

KS FITTING & FLANGE CO.

KS FITTING & FLANGE CO. shall be continue that
effort to satisfy customer's demand
and to become a number 1 all over the world

BUTT-WELDING FITTINGS

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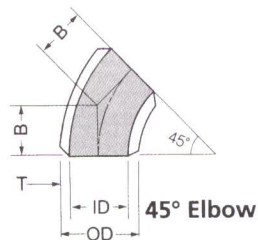
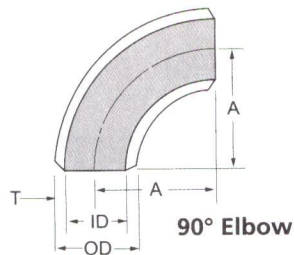


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45°, 90° ELBOW (LR, SR)

Sch5s, Sch10s, Sch40s, Sch80s



ASME B16.9

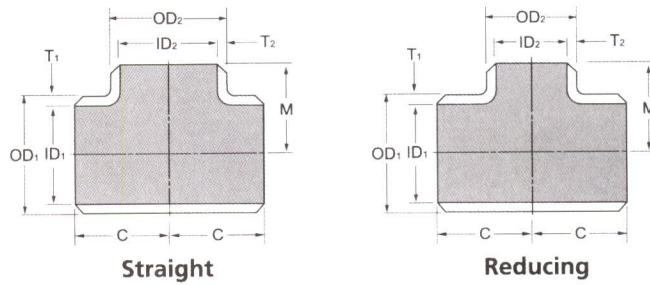
(Unit: inch)

Nominal Pipe Size	Outside Diameter OD	Center to End			Sch 5s		Sch 10s		Sch 40s		Sch 80s	
		Long		Short	T	I.D	T	I.D	T	I.D	T	I.D
		A	B	A								
½	0.840	1.50	0.62		0.065	0.710	0.083	0.674	0.109	0.622	0.147	0.546
¾	1.050	1.50	0.62		0.065	0.920	0.083	0.884	0.113	0.824	0.154	0.742
1	1.315	1.50	0.88	1.00	0.065	1.185	0.109	1.097	0.133	1.049	0.179	0.957
1¼	1.660	1.88	1.00	1.25	0.065	1.530	0.109	1.442	0.140	1.380	0.191	1.278
1½	1.900	2.25	1.12	1.50	0.065	1.770	0.109	1.682	0.145	1.610	0.200	1.500
2	2.375	3.00	1.38	2.00	0.065	2.245	0.109	2.157	0.154	2.067	0.218	1.939
2½	2.875	3.75	1.75	2.50	0.083	2.709	0.120	2.635	0.203	2.469	0.276	2.323
3	3.500	4.50	2.00	3.00	0.083	3.334	0.120	3.260	0.216	3.068	0.300	2.900
3½	4.000	5.25	2.25	3.50	0.083	3.834	0.120	3.760	0.226	3.548	0.318	3.364
4	4.500	6.00	2.50	4.00	0.083	4.417	0.120	4.260	0.237	4.026	0.337	3.826
5	5.563	7.50	3.12	5.00	0.109	5.345	0.134	5.295	0.258	5.047	0.375	4.813
6	6.625	9.00	3.75	6.00	0.109	6.407	0.134	6.357	0.280	6.065	0.432	5.761
8	8.625	12.00	5.00	8.00	0.109	8.407	0.148	8.329	0.322	7.981	0.500	7.625
10	10.750	15.00	6.25	10.00	0.134	10.482	0.165	10.420	0.365	10.020	0.500	9.750
12	12.750	18.00	7.50	12.00	0.156	12.438	0.180	12.390	0.375	12.000	0.500	11.750
14	14.000	21.00	8.75	14.00	0.156	13.688	0.188	13.624				
16	16.000	24.00	10.00	16.00	0.165	15.670	0.188	15.624				
18	18.000	27.00	11.25	18.00	0.165	17.670	0.188	17.624				
20	20.000	30.00	12.50	20.00	0.188	19.624	0.218	19.564				
22	22.000	33.00	13.50	22.00	0.188	21.624	0.218	21.564				
24	24.000	36.00	15.00	24.00	0.218	23.564	0.250	23.500				
30	30.000	45.00	18.50	30.00	0.250	29.500	0.312	29.376				

- For Bevel Details See Page 172
- Dimensional Tolerances See Page 169

TEE

Sch5s, Sch10s, Sch40s, Sch80s



ASME B16.9

(Unit: inch)

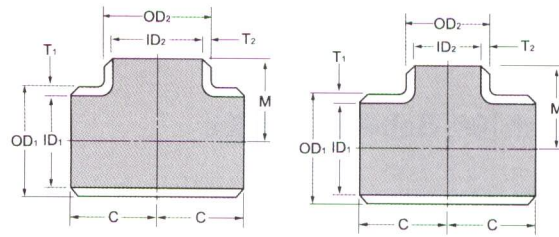
Nominal Pipe Size	Outside Diameter		Center to End		Sch 5s		Sch 10s		Sch 40s		Sch 80s	
			Run C	Outlet M	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
	OD ₁	OD ₂										
$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$	0.840	0.040	1.00	1.00	0.065	0.065	0.083	0.083	0.109	0.109	0.147	0.147
$\frac{1}{2} \times \frac{1}{2} \times \frac{3}{8}$	0.840	0.675	1.00	1.00			0.083	0.065	0.109	0.109	0.147	0.126
$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{4}$	0.840	0.540	1.00	1.00			0.083	0.065	0.109	0.088	0.147	0.119
$\frac{3}{4} \times \frac{3}{4} \times \frac{3}{4}$	1.050	1.050	1.12	1.12	0.065	0.065	0.083	0.083	0.113	0.113	0.154	0.154
$\frac{3}{4} \times \frac{3}{4} \times \frac{1}{2}$	1.050	0.840	1.12	1.12	0.065	0.065	0.083	0.083	0.113	0.109	0.154	0.147
$\frac{3}{4} \times \frac{3}{4} \times \frac{3}{8}$	1.050	0.675	1.12	1.12			0.083	0.065	0.113	0.091	0.154	0.126
$1 \times 1 \times 1$	1.315	1.315	1.50	1.50	0.065	0.065	0.109	0.109	0.133	0.133	0.179	0.179
$1 \times 1 \times \frac{3}{4}$	1.315	1.050	1.50	1.50	0.065	0.065	0.109	0.083	0.133	0.113	0.179	0.154
$1 \times 1 \times \frac{1}{2}$	1.315	0.840	1.50	1.50	0.065	0.065	0.109	0.083	0.133	0.109	0.179	0.147
$1\frac{1}{4} \times 1\frac{1}{4} \times 1\frac{1}{4}$	1.660	1.660	1.88	1.88	0.065	0.065	0.109	0.109	0.140	0.140	0.191	0.191
$1\frac{1}{4} \times 1\frac{1}{4} \times 1$	1.660	1.315	1.88	1.88	0.065	0.065	0.109	0.109	0.140	0.133	0.191	0.179
$1\frac{1}{4} \times 1\frac{1}{4} \times \frac{3}{4}$	1.660	1.050	1.88	1.88	0.065	0.065	0.109	0.083	0.140	0.113	0.191	0.154
$1\frac{1}{4} \times 1\frac{1}{4} \times \frac{1}{2}$	1.660	0.840	1.88	1.88	0.065	0.065	0.109	0.083	0.140	0.109	0.191	0.147
$1\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{2}$	1.900	1.900	2.25	2.25	0.065	0.065	0.109	0.109	0.145	0.145	0.200	0.200
$1\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{4}$	1.900	1.660	2.25	2.25	0.065	0.065	0.109	0.109	0.145	0.140	0.200	0.191
$1\frac{1}{2} \times 1\frac{1}{2} \times 1$	1.900	1.315	2.25	2.25	0.065	0.065	0.109	0.109	0.145	0.133	0.200	0.179
$1\frac{1}{2} \times 1\frac{1}{2} \times \frac{3}{4}$	1.900	1.050	2.25	2.25	0.065	0.065	0.109	0.083	0.145	0.113	0.200	0.154
$1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$	1.900	0.840	2.25	2.25	0.065	0.065	0.109	0.083	0.145	0.109	0.200	0.147
$2 \times 2 \times 2$	2.375	2.375	2.50	2.50	0.065	0.065	0.109	0.109	0.154	0.154	0.218	0.218
$2 \times 2 \times 1\frac{1}{2}$	2.375	1.900	2.50	2.38	0.065	0.065	0.109	0.109	0.154	0.145	0.218	0.200
$2 \times 2 \times 1\frac{1}{4}$	2.375	1.660	2.50	2.25	0.065	0.065	0.109	0.109	0.154	0.140	0.218	0.191
$2 \times 2 \times 1$	2.375	1.315	2.50	2.00	0.065	0.065	0.109	0.109	0.154	0.133	0.218	0.179
$2 \times 2 \times \frac{3}{4}$	2.375	1.050	2.50	1.75	0.065	0.065	0.109	0.083	0.154	0.113	0.218	0.154
$2\frac{1}{2} \times 2\frac{1}{2} \times 2\frac{1}{2}$	2.875	2.875	3.00	3.00	0.083	0.083	0.120	0.120	0.203	0.203	0.276	0.276
$2\frac{1}{2} \times 2\frac{1}{2} \times 2$	2.875	2.375	3.00	2.75	0.083	0.065	0.120	0.109	0.203	0.154	0.276	0.218
$2\frac{1}{2} \times 2\frac{1}{2} \times 1\frac{1}{2}$	2.875	1.900	3.00	2.62	0.083	0.065	0.120	0.109	0.203	0.145	0.276	0.200
$2\frac{1}{2} \times 2\frac{1}{2} \times 1\frac{1}{4}$	2.875	1.660	3.00	2.50	0.083	0.065	0.120	0.109	0.203	0.140	0.276	0.191
$2\frac{1}{2} \times 2\frac{1}{2} \times 1$	2.875	1.315	3.00	2.25	0.083	0.065	0.120	0.109	0.203	0.133	0.276	0.179
$3 \times 3 \times 3$	3.500	3.500	3.38	3.38	0.083	0.083	0.120	0.120	0.216	0.216	0.300	0.300
$3 \times 3 \times 2\frac{1}{2}$	3.500	2.875	3.38	3.25	0.083	0.083	0.120	0.120	0.216	0.203	0.300	0.276
$3 \times 3 \times 2$	3.500	2.375	3.38	3.00	0.083	0.065	0.120	0.109	0.216	0.154	0.300	0.218
$3 \times 3 \times 1\frac{1}{2}$	3.500	1.900	3.38	2.88	0.083	0.065	0.120	0.109	0.216	0.145	0.300	0.200
$3 \times 3 \times 1\frac{1}{4}$	3.500	1.660	3.38	2.75	0.083	0.065	0.120	0.109	0.216	0.140	0.300	0.191
$3\frac{1}{2} \times 3\frac{1}{2} \times 3\frac{1}{2}$	4.000	4.000	3.75	3.75	0.083	0.083	0.120	0.120	0.226	0.226	0.318	0.318
$3\frac{1}{2} \times 3\frac{1}{2} \times 3$	4.000	3.500	3.75	3.62	0.083	0.083	0.120	0.120	0.226	0.216	0.318	0.300
$3\frac{1}{2} \times 3\frac{1}{2} \times 2\frac{1}{2}$	4.000	2.875	3.75	3.50	0.083	0.083	0.120	0.120	0.226	0.203	0.318	0.276
$3\frac{1}{2} \times 3\frac{1}{2} \times 2$	4.000	2.375	3.75	3.25	0.083	0.065	0.120	0.109	0.226	0.154	0.318	0.218
$3\frac{1}{2} \times 3\frac{1}{2} \times 1\frac{1}{2}$	4.000	1.900	3.75	3.12	0.083	0.065	0.120	0.109	0.226	0.145	0.318	0.200

