

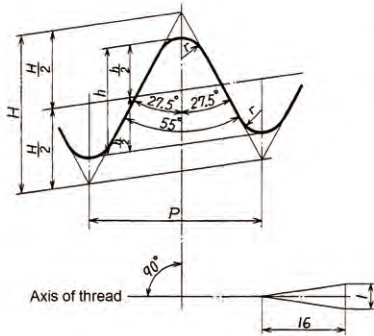
Taper Pipe Thread JIS B 0203:1999* (BSPT)

Extracted and partly modified from JIS B 0203:1999. For further information, please refer to JSA, Japanese Standards Association, <https://www.jsa.or.jp/en/>

Inspection The threads manufactured in accordance with this Annex shall, as a rule, be inspected with limit gauge for taper screw thread specified in annex (normative) to JIS B 0253.

Attached Table 1 Basic Thread Profile, Basic Dimensions and Tolerances

Basic profile applied for taper external and taper internal threads



Thick solid line shows the basic thread profile

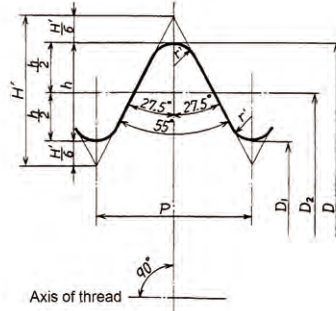
$$P = \frac{25.4}{n}$$

$$H = 0.960\,237\,P$$

$$h = 0.640\,327\,P$$

$$r = 0.137\,278\,P$$

Basic profile applied for parallel internal threads



Thick solid line shows the basic thread profile

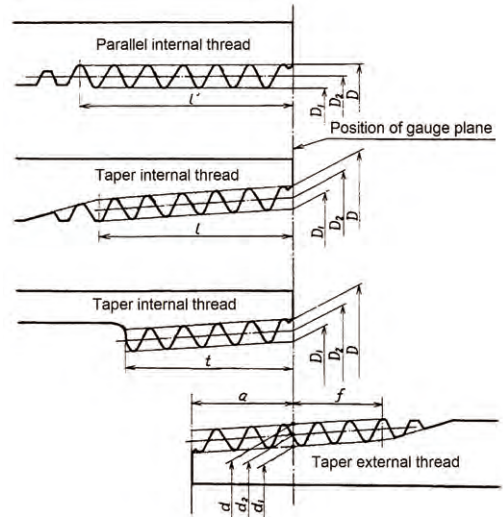
$$P = \frac{25.4}{n}$$

$$H' = 0.960\,491\,P$$

$$h = 0.640\,327\,P$$

$$r' = 0.137\,329\,P$$

Fitting between taper external thread and taper internal or parallel internal thread



Attached Table 1 Basic Thread Profile, Basic Dimensions and Tolerances (concluded)

(Unit: mm)

