacturer and those which are shipped as the sections from the manufacturer and assembled at the construction site.

2. Class and Symbol

The classes and symbols of the corrugated pipes according to combination of sectional shapes and corrugation shapes of the pipes shall be as given in Table 1.

Table 1 Class and Symbol

Class		KS	JIS	Remark
Shape of section	Shape of corrugation	D3590	G3471	
Circular type	Type1	SCP 1R	SCP 1 R	Jointing of the sections is of the flange type in the axial direction and of the lap type in the circumferential direction.
	Type1S	SCP 1RS	SCP 1 RS	Spiral pipes are connected by the coupling band.
	Type1S	SCP 2R	SCP 2 R	Jointing of the sections is of the lap type both in the axial direction and in the circumferential direction.
	Type3S	SCP 3RS	SCP 3 RS	Spiral pipes are connected by the coupling band.
Elongation type	Type2	SCP 2E	SCP 2 E	Jointing of the sections is of the lap type both in the axial direction and in the circumferential direction.
Pipe arch type	Type2	SCP 2P	SCP 2 P	
Arch type	Type2	SCP 2A	SCP 2 A	

Remark

When the material contains copper, "Cu" shall be suffixed the symbol

Examples SCP 1 RSCu, SCP 3 RSCu

3. Manufacturing Method

The corrugated steel pipes and sections shall be manufactured by cold forming steel plate or galvanized iron plate in the specified shapes and dimensions. When a steel plate is

used, the pipes and sections shall be plated by hot zinc dipping after forming unless otherwise specified.

Plate thickness of section mm	Strength classification		Grade			
	Bolt	Nut	Finish		Grade of thread	
			Bolt	Nut	Bolt	Nut
Under 4.5	4T min.	4 min.	Ordinary	Ordinary	Grade 3	Grade 3
4.5 and over	7T min.					

The bolts to be used for assembling the pipe with the sections shall be provided with coarse threads of nominal diameter 10 for Type 1 and nominal diameter 20 for Type 2 and the grade of thread shall be that before galvanizing.

4.3 The zinc metal to be used for hot zinc dipping shall be Class 2 specified in JIS H 2107 or the superior.

5. Appearance and Weight of Zinc Coating

5.1 The sections, spiral pipes, bolts for jointing, nuts, washers and coupling bands shall be free from injurious defects in use.

5.2 The weight of zinc coating on the hot zinc dipped pipe and section shall be as given in Table 3.

Table 3 Weight of Zinc Coating

Unit :g/㎡

Type of weight of zinc coating	Minimum weight of coating
600	600
900	900

Remarks

1. The weight of zinc coating as given as the weight of zinc coating on both sides of a product.
2. Type 600 shall comply with JIS G 3302.
3. Type 900 shall conform to Class 2, 45 specified in JIS H 8641

5.3 The weight of zinc coating on bolts, nuts and washers shall be Class 1 Grade 3 specified in JIS H 8610 or the superior.

5.4 The weight of zinc coating on the coupling band shall be equivalent to Type 600 in Table 3 of 5.2.

6.1 Sectional Shape and Dimensions of Circular Type

6.1.1 The dimensions of the circular type 1 pipe shall be as given in Table 4.

Table 4 Dimensions of Circular Type 1 Pipe

Unit: mm

Symbol	Nominal dia. D	Plate thickness t				
		1.6	2.0	2.7	3.2	4.0
SCP 1R	400	O	O	O	O	O
	600	O	O	O	O	O
	800	O	O	O	O	O
	1000	O	O	O	O	O
	1200	O	O	O	O	O
	1350	O	O	O	O	O
	1500	O	O	O	O	O
	1650	O	O	O	O	O
	1800	O	O	O	O	O

Remark

The plate thickness indicates the thickness of the original plate before plating.

6.1.2 The sectional shape and dimensions of the circular type 1 section shall be as given in Table 5.

Table 5 Sectional Shape and Dimensions of Circular Type 1 Section

Unit: mm

Symbol	Dimensions						
	Corrugation pitch *P*	Corrugation height *H*	Bend radius of corrugation *r*	Effective length *L*	Flange length *f*	Hole position in axial direction *g*	Lap allowance in axial direction *l*
SCP 1R	68.0	13.0	17.5	612 1020	55	25	19

6.1.3 The number of bolt holes of the circular type 1 section shall be as given in Table 6.

Table 6 Number of Bolt Holes of Circular Type 1 Section

Nominal diameter of section D	Number of bolt, holes		Help potch in circumferential direction mm
	Axial direction	Circumferential direction (both sides)	