For Bevel Details See Page 172

Dimensional Tolerances See Page 169

TEE

Sch5s, Sch10s, Sch40s, Sch80s



Straight (I)

Reducing (I)

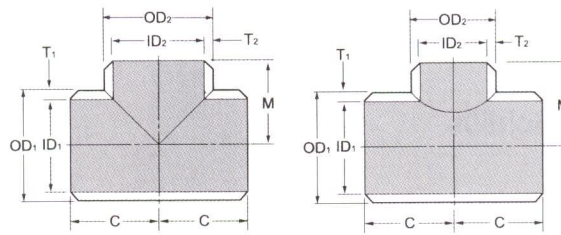
ASME B16.9

(Unit: inch)

Nominal Pipe Size	Outside Diameter		Center to End		Sch 5s		Sch 10s		Sch 40s		Sch 80s	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
4 × 4 × 4	4.500	4.500	4.12	4.12	0.083	0.083	0.120	0.120	0.237	0.237	0.337	0.337
4 × 4 × 3½	4.500	4.000	4.12	4.00	0.083	0.083	0.120	0.120	0.237	0.226	0.337	0.318
4 × 4 × 3	4.500	3.500	4.12	3.88	0.083	0.083	0.120	0.120	0.237	0.216	0.337	0.300
4 × 4 × 2½	4.500	2.875	4.12	3.75	0.083	0.083	0.120	0.120	0.237	0.203	0.337	0.276
4 × 4 × 2	4.500	2.375	4.12	3.50	0.083	0.065	0.120	0.109	0.237	0.154	0.337	0.218
4 × 4 × 1½	4.500	1.900	4.12	3.38	0.083	0.065	0.120	0.109	0.237	0.145	0.337	0.200
5 × 5 × 5	5.563	5.563	4.88	4.88	0.109	0.109	0.134	0.134	0.258	0.258	0.375	0.375
5 × 5 × 4	5.563	4.500	4.88	4.62	0.109	0.083	0.134	0.120	0.258	0.237	0.375	0.337
5 × 5 × 3½	5.563	4.000	4.88	4.50	0.109	0.083	0.134	0.120	0.258	0.226	0.375	0.318
5 × 5 × 3	5.563	3.500	4.88	4.38	0.109	0.083	0.134	0.120	0.258	0.216	0.375	0.300
5 × 5 × 2½	5.563	2.875	4.88	4.25	0.109	0.083	0.134	0.120	0.258	0.203	0.375	0.276
5 × 5 × 2	5.563	2.375	4.88	4.12	0.109	0.065	0.134	0.109	0.258	0.154	0.375	0.218
6 × 6 × 6	6.625	6.625	5.62	5.62	0.109	0.109	0.134	0.134	0.280	0.280	0.432	0.432
6 × 6 × 5	6.625	5.563	5.62	5.38	0.109	0.109	0.134	0.134	0.280	0.258	0.432	0.375
6 × 6 × 4	6.625	4.500	5.62	5.12	0.109	0.083	0.134	0.120	0.280	0.237	0.432	0.337
6 × 6 × 3½	6.625	4.000	5.62	5.00	0.109	0.083	0.134	0.120	0.280	0.226	0.432	0.318
6 × 6 × 3	6.625	3.500	5.62	4.88	0.109	0.083	0.134	0.120	0.280	0.216	0.432	0.300
6 × 6 × 2½	6.625	2.875	5.62	4.75	0.109	0.083	0.134	0.120	0.280	0.203	0.432	0.276
8 × 8 × 8	8.625	8.625	7.00	7.00	0.109	0.109	0.148	0.148	0.322	0.322	0.500	0.500
8 × 8 × 6	8.625	6.625	7.00	6.62	0.109	0.109	0.148	0.134	0.322	0.280	0.520	0.432
8 × 8 × 5	8.625	5.563	7.00	6.38	0.109	0.109	0.148	0.134	0.322	0.258	0.500	0.375
8 × 8 × 4	8.625	4.500	7.00	6.12	0.109	0.083	0.148	0.120	0.322	0.237	0.500	0.337
8 × 8 × 3½	8.625	4.000	7.00	6.00	0.109	0.083	0.148	0.120	0.322	0.226	0.500	0.318
10 × 10 × 10	10.750	10.750	8.50	8.50	0.134	0.134	0.165	0.165	0.365	0.365	0.500	0.500
10 × 10 × 8	10.750	8.625	8.50	8.00	0.134	0.109	0.165	0.148	0.365	0.322	0.500	0.500
10 × 10 × 6	10.750	6.625	8.50	7.62	0.134	0.109	0.165	0.134	0.365	0.280	0.500	0.432
10 × 10 × 5	10.750	5.563	8.50	7.50	0.134	0.109	0.165	0.134	0.365	0.258	0.500	0.375
10 × 10 × 4	10.750	4.500	8.50	7.25	0.134	0.083	0.165	0.120	0.365	0.237	0.520	0.337
12 × 12 × 12	12.750	12.750	10.00	10.00	0.156	0.156	0.180	0.180	0.375	0.375	0.500	0.500
12 × 12 × 10	12.750	10.750	10.00	9.50	0.156	0.134	0.180	0.165	0.375	0.365	0.500	0.500
12 × 12 × 8	12.750	8.625	10.00	9.00	0.156	0.109	0.180	0.148	0.375	0.322	0.500	0.500
12 × 12 × 6	12.750	6.625	10.00	8.62	0.156	0.109	0.180	0.134	0.375	0.280	0.500	0.432
12 × 12 × 5	12.750	5.563	10.00	8.50	0.156	0.109	0.180	0.134	0.375	0.258	0.500	0.375
14 × 14 × 14	14.000	14.000	11.00	11.00	0.156	0.156	0.188	0.188	—	—	—	—
14 × 14 × 12	14.000	12.750	11.00	10.62	0.156	0.156	0.188	0.180	—	—	—	—
14 × 14 × 10	14.000	10.750	11.00	10.12	0.156	0.134	0.188	0.165	—	—	—	—
14 × 14 × 8	14.000	8.625	11.00	9.75	0.156	0.109	0.188	0.148	—	—	—	—
14 × 14 × 6	14.000	6.625	11.00	9.38	0.156	0.109	0.188	0.134	—	—	—	—

For Bevel Details See Page 114

Dimensional Tolerances See Page 119



Straight (II)

Reducing (II)

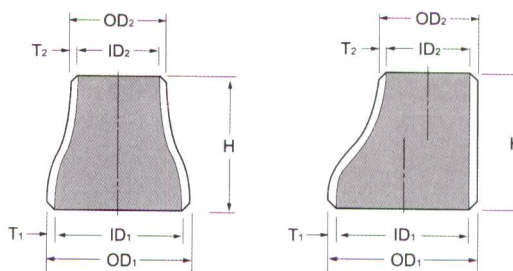
ASME B16.9

(Unit : inch)

Nominal Pipe Size	Outside Diameter		Center to End		Sch 5s		Sch 10s		Sch 40s		Sch 80s	
			Run C	Outlet M	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
	OD ₁	OD ₂										
16×16×16	16.000	16.000	12.00	12.00	0.165	0.165	0.188	0.188	—	—	—	—
16×16×14	16.000	14.000	12.00	12.00	0.165	0.156	0.188	0.188	—	—	—	—
16×16×12	16.000	12.750	12.00	11.62	0.165	0.156	0.188	0.180	—	—	—	—
16×16×10	16.000	10.750	12.00	11.12	0.165	0.134	0.188	0.165	—	—	—	—
16×16× 8	16.000	8.625	12.00	10.75	0.165	0.109	0.188	0.148	—	—	—	—
16×16× 6	16.000	6.625	12.00	10.38	0.165	0.109	0.188	0.134	—	—	—	—
18×18×18	18.000	18.000	13.50	13.50	0.165	0.165	0.188	0.188	—	—	—	—
18×18×16	18.000	16.000	13.50	13.00	0.165	0.165	0.188	0.188	—	—	—	—
18×18×14	18.000	14.000	13.50	13.00	0.165	0.156	0.188	0.188	—	—	—	—
18×18×12	18.000	12.750	13.50	12.62	0.165	0.156	0.188	0.180	—	—	—	—
18×18×10	18.000	10.750	13.50	12.12	0.165	0.134	0.188	0.165	—	—	—	—
18×18× 8	18.000	8.625	13.50	11.75	0.165	0.109	0.188	0.148	—	—	—	—
20×20×20	20.000	20.000	15.00	15.00	0.188	0.188	0.218	0.218	—	—	—	—
20×20×18	20.000	18.000	15.00	14.50	0.188	0.156	0.218	0.188	—	—	—	—
20×20×16	20.000	16.000	15.00	14.00	0.188	0.165	0.218	0.188	—	—	—	—
20×20×14	20.000	14.000	15.00	14.00	0.188	0.165	0.218	0.188	—	—	—	—
20×20×12	20.000	12.750	15.00	13.62	0.188	0.156	0.218	0.180	—	—	—	—
20×20×10	20.000	10.750	15.00	13.12	0.188	0.134	0.218	0.165	—	—	—	—
20×20× 8	20.000	8.625	15.00	12.75	0.188	0.109	0.218	0.148	—	—	—	—
22×22×22	22.000	22.000	16.50	16.50	0.188	0.188	0.218	0.218	—	—	—	—
22×22×20	22.000	20.000	16.50	16.00	0.188	0.188	0.218	0.218	—	—	—	—
22×22×18	22.000	18.000	16.50	15.50	0.188	0.165	0.218	0.188	—	—	—	—
22×22×16	22.000	16.000	16.50	15.00	0.188	0.165	0.218	0.188	—	—	—	—
22×22×14	22.000	14.000	16.50	15.00	0.188	0.156	0.218	0.188	—	—	—	—
22×22×12	22.000	12.750	16.50	14.62	0.188	0.156	0.218	0.180	—	—	—	—
22×22×10	22.000	10.750	16.50	14.12	0.188	0.134	0.218	0.165	—	—	—	—
24×24×24	24.000	24.000	17.00	17.00	0.218	0.218	0.250	0.250	—	—	—	—
24×24×22	24.000	22.000	17.00	17.00	0.218	0.188	0.250	0.218	—	—	—	—
24×24×20	24.000	20.000	17.00	17.00	0.218	0.188	0.250	0.218	—	—	—	—
24×24×18	24.000	18.000	17.00	16.50	0.218	0.165	0.250	0.188	—	—	—	—
24×24×16	24.000	16.000	17.00	16.00	0.218	0.165	0.250	0.188	—	—	—	—
24×24×14	24.000	14.000	17.00	16.00	0.218	0.156	0.250	0.188	—	—	—	—
24×24×12	24.000	12.750	17.00	15.62	0.218	0.156	0.250	0.180	—	—	—	—
24×24×10	24.000	10.750	17.00	15.12	0.218	0.134	0.250	0.165	—	—	—	—
30×30×30	30.000	30.000	22.00	22.00	0.250	0.250	0.312	0.312	—	—	—	—
30×30×24	30.000	24.000	22.00	21.00	0.250	0.218	0.312	0.258	—	—	—	—
30×30×22	30.000	22.000	22.00	20.50	0.250	0.188	0.312	0.218	—	—	—	—
30×30×20	30.000	20.000	22.00	20.00	0.250	0.188	0.312	0.218	—	—	—	—
30×30×18	30.000	18.000	22.00	19.50	0.250	0.165	0.312	0.188	—	—	—	—
30×30×16	30.000	16.000	22.00	19.00	0.250	0.165	0.312	0.188	—	—	—	—
30×30×14	30.000	14.000	22.00	19.00	0.250	0.156	0.312	0.188	—	—	—	—
30×30×12	30.000	12.750	22.00	18.62	0.250	0.156	0.312	0.180	—	—	—	—
30×30×10	30.000	10.750	22.00	18.12	0.250	0.134	0.312	0.165	—	—	—	—