Designation of thread size ⁽³⁾	Thread				Gauge diameter			Position of gauge plane			Tolerance on D , D_2 and D_1 of parallel internal thread	Length of useful thread (min.)				Size of carbon steel pipe for ordinary piping (Reference)	
	Number of threads (in 25.4mm)	Pitch (informative)	Height of thread	Radius	External thread			External thread		Internal thread		From position of gauge plane to larger diameter end	From position of gauge plane to smaller diameter end	Internal thread		Outside diameter	Thickness
					Major dia.	Pitch dia.	Minor dia.	From pipe end		At pipe end				When there is incomplete thread part	When there is no incomplete thread part		
								Gauge length	Axial tolerance	Axial tolerance							
					Internal thread									From end of pipe or coupler	(4)		
					Major dia.	Pitch dia.	Minor dia.										
	n	P	h	r or r'	D	D_2	D_1	a	b	c		f	ℓ	ℓ'	ℓ		
R $\frac{1}{8}$	28	0.907 1	0.581	0.12	7.723	7.142	6.561	3.97	±0.91	±1.13	±0.071	2.5	6.2	7.4	4.4	—	—
R $\frac{1}{4}$	28	0.907 1	0.581	0.12	9.728	9.147	8.566	3.97	±0.91	±1.13	±0.071	2.5	6.2	7.4	4.4	10.5	2.0
R $\frac{3}{8}$	19	1.336 8	0.856	0.18	13.157	12.301	11.445	6.01	±1.34	±1.67	±0.104	3.7	9.4	11.0	6.7	13.8	2.3
R $\frac{1}{2}$	19	1.336 8	0.856	0.18	16.662	15.806	14.950	6.35	±1.34	±1.67	±0.104	3.7	9.7	11.4	7.0	17.3	2.3
R $\frac{3}{4}$	14	1.814 3	1.162	0.25	20.955	19.793	18.631	8.16	±1.81	±2.27	±0.142	5.0	12.7	15.0	9.1	21.7	2.8
R $\frac{1}{2}$	14	1.814 3	1.162	0.25	26.441	25.279	24.117	9.53	±1.81	±2.27	±0.142	5.0	14.1	16.3	10.2	27.2	2.8
R1	11	2.309 1	1.479	0.32	33.249	31.770	30.291	10.39	±2.31	±2.89	±0.181	6.4	16.2	19.1	11.6	34	3.2
R1 $\frac{1}{4}$	11	2.309 1	1.479	0.32	41.910	40.431	38.952	12.70	±2.31	±2.89	±0.181	6.4	18.5	21.4	13.4	42.7	3.5
R1 $\frac{1}{2}$	11	2.309 1	1.479	0.32	47.803	46.324	44.845	12.70	±2.31	±2.89	±0.181	6.4	18.5	21.4	13.4	48.6	3.5
R2	11	2.309 1	1.479	0.32	59.614	58.135	56.656	15.88	±2.31	±2.89	±0.181	7.5	22.8	25.7	16.9	60.5	3.8
R2 $\frac{1}{2}$	11	2.309 1	1.479	0.32	75.184	73.705	72.226	17.46	±3.46	±3.46	±0.216	9.2	26.7	30.1	18.6	76.3	4.2
R3	11	2.309 1	1.479	0.32	87.884	86.405	84.926	20.64	±3.46	±3.46	±0.216	9.2	29.8	33.3	21.1	89.1	4.2
R4	11	2.309 1	1.479	0.32	113.030	111.551	110.072	25.40	±3.46	±3.46	±0.216	10.4	35.8	39.3	25.9	114.3	4.5
R5	11	2.309 1	1.479	0.32	138.430	136.951	135.472	28.58	±3.46	±3.46	±0.216	11.5	40.1	43.5	29.3	139.8	4.5
R6	11	2.309 1	1.479	0.32	163.830	162.351	160.872	28.58	±3.46	±3.46	±0.216	11.5	40.1	43.5	29.3	165.2	5.0

Notes ⁽³⁾: This designation is for taper external threads, and for taper internal threads and parallel internal threads, the notation R shall be substituted by Rc or Rp.

⁽⁴⁾: In case of the taper thread, length from position of gauge plane to smaller diameter end, and in case of parallel internal thread, length from the end of pipe or coupler.

Remarks 1: The thread shall be perpendicular to the axis, and the pitch shall be measured in parallel with the axis.

2: The length of useful thread is the length of completely screwed part, except the last several threads which may be truncated at the crest by its intersection with the cylindrical surface of the pipe or coupler. The chamfered end of the pipe or coupler, is included in the length of useful thread part.

Technical Information

Making the Best Threads

How you cut steel pipes has a great influence on the shape of a thread

1) Use the most appropriate cutting tool for the type of pipe used.

Depending on your intended use, refer to the following for cutting steel pipes used for construction equipment.

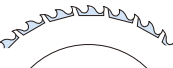
Type	Blade	Appropriate REX Products	Steel Pipe	Stainless Steel Pipe
Band saw cutting machine	 Band saw	Mantis 125/120A/180WS/180WA/270A	OK	OK
Circular saw cutting machine	 Circular saw	Carbide cutter TC-20 -150	OK	×
Pipe cutter	 Cutter wheel	Cutter on pipe machine (standard equipment)	OK	OK*

Table 1. Types of Cutter and their use

* Optional cutter wheel

2) Cutting precision has a great influence on the shape of the thread.

