



ADVANCE FORGING

Manufacturers of Pipefittings

**Specialists in (IBR) Approved Pipefittings and Flanges
and all types of third party inspection material**



***Registered with SSI / MSME / NSIC
ISO 9001:2015 Approved***

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GENERAL ILLUSTRATION

Wrought Steel Butt-Welding Fittings
(Carbon & Alloy Steel)

A long, smooth 90-degree elbow fitting.	A long, smooth 180-degree elbow fitting.	A concentric reducer fitting.	A concentric reducer fitting.
90° Elbow (Long)	180° Elbow (Long)	Reducer (Concentric)	Reducer (Concentric)
A short, smooth 90-degree elbow fitting.	A short, smooth 180-degree elbow fitting.	An eccentric reducer fitting.	An eccentric reducer fitting.
90° Elbow (Short)	180° Elbow (Short)	Reducer (Eccentric)	Reducer (Eccentric)
A long, smooth 45-degree elbow fitting.	A straight tee fitting.	A reducing tee fitting.	A hemispherical cap fitting.
45° Elbow (Long)	Tee (Straight)	Tee (Reducing)	Cap

Stainless Steel Butt-Welding Fittings

A long, smooth 90-degree elbow fitting.	A concentric reducer fitting.	A straight tee fitting.
90° Elbow (Long)	Reducer (Concentric)	Tee (Straight)
A short, smooth 90-degree elbow fitting.	An eccentric reducer fitting.	A reducing tee fitting.
90° Elbow (Short)	Reducer (Eccentric)	Tee (Reducing)
A long, smooth 45-degree elbow fitting.	A lap joint stub end fitting.	A hemispherical cap fitting.
45° Elbow (Long)	Lap Joint Stub End	Cap

Forged Steel Socket-Welding & Threaded Fittings
Socket Welding Fittings

A 90-degree elbow fitting with socket ends.	A 45-degree elbow fitting with socket ends.	A tee fitting with socket ends.	A cross fitting with socket ends.
90° Elbow	45° Elbow	Tee	Cross
A coupling fitting with socket ends.	A reducer fitting with socket ends.	A cap fitting with socket ends.	A union fitting with socket ends.
Coupling	Reducer	Cap	Union

• Threaded Fittings

A 90-degree elbow fitting with threaded ends.	A 45-degree elbow fitting with threaded ends.	A tee fitting with threaded ends.	A cross fitting with threaded ends.
90° Elbow	45° Elbow	Tee	Cross
A coupling fitting with threaded ends.	A half coupling fitting with threaded ends.	A cap fitting with threaded ends.	A union fitting with threaded ends.
Coupling	Half Coupling	Cap	Union
A hex head plug fitting.	A square head plug fitting.	A round head plug fitting.	A hex head bushing fitting.
Hex. Head Plug	S.Q. Head Plug	Round Head Plug	Hex. Head Bushing
A boss fitting with threaded ends.	An insert fitting with threaded ends.	A nipple fitting with threaded ends.	A swage nipple fitting with threaded ends.
Boss	Insert	Nipple	Swage Nipple

• Outlets

A socket outlet fitting.	A welding outlet fitting.	A thread outlet fitting.	A nipple outlet fitting.
Socket-Outlet	Welding-Outlet	Thread-Outlet	Nipple-Outlet

STEEL BUTT-WELDING FITTINGS



STEEL BUTT-WELDING FITTINGS

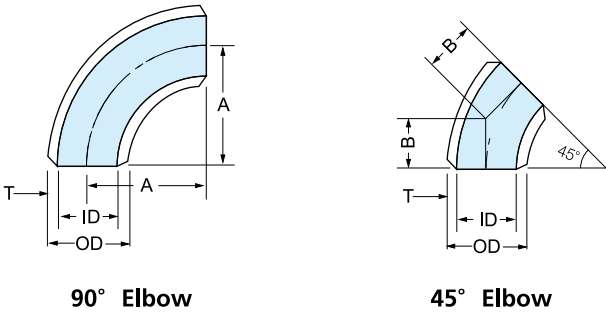
ASME

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WROUGHT STEEL BUTT-WELDING FITTING

90° Elbow (Long, Short) STD, Sch40, X-S, Sch80, 45° Elbow (Long) Sch160, XX-S



ASME B16.9

Nominal Pipe Size	Outside Diameter O.D	Center to End			STD		Sch 40	
		Long		Short	T	I.D	T	I.D
		A	B	A				
1/2	0.840	1.50	0.62	- 0.109	0.622	0.109	0.622	
3/4	1.050	1.50	0.75	- 0.113	0.824	0.113	0.824	
1	1.315	1.50	0.88	1.00	0.133	1.049	0.133	1.049
1 1/4	1.660	1.88	1.00	1.25	0.140	1.380	0.140	1.380
1 1/2	1.900	2.25	1.12	1.50	0.145	1.610	0.145	1.610
2	2.375	3.00	1.38	2.00	0.154	2.067	0.154	2.067
2 1/2	2.875	3.75	1.75	2.50	0.203	2.469	0.203	2.469
3	3.500	4.50	2.00	3.00	0.216	3.068	0.216	3.068
3 1/2	4.000	5.25	2.25	3.50	0.226	3.548	0.226	3.548
4	4.500	6.00	2.50	4.00	0.237	4.026	0.237	4.026
5	5.563	7.50	3.12	5.00	0.258	5.047	0.258	5.047
6	6.625	9.00	3.75	6.00	0.280	6.065	0.280	6.065
8	8.625	12.00	5.00	8.00	0.322	7.981	0.322	7.981
10	10.750	15.00	6.25	10.00	0.365	10.020	0.365	10.020
12	12.750	18.00	7.50	12.00	0.375	12.000	0.406	11.938
14	14.000	21.00	8.75	14.00	0.375	13.250	0.438	13.124
16	16.000	24.00	10.00	16.00	0.375	15.250	0.500	15.000
18	18.000	27.00	11.25	18.00	0.375	17.250	0.562	16.876
20	20.000	30.00	12.50	20.00	0.375	19.250	0.594	18.812
22	22.000	33.00	13.50	22.00	0.375	21.250	*0.594	20.812
24	24.000	36.00	15.00	24.00	0.375	23.250	0.688	22.624
26	26.000	39.00	16.00	*26.00	0.375	25.250	*0.688	24.624
28	28.000	42.00	17.25	*28.00	0.375	27.250	*0.688	26.624
30	30.000	45.00	18.50	*30.00	0.375	29.250	*0.688	28.624
32	32.000	48.00	19.75	*32.00	0.375	31.250	0.688	30.624
34	34.000	51.00	21.00	*34.00	0.375	33.250	0.688	32.624
36	36.000	54.00	22.25	*36.00	0.375	35.250	0.750	34.500
38	38.000	57.00	23.62	*38.00	0.375	37.250	-	-
40	40.000	60.00	24.88	*40.00	0.375	39.250	-	-
42	42.000	63.00	26.00	*42.00	0.375	41.250	-	-
44	44.000	66.00	27.38	*44.00	0.375	43.250	-	-
46	46.000	69.00	28.62	*46.00	0.375	45.250	-	-
48	48.000	72.00	29.88	*48.00	0.375	47.250	-	-
*50	50.000	75.00	31.06	*50.00	0.375	49.250	-	-
*52	52.000	78.00	32.30	*52.00	0.375	51.250	-	-
*54	54.000	81.00	33.55	*54.00	0.375	53.250	-	-
*56	56.000	84.00	34.79	*56.00	0.375	55.250	-	-
*58	58.000	87.00	36.04	*58.00	0.375	57.250	-	-
*60	60.000	90.00	37.28	*60.00	0.375	59.250	-	-

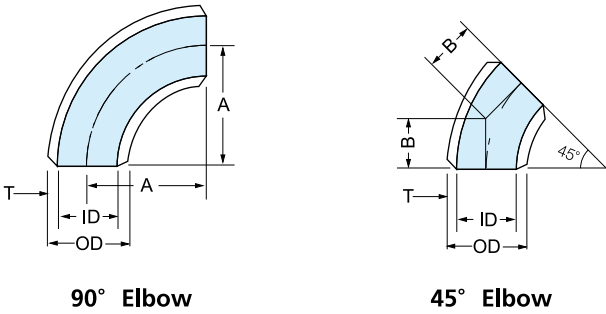
• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119
• Asterisks(*) denote Advance Forging Standard.

Unit: inch

X-S		Sch 80		Sch 160		XX-S		Nominal Pipe Size
T	I.D	T	I.D	T	I.D	T	I.D	
0.147	0.546	0.147	0.546	0.188	0.464	0.294	0.252	1/2
0.154	0.742	0.154	0.742	0.218	0.612	0.308	0.434	3/4
0.179	0.957	0.179	0.957	0.250	0.815	0.358	0.599	1
0.191	1.278	0.191	1.278	0.250	1.160	0.382	0.896	1 1/4
0.200	1.500	0.200	1.500	0.281	1.338	0.400	1.100	1 1/2
0.218	1.939	0.218	1.939	0.344	1.687	0.436	1.503	2
0.276	2.323	0.276	2.323	0.375	2.125	0.552	1.771	2 1/2
0.300	2.900	0.300	2.900	0.438	2.624	0.600	2.300	3
0.318	3.364	0.318	3.364	-	-	-	-	3 1/2
0.337	3.826	0.337	3.826	0.531	3.438	0.674	3.152	4
0.375	4.813	0.375	4.813	0.625	4.313	0.750	4.063	5
0.432	5.761	0.432	5.761	0.719	5.187	0.864	4.897	6
0.500	7.625	0.500	7.625	0.906	6.813	0.875	6.875	8
0.500	9.750	0.594	9.562	1.125	8.500	1.000	8.750	10
0.500	11.750	0.688	11.374	1.312	10.126	1.000	10.750	12
0.500	13.000	0.750	12.500	1.406	11.188	-	-	14
0.500	15.000	0.844	14.312	1.594	12.812	-	-	16
0.500	17.000	0.938	16.124	1.781	14.438	-	-	18
0.500	19.000	1.031	17.938	1.968	16.062	-	-	20
0.500	21.000	1.125	19.750	2.125	17.750	-	-	22
0.500	23.000	1.219	21.562	2.344	19.312	-	-	24
0.500	25.000	-	-	-	-	-	-	26
0.500	27.000	-	-	-	-	-	-	28
0.500	29.000	-	-	-	-	-	-	30
0.500	31.000	-	-	-	-	-	-	32
0.500	33.000	-	-	-	-	-	-	34
0.500	35.000	-	-	-	-	-	-	36
0.500	37.000	-	-	-	-	-	-	38
0.500	39.000	-	-	-	-	-	-	40
0.500	41.000	-	-	-	-	-	-	42
0.500	43.000	-	-	-	-	-	-	44
0.500	45.000	-	-	-	-	-	-	46
0.500	47.000	-	-	-	-	-	-	48
0.500	49.000	-	-	-	-	-	-	50*
0.500	51.000	-	-	-	-	-	-	52*
0.500	53.000	-	-	-	-	-	-	54*
0.500	55.000	-	-	-	-	-	-	56*
0.500	57.000	-	-	-	-	-	-	58*
0.500	59.000	-	-	-	-	-	-	60*

WROUGHT STEEL BUTT-WELDING FITTING

90° Elbow (Long, Short)
45° Elbow (Long) Sch20, Sch30, Sch60, Sch100,
Sch120, Sch140



ASME B16.9

Nominal Pipe Size	Outside Diameter O.D	Center to End			Sch 20		Sch 30	
		Long		Short	T	I.D	T	I.D
		A	B	A				
4	4.500	6.00	2.50	4.00	-	-	-	-
5	5.563	7.50	3.12	5.00	-	-	-	-
6	6.625	9.00	3.75	6.00	-	-	-	-
8	8.625	12.00	5.00	8.00	0.250	8.125	0.277	8.071
10	10.750	15.00	6.25	10.00	0.250	10.250	0.307	10.136
12	12.750	18.00	7.50	12.00	0.250	12.250	0.330	12.090
14	14.000	21.00	8.75	14.00	0.312	13.376	0.375	13.250
16	16.000	24.00	10.00	16.00	0.312	15.376	0.375	15.250
18	18.000	27.00	11.25	18.00	0.312	17.376	0.438	17.124
20	20.000	30.00	12.50	20.00	0.375	19.250	0.500	19.000
22	22.000	33.00	13.50	22.00	0.375	21.250	0.500	21.000
24	24.000	36.00	15.00	24.00	0.375	23.250	0.562	22.876
26	26.000	39.00	16.00	*26.00	0.500	25.000	-	-
28	28.000	42.00	17.25	*28.00	0.500	27.000	0.625	26.750
30	30.000	45.00	18.50	*30.00	0.500	29.000	0.625	28.750
32	32.000	48.00	19.75	*32.00	0.500	31.000	0.625	30.750
34	34.000	51.00	21.00	*34.00	0.500	33.000	0.625	32.750
36	36.000	54.00	22.25	*36.00	0.500	35.000	0.625	34.750

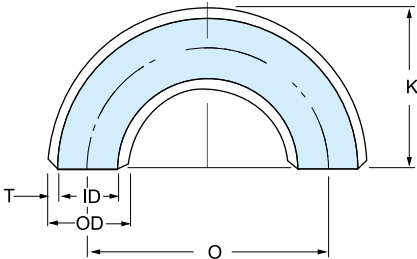
- For Bevel Details See Page 114
- Dimensional Tolerances See Page 119
- Asterisks(*) denote Advance Forging Standard.

Unit: inch

Sch 60		Sch 100		Sch 120		Sch 140		Nominal Pipe Size
T	I.D	T	I.D	T	I.D	T	I.D	
-	-	-	-	0.438	3.624	-	-	4
-	-	-	-	0.500	4.563	-	-	5
-	-	-	-	0.562	5.501	-	-	6
0.406	7.813	0.594	7.437	0.719	7.187	0.812	7.001	8
0.500	9.750	0.719	9.312	0.844	9.062	1.000	8.750	10
0.562	11.626	0.844	11.062	1.000	10.750	1.125	10.500	12
0.594	12.812	0.936	12.128	1.094	11.812	1.250	11.500	14
0.656	14.688	1.031	13.938	1.219	13.562	1.438	13.124	16
0.750	16.500	1.156	15.688	1.375	15.250	1.562	14.876	18
0.812	18.376	1.281	17.438	1.500	17.000	1.750	16.500	20
0.875	20.250	1.375	19.250	1.625	18.750	1.875	18.250	22
0.969	22.062	1.531	20.938	1.812	20.376	2.062	19.876	24
-	-	-	-	-	-	-	-	26
-	-	-	-	-	-	-	-	28
-	-	-	-	-	-	-	-	30
-	-	-	-	-	-	-	-	32
-	-	-	-	-	-	-	-	34
-	-	-	-	-	-	-	-	36

WROUGHT STEEL BUTT-WELDING FITTING

STD, Sch40, X-S, Sch80, Sch160, XX-S
Sch20, Sch30, Sch60, Sch100, Sch120, Sch140



180° Elbow

ASME B16.9

Nominal Pipe Size	Outside Diameter O.D	Long		Short		STD		Sch 40	
		Center to Center O	Back to Face K	Center to Center O	Back to Face K	T	I.D	T	I.D
1/2	0.840	3.00	1.88	-	-	0.109	0.622	0.109	0.622
3/4	1.050	3.00	2.00	-	-	0.113	0.824	0.113	0.824
1	1.315	3.00	2.19	2.00	1.62	0.133	1.049	0.133	1.049
1 1/4	1.660	3.75	2.75	2.50	2.06	0.140	1.380	0.140	1.380
1 1/2	1.900	4.50	3.25	3.00	2.44	0.145	1.610	0.145	1.610
2	2.375	6.00	4.19	4.00	3.19	0.154	2.067	0.154	2.067
2 1/2	2.875	7.50	5.19	5.00	3.94	0.203	2.469	0.203	2.469
3	3.500	9.00	6.25	6.00	4.75	0.216	3.068	0.216	3.068
3 1/2	4.000	10.50	7.25	7.00	5.50	0.226	3.548	0.226	3.548
4	4.500	12.00	8.25	8.00	6.25	0.237	4.026	0.237	4.026
5	5.563	15.00	10.31	10.00	7.75	0.258	5.047	0.258	5.047
6	6.625	18.00	12.31	12.00	9.31	0.280	6.065	0.280	6.065
8	8.625	24.00	16.31	16.00	12.31	0.322	7.981	0.322	7.981
10	10.750	30.00	20.38	20.00	15.38	0.365	10.020	0.365	10.020
12	12.750	36.00	24.38	24.00	18.38	0.375	12.000	0.406	11.938
14	14.000	42.00	28.00	28.00	21.00	0.375	13.250	0.438	13.124
16	16.000	48.00	32.00	32.00	24.00	0.375	15.250	0.500	15.000
18	18.000	54.00	36.00	36.00	27.00	0.375	17.250	0.562	16.876
20	20.000	60.00	40.00	40.00	30.00	0.375	19.250	0.594	18.812
22	22.000	66.00	44.00	44.00	33.00	0.375	21.250	*0.594	20.812
24	24.000	72.00	48.00	48.00	36.00	0.375	23.250	0.688	22.624

Nominal Pipe Size	Outside Diameter O.D	Long		Short		Sch 20		Sch 30	
		Center to Center O	Back to Face K	Center to Center O	Back to Face K	T	I.D	T	I.D
4	4.500	12.00	8.25	8.00	6.25	-	-	-	-
5	5.563	15.00	10.31	10.00	7.75	-	-	-	-
6	6.625	18.00	12.31	12.00	9.31	-	-	-	-
8	8.625	24.00	16.31	16.00	12.31	0.250	8.125	0.277	8.071
10	10.750	30.00	20.38	20.00	15.38	0.250	10.250	0.307	10.136
12	12.750	36.00	24.38	24.00	18.38	0.250	12.250	0.330	12.090
14	14.000	42.00	28.00	28.00	21.00	0.312	13.376	0.375	13.250
16	16.000	48.00	32.00	32.00	24.00	0.312	15.376	0.375	15.250
18	18.000	54.00	36.00	36.00	27.00	0.312	17.376	0.438	17.124
20	20.000	60.00	40.00	40.00	30.00	0.375	19.250	0.500	19.000
22	22.000	66.00	44.00	44.00	33.00	0.375	21.250	0.500	21.000
24	24.000	72.00	48.00	48.00	36.00	0.375	23.250	0.562	22.876

- For Bevel Details See Page 114
- Dimensional Tolerances See Page 119
- Asterisks(*) denote Advance Forging Standard.

Unit: inch

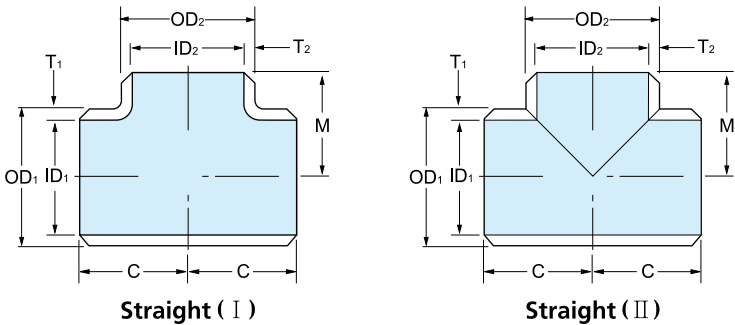
X-S		Sch 80		Sch 160		XX-S		Nominal Pipe Size
T	I.D	T	I.D	T	I.D	T	I.D	
0.147	0.546	0.147	0.546	0.188	0.464	0.294	0.252	1/2
0.154	0.742	0.154	0.742	0.218	0.612	0.308	0.434	3/4
0.179	0.957	0.179	0.957	0.250	0.815	0.358	0.599	1
0.191	1.278	0.191	1.278	0.250	1.160	0.382	0.896	1 1/4
0.200	1.500	0.200	1.500	0.281	1.338	0.400	1.100	1 1/2
0.218	1.939	0.218	1.939	0.344	1.687	0.436	1.503	2
0.276	2.323	0.276	2.323	0.375	2.125	0.552	1.771	2 1/2
0.300	2.900	0.300	2.900	0.438	2.624	0.600	2.300	3
0.318	3.364	0.318	3.364	-	-	-	-	3 1/2
0.337	3.826	0.337	3.826	0.531	3.438	0.674	3.152	4
0.375	4.813	0.375	4.813	0.625	4.313	0.750	4.063	5
0.432	5.761	0.432	5.761	0.719	5.187	0.864	4.897	6
0.500	7.625	0.500	7.625	0.906	6.813	0.875	6.875	8
0.500	9.750	0.594	9.562	1.125	8.500	1.000	8.750	10
0.500	11.750	0.688	11.374	1.312	10.126	1.000	10.750	12
0.500	13.000	0.750	12.500	1.406	11.188	-	-	14
0.500	15.000	0.844	14.312	1.594	12.812	-	-	16
0.500	17.000	0.938	16.124	1.781	14.438	-	-	18
0.500	19.000	1.031	17.938	1.969	16.062	-	-	20
0.500	21.000	1.125	19.750	2.125	17.750	-	-	22
0.500	23.000	1.219	21.562	2.344	19.312	-	-	24

Sch 60		Sch 100		Sch 120		Sch 140		Nominal Pipe Size
T	I.D	T	I.D	T	I.D	T	I.D	
-	-	-	-	0.438	3.624	-	-	4
-	-	-	-	0.500	4.563	-	-	5
-	-	-	-	0.562	5.501	-	-	6
0.406	7.813	0.594	7.437	0.719	7.187	0.812	7.001	8
0.500	9.750	0.719	9.312	0.844	9.062	1.000	8.750	10
0.562	11.626	0.844	11.062	1.000	10.750	1.125	10.500	12
0.594	12.812	0.936	12.128	1.094	11.812	1.250	11.500	14
0.656	14.688	1.031	13.938	1.219	13.562	1.438	13.124	16
0.750	16.500	1.156	15.688	1.375	15.250	1.562	14.876	18
0.812	18.376	1.281	17.438	1.500	17.000	1.750	16.500	20
0.875	20.250	1.375	19.250	1.625	18.750	1.875	18.250	22
0.969	22.062	1.531	20.938	1.812	20.376	2.062	19.876	24

WROUGHT STEEL BUTT-WELDING FITTING

Straight Tee

STD, Sch40, X-S, Sch80, Sch160, XX-S



ASME B16.9

Nominal Pipe Size	Outside Diameter O.D	Center to End		STD		Sch 40	
		Run C	Outlet M	T	I.D	T	I.D
1/2	0.840	1.00	1.00	0.109	0.622	0.109	0.622
3/4	1.050	1.12	1.12	0.113	0.824	0.113	0.824
1	1.315	1.50	1.50	0.133	1.049	0.133	1.049
1 1/4	1.660	1.88	1.88	0.140	1.380	0.140	1.380
1 1/2	1.900	2.25	2.25	0.145	1.610	0.145	1.610
2	2.375	2.50	2.50	0.154	2.067	0.154	2.067
2 1/2	2.875	3.00	3.00	0.203	2.469	0.203	2.469
3	3.500	3.38	3.38	0.216	3.068	0.216	3.068
3 1/2	4.000	3.75	3.75	0.226	3.548	0.226	3.548
4	4.500	4.12	4.12	0.237	4.026	0.237	4.026
5	5.563	4.88	4.88	0.258	5.047	0.258	5.047
6	6.625	5.62	5.62	0.280	6.065	0.280	6.065
8	8.625	7.00	7.00	0.322	7.981	0.322	7.981
10	10.750	8.50	8.50	0.365	10.020	0.365	10.020
12	12.750	10.00	10.00	0.375	12.000	0.406	11.938
14	14.000	11.00	11.00	0.375	13.250	0.438	13.124
16	16.000	12.00	12.00	0.375	15.250	0.500	15.000
18	18.000	13.50	13.50	0.375	17.250	0.562	16.876
20	20.000	15.00	15.00	0.375	19.250	0.594	18.812
22	22.000	16.50	16.50	0.375	21.250	*0.594	*20.812
24	24.000	17.00	17.00	0.375	23.250	0.688	22.624
26	26.000	19.50	19.50	0.375	25.250	*0.688	*24.624
28	28.000	20.50	20.50	0.375	27.250	*0.688	*26.624
30	30.000	22.00	22.00	0.375	29.250	*0.688	*28.624
32	32.000	23.50	23.50	0.375	31.250	0.688	30.624
34	34.000	25.00	25.00	0.375	33.250	0.688	32.624
36	36.000	26.50	26.50	0.375	35.250	0.750	34.500
38	38.000	28.00	28.00	0.375	37.250	-	-
40	40.000	29.50	29.50	0.375	39.250	-	-
42	42.000	30.00	28.00	0.375	41.250	-	-
44	44.000	32.00	30.00	0.375	43.250	-	-
46	46.000	33.50	31.50	0.375	45.250	-	-
48	48.000	35.00	33.00	0.375	47.250	-	-
*50	50.000	37.16	35.36	-	-	-	-
*52	52.000	38.16	36.36	-	-	-	-
*54	54.000	39.16	37.36	-	-	-	-
*56	56.000	40.16	38.36	-	-	-	-
*58	58.000	41.16	39.36	-	-	-	-
*60	60.000	42.16	40.36	-	-	-	-

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119
• Asterisks(*) denote Advance Forging Standard.