400	1 per pitch of corrugation	None	-
600		None	-
800		None	-
1000		None	-
1200		8	500
1350		8	500
1500		10	500
1650		10	500
1800		10	500

6.2 Sectional Shape and Dimensions of Circular Type 1 S

6.2.1 The sectional shape and dimensions of the circular type 1 S pipe shall be as given in Tables 7 and 8.

Table 7 Dimensions of Circular Type 1 S Pipe

Unit: mm

Symbol	Nominal dis. D	Plate thickness t				Length L
		1.6	2.0	2.7	3.2	
SCP 1RS	300	O	O	-	-	Specified length from 4000 to 6000 incl.
	400	O	O	-	-	
	450	O	O	-	-	
	600	O	O	O	-	
	800	O	O	O	-	
	1000	O	O	O	O	
	1200	O	O	O	O	
	1350	O	O	O	O	
	1500	O	O	O	O	
	1650	O	O	O	O	

	1800	O	O	O	O	

Remark

The plate thickness indicates the thickness of the original plate before plating.

Table 8 Sectional Shape and Dimensions of Circular 1 S Pipe

Unit: mm

Symbol	Dimensions		
	Corrugation pitch P	Corrugation height H	Bend radius of corrugation r
SCP 1RS	68.0	13.0	17.5

6.2.2 The sectional shape and dimensions of the coupling band to be used for the circular type 1 S pipe shall be as given in Table 9.

Table 9 Sectional Shape and Dimensions of Coupling Band Used for Circular Type 1 S Pipe

Unit: mm

Symbol	Plate thickness and width of band	Nominal dia. of pipe D	300	400	450	600	800	1000	1200	1350	1500	1650	1800
D-1	Plate thickness t		1.6					-					
	Width W		270					-					
D-2	Plate thickness t		-					2.0					2.7
	Width W		-					410					410
S-1	Plate thickness t		1.6,2.0			1.6,2.0,2.7		1.6,2.0,2.7,3.2					
	Width W		410			410		410					
S-2	Plate thickness t		-										3.2
	Width W		-										410

6.3 Sectional Shape and Dimensions of Circular Type 2

6.3.1 The dimensions of the circular type 2 shall be as given in Table 10.

Table 10 Dimensions of Circular Type 2 Pipe and Number of Sections Forming Pipe

Unit: mm

Symbol	Plate thickness	Plate thickness t	Number of sections forming pipe (example)

	D	2.7	3.2	4.0	4.5	5.3	6.0	7.0	9pitches	6pitches	3pitches
SCP 2R	1500	O	O	O	O	O	O	O	-	2	2
	1750	O	O	O	O	O	O	O	-	3	1
	2000	O	O	O	O	O	O	O	-	4	-
	2500	O	O	O	O	O	O	O	2	2	-
	3000	O	O	O	O	O	O	O	4	-	-
	3500	O	O	O	O	O	O	O	2	4	-
	4000	O	O	O	O	O	O	O	4	2	-
	4500	O	O	O	O	O	O	O	6	-	-
	5000	O	O	O	O	O	O	O	4	4	-
	6000	O	O	O	O	O	O	O	8	-	-
	7000	O	O	O	O	O	O	O	8	2	-
	8000	O	O	O	O	O	O	O	8	4	-
	9000	O	O	O	O	O	O	O	12	-	-
	10000	O	O	O	O	O	O	O	12	2	-
	11000	O	O	O	O	O	O	O	12	4	-
	12000	O	O	O	O	O	O	O	16	-	-
	13000	O	O	O	O	O	O	O	16	2	-
	14000	O	O	O	O	O	O	O	16	4	-
	15000	O	O	O	O	O	O	O	20	-	-

Remark The plate thickness indicates the thickness of the original plate before plating.

6.3.2 The sectional shape and dimensions of the circular type 2 section shall be as given in Table 11.

Table 11 Sectional Shape and Dimensions of Circular Type 2 Section

Unit: mm

Symbol	Dimensions

	Corrugation pitch *P*	Corrugation height *H*	Bend radius of corrugation *r*	Effective length *L*	Lap allowance in axial direction *l*	Lap allowance in circumferential direction	
						g1	g2
SPC 2R	150.0	48.0	28.0	450 600 750 900 1050 1200	50	35	50
	150.0	50.0	28.0				

Remarks

1. O mark indicates the positions of bolt holes. However, ≤ mark indicates the position of bolt holes to be provided in addition when the plate thickness is 6.0mm or 7.0mm.