Only use pipes with a flat, right-angled cut. Avoid using pipes with a slant or step of more than 1 mm. (Fig. 1)

· When a thread is cut on a steel pipe that has been correctly cut at right angles, the 4 dies work in unison to cut a perfect thread. (Fig. 2)

· When a thread is cut on a steel pipe where the end of the pipe is slanted or has steps, the result is a polygonal thread or a pipe of uneven thickness. (Fig. 3)

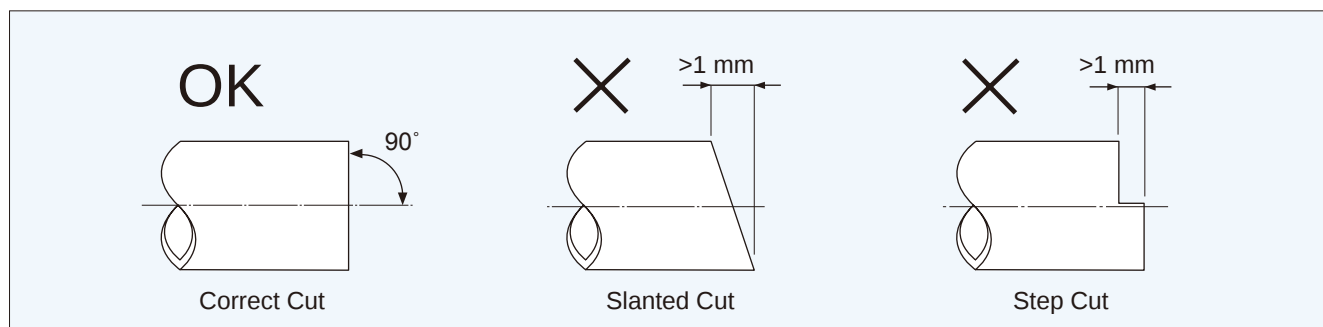


Fig. 1 Acceptable and unacceptable pipe ends

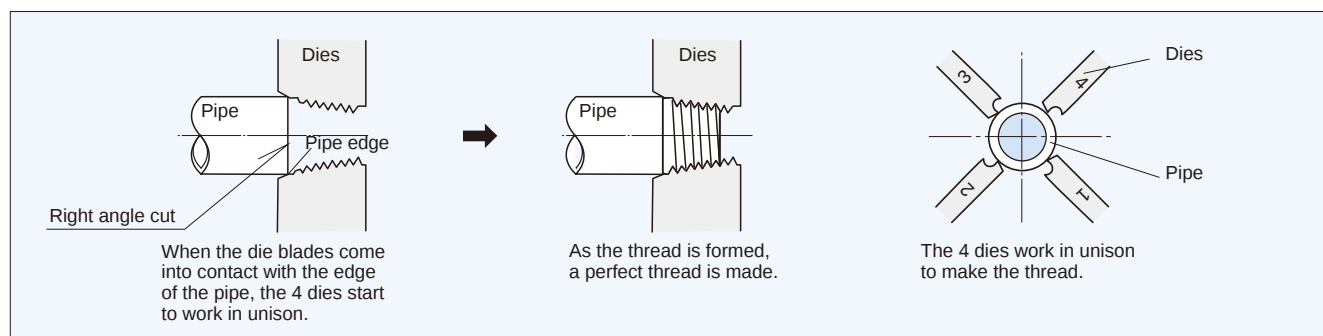


Fig. 2 Principle of cutting threads with a set of dies

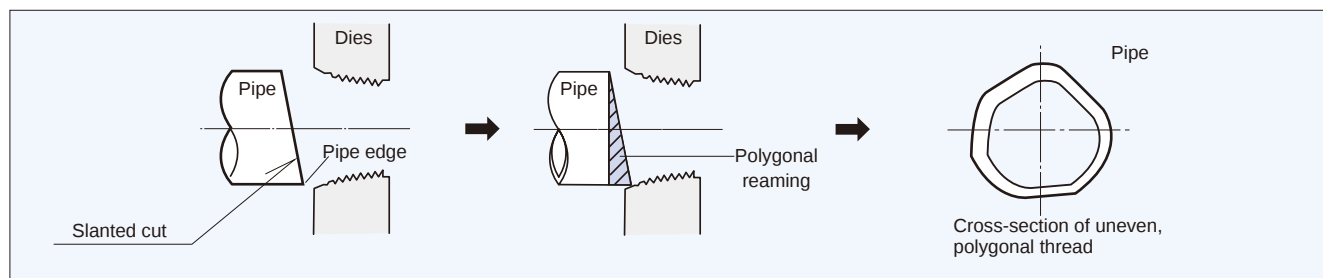


Fig. 3 Principle of polygonal threads

Using the right oil means consistent finishes and increases the life of the dies

1) Cutting oil comes in 3 types: for use with tap water pipes, general plumbing, and stainless steel pipes.

As shown in the table below, use the correct cutting oil according to the type of pipe. (Table 2)

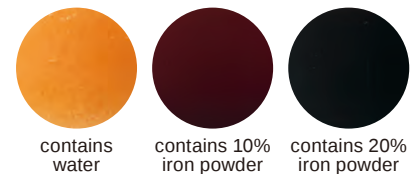
Note: Using cutting oil for stainless steel on steel pipes will result in imperfect threads and leakages.

Cutting oil \ Type of pipe	Steel pipes for tap water	Stainless steel pipes	General plumbing pipes
For tap water pipes 50W-R, N50W	OK	×	OK
For general plumbing 246-R, N246	×	×	OK
For stainless steel pipes 100SW-RN	×	OK	×

Table 2. Appropriate cutting oil

2) Changing cutting oil, and causes of a reduction in oil performance

If any of the following occurs, it means it is time to change the cutting oil.



Problem	Cause