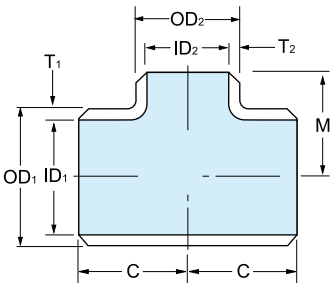
Unit: inch

X-S		Sch 80		Sch 160		XX-S		Nominal Pipe Size
T	I.D	T	I.D	T	I.D	T	I.D	
0.147	0.546	0.147	0.546	0.188	0.464	0.294	0.252	1/2
0.154	0.742	0.154	0.742	0.218	0.612	0.308	0.434	3/4
0.179	0.957	0.179	0.957	0.250	0.815	0.358	0.599	1
0.191	1.278	0.191	1.278	0.250	1.160	0.382	0.896	1 1/4
0.200	1.500	0.200	1.500	0.281	1.338	0.400	1.100	1 1/2
0.218	1.939	0.218	1.939	0.344	1.687	0.436	1.503	2
0.276	2.323	0.276	2.323	0.375	2.125	0.552	1.771	2 1/2
0.300	2.900	0.300	2.900	0.438	2.624	0.600	2.300	3
0.318	3.364	0.318	3.364	-	-	-	-	3 1/2
0.337	3.826	0.337	3.826	0.531	3.438	0.674	3.152	4
0.375	4.813	0.375	4.813	0.625	4.313	0.750	4.063	5
0.432	5.761	0.432	5.761	0.719	5.187	0.864	4.897	6
0.500	7.625	0.500	7.625	0.906	6.813	0.875	6.875	8
0.500	9.750	0.594	9.562	1.125	8.500	1.000	8.750	10
0.500	11.750	0.688	11.374	1.312	10.126	1.000	10.750	12
0.500	13.000	0.750	12.500	1.406	11.188	-	-	14
0.500	15.000	0.844	14.312	1.594	12.812	-	-	16
0.500	17.000	0.938	16.124	1.781	14.438	-	-	18
0.500	19.000	1.031	17.938	1.969	16.062	-	-	20
0.500	21.000	1.125	19.750	2.125	17.750	-	-	22
0.500	23.000	1.219	21.562	2.344	19.312	-	-	24
0.500	25.000	-	-	-	-	-	-	26
0.500	27.000	-	-	-	-	-	-	28
0.500	29.000	-	-	-	-	-	-	30
0.500	31.000	-	-	-	-	-	-	32
0.500	33.000	-	-	-	-	-	-	34
0.500	35.000	-	-	-	-	-	-	36
0.500	37.000	-	-	-	-	-	-	38
0.500	39.000	-	-	-	-	-	-	40
0.500	41.000	-	-	-	-	-	-	42
0.500	43.000	-	-	-	-	-	-	44
0.500	45.000	-	-	-	-	-	-	46
0.500	47.000	-	-	-	-	-	-	48
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

WROUGHT STEEL BUTT-WELDING FITTING

Reducing Tee

STD, Sch40, X-S, Sch80,
Sch160, XX-S



Reducing

ASME B16.9

Nominal Pipe Size	Outside Diameter		Center to End		STD		Sch 40	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂
1/2 × 1/2 × 3/8	0.840	0.675	1.00	1.00	0.109	0.091	0.109	0.091
1/2 × 1/2 × 1/4	0.840	0.540	1.00	1.00	0.109	0.088	0.109	0.088
3/4 × 3/4 × 1/2	1.050	0.840	1.12	1.12	0.113	0.109	0.113	0.109
3/4 × 3/4 × 3/8	1.050	0.675	1.12	1.12	0.113	0.091	0.113	0.091
1 × 1 × 3/4	1.315	1.050	1.50	1.50	0.133	0.113	0.133	0.113
1 × 1 × 1/2	1.315	0.840	1.50	1.50	0.133	0.109	0.133	0.109
1 1/4 × 1 1/4 × 1	1.660	1.315	1.88	1.88	0.140	0.133	0.140	0.133
1 1/4 × 1 1/4 × 3/4	1.660	1.050	1.88	1.88	0.140	0.113	0.140	0.113
1 1/4 × 1 1/4 × 1/2	1.660	0.840	1.88	1.88	0.140	0.109	0.140	0.109
1 1/2 × 1 1/2 × 1 1/4	1.900	1.660	2.25	2.25	0.145	0.140	0.145	0.140
1 1/2 × 1 1/2 × 1	1.900	1.315	2.25	2.25	0.145	0.133	0.145	0.133
1 1/2 × 1 1/2 × 3/4	1.900	1.050	2.25	2.25	0.145	0.113	0.145	0.113
1 1/2 × 1 1/2 × 1/2	1.900	0.840	2.25	2.25	0.145	0.109	0.145	0.109
2 × 2 × 1 1/2	2.375	1.900	2.50	2.38	0.154	0.145	0.154	0.145
2 × 2 × 1 1/4	2.375	1.660	2.50	2.25	0.154	0.140	0.154	0.140
2 × 2 × 1	2.375	1.315	2.50	2.00	0.154	0.133	0.154	0.133
2 × 2 × 3/4	2.375	1.050	2.50	1.75	0.154	0.113	0.154	0.113
2 1/2 × 2 1/2 × 2	2.875	2.375	3.00	2.75	0.203	0.154	0.203	0.154
2 1/2 × 2 1/2 × 1 1/2	2.875	1.900	3.00	2.62	0.203	0.145	0.203	0.145
2 1/2 × 2 1/2 × 1 1/4	2.875	1.660	3.00	2.50	0.203	0.140	0.203	0.140
2 1/2 × 2 1/2 × 1	2.875	1.315	3.00	2.25	0.203	0.133	0.203	0.133
3 × 3 × 2 1/2	3.500	2.875	3.38	3.25	0.216	0.203	0.216	0.203
3 × 3 × 2	3.500	2.375	3.38	3.00	0.216	0.154	0.216	0.154
3 × 3 × 1 1/2	3.500	1.900	3.38	2.88	0.216	0.145	0.216	0.145
3 × 3 × 1 1/4	3.500	1.660	3.38	2.75	0.216	0.140	0.216	0.140
3 1/2 × 3 1/2 × 3	4.000	3.500	3.75	3.62	0.226	0.216	0.226	0.216
3 1/2 × 3 1/2 × 2 1/2	4.000	2.875	3.75	3.50	0.226	0.203	0.226	0.203
3 1/2 × 3 1/2 × 2	4.000	2.375	3.75	3.25	0.226	0.154	0.226	0.154
3 1/2 × 3 1/2 × 1 1/2	4.000	1.900	3.75	3.12	0.226	0.145	0.226	0.145
4 × 4 × 3 1/2	4.500	4.000	4.12	4.00	0.237	0.226	0.237	0.226
4 × 4 × 3	4.500	3.500	4.12	3.88	0.237	0.216	0.237	0.216
4 × 4 × 2 1/2	4.500	2.875	4.12	3.75	0.237	0.203	0.237	0.203
4 × 4 × 2	4.500	2.375	4.12	3.50	0.237	0.154	0.237	0.154
4 × 4 × 1 1/2	4.500	1.900	4.12	3.38	0.237	0.145	0.237	0.145
5 × 5 × 4	5.563	4.500	4.88	4.62	0.258	0.237	0.258	0.237
5 × 5 × 3 1/2	5.563	4.000	4.88	4.50	0.258	0.226	0.258	0.226
5 × 5 × 3	5.563	3.500	4.88	4.38	0.258	0.216	0.258	0.216
5 × 5 × 2 1/2	5.563	2.875	4.88	4.25	0.258	0.203	0.258	0.203
5 × 5 × 2	5.563	2.375	4.88	4.12	0.258	0.154	0.258	0.154
6 × 6 × 5	6.625	5.563	5.62	5.38	0.280	0.258	0.280	0.258
6 × 6 × 4	6.625	4.500	5.62	5.12	0.280	0.237	0.280	0.237
6 × 6 × 3 1/2	6.625	4.000	5.62	5.00	0.280	0.226	0.280	0.226
6 × 6 × 3	6.625	3.500	5.62	4.88	0.280	0.216	0.280	0.216
6 × 6 × 2 1/2	6.625	2.875	5.62	4.75	0.280	0.203	0.280	0.203

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119

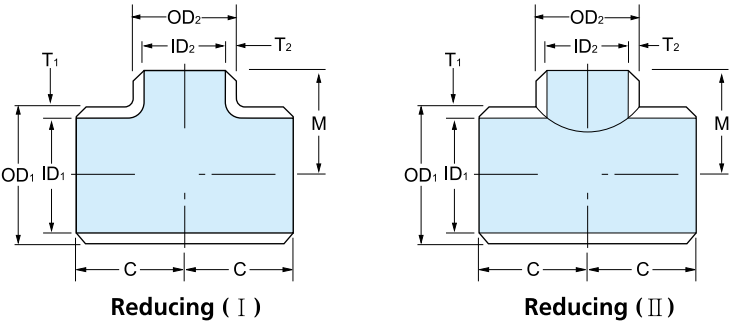
Unit: inch

X-S		Sch 80		Sch 160		XX-S		Nominal Pipe Size
T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
0.147	0.126	0.147	0.126	-	-	-	-	1/2 × 1/2 × 3/8
0.147	0.119	0.147	0.119	-	-	-	-	1/2 × 1/2 × 1/4
0.154	0.147	0.154	0.147	0.218	0.188	0.308	0.294	3/4 × 3/4 × 1/2
0.154	0.126	0.154	0.126	-	-	-	-	3/4 × 3/4 × 3/8
0.179	0.154	0.179	0.154	0.250	0.218	0.358	0.308	1 × 1 × 3/4
0.179	0.147	0.179	0.147	0.250	0.188	0.358	0.294	1 × 1 × 1/2
0.191	0.179	0.191	0.179	0.250	0.250	0.382	0.358	1 1/4 × 1 1/4 × 1
0.191	0.154	0.191	0.154	0.250	0.218	0.382	0.308	1 1/4 × 1 1/4 × 3/4
0.191	0.147	0.191	0.147	0.250	0.188	0.382	0.294	1 1/4 × 1 1/4 × 1/2
0.200	0.191	0.200	0.191	0.281	0.250	0.400	0.382	1 1/2 × 1 1/2 × 1 1/4
0.200	0.179	0.200	0.179	0.281	0.250	0.400	0.358	1 1/2 × 1 1/2 × 1
0.200	0.154	0.200	0.154	0.281	0.218	0.400	0.308	1 1/2 × 1 1/2 × 3/4
0.200	0.147	0.200	0.147	0.281	0.188	0.400	0.294	1 1/2 × 1 1/2 × 1/2
0.218	0.200	0.218	0.200	0.344	0.281	0.436	0.400	2 × 2 × 1 1/2
0.218	0.191	0.218	0.191	0.344	0.250	0.436	0.382	2 × 2 × 1 1/4
0.218	0.179	0.218	0.179	0.344	0.250	0.436	0.358	2 × 2 × 1
0.218	0.154	0.218	0.154	0.344	0.218	0.436	0.308	2 × 2 × 3/4
0.276	0.218	0.276	0.218	0.375	0.344	0.552	0.436	2 1/2 × 2 1/2 × 2
0.276	0.200	0.276	0.200	0.375	0.281	0.552	0.400	2 1/2 × 2 1/2 × 1 1/2
0.276	0.191	0.276	0.191	0.375	0.250	0.552	0.382	2 1/2 × 2 1/2 × 1 1/4
0.276	0.179	0.276	0.179	0.375	0.250	0.552	0.358	2 1/2 × 2 1/2 × 1
0.300	0.276	0.300	0.276	0.438	0.375	0.600	0.552	3 × 3 × 2 1/2
0.300	0.218	0.300	0.218	0.438	0.344	0.600	0.436	3 × 3 × 2
0.300	0.200	0.300	0.200	0.438	0.281	0.600	0.400	3 × 3 × 1 1/2
0.300	0.191	0.300	0.191	0.438	0.250	0.600	0.382	3 × 3 × 1 1/4
0.318	0.300	0.318	0.300	-	-	-	-	3 1/2 × 3 1/2 × 3
0.318	0.276	0.318	0.276	-	-	-	-	3 1/2 × 3 1/2 × 2 1/2
0.318	0.218	0.318	0.218	-	-	-	-	3 1/2 × 3 1/2 × 2
0.318	0.200	0.318	0.200	-	-	-	-	3 1/2 × 3 1/2 × 1 1/2
0.337	0.318	0.337	0.318	-	-	-	-	4 × 4 × 3 1/2
0.337	0.300	0.337	0.300	0.531	0.438	0.674	0.600	4 × 4 × 3
0.337	0.276	0.337	0.276	0.531	0.375	0.674	0.552	4 × 4 × 2 1/2
0.337	0.218	0.337	0.218	0.531	0.344	0.674	0.436	4 × 4 × 2
0.337	0.200	0.337	0.200	0.531	0.281	0.674	0.400	4 × 4 × 1 1/2
0.375	0.337	0.375	0.337	0.625	0.531	0.750	0.674	5 × 5 × 4
0.375	0.318	0.375	0.318	-	-	-	-	5 × 5 × 3 1/2
0.375	0.300	0.375	0.300	0.625	0.438	0.750	0.600	5 × 5 × 3
0.375	0.276	0.375	0.276	0.625	0.375	0.750	0.552	5 × 5 × 2 1/2
0.375	0.218	0.375	0.218	0.625	0.344	0.750	0.436	5 × 5 × 2
0.432	0.375	0.432	0.375	0.719	0.625	0.864	0.750	6 × 6 × 5
0.432	0.337	0.432	0.337	0.719	0.531	0.864	0.674	6 × 6 × 4
0.432	0.318	0.432	0.318	-	-	-	-	6 × 6 × 3 1/2
0.432	0.300	0.432	0.300	0.719	0.438	0.864	0.600	6 × 6 × 3
0.432	0.276	0.432	0.276	0.719	0.375	0.864	0.552	6 × 6 × 2 1/2

WROUGHT STEEL BUTT-WELDING FITTING

Reducing Tee

STD, Sch40, X-S, Sch80, Sch160, XX-S



ASME B16.9

Nominal Pipe Size	Outside Diameter		Center to End		STD		Sch 40	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂
8 × 8 × 6	8.625	6.625	7.00	6.62	0.322	0.280	0.322	0.280
8 × 8 × 5	8.625	5.563	7.00	6.38	0.322	0.258	0.322	0.258
8 × 8 × 4	8.625	4.500	7.00	6.12	0.322	0.237	0.322	0.237
8 × 8 × 3 1/2	8.625	4.000	7.00	6.00	0.322	0.226	0.322	0.226
10 × 10 × 8	10.750	8.625	8.50	8.00	0.365	0.322	0.365	0.322
10 × 10 × 6	10.750	6.625	8.50	7.62	0.365	0.280	0.365	0.280
10 × 10 × 5	10.750	5.563	8.50	7.50	0.365	0.258	0.365	0.258
10 × 10 × 4	10.750	4.500	8.50	7.25	0.365	0.237	0.365	0.237
12 × 12 × 10	12.750	10.750	10.00	9.50	0.375	0.365	0.406	0.365
12 × 12 × 8	12.750	8.625	10.00	9.00	0.375	0.322	0.406	0.322
12 × 12 × 6	12.750	6.625	10.00	8.62	0.375	0.280	0.406	0.280
12 × 12 × 5	12.750	5.563	10.00	8.50	0.375	0.258	0.406	0.258
14 × 14 × 12	14.000	12.750	11.00	10.62	0.375	0.375	0.438	0.406
14 × 14 × 10	14.000	10.750	11.00	10.12	0.375	0.365	0.438	0.365
14 × 14 × 8	14.000	8.625	11.00	9.75	0.375	0.322	0.438	0.322
14 × 14 × 6	14.000	6.625	11.00	9.38	0.375	0.280	0.438	0.280
16 × 16 × 14	16.000	14.000	12.00	12.00	0.375	0.375	0.500	0.438
16 × 16 × 12	16.000	12.750	12.00	11.62	0.375	0.375	0.500	0.406
16 × 16 × 10	16.000	10.750	12.00	11.12	0.375	0.365	0.500	0.365
16 × 16 × 8	16.000	8.625	12.00	10.75	0.375	0.322	0.500	0.322
16 × 16 × 6	16.000	6.625	12.00	10.38	0.375	0.280	0.500	0.280
18 × 18 × 16	18.000	16.000	13.50	13.00	0.375	0.375	0.562	0.500
18 × 18 × 14	18.000	14.000	13.50	13.00	0.375	0.375	0.562	0.438
18 × 18 × 12	18.000	12.750	13.50	12.62	0.375	0.375	0.562	0.406
18 × 18 × 10	18.000	10.750	13.50	12.12	0.375	0.365	0.562	0.365
18 × 18 × 8	18.000	8.625	13.50	11.75	0.375	0.322	0.562	0.322
20 × 20 × 18	20.000	18.000	15.00	14.50	0.375	0.375	0.594	0.562
20 × 20 × 16	20.000	16.000	15.00	14.00	0.375	0.375	0.594	0.500
20 × 20 × 14	20.000	14.000	15.00	14.00	0.375	0.375	0.594	0.438
20 × 20 × 12	20.000	12.750	15.00	13.62	0.375	0.375	0.594	0.406
20 × 20 × 10	20.000	10.750	15.00	13.12	0.375	0.365	0.594	0.365
20 × 20 × 8	20.000	8.625	15.00	12.75	0.375	0.322	0.594	0.322
22 × 22 × 20	22.000	20.000	16.50	16.00	0.375	0.375	*0.594	0.594
22 × 22 × 18	22.000	18.000	16.50	15.50	0.375	0.375	*0.594	0.562
22 × 22 × 16	22.000	16.000	16.50	15.00	0.375	0.375	*0.594	0.500
22 × 22 × 14	22.000	14.000	16.50	15.00	0.375	0.375	*0.594	0.438
22 × 22 × 12	22.000	12.750	16.50	14.62	0.375	0.375	*0.594	0.406
22 × 22 × 10	22.000	10.750	16.50	14.12	0.375	0.365	*0.594	0.365
24 × 24 × 22	24.000	22.000	17.00	17.00	0.375	0.375	-	-
24 × 24 × 20	24.000	20.000	17.00	17.00	0.375	0.375	0.688	0.594
24 × 24 × 18	24.000	18.000	17.00	16.50	0.375	0.375	0.688	0.562
24 × 24 × 16	24.000	16.000	17.00	16.00	0.375	0.375	0.688	0.500
24 × 24 × 14	24.000	14.000	17.00	16.00	0.375	0.375	0.688	0.438
24 × 24 × 12	24.000	12.750	17.00	15.62	0.375	0.375	0.688	0.406
24 × 24 × 10	24.000	10.750	17.00	15.12	0.375	0.365	0.688	0.365

• For Bevel Details See Page 114 • Dimensional Tolerances See Page 119 • Asterisks(*) denote Advance Forging Standard.

Unit: inch

X-S		Sch 80		Sch 160		XX-S		Nominal Pipe Size
T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
0.500	0.432	0.500	0.432	0.906	0.719	0.875	0.864	8 × 8 × 6
0.500	0.375	0.500	0.375	0.906	0.625	0.875	0.750	8 × 8 × 5
0.500	0.318	0.500	0.318	0.906	0.531	0.875	0.674	8 × 8 × 4
0.500	0.300	0.500	0.300	-	-	-	-	8 × 8 × 3 1/2
0.500	0.500	0.594	0.500	1.125	0.906	1.000	0.875	10 × 10 × 8
0.500	0.432	0.594	0.432	1.125	0.719	1.000	0.864	10 × 10 × 6
0.500	0.375	0.594	0.375	1.125	0.625	1.000	0.750	10 × 10 × 5
0.500	0.318	0.594	0.318	1.125	0.531	1.000	0.674	10 × 10 × 4
0.500	0.500	0.688	0.594	1.312	1.125	1.000	1.000	12 × 12 × 10
0.500	0.500	0.688	0.500	1.312	0.906	1.000	0.875	12 × 12 × 8
0.500	0.432	0.688	0.432	1.312	0.719	1.000	0.864	12 × 12 × 6
0.500	0.375	0.688	0.375	1.312	0.625	1.000	0.750	12 × 12 × 5
0.500	0.500	0.750	0.688	1.406	1.312	-	-	14 × 14 × 12
0.500	0.500	0.750	0.594	1.406	1.125	-	-	14 × 14 × 10
0.500	0.500	0.750	0.500	1.406	0.906	-	-	14 × 14 × 8
0.500	0.432	0.750	0.432	1.406	0.719	-	-	14 × 14 × 6
0.500	0.500	0.844	0.750	1.594	1.406	-	-	16 × 16 × 14
0.500	0.500	0.844	0.688	1.594	1.312	-	-	16 × 16 × 12
0.500	0.500	0.844	0.594	1.594	1.125	-	-	16 × 16 × 10
0.500	0.500	0.844	0.500	1.594	0.906	-	-	16 × 16 × 8
0.500	0.432	0.844	0.432	1.594	0.719	-	-	16 × 16 × 6
0.500	0.500	0.938	0.844	1.781	1.594	-	-	18 × 18 × 16
0.500	0.500	0.938	0.750	1.781	1.406	-	-	18 × 18 × 14
0.500	0.500	0.938	0.688	1.781	1.312	-	-	18 × 18 × 12
0.500	0.500	0.938	0.594	1.781	1.125	-	-	18 × 18 × 10
0.500	0.500	0.938	0.500	1.781	0.906	-	-	18 × 18 × 8
0.500	0.500	1.031	0.938	1.969	1.781	-	-	20 × 20 × 18
0.500	0.500	1.031	0.844	1.969	1.594	-	-	20 × 20 × 16
0.500	0.500	1.031	0.750	1.969	1.406	-	-	20 × 20 × 14
0.500	0.500	1.031	0.688	1.969	1.312	-	-	20 × 20 × 12
0.500	0.500	1.031	0.594	1.969	1.125	-	-	20 × 20 × 10
0.500	0.500	1.031	0.500	1.969	0.906	-	-	20 × 20 × 8
0.500	0.500	1.125	1.031	2.125	1.969	-	-	22 × 22 × 20
0.500	0.500	1.125	0.938	2.125	1.781	-	-	22 × 22 × 18
0.500	0.500	1.125	0.844	2.125	1.594	-	-	22 × 22 × 16
0.500	0.500	1.125	0.750	2.125	1.406	-	-	22 × 22 × 14
0.500	0.500	1.125	0.688	2.125	1.312	-	-	22 × 22 × 12
0.500	0.500	1.125	0.594	2.125	1.125	-	-	22 × 22 × 10
0.500	0.500	1.219	1.125	2.344	2.125	-	-	24 × 24 × 22
0.500	0.500	1.219	1.031	2.344	1.969	-	-	24 × 24 × 20
0.500	0.500	1.219	0.938	2.344	1.781	-	-	24 × 24 × 18
0.500	0.500	1.219	0.844	2.344	1.594	-	-	24 × 24 × 16
0.500	0.500	1.219	0.750	2.344	1.406	-	-	24 × 24 × 14
0.500	0.500	1.219	0.688	2.344	1.312	-	-	24 × 24 × 12
0.500	0.500	1.219	0.594	2.344	1.125	-	-	24 × 24 × 10

WROUGHT STEEL BUTT-WELDING FITTING

Reducing Tee

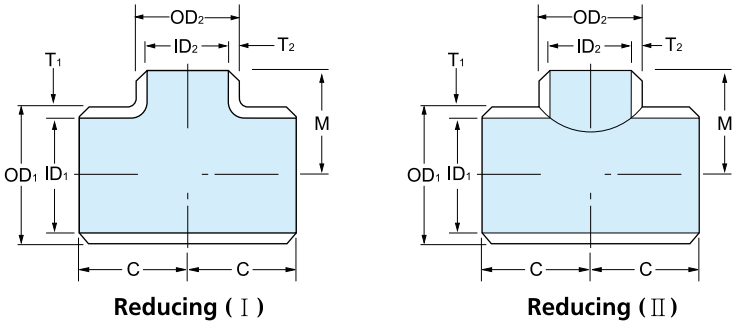
STD, Sch40, X-S

ASME B16.9

Unit: inch

Nominal Pipe Size	Outside Diameter		Center to End		STD		Sch 40		X-S	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
26 × 26 × 24	26.000	24.000	19.50	19.00	0.375	0.375	*0.688	0.688	0.500	0.500
26 × 26 × 22	26.000	22.000	19.50	18.50	0.375	0.375	*0.688	*0.594	0.500	0.500
26 × 26 × 20	26.000	20.000	19.50	18.00	0.375	0.375	*0.688	0.594	0.500	0.500
26 × 26 × 18	26.000	18.000	19.50	17.50	0.375	0.375	*0.688	0.562	0.500	0.500
26 × 26 × 16	26.000	16.000	19.50	17.00	0.375	0.375	*0.688	0.500	0.500	0.500
26 × 26 × 14	26.000	14.000	19.50	17.00	0.375	0.375	*0.688	0.438	0.500	0.500
26 × 26 × 12	26.000	12.750	19.50	16.62	0.375	0.375	*0.688	0.406	0.500	0.500
28 × 28 × 26	28.000	26.000	20.50	20.50	0.375	0.375	*0.688	*0.688	0.500	0.500
28 × 28 × 24	28.000	24.000	20.50	20.00	0.375	0.375	*0.688	0.688	0.500	0.500
28 × 28 × 22	28.000	22.000	20.50	19.50	0.375	0.375	*0.688	*0.594	0.500	0.500
28 × 28 × 20	28.000	20.000	20.50	19.00	0.375	0.375	*0.688	0.594	0.500	0.500
28 × 28 × 18	28.000	18.000	20.50	18.50	0.375	0.375	*0.688	0.562	0.500	0.500
28 × 28 × 16	28.000	16.000	20.50	18.00	0.375	0.375	*0.688	0.500	0.500	0.500
28 × 28 × 14	28.000	14.000	20.50	18.00	0.375	0.375	*0.688	0.438	0.500	0.500
28 × 28 × 12	28.000	12.750	20.50	17.62	0.375	0.375	*0.688	0.406	0.500	0.500
30 × 30 × 28	30.000	28.000	22.00	21.50	0.375	0.375	*0.688	*0.688	0.500	0.500
30 × 30 × 26	30.000	26.000	22.00	21.50	0.375	0.375	*0.688	*0.688	0.500	0.500
30 × 30 × 24	30.000	24.000	22.00	21.00	0.375	0.375	*0.688	0.688	0.500	0.500
30 × 30 × 22	30.000	22.000	22.00	20.50	0.375	0.375	*0.688	*0.594	0.500	0.500
30 × 30 × 20	30.000	20.000	22.00	20.00	0.375	0.375	*0.688	*0.594	0.500	0.500
30 × 30 × 18	30.000	18.000	22.00	19.50	0.375	0.375	*0.688	0.562	0.500	0.500
30 × 30 × 16	30.000	16.000	22.00	19.00	0.375	0.375	*0.688	0.500	0.500	0.500
30 × 30 × 14	30.000	14.000	22.00	19.00	0.375	0.375	*0.688	0.438	0.500	0.500
30 × 30 × 12	30.000	12.750	22.00	18.62	0.375	0.375	*0.688	0.406	0.500	0.500
30 × 30 × 10	30.000	10.750	22.00	18.12	0.375	0.375	*0.688	0.365	0.500	0.500
32 × 32 × 30	32.000	30.000	23.50	23.00	0.375	0.375	0.688	*0.688	0.500	0.500
32 × 32 × 28	32.000	28.000	23.50	22.50	0.375	0.375	0.688	*0.688	0.500	0.500
32 × 32 × 26	32.000	26.000	23.50	22.50	0.375	0.375	0.688	*0.688	0.500	0.500
32 × 32 × 24	32.000	24.000	23.50	22.00	0.375	0.375	0.688	0.688	0.500	0.500
32 × 32 × 22	32.000	22.000	23.50	21.50	0.375	0.375	0.688	*0.594	0.500	0.500
32 × 32 × 20	32.000	20.000	23.50	21.00	0.375	0.375	0.688	0.594	0.500	0.500
32 × 32 × 18	32.000	18.000	23.50	20.50	0.375	0.375	0.688	0.562	0.500	0.500
32 × 32 × 16	32.000	16.000	23.50	20.00	0.375	0.375	0.688	0.500	0.500	0.500
32 × 32 × 14	32.000	14.000	23.50	20.00	0.375	0.375	0.688	0.438	0.500	0.500

- For Bevel Details See Page 114
- Dimensional Tolerances See Page 119
- Asterisks(*) denote Advance Forging Standard.