REDUCER

Sch5s, Sch10s, Sch40s, Sch80s



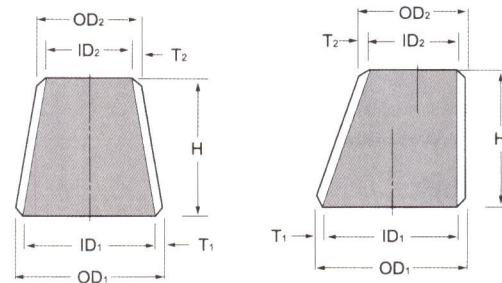
Concentric (I)

Eccentric (I)

ASME B16.9

(Unit: inch)

Nominal Pipe Size	Outside Diameter		End to End H	Wall Thickness T							
				Sch 5s		Sch 10s		Sch 40s		Sch 80s	
	OD ₁	OD ₂		T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
$\frac{3}{4} \times \frac{1}{2}$	1.050	0.840	1.50	0.065	0.065	0.083	0.083	0.113	0.109	0.154	0.147
$1 \times \frac{3}{4}$	1.315	1.050	2.00	0.065	0.065	0.109	0.083	0.133	0.133	0.179	0.154
$1 \times \frac{1}{2}$	1.315	0.840	2.00	0.065	0.065	0.109	0.083	0.133	0.109	0.179	0.147
$1\frac{1}{4} \times 1$	1.660	1.135	2.00	0.065	0.065	0.109	0.109	0.140	0.133	0.191	0.179
$1\frac{1}{4} \times \frac{3}{4}$	1.660	1.050	2.00	0.065	0.065	0.109	0.083	0.140	0.113	0.191	0.154
$1\frac{1}{4} \times \frac{1}{2}$	1.660	0.840	2.00	0.065	0.065	0.109	0.083	0.140	0.109	0.191	0.147
$1\frac{1}{2} \times 1\frac{1}{4}$	1.900	1.660	2.50	0.065	0.065	0.109	0.109	0.145	0.140	0.200	0.191
$1\frac{1}{2} \times 1$	1.900	1.315	2.50	0.065	0.065	0.109	0.109	0.145	0.133	0.200	0.179
$1\frac{1}{2} \times \frac{3}{4}$	1.900	1.050	2.50	0.065	0.065	0.109	0.083	0.145	0.113	0.200	0.154
$1\frac{1}{2} \times \frac{1}{2}$	1.900	0.840	2.50	0.065	0.065	0.109	0.083	0.145	0.109	0.200	0.147
$2 \times 1\frac{1}{2}$	2.375	1.900	3.00	0.065	0.065	0.109	0.109	0.154	0.145	0.218	0.200
$2 \times 1\frac{1}{4}$	2.375	1.660	3.00	0.065	0.065	0.109	0.109	0.154	0.140	0.218	0.191
2×1	2.375	1.315	3.00	0.065	0.065	0.109	0.109	0.154	0.133	0.218	0.179
$2 \times \frac{3}{4}$	2.375	1.050	3.00	0.065	0.065	0.109	0.083	0.154	0.113	0.218	0.154
$2\frac{1}{2} \times 2$	2.875	2.375	3.50	0.083	0.065	0.120	0.109	0.203	0.154	0.276	0.218
$2\frac{1}{2} \times 1\frac{1}{2}$	2.875	1.900	3.50	0.083	0.065	0.120	0.109	0.203	0.145	0.276	0.200
$2\frac{1}{2} \times 1\frac{1}{4}$	2.875	1.660	3.50	0.083	0.065	0.120	0.109	0.203	0.140	0.276	0.191
$2\frac{1}{2} \times 1$	2.875	1.315	3.50	0.083	0.065	0.120	0.109	0.203	0.133	0.276	0.179
$3 \times 2\frac{1}{2}$	3.500	2.875	3.50	0.083	0.083	0.120	0.120	0.216	0.203	0.300	0.276
3×2	3.500	2.375	3.50	0.083	0.065	0.120	0.109	0.216	0.154	0.300	0.218
$3 \times 1\frac{1}{2}$	3.500	1.900	3.50	0.083	0.065	0.120	0.109	0.216	0.145	0.300	0.200
$3 \times 1\frac{1}{4}$	3.500	1.660	3.50	0.083	0.065	0.120	0.109	0.216	0.140	0.300	0.191
$3\frac{1}{2} \times 3$	4.000	3.500	4.00	0.083	0.083	0.120	0.120	0.226	0.216	0.318	0.300
$3\frac{1}{2} \times 2\frac{1}{2}$	4.000	2.875	4.00	0.083	0.083	0.120	0.120	0.226	0.203	0.318	0.276
$3\frac{1}{2} \times 2$	4.000	2.375	4.00	0.083	0.065	0.120	0.109	0.226	0.154	0.318	0.218
$3\frac{1}{2} \times 1\frac{1}{2}$	4.000	1.900	4.00	0.083	0.065	0.120	0.109	0.226	0.145	0.318	0.200
$3\frac{1}{2} \times 1\frac{1}{4}$	4.000	1.660	4.00	0.083	0.065	0.120	0.109	0.226	0.140	0.318	0.191
$4 \times 3\frac{1}{2}$	4.500	4.000	4.00	0.083	0.083	0.120	0.120	0.237	0.226	0.337	0.318
4×3	4.500	3.500	4.00	0.083	0.083	0.120	0.120	0.237	0.216	0.337	0.300
$4 \times 2\frac{1}{2}$	4.500	2.875	4.00	0.083	0.083	0.120	0.120	0.237	0.203	0.337	0.276
4×2	4.500	2.375	4.00	0.083	0.065	0.120	0.109	0.237	0.154	0.337	0.218
$4 \times 1\frac{1}{2}$	4.500	1.900	4.00	0.083	0.065	0.120	0.109	0.237	0.145	0.337	0.200
5×4	5.563	4.500	5.00	0.109	0.083	0.134	0.120	0.258	0.237	0.375	0.337
$5 \times 3\frac{1}{2}$	5.563	4.000	5.00	0.109	0.083	0.134	0.120	0.258	0.226	0.375	0.318
5×3	5.563	3.500	5.00	0.109	0.083	0.134	0.120	0.258	0.216	0.375	0.300
$5 \times 2\frac{1}{2}$	5.563	2.875	5.00	0.109	0.083	0.134	0.120	0.258	0.203	0.375	0.276
5×2	5.563	2.375	5.00	0.109	0.065	0.134	0.109	0.258	0.154	0.375	0.218
6×5	6.625	5.563	5.50	0.109	0.109	0.134	0.134	0.280	0.258	0.432	0.375
6×4	6.625	4.500	5.50	0.109	0.083	0.134	0.120	0.280	0.237	0.432	0.337
$6 \times 3\frac{1}{2}$	6.625	4.000	5.50	0.109	0.083	0.134	0.120	0.280	0.226	0.432	0.318
6×3	6.625	3.500	5.50	0.109	0.083	0.134	0.120	0.280	0.216	0.432	0.300
$6 \times 2\frac{1}{2}$	6.625	2.875	5.50	0.109	0.083	0.134	0.120	0.280	0.203	0.432	0.276



Concentric (II)

Eccentric (II)

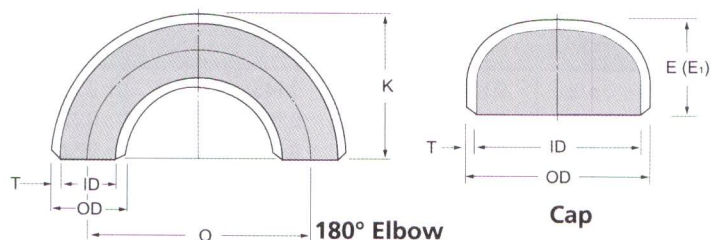
ASME B16.9

(Unit: inch)