If the oil becomes cloudy	This is the result of water getting mixed into the oil. If the cutting oil contains more than 20% water, the life of the dies will be drastically reduced.
If the oil turns black	When the amount of oil flowing from the die head is reduced, the surfaces where the pipe is cut get very hot and smoke is produced. This greatly reduces the performance of the oil.
If the oil becomes 'shiny' caused by metal powder	This means that microscopic colloidal sediment or metal powder has become mixed in with the oil. Change the oil.

3) Amount of cutting oil

The oil coming from the Die-head should flow continuously without interruption, and no smoke should be produced.

Inspecting the Thread

After making a thread, inspect it both visually and with a thread gauge to ensure it is accurate.

Inspection with a tapered thread ring gauge

ISO 7/1 (JIS B0203) Male Tapered Thread for Pipe

a: standard distance from pipe edge

b, b': allowance from pipe edge along the axis

f: Necessary effective thread portion (minimum)

Thread is acceptable if the pipe edge is located between b and b' after you screw the pipe thread into the ring gauge with your hand.

When the male thread is screwed into the tapered thread ring gauge by hand, if the end face of the male thread is between the notches -b and +b as shown in Figure 5, it is passed, and if it is out of place, it is rejected.

To pass, the full thread length (L) must have three or more threads from the large diameter end face of the gauge, and if the thread length is less than three threads, it is too short and fails.

Gauge: see page 33.