ASME B16.9

Unit: inch

Nominal Pipe Size	Outside Diameter		Center to End		STD		Sch 40		X-S	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
34 × 34 × 32	34.000	32.000	25.00	24.50	0.375	0.375	0.688	0.688	0.500	0.500
34 × 34 × 30	34.000	30.000	25.00	24.00	0.375	0.375	0.688	*0.688	0.500	0.500
34 × 34 × 28	34.000	28.000	25.00	23.50	0.375	0.375	0.688	*0.688	0.500	0.500
34 × 34 × 26	34.000	26.000	25.00	23.50	0.375	0.375	0.688	*0.688	0.500	0.500
34 × 34 × 24	34.000	24.000	25.00	23.00	0.375	0.375	0.688	0.688	0.500	0.500
34 × 34 × 22	34.000	22.000	25.00	22.50	0.375	0.375	0.688	*0.594	0.500	0.500
34 × 34 × 20	34.000	20.000	25.00	22.00	0.375	0.375	0.688	0.594	0.500	0.500
34 × 34 × 18	34.000	18.000	25.00	21.50	0.375	0.375	0.688	0.562	0.500	0.500
34 × 34 × 16	34.000	16.000	25.00	21.00	0.375	0.375	0.688	0.500	0.500	0.500
36 × 36 × 34	36.000	34.000	26.50	26.00	0.375	0.375	0.750	0.688	0.500	0.500
36 × 36 × 32	36.000	32.000	26.50	25.50	0.375	0.375	0.750	0.688	0.500	0.500
36 × 36 × 30	36.000	30.000	26.50	25.00	0.375	0.375	0.750	*0.688	0.500	0.500
36 × 36 × 28	36.000	28.000	26.50	24.50	0.375	0.375	0.750	*0.688	0.500	0.500
36 × 36 × 26	36.000	26.000	26.50	24.50	0.375	0.375	0.750	*0.688	0.500	0.500
36 × 36 × 24	36.000	24.000	26.50	24.00	0.375	0.375	0.750	0.688	0.500	0.500
36 × 36 × 22	36.000	22.000	26.50	23.50	0.375	0.375	0.750	*0.594	0.500	0.500
36 × 36 × 20	36.000	20.000	26.50	23.00	0.375	0.375	0.750	0.594	0.500	0.500
36 × 36 × 18	36.000	18.000	26.50	22.50	0.375	0.375	0.750	0.562	0.500	0.500
36 × 36 × 16	36.000	16.000	26.50	22.00	0.375	0.375	0.750	0.500	0.500	0.500
38 × 38 × 36	38.000	36.000	28.00	28.00	0.375	0.375	-	-	0.500	0.500
38 × 38 × 34	38.000	34.000	28.00	27.50	0.375	0.375	-	-	0.500	0.500
38 × 38 × 32	38.000	32.000	28.00	27.00	0.375	0.375	-	-	0.500	0.500
38 × 38 × 30	38.000	30.000	28.00	26.50	0.375	0.375	-	-	0.500	0.500
38 × 38 × 28	38.000	28.000	28.00	25.50	0.375	0.375	-	-	0.500	0.500
38 × 38 × 26	38.000	26.000	28.00	25.50	0.375	0.375	-	-	0.500	0.500
38 × 38 × 24	38.000	24.000	28.00	25.00	0.375	0.375	-	-	0.500	0.500
38 × 38 × 22	38.000	22.000	28.00	24.50	0.375	0.375	-	-	0.500	0.500
38 × 38 × 20	38.000	20.000	28.00	24.00	0.375	0.375	-	-	0.500	0.500
38 × 38 × 18	38.000	18.000	28.00	23.50	0.375	0.375	-	-	0.500	0.500

- For Bevel Details See Page 114
- Dimensional Tolerances See Page 119
- Asterisks(*) denote Advance Forging Standard.

WROUGHT STEEL BUTT-WELDING FITTING

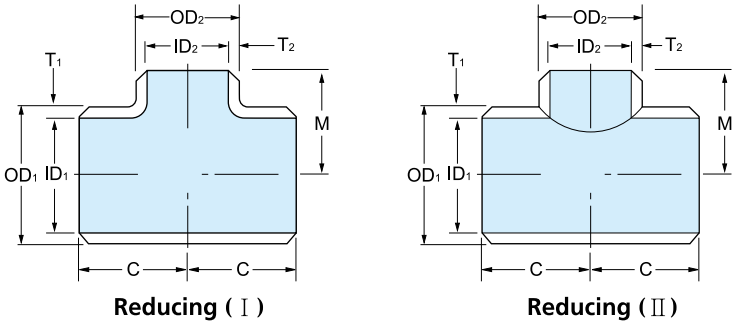
Reducing Tee

STD, X-S

ASME B16.9Unit: inch

Nominal Pipe Size	Outside Diameter		Center to End		STD		X-S	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂
40 × 40 × 38	40.000	38.000	29.50	29.50	0.375	0.375	0.500	0.500
40 × 40 × 36	40.000	36.000	29.50	29.00	0.375	0.375	0.500	0.500
40 × 40 × 34	40.000	34.000	29.50	28.50	0.375	0.375	0.500	0.500
40 × 40 × 32	40.000	32.000	29.50	28.00	0.375	0.375	0.500	0.500
40 × 40 × 30	40.000	30.000	29.50	27.50	0.375	0.375	0.500	0.500
40 × 40 × 28	40.000	28.000	29.50	26.50	0.375	0.375	0.500	0.500
40 × 40 × 26	40.000	26.000	29.50	26.50	0.375	0.375	0.500	0.500
40 × 40 × 24	40.000	24.000	29.50	26.00	0.375	0.375	0.500	0.500
40 × 40 × 22	40.000	22.000	29.50	25.50	0.375	0.375	0.500	0.500
40 × 40 × 20	40.000	20.000	29.50	25.00	0.375	0.375	0.500	0.500
40 × 40 × 18	40.000	18.000	29.50	24.50	0.375	0.375	0.500	0.500
42 × 42 × 40	42.000	40.000	30.00	28.00	0.375	0.375	0.500	0.500
42 × 42 × 38	42.000	38.000	30.00	28.00	0.375	0.375	0.500	0.500
42 × 42 × 36	42.000	36.000	30.00	28.00	0.375	0.375	0.500	0.500
42 × 42 × 34	42.000	34.000	30.00	28.00	0.375	0.375	0.500	0.500
42 × 42 × 32	42.000	32.000	30.00	28.00	0.375	0.375	0.500	0.500
42 × 42 × 30	42.000	30.000	30.00	28.00	0.375	0.375	0.500	0.500
42 × 42 × 28	42.000	28.000	30.00	27.50	0.375	0.375	0.500	0.500
42 × 42 × 26	42.000	26.000	30.00	27.50	0.375	0.375	0.500	0.500
42 × 42 × 24	42.000	24.000	30.00	26.00	0.375	0.375	0.500	0.500
42 × 42 × 22	42.000	22.000	30.00	26.00	0.375	0.375	0.500	0.500
42 × 42 × 20	42.000	20.000	30.00	26.00	0.375	0.375	0.500	0.500
42 × 42 × 18	42.000	18.000	30.00	25.50	0.375	0.375	0.500	0.500
42 × 42 × 16	42.000	16.000	30.00	25.00	0.375	0.375	0.500	0.500
44 × 44 × 42	44.000	42.000	32.00	30.00	0.375	0.375	0.500	0.500
44 × 44 × 40	44.000	40.000	32.00	29.50	0.375	0.375	0.500	0.500
44 × 44 × 38	44.000	38.000	32.00	29.00	0.375	0.375	0.500	0.500
44 × 44 × 36	44.000	36.000	32.00	28.50	0.375	0.375	0.500	0.500
44 × 44 × 34	44.000	34.000	32.00	28.50	0.375	0.375	0.500	0.500
44 × 44 × 32	44.000	32.000	32.00	28.00	0.375	0.375	0.500	0.500
44 × 44 × 30	44.000	30.000	32.00	28.00	0.375	0.375	0.500	0.500
44 × 44 × 28	44.000	28.000	32.00	27.50	0.375	0.375	0.500	0.500
44 × 44 × 26	44.000	26.000	32.00	27.50	0.375	0.375	0.500	0.500
44 × 44 × 24	44.000	24.000	32.00	27.50	0.375	0.375	0.500	0.500
44 × 44 × 22	44.000	22.000	32.00	27.00	0.375	0.375	0.500	0.500
44 × 44 × 20	44.000	20.000	32.00	27.00	0.375	0.375	0.500	0.500

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119



ASME B16.9Unit: inch

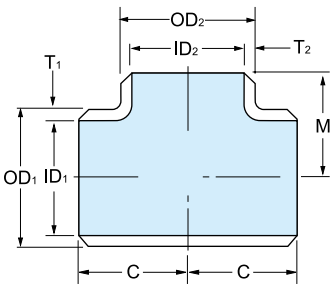
Nominal Pipe Size	Outside Diameter		Center to End		STD		X-S	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂
46 × 46 × 44	46.000	44.000	33.50	31.50	0.375	0.375	0.500	0.500
46 × 46 × 42	46.000	42.000	33.50	31.00	0.375	0.375	0.500	0.500
46 × 46 × 40	46.000	40.000	33.50	30.50	0.375	0.375	0.500	0.500
46 × 46 × 38	46.000	38.000	33.50	30.00	0.375	0.375	0.500	0.500
46 × 46 × 36	46.000	36.000	33.50	30.00	0.375	0.375	0.500	0.500
46 × 46 × 34	46.000	34.000	33.50	29.50	0.375	0.375	0.500	0.500
46 × 46 × 32	46.000	32.000	33.50	29.50	0.375	0.375	0.500	0.500
46 × 46 × 30	46.000	30.000	33.50	29.00	0.375	0.375	0.500	0.500
46 × 46 × 28	46.000	28.000	33.50	29.00	0.375	0.375	0.500	0.500
46 × 46 × 26	46.000	26.000	33.50	29.00	0.375	0.375	0.500	0.500
46 × 46 × 24	46.000	24.000	33.50	28.50	0.375	0.375	0.500	0.500
46 × 46 × 22	46.000	22.000	33.50	28.50	0.375	0.375	0.500	0.500
48 × 48 × 46	48.000	46.000	35.00	33.00	0.375	0.375	0.500	0.500
48 × 48 × 44	48.000	44.000	35.00	33.00	0.375	0.375	0.500	0.500
48 × 48 × 42	48.000	42.000	35.00	32.00	0.375	0.375	0.500	0.500
48 × 48 × 40	48.000	40.000	35.00	32.00	0.375	0.375	0.500	0.500
48 × 48 × 38	48.000	38.000	35.00	32.00	0.375	0.375	0.500	0.500
48 × 48 × 36	48.000	36.000	35.00	31.00	0.375	0.375	0.500	0.500
48 × 48 × 34	48.000	34.000	35.00	31.00	0.375	0.375	0.500	0.500
48 × 48 × 32	48.000	32.000	35.00	31.00	0.375	0.375	0.500	0.500
48 × 48 × 30	48.000	30.000	35.00	30.00	0.375	0.375	0.500	0.500
48 × 48 × 28	48.000	28.000	35.00	30.00	0.375	0.375	0.500	0.500
48 × 48 × 26	48.000	26.000	35.00	30.00	0.375	0.375	0.500	0.500
48 × 48 × 24	48.000	24.000	35.00	29.00	0.375	0.375	0.500	0.500
48 × 48 × 22	48.000	22.000	35.00	29.00	0.375	0.375	0.500	0.500

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119

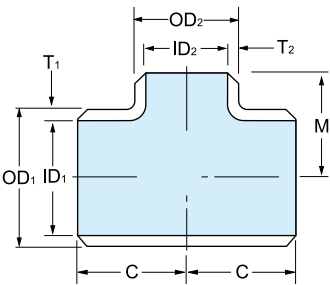
WROUGHT STEEL BUTT-WELDING FITTING

Tee

Sch20, Sch30, Sch60, Sch100, Sch120, Sch140



Straight



Reducing

ASME B16.9

Nominal Pipe Size	Outside Diameter		Center to End		Sch 20		Sch 30	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂
4 × 4 × 4	4.500	4.500	4.12	4.12	-	-	-	-
5 × 5 × 5	5.563	5.563	4.88	4.88	-	-	-	-
5 × 5 × 4	5.563	4.500	4.88	4.62	-	-	-	-
6 × 6 × 6	6.625	6.625	5.62	5.62	-	-	-	-
6 × 6 × 5	6.625	5.563	5.62	5.38	-	-	-	-
6 × 6 × 4	6.625	4.500	5.62	5.12	-	-	-	-
8 × 8 × 8	8.625	8.625	7.00	7.00	0.250	0.250	0.277	0.277
8 × 8 × 6	8.625	6.625	7.00	6.62	-	-	-	-
8 × 8 × 5	8.625	5.563	7.00	6.38	-	-	-	-
8 × 8 × 4	8.625	4.500	7.00	6.12	-	-	-	-
10 × 10 × 10	10.750	10.750	8.50	8.50	0.250	0.250	0.307	0.307
10 × 10 × 8	10.750	8.625	8.50	8.00	0.250	0.250	0.307	0.277
10 × 10 × 6	10.750	6.625	8.50	7.62	-	-	-	-
10 × 10 × 5	10.750	5.563	8.50	7.50	-	-	-	-
10 × 10 × 4	10.750	4.500	8.50	7.25	-	-	-	-
12 × 12 × 12	12.750	12.750	10.00	10.00	0.250	0.250	0.330	0.330
12 × 12 × 10	12.750	10.750	10.00	9.50	0.250	0.250	0.330	0.307
12 × 12 × 8	12.750	8.625	10.00	9.00	0.250	0.250	0.330	0.277
12 × 12 × 6	12.750	6.625	10.00	8.62	-	-	-	-
12 × 12 × 5	12.750	5.563	10.00	8.50	-	-	-	-
14 × 14 × 14	14.000	14.000	11.00	11.00	0.312	0.312	0.375	0.375
14 × 14 × 12	14.000	12.750	11.00	10.62	0.312	0.250	0.375	0.330
14 × 14 × 10	14.000	10.750	11.00	10.12	0.312	0.250	0.375	0.307
14 × 14 × 8	14.000	8.625	11.00	9.75	0.312	0.250	0.375	0.277
14 × 14 × 6	14.000	6.625	11.00	9.38	-	-	-	-
16 × 16 × 16	16.000	16.000	12.00	12.00	0.312	0.312	0.375	0.375
16 × 16 × 14	16.000	14.000	12.00	12.00	0.312	0.312	0.375	0.375
16 × 16 × 12	16.000	12.750	12.00	11.62	0.312	0.250	0.375	0.330
16 × 16 × 10	16.000	10.750	12.00	11.12	0.312	0.250	0.375	0.307
16 × 16 × 8	16.000	8.625	12.00	10.75	0.312	0.250	0.375	0.277
16 × 16 × 6	16.000	6.625	12.00	10.38	-	-	-	-

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119

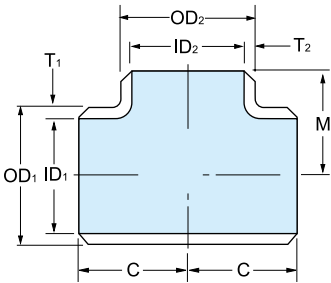
Unit: inch

Sch 60		Sch 100		Sch 120		Sch 140		Nominal Pipe Size
T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
-	-	-	-	0.438	0.438	-	-	4 × 4 × 4
-	-	-	-	0.500	0.500	-	-	5 × 5 × 5
-	-	-	-	0.500	0.438	-	-	5 × 5 × 4
-	-	-	-	0.562	0.562	-	-	6 × 6 × 6
-	-	-	-	0.562	0.500	-	-	6 × 6 × 5
-	-	-	-	0.562	0.438	-	-	6 × 6 × 4
0.406	0.406	0.594	0.594	0.719	0.719	0.812	0.812	8 × 8 × 8
-	-	-	-	0.719	0.562	-	-	8 × 8 × 6
-	-	-	-	0.719	0.500	-	-	8 × 8 × 5
-	-	-	-	0.719	0.438	-	-	8 × 8 × 4
0.500	0.500	0.719	0.719	0.844	0.844	1.000	1.000	10 × 10 × 10
0.500	0.406	0.719	0.594	0.844	0.719	1.000	0.812	10 × 10 × 8
-	-	-	-	0.844	0.562	-	-	10 × 10 × 6
-	-	-	-	0.844	0.500	-	-	10 × 10 × 5
-	-	-	-	0.844	0.438	-	-	10 × 10 × 4
0.562	0.562	0.844	0.844	1.000	1.000	1.125	1.125	12 × 12 × 12
0.562	0.500	0.844	0.719	1.000	0.844	1.125	1.000	12 × 12 × 10
0.562	0.406	0.844	0.594	1.000	0.719	1.125	0.812	12 × 12 × 8
-	-	-	-	1.000	0.562	-	-	12 × 12 × 6
-	-	-	-	1.000	0.500	-	-	12 × 12 × 5
0.594	0.594	0.936	0.936	1.094	1.094	1.250	1.250	14 × 14 × 14
0.594	0.562	0.938	0.844	1.094	1.000	1.250	1.125	14 × 14 × 12
0.594	0.500	0.938	0.719	1.094	0.844	1.250	1.000	14 × 14 × 10
0.594	0.406	0.938	0.594	1.094	0.719	1.250	0.812	14 × 14 × 8
-	-	-	-	1.094	0.562	-	-	14 × 14 × 6
0.656	0.656	1.031	1.031	1.219	1.219	1.438	1.438	16 × 16 × 16
0.656	0.594	1.031	0.938	1.219	1.094	1.438	1.250	16 × 16 × 14
0.656	0.562	1.031	0.844	1.219	1.000	1.438	1.125	16 × 16 × 12
0.656	0.500	1.031	0.719	1.219	0.844	1.438	1.000	16 × 16 × 10
0.656	0.406	1.031	0.594	1.219	0.719	1.438	0.812	16 × 16 × 8
-	-	-	-	1.219	0.562	-	-	16 × 16 × 6

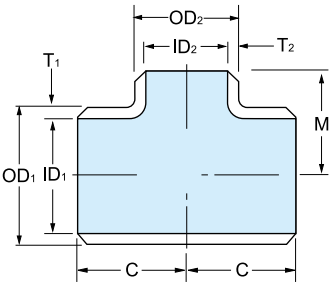
WROUGHT STEEL BUTT-WELDING FITTING

Tee

Sch20, Sch30, Sch60,
Sch100, Sch120, Sch140



Straight



Reducing

ASME B16.9

Nominal Pipe Size	Outside Diameter		Center to End		Sch 20		Sch 30	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂
18 × 18 × 18	18.000	18.000	13.50	13.50	0.312	0.312	0.438	0.438
18 × 18 × 16	18.000	16.000	13.50	13.00	0.312	0.312	0.438	0.375
18 × 18 × 14	18.000	14.000	13.50	13.00	0.312	0.312	0.438	0.375
18 × 18 × 12	18.000	12.750	13.50	12.62	0.312	0.250	0.438	0.330
18 × 18 × 10	18.000	10.750	13.50	12.12	0.312	0.250	0.438	0.307
18 × 18 × 8	18.000	8.625	13.50	11.75	0.312	0.250	0.438	0.277
20 × 20 × 20	20.000	20.000	15.00	15.00	0.375	0.375	0.500	0.500
20 × 20 × 18	20.000	18.000	15.00	14.50	0.375	0.312	0.500	0.438
20 × 20 × 16	20.000	16.000	15.00	14.00	0.375	0.312	0.500	0.375
20 × 20 × 14	20.000	14.000	15.00	14.00	0.375	0.312	0.500	0.375
20 × 20 × 12	20.000	12.750	15.00	13.62	0.375	0.250	0.500	0.330
20 × 20 × 10	20.000	10.750	15.00	13.12	0.375	0.250	0.500	0.307
20 × 20 × 8	20.000	8.625	15.00	12.75	0.375	0.250	0.500	0.277
22 × 22 × 22	22.000	22.000	16.50	16.50	0.375	0.375	0.500	0.500
22 × 22 × 20	22.000	20.000	16.50	16.00	0.375	0.375	0.500	0.500
22 × 22 × 18	22.000	18.000	16.50	15.50	0.375	0.312	0.500	0.438
22 × 22 × 16	22.000	16.000	16.50	15.00	0.375	0.312	0.500	0.375
22 × 22 × 14	22.000	14.000	16.50	15.00	0.375	0.312	0.500	0.375
22 × 22 × 12	22.000	12.750	16.50	14.62	0.375	0.250	0.500	0.330
22 × 22 × 10	22.000	10.750	16.50	14.12	0.375	0.250	0.500	0.307
24 × 24 × 24	24.000	24.000	17.00	17.00	0.375	0.375	0.562	0.562
24 × 24 × 22	24.000	22.000	17.00	17.00	0.375	0.375	0.562	0.500
24 × 24 × 20	24.000	20.000	17.00	17.00	0.375	0.375	0.562	0.500
24 × 24 × 18	24.000	18.000	17.00	16.50	0.375	0.312	0.562	0.438
24 × 24 × 16	24.000	16.000	17.00	16.00	0.375	0.312	0.562	0.375
24 × 24 × 14	24.000	14.000	17.00	16.00	0.375	0.312	0.562	0.375
24 × 24 × 12	24.000	12.750	17.00	15.62	0.375	0.250	0.562	0.330
24 × 24 × 10	24.000	10.750	17.00	15.12	0.375	0.250	0.562	0.307
26 × 26 × 26	26.000	26.000	19.50	19.50	0.500	0.500	-	-
26 × 26 × 24	26.000	24.000	19.50	19.00	0.500	0.375	-	-
26 × 26 × 22	26.000	22.000	19.50	18.50	0.500	0.375	-	-
26 × 26 × 20	26.000	20.000	19.50	18.00	0.500	0.375	-	-
26 × 26 × 18	26.000	18.000	19.50	17.50	0.500	0.312	-	-
26 × 26 × 16	26.000	16.000	19.50	17.00	0.500	0.312	-	-
26 × 26 × 14	26.000	14.000	19.50	17.00	0.500	0.312	-	-
26 × 26 × 12	26.000	12.750	19.50	16.62	0.500	0.250	-	-

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119

Unit: inch

Sch 60		Sch 100		Sch 120		Sch 140		Nominal Pipe Size
T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
0.750	0.750	1.156	1.156	1.375	1.375	1.562	1.562	18 × 18 × 18
0.750	0.656	1.156	1.031	1.375	1.219	1.562	1.438	18 × 18 × 16
0.750	0.594	1.156	0.938	1.375	1.094	1.562	1.250	18 × 18 × 14
0.750	0.562	1.156	0.844	1.375	1.000	1.562	1.125	18 × 18 × 12
0.750	0.500	1.156	0.719	1.375	0.844	1.562	1.000	18 × 18 × 10
0.750	0.406	1.156	0.594	1.375	0.719	1.562	0.812	18 × 18 × 8
0.812	0.812	1.281	1.281	1.500	1.500	1.750	1.750	20 × 20 × 20
0.812	0.750	1.281	1.156	1.500	1.375	1.750	1.562	20 × 20 × 18
0.812	0.656	1.281	1.031	1.500	1.219	1.750	1.438	20 × 20 × 16
0.812	0.594	1.281	0.938	1.500	1.094	1.750	1.250	20 × 20 × 14
0.812	0.562	1.281	0.844	1.500	1.000	1.750	1.125	20 × 20 × 12
0.812	0.500	1.281	0.719	1.500	0.844	1.750	1.000	20 × 20 × 10
0.812	0.406	1.281	0.594	1.500	0.719	1.750	0.812	20 × 20 × 8
0.875	0.875	1.375	1.375	1.625	1.625	1.875	1.875	22 × 22 × 22
0.875	0.812	1.375	1.281	1.625	1.500	1.875	1.750	22 × 22 × 20
0.875	0.750	1.375	1.156	1.625	1.375	1.875	1.562	22 × 22 × 18
0.875	0.656	1.375	1.031	1.625	1.219	1.875	1.438	22 × 22 × 16
0.875	0.594	1.375	0.938	1.625	1.094	1.875	1.250	22 × 22 × 14
0.875	0.562	1.375	0.844	1.625	1.000	1.875	1.125	22 × 22 × 12
0.875	0.500	1.375	0.719	1.625	0.844	1.875	1.000	22 × 22 × 10
0.969	0.969	1.531	1.531	1.812	1.812	2.062	2.062	24 × 24 × 24
0.969	0.875	1.531	1.375	1.812	1.625	2.062	1.875	24 × 24 × 22
0.969	0.812	1.531	1.281	1.812	1.500	2.062	1.750	24 × 24 × 20
0.969	0.750	1.531	1.156	1.812	1.375	2.062	1.562	24 × 24 × 18
0.969	0.656	1.531	1.031	1.812	1.219	2.062	1.438	24 × 24 × 16
0.969	0.594	1.531	0.938	1.812	1.094	2.062	1.250	24 × 24 × 14
0.969	0.562	1.531	0.844	1.812	1.000	2.062	1.125	24 × 24 × 12
0.969	0.500	1.531	0.719	1.812	0.844	2.062	1.000	24 × 24 × 10
-	-	-	-	-	-	-	-	26 × 26 × 26
-	-	-	-	-	-	-	-	26 × 26 × 24
-	-	-	-	-	-	-	-	26 × 26 × 22
-	-	-	-	-	-	-	-	26 × 26 × 20
-	-	-	-	-	-	-	-	26 × 26 × 18
-	-	-	-	-	-	-	-	26 × 26 × 16
-	-	-	-	-	-	-	-	26 × 26 × 14
-	-	-	-	-	-	-	-	26 × 26 × 12