Nominal Pipe Size	Outside Diameter		End to End H	Wall Thickness T							
				Sch 5s		Sch 10s		Sch 40s		Sch 80s	
	OD ₁	OD ₂		T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
8 × 6	8.625	6.625	6.00	0.109	0.109	0.148	0.134	0.322	0.280	0.500	0.432
8 × 5	8.625	5.563	6.00	0.109	0.109	0.148	0.134	0.322	0.258	0.500	0.375
8 × 4	8.625	4.500	6.00	0.109	0.083	0.148	0.120	0.322	0.237	0.500	0.337
8 × 3½	8.625	4.000	6.00	0.109	0.083	0.148	0.120	0.322	0.226	0.500	0.318
10 × 8	10.750	8.625	7.00	0.134	0.109	0.165	0.148	0.365	0.322	0.500	0.500
10 × 6	10.750	6.625	7.00	0.134	0.109	0.165	0.134	0.365	0.280	0.500	0.432
10 × 5	10.750	5.563	7.00	0.134	0.109	0.165	0.134	0.365	0.258	0.500	0.375
10 × 4	10.750	4.500	7.00	0.134	0.083	0.165	0.120	0.365	0.237	0.500	0.337
12 × 10	12.750	10.750	8.00	0.156	0.134	0.180	0.165	0.375	0.365	0.500	0.500
12 × 8	12.750	8.625	8.00	0.156	0.109	0.180	0.148	0.375	0.322	0.500	0.500
12 × 6	12.750	6.625	8.00	0.156	0.109	0.180	0.134	0.375	0.280	0.500	0.432
12 × 5	12.750	5.563	8.00	0.156	0.109	0.180	0.134	0.375	0.258	0.500	0.375
14 × 12	14.000	12.750	13.00	0.156	0.156	0.188	0.180	—	—	—	—
14 × 10	14.000	10.750	13.00	0.156	0.134	0.188	0.165	—	—	—	—
14 × 8	14.000	8.625	13.00	0.156	0.109	0.188	0.148	—	—	—	—
14 × 6	14.000	6.625	13.00	0.156	0.109	0.188	0.134	—	—	—	—
16 × 14	16.000	14.000	14.00	0.165	0.156	0.188	0.188	—	—	—	—
16 × 12	16.000	12.750	14.00	0.165	0.156	0.188	0.180	—	—	—	—
16 × 10	16.000	10.750	14.00	0.165	0.134	0.188	0.165	—	—	—	—
16 × 8	16.000	8.675	14.00	0.165	0.109	0.188	0.148	—	—	—	—
18 × 16	18.000	16.000	15.00	0.165	0.165	0.188	0.188	—	—	—	—
18 × 14	18.000	14.000	15.00	0.165	0.156	0.188	0.188	—	—	—	—
18 × 12	18.000	12.750	15.00	0.165	0.156	0.188	0.180	—	—	—	—
18 × 10	18.000	10.750	15.00	0.165	0.134	0.188	0.165	—	—	—	—
20 × 18	20.000	18.000	20.00	0.188	0.165	0.218	0.188	—	—	—	—
20 × 16	20.000	16.000	20.00	0.188	0.165	0.218	0.188	—	—	—	—
20 × 14	20.000	14.000	20.00	0.188	0.156	0.218	0.188	—	—	—	—
20 × 12	20.000	12.750	20.00	0.188	0.156	0.218	0.180	—	—	—	—
22 × 20	22.000	20.000	20.00	0.188	0.188	0.218	0.218	—	—	—	—
22 × 18	22.000	18.000	20.00	0.188	0.165	0.218	0.188	—	—	—	—
22 × 16	22.000	16.000	20.00	0.188	0.165	0.218	0.188	—	—	—	—
22 × 14	22.000	14.000	20.00	0.188	0.156	0.218	0.188	—	—	—	—
24 × 22	24.000	22.000	20.00	0.218	0.188	0.250	0.218	—	—	—	—
24 × 20	24.000	20.000	20.00	0.218	0.188	0.250	0.218	—	—	—	—
24 × 18	24.000	18.000	20.00	0.218	0.165	0.250	0.188	—	—	—	—
24 × 16	24.000	16.000	20.00	0.218	0.165	0.250	0.188	—	—	—	—
30 × 24	30.000	24.000	24.00	0.250	0.218	0.312	0.250	—	—	—	—
30 × 22	30.000	22.000	24.00	0.250	0.188	0.312	0.218	—	—	—	—
30 × 20	30.000	20.000	24.00	0.250	0.188	0.312	0.218	—	—	—	—

180° Elbow (LR, SR) Cap

Sch5s, Sch10s, Sch40s, Sch80S



ASME B16.9

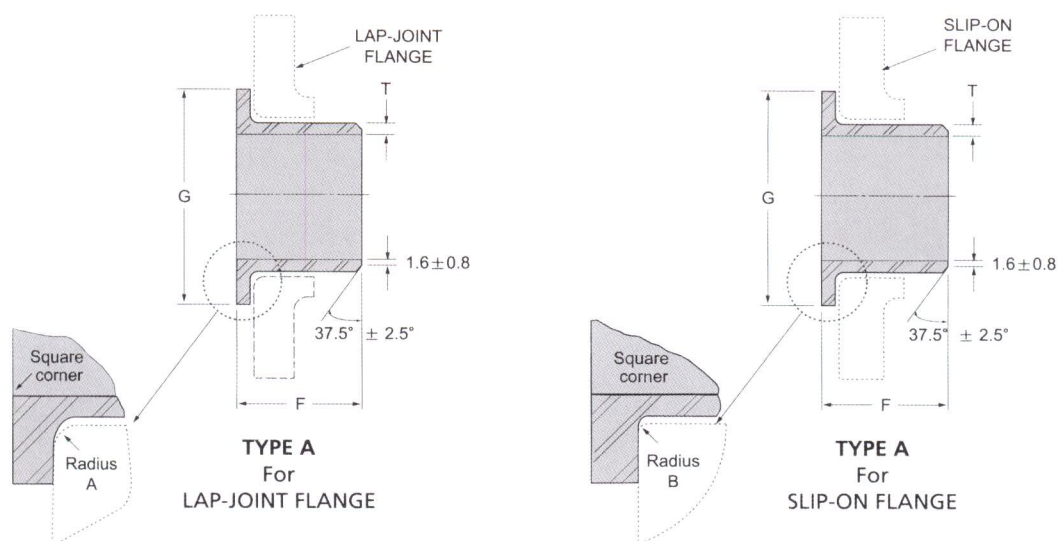
(Unit: inch)

(Unit: Inch)

Nominal Pipe Size	Outside Diameter OD	Wall Thickness T				Length E	Limiting Wall Thickness For Length E	Length E ₁	180° Elbow			
		5s	10s	40s	80s				Long		Short	
									O	K	O	K
½	0.840	0.065	0.083	0.109	0.147	1.00	0.18	1.00	3.00	1.88	—	—
¾	1.050	0.065	0.083	0.113	0.154	1.00	0.15	1.00	3.00	1.88	—	—
1	1.315	0.065	0.109	0.133	0.179	1.50	0.18	1.50	3.00	2.19	2.00	1.62
1¼	1.660	0.065	0.109	0.140	0.191	1.50	0.19	1.50	3.75	2.75	2.50	2.06
1½	1.900	0.065	0.109	0.145	0.200	1.50	0.20	1.50	4.50	3.25	3.00	2.44
2	2.375	0.065	0.109	0.154	0.218	1.50	0.22	1.75	6.00	4.19	4.00	3.19
2½	2.875	0.083	0.120	0.203	0.276	1.50	0.28	2.00	7.50	5.19	5.00	3.94
3	3.500	0.083	0.120	0.216	0.300	2.00	0.30	2.50	9.00	6.25	6.00	4.75
3½	4.000	0.083	0.120	0.226	0.318	2.50	0.32	3.00	10.50	7.25	7.00	5.50
4	4.500	0.083	0.120	0.237	0.337	2.50	0.34	3.00	12.00	8.25	8.00	6.25
5	5.563	0.109	0.134	0.258	0.375	3.00	0.38	3.50	15.00	10.31	10.00	7.75
6	6.625	0.109	0.134	0.280	0.432	3.50	0.43	4.00	18.00	12.31	12.00	9.31
8	8.625	0.109	0.148	0.322	0.500	4.00	0.50	5.00	24.00	16.31	16.00	12.31
10	10.750	0.134	0.165	0.365	0.500	5.00	0.50	6.00	30.00	20.38	20.00	15.38
12	12.750	0.156	0.180	0.375	0.500	6.00	0.50	7.00	36.00	24.38	24.00	18.38
14	14.000	0.156	0.188	—	—	6.50	0.50	7.50	42.00	28.00	28.00	21.00
16	16.000	0.165	0.188	—	—	7.00	0.50	8.00	48.00	32.00	32.00	24.00
18	18.000	0.165	0.188	—	—	8.00	0.50	9.00	54.00	36.00	36.00	27.00
20	20.000	0.188	0.218	—	—	9.00	0.50	10.00	60.00	40.00	40.00	30.00
22	22.000	0.188	0.218	—	—	10.00	0.50	10.00	66.00	44.00	44.00	33.00
24	24.000	0.218	0.250	—	—	10.50	0.50	12.00	72.00	48.00	48.00	36.00
30	30.000	0.250	0.312	—	—	10.50	—	—	—	—	—	—

- For Bevel Details See Page 172
- Dimensional Tolerances See Page 169

LAP JOINT STUB END



MSS SP-43 ASME B16.9

(Unit: inch)

Nominal Pipe Size	Outside Diameter OD	Length F			Dia. of Lap—G Nominal & Maximum	Radius of Fillet		Wall Thickness T		
		MSS	ASME			A Max.	B Max.	Sch 5s	Sch 10s	Sch 40s
			Long	Short						
½	0.840	2.00	3.00	2.00	1.38	0.12	0.03	0.065	0.083	0.109
¾	1.050	2.00	3.00	2.00	1.69	0.12	0.03	0.065	0.083	0.113
1	1.315	2.00	4.00	2.00	2.00	0.12	0.03	0.065	0.109	0.133
1¼	1.660	2.00	4.00	2.00	2.50	0.19	0.03	0.065	0.109	0.140
1½	1.900	2.00	4.00	2.00	2.88	0.25	0.03	0.065	0.109	0.145
2	2.375	2.50	6.00	2.50	3.62	0.31	0.03	0.065	0.109	0.154
2½	2.875	2.50	6.00	2.50	4.12	0.31	0.03	0.083	0.120	0.203
3	3.500	2.50	6.00	2.50	5.00	0.38	0.03	0.083	0.120	0.216
3½	4.000	3.00	6.00	3.00	5.50	0.38	0.03	0.083	0.120	0.226
4	4.500	3.00	6.00	3.00	6.19	0.44	0.03	0.083	0.120	0.237
5	5.563	3.00	8.00	3.00	7.31	0.44	0.06	0.109	0.134	0.258
6	6.625	3.50	8.00	3.50	8.50	0.50	0.06	0.109	0.134	0.280
8	8.625	4.00	8.00	4.00	10.62	0.50	0.06	0.109	0.148	0.322
10	10.750	5.00	10.00	5.00	12.75	0.50	0.06	0.134	0.165	0.365
12	12.750	6.00	10.00	6.00	15.00	0.50	0.06	0.156	0.180	0.375
14	14.000	6.00	12.00	6.00	16.25	0.50	0.06	0.156	0.188	—
16	16.000	6.00	12.00	6.00	18.50	0.50	0.06	0.165	0.188	—
18	18.000	6.00	12.00	6.00	21.00	0.50	0.06	0.165	0.188	—
20	20.000	6.00	12.00	6.00	23.00	0.50	0.06	0.188	0.218	—
22	22.000	6.00	12.00	6.00	25.25	0.50	0.06	0.188	0.218	—
24	24.000	6.00	12.00	6.00	27.25	0.50	0.06	0.218	0.250	—

- For Bevel Details See Page 172
- Dimensional Tolerances See Page 169

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DIMENSIONAL TOLERANCES

MSS SP-43

Nominal Pipe Size	All Fittings		90° Elbow 45° Elbow Tee	Reducer Lap Joint Stub End	180° Return		
	Outside Diameter at Welding End	Wall Thickness	Center-to-End Dimension A, B, C, M	Overall Length F, H	Center-to-Center Dimension O	Center-to-Center Dimension K	Alignment of Ends U
1½ ~ 1½	±0.03	Not less than 87½% of nominal thickness	±0.06	±0.06	±0.25	±0.25	±0.03
2 ~ 3½	±0.03		±0.06	±0.06	±0.25	±0.25	±0.03
4	±0.03		±0.06	±0.06	±0.25	±0.25	±0.03
5 ~ 8	+0.06 -0.03		±0.06	±0.06	±0.25	±0.25	±0.03
10 ~ 18	+0.09 -0.03		±0.09	±0.09	±0.25	±0.25	±0.06
20 ~ 24	+0.12 -0.03		±0.09	±0.09	±0.25	±0.25	±0.06