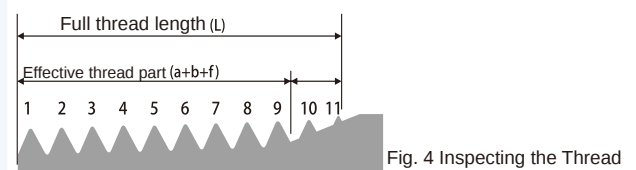


Fig. 4 Inspecting the Thread

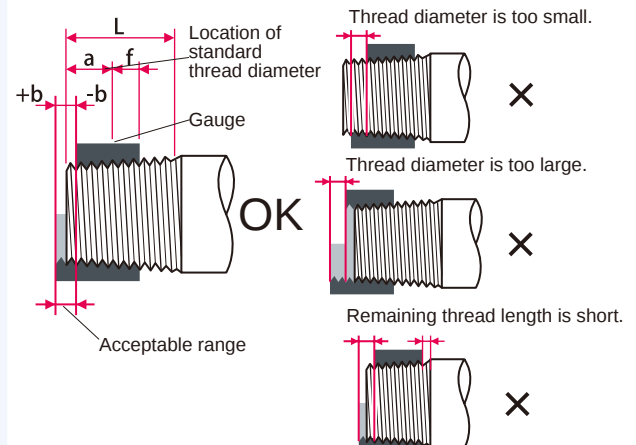


Fig. 5 Acceptable

Fig. 6 Not acceptable

Technical Information

Steel pipes:

Carbon steel pipes for ordinary piping : SGP

Carbon steel pipes for pressure service : STPG

Nominal size		Outside diameter (mm)	SGP (JIS G3452)	STPG (JIS G3454)					
				Nominal thickness					
				Sch10	Sch20	Sch30	Sch40	Sch60	Sch80
A	B		Wall thickness (mm)						
6	1/8"	10.5	2.0	-	-	-	1.7	2.2	2.4
8	1/4"	13.8	2.3	-	-	-	2.2	2.4	3.0
10	3/8"	17.3	2.3	-	-	-	2.3	2.8	3.2
15	1/2"	21.7	2.8	-	-	-	2.8	3.2	3.7
20	3/4"	27.2	2.8	-	-	-	2.9	3.4	3.9
25	1"	34.0	3.2	-	-	-	3.4	3.9	4.5
32	1 1/4"	42.7	3.5	-	-	-	3.6	4.5	4.9
40	1 1/2"	48.6	3.5	-	-	-	3.7	4.5	5.1
50	2"	60.5	3.8	-	3.2	-	3.9	4.9	5.5
65	2 1/2"	76.3	4.2	-	4.5	-	5.2	6.0	7.0
80	3"	89.1	4.2	-	4.5	-	5.5	6.6	7.6
90	3 1/2"	101.6	4.2	-	4.5	-	5.7	7.0	8.1
100	4"	114.3	4.5	-	4.9	-	6.0	7.1	8.6
125	5"	139.8	4.5	-	5.1	-	6.6	8.1	9.5
150	6"	165.2	5.0	-	5.5	-	7.1	9.3	11.0
200	8"	216.3	5.8	-	6.4	7.0	8.2	10.3	12.7
250	10"	267.4	6.6	-	6.4	7.8	9.3	12.7	15.1
300	12"	318.5	6.9	-	6.4	8.4	10.3	14.3	17.4
350	14"	355.6	7.9	6.4	7.9	9.5	11.1	15.1	19.0
400	16"	406.4	7.9	6.4	7.9	9.5	12.7	16.7	21.4

Stainless steel pipes (JIS G3459)

Nominal size		Outside diameter (mm)	Nominal thickness				
			Sch5S	Sch10S	Sch20S	Sch40	Sch80
			Wall thickness (mm)				
6	½"	10.5	1.0	1.2	1.5	1.7	2.4
8	¾"	13.8	1.2	1.65	2.0	2.2	3.0
10	¾"	17.3	1.2	1.65	2.0	2.3	3.2
15	½"	21.7	1.65	2.1	2.5	2.8	3.7
20	¾"	27.2	1.65	2.1	2.5	2.9	3.9
25	1"	34.0	1.65	2.8	3.0	3.4	4.5
32	1¼"	42.7	1.65	2.8	3.0	3.6	4.9
40	1½"	48.6	1.65	2.8	3.0	3.7	5.1
50	2"	60.5	1.65	2.8	3.5	3.9	5.5
65	2½"	76.3	2.1	3.0	3.5	5.2	7.0
80	3"	89.1	2.1	3.0	4.0	5.5	7.6
90	3½"	101.6	2.1	3.0	4.0	5.7	8.1
100	4"	114.3	2.1	3.0	4.0	6.0	8.6
125	5"	139.8	2.8	3.4	5.0	6.6	9.5
150	6"	165.2	2.8	3.4	5.0	7.1	11.0
200	8"	216.3	2.8	4.0	6.5	8.2	12.7
250	10"	267.4	3.4	4.0	6.5	9.3	15.1
300	12"	318.5	4.0	4.5	6.5	10.3	17.4
350	14"	355.6	-	-	-	11.1	19.0
400	16"	406.4	-	-	-	12.7	21.4