2. The distances g1 and g2 and the distance between holes (262 mm) in the circumferential direction shall be the dimension before corrugation.

3. Number n shall be 3, 6 and 9 and referred to as 3 pitches, 6 pitches and 9 pitches.

4. Dimension a (length of chord) and dimension b (effective circumference) shall be calculated from the following formula.

where r1 shall be as follows

Circular type: D/2

Elongation type: r_1, r_2, r_3

Pipe arch type: r_1, r_2, r_3

Arch type: r_s

6.3.3 The number of bolt holes of the circular type 2 section shall be as given in Table 12.

Table 12 Number of Bolt Holes of Circular Type 2 Section

Plate thickness of section t mm	Number of bolt holes	
	Axial direction	Circumferential direction
5.3 max.	Not less than 2 per corrugation pitch	1 per 262 mm
6.0 min.	Not less than 3 per corrugation pitch	1 per 262 mm

6.4 Sectional Shape and Dimensions of Circular Types 3 S

6.4.1 The sectional shape and the dimensions of the circular type 3 S pipe shall be as given in Tables 13 and 14.

Table 13 Dimensions of Circular Type 3 S Pipe

Symbol	Nominal dia. D	Plate thickness t				Length L
		1.6	2.0	2.7	3.2	
SCP 3RS	900	O	O	O	O	Specified length from 4000 to 6000 inch.
	1000	O	O	O	O	
	1200	O	O	O	O	
	1350	O	O	O	O	
	1500	O	O	O	O	
	1650	O	O	O	O	
	1800	O	O	O	O	
	2000	O	O	O	O	
	2200	O	O	O	O	
	2400	O	O	O	O	

Remark

The plate thickness indicates the thickness of the original plate before plating.

Table 14 Sectional Shape and Dimensions of Circular Type 3 S Pipe

Unit: mm

Symbol	Dimensions		
	Corrugation pitch P	Corrugation height H	Bend radius of corrugation r
SCP 3RS	76.2	25.4	17.5

6.4.2 The sectional shape and dimensions of the coupling band to be used for the circular type 3 S pipe shall be as given in Table 15.

Table 15 Sectional Shape and Dimensions of Coupling Band to Be Used for Circular Type 3 S Pipe

Unit: mm

Symbol	Plate thickness and width of band	Nominal dia. of pipe D	900	1000	1200	1350	1500	1650	1800	2000	2200	2400
S-3	plate thickness t		1.6, 2.0, 2.7, 3.2						-			

	Width W	460	-
S-4	plate thickness t	-	3.2
	Width W	-	460

6.5 Sectional Shape and Dimensions of Elongation Type

6.5.1 The dimensions of the elongation type shall be as given in Table 16. However, the sectional shape and dimensions of the section and the number of holes of the section shall be as given in Tables 11 and 12.

Table 16 Dimensions of Elongation Type and Number of Sections Forming Pipe

Unit: mm

Symbol	Nominal dia. D	Span S	Rise R	Radius			Plate thickness t							Number of sections forming pipe (example)								
														9pitches			6pitches			3pitches		
				r1	r2	r3	2.7	3.2	4.0	4.5	5.3	6.0	7.0	r1	r2	r3	r1	r2	r3	r1	r2	r3
SCP 2E	1500	1405	1575	680	947	680	O	O	O	O	O	O	O	-	-	-	1	-	1	-	2	-
	1750	1668	1839	705	979	804	O	O	O	O	O	O	O	-	-	-	-	2	1	1	-	-
	2000	1898	2100	892	1140	892	O	O	O	O	O	O	O	-	-	-	1	2	1	-	-	-
	2500	2317	2625	1092	1385	1092	O	O	O	O	O	O	O	-	2	-	1	-	1	-	-	-
	3000	2846	3150	1338	1710	1338	O	O	O	O	O	O	O	1	2	1	-	-	-	-	-	-
	3500	3333	3675	1540	1953	1540	O	O	O	O	O	O	O	1	-	1	-	4	-	-	-	-
	4000	3844	4200	1645	2157	1645	O	O	O	O	O	O	O	-	4	-	1	-	1	-	-	-
	4500	4305	4725	1925	2460	1925	O	O	O	O	O	O	O	1	4	1	-	-	-	-	-	-

Remark The plate thickness indicates the thickness of the original plate before plating.

6.6 Sectional Shape and Dimensions of Pipe Arch Type

6.6.1 The dimensions of the pipe arch type shall be as given in Table 17. However, the sectional shape and dimensions of the section and the number of bolt holes of the section shall be as given in Table 11 and 12.