Nominal Pipe Size	All Fittings		Cap	Lap Joint Stub end	
	Outside (1) Diameter at Welding End	Wall Thickness	Overall Length E	Fillet(2) Radius of Lap A	Outside Diameter of Lap G
½ ~ 1½	±0.03	Not less than 87½% of nominal thickness	±0.12	+3 -0.03	+0 -0.03
2 ~ 3½	±0.03		±0.12	+0 -0.03	+0 -0.03
4	±0.03		±0.12	+0 -0.06	+0 -0.03
5 ~ 8	+0.06 -0.03		±0.25	+0 -0.06	+0 -0.03
10 ~ 18	+0.09 -0.03		±0.25	+0 -0.06	+0 -0.06
20 ~ 24	+0.12 -0.03		±0.25	+0 -0.06	+0 -0.06

Notes:

1. Out of roundness is the vector sum of the plus and minus tolerance.
2. Fillet B radius is the maximum.

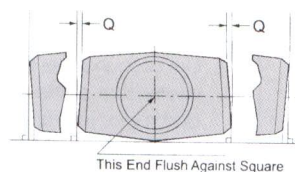
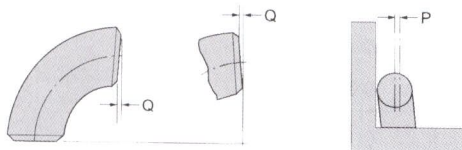
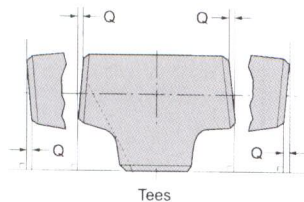
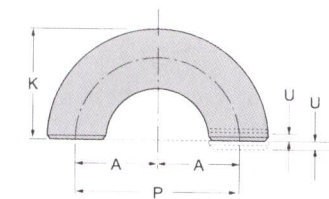
Dimensions are in inches.

DIMENSIONAL TOLERANCES

ASME B16.9

1. Wrought Steel Butt Welding Fittings

All Fittings				90° and 45° Elbows	Tees	Reducers	Caps	180° Returns		
Nominal Pipe Size	Outside Diameter at Bevel OD	Inside Diameter at End ID	Wall Thickness T	Center-to-End Dimension A, B	Center-to-End Dimension C, M	End to End H	Back to Face E	Center-to-Center Dimension P	Back-to-Face Dimension K	Alignments of Ends K
½ ~ 2½	+0.06 -0.03	±0.03	Not less than 87½% of nominal thickness	±0.06	±0.06	±0.06	±0.12	±0.25	±0.25	±0.03
3 ~ 4	±0.06	±0.06					±0.25			
5 ~ 8	±0.09 -0.06			±0.12	±0.25	±0.38		±0.06		
10 ~ 18	+0.16 -0.12	±0.19					±0.12		±0.19	±0.38
20 ~ 24										
26 ~ 30										
32 ~ 48										



Nominal Pipe Size	Angularity Tolerance	
	Off Angle Q	Off Plane P
½~4	0.03	0.06
5 ~ 8	0.06	0.12
10 ~ 12	0.09	0.19
14 ~ 16		0.25
18 ~ 24	0.12	0.38
26 ~ 30	0.19	
32 ~ 42		0.5
44 ~ 48		0.75

Dimensions are in inches.

2. Forged Socket Welding Fittings

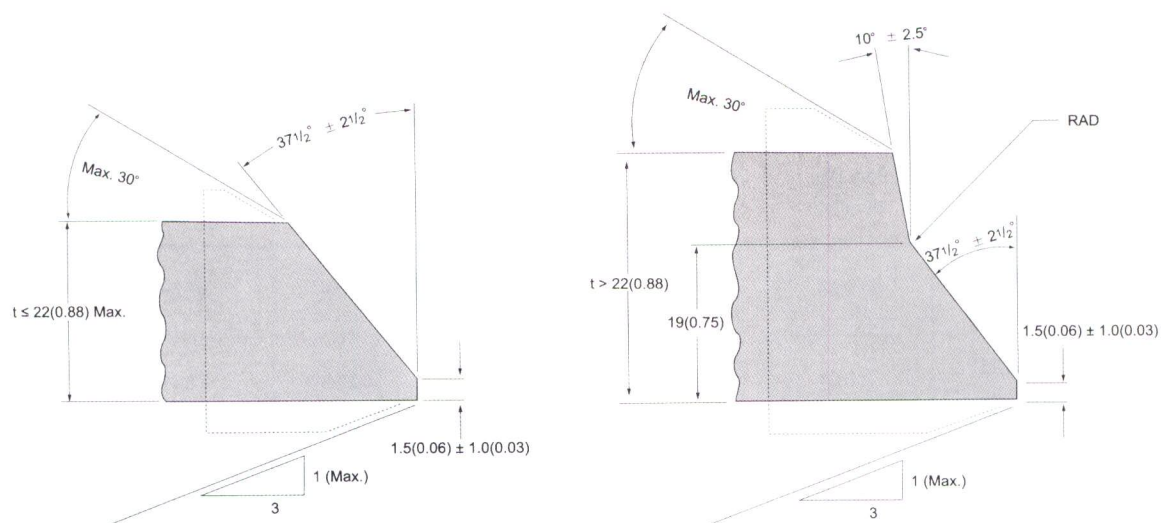
Nominal Pipe Size	All Fittings				Elbow Tee, Cross	Coupling	Half Coupling
	Socket Bore Dia	Bore Dia. of Fitting	Concentricity of Bore	Coincidence of Axis	Center to Bottom of Socket	Bottom to Bottom of Socket	Bottom of Socket to Opposite Face
$\frac{1}{8} \sim \frac{1}{4}$	+0.012 -0.000	± 0.03	Socket and Fitting Bores within ± 0.030	Maximum variation in alignment of socket and fitting bores for $\frac{1}{8}$ in 12	± 0.03	± 0.06	± 0.03
$\frac{3}{8} \sim \frac{1}{2}$	+0.012 -0.000	± 0.03			± 0.06	± 0.12	± 0.06
1 ~ 2	+0.012 -0.000	± 0.03			± 0.08	± 0.16	± 0.08
$2\frac{1}{2} \sim 3$	+0.012 -0.000	± 0.06			± 0.10	± 0.20	± 0.10

Dimensions are in inches.

Above table is followed accordingly to ASME B16.11

WELDING END PREPARATIONS

ASME B16.9



(a) Plain Bevel

(b) Compound Bevel

Nominal Pipe Wall Thickness (t)	End Preparation
Less than X*	Cut square of slightly chamfer, at mfr's. option
X* to 22(0.88), inclusive	Plain bevel as in sketch "(a)" above
More than 22(0.88)	Compound bevel as in sketch "(a)" above
X*=5(0.19) for carbon steel, ferritic alloy steel or wrought iron; 3(0.12) for austenitic alloy steel	

Notes:

- End preparations are in accordance with ASME B16.25 Paragraph 4.2
- End preparations conforming to customer specifications will be specially manufactured consultation

KS : KOREAN INDUSTRIAL STANDARDS

KS B 1522	Steel Butt-Welding Pipe Fittings for Ordinary use.
KS B 1541	Steel Butt-Welding Pipe Fittings.
KS B 1542	Steel Socket-Welding Pipe Fittings.
KS B 1543	Steel Plate Butt-Welding Pipe Fittings.

JIS : JAPANESE INDUSTRIAL STANDARDS

JIS B 2311	Steel Butt-Welding Pipe Fittings for Ordinary use.
JIS B 2312	Steel Butt-Welding Pipe Fittings.
JIS B 2313	Steel Plate Butt-Welding Pipe Fittings.
JIS B 2314	Steel Socket-Welding Pipe Fittings.

ANSI : AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI B 16.5	Pipe Flanges and Flanged Fittings.
ANSI B 16.9	Factory Made Wrought Steel Butt-Welding Fittings.
ANSI B 16.11	Forged Steel Fittings, Socket-Welding and Threaded.
ANSI B 16.25	Butt-Welding Ends.
ANSI B 16.28	Wrought Steel Butt-Welding Short Radius Elbows and Returns.
ANSI B 36.10	Welded and Seamless Wrought Steel Pipe.
ANSI B 36.19	Stainless Steel Pipe.

ASTM : AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM A 105	Forging, Carbon Steel for Piping Components.
ASTM A 182	Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
ASTM A 234	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
ASTM A 350	Forgings Carbon and Low-Alloy Steel, Requiring Notch Toughness Testing for Piping Components.
ASTM A 403	Wrought Austenitic Stainless Steel Piping Fittings.
ASTM A 420	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service.
ASTM A 815	Specification for Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings.

MSS : MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY

MSS SP-25	Standard Marking System for Valves, Fittings, Flanges and Unions.
MSS SP-43	Wrought Stainless Steel Butt-Welding Fittings.
MSS SP-44	Steel Pipe Line Flanges.
MSS SP-75	Specification for High Test Wrought Butt-Welding Fittings.
MSS SP-79	Socket Welding Reducer Inserts.
MSS SP-83	Carbon Steel Pipe Unions Socket-Welding and Threaded.
MSS SP-87	Factory-Made Butt-Welding Fittings for Class 1 Nuclear Piping Applications.
MSS SP-95	Swage(d) Nipples and Bull Plugs.
MSS SP-97	Integrally Reinforced Forged Branch Outlet Fittings-Socket Welding, Threaded and Butt-Welding Ends.

ASME : AMERICAN SOCIETY OF MECHANICAL ENGINEERS

ASME SECTION II	Materials.
ASME SECTION III	Subsection NCA / Division 1 / Division 2.
ASME SECTION V	Nondestructive Examination
ASME SECTION VII	Rules for Construction of Pressure Vessels / Division 1, Division 2.
ASME SECTION IX	Welding and Brazing Qualifications.

KEPIC : KOREA ELECTRIC POWER INDUSTRY CODE

KEPIC MN	Nuclear Components.
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API : AMERICAN PETROLEUM INSTITUTE

API 5L	Line Pipe.
API 5X	High Test Line Pipe.
API 6A	Wellhead and Christmas Tree Equipment.