Rigid steel conduit (JIS C8305)

Thicker conduit

Nominal size	Outside diameter (mm)	Thickness (mm)
G**(PF*)		
½" (16)	21.0	2.3
¾" (22)	26.5	2.3
1" (28)	33.3	2.5
1¼" (36)	41.9	2.5
1½" (42)	47.8	2.5
2" (54)	59.6	2.8
2½" (70)	75.2	2.8
3" (82)	87.9	2.8
3½" (92)	100.7	3.5
4" (104)	113.4	3.5

Thinner conduit

Nominal size	Outside diameter (mm)	Thickness (mm)
C***		
19	19.1	1.6
25	25.4	1.6
31	31.8	1.6
39	38.1	1.6
51	50.8	1.6
63	63.5	2.0
75	76.2	2.0

***Thread CTC: JIS C 8305 Appendix, former JIS B 0204

*Thread PF: former JIS B 0202

**Thread CTG: JIS C 8305 Appendix, former JIS B 0204, equivalent to the Thread G (BSPP): JIS B 0202/ISO 228-1

Light gauge stainless tube for ordinary piping (JIS G3448)

Nominal size	Outside diameter (mm)	Thickness (mm)
Su		
8	9.52	0.7
10	12.7	0.8
13	15.88	0.8
20	22.22	1.0
25	28.58	1.0
30	34.0	1.2
40	42.7	1.2
50	48.6	1.2
60	60.5	1.5
75	76.3	1.5
80	89.1	2.0
100	114.3	2.0
125	139.8	2.0
150	165.2	3.0

Stainless steel sanitary pipes (JIS G3447)

Outside diameter (mm)	Thickness (mm)
25.4	1.2
31.8	1.2
38.1	1.2
50.8	1.5
63.5	2.0
76.3	2.0
89.1	2.0
101.6	2.0
114.3	3.0
139.8	3.0
165.2	3.0

Steel pipe : EN10255 (transition from BS1387)

Nominal size		Type L2(L)			Series M&H		M	H
		Outside diameter (mm)		Wall Thickness (mm)	Outside diameter (mm)		Wall Thickness (mm)	Wall Thickness (mm)
					Min.	Max.		
6	⅝"	-	-	-	9.8	10.6	2.0	2.6
8	¾"	13.2	13.6	1.8	13.2	14.0	2.3	2.9
10	⅞"	16.7	17.1	1.8	16.7	17.5	2.3	2.9
15	½"	21.0	21.4	2.0	21.0	21.8	2.6	3.2
20	¾"	26.4	26.9	2.3	26.5	27.3	2.6	3.2
25	1"	33.2	33.8	2.6	33.3	34.2	3.2	4.0
32	1¼"	41.9	42.5	2.6	42.0	42.9	3.2	4.0
40	1½"	47.8	48.4	2.9	47.9	48.8	3.2	4.0
50	2"	59.6	60.2	2.9	59.7	60.8	3.6	4.5
65	2½"	75.2	76.0	3.2	75.3	76.6	3.6	4.5
80	3"	87.9	88.7	3.2	88.0	89.5	4.0	5.0
100	4"	113.0	113.9	3.6	113.1	115.0	4.5	5.4
125	5"	-	-	-	138.5	140.8	5.0	5.4
150	6"	-	-	-	163.9	165.1	5.0	5.4

not in BS1387

different from BS1387

Copper tube for construction piping (JIS H3300)