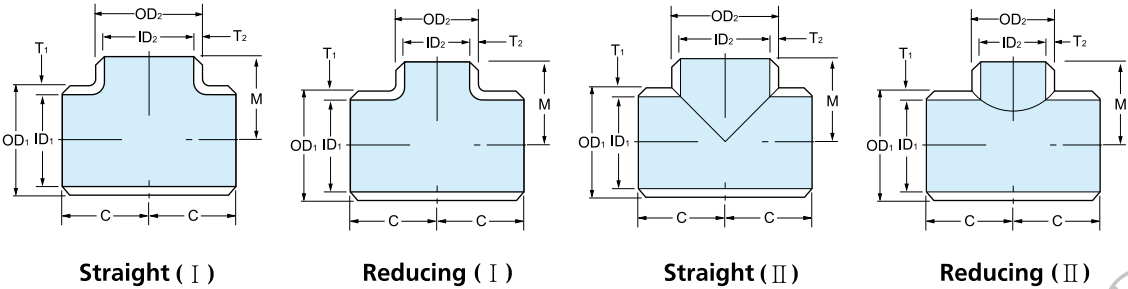
WROUGHT STEEL BUTT-WELDING FITTING

Tee

Sch20, Sch30

ASME B16.9					Unit: inch			
Nominal Pipe Size	Outside Diameter		Center to End		Sch 20		Sch 20	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂
28 × 28 × 28	28.000	28.000	20.50	20.50	0.500	0.500	0.625	0.625
28 × 28 × 26	28.000	26.000	20.50	20.50	0.500	0.500	-	-
28 × 28 × 24	28.000	24.000	20.50	20.00	0.500	0.375	0.625	0.562
28 × 28 × 22	28.000	22.000	20.50	19.50	0.500	0.375	0.625	0.500
28 × 28 × 20	28.000	20.000	20.50	19.00	0.500	0.375	0.625	0.500
28 × 28 × 18	28.000	18.000	20.50	18.50	0.500	0.312	0.625	0.438
28 × 28 × 16	28.000	16.000	20.50	18.00	0.500	0.312	0.625	0.375
28 × 28 × 14	28.000	14.000	20.50	18.00	0.500	0.312	0.625	0.375
28 × 28 × 12	28.000	12.750	20.50	17.62	0.500	0.250	0.625	0.330
30 × 30 × 30	30.000	30.000	22.00	22.00	0.500	0.500	0.625	0.625
30 × 30 × 28	30.000	28.000	22.00	21.50	0.500	0.500	0.625	0.625
30 × 30 × 26	30.000	26.000	22.00	21.50	0.500	0.500	-	-
30 × 30 × 24	30.000	24.000	22.00	21.00	0.500	0.375	0.625	0.562
30 × 30 × 22	30.000	22.000	22.00	20.50	0.500	0.375	0.625	0.500
30 × 30 × 20	30.000	20.000	22.00	20.00	0.500	0.375	0.625	0.500
30 × 30 × 18	30.000	18.000	22.00	19.50	0.500	0.312	0.625	0.438
30 × 30 × 16	30.000	16.000	22.00	19.00	0.500	0.312	0.625	0.375
30 × 30 × 14	30.000	14.000	22.00	19.00	0.500	0.312	0.625	0.375
30 × 30 × 12	30.000	12.750	22.00	18.62	0.500	0.250	0.625	0.330
30 × 30 × 10	30.000	10.750	22.00	18.12	0.500	0.250	0.625	0.307
32 × 32 × 32	32.000	32.000	23.50	23.50	0.500	0.500	0.625	0.625
32 × 32 × 30	32.000	30.000	23.50	23.00	0.500	0.500	0.625	0.625
32 × 32 × 28	32.000	28.000	23.50	22.50	0.500	0.500	0.625	0.625
32 × 32 × 26	32.000	26.000	23.50	22.50	0.500	0.500	-	-
32 × 32 × 24	32.000	24.000	23.50	22.00	0.500	0.375	0.625	0.562
32 × 32 × 22	32.000	22.000	23.50	21.50	0.500	0.375	0.625	0.500
32 × 32 × 20	32.000	20.000	23.50	21.00	0.500	0.375	0.625	0.500
32 × 32 × 18	32.000	18.000	23.50	20.50	0.500	0.312	0.625	0.438
32 × 32 × 16	32.000	16.000	23.50	20.00	0.500	0.312	0.625	0.375
32 × 32 × 14	32.000	14.000	23.50	20.00	0.500	0.312	0.625	0.375

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119



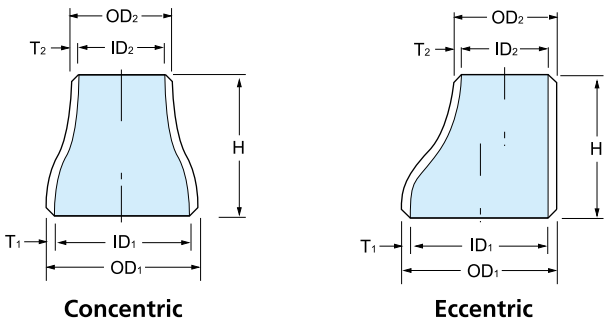
ASME B16.9					Unit: inch			
Nominal Pipe Size	Outside Diameter		Center to End		Sch 20		Sch 20	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂
34 × 34 × 34	34.000	34.000	25.00	25.00	0.500	0.500	0.625	0.625
34 × 34 × 32	34.000	32.000	25.00	24.50	0.500	0.500	0.625	0.625
34 × 34 × 30	34.000	30.000	25.00	24.00	0.500	0.500	0.625	0.625
34 × 34 × 28	34.000	28.000	25.00	23.50	0.500	0.500	0.625	0.625
34 × 34 × 26	34.000	26.000	25.00	23.50	0.500	0.500	-	-
34 × 34 × 24	34.000	24.000	25.00	23.00	0.500	0.375	0.625	0.562
34 × 34 × 22	34.000	22.000	25.00	22.50	0.500	0.375	0.625	0.500
34 × 34 × 20	34.000	20.000	25.00	22.00	0.500	0.375	0.625	0.500
34 × 34 × 18	34.000	18.000	25.00	21.50	0.500	0.312	0.625	0.438
34 × 34 × 16	34.000	16.000	25.00	21.00	0.500	0.312	0.625	0.375
36 × 36 × 36	36.000	36.000	26.50	26.50	0.500	0.500	0.625	0.625
36 × 36 × 34	36.000	34.000	26.50	26.00	0.500	0.500	0.625	0.625
36 × 36 × 32	36.000	32.000	26.50	25.50	0.500	0.500	0.625	0.625
36 × 36 × 30	36.000	30.000	26.50	25.00	0.500	0.500	0.625	0.625
36 × 36 × 28	36.000	28.000	26.50	24.50	0.500	0.500	0.625	0.625
36 × 36 × 26	36.000	26.000	26.50	24.50	0.500	0.500	-	-
36 × 36 × 24	36.000	24.000	26.50	24.00	0.500	0.375	0.625	0.562
36 × 36 × 22	36.000	22.000	26.50	23.50	0.500	0.375	0.625	0.500
36 × 36 × 20	36.000	20.000	26.50	23.00	0.500	0.375	0.625	0.500
36 × 36 × 18	36.000	18.000	26.50	22.50	0.500	0.312	0.625	0.438
36 × 36 × 16	36.000	16.000	26.50	22.00	0.500	0.312	0.625	0.375

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119

WROUGHT STEEL BUTT-WELDING FITTING

Reducer

STD, Sch40, X-S, Sch80, Sch160, XX-S



ASME B16.9

Nominal Pipe Size	Outside Diameter		End to End	Sch 20		Sch 40	
	OD ₁	OD ₂	H	T ₁	T ₂	T ₁	T ₂
3/4 × 1/2	1.050	0.840	1.50	0.113	0.109	0.113	0.109
3/4 × 3/8	1.050	0.675	1.50	0.113	0.091	0.113	0.091
1 × 3/4	1.315	1.050	2.00	0.133	0.113	0.133	0.113
1 × 1/2	1.315	0.840	2.00	0.133	0.109	0.133	0.109
1 1/4 × 1	1.660	1.315	2.00	0.140	0.133	0.140	0.133
1 1/4 × 3/4	1.660	1.050	2.00	0.140	0.113	0.140	0.113
1 1/4 × 1/2	1.660	0.840	2.00	0.140	0.109	0.140	0.109
1 1/2 × 1 1/4	1.900	1.660	2.50	0.145	0.140	0.145	0.140
1 1/2 × 1	1.900	1.315	2.50	0.145	0.133	0.145	0.133
1 1/2 × 3/4	1.900	1.050	2.50	0.145	0.113	0.145	0.113
1 1/2 × 1/2	1.900	0.840	2.50	0.145	0.109	0.145	0.109
2 × 1 1/2	2.375	1.900	3.00	0.154	0.145	0.154	0.145
2 × 1 1/4	2.375	1.660	3.00	0.154	0.140	0.154	0.140
2 × 1	2.375	1.315	3.00	0.154	0.133	0.154	0.133
2 × 3/4	2.375	1.050	3.00	0.154	0.113	0.154	0.113
2 1/2 × 2	2.875	2.375	3.50	0.203	0.154	0.203	0.154
2 1/2 × 1 1/2	2.875	1.900	3.50	0.203	0.145	0.203	0.145
2 1/2 × 1 1/4	2.875	1.660	3.50	0.203	0.140	0.203	0.140
2 1/2 × 1	2.875	1.315	3.50	0.203	0.133	0.203	0.133
3 × 2 1/2	3.500	2.875	3.50	0.216	0.203	0.216	0.203
3 × 2	3.500	2.375	3.50	0.216	0.154	0.216	0.154
3 × 1 1/2	3.500	1.900	3.50	0.216	0.145	0.216	0.145
3 × 1 1/4	3.500	1.660	3.50	0.216	0.140	0.216	0.140
3 1/2 × 3	4.000	3.500	4.00	0.226	0.216	0.226	0.216
3 1/2 × 2 1/2	4.000	2.875	4.00	0.226	0.203	0.226	0.203
3 1/2 × 2	4.000	2.375	4.00	0.226	0.154	0.226	0.154
3 1/2 × 1 1/2	4.000	1.900	4.00	0.226	0.145	0.226	0.145
3 1/2 × 1 1/4	4.000	1.660	4.00	0.226	0.140	0.226	0.140
4 × 3 1/2	4.500	4.000	4.00	0.237	0.226	0.237	0.226
4 × 3	4.500	3.500	4.00	0.237	0.216	0.237	0.216
4 × 2 1/2	4.500	2.875	4.00	0.237	0.203	0.237	0.203
4 × 2	4.500	2.375	4.00	0.237	0.154	0.237	0.154
4 × 1 1/2	4.500	1.900	4.00	0.237	0.145	0.237	0.145

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119

Unit: inch

X-S		Sch 80		Sch 160		XX-S		Nominal Pipe Size
T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
0.154	0.147	0.154	0.147	0.218	0.188	0.308	0.294	3/4 × 1/2
0.154	0.126	0.154	0.126	0.218	-	-	-	3/4 × 3/8
0.179	0.154	0.179	0.154	0.250	0.218	0.358	0.308	1 × 3/4
0.179	0.147	0.179	0.147	0.250	0.188	0.358	0.294	1 × 1/2
0.191	0.179	0.191	0.179	0.250	0.250	0.382	0.358	1 1/4 × 1
0.191	0.154	0.191	0.154	0.250	0.218	0.382	0.308	1 1/4 × 3/4
0.191	0.147	0.191	0.147	0.250	0.188	0.382	0.294	1 1/4 × 1/2
0.200	0.191	0.200	0.191	0.281	0.250	0.400	0.382	1 1/2 × 1 1/4
0.200	0.179	0.200	0.179	0.281	0.250	0.400	0.358	1 1/2 × 1
0.200	0.154	0.200	0.154	0.281	0.218	0.400	0.308	1 1/2 × 3/4
0.200	0.147	0.200	0.147	0.281	0.188	0.400	0.294	1 1/2 × 1/2
0.218	0.200	0.218	0.200	0.344	0.281	0.436	0.400	2 × 1 1/2
0.218	0.191	0.218	0.191	0.344	0.250	0.436	0.382	2 × 1 1/4
0.218	0.179	0.218	0.179	0.344	0.250	0.436	0.358	2 × 1
0.218	0.154	0.218	0.154	0.344	0.218	0.436	0.308	2 × 3/4
0.276	0.218	0.276	0.218	0.375	0.344	0.552	0.436	2 1/2 × 2
0.276	0.200	0.276	0.200	0.375	0.281	0.552	0.400	2 1/2 × 1 1/2
0.276	0.191	0.276	0.191	0.375	0.250	0.552	0.382	2 1/2 × 1 1/4
0.276	0.179	0.276	0.179	0.375	0.250	0.552	0.358	2 1/2 × 1
0.300	0.276	0.300	0.276	0.438	0.375	0.600	0.552	3 × 2 1/2
0.300	0.218	0.300	0.218	0.438	0.344	0.600	0.436	3 × 2
0.300	0.200	0.300	0.200	0.438	0.281	0.600	0.400	3 × 1 1/2
0.300	0.191	0.300	0.191	0.438	0.250	0.600	0.382	3 × 1 1/4
0.318	0.300	0.318	0.300	-	-	-	-	3 1/2 × 3
0.318	0.276	0.318	0.276	-	-	-	-	3 1/2 × 2 1/2
0.318	0.218	0.318	0.218	-	-	-	-	3 1/2 × 2
0.318	0.200	0.318	0.200	-	-	-	-	3 1/2 × 1 1/2
0.318	0.191	0.318	0.191	-	-	-	-	3 1/2 × 1 1/4
0.337	0.318	0.337	0.318	-	-	-	-	4 × 3 1/2
0.337	0.300	0.337	0.300	0.531	0.438	0.674	0.600	4 × 3
0.337	0.276	0.337	0.276	0.531	0.375	0.674	0.552	4 × 2 1/2
0.337	0.218	0.337	0.218	0.531	0.344	0.674	0.436	4 × 2
0.337	0.200	0.337	0.200	0.531	0.281	0.674	0.400	4 × 1 1/2

WROUGHT STEEL BUTT-WELDING FITTING

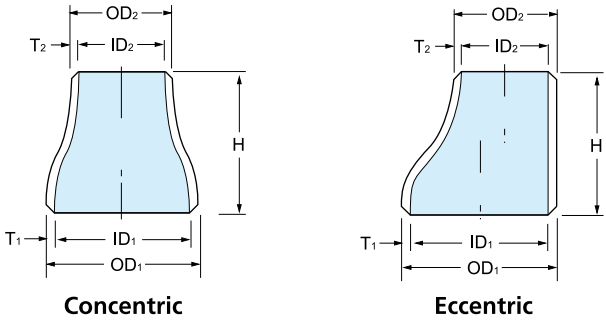
Reducer

STD, Sch40, X-S, Sch80, Sch160, XX-S

ASME B16.9

Nominal Pipe Size	Outside Diameter		End to End	Sch 20		Sch 40	
	OD ₁	OD ₂	H	T ₁	T ₂	T ₁	T ₂
5 × 4	5.563	4.500	5.00	0.258	0.237	0.258	0.237
5 × 3½	5.563	4.000	5.00	0.258	0.226	0.258	0.226
5 × 3	5.563	3.500	5.00	0.258	0.216	0.258	0.216
5 × 2½	5.563	2.875	5.00	0.258	0.203	0.258	0.203
5 × 2	5.563	2.375	5.00	0.258	0.154	0.258	0.154
6 × 5	6.625	5.563	5.50	0.280	0.258	0.280	0.258
6 × 4	6.625	4.500	5.50	0.280	0.237	0.280	0.237
6 × 3½	6.625	4.000	5.50	0.280	0.226	0.280	0.226
6 × 3	6.625	3.500	5.50	0.280	0.216	0.280	0.216
6 × 2½	6.625	2.875	5.50	0.280	0.203	0.280	0.203
8 × 6	8.625	6.625	6.00	0.322	0.280	0.322	0.280
8 × 5	8.625	5.563	6.00	0.322	0.258	0.322	0.258
8 × 4	8.625	4.500	6.00	0.322	0.237	0.322	0.237
8 × 3½	8.625	4.000	6.00	0.322	0.226	0.322	0.226
10 × 8	10.750	8.625	7.00	0.365	0.322	0.365	0.322
10 × 6	10.750	6.625	7.00	0.365	0.280	0.365	0.280
10 × 5	10.750	5.563	7.00	0.365	0.258	0.365	0.258
10 × 4	10.750	4.500	7.00	0.365	0.237	0.365	0.237
12 × 10	12.750	10.750	8.00	0.375	0.365	0.406	0.365
12 × 8	12.750	8.625	8.00	0.375	0.322	0.406	0.322
12 × 6	12.750	6.625	8.00	0.375	0.280	0.406	0.280
12 × 5	12.750	5.563	8.00	0.375	0.258	0.406	0.258
14 × 12	14.000	12.750	13.00	0.375	0.375	0.438	0.406
14 × 10	14.000	10.750	13.00	0.375	0.365	0.438	0.365
14 × 8	14.000	8.625	13.00	0.375	0.322	0.438	0.322
14 × 6	14.000	6.625	13.00	0.375	0.280	0.438	0.280

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119



X-S		Sch 80		Sch 160		XX-S		Nominal Pipe Size
T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
0.375	0.337	0.375	0.337	0.625	0.531	0.750	0.674	5 × 4
0.375	0.318	0.375	0.318	-	-	-	-	5 × 3½
0.375	0.300	0.375	0.300	0.625	0.438	0.750	0.600	5 × 3
0.375	0.276	0.375	0.276	0.625	0.375	0.750	0.552	5 × 2½
0.375	0.218	0.375	0.218	0.625	0.344	0.750	0.436	5 × 2
0.432	0.375	0.432	0.375	0.719	0.625	0.864	0.750	6 × 5
0.432	0.337	0.432	0.337	0.719	0.531	0.864	0.674	6 × 4
0.432	0.318	0.432	0.318	-	-	-	-	6 × 3½
0.432	0.300	0.432	0.300	0.719	0.438	0.864	0.600	6 × 3
0.432	0.276	0.432	0.276	0.719	0.375	0.864	0.552	6 × 2½
0.500	0.432	0.500	0.432	0.906	0.719	0.875	0.864	8 × 6
0.500	0.375	0.500	0.375	0.906	0.625	0.875	0.750	8 × 5
0.500	0.337	0.500	0.337	0.906	0.531	0.875	0.674	8 × 4
0.500	0.318	0.500	0.318	-	-	-	-	8 × 3½
0.500	0.500	0.594	0.500	1.125	0.906	1.000	0.875	10 × 8
0.500	0.432	0.594	0.432	1.125	0.719	1.000	0.864	10 × 6
0.500	0.375	0.594	0.375	1.125	0.625	1.000	0.750	10 × 5
0.500	0.337	0.594	0.337	1.125	0.531	1.000	0.674	10 × 4
0.500	0.500	0.688	0.594	1.312	1.125	1.000	1.000	12 × 10
0.500	0.500	0.688	0.500	1.312	0.906	1.000	0.875	12 × 8
0.500	0.432	0.688	0.432	1.312	0.719	1.000	0.864	12 × 6
0.500	0.375	0.688	0.375	1.312	0.625	1.000	0.750	12 × 5
0.500	0.500	0.750	0.688	1.406	1.312	-	-	14 × 12
0.500	0.500	0.750	0.594	1.406	1.125	-	-	14 × 10
0.500	0.500	0.750	0.500	1.406	0.906	-	-	14 × 8
0.500	0.432	0.750	0.432	1.406	0.719	-	-	14 × 6

WROUGHT STEEL BUTT-WELDING FITTING

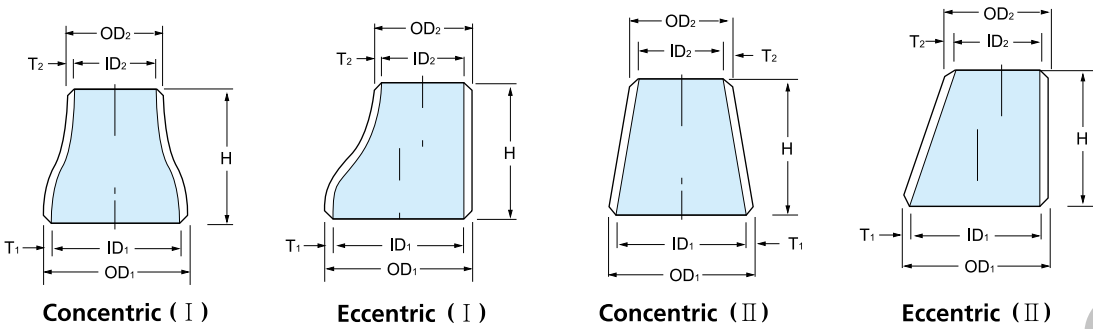
Reducer

STD, Sch40, X-S, Sch80, Sch160

ASME B16.9

Nominal Pipe Size	Outside Diameter		End to End	Sch 20		Sch 40	
	OD ₁	OD ₂	H	T ₁	T ₂	T ₁	T ₂
16 × 14	16.000	14.000	14.00	0.375	0.375	0.500	0.438
16 × 12	16.000	12.750	14.00	0.375	0.375	0.500	0.406
16 × 10	16.000	10.750	14.00	0.375	0.365	0.500	0.365
16 × 8	16.000	8.625	14.00	0.375	0.322	0.500	0.322
18 × 16	18.000	16.000	15.00	0.375	0.375	0.562	0.500
18 × 14	18.000	14.000	15.00	0.375	0.375	0.562	0.438
18 × 12	18.000	12.750	15.00	0.375	0.375	0.562	0.406
18 × 10	18.000	10.750	15.00	0.375	0.365	0.562	0.365
20 × 18	20.000	18.000	20.00	0.375	0.375	0.594	0.562
20 × 16	20.000	16.000	20.00	0.375	0.375	0.594	0.500
20 × 14	20.000	14.000	20.00	0.375	0.375	0.594	0.438
20 × 12	20.000	12.750	20.00	0.375	0.375	0.594	0.406
22 × 20	22.000	20.000	20.00	0.375	0.375	*0.594	0.594
22 × 18	22.000	18.000	20.00	0.375	0.375	*0.594	0.562
22 × 16	22.000	16.000	20.00	0.375	0.375	*0.594	0.500
22 × 14	22.000	14.000	20.00	0.375	0.375	*0.594	0.438
24 × 22	24.000	22.000	20.00	0.375	0.375	0.688	*0.594
24 × 20	24.000	20.000	20.00	0.375	0.375	0.688	0.594
24 × 18	24.000	18.000	20.00	0.375	0.375	0.688	0.562
24 × 16	24.000	16.000	20.00	0.375	0.375	0.688	0.500
26 × 24	26.000	24.000	24.00	0.375	0.375	*0.688	0.688
26 × 22	26.000	22.000	24.00	0.375	0.375	*0.688	*0.594
26 × 20	26.000	20.000	24.00	0.375	0.375	*0.688	0.594
26 × 18	26.000	18.000	24.00	0.375	0.375	*0.688	0.562
28 × 26	28.000	26.000	24.00	0.375	0.375	*0.688	*0.688
28 × 24	28.000	24.000	24.00	0.375	0.375	*0.688	0.688
28 × 20	28.000	20.000	24.00	0.375	0.375	*0.688	0.594
28 × 18	28.000	18.000	24.00	0.375	0.375	*0.688	0.562

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119
• Asterisks(*) denote Advance Forging Standard.



X-S		Sch 80		Sch 160		Nominal Pipe Size
T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
0.500	0.500	0.844	0.750	1.594	1.406	16 × 14
0.500	0.500	0.844	0.688	1.594	1.312	16 × 12
0.500	0.500	0.844	0.594	1.594	1.125	16 × 10
0.500	0.500	0.844	0.500	1.594	0.906	16 × 8
0.500	0.500	0.938	0.844	1.781	1.594	18 × 16
0.500	0.500	0.938	0.750	1.781	1.406	18 × 14
0.500	0.500	0.938	0.688	1.781	1.312	18 × 12
0.500	0.500	0.938	0.594	1.781	1.125	18 × 10
0.500	0.500	1.031	0.938	1.969	1.781	20 × 18
0.500	0.500	1.031	0.844	1.969	1.594	20 × 16
0.500	0.500	1.031	0.750	1.969	1.406	20 × 14
0.500	0.500	1.031	0.688	1.969	1.312	20 × 12
0.500	0.500	1.125	1.031	2.125	1.969	22 × 20
0.500	0.500	1.125	0.938	2.125	1.781	22 × 18
0.500	0.500	1.125	0.844	2.125	1.594	22 × 16
0.500	0.500	1.125	0.750	2.125	1.406	22 × 14
0.500	0.500	1.219	1.125	2.344	2.125	24 × 22
0.500	0.500	1.219	1.031	2.344	1.969	24 × 20
0.500	0.500	1.219	0.938	2.344	1.781	24 × 18
0.500	0.500	1.219	0.844	2.344	1.594	24 × 16
0.500	0.500	-	-	-	-	26 × 24
0.500	0.500	-	-	-	-	26 × 22
0.500	0.500	-	-	-	-	26 × 20
0.500	0.500	-	-	-	-	26 × 18
0.500	0.500	-	-	-	-	28 × 26
0.500	0.500	-	-	-	-	28 × 24
0.500	0.500	-	-	-	-	28 × 20
0.500	0.500	-	-	-	-	28 × 18

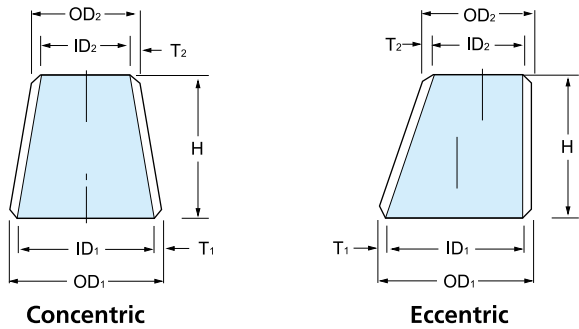
WROUGHT STEEL BUTT-WELDING FITTING

Reducer

STD, Sch40, X-S

ASME B16.9		Unit: inch							
Nominal Pipe Size	Outside Diameter		End to End	STD		Sch 40		X-S	
	OD ₁	OD ₂	H	T ₁		T ₁	T ₂	T ₁	T ₂
30 × 28	30.000	28.000	24.00	0.375	0.375	*0.688	*0.688	0.500	0.500
30 × 26	30.000	26.000	24.00	0.375	0.375	*0.688	*0.688	0.500	0.500
30 × 24	30.000	24.000	24.00	0.375	0.375	*0.688	0.688	0.500	0.500
30 × 20	30.000	20.000	24.00	0.375	0.375	*0.688	0.594	0.500	0.500
32 × 30	32.000	30.000	24.00	0.375	0.375	0.688	*0.688	0.500	0.500
32 × 28	32.000	28.000	24.00	0.375	0.375	0.688	*0.688	0.500	0.500
32 × 26	32.000	26.000	24.00	0.375	0.375	0.688	*0.688	0.500	0.500
32 × 24	32.000	24.000	24.00	0.375	0.375	0.688	0.688	0.500	0.500
34 × 32	34.000	32.000	24.00	0.375	0.375	0.688	0.688	0.500	0.500
34 × 30	34.000	30.000	24.00	0.375	0.375	0.688	*0.688	0.500	0.500
34 × 26	34.000	26.000	24.00	0.375	0.375	0.688	*0.688	0.500	0.500
34 × 24	34.000	24.000	24.00	0.375	0.375	0.688	0.688	0.500	0.500
36 × 34	36.000	34.000	24.00	0.375	0.375	0.750	0.688	0.500	0.500
36 × 32	36.000	32.000	24.00	0.375	0.375	0.750	0.688	0.500	0.500
36 × 30	36.000	30.000	24.00	0.375	0.375	0.750	*0.688	0.500	0.500
36 × 26	36.000	26.000	24.00	0.375	0.375	0.750	*0.688	0.500	0.500
36 × 24	36.000	24.000	24.00	0.375	0.375	0.750	0.688	0.500	0.500
38 × 36	38.000	36.000	24.00	0.375	0.375	-	-	0.500	0.500
38 × 34	38.000	34.000	24.00	0.375	0.375	-	-	0.500	0.500
38 × 32	38.000	32.000	24.00	0.375	0.375	-	-	0.500	0.500
38 × 30	38.000	30.000	24.00	0.375	0.375	-	-	0.500	0.500
38 × 28	38.000	28.000	24.00	0.375	0.375	-	-	0.500	0.500
38 × 26	38.000	26.000	24.00	0.375	0.375	-	-	0.500	0.500
40 × 38	40.000	38.000	24.00	0.375	0.375	-	-	0.500	0.500
40 × 36	40.000	36.000	24.00	0.375	0.375	-	-	0.500	0.500
40 × 34	40.000	34.000	24.00	0.375	0.375	-	-	0.500	0.500
40 × 32	40.000	32.000	24.00	0.375	0.375	-	-	0.500	0.500
40 × 30	40.000	30.000	24.00	0.375	0.375	-	-	0.500	0.500
42 × 40	42.000	40.000	24.00	0.375	0.375	-	-	0.500	0.500
42 × 38	42.000	38.000	24.00	0.375	0.375	-	-	0.500	0.500
42 × 36	42.000	36.000	24.00	0.375	0.375	-	-	0.500	0.500
42 × 34	42.000	34.000	24.00	0.375	0.375	-	-	0.500	0.500
42 × 32	42.000	32.000	24.00	0.375	0.375	-	-	0.500	0.500
42 × 30	42.000	30.000	24.00	0.375	0.375	-	-	0.500	0.500

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119
• Asterisks(*) denote Advance Forging Standard.