Comparison of ASTM Specification and Similar Standards

Steel Composition	ASTM Specification and Grade				KS Specification and Grade
	marking Symbol	Pipe	Plate	Forgings	Pipe
Carbon Steel	—	A120	A283A	—	SPP
Carbon Steel	—	A53—B	A242	—	SPPS38
Carbon Steel	—	A53—B	A242	—	SPPS42
Carbon Steel	WPB	A106—B	A515—65 or 70	A181—2 and A105	SPPS42
Carbon Steel	WPC	A106—C	—	—	SPHT49
Carbon Steel	WPL6	A333 and A334—6	A516—60	A350—LF2	SPLT39
3 1/2 % Ni Steel	WPL3	A333 and A334—3	A203—D	A350—LF3	—
Carbon—molybdenum steel	WP1	A335—P1	A204—B	A182—F1	SPA12
1% Cr—1/2 % Molybdenum Steel	WP12	A335—P12	A387—12	A182—F12	SPA22
1 1/4 % Cr—1/2 % Molybdenum Steel	WP11	A335—P11	A387—11	A182—F11	SPA23
2 1/4 % Cr— 1% Molybdenum Steel	WP22	A335—P22	A387—22	A182—F22	SPA24
5% Cr—1/2 % Molybdenum Steel	WP5	A335—P5	A387—5	A182—F5	SPA25
7% Cr—1/2 % Molybdenum Steel	WP7	A335—P7	—	A182—F7	—
9% Cr— 1% Molybdenum Steel	WP9	A335—P9	—	A182—F9	—
18% Cr—8% Ni Steel	WP304	A312—TP304	A240—Type 304	A182—F304	STS304TP
18% Cr—8% Ni—(0.04—0.10)% C Steel	WP304H	A312—TP304H	A240—Type 304H	A182—F304H	—
18% Cr—8% Ni—0.035% C Steel	WP304L	A312—TP304L	A240—Type 304L	A182—F304L	SPS304LTP
22% Cr—12% Ni Steel	WP309	A312—TP309	A240—Type 309S	—	STS309STP
25% Cr—20% Ni Steel	WP310	A312—TP310	A240—Type 310S	A182—F310	STS310STP
18% Cr—8% Ni—Cb + Ta Steel	WP347	A312—TP347	A240—Type 347	A182—F347	STS347TP
18% Cr—8% Ni—Mo Steel	WP316	A312—TP316	A240—Type 316	A182—F316	STS316TP
18% Cr—8% Ni—Mo—(0.04—0.10)% C Steel	WP316H	A312—TP316H	A240—Type 316H	A182—F316H	STS316HTP
18% Cr—8% Ni—Mo—0.035% C Steel	WP316L	A312—TP316L	A240—Type 316L	A182—F316L	STS316LTP
18% Cr—8% Ni—Ti Steel	WP321	A312—TP321	A240—Type 321	A182—F321	STS321TP
18% Cr—8% Ni—Ti—(0.04—0.10)% C Steel	WP321H	A312—TP321H	A240—Type 321H	A182—F321H	—
18% Cr—8% Ni—Cb+Ta—(0.04—0.10)% C Steel	WP347H	A312—TP347H	A240—Type347—H	A182—F347—H	STS347HTP

KS Specification and Grade	JIS Grade		B.S Specification and Grade	DIN Specification and Grade	Steel Composition
Plate	Pipe	Plate	Pipe	Pipe	
SS41	SGP	SS41	1378-M	2440-ST33-1	Carbon Steel
SWS41B	STPG38	SM41B	3602-ERW23	1626-ST37	Carbon Steel
SWS41B	STPG42	SM41B	3602-ERW27	-	Carbon Steel
SBB42	STPT42	SB42	3602-Steel27	17175-St 45.8	Carbon Steel
SBB49	STPT49	SB49	3602-Steel35	-	Carbon Steel
SLAL33	STPL39	-	3603-Steel27 LT30	-	Carbon Steel
-	STPL46	-	3603-Steel503 LT100	-	3½% Ni Steel
SBB46M	STPA12	-	-	17175-15 Mo3	Carbon-Molybdenum Steel
SCMV2	STPA22	-	3604-HF620	17175-13CrMo44	1% Cr-½% Molybdenum Steel
SCMV3	STPA23	-	3604-HF621	-	1¼% Cr-½% Molybdenum Steel
SCMV4	STPA24	-	3604-HF622,27	17175-10CrMo910	2¼% Cr- 1% Molybdenum Steel
SCMV6	STPA25	-	3604-HF625	-	5% Cr-½% Molybdenum Steel
-	-	-	-	-	7% Cr-½% Molybdenum Steel
-	STPA26	-	-	-	9% Cr-1% Molybdenum Steel
STS304	SUS304TP	SUS304	3605-801	17440-X5CrNi189	18% Cr-8% Ni Steel
-	SUS304HTP	-	3605-811	-	18% Cr-8% Ni-(0.04-0.10)% C Steel
STS304L	SUS304LTP	SUS304L	3605-811L	17440-X2CrNiMo189	18% Cr-8% Ni-0.035% C Steel
STS309S	SUS309STP	SUS309S	-	-	22% Cr-12% Ni Steel
STS310S	SUS310STP	SUS310S	3605-805S	-	25% Cr-20% Ni Steel
STS347	SUS347TP	SUS347	3605-822 Nb	17440-X0CrNiNb189	18% Cr-8% Ni-Cb + Ta Steel
STS316	SUS316TP	SUS316	3605-845	17440-X5CrNiMo1810	18% Cr-8% Ni-Mo Steel
-	SUS316HTP	-	3605-855	-	18% Cr-8% Ni-Mo-(0.04-0.10)% C Steel
STS316L	SUS321LTP	SUS316L	3605-845L	17440-X2CrNiMo1810	18% Cr-8% Ni-Mo-0.035% C Steel
STS321	SUS321TP	SUS321	3605-822Ti	17440-X10CrNiTi89	18% Cr-8% Ni-Ti Steel
-	SUS321HTP	-	3605-832Ti	-	18% Cr-8% Ni-Ti-(0.04-0.10)% C Steel
-	SUS347HTP	-	3605-832Nb	-	18% Cr-8% Ni-Cb+Ta-(0.04-0.10)% C Steel

Material Specification for Forging

GRADE	COMPOSITION									
	C	Mn	P	S	Si	Ni	Cr	Mo	N	V
LOW ALLOY STEELS										
F1	0.28	0.06–0.90	0.045	0.045	0.15–0.35	–	–	0.44–0.65	–	–
F5	0.15	0.30–0.60	0.03	0.03	0.5	0.5	4.0–6.0	0.44–0.65	–	–
F9	0.15	0.30–0.60	0.03	0.03	0.50–1.10	–	8.0–10.0	0.90–1.10	–	–
F91	0.08–0.12	0.30–0.60	0.02	0.01	0.20–0.50	0.4	8.0–9.5	0.85–1.05	–	–
F92	0.07–0.13	0.30–0.60	0.02	0.01	0.5	0.4	8.50–9.50	0.30–0.60	–	–
F11	0.05–0.15	0.30–0.60	0.03	0.03	0.50–1.00	–	1.00–1.50	0.44–0.65	–	–
F12	0.05–0.15	0.30–0.60	0.045	0.045	0.50	–	0.80–1.25	0.44–0.65	–	–
F22	0.05–0.15	0.30–0.60	0.04	0.04	0.5	–	2.00–2.50	0.87–1.13	–	–
F23	0.04–0.10	0.10–0.60	0.03	0.01	0.5	–	1.92–2.60	0.05–0.30	–	–
SCM440	0.38–0.43	0.60–0.90	0.03	0.03	0.15–0.35	0.25	0.90–1.20	0.15–0.30	–	–
SNCM439	0.36–0.43	0.60–0.90	0.03	0.03	0.15–0.35	1.60–2.00	0.60–1.00	0.15–0.30	–	–
STAINLESS STEELS (MARTENSITIC)										
F6	0.15	1	0.04	0.03	1	0.5	11.5–13.5	–	–	–
STAINLESS STEELS (FERRITIC)										
F429	0.12	1	0.04	0.03	0.75	0.5	14.0–16.0	–	–	–
F430	0.12	1	0.04	0.03	0.75	0.5	16.0–18.0	–	–	–
STAINLESS STEELS (AUSTENITIC)										
F304L	0.03	2	0.045	0.03	1	8.0–13.0	18.0–20.0	–	–	–
F310	0.25	2	0.045	0.03	1	19.0–22.0	24.0–26.0	–	–	–
F316L	0.03	2	0.045	0.03	1	10.0–15.0	16.0–18.0	2.0–3.0	–	–
F317L	0.03	2	0.045	0.03	1	11.0–15.0	18.0–20.0	3.0–4.0	–	–
F321	0.08	2	0.045	0.03	1	9.0–12.0	17.0–19.0	–	–	–
F347	0.08	2	0.045	0.03	1	9.0–13.0	17.0–20.0	–	–	–
F44	0.02	1	0.03	0.01	0.8	17.5–18.5	19.5–20.5	6.0–6.5	–	–
STAINLESS STEEL (DUPLEX)										
F51	0.03	2	0.03	0.02	1	4.5–6.5	21.0–23.0	2.5–3.5	–	–
F53	0.03	1.2	0.035	0.02	0.8	6.8–8.0	24.0–26.0	3.0–5.0	–	–
F904L	0.02	2	0.04	0.03	1	23.0–28.0	19.0–23.0	4.0–5.0	–	–
SUSF329J3L	0.03	2.00	0.04	0.030	1.00	4.50–6.50	21.0–24.0	2.50–3.50	0.08–0.20	
F60	–	–	–	–	–	–	–	–	–	
CARBON STEELS										
A105	0.35	0.60–1.05	0.035	0.04	0.10–0.35	0.4	0.3	0.12	–	–
A350LF2	0.3	0.60–1.35	0.035	0.04	0.15–0.30	0.4	0.3	0.12	–	–
A350LF3	0.2	0.9	0.035	0.04	0.20–0.35	3.3–3.7	0.3	0.12	–	–
A694/F65	0.26	1.4	0.025	0.025	0.15–0.35	–	–	–	–	–
S45C	0.42–0.48	0.60–0.90	0.30	0.35	0.15–0.35	–	–	–	–	–
ALLOY STEELS										
ALLOY20	0.07	2	0.45	0.35	1	32–38	19–21	2.0–3.0	–	–
ALLOY625	0.1	0.5	0.015	0.015	0.5	58	20–23	8.0–10.0	–	–
ALLOY800	0.1	1.5	–	0.015	1	30–35	19–23	–	–	–
A800H/HT	0.05–0.10	1.5	–	0.015	1	30–35	19–23	–	–	–
ALLOY825	0.05	1	–	0.03	0.5	38–46	19.5–23.5	2.50–3.50	–	–
MOLD STEELS										
SKT4	0.50–0.60	0.60–0.90	0.03	0.02	0.10–0.40	1.50–1.80	0.80–1.20	0.35–0.55	–	0.05–0.15
STD61	0.32–0.42	0.50	0.03	0.03	–		4.50–5.50	1.00–1.50	–	0.80–1.20