Nominal size		Outside diameter (mm)	Thickness (mm)	
			M type	L type
A	B		Water Supply	Gas and water supply
8	¼"	9.52	-	0.76
10	¾"	12.70	0.64	0.89
15	½"	15.88	0.71	1.02
-	¾"	19.05	-	1.07
20	¾"	22.22	0.81	1.14
25	1"	28.58	0.89	1.27
32	1¼"	34.92	1.07	1.40
40	1½"	41.28	1.24	1.52
50	2"	53.98	1.47	1.78

Copper tube for refrigerant piping (JIS H3300)

Nominal size	Outside diameter (mm)	Thickness (mm)
¼"	6.35	0.8
¾"	9.52	0.8
½"	12.70	0.8
¾"	15.88	1.0
¾"	19.05	1.0
¾"	22.22	1.0
1"	25.40	1.0
1½"	28.58	1.0
1¼"	31.75	1.1
1½"	34.92	1.1
1½"	38.10	1.15
1½"	41.28	1.2
1¾"	44.45	1.25
2"	50.80	1.4

Steel Pipe: ASME / ANSI B36.10

Nominal size		Outside Diameter		Nominal Thickness															
				Schdule 10		Schdule 20		Schdule 30		STD		Schdule 40		XS		Schdule 60		Schdule 80	
				Wall Thickness															
A	B	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
6	½"	10.3	0.405	-	-	-	-	-	-	1.73	0.068	1.73	0.068	2.41	0.095	-	-	2.41	0.095
8	¾"	13.7	0.540	-	-	-	-	-	-	2.24	0.088	2.24	0.088	3.02	0.119	-	-	3.02	0.119
10	¾"	17.1	0.675	-	-	-	-	-	-	2.31	0.091	2.31	0.091	3.20	0.126	-	-	3.20	0.126
15	½"	21.3	0.840	-	-	-	-	-	-	2.77	0.109	2.77	0.109	3.73	0.147	-	-	3.73	0.147
20	¾"	26.7	1.050	-	-	-	-	-	-	2.87	0.113	2.87	0.113	3.91	0.154	-	-	3.91	0.154
25	1"	33.4	1.315	2.8	0.109	-	-	-	-	3.38	0.133	3.38	0.133	4.55	0.179	-	-	4.55	0.179
32	1¼"	42.2	1.660	2.8	0.109	-	-	-	-	3.56	0.140	3.56	0.140	4.85	0.191	-	-	4.85	0.191
40	1½"	48.3	1.900	2.8	0.109	-	-	-	-	3.68	0.145	3.68	0.145	5.08	0.200	-	-	5.08	0.200
50	2"	60.3	2.375	2.8	0.109	-	-	-	-	3.91	0.154	3.91	0.154	5.54	0.218	-	-	5.54	0.218
65	2½"	73.0	2.875	3.1	0.120	-	-	-	-	5.16	0.203	5.16	0.203	7.01	0.276	-	-	7.01	0.276
80	3"	88.9	3.500	3.1	0.120	-	-	-	-	5.49	0.216	5.49	0.216	7.62	0.300	-	-	7.62	0.300
90	3½"	101.6	4.000	3.1	0.120	-	-	-	-	5.74	0.226	5.74	0.226	8.09	0.318	-	-	8.08	0.318
100	4"	114.3	4.500	3.1	0.120	-	-	-	-	6.02	0.237	6.02	0.237	8.56	0.337	-	-	8.56	0.337
125	5"	141.3	5.563	3.4	0.134	-	-	-	-	6.55	0.258	6.55	0.258	9.53	0.375	-	-	9.53	0.375
150	6"	168.3	6.625	3.4	0.134	-	-	-	-	7.11	0.280	7.11	0.280	10.97	0.432	-	-	10.97	0.432
200	8"	219.1	8.625	3.8	0.140	6.35	0.250	7.04	0.277	8.18	0.322	8.18	0.322	12.70	0.500	10.31	0.406	12.70	0.500
250	10"	273.1	10.750	4.2	0.165	6.35	0.250	7.80	0.307	9.27	0.365	9.27	0.365	12.70	0.500	12.70	0.500	15.09	0.594
300	12"	323.9	12.750	4.6	0.180	6.35	0.250	8.38	0.330	9.53	0.375	10.31	0.406	12.70	0.500	14.27	0.562	17.48	0.688
350	14"	355.6	14.000	6.4	0.250	7.92	0.312	9.53	0.375	9.53	0.375	11.13	0.438	12.70	0.500	15.09	0.594	19.05	0.750
400	16"	406.4	16.000	6.4	0.250	7.92	0.312	9.53	0.375	9.53	0.375	12.70	0.500	12.70	0.500	16.66	0.656	21.44	0.844
450	18"	457.2	18.000	6.4	0.250	7.92	0.312	11.13	0.438	9.53	0.375	14.27	0.562	12.70	0.500	19.05	0.750	23.83	0.938
500	20"	508.0	20.000	6.4	0.250	9.53	0.375	12.70	0.500	9.53	0.375	15.09	0.594	12.70	0.500	20.62	0.812	26.19	1.031
600	24"	610.0	24.000	6.4	0.250	9.53	0.375	14.27	0.502	9.53	0.375	17.48	0.688	12.70	0.500	24.61	0.909	30.96	1.219