Table 17 Dimensions of Pipe Arch Type and Number of Sections Forming Pipe

Unit: mm

Symbol	Nominal dia.	Span	Rise	Bottom depth	C	Radius	Plate thickness t	Number of sections forming pipe (example)

	D	S	R	B		r1	r2	r3	2.7	3.2	4.0	4.5	5.3	6.0	7.0	9pitches			6pitches			3pitches		
																r1	r2	r3	r1	r2	r3	r1	r2	r3
SCP 2P	1500	1500	810	662	947	1057	1446	530	O	O	O	O	O	O	O	1	-	-	-	1	-	-	-	2
	2000	2000	1060	624	1231	1160	2588	530	O	O	O	O	O	O	O	-	-	-	2	1	-	-	-	2
	2500	2500	1310	777	1641	1463	2018	530	O	O	O	O	O	O	O	-	1	-	2	-	-	-	-	2
	3000	3000	1560	711	1917	1529	3157	530	O	O	O	O	O	O	O	1	1	-	1	-	-	-	-	2
	3500	3500	1810	813	2611	1914	3684	530	O	O	O	O	O	O	O	2	-	-	-	2	-	-	-	2
	4000	4000	2060	925	3309	2312	4191	530	O	O	O	O	O	O	O	1	1	-	2	1	-	-	-	2
	4500	4500	2310	1045	4009	2720	4688	530	O	O	O	O	O	O	O	2	2	-	1	-	-	-	-	2
	5000	5000	2560	1171	4710	3138	5176	530	O	O	O	O	O	O	O	3	1	-	-	2	-	-	-	2

Remark The plate thickness indicates the thickness of the original plate before plating.

6.7 Sectional Shape and Dimensions of Arch Type

6.7.1 The dimensions of the arch type shall be as given in Table 18. However, the sectional shape and dimensions of the section and the number of bolt holes of the section shall be as given in Tables 11 and 12.

Table 18 Dimensions of Arch Type and Number of Sections Forming Pipe

Symbol	Nominal dia. D	Span S	Rise R	Plate thickness t							Number of sections forming arch (example)		
				2.7	3.2	4.0	4.5	5.3	6.0	7.0	9pitches	6pitches	3pitches
SCP 2P	1500	1500	810	O	O	O	O	O	O	O	-	1	1
	2000	2000	1060	O	O	O	O	O	O	O	-	2	-
	2500	2500	1310	O	O	O	O	O	O	O	1	1	-
	3000	3000	1560	O	O	O	O	O	O	O	-	3	-
	3500	3500	1810	O	O	O	O	O	O	O	1	2	-
	4000	4000	2060	O	O	O	O	O	O	O	2	1	-
	4500	4500	2310	O	O	O	O	O	O	O	3	-	-
	5000	5000	2560	O	O	O	O	O	O	O	2	2	-

	5500	5500	2810	O	O	O	O	O	O	O	3	1	-
	6000	6000	3060	O	O	O	O	O	O	O	2	3	-
	6500	6500	3310	O	O	O	O	O	O	O	3	2	-
	7000	7000	3560	O	O	O	O	O	O	O	4	1	-

Remark The plate thickness indicates the thickness of the original plate before plating

7. Dimensional Tolerance for Pipes and Sections

7.1 The dimensional tolerances on the circular type 1, circular type 2, elongation type, pipe arch type and arch type sections shall be as given in Table 19.

Table 19 Dimensional Tolerances on Circular Type 1, Circular Type 2, Elongation Type, Pipe Arch Type and Arch Type Sections Unit: mm

8. Test

The test for the weight of zinc coating after hot zinc dipping shall be in accordance with the weight method (direct method) specified in JIS H 0401 or the three points method of the antimony chloride method (indirect method). In this case, when the hot zinc dipping as conducted after forming, the weight method shall, as a rule, apply and, when a galvanized iron plate is used, the three point method (mean value of three points) of the antimony chloride method shall, as a rule, apply.

9. Inspection

The results of inspections on the appearance, weight of zinc coating and dimensions of the sections, spiral type pipes, and bolts for jointing, nuts, washers and coupling bands shall conform to the specifications in 4., 5 and 1.

10.Marking

Each spiral type pipe and each bundle of sections which have passed the inspection shall be marked with the following particulars

(1) Symbol of class

(2) Type of weight of zinc coating (When not galvanized, the pipes and sections shall be marked with 000.)

(3) Dimensions (plate thickness x nominal diameter

(4) Manufacturer's name or its abbreviation