GRADE	UNSNO	DIN	Tensile Strength Min, ksi(MPa)	Yield Strength Min, ksi(MPa)	Brinell Hardness
LOW ALLOY STEELS					
F1	K12822	15Mo3	70(485)	40(275)	143–192
F5	K41545	12CrMo19–5	70(485)	40(275)	143–217
F9	K90941	12–CrMo9–1	85(585)	55(380)	179–217
F91	K90901	X10CrMovN69–1	85(585)	60(415)	248max
F92	–	–	90(620)	64(440)	269max
F11	K11597	13CrMo44	60(415)	30(205)	121–174
F12	K11562	16CrMo44	60(415)	32(220)	121–174
F22	K21590	10CrMo9–10	60(415)	30(205)	170max
F23	K41650	–	74(510)	58(400)	220max
SCM440	–	42CrMo4	–	–	–
SNCM439	–	36CrNiMo4	–	–	–
STAINLESS STEELS (MARTENSITIC)					
F6	S41000	X12Cr13	70(485)	40(275)	143–207
STAINLESS STEELS (FERRITIC)					
F429	S42900	–	60(415)	35(240)	190max
F430	S43000	–	60(415)	35(240)	190max
STAINLESS STEELS (AUSTENITIC)					
F304L	S30403	X2CrNi19–11	70(485)	25(170)	–
F310	S31000	X12CrNi25–20	75(515)	30(205)	–
F316L	S31603	X2CrNiMo18–14–3	70(485)	25(170)	–
F317L	S31703	–	70(485)	25(170)	–
F321	S32100	X6CrNiTi18–10	75(515)	30(205)	–
F347	S34700	X6CrNiNb18–10	75(515)	30(205)	–
F44	S31254	–	94(650)	44(300)	–
STAINLESS STEEL (DUPLEX)					
F51	S31803	X2CrNiMoN22–5–3	90(620)	65(450)	–
F53	S32750	X2CrNiMoCuWN25–7–4	116(800)	80(550)	310max
F904L	NO8904	–	71(490)	31(215)	–
SUSF329J3L	–	–	–	–	–
F60	S32205	–	–	–	–
CARBON STEELS					
A105	–	CK25	70(485)	36(250)	187
A350LF2	–	–	70–95(485–655)	36(250)	197
A350LF3	–	–	70–95(485–655)	37.5(260)	–
A694/F65	–	–	77(530)	65(450)	–
S45C	–	CK45	–	–	–
ALLOY STEELS					
ALLOY20	NO8020	–	–	–	–
ALLOY625	NO6625	–	–	–	–
ALLOY800	NO8800	–	–	–	–
A800H/HT	NO8810/11	–	–	–	–
ALLOY825	NO8825	–	–	–	–
MOLD STEELS					
SKT4	–	–	–	–	–
STD61	–	–	–	–	–

Material Specification for Buttwelding Fittings

Marking Symbols		Materials	Form	Chemical Composition(percent)					
				Max. or Range(Unless otherwise indicated)					
				C	Si	Mn	P	S	Ni
A234	WPB	A106 Gr.B	P	0.30	0.10min	0.29-1.06	0.048	0.058	-
		A151 Gr.65	PL	0.28-0.33	0.13-0.33	0.90	0.035	0.040	-
		A515 Gr.70	PL	0.31-0.35	0.13-0.33	0.90	0.035	0.040	-
	WPC	A106 Gr.C	P	0.35	0.10min	0.29-1.06	0.048	0.058	-
		WP1	A335 Gr.P1	P	0.10-0.20	0.10-0.50	0.30-0.80	0.045	0.055
	A204 Gr.B		PL	0.20-0.27	0.13-0.32	0.90	0.035	0.040	-
	WP12	A335 Gr.P12	P	0.15	0.50	0.30-0.61	0.045	0.055	-
		A387 Gr.12	PL	0.17	0.13-0.32	0.36-0.69	0.035	0.040	-
	WP11	A335 Gr. P11	P	0.15	0.50-1.00	0.30-0.60	0.030	0.030	-
		A387 Gr.11	PL	0.17	0.44-0.86	0.35-0.69	0.035	0.040	-
WP22	A335 Gr.P22	P	0.15	0.50	0.30-0.60	0.030	0.030	-	
	A387 Gr.22	PL	0.15-0.17	0.50	0.27-0.63	0.035	0.035	-	
WP5	A335 Gr. P5	P	0.15	0.50	0.30-0.60	0.030	0.030	-	
	A387 Gr.5	PL	0.15	0.50	0.27-0.63	0.040	0.030	-	
WP91	A335 Gr.P91	P	0.08-0.12	0.20	0.30-0.60	0.020	0.010	0.400	
	A387 Gr.91	PL	0.18-0.12	0.50	0.30-0.60	0.020	0.010	0.400	
A403	WP304	A312 Gr. TP 304	P	0.08	0.75	2.00	0.040	0.030	8.00-11.00
		A240 Type 304	PL	0.15	1.00	2.00	0.045	0.030	8.00-10.50
	WP304H	A312 Gr. TP 304H	P	0.01-0.10	0.75	2.00	0.040	0.030	8.00-11.00
		A240 Type 304H	PL	0.04-0.10	1.00	2.00	0.045	0.030	8.00-10.50
	WP304L	A312 Gr. TP 304L+	P	0.035	0.75	2.00	0.040	0.030	8.00-13.00
		A240 Type 304L+	PL	0.030	1.00	2.00	0.045	0.030	8.00-12.00
	WP309	A312 Gr. TP309	P	0.15	0.75	2.00	0.040	0.030	12.00-15.00
		A240 Type309S	PL	0.08	1.00	2.00	0.045	0.030	12.00-15.00
	WP310	A312 Gr. TP310	P	0.15	0.75	2.00	0.040	0.030	19.00-22.00
		A240 Type310S	PL	0.08	1.00	2.00	0.045	0.030	19.00-22.00
	WP316	A312 Gr. TP316	P	0.08	0.75	2.00	0.040	0.030	11.00-14.00
		A240 Type316	PL	0.08	1.00	2.00	0.045	0.030	10.00-14.00
	WP316H	A312 Gr. TP316H	P	0.04-0.10	0.75	2.00	0.040	0.030	11.00-14.00
		A240 Type 316H*	PL	0.40-0.10	1.00	2.00	0.045	0.030	10.00-14.00
	WP316L	A312 Gr. TP316L	P	0.035	0.75	2.00	0.040	0.030	10.00-15.00
		A240 Type316L*	PL	0.030	1.00	2.00	0.045	0.030	10.00-14.00
	WP317L	A312 Gr. TP317L	P	0.035	0.75	2.00	0.040	0.030	11.00-15.00
		A240 Type 317L	PL	0.030	1.00	2.00	0.045	0.030	11.00-15.00
WP321	A312 Gr. TP321	P	0.08	0.75	2.00	0.040	0.030	9.00-13.00	
	A240 Type321	PL	0.08	1.00	2.00	0.045	0.030	9.00-12.00	
WP321H	A312 Gr. TP321H	P	0.04-0.10	0.75	2.00	0.040	0.030	9.00-13.00	
	A240 Type 321H*	PL	0.04-0.10	1.00	2.00	0.045	0.030	9.00-12.00	
WP347	A312 Gr. TP347	P	0.08	0.75	2.00	0.040	0.030	9.00-13.00	
	A240 Type347	PL	0.08	1.00	2.00	0.045	0.035	9.00-13.00	
WP347H	A312 Gr. TP347H	P	0.04-0.10	0.75	2.00	0.040	0.030	9.00-13.00	
	A240 Type347H*	PL	0.08	1.00	2.00	0.045	0.030	9.00-13.00	
A420	WPL6	A333 and A334 Gr.6	P	0.30	0.10min	0.29-1.06	0.048	0.058	-
		A516 Gr.60	PL	0.21-0.27	0.13-0.33	0.60-1.25	0.035	0.040	-
	WPL3	A333 and A334 Gr.3	P	0.19	0.18-0.37	0.31-0.64	0.050	0.050	3.18-3.82
A203 Gr.D		PL	0.17-0.20	0.13-0.32	0.70-0.80	0.035	0.040	3.18-3.82	
WPL9	A333 and A334 Gr.9	A203 Gr.A	P	0.20	-	0.40-1.06	0.025	0.025	1.60-2.24
		PL	0.17	0.15-0.40	0.70	0.035	0.040	2.10-2.50	
A815	S31803	A790 S31803	P						
		A240 S31803	PL	0.030	1.0	2.0	0.030	0.020	4.50-6.50
	S32750	A790 S32750	P						
A240 S32750		PL	0.030	0.8	1.2	0.035	0.020	-0.0-8.00	
S32760	A790 S32760	P	0.05					-	
	A240 S32760	PL	0.030	1.00	1.00	0.030	0.010	-	
A860	WPHY42	API5L Gr. X 42	P		-	1.25	0.04	0.05	-
		A572 Gr. 42	PL	0.28	-				-
	WPHY60	API5L Gr. X 60	P		-	1.35	0.04	0.05	-
A572 Gr. 60		PL	0.26	-				-	
WPHY65	API5L Gr. X 65	P		-	1.40	0.04	0.05	-	
	A572 Gr. 65	PL	0.26	-				-	

* Asterisks(*)denote that the carbon content shall be 0.04 to 0.10% Daggers(+)denote that the minimum tensile strength shall be 65,000psi(488 MPa), and that the minimum yield strength shall be 25,000 psi(172 MPa)

The yield strength shall be determined by the offset method at 0.2% limiting permanent set in accordance with ASTM A370 Specification
An alternative method of determining yield strength may be based on a total extension under load of 0.5%

			Other Elements	Chemical Composition(percent)				Marking Symbols
Cr	Mo	Ti		Tensile Strength Min.or Range Ksi(Mpa)		Yield Strenght Mim Ksi(Mpa)	Longitudinal Elongation in 2 in. (50mm) Min. %	
—	—	—	—	60	(414)	35(241)	25	WPB
—	—	—	—	65–85	(450–585)	35(240)	23	
—	—	—	—	70–90	(485–620)	38(260)	21	
—	—	—	—	70	(483)	40(276)	30	WPC
—	0.44–0.65	—	—	55	(379)	30(207)	30	WP1
—	0.41–0.64	—	—	70–90	(485–620)	40(275)	21	
0.80–1.25	—	—	—	60	(414)	30(207)	30	WP12
0.74–1.21	0.40–0.65	—	—	56–80	(380–550)	33(230)	22	
1.00–1.50	0.40–0.65	—	—	60	(414)	30(207)	30	WP11
0.94–1.56	0.40–0.70	—	—	60–65	(415–585)	35(240)	22	
0.90–2.62	0.87–1.13	—	—	60	(414)	30(207)	30	WP22
1.88–2.62	0.85–1.15	—	—	60–85	(415–585)	30(205)	18	
4.00–600	1.45–0.65	—	—	60	(414)	30(207)	30	WP5
4.00–600	0.40–0.70	—	—	60–85	(415–585)	30(205)	18	
8.00–9.50	0.85–1.05	—	V:0.18–0.25 Cb:0.06–0.10	85	(585)	60(415)	—	WP91
8.00–9.50	0.85–1.05	—	N:0.030–0.070 Al:0.04	85–110	(585–760)	60(415)	18	
18.00–20.00	—	—	—	75	(517)	30(207)	30	WP304
18.00–20.00	—	—	—	75	(515)	30(205)	40	
18.00–20.00	—	—	—	75	(517)	30(205)	35	WP304H
18.00–20.00	—	—	—	75	(515)	30(205)	40	
18.00–20.00	—	—	—	65	(448)	25(172)	30	WP304L
18.00–20.00	—	—	—	65	(448)	25(175)	40	
22.00–24.00	—	—	—	75	(517)	30(207)	30	WP309
22.00–24.00	—	—	—	75	(515)	30(205)	40	
24.00–26.00	—	—	—	75	(517)	30(207)	30	WP310
24.00–26.00	—	—	—	75	(515)	30(205)	40	
16.00–18.00	2.00–3.00	—	—	75	(517)	30(207)	35	WP316
16.00–18.00	2.00–3.00	—	—	75	(515)	30(205)	40	
16.00–18.00	2.00–3.00	—	—	75	(517)	30(207)	35	WP316H
16.00–18.00	2.00–3.00	—	—	75	(515)	30(205)	40	
16.00–18.00	2.00–3.00	—	—	75	(517)	25(172)	35	WP316L
16.00–18.00	2.00–3.00	—	—	75	(515)	25(170)	40	
18.00–20.00	3.00–4.00	—	—	75	(517)	30(205)	35	WP317L
18.00–20.00	3.00–4.00	—	N–0.10	80	(550)	35(240)	40	
17.00–19.00	—	5xC–0.60	—	70	(483)	30(207)	35	WP321
17.00–19.00	—	5xC–0.70	—	65	(448)	30(205)	40	
17.00–20.00	—	4xC–0.60	—	75	(517)	30(207)	35	WP321H
17.00–19.00	—	4xC–0.70	—	75	(515)	30(205)	40	
17.00–20.00	—	—	Cb+Ta10xC–1.00	75	(517)	30(207)	35	WP347
17.00–19.00	—	—	Cb+Ta10xC–1.10	75	(515)	30(205)	40	
17.00–20.00	—	—	Cb+Ta10xC–1.00	75	(517)	30(207)	35	WP347H
17.00–19.00	—	—	Cb+Ta10xC–1.10	75	(515)	30(207)	40	
—	—	—	—	60	(414)	35(241)	30	WPL6
—	—	—	—	60–80	(415–550)	32(220)	25	
—	—	—	—	65	(448)	35(241)	30	WP3
—	—	—	—	65–85	(450–585)	37(255)	23	
—	—	—	Cu+0.75–1.25	63	(435)	46(315)	28	WP9
—	—	—	—	65–85	(450–585)	37(255)	23	
21.0–23.0	2.50–3.50	—	N:0.08–20	90	(620)	65(450)	25	S31803
24.0–26.0	3.0–5.0	—	N:0.24–0.32 Cu:0.5	116	(795)	80(550)	15	S32750
24.00–26.00	3.00–4.00	—	—	108 109–130	(750) (750–895)	80(550)	25	S32760
—	—	—	—	60	(414)	42(289)	—	WPHY42
—	—	—	—	—	—	—	24	
—	—	0.03Min.	Cb:0.005min. V:0.02min.	75	(517)	60(413)	—	WPHY60
—	—	—	—	—	—	—	18	
—	—	—	Cb:0.005min. V:0.02min.	77 80	(530) (550)	65(448)	—	WPHY65
—	—	—	—	—	—	—	17	