 : Differs from JIS pipes by 3mm or more

Stainless Steel Pipe: ASME B36.19M-1985

Nominal size		Outside Diameter		Nominal Thickness							
				Schdule 5S		Schdule 10S		Schdule 40S		Schdule 80S	
				Wall Thickness							
A	B	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
6	½"	10.3	0.405	-	-	1.24	0.049	1.73	0.068	2.41	0.095
8	¾"	13.7	0.540	-	-	1.65	0.065	2.24	0.088	3.02	0.119
10	¾"	17.1	0.675	-	-	1.65	0.065	2.31	0.091	3.20	0.126
15	½"	21.3	0.840	1.65	0.065	2.11	0.083	2.77	0.109	3.75	0.147
20	¾"	26.7	1.050	1.65	0.065	2.11	0.083	2.87	0.113	3.91	0.154
25	1"	33.4	1.315	1.65	0.065	2.77	0.109	3.38	0.133	4.55	0.179
32	1¼"	42.2	1.660	1.65	0.065	2.77	0.109	3.56	0.140	4.85	0.191
40	1½"	48.3	1.900	1.65	0.065	2.77	0.109	3.68	0.145	5.08	0.200
50	2"	60.3	2.375	1.65	0.065	2.77	0.109	3.91	0.154	5.54	0.218
65	2½"	73.0	2.875	2.11	0.083	3.05	0.120	5.16	0.203	7.01	0.276
80	3"	88.9	3.500	2.11	0.083	3.05	0.120	5.49	0.216	7.62	0.300
90	3½"	101.6	4.000	2.11	0.083	3.05	0.120	5.74	0.226	8.08	0.318
100	4"	114.3	4.500	2.11	0.083	3.05	0.120	6.02	0.237	8.56	0.337
125	5"	141.3	5.563	2.77	0.109	3.40	0.134	6.55	0.258	9.53	0.375
150	6"	168.3	6.625	2.77	0.109	3.40	0.134	7.11	0.280	10.97	0.432
200	8"	219.1	8.625	2.77	0.109	3.76	0.148	8.18	0.322	12.70	0.500
250	10"	273.1	10.750	3.40	0.134	4.19	0.165	9.27	0.365	12.70	0.500
300	12"	323.9	12.750	3.96	0.156	4.57	0.180	9.53	0.375	12.70	0.500
350	14"	355.6	14.000	3.96	0.156	4.78	0.188	-	-	-	-
400	16"	406.4	16.000	4.19	0.165	4.78	0.188	-	-	-	-
450	18"	457.2	18.000	4.19	0.165	4.78	0.188	-	-	-	-
500	20"	508.0	20.000	4.78	0.188	5.54	0.218	-	-	-	-
550	22"	559.0	22.000	4.78	0.188	5.54	0.218	-	-	-	-
600	24"	610.0	24.000	5.54	0.218	6.35	0.250	-	-	-	-

 : Size differs from steel pipe