ASME B16.9		Unit: inch					
Nominal Pipe Size	Outside Diameter		End to End	STD		X-S	
	OD ₁	OD ₂	H	T ₁	T ₂	T ₁	T ₂
44 × 42	44.000	42.000	24.00	0.375	0.375	0.500	0.500
44 × 40	44.000	40.000	24.00	0.375	0.375	0.500	0.500
44 × 38	44.000	38.000	24.00	0.375	0.375	0.500	0.500
44 × 36	44.000	36.000	24.00	0.375	0.375	0.500	0.500
46 × 44	46.000	44.000	28.00	0.375	0.375	0.500	0.500
46 × 42	46.000	42.000	28.00	0.375	0.375	0.500	0.500
46 × 40	46.000	40.000	28.00	0.375	0.375	0.500	0.500
46 × 38	46.000	38.000	28.00	0.375	0.375	0.500	0.500
48 × 46	48.000	46.000	28.00	0.375	0.375	0.500	0.500
48 × 44	48.000	44.000	28.00	0.375	0.375	0.500	0.500
48 × 42	48.000	42.000	28.00	0.375	0.375	0.500	0.500
48 × 40	48.000	40.000	28.00	0.375	0.375	0.500	0.500
*50 × 48	50.000	48.000	30.00	-	-	-	-
*50 × 46	50.000	46.000	30.00	-	-	-	-
*50 × 44	50.000	44.000	30.00	-	-	-	-
*50 × 42	50.000	42.000	30.00	-	-	-	-
*52 × 50	52.000	50.000	30.00	-	-	-	-
*52 × 48	52.000	48.000	30.00	-	-	-	-
*52 × 46	52.000	46.000	30.00	-	-	-	-
*52 × 44	52.000	44.000	30.00	-	-	-	-
*54 × 52	54.000	52.000	30.00	-	-	-	-
*54 × 50	54.000	50.000	30.00	-	-	-	-
*54 × 48	54.000	48.000	30.00	-	-	-	-
*54 × 46	54.000	46.000	30.00	-	-	-	-
*56 × 54	56.000	54.000	30.00	-	-	-	-
*56 × 52	56.000	52.000	30.00	-	-	-	-
*56 × 50	56.000	50.000	30.00	-	-	-	-
*56 × 48	56.000	48.000	30.00	-	-	-	-
*58 × 56	58.000	56.000	30.00	-	-	-	-
*58 × 54	58.000	54.000	30.00	-	-	-	-
*58 × 52	58.000	52.000	30.00	-	-	-	-
*58 × 50	58.000	50.000	30.00	-	-	-	-
*60 × 58	60.000	58.000	30.00	-	-	-	-
*60 × 56	60.000	56.000	30.00	-	-	-	-
*60 × 54	60.000	54.000	30.00	-	-	-	-
*60 × 52	60.000	52.000	30.00	-	-	-	-

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119
• Asterisks(*) denote Advance Forging Standard.

WROUGHT STEEL BUTT-WELDING FITTING

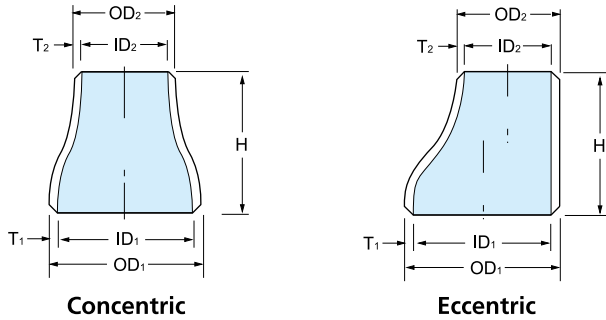
Reducer

Sch20, Sch30, Sch60, Sch100, Sch120, Sch140

ASME B16.9

Nominal Pipe Size	Outside Diameter		End to End	Sch 20		Sch 30	
	OD ₁	OD ₂	H	T ₁	T ₂	T ₁	T ₂
5 × 4	5.563	4.500	5.00	-	-	-	-
6 × 5	6.625	5.563	5.50	-	-	-	-
6 × 4	6.625	4.500	5.50	-	-	-	-
8 × 6	8.625	6.625	6.00	-	-	-	-
8 × 5	8.625	5.563	6.00	-	-	-	-
8 × 4	8.625	4.500	6.00	-	-	-	-
10 × 8	10.750	8.625	7.00	0.250	0.250	0.307	0.277
10 × 6	10.750	6.625	7.00	-	-	-	-
10 × 5	10.750	5.563	7.00	-	-	-	-
10 × 4	10.750	4.500	7.00	-	-	-	-
12 × 10	12.750	10.750	8.00	0.250	0.250	0.330	0.307
12 × 8	12.750	8.625	8.00	0.250	0.250	0.330	0.277
12 × 6	12.750	6.625	8.00	-	-	-	-
12 × 5	12.750	5.563	8.00	-	-	-	-
14 × 12	14.000	12.750	13.00	0.312	0.250	0.375	0.330
14 × 10	14.000	10.750	13.00	0.312	0.250	0.375	0.307
14 × 8	14.000	8.625	13.00	0.312	0.250	0.375	0.277
14 × 6	14.000	6.625	13.00	-	-	-	-
16 × 14	16.000	14.000	14.00	0.312	0.312	0.375	0.375
16 × 12	16.000	12.750	14.00	0.312	0.250	0.375	0.330
16 × 10	16.000	10.750	14.00	0.312	0.250	0.375	0.307
16 × 8	16.000	8.625	14.00	0.312	0.250	0.375	0.277
18 × 16	18.000	16.000	15.00	0.312	0.312	0.438	0.375
18 × 14	18.000	14.000	15.00	0.312	0.312	0.438	0.375
18 × 12	18.000	12.750	15.00	0.312	0.250	0.438	0.330
18 × 10	18.000	10.750	15.00	0.312	0.250	0.438	0.307
20 × 18	20.000	18.000	20.00	0.375	0.375	0.500	0.438
20 × 16	20.000	16.000	20.00	0.375	0.375	0.500	0.375
20 × 14	20.000	14.000	20.00	0.375	0.375	0.500	0.375
20 × 12	20.000	12.000	20.00	0.375	0.250	0.500	0.330

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119



Sch 60		Sch 100		Sch 120		Sch 140		Nominal Pipe Size
T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
-	-	-	-	0.500	0.438	-	-	5 × 4
-	-	-	-	0.562	0.500	-	-	6 × 5
-	-	-	-	0.562	0.438	-	-	6 × 4
-	-	-	-	0.719	0.562	-	-	8 × 6
-	-	-	-	0.719	0.500	-	-	8 × 5
-	-	-	-	0.719	0.438	-	-	8 × 4
0.500	0.406	0.719	0.594	0.844	0.719	1.000	0.812	10 × 8
-	-	-	-	0.844	0.562	-	-	10 × 6
-	-	-	-	0.844	0.500	-	-	10 × 5
-	-	-	-	0.844	0.438	-	-	10 × 4
0.562	0.500	0.844	0.719	1.000	0.844	1.125	1.000	12 × 10
0.562	0.406	0.844	0.594	1.000	0.719	1.125	0.812	12 × 8
-	-	-	-	1.000	0.562	-	-	12 × 6
-	-	-	-	1.000	0.500	-	-	12 × 5
0.594	0.562	0.938	0.844	1.094	1.000	1.250	1.125	14 × 12
0.594	0.500	0.938	0.719	1.094	0.844	1.250	1.000	14 × 10
0.594	0.406	0.938	0.594	1.094	0.719	1.250	0.812	14 × 8
-	-	-	-	1.094	0.562	-	-	14 × 6
0.656	0.594	1.031	0.938	1.219	1.094	1.438	1.250	16 × 14
0.656	0.562	1.031	0.844	1.219	1.000	1.438	1.125	16 × 12
0.656	0.500	1.031	0.719	1.219	0.844	1.438	1.000	16 × 10
0.656	0.406	1.031	0.594	1.219	0.719	1.438	0.812	16 × 8
0.750	0.656	1.156	1.031	1.375	1.219	1.562	1.438	18 × 16
0.750	0.594	1.156	0.938	1.375	1.094	1.562	1.250	18 × 14
0.750	0.562	1.156	0.844	1.375	1.000	1.562	1.125	18 × 12
0.750	0.500	1.156	0.719	1.375	0.844	1.562	1.000	18 × 10
0.812	0.750	1.281	1.156	1.500	1.375	1.750	1.562	20 × 18
0.812	0.656	1.281	1.031	1.500	1.219	1.750	1.438	20 × 16
0.812	0.594	1.281	0.938	1.500	1.094	1.750	1.250	20 × 14
0.812	0.562	1.281	0.844	1.500	1.000	1.750	1.125	20 × 12

WROUGHT STEEL BUTT-WELDING FITTING

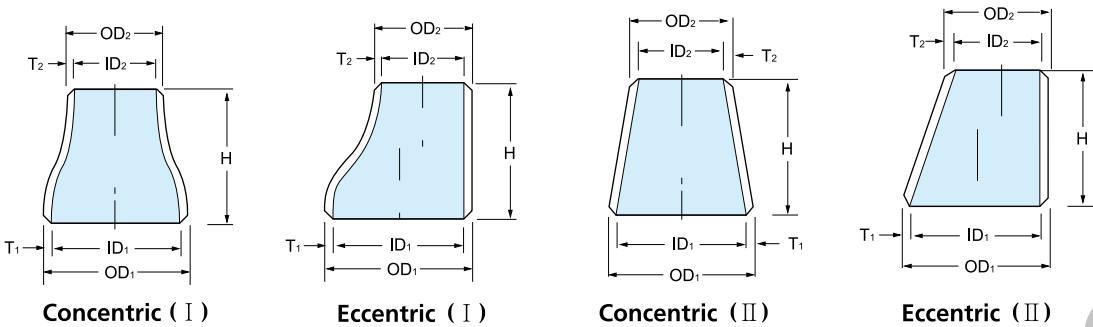
Reducer

Sch20, Sch30, Sch60, Sch100, Sch120, Sch140

ASME B16.9

Nominal Pipe Size	Outside Diameter		End to End	Sch 20		Sch 30	
	OD ₁	OD ₂	H	T ₁	T ₂	T ₁	T ₂
22 × 20	22.000	20.000	20.00	0.375	0.375	0.500	0.500
22 × 18	22.000	18.000	20.00	0.375	0.312	0.500	0.438
22 × 16	22.000	16.000	20.00	0.375	0.312	0.500	0.375
22 × 14	22.000	14.000	20.00	0.375	0.312	0.500	0.375
24 × 22	24.000	22.000	20.00	0.375	0.375	0.562	0.500
24 × 20	24.000	20.000	20.00	0.375	0.375	0.562	0.500
24 × 18	24.000	18.000	20.00	0.375	0.312	0.562	0.438
24 × 16	24.000	16.000	20.00	0.375	0.312	0.562	0.375
26 × 24	26.000	24.000	24.00	0.500	0.375	-	-
26 × 22	26.000	22.000	24.00	0.500	0.375	-	-
26 × 20	26.000	20.000	24.00	0.500	0.375	-	-
26 × 18	26.000	18.000	24.00	0.500	0.312	-	-
28 × 26	28.000	26.000	24.00	0.500	0.500	-	-
28 × 24	28.000	24.000	24.00	0.500	0.375	0.625	0.562
28 × 20	28.000	20.000	24.00	0.500	0.375	0.625	0.500
28 × 18	28.000	18.000	24.00	0.500	0.312	0.625	0.438
30 × 28	30.000	28.000	24.00	0.500	0.500	0.625	0.625
30 × 26	30.000	26.000	24.00	0.500	0.500	-	-
30 × 24	30.000	24.000	24.00	0.500	0.375	0.625	0.562
30 × 20	30.000	20.000	24.00	0.500	0.375	0.625	0.500
32 × 30	32.000	30.000	24.00	0.500	0.500	0.625	0.625
32 × 28	32.000	28.000	24.00	0.500	0.500	0.625	0.625
32 × 26	32.000	26.000	24.00	0.500	0.500	-	-
32 × 24	32.000	24.000	24.00	0.500	0.375	0.625	0.562
34 × 32	34.000	32.000	24.00	0.500	0.500	0.625	0.625
34 × 30	34.000	30.000	24.00	0.500	0.500	0.625	0.625
34 × 28	34.000	28.000	24.00	0.500	0.500	0.625	0.625
34 × 26	34.000	26.000	24.00	0.500	0.500	-	-
36 × 34	36.000	34.000	24.00	0.500	0.500	0.625	0.625
36 × 32	36.000	32.000	24.00	0.500	0.500	0.625	0.625
36 × 30	36.000	30.000	24.00	0.500	0.500	0.625	0.625
36 × 28	36.000	28.000	24.00	0.500	0.500	0.625	0.625

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119

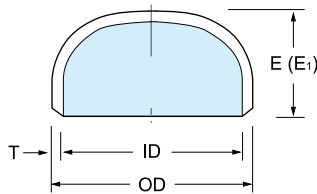


Sch 60		Sch 100		Sch 120		Sch 140		Nominal Pipe Size
T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
0.875	0.812	1.375	1.281	1.625	1.500	1.875	1.750	22 × 20
0.875	0.750	1.375	1.156	1.625	1.375	1.875	1.562	22 × 18
0.875	0.656	1.375	1.031	1.625	1.219	1.875	1.438	22 × 16
0.875	0.594	1.375	0.938	1.625	1.094	1.875	1.250	22 × 14
0.969	0.875	1.531	1.375	1.812	1.625	2.062	1.875	24 × 22
0.969	0.812	1.531	1.281	1.812	1.500	2.062	1.750	24 × 20
0.969	0.750	1.531	1.156	1.812	1.375	2.062	1.562	24 × 18
0.969	0.656	1.531	1.031	1.812	1.219	2.062	1.438	24 × 16
-	-	-	-	-	-	-	-	26 × 24
-	-	-	-	-	-	-	-	26 × 22
-	-	-	-	-	-	-	-	26 × 20
-	-	-	-	-	-	-	-	26 × 18
-	-	-	-	-	-	-	-	28 × 26
-	-	-	-	-	-	-	-	28 × 24
-	-	-	-	-	-	-	-	28 × 20
-	-	-	-	-	-	-	-	28 × 18
-	-	-	-	-	-	-	-	30 × 28
-	-	-	-	-	-	-	-	30 × 26
-	-	-	-	-	-	-	-	30 × 24
-	-	-	-	-	-	-	-	30 × 20
-	-	-	-	-	-	-	-	32 × 30
-	-	-	-	-	-	-	-	32 × 28
-	-	-	-	-	-	-	-	32 × 26
-	-	-	-	-	-	-	-	32 × 24
-	-	-	-	-	-	-	-	34 × 32
-	-	-	-	-	-	-	-	34 × 30
-	-	-	-	-	-	-	-	34 × 28
-	-	-	-	-	-	-	-	34 × 26
-	-	-	-	-	-	-	-	36 × 34
-	-	-	-	-	-	-	-	36 × 32
-	-	-	-	-	-	-	-	36 × 30
-	-	-	-	-	-	-	-	36 × 28

WROUGHT STEEL BUTT-WELDING FITTING

Cap

STD, Sch40, X-S, Sch80,
Sch160, XX-S



Cap

ASME B16.9

Nominal Pipe Size	Outside Diameter O.D	Length	Limiting Wall Thickness for Length E	Length	STD		Sch 40	
		E		E ₁	T	I.D	T	I.D
1/2	0.840	1.00	0.18	1.00	0.109	0.622	0.109	0.622
3/4	1.050	1.00	0.15	1.00	0.113	0.824	0.113	0.824
1	1.315	1.50	0.18	1.50	0.133	1.049	0.133	1.049
1 1/4	1.660	1.50	0.19	1.50	0.140	1.380	0.140	1.380
1 1/2	1.900	1.50	0.20	1.50	0.145	1.610	0.145	1.610
2	2.375	1.50	0.22	1.75	0.154	2.067	0.154	2.067
2 1/2	2.875	1.50	0.28	2.00	0.203	2.469	0.203	2.469
3	3.500	2.00	0.30	2.50	0.216	3.068	0.216	3.068
3 1/2	4.000	2.50	0.32	3.00	0.226	3.548	0.226	3.548
4	4.500	2.50	0.34	3.00	0.237	4.026	0.237	4.026
5	5.563	3.00	0.38	3.50	0.258	5.047	0.258	5.047
6	6.625	3.50	0.43	4.00	0.280	6.065	0.280	6.065
8	8.625	4.00	0.50	5.00	0.322	7.981	0.322	7.981
10	10.750	5.00	0.50	6.00	0.365	10.020	0.365	10.020
12	12.750	6.00	0.50	7.00	0.375	12.000	0.406	11.938
14	14.000	6.50	0.50	7.50	0.375	13.250	0.438	13.124
16	16.000	7.00	0.50	8.00	0.375	15.250	0.500	15.000
18	18.000	8.00	0.50	9.00	0.375	17.250	0.562	16.876
20	20.000	9.00	0.50	10.00	0.375	19.250	0.594	18.812
22	22.000	10.00	0.50	10.00	0.375	21.250	*0.594	20.812
24	24.000	10.50	0.50	12.00	0.375	23.250	0.688	22.624
26	26.000	10.50	-	-	0.375	25.250	*0.688	24.624
28	28.000	10.50	-	-	0.375	27.250	*0.688	26.624
30	30.000	10.50	-	-	0.375	29.250	*0.688	28.624
32	32.000	10.50	-	-	0.375	31.250	0.688	30.624
34	34.000	10.50	-	-	0.375	33.250	0.688	32.624
36	36.000	10.50	-	-	0.375	35.250	0.750	34.500
38	38.000	12.00	-	-	0.375	37.250	-	-
40	40.000	12.00	-	-	0.375	39.250	-	-
42	42.000	12.00	-	-	0.375	41.250	-	-
44	44.000	13.50	-	-	0.375	43.250	-	-
46	46.000	13.50	-	-	0.375	45.250	-	-
48	48.000	13.50	-	-	0.375	47.250	-	-
*50	50.000	14.07	-	-	-	-	-	-
*52	52.000	14.57	-	-	-	-	-	-
*54	54.000	15.15	-	-	-	-	-	-
*56	56.000	15.65	-	-	-	-	-	-
*58	58.000	16.23	-	-	-	-	-	-
*60	60.000	16.53	-	-	-	-	-	-

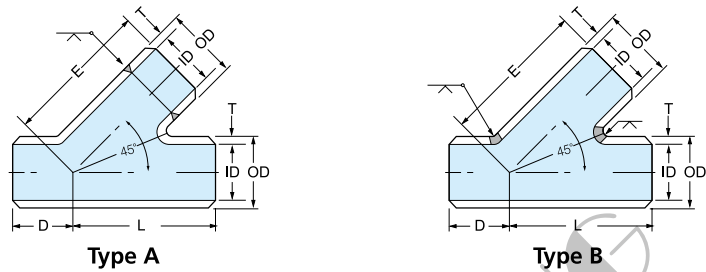
- For Bevel Details See Page 114
- Dimensional Tolerances See Page 119
- Asterisks(*) denote Advance Forging Standard.

Unit: inch

X-S		Sch 80		Sch 160		XX-S		Nominal Pipe Size
T	I.D	T	I.D	T	I.D	T	I.D	
0.147	0.546	0.147	0.546	0.188	0.464	0.294	0.252	1/2
0.154	0.742	0.154	0.742	0.218	0.612	0.308	0.434	3/4
0.179	0.957	0.179	0.957	0.250	0.815	0.358	0.599	1
0.191	1.278	0.191	1.278	0.250	1.160	0.382	0.896	1 1/4
0.200	1.500	0.200	1.500	0.281	1.338	0.400	1.100	1 1/2
0.218	1.939	0.218	1.939	0.344	1.687	0.436	1.503	2
0.276	2.323	0.276	2.323	0.375	2.125	0.552	1.771	2 1/2
0.300	2.900	0.300	2.900	0.438	2.624	0.600	2.300	3
0.318	3.364	0.318	3.364	-	-	-	-	3 1/2
0.337	3.826	0.337	3.826	0.531	3.438	0.674	3.152	4
0.375	4.813	0.375	4.813	0.625	4.313	0.750	4.063	5
0.432	5.761	0.432	5.761	0.719	5.187	0.864	4.897	6
0.500	7.625	0.500	7.625	0.906	6.813	0.875	6.875	8
0.500	9.750	0.594	9.562	1.125	8.500	1.000	8.750	10
0.500	11.750	0.688	11.374	1.312	10.126	1.000	10.750	12
0.500	13.000	0.750	12.500	1.406	11.188	-	-	14
0.500	15.000	0.844	14.312	1.594	12.812	-	-	16
0.500	17.000	0.938	16.124	1.781	14.438	-	-	18
0.500	19.000	1.031	17.938	1.968	16.062	-	-	20
0.500	21.000	1.125	19.750	2.125	17.750	-	-	22
0.500	23.000	1.219	21.562	2.344	19.312	-	-	24
0.500	25.000	-	-	-	-	-	-	26
0.500	27.000	-	-	-	-	-	-	28
0.500	29.000	-	-	-	-	-	-	30
0.500	31.000	-	-	-	-	-	-	32
0.500	33.000	-	-	-	-	-	-	34
0.500	35.000	-	-	-	-	-	-	36
0.500	37.000	-	-	-	-	-	-	38
0.500	39.000	-	-	-	-	-	-	40
0.500	41.000	-	-	-	-	-	-	42
0.500	43.000	-	-	-	-	-	-	44
0.500	45.000	-	-	-	-	-	-	46
0.500	47.000	-	-	-	-	-	-	48
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

WROUGHT STEEL BUTT-WELDING FITTING

Lateral
STD, X-S



Nominal Pipe Size	TYPE	Outside Diameter O.D	STD					X-S				
			E & L	D	T	ID	WT(kg)	E & L	D	T	ID	WT(kg)
1	B	1.315	5.75	1.75	0.133	1.049	0.77	6.50	2.00	0.179	0.957	1.13
1 1/4	B	1.660	6.25	1.75	0.140	1.380	1.09	7.25	2.25	0.191	1.278	1.72
1 1/2	B	1.900	7.00	2.00	0.145	1.610	1.45	8.50	2.50	0.200	1.500	2.45
2	A/B	2.375	8.00	2.50	0.154	2.067	2.27	*8.00 **9.00	2.50	0.218	1.939	3.40
2 1/2	B	2.875	9.50	2.50	0.203	2.469	4.17	10.50	2.50	0.276	2.323	6.15
3	B	3.500	10.00	3.00	0.216	3.068	5.72	11.00	3.00	0.300	2.900	8.53
3 1/2	B	4.000	11.50	3.00	0.226	3.548	7.80	12.50	3.00	0.318	3.364	11.61
4	A/B	4.500	12.00	3.00	0.237	4.026	9.43	*12.00 **13.50	3.00	0.337	3.826	14.88
5	B	5.562	13.50	3.50	0.258	5.047	14.24	15.00	3.50	0.375	4.813	22.59
6	A/B	6.625	14.50	3.50	0.280	6.065	19.23	*14.50 **17.50	*3.50 **4.00	0.432	5.761	35.83
8	B	8.625	17.50	4.50	0.322	7.981	34.47	20.50	5.00	0.500	7.625	63.50
10	B	10.750	20.50	5.00	0.365	10.020	56.25	24.00	5.50	0.500	9.750	96.63
12	B	12.750	24.50	5.50	0.375	12.000	81.65	27.50	6.00	0.500	11.750	123.83
14	B	14.000	27.00	6.00	0.375	13.250	98.88	31.00	6.50	0.500	13.000	154.22
16	B	16.000	30.00	6.50	0.375	15.250	124.74	34.50	7.50	0.500	15.000	196.41
18	B	18.000	32.00	7.00	0.375	17.250	147.87	37.50	8.00	0.500	17.000	238.59
20	B	20.000	35.00	8.00	0.375	19.250	179.63	40.50	8.50	0.500	19.000	284.86
24	B	24.000	40.50	9.00	0.375	23.250	246.76	47.50	10.00	0.500	23.000	400.08