• The basic minimum elongation for walls 3/16(7.94mm)and over in thickness shall be determined according to strip tests:
all small sizes are tested in their full section.

• P denotes pipe. PL Plate.

WALL THICKNESS OF WELDED AND SEAMLESS PIPE

Nominal Pipe Size		Outside diameter		Nominal Wall Thickness							
A	B	KS/JIS	ASME	SPP SGP	Sch 5s	Sch 10s	Sch 10	Sch 20s	Sch 20	Sch 30	Sch 40s
6	$\frac{1}{8}$	10.50	10.29	—	—	1.24	—	1.5	—	—	1.73
8	$\frac{1}{4}$	13.80	13.72	—	—	1.65	—	2.0	—	—	2.24
10	$\frac{3}{8}$	17.30	17.14	—	—	1.65	—	2.0	—	—	2.31
15	$\frac{1}{2}$	21.70	21.34	2.8	1.65	2.11	—	2.5	—	—	2.77
20	$\frac{3}{4}$	27.20	26.67	2.8	1.65	2.11	—	2.5	—	—	2.87
25	1	34.00	33.40	3.2	1.65	2.77	—	3.0	—	—	3.38
32	$1\frac{1}{4}$	42.70	42.16	3.5	1.65	2.77	—	3.0	—	—	3.56
40	$1\frac{1}{2}$	48.60	48.26	3.5	1.65	2.77	—	3.0	—	—	3.68
50	2	60.50	60.32	3.8	1.65	2.77	—	3.5	3.20	—	3.91
65	$2\frac{1}{2}$	76.30	73.02	4.2	2.11	3.05	—	3.5	4.50	—	5.16
80	3	89.10	88.90	4.2	2.11	3.05	—	4.0	4.50	—	5.49
90	$3\frac{1}{2}$	101.60	101.60	4.2	2.11	3.05	—	4.0	4.50	—	5.74
100	4	114.30	114.30	4.5	2.77	3.05	—	4.0	4.90	—	6.02
125	5	139.80	141.30	4.5	2.77	3.40	—	5.0	5.10	—	6.55
150	6	165.20	168.30	5.0	2.77	3.40	—	5.0	5.50	—	7.11
200	8	216.30	219.08	5.8	2.77	3.76	—	6.5	6.35	7.04	8.18
250	10	267.40	273.05	6.6	3.40	4.19	—	6.5	6.35	7.80	9.27
300	12	318.50	323.80	6.9	3.96	4.57	—	6.5	6.35	8.38	9.52
350	14	355.60	355.60	7.9	3.96	4.78	6.35	8.0	7.92	9.52	*9.52
400	16	406.40	406.40	7.9	4.19	4.78	6.35	8.0	7.92	9.52	*9.52
450	18	457.20	457.20	7.9	4.19	4.78	6.35	8.0	7.92	11.12	*9.52
500	20	508.00	508.00	7.9	4.78	5.54	6.35	9.5	9.52	12.70	*9.52
550	22	558.80	558.80	—	4.78	5.54	6.35	—	9.52	12.70	*9.52
600	24	609.60	609.60	—	5.54	6.35	6.35	—	9.52	14.27	*9.52
650	26	660.40	660.40	—	—	*7.92	7.92	—	12.70	—	*9.52
700	28	711.20	711.20	—	—	*7.92	7.92	—	12.70	15.88	*9.52
750	30	762.00	762.00	—	6.35	*7.92	7.92	—	12.70	15.88	*9.52
800	32	812.80	812.80	—	—	*7.92	7.92	—	12.70	15.88	*9.52
850	34	863.60	863.60	—	—	*7.92	7.92	—	12.70	15.88	*9.52
900	36	914.40	914.40	—	—	*7.92	7.92	—	12.70	15.88	*9.52
950	38	965.20	965.20	—	—	*7.92	—	—	—	—	*9.52
1000	40	1016.00	1016.00	—	—	*7.92	—	—	—	—	*9.52
1050	42	1066.80	1066.80	—	—	*7.92	—	—	—	—	*9.52
1100	44	1117.60	1117.60	—	—	*7.92	—	—	—	—	*9.52
1150	46	1168.40	1168.40	—	—	*7.92	—	—	—	—	*9.52
1200	48	1219.20	1219.20	—	—	*7.92	—	—	—	—	*9.52

• Asterisks(*) denote Manufacturer's Standard as no internationally Recognized Standards for these wall thickness have been established.

(Unit: mm)

Nominal Wall Thickness											Nominal Pipe Size inch
STD	Sch 40	Sch 60	Sch 80s	X-S	Sch 80	Sch 100	Sch 120	Sch 140	Sch 160	XX-S	
1.73	1.73	2.20	2.41	2.41	2.41	—	—	—	3.15	4.83	$\frac{1}{8}$
2.24	2.24	2.40	3.02	3.02	3.02	—	—	—	3.68	6.05	$\frac{1}{4}$
2.31	2.31	2.80	3.20	3.20	3.20	—	—	—	4.01	6.40	$\frac{3}{8}$
2.77	2.77	3.20	3.73	3.73	3.73	—	—	—	4.78	7.47	$\frac{1}{2}$
2.87	2.87	3.40	3.91	3.91	3.91	—	—	—	5.56	7.82	$\frac{3}{4}$
3.38	3.38	3.90	4.55	4.55	4.55	—	—	—	6.35	9.09	1
3.56	3.56	4.50	4.85	4.85	4.85	—	—	—	6.35	9.70	1 $\frac{1}{4}$
3.68	3.68	4.50	5.08	5.08	5.08	—	—	—	7.14	10.16	1 $\frac{1}{2}$
3.91	3.91	4.90	5.54	5.54	5.54	—	—	—	8.74	11.07	2
5.16	5.16	6.00	7.01	7.01	7.01	—	—	—	9.52	14.02	2 $\frac{1}{2}$
5.49	5.49	6.60	7.62	7.62	7.62	—	—	—	11.12	15.24	3
5.74	5.74	7.00	8.08	8.08	8.08	—	—	—	—	—	3 $\frac{1}{2}$
6.02	6.02	7.10	8.56	8.56	8.56	—	11.12	—	13.49	17.12	4
6.55	6.55	8.10	9.53	9.53	9.53	—	12.70	—	15.88	19.05	5
7.11	7.11	9.30	10.97	10.97	10.97	—	14.27	—	18.26	21.94	6
8.18	8.18	10.31	12.70	12.70	12.70	15.09	18.26	20.62	23.01	22.22	8
9.27	9.27	12.70	12.70	12.70	15.09	18.26	21.44	25.40	28.58	25.40	10
9.52	10.31	14.27	*12.70	12.70	17.48	21.44	25.40	28.58	33.32	25.40	12
9.52	11.13	15.09	*12.70	12.70	19.05	23.83	27.79	31.75	35.71	—	14
9.52	12.70	16.66	*12.70	12.70	21.44	26.19	30.96	36.52	40.49	—	16
9.52	14.27	19.05	*12.70	12.70	23.82	29.36	34.92	39.67	45.24	—	18
9.52	15.09	20.62	*12.70	12.70	26.19	32.54	38.10	44.45	50.51	—	20
9.52	—	22.22	*12.70	12.70	28.58	34.92	41.28	47.62	53.98	—	22
9.52	17.48	24.61	*12.70	12.70	30.96	38.89	46.02	52.37	59.54	—	24
9.52	—	—	*12.70	12.70	—	—	—	—	—	—	26
9.52	—	—	*12.70	12.70	—	—	—	—	—	—	28
9.52	—	—	*12.70	12.70	—	—	—	—	—	—	30
9.52	17.48	—	*12.70	12.70	—	—	—	—	—	—	32
9.52	17.48	—	*12.70	12.70	—	—	—	—	—	—	34
9.52	19.05	—	*12.70	12.70	—	—	—	—	—	—	36
9.52	—	—	*12.70	12.70	—	—	—	—	—	—	38
9.52	—	—	*12.70	12.70	—	—	—	—	—	—	40
9.52	—	—	*12.70	12.70	—	—	—	—	—	—	42
9.52	—	—	*12.70	12.70	—	—	—	—	—	—	44
9.52	—	—	*12.70	12.70	—	—	—	—	—	—	46
9.52	—	—	*12.70	12.70	—	—	—	—	—	—	48

• Astrisks(*) denote Manufacturer's Standard as no internationally
Recognized Standards for these wall thickness have been established.

An aerial photograph of a vast, deep blue body of water, likely a fjord or a large lake, stretching towards a distant horizon. The water's surface is covered in fine, shimmering ripples. On the right side, a steep, green, forested hillside slopes down towards the water. The sky above is a deep blue, filled with large, white, fluffy clouds that are illuminated from above, creating a high-contrast scene. The overall mood is serene and majestic.

Only One, Premium Business Partner

The Worlds is Our Stage.
Until the day that the world's leading,
will continue our efforts.