•*A TYPE **B TYPE

STEEL BUTT-WELDING FITTINGS

KS / JIS

CONTENTS

• U90°, 45° Elbow (SPP/SGP, 7.9T, STD, X-S)	58
• 180° Elbow, Cap (SPP/SGP, 7.9T, STD, X-S)	59
• Tee (SPP/SGP, 7.9T, STD, X-S)	60
• Reducer (SPP/SGP, 7.9T, STD, X-S)	64
• 90°, 45° Elbow (Sch40, Sch80, Sch120, Sch160)	68
• 180° Elbow, Cap (Sch40, Sch80, Sch120, Sch160)	69
• Tee (Sch40, Sch80, Sch120, Sch160)	70
• Reducer (Sch40, Sch80, Sch120, Sch160)	73

STAINLESS STEEL BUTT-WELDING FITTINGS



STAINLESS STEEL BUTT-WELDING PIPE FITTINGS

ASME

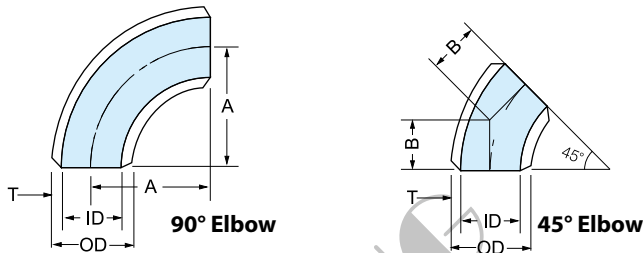
CONTENTS

• U90°, 45° Elbow (Sch5s, Sch10s, Sch40s, Sch80s)	78
• Tee (Sch5s, Sch10s, Sch40s, Sch80s)	79
• Reducer (Sch5s, Sch10s, Sch40s, Sch80s)	82
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• Lap Joint, Stub End (Sch5s, Sch10s, Sch40s)	85

■ STAINLESS STEEL BUTT-WELDING FITTINGS

90° Elbow (Long, Short)
45° Elbow (Long)

Sch5s, Sch10s, Sch40s, Sch80s



ASME B16.9 Unit: inch

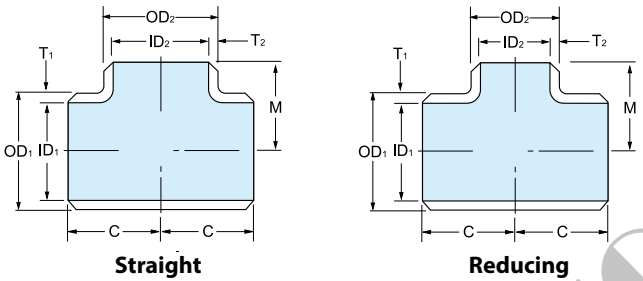
Nominal Pipe Size	Outside Diameter OD	Center to End			Sch 5s		Sch 10s		Sch 40s		Sch 80s	
		Long		Short	T	I.D	T	I.D	T	I.D	T	I.D
		A	B	A								
1/2	0.840	1.50	0.62	-	0.065	0.710	0.083	0.674	0.109	0.622	0.147	0.546
3/4	1.050	1.50	0.62	-	0.065	0.920	0.083	0.884	0.113	0.824	0.154	0.742
1	1.315	1.50	0.88	1.00	0.065	1.185	0.109	1.097	0.133	1.049	0.179	0.957
1 1/4	1.660	1.88	1.00	1.25	0.065	1.530	0.109	1.442	0.140	1.380	0.191	1.278
1 1/2	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
2 1/2	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
3 1/2	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 114
• Dimensional Tolerances See Page 119

■ STAINLESS STEEL BUTT-WELDING FITTINGS

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	
	OD ₁	OD ₂	Run C	Outlet M	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
1/2 × 1/2 × 1/2	0.840	0.840	1.00	1.00	0.065	0.065	0.083	0.083	0.109	0.109	0.147	0.147
1/2 × 1/2 × 3/8	0.840	0.675	1.00	1.00	-	-	0.083	0.065	0.109	0.109	0.147	0.126
1/2 × 1/2 × 1/4	0.840	0.540	1.00	1.00	-	-	0.083	0.065	0.109	0.088	0.147	0.119
3/4 × 3/4 × 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
3/4 × 3/4 × 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
3/4 × 3/4 × 3/8	1.050	0.675	1.12	1.12	-	-	0.083	0.065	0.113	0.091	0.154	0.126
1 × 1 × 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 × 1 × 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 × 1 × 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 1/4 × 1 1/4 × 1 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 1/4 × 1 1/4 × 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 1/4 × 1 1/4 × 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 1/4 × 1 1/4 × 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 1/2 × 1 1/2 × 1 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 1/2 × 1 1/2 × 1 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 1/2 × 1 1/2 × 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 1/2 × 1 1/2 × 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 1/2 × 1 1/2 × 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 × 2 × 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 × 2 × 1 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 × 2 × 1 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 × 2 × 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 × 2 × 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 1/2 × 2 1/2 × 2 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 1/2 × 2 1/2 × 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 1/2 × 2 1/2 × 1 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 1/2 × 2 1/2 × 1 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 1/2 × 2 1/2 × 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 × 3 × 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 × 3 × 2 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 × 3 × 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 × 3 × 1 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 × 3 × 1 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 1/2 × 3 1/2 × 3 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 1/2 × 3 1/2 × 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 1/2 × 3 1/2 × 2 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 1/2 × 3 1/2 × 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 1/2 × 3 1/2 × 1 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 114
• Dimensional Tolerances See Page 119

STAINLESS STEEL BUTT-WELDING FITTINGS

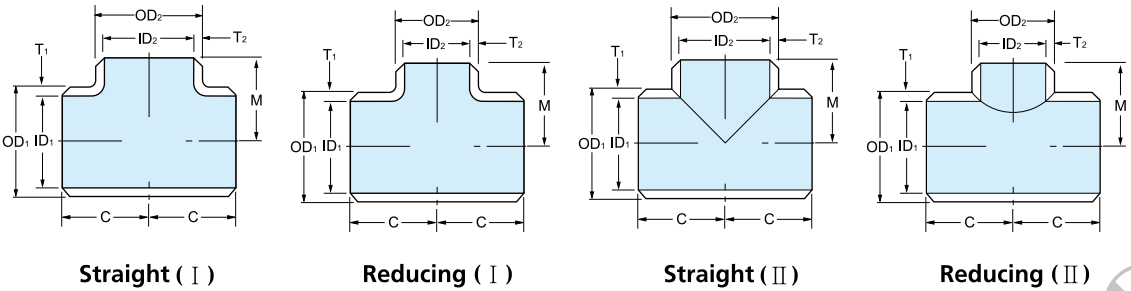
Tee

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	
	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 × 3 1/2	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 × 2 1/2	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 × 1 1/2	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 × 3 1/2	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 × 2 1/2	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 × 3 1/2	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 × 2 1/2	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 × 3 1/2	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



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
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	-	-	-	-

• For Bevel Details See Page 114 • Dimensional Tolerances See Page 119

■ STAINLESS STEEL BUTT-WELDING FITTINGS

Reducer

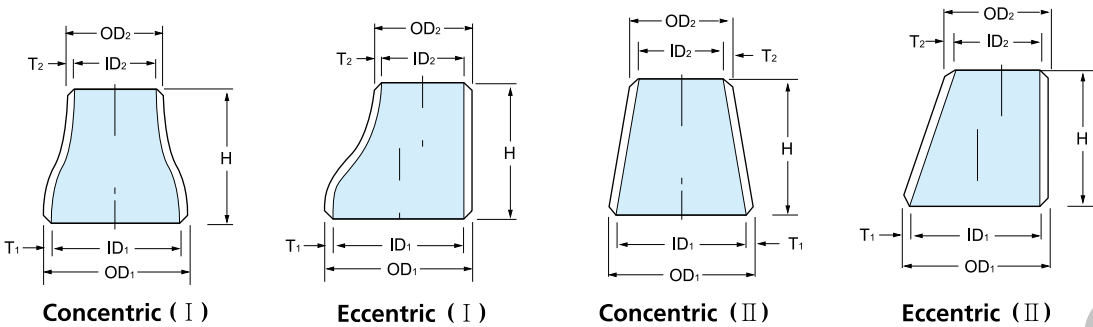
Sch5s, Sch10s, Sch40s, Sch80s

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
3/4 × 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 × 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 × 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 1/4 × 1	1.660	1.135	2.00	0.065	0.065	0.109	0.109	0.140	0.133	0.191	0.179
1 1/4 × 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 1/4 × 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 1/2 × 1 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 1/2 × 1	1.900	1.315	2.50	0.065	0.065	0.109	0.109	0.145	0.133	0.200	0.179
1 1/2 × 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 1/2 × 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 × 1 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 × 1 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 × 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 1/2 × 2	2.875	2.375	3.50	0.083	0.065	0.120	0.109	0.203	0.154	0.276	0.218
2 1/2 × 1 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 1/2 × 1 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 1/2 × 1	2.875	1.315	3.50	0.083	0.065	0.120	0.109	0.203	0.133	0.276	0.179
3 × 2 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 × 1 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 × 1 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 1/2 × 3	4.000	3.500	4.00	0.083	0.083	0.120	0.120	0.226	0.216	0.318	0.300
3 1/2 × 2 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 1/2 × 2	4.000	2.375	4.00	0.083	0.065	0.120	0.109	0.226	0.154	0.318	0.218
3 1/2 × 1 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 1/2 × 1 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 × 3 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 × 2 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 × 1 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 × 3 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 × 2 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 × 3 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 × 2 1/2	6.625	2.875	5.50	0.109	0.083	0.134	0.120	0.280	0.203	0.432	0.276

• For Bevel Details See Page 114 • Dimensional Tolerances See Page 119



ASME B16.9

Unit: inch

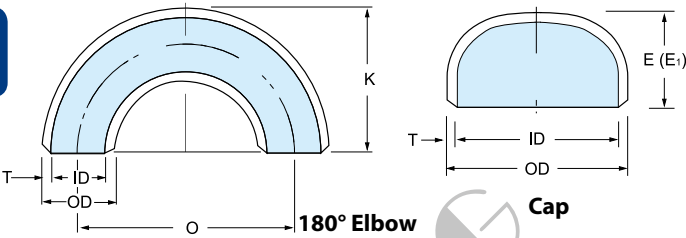
Nominal Pipe Size	Outside Diameter		End to End H	Wall Thickness T							
				Sch 5s		Sch 10s		Sch 40s		Sch 80s	
	OD ₁	OD ₂		T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
8 × 6	8.625	6.625	6.00	0.109	0.109	0.148	0.134	0.322	0.280	0.500	0.432
8 × 5	8.625	5.563	6.00	0.109	0.109	0.148	0.134	0.322	0.258	0.500	0.375
8 × 4	8.625	4.500	6.00	0.109	0.083	0.148	0.120	0.322	0.237	0.500	0.337
8 × 3 1/2	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	8.625	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	-	-	-	-

• For Bevel Details See Page 114
• Dimensional Tolerances See Page 119

STAINLESS STEEL BUTT-WELDING FITTINGS

180° Elbow (Long, Short) Cap

Sch5s, Sch10s, Sch40s, Sch80s



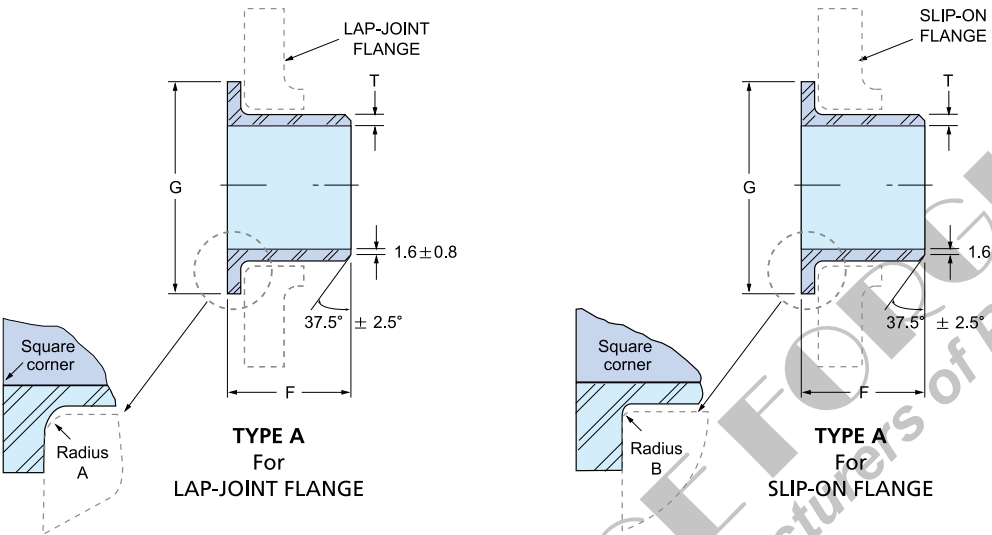
ASME B16.9 Unit: inch

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
1/2	0.840	0.065	0.083	0.109	0.147	1.00	0.18	1.00	3.00	1.88	-	-
3/4	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
1 1/4	1.660	0.065	0.109	0.140	0.191	1.50	0.19	1.50	3.75	2.75	2.50	2.06
1 1/2	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
2 1/2	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
3 1/2	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 114
• UDimensional Tolerances See Page 119

STAINLESS STEEL BUTT-WELDING FITTINGS

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						
1/2	0.840	2.00	3.00	2.00	1.38	0.12	0.03	0.065	0.083	0.109
3/4	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
1 1/4	1.660	2.00	4.00	2.00	2.50	0.19	0.03	0.065	0.109	0.140
1 1/2	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
2 1/2	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
3 1/2	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 114
• Dimensional Tolerances See Page 119

FORGED STEEL SOCKET-WELDING & THREADED FITTINGS



FORGED STEEL SOCKET-WELDING & THREADED FITTINGS

ASME

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FORGED STEEL SOCKET-WELDING AND THREADED

1. Pressure Ratings

These fittings shall be designated as pressure class 2000, 3000 and 6000 fittings for threading and pressure class 3000, 6000 and 9000 for socket- welding. This designation identifies the fittings with their ratings as shown as follows, Table 1.

Table 1. : Correlation of Fittings Class With Schedule Number of Wall Designation of Pipe for Calculation of Ratings.

Pressure Class Designation of Fitting	Type of Fitting	Pipe Used for Rating Basic	
		Schedule No.	Wall Designation
2000 lb	Threaded	80	X-S
3000 lb	Threaded	160	-
6000 lb	Threaded	-	XX-S
3000 lb	Socket-Welding	80	X-S
6000 lb	Socket-Welding	160	-
9000 lb	Socket-Welding	-	XX-S

*This table is not intended to restrict the use of pipe of thinner or thicker wall with fittings pipe actually used may be thinner or thicker in nominal wall than that shown in Table 1. When thinner pipe is used its strength may govern the rating. When thicker pipe is used (e.g., for mechanical strength) the strength of the fitting governs the rating.

Table 2. : Nominal wall thickness of Schedule 160 and Double Extra Strong Pipe.

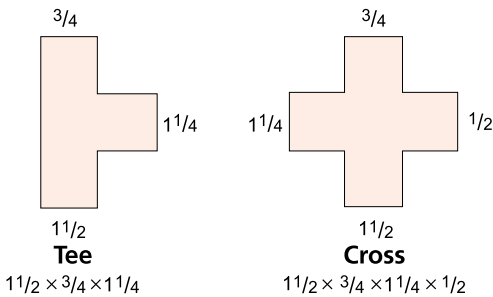
NPS.	Schedule 160		XX-S	
	in	mm	in	mm
1/8	0.124	3.15	0.190	4.83
1/4	0.145	3.68	0.238	6.05
3/8	0.158	4.01	0.252	6.40

Table 3. : Pressure / Temperature Ratings

Service Temperature Degree "F"	2000lb Threaded Fittings					3000lb Socket Welding and Threaded Fittings					6000lb Socket Welding and Threaded Fittings				
	Carbon Steel	F304	F316	F22	F5	Carbon Steel	F304	F316	F22	F5	Carbon Steel	F304	F316	F22	F5
100	2000	1715	2000	2000	2000	3000	2570	3000	3000	3000	6000	5145	6000	6000	6000
150	1970	1615	1970	1970	1970	2950	2425	2950	2950	2950	5915	4855	5915	5915	5915
200	1940	1520	1940	1940	1940	2915	2280	2915	2915	2915	5830	4565	5830	5830	5830
250	1915	1445	1915	1915	1915	2875	2170	2875	2875	2875	5750	4340	5750	5750	5750
300	1895	1370	1896	1895	1895	2845	2055	2845	2845	2845	5690	4115	5690	5690	5690
350	1875	1310	1875	1875	1875	2810	1965	2810	2810	2810	5625	3930	5690	5625	5625
400	1850	1245	1850	1850	1850	2775	1870	2775	2775	2775	5550	3745	5550	5550	5550
450	1810	1195	1810	1810	1810	2715	1790	2715	2715	2715	5430	3585	5430	5430	5430
500	1735	1140	1735	1735	1735	2605	1715	2605	2605	2605	5210	3430	5210	5210	5210
550	1640	1100	1640	1640	1640	2460	1650	2460	2460	2460	4925	3305	4925	4925	4925
600	1540	1060	1540	1540	1540	2310	1590	2310	2310	2310	4620	3180	4620	4620	4620
650	1430	1020	1430	1430	1430	2150	1535	2150	2150	2150	4300	3070	4300	4300	4300
700	1305	985	1370	1340	1340	1960	1480	2055	2010	2010	3920	2960	4110	4025	4025
750	1180	950	1305	1245	1245	1775	1425	1960	1870	1870	3550	2580	3920	3745	3745
800	1015	915	1240	1155	1155	1525	1370	1865	1735	1735	3050	2745	3730	3470	3470
850	830	880	1180	1060	1060	1250	1330	1770	1595	1595	2500	2660	3540	3190	3190
900	615	860	1115	970	970	925	1290	1675	1455	1455	1885	2580	3350	2915	2915
950	425	845	1055	880	880	640	1270	1580	1320	1320	1295	2540	3165	2640	2640
1000	235	830	990	740	695	350	1250	1485	1115	1040	715	2500	2975	2230	2085

2. Size Identification

The size of fitting is identified by the nominal pipe size. For reducing fittings, the size of the largest run opening is to be given first, followed by the size of the opening opposite of the same run. The branch size of a Tee is given last. Where the case is a Cross, the largest side-outlet is thirdly given, then the opening opposite.



3. Threads

- Unless otherwise specified in inquiry, all threaded fittings are supplied with NPT threads (ASME B1.20.1 American National Standard Taper Pipe Threads) for reference, other available threads are:
- ISO/R7, Pipe Threads for Gas List Tubes and Screwed Fittings where Pressure-tight Joints are made on the threads (BS 2.1 & JIS B0203 PT Thread).
 - API 5B, Line Pipe Threads.
 - KS B0222 Taper Pipe Threads.

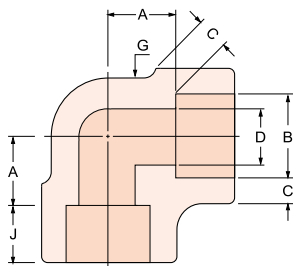
4. Bore Diameter of Fittings

Bore Diameter of fittings(B),(S) are manufactured for conforming with KS, JIS, ASME or MSS dimension.

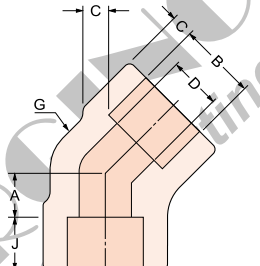
FORGED STEEL/SOCKET WELDING FITTINGS

90° Elbow, 45° Elbow

3000# 6000# 9000#



90° Elbow



45° Elbow

ANSI B16.11

Unit : mm

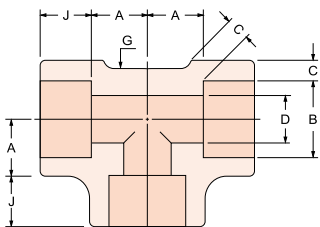
Nom Pipe Size	Socket Bore Dia	Bore Diameter of Fitting-D			Socket Wall Thickness C(Ave/Min)			Depth of Socket Min-J
	B	3000	6000	9000	3000	6000	9000	
1/8	10.65 11.15	6.1~7.6	3.2~4.8	-	3.20/3.20	3.95/3.45	-	10
1/4	14.10 14.60	8.5~10.0	5.6~7.1	-	3.80/3.30	4.60/4.00	-	10
3/8	17.55 18.05	11.8~13.3	8.4~9.9	-	4.00/3.50	5.05/4.32	-	10
1/2	21.70 22.20	15.0~16.6	11.0~12.5	5.6~7.2	4.65/4.10	5.95/5.20	9.35/8.20	10
3/4	27.05 27.55	20.2~21.7	14.8~16.3	10.3~11.8	4.90/4.25	6.95/6.05	9.80/8.55	13
1	33.80 34.30	25.9~27.4	19.9~21.5	14.5~16.0	5.70/5.00	7.90/6.95	11.40/9.95	13
1 1/4	42.55 43.05	34.3~35.8	28.7~30.2	22.0~23.5	6.05/5.30	7.90/6.95	12.15/10.60	13
1 1/2	48.65 49.15	40.1~41.7	33.2~34.7	27.2~28.7	6.35/5.55	8.90/7.80	12.70/11.15	13
2	61.10 61.60	51.7~53.5	42.1~43.6	37.4~38.9	6.95/6.05	10.90/9.50	13.85/12.15	16
2 1/2	73.80 74.45	61.2~64.2	-	-	8.75/7.65	-	-	16
3	89.80 90.40	76.4~79.5	-	-	9.50/8.30	-	-	16
4	115.45 116.05	100.7~103.8	-	-	10.70/9.35	-	-	19

NOTE : 1. Dimensions are in millimeters.
2. Average of socket wall thickness around periphery shall be no less than listed values.
The minimum values are permitted in localized areas.

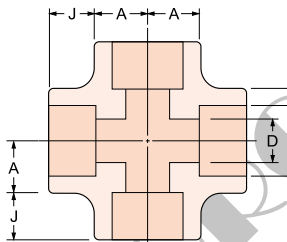
FORGED STEEL/SOCKET WELDING FITTINGS

Tee, Cross

3000# 6000# 9000#



Tee



Cross

ANSI B16.11

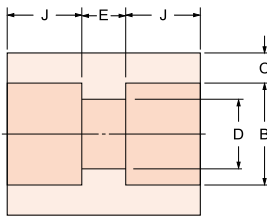
Unit : mm

Nom Pipe Size	Body Wall Thickness Min-G			Center to Bottom of Socket-A					
				90° Elbow, Tees and Crosses			45° Elbow		
	3000	6000	9000	3000	6000	9000	3000	6000	9000
1/8	2.40	3.15	-	10~12	10~12	-	7~9	7~9	-
1/4	3.00	3.70	-	10~12	13~17	-	7~9	7~9	-
3/8	3.20	4.00	-	12~15	14~17	-	6~9	10~13	-
1/2	3.75	4.80	7.45	14~17	18~21	24~27	10~13	11~14	14~17
3/4	3.90	5.55	7.80	18~21	21~24	27~30	11~14	13~16	17~21
1	4.55	6.35	9.10	20~24	25~29	30~34	12~16	15~19	19~23
1 1/4	4.85	6.35	9.70	25~29	30~34	33~37	15~19	19~23	20~24
1 1/2	5.10	7.15	10.15	30~34	36~40	36~40	19~23	23~27	23~28
2	5.55	8.75	11.05	36~40	39~43	52~56	23~27	27~31	26~31
2 1/2	7.00	-	-	39~44	-	-	27~31	-	-
3	7.60	-	-	55~60	-	-	29~34	-	-
4	8.55	-	-	64~69	-	-	39~44	-	-

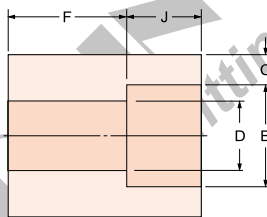
FORGED STEEL/SOCKET WELDING FITTINGS

Full Coupling
Half Coupling

3000# 6000# 9000#



Full Coupling



Half Coupling

ANSI B16.11

Unit : mm

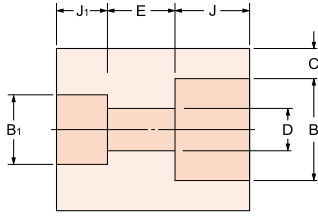
Nom Pipe Size	Socket Bore Dia	Bore Diameter of Fitting-D			Socket Wall Thickness C(Ave/Min)			Depth Min J	Laying Lengths		
		B	3000	6000	9000	3000	6000		9000	F/C	H/C
										E	F
⅝	10.65 11.15	6.1~7.6	3.2~4.8	-	3.20/3.20	3.95/3.45	-	10	5~8	15~17	
¼	14.10 14.60	8.5~10.0	5.6~7.1	-	3.80/3.30	4.60/4.00	-	10	5~8	15~17	
⅜	17.55 18.05	11.8~13.3	8.4~9.9	-	4.00/3.50	5.05/4.32	-	10	5~9	16~19	
½	21.70 22.20	15.0~16.6	11.0~12.5	5.6~7.2	4.65/4.10	5.95/5.20	9.35/8.20	10	6~13	21~24	
¾	27.05 27.55	20.2~21.7	14.8~16.3	10.3~11.8	4.90/4.25	6.95/6.05	9.80/8.55	13	6~13	22~25	
1	33.80 34.30	25.9~27.4	19.9~21.5	14.5~16.0	5.70/5.00	7.90/6.95	11.40/9.95	13	9~17	27~31	
1¼	42.55 43.05	34.3~35.8	28.7~30.2	22.0~23.5	6.05/5.30	7.90/6.95	12.15/10.60	13	9~17	28~32	
1½	48.65 49.15	40.1~41.7	33.2~34.7	27.2~28.7	6.35/5.55	8.90/7.80	12.70/11.15	13	9~17	30~34	
2	61.10 61.60	51.7~53.5	42.1~43.6	37.4~38.9	6.95/6.05	10.90/9.50	13.85/12.15	16	15~23	39~43	
2½	73.80 74.45	61.2~64.2	-	-	8.75/7.65	-	-	16	14~24	40~45	
3	89.80 90.40	76.4~79.5	-	-	9.50/8.30	-	-	16	14~24	42~47	
4	115.45 116.05	100.7~103.8	-	-	10.70/9.35	-	-	19	14~24	45~50	

NOTE : 1. Dimensions are in millimeters.
2. Average of socket wall thickness around periphery shall be no less than listed values.
The minimum values are permitted in localized areas.

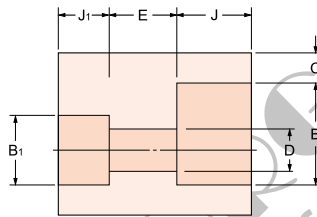
FORGED STEEL/SOCKET WELDING FITTINGS

Concentric Reducer
Eccentric Reducer

3000# 6000# 9000#



Concentric Reducer



Eccentric Reducer

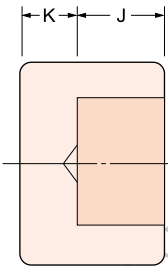
Unit : mm

Nom Pipe Size	Socket Bore Dia Min		Bore Diameter of Fitting-D			Socket Wall Thickness C(Ave/Min)			Depth Min		Laying Lengths (Min/Max)
	B	B1	3000	6000	9000	3000	6000	9000	J	J1	E
1/4 x 1/8	14.10/14.60	10.65/11.15	6.1/7.6	3.2/4.8	-	3.80/3.30	4.60/4.00	-	10	10	5/8
3/8 x 1/4	17.55/18.05	14.10/14.60	8.5/10.0	5.6/7.1	-	4.00/3.50	5.05/4.35	-	10	10	5/9
1/2 x 1/4	21.70/22.20	14.10/14.60	8.5/10.0	5.6/7.1	-	4.65/4.10	5.95/5.20	9.35/8.20	10	10	6/13
1/2 x 3/8	-	17.55/18.05	11.3/13.3	8.4/9.9	-	-	-	-	10	10	-
3/4 x 1/4	27.055/27.55	14.10/14.60	8.5/10.0	5.6/7.1	-	4.90/4.25	6.95/6.05	9.80/8.55	13	10	6/13
3/4 x 3/8	-	17.55/18.05	11.3/13.3	8.4/9.9	-	-	-	-	13	10	-
1 x 1/2	-	21.70/22.20	15.0/16.6	11.0/12.5	5.6/7.2	-	-	-	13	10	-
1 x 3/8	33.80/34.30	17.55/18.05	11.3/13.3	8.4/9.9	-	5.70/5.00	7.90/6.95	11.40/9.95	13	10	9/17
1 x 1/2	-	21.70/22.20	15.0/16.6	11.0/12.5	5.6/7.2	-	-	-	13	10	-
1 x 3/4	-	27.05/27.55	20.2/21.7	14.8/16.3	10.3/11.8	-	-	-	13	13	-
1 1/4 x 1/2	42.55/43.05	21.70/22.20	15.0/16.6	10.2/12.5	5.6/7.2	6.05/7.30	7.90/6.95	12.15/10.60	13	13	9/17
1 1/4 x 3/4	-	27.05/27.55	20.2/21.7	14.8/16.3	10.3/11.8	-	-	-	13	13	-
1 1/4 x 1	-	33.80/34.30	25.9/27.4	19.9/21.5	14.5/16.0	-	-	-	13	13	-
1 1/2 x 3/4	48.65/49.15	27.05/27.55	20.2/21.7	14.8/16.3	14.8/16.3	6.35/5.55	8.90/7.80	12.70/11.15	13	13	9/17
1 1/2 x 1	-	33.80/34.30	25.9/27.4	19.9/21.5	14.5/16.0	-	-	-	13	13	-
1 1/2 x 1 1/4	-	42.55/43.05	34.3/35.8	28.7/30.2	22.0/23.5	-	-	-	13	13	-
2 x 1	61.10/61.60	33.80/34.30	25.9/27.4	19.9/21.5	14.5/16.0	6.95/6.05	10.90/9.50	13.85/12.15	16	13	15/23
2 x 1 1/4	-	42.55/43.05	34.3/35.8	28.7/30.2	22.0/23.5	-	-	-	16	13	-
2 x 1 1/2	-	48.65/49.15	40.1/41.7	33.2/34.7	27.2/28.7	-	10.90/9.00	-	16	13	-
2 1/2 x 1 1/4	73.80/74.45	42.55/43.05	34.3/35.8	28.7/30.2	22.0/23.5	8.75/7.65	-	-	16	13	14/24
2 1/2 x 1 1/2	-	48.65/49.15	40.1/41.7	33.2/34.7	27.2/28.7	-	-	-	16	13	-
2 1/2 x 2	-	61.10/61.60	51.7/53.5	42.1/43.6	27.4/38.9	-	-	-	16	13	-
3 x 1 1/2	89.30/90.40	48.65/49.15	40.1/41.7	33.2/34.7	-	9.50/8.30	-	-	16	16	14/24
3 x 2	-	61.10/61.60	51.7/53.5	42.1/43.6	-	-	-	-	16	16	-
3 x 2 1/2	-	73.80/74.45	61.2/64.2	-	-	-	-	-	16	16	-
4 x 2	115.45/116.05	61.10/61.60	51.7/53.5	-	-	10.70/9.35	-	-	19	16	14/24
4 x 2 1/2	-	73.80/74.45	61.2/64.2	-	-	-	-	-	19	16	-
4 x 3	-	89.30/90.40	74.4/79.5	-	-	-	-	-	19	16	-

FORGED STEEL/SOCKET WELDING FITTINGS

Cap

3000# 6000# 9000#



ANSI B16.11

Unit : mm

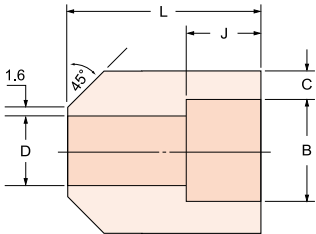
Nom Pipe Size	Socket Bore Dia	Socket Wall Thickness C(Ave/Min)			Depth Min J	Socket Wall Thickness K(Min)		
	B	3000	6000	9000		3000	6000	9000
⅛	10.65 11.15	3.20/3.20	3.20/3.20	-	10	5.0	6.5	-
¼	14.10 14.60	3.80/3.30	4.60/4.00	-	10	5.0	6.5	-
⅜	17.55 18.05	4.00/3.50	5.05/4.32	-	10	5.0	6.5	-
½	21.70 22.20	4.65/4.10	5.95/5.20	9.35/8.20	10	6.5	8.0	11.0
¾	27.05 27.55	4.90/4.25	6.95/6.05	9.80/8.55	13	6.5	8.0	12.5
1	33.80 34.30	5.70/5.00	7.90/6.95	11.40/9.95	13	9.5	11.0	14.0
1¼	42.55 43.05	6.05/5.30	7.90/6.95	12.15/10.60	13	9.5	11.0	14.0
1½	48.65 49.15	6.35/5.55	8.90/7.80	12.70/11.15	13	11.0	12.5	16.0
2	61.10 61.60	6.95/6.05	10.90/9.50	13.85/12.15	16	12.5	16.0	19.0
2½	73.80 74.45	8.75/7.65	-	-	16	16.0	19.0	-
3	89.80 90.40	9.50/8.30	-	-	16	19.0	22.0	-
4	115.45 116.05	10.70/9.35	-	-	19	22.0	28.5	-

NOTE : 1. Dimensions are in millimeters.
2. Average of socket wall thickness around periphery shall be no less than listed values.
The minimum values are permitted in localized areas.

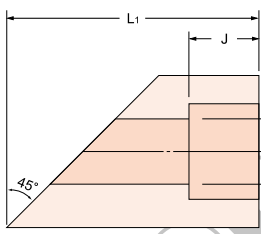
FORGED STEEL/SOCKET WELDING FITTINGS

Boss

3000# 6000# 9000#



Type. 1



Type. 2

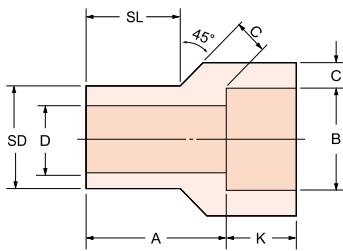
Unit : mm

Nom Pipe Size	Socket Bore Dia	Bore Diameter of Fitting-D			Socket Wall Thickness C(Ave/Min)			Depth Min J	End to End	
	B	3000	6000	9000	3000	6000	9000		L	L ₁
¼	14.10 14.60	8.5~10.0	5.6~7.1	-	3.80/3.30	4.60/4.00	-	10	25.7	62
⅜	17.55 18.05	11.8~13.3	8.4~9.9	-	4.00/3.50	5.05/4.32	-	10	27.5	66
½	21.70 22.20	15.0~16.6	11.0~12.5	5.6~7.2	4.65/4.10	5.95/5.20	9.35/8.20	10	32.4	82
¾	27.05 27.55	20.2~21.7	14.8~16.3	10.3~11.8	4.90/4.25	6.95/6.05	9.80/8.55	13	36.9	88
1	33.80 34.30	25.9~27.4	19.9~21.5	14.5~16.0	5.70/5.00	7.90/6.95	11.40/9.95	13	41.4	96
1¼	42.55 43.05	34.3~35.8	28.7~30.2	22.0~23.5	6.05/5.30	7.90/6.95	12.15/10.60	13	43.2	105
1½	48.65 49.15	40.1~41.7	33.2~34.7	27.2~28.7	6.35/5.55	8.90/7.80	12.70/11.15	13	44.8	112
2	61.10 61.60	51.7~53.5	42.1~43.6	37.4~38.9	6.95/6.05	10.90/9.50	13.85/12.15	16	57.1	125

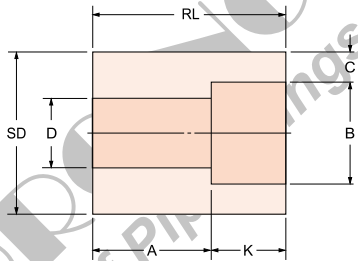
FORGED STEEL/SOCKET WELDING FITTINGS

Reducer Insert

3000# 6000#



Type. 1



Type. 2⁽¹⁾

MSS SP-79

Unit : mm

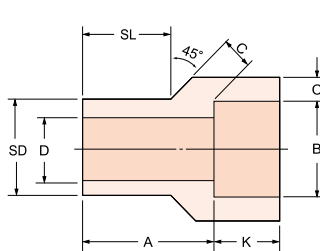
Nominal Pipe Size	Type ⁽²⁾		Socket Min		Shank Dia SD	Laying Length A		Bore D		Wall Thickness Min C		Length Min			
	3M	6M	Dia B	Depth K		3M	6M	3M	6M	3M	6M	SL		RL	
												3M	6M	3M	6M
¾ × ¼	1	1	14.22	10	17.15	19	21	9.0	6.5	3.78	4.60	14	16	-	-
½ × ¾	1	1	17.65	10	21.34	21	23	12.5	9.0	4.01	5.03	16	16	-	-
× ¼	2	1	14.22	10	21.34	21	21	9.0	6.0	3.78	4.60	16	16	-	-
¾ × ½	1	1	21.84	10	26.67	22	25	16.0	11.5	4.67	5.97	17	19	-	-
× ¾	2	1	17.65	10	26.67	16	22	12.5	9.0	4.01	5.03	-	19	21	-
× ¼	2	2	14.22	10	26.67	18	22	9.0	6.5	3.78	4.60	-	-	21	32
1 × ¾	1	1	27.18	13	33.40	24	28	21.0	15.5	4.90	6.96	19	21	-	-
× ½	2	1	21.84	10	33.40	16	28	16.0	11.5	4.67	5.97	-	21	28	-
× ¾	2	2	17.65	10	33.40	18	22	12.5	9.0	4.01	5.03	-	-	28	33
× ¼	2	2	14.22	10	33.40	19	24	9.0	6.0	3.78	4.60	-	-	28	33
1¼ × 1	1	1	33.91	13	42.16	25	60	26.5	20.5	5.69	7.92	21	22	-	-
× ¾	2	2	27.18	13	42.16	18	21	21.0	15.5	4.90	6.96	-	-	32	35
× ½	2	2	21.84	10	42.16	19	22	16.0	11.5	4.67	5.97	-	-	32	35
× ¾	2	2	17.65	10	42.16	21	24	12.5	9.0	4.01	5.03	-	-	32	35
× ¼	2	2	14.22	10	42.16	22	25	9.0	6.0	3.78	4.60	-	-	32	35
1½ × 1¼	1	1	42.67	13	48.26	28	35	35.0	29.5	6.07	7.92	22	25	-	-
× 1	2	1	33.91	13	48.26	18	29	26.5	20.5	5.69	7.92	-	25	33	-
× ¾	2	2	27.18	13	48.26	19	25	21.0	15.5	4.90	6.96	-	-	33	40
× ½	2	2	21.84	10	48.26	21	27	16.0	11.5	4.67	5.97	-	-	33	40
× ¾	2	2	17.65	10	48.26	22	28	12.5	9.0	4.01	5.03	-	-	33	40

NOTE : 1. At the option of the manufacturer Type 2 Reducers may be furnished in Type 1 configuration.
2. 3M and 6M symbols denote 3000 and 6000 classes.

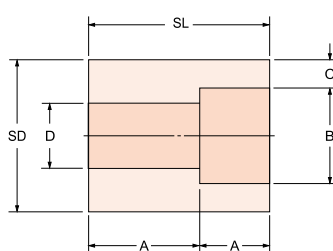
FORGED STEEL/SOCKET WELDING FITTINGS

Reducer Insert

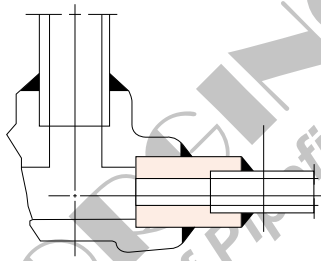
3000# 6000#



Type. 1



Type. 2⁽¹⁾



Application of Reducer Insert

MSS SP-79

Unit : mm

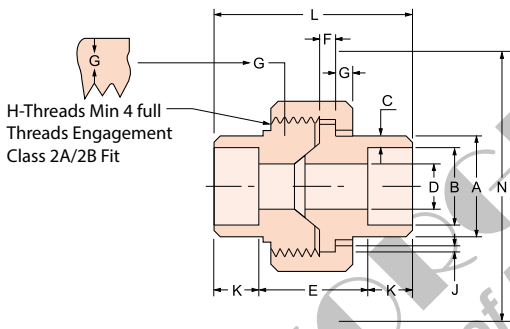
Nominal Pipe Size	Type ⁽²⁾		Socket Min		Shank Dia SD	Laying Length A		Bore D		Wall Thickness Min C		Length Min			
	3M	6M	Dia B	Depth K		3M	6M	3M	6M	3M	6M	SL		RL	
												3M	6M	3M	6M
2 × 1½	1	1	48.77	13	60.32	32	39	41.0	34.0	6.35	8.90	25	28	-	-
× 1¼	2	2	42.67	13	60.32	21	24	35.0	29.5	6.07	7.92	-	-	38	41
× 1	2	2	33.91	13	60.32	22	25	26.5	20.5	5.69	7.92	-	-	38	41
× ¾	2	2	27.18	13	60.32	24	27	21.0	15.5	4.90	6.96	-	-	38	41
× ½	2	2	21.84	10	60.32	25	28	16.0	11.5	4.67	5.97	-	-	38	41
2½ × 2	1	1	61.24	16	73.02	46	43	52.5	43.0	6.93	10.92	38	32	-	-
× 1½	2	-	48.77	13	73.02	35	-	41.0	-	6.35	-	-	-	54	-
× 1¼	2	-	42.67	13	73.02	37	-	35.0	-	6.07	-	-	-	54	-
× 1	2	-	33.91	13	73.02	38	-	26.5	-	5.69	-	-	-	54	-
× ¾	2	-	27.18	13	73.02	40	-	21.0	-	4.90	-	-	-	54	-
3 × 2½	1	-	74.01	16	88.90	38	-	62.5	-	8.76	-	32	-	-	-
× 2	2	-	61.24	16	88.90	25	-	52.5	-	6.93	-	-	-	48	-
× 1½	2	-	48.77	13	88.90	29	-	41.0	-	6.35	-	-	-	48	-
× 1¼	2	-	42.67	13	88.90	30	-	35.0	-	6.07	-	-	-	48	-
× 1	2	-	33.91	13	88.90	32	-	26.5	-	5.69	-	-	-	48	-
4 × 3	2	-	89.99	16	114.30	33	-	78.0	-	9.50	-	-	-	60	-
× 2½	2	-	74.01	16	114.30	38	-	62.5	-	8.76	-	-	-	60	-
× 2	2	-	61.24	16	114.30	38	-	52.5	-	6.93	-	-	-	60	-
× 1½	2	-	48.77	13	114.30	42	-	41.0	-	6.35	-	-	-	60	-
× 1¼	2	-	42.67	13	114.30	43	-	35.0	-	6.07	-	-	-	60	-

※Laying Length A - Sizes ¾* thru ¾* ±1.50mm
 Sizes 1* thru 2* ±2.00mm
 Sizes 2½* thru 4* ±2.50mm
※Laying Length B - Sizes ¾* thru 2* ±0.13mm
 Sizes 2½* thru 4* ±0.20mm
TOLERANCES
※Bore D - Sizes ¾* thru ¾* ±0.8mm
※Socket Dia SD - Sizes 2½* thru 4* ±1.5mm
 Sizes ¼* thru 1½* ±0.25mm
 Sizes 2* thru 3* ±0.75mm
 Sizes 4* ±0.25mm
※Shank Length
SL - Sizes ¾* thru ¾* -1.5mm
 Sizes 1* thru 2* -2.0mm
 Sizes 2½* thru 4* -2.5mm

FORGED STEEL/SOCKET WELDING FITTINGS

Union

3000#



MSS SP-83

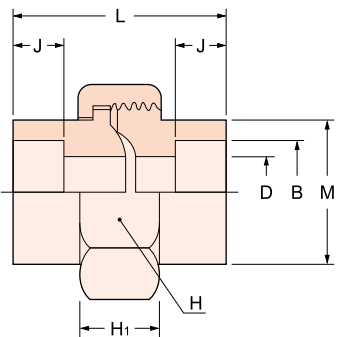
Unit : mm

Nom Pipe Size	Pipe End Min	Socket Bore Dia	Socket Wall Min	Water Way Bore	Laying Length	Male Flange Min	Nut Min	Threads Per 25.4 Max	Bearing Min	Depth of Socket Min	Length Ass'y Nominal	Clear Ass'y Nut
	A	B	C	D	E	F	G	H	J	K	L	N
¼	21.8	14.22 13.97	3.30	9.85 9.45	22.4 19.0	3.17	3.17	16	1.24	9.6	41.4	49.0
⅜	25.9	17.78 17.53	3.48	13.92 13.51	26.9 20.6	3.43	3.43	14	1.37	9.6	46.0	55.0
½	31.2	21.84 21.59	4.06	17.47 17.07	26.9 20.6	3.68	3.68	14	14	9.6	49.0	57.0
¾	37.1	27.18 26.92	4.27	21.79 21.39	31.8 25.4	4.06	4.06	11	1.68	12.7	56.9	67.0
1	45.5	34.04 33.78	4.95	28.14 27.74	34.3 26.2	4.57	4.44	11	1.85	12.7	62.0	79.0
1¼	54.9	42.67 42.42	5.28	35.76 35.36	40.6 32.5	5.33	5.21	11	2.13	12.7	71.1	94.0
1½	61.5	48.77 48.51	5.54	41.61 41.20	42.2 34.0	5.84	5.59	10	2.31	12.7	76.5	111.0
2	75.2	61.47 61.21	6.05	52.53 52.12	45.5 37.3	6.60	6.35	10	2.69	15.8	86.1	132.0
2½	91.7	74.17 73.66	7.65	64.72 64.31	61.7 52.1	7.49	7.11	8	3.07	15.8	102.4	148.0
3	109.2	90.17 89.66	8.31	77.67 77.27	63.8 53.6	8.25	8.00	8	3.53	15.8	109.0	175.0

FORGED STEEL/SOCKET WELDING FITTINGS

Union

3000# 6000#



Unit : mm

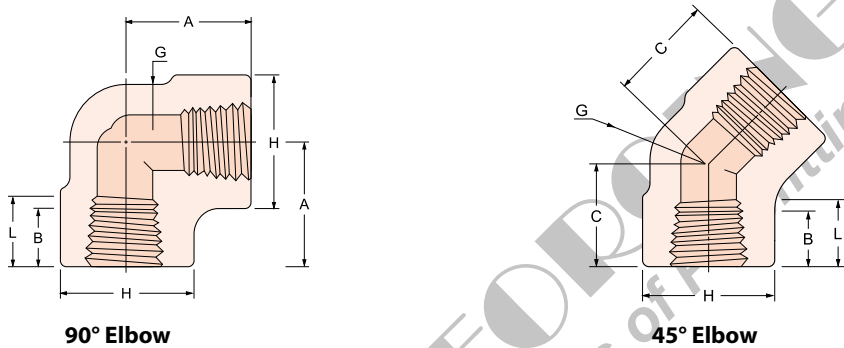
Nom Pipe Size	Socket Bore Dia Min-B	Bore-D		Pipe End-M		Depth Min J	Length Ass'y Nomi-L		Nut-H		Nut-H1	
		3000	6000	3000	6000		3000	6000	3000	6000	3000	6000
¼	14.10	9.0	6.5	23.0	25	10	45	51	38	38	20	20
⅜	17.55	12.5	9.0	25.9	32	10	51	54	42	48	20	20
½	21.70	16.0	11.5	31.5	38	10	54	57	46	55	20	26
¾	27.05	21.0	15.5	38.0	42	13	57	64	55	60	26	26
1	33.80	26.5	20.5	46.0	49	13	64	72	63	72	26	28
1¼	42.55	35.0	29.5	55.0	59	13	72	80	74	82	30	30
1½	48.65	41.0	34.0	61.5	69	13	78	89	82	91	36	36
2	61.10	52.5	43.0	75.5	90	16	89	110	101	120	38	40
2½	73.80	62.5	54.0	92.0	105	16	110	120	120	150	40	45
3	89.80	78.0	66.8	109.2	125	24	110	140	142	176	42	50
4	115.45	102.3	-	140.0	-	24	128	-	180	-	45	-

*Nut-H : 3000# Size ¼ ~ 1" Hexagon, 1¼ ~ 4" : Octagon
6000# Size ⅜ ~ ¾" Hexagon, 1 ~ 3" : Octagon

FORGED STEEL THREADED/FITTINGS

90° Elbow, 45° Elbow

2000# 3000# 6000#



ANSI B16.11

Unit : mm

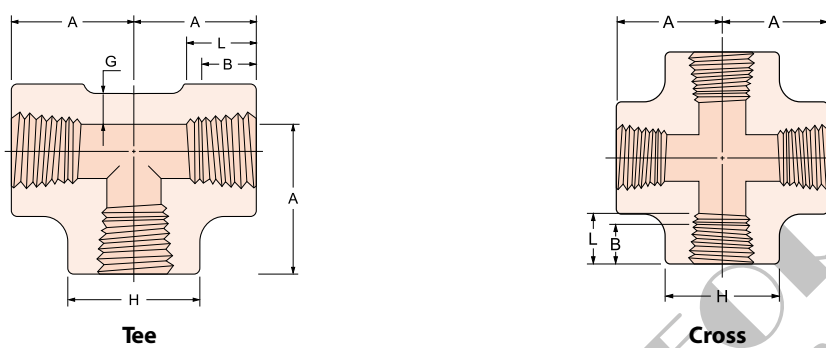
Nom Pipe Size	Center to End Elbows, Tees, Crosses A			Center to End 45° Elbow C			Outside Diameter of Bend H			Minimum Wall Thickness G			Length of thread Min(1)	
	2000	3000	6000	2000	3000	6000	2000	3000	6000	2000	3000	6000	B	L
1/8	21	21	25	17	17	19	22	22	25	3.0	3.0	6.5	6.35	6.70
1/4	21	25	29	17	19	22	22	25	33	3.0	3.5	6.5	8.12	10.20
3/8	25	29	33	19	22	25	25	33	38	3.0	3.5	7.0	9.14	10.36
1/2	29	33	38	22	25	29	33	38	46	3.0	4.0	8.0	10.92	13.55
3/4	33	38	44	25	29	33	38	46	56	3.0	4.5	8.5	12.70	13.86
1	38	44	51	29	33	35	46	56	62	3.5	5.0	10.0	14.73	17.34
1 1/4	44	51	60	33	35	43	56	62	75	4.0	5.5	10.5	17.01	17.95
1 1/2	51	60	64	35	43	44	62	75	84	4.0	5.5	11.0	17.78	18.37
2	60	64	83	43	45	52	75	84	102	4.5	7.0	12.0	19.05	19.21
2 1/2	76	83	95	52	52	64	92	102	121	5.5	7.5	15.5	23.62	28.90
3	86	95	106	64	64	79	110	121	146	6.0	9.0	16.5	25.90	30.48
4	106	114	114	79	79	79	146	152	152	6.5	11.0	18.5	27.68	33.02

NOTE : 1. Dimensions B is minimum length of perfect thread. The length of useful thread(L plus threads with fully formed roots and crests) shall not be less than L(effective length of external thread) required by American National Standard for Pipe Threads(ASME B1.20.1)

FORGED STEEL THREADED/FITTINGS

Tee, Cross

2000# 3000# 6000#



ANSI B16.11

Unit : mm

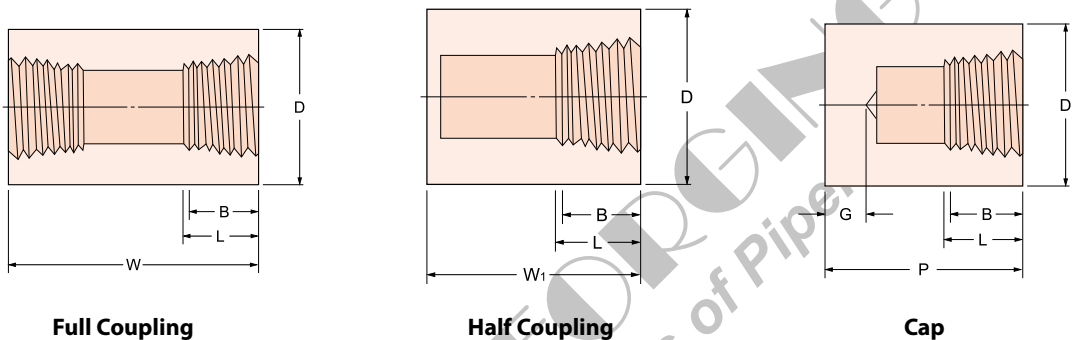
Nom Pipe Size	Center to End Elbows, Tees, Crosses A			Min Outside Diameter of H			Minimum Wall Thickness G			Length of thread Min(1)	
	2000	3000	6000	2000	3000	6000	2000	3000	6000	B	L
1/8	21	21	25	22	22	25	3.0	3.0	6.5	6.35	6.70
1/4	21	25	29	22	25	33	3.0	3.5	6.5	8.12	10.20
3/8	25	29	33	25	33	38	3.0	3.5	7.0	9.14	10.36
1/2	29	33	38	33	38	46	3.0	4.0	8.0	10.92	13.55
3/4	33	38	44	38	46	56	3.0	4.5	8.5	12.70	13.86
1	38	44	51	46	56	62	3.5	5.0	10.0	14.73	17.34
1 1/4	44	51	60	56	62	75	4.0	5.5	10.5	17.01	17.95
1 1/2	51	60	64	62	75	84	4.0	5.5	11.0	17.78	18.37
2	60	64	83	75	84	102	4.5	7.0	12.0	19.05	19.21
2 1/2	76	83	95	92	102	121	5.5	7.5	15.5	23.62	28.90
3	86	95	106	110	121	146	6.0	9.0	16.5	25.90	30.48
4	106	114	114	146	152	152	6.5	11.0	18.5	27.68	33.02

NOTE : 1. Dimensions B is minimum length of perfect thread. The length of useful thread(L plus threads with fully formed roots and crests) shall not be less than L(effective length of external thread) required by American National Standard for Pipe Threads(ASME B1.20.1)

FORGED STEEL THREADED/FITTINGS

Full Coupling
Half Coupling, Cap

3000# 6000#



ANSI B16.11

Unit : mm

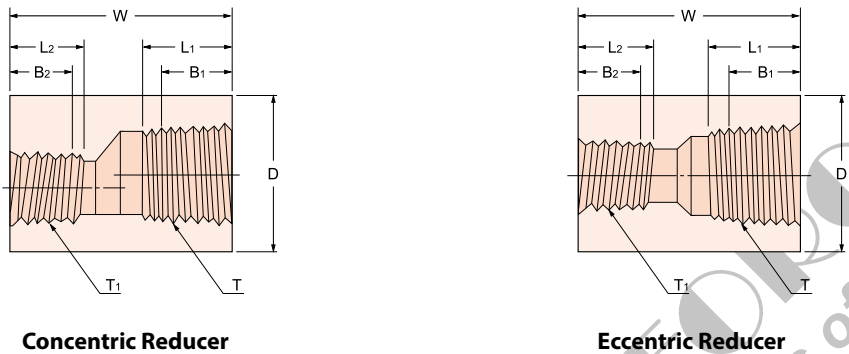
Nom Pipe Size	Outside Diameter-D		Full Coupling End to End W	Half Coupling End to End W	Cap				Length of thread Min(1)	
					End to End-P		Thickness Min-G			
	3000	6000			3000	6000	3000	6000	B	L
1/8	15.7	22.0	32	16.0	19	-	5.0	-	6.35	6.70
1/4	19.0	25.4	35	17.5	25	27	5.0	6.5	8.12	10.20
3/8	22.3	31.8	38	19.0	25	27	5.0	6.5	9.14	10.35
1/2	28.4	38.1	48	24.0	32	33	6.5	8.0	10.92	13.55
3/4	35.0	44.5	51	25.5	37	38	6.5	8.0	12.70	13.86
1	44.5	57.0	60	30.0	41	43	9.5	11.2	14.73	17.34
1 1/4	57.0	63.5	67	33.5	44	46	9.5	11.2	17.01	17.95
1 1/2	63.5	76.2	80	40.0	44	48	11.2	12.7	17.78	18.37
2	76.2	92.0	86	43.0	48	51	12.7	16.0	19.05	19.21
2 1/2	91.9	108.0	92	46.0	60	64	16.0	19.1	23.62	28.90
3	108.0	127.0	108	54.0	65	68	19.1	22.4	25.90	30.48
4	140.0	160.0	121	60.5	68	75	22.4	28.5	27.68	33.02

NOTE : 1. Dimensions B is minimum length of perfect thread. The length of useful thread (L plus threads with fully formed roots and crests) shall not be less than L (effective length of external thread) required by American National Standard for Pipe Threads (ASME B1.20.1)
*Class 2000 and NPS 1/8 class 6000 couplings half couplings, and caps are not included in this standard.

FORGED STEEL THREADED/FITTINGS

Concentric Reducer
Eccentric Reducer

3000# 6000#



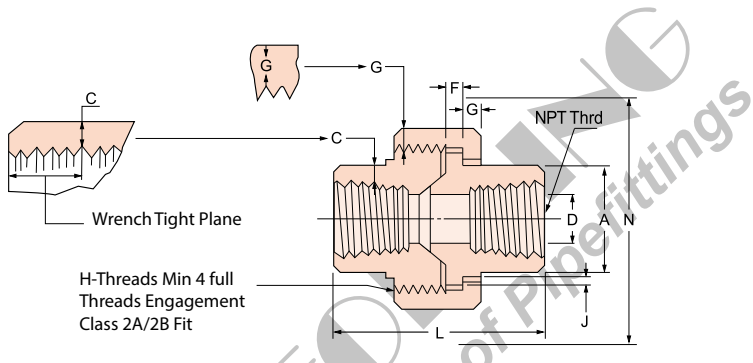
Unit : mm

Nom Pipe Size	Min Outside Diameter-D		End to End W	Length of thread Min(1)				Nom Pipe Size	Min Outside Diameter-D		End to End W	Length of thread Min(1)											
	T × T	3000		6000	6000	B ₁	B ₂		L ₁	L ₂		T × T	3000	6000	6000	B ₁	B ₂	L ₁	L ₂				
¼ × ⅝	19.0	25.4	35	8.12	6.35	10.20	6.70	1½ × 1	63.5	76.0	80	17.78	14.73	18.37	17.34	2 × 1	76.0	92.0	86	19.05	14.73	19.21	17.34
⅝ × ¼	22.0	31.8	38	9.14	8.12	10.35	10.20		63.5	76.0	80	17.78	17.01	18.37	17.95		76.0	92.0	86	19.05	17.01	19.21	17.95
½ × ¼	28.5	38.1	48	10.92	8.12	13.55	10.20	× 1¼	76.0	92.0	86	19.05	17.01	19.21	17.95	× 1½	76.0	92.0	86	19.05	17.78	19.21	18.37
× ⅝	28.5	38.1	48	10.92	9.14	13.55	10.35		76.0	92.0	86	19.05	17.01	19.21	17.95		76.0	92.0	86	19.05	17.78	19.21	18.37
¾ × ¼	35.0	44.5	51	12.70	8.12	13.86	10.20	2½ × 1¼	92.0	108.0	92	23.62	17.01	28.90	17.95	× 1½	92.0	108.0	92	23.62	17.78	28.90	18.37
× ⅝	35.0	44.5	51	12.70	9.14	13.86	10.35		92.0	108.0	92	23.62	17.01	28.90	17.95		92.0	108.0	92	23.62	17.78	28.90	18.37
× ½	35.0	44.5	51	12.70	10.92	13.86	13.55	× 2	92.0	108.0	92	23.62	19.05	28.90	19.21	3 × 1½	108.0	127.0	108	25.90	17.78	30.48	18.37
1 × ⅝	44.5	57.0	60	14.73	9.14	17.34	10.35		92.0	108.0	92	23.62	19.05	28.90	19.21		108.0	127.0	108	25.90	19.05	30.48	19.21
× ½	44.5	57.0	60	14.73	10.92	17.34	13.55	× 2	108.0	127.0	108	25.90	19.05	30.48	19.21	× 2½	108.0	127.0	108	25.90	23.62	30.48	28.90
× ¾	44.5	57.0	60	14.73	12.70	17.34	13.86		108.0	127.0	108	25.90	23.62	30.48	28.90		140.0	160.0	121	27.68	19.06	33.02	19.21
1¼ × ½	57.0	63.5	67	17.01	10.92	17.95	13.55	4 × 2	140.0	160.0	121	27.68	19.06	33.02	19.21	× 2½	140.0	160.0	121	27.68	23.62	33.02	28.90
× ¾	57.0	63.5	67	17.01	12.70	17.95	13.86		140.0	160.0	121	27.68	23.62	33.02	28.90		140.0	160.0	121	27.68	25.90	33.02	30.48
× 1	57.0	63.5	67	17.01	14.73	17.95	17.34	× 3	140.0	160.0	121	27.68	25.90	33.02	30.48								
1½ × ¾	63.1	76.0	80	17.78	12.70	18.37	13.86		140.0	160.0	121	27.68	25.90	33.02	30.48								

FORGED STEEL THREADED/FITTINGS

Union

3000#



MSS SP-83

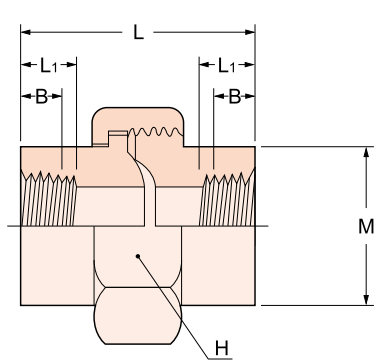
Unit : mm

Nom Pipe Size	Pipe End Min	Socket Wall Min	Water Way Bore	Male Flange Min	Nut Min	Threads Per 25.4 Max	Bearing Min	Length Ass' y Nominal	Clear Ass' y Nut
	A	C	D	F	G	H	J	L	N
1/8	14.7	2.41	6.83 6.43	3.17	3.2	16	1.24	41.4	49.0
1/4	19.0	3.02	9.85 9.45	3.17	3.2	16	1.24	41.4	49.03.2
3/8	22.9	3.20	13.92 13.51	3.43	3.4	14	1.37	46.0	55.0
1/2	27.7	3.73	17.47 17.07	3.68	3.7	14	1.4	49.0	57.0
3/4	33.5	3.91	21.79 21.39	4.06	4.1	11	1.68	56.9	67.0
1	41.4	4.55	28.14 27.74	4.57	4.4	11	1.85	62.0	79.0
1 1/4	50.5	4.85	35.76 35.36	5.33	5.2	11	2.13	71.1	94.0
1 1/2	57.2	5.08	41.61 41.20	5.84	5.6	10	2.31	76.5	111.0
2	70.1	5.54	52.53 52.12	6.60	6.4	10	2.69	86.1	132.0
2 1/2	85.3	7.01	64.72 64.31	7.49	7.1	8	3.07	102.4	148.0
3	102.4	7.62	77.67 77.27	8.25	8.0	8	3.53	109.0	175.0

FORGED STEEL THREADED/FITTINGS

Union

3000# 6000#



Unit : mm

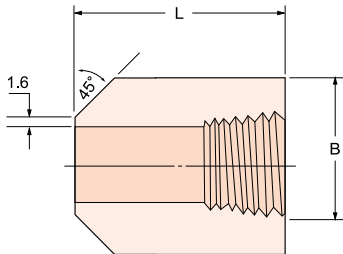
Nom Pipe Size	Pipe End-M		Length Ass' y Nomi-L		Nut-H		Length of Thread Mln	
	3000	6000	3000	6000	3000	6000	L ₁	B
1/4	23.0	30	45	54	38	46	10.20	8.12
3/8	25.9	36	51	57	42	54	10.35	9.14
1/2	31.5	42	54	64	46	60	13.55	10.92
3/4	38.0	49	57	72	55	72	13.86	12.70
1	46.0	56	69	80	63	80	17.34	14.73
1 1/4	55.0	64	72	89	74	94	17.95	17.01
1 1/2	61.5	76	78	108	82	100	18.37	17.78
2	75.5	90	89	114	101	120	19.21	19.05
2 1/2	92.0	105	110	120	120	150	28.90	23.62
3	109.2	125	110	140	142	180	30.48	25.90
4	140.0	-	128	-	180	-	33.02	27.68

*Nut-H : 3000# Size 1/8 ~ 1" Hexagon, 1 1/4 ~ 4" : Octagon
6000# Size 1/8 ~ 3/4" Hexagon, 1 ~ 3" : Octagon

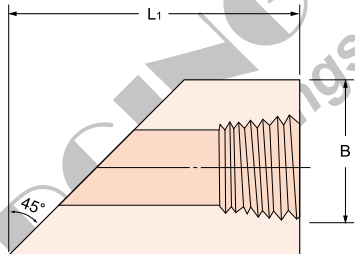
FORGED STEEL THREADED/FITTINGS

Boss

3000# 6000#



Type. 1



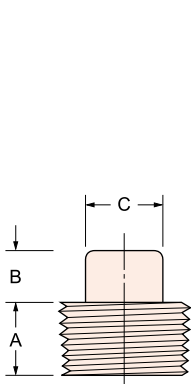
Type. 2

Unit : mm

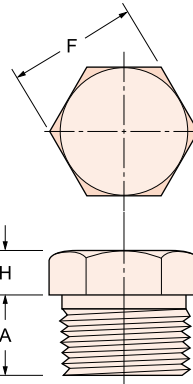
Nom Pipe Size		Outside Diameter-D		End to End	
B	A	3000	6000	L	L ₁
¼	8	19.0	25.4	17.5	62
⅜	10	22.3	31.8	19.0	66
½	15	28.4	38.1	24.0	82
¾	20	35.0	44.5	25.5	88
1	25	44.5	57.0	30.0	96
1¼	32	57.0	63.5	33.5	105
1½	40	63.5	76.2	39.5	112
2	50	76.2	92.0	43.0	125

FORGED STEEL THREADED/FITTINGS

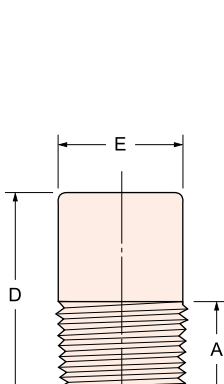
Plug Bushing



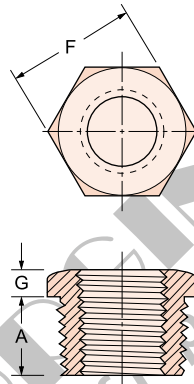
Square Head Plug



Hex Head Plug



Round Head Plug



Hex Head Bushing
[Note (1)]

ANSI B16.11

Unit : mm

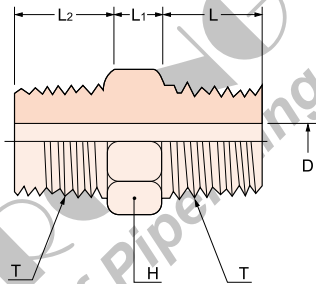
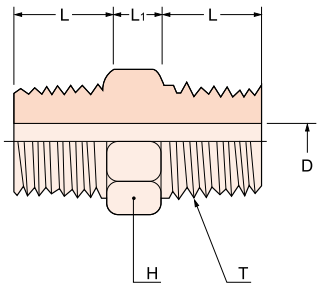
Nom Pipe Size	Length (Min) A	Plugs Square Head		Plugs Round Head		Hex Plugs & Bushing		
		Height of Square (Min) B	Width Flats (Min) C	Length (Min) D	Nominal Diameter of Head E	Width Flats (Nom) F	Hex Height Min	
							Bushing G	Plug H
¼	9.5	6	7.0	35	10	11.0	-	6
¼	11.0	6	9.5	41	13	16.0	3	6
⅜	12.5	8	11.0	41	17	17.5	4	8
½	14.5	10	14.5	44	21	22.0	5	8
¾	16.0	11	16.0	44	27	27.0	6	10
1	19.0	13	20.5	51	33	35.0	6	10
1¼	20.5	14	24.0	51	43	44.5	7	14
1½	20.5	16	28.5	51	48	51.0	8	16
2	22.0	17	33.5	64	60	63.5	9	17
2½	27.0	19	38.0	70	73	76.0	10	19
3	28.5	21	43.0	70	89	89.0	10	21
4	32.0	25	63.5	76	114	117.5	13	25

NOTE : 1. CAUTIONARY NOTE REGARDING HEX HEAD BUSHINGS. Hex HEAD Bushings of one-size reduction should not be used in services wherein they might be subject to harmful loads and forces other than internal pressures.

FORGED STEEL THREADED/FITTINGS

Nipple

3000# 6000#



Reducing Nipple

IHARA STD

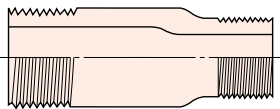
Unit : mm

Nom Pipe Size	D	H	L	L ₁	Nom Pipe Size T x T1	D	H	L	L ₁	L ₂
1/8	5.5	11.0	10	6	3/8 x 1/4	7	18	14	8	14
1/4	7	16.0	14	8	1/2 x 1/4	7	22	19	9	14
3/8	9	18.0	14	8	1/2 x 3/8	9	22	19	9	14
1/2	12	22.0	19	9	3/4 x 1/4	7	27	19	10	14
3/4	15	27.0	19	10	3/4 x 3/8	9	27	19	10	14
1	20	35.0	24	11	3/4 x 1/2	12	27	19	10	19
1 1/4	28	44.0	24	12	1 x 3/8	9	35	24	11	14
1 1/2	32	51.0	25	14	1 x 1/2	12	35	24	11	19
2	40	63.5	26	16	1 x 3/4	15	35	24	11	19
2 1/2	60	76.2	38	18	1 1/4 x 1/2	12	44	24	12	19
3	74	95.0	40	20	1 1/4 x 3/4	15	44	24	12	19
					1 1/4 x 1	20	44	24	12	24
					1 1/2 x 3/4	15	51	25	14	19
					1 1/2 x 1	20	51	25	14	24
					1 1/2 x 1 1/4	28	51	25	14	24
					2 x 1	20	63.5	26	16	24
					2 x 1 1/4	28	63.5	26	16	24
					2 x 1 1/2	32	63.5	26	16	25
					2 1/2 x 1 1/4	28	76.2	38	18	24
					2 1/2 x 1 1/2	32	76.2	38	18	25
					2 1/2 x 2	40	76.2	38	18	26
					3 x 1 1/2	32	95	40	20	25
					3 x 2	40	95	40	20	26
					3 x 2 1/2	60	95	40	20	38

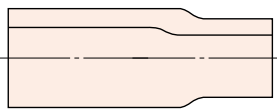
H* : Size 2" and smaller are Hexagonal
Bodles 3" is Octagonal body

FORGED STEEL THREADED/FITTINGS

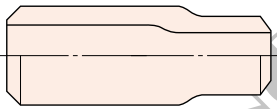
Swaged Nipple



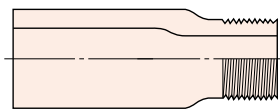
TBE



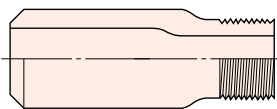
PBE



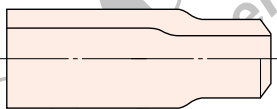
BBE



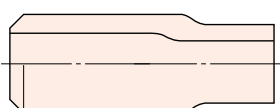
PLE/TSE



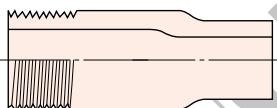
BLE/TSE



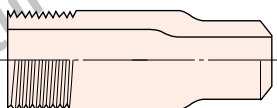
PLE/BSE



BLE/PSE



TLE/PSE



TLE/BSE

MSS SP-95

Large and Size	Small end Size	Length (mm)
1/2	3/8 ~ 1/8	70
3/4	1/2 ~ 1/8	76
1	3/4 ~ 1/8	89
1 1/4	1 ~ 1/8	102
1 1/2	1 1/4 ~ 1/8	114
2	1 1/2 ~ 1/8	165
2 1/2	2 ~ 1/8	178
3	2 1/2 ~ 1/8	203
3 1/2	3 ~ 1/8	203
4	3 1/2 ~ 1/8	229
5	4 ~ 1/4	279
6	5 ~ 1/2	305

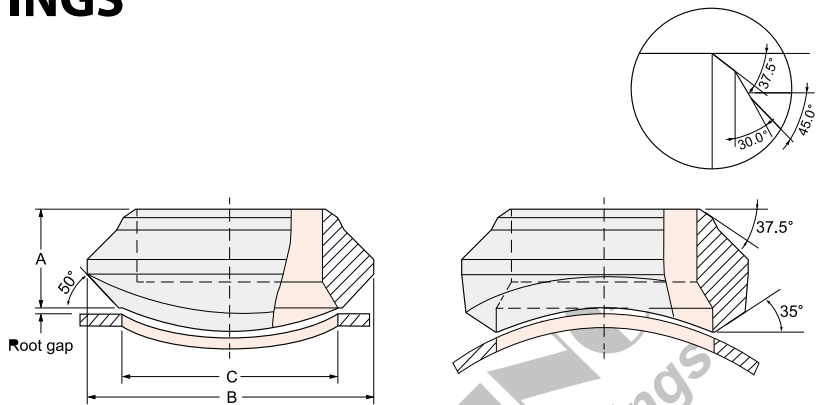
BBE : Beveled both end
TBE : Threaded both end
PBE : Plane both end
PLE/TSE : Plane large end-threaded small end
BLE/TSE : Beveled large end-Threaded small end
TLE/PSE : Threaded large end-Plane small end
BLE/PSE : Beveled large end-Plane small end
PLE/BSE : Plane large end-Beveled small end
TLE/BSE : Threaded large end-Beveled small end

*Pipe schedule numbers and weight
designations accordance with ASME B36.10
*Swaged Nipples are from Forged Steel or Pipe

FORGED OUTLET FITTINGS

Weldolet

STD(Sch40),
X-S(SCH80)
Sch160, XX-S



STD, X-S

Outlet Size	A		B		C	
	STD	X-S	STD	X-S	STD	X-S
½	19.1	19.1	34.9	34.9	23.8	23.8
¾	22.2	22.2	44.5	44.5	30.2	30.2
1	27.0	27.0	54.0	54.0	36.5	36.5
1¼	31.8	31.8	65.1	65.1	44.5	44.5
1½	33.3	33.3	73.0	73.0	50.8	50.8
2	38.1	38.1	88.9	88.9	65.1	65.1
2½	41.3	41.3	103.2	103.2	76.2	76.2
3	44.5	44.5	122.2	122.2	93.7	93.7
4	50.8	50.8	152.4	152.4	120.7	120.7
5	57.2	57.2	179.4	179.4	141.3	141.3
6	60.3	77.8	215.9	225.4	169.9	169.9
8	69.9	98.5	263.5	292.1	220.7	220.7
10	77.8	93.7	322.3	323.9	274.7	265.1
12	85.7	103.2	377.8	397.4	325.4	317.5
14	88.9	100.0	409.6	431.8	357.2	350.8
16	93.7	106.4	463.6	466.7	408.0	403.2
18	96.8	111.1	520.7	523.9	458.0	455.6
20	101.6	119.1	571.5	582.6	508.0	509.6
24	115.9	139.7	689.0	708.0	614.4	638.2

SCH 160, XX-S

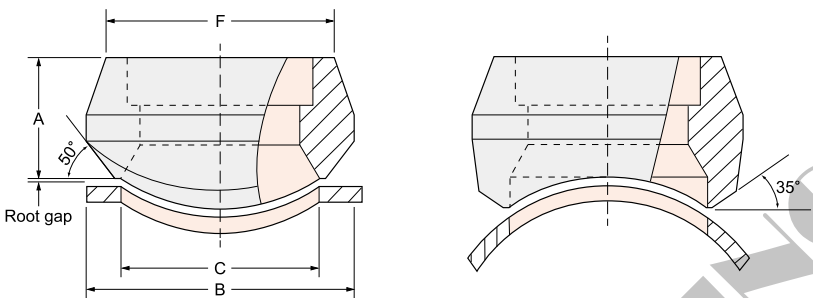
Outlet Size	A		B		C	
	SCH 160	XX-S	SCH 160	XX-S	SCH 160	XX-S
½	28.6	28.6	34.9	34.9	14.3	14.3
¾	31.8	31.8	44.5	44.5	19.1	19.1
1	38.1	38.1	50.8	50.8	25.4	25.4
1¼	44.5	44.5	61.9	61.9	33.3	33.3
1½	50.8	50.8	69.9	69.9	38.1	38.1
2	55.6	55.6	81.0	81.0	42.9	42.9
2½	61.9	61.9	96.8	96.8	54.0	54.0
3	73.0	73.0	120.7	120.7	73.0	73.0
4	84.1	84.1	152.4	152.4	98.4	98.4
5	93.7	93.7	187.3	187.3	122.2	122.2
6	104.8	104.8	220.7	220.7	146.1	146.1
8	111.1	111.1	284.2	284.2	173.0	173.0
10	125.4	125.4	312.7	312.7	215.9	215.9

• Dimensions are in millimeters.
• Applicable Run Pipe Sizes are from Out-Let size to 36 inch.

FORGED OUTLET FITTINGS

Socketlet

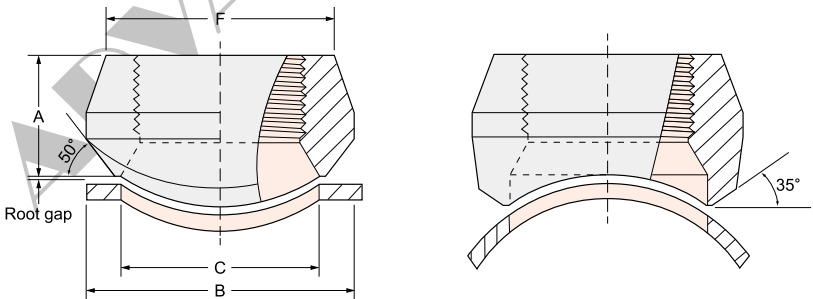
3000# 6000#



Outlet Size	A		B		C		F	
	3000#	6000#	3000#	6000#	3000#	6000#	3000#	6000#
½	25.4	31.8	34.9	44.5	23.8	19.1	31.8	39.7
¾	27.0	36.5	44.5	50.8	30.2	25.4	36.5	45.2
1	33.3	39.7	54.0	61.9	36.5	33.3	46.0	57.2
1¼	33.3	41.3	65.1	69.9	44.5	38.1	55.6	65.1
1½	34.9	42.9	73.0	82.6	50.8	49.2	61.9	76.2
2	38.1	58.7	88.9	103.2	65.1	69.9	74.6	92.1
2½	46.0	-	103.2	-	76.2	-	87.3	-
3	50.8	-	122.2	-	93.7	-	104.8	-
4	57.2	-	152.4	-	120.7	-	130.2	-

Threadolet

3000# 6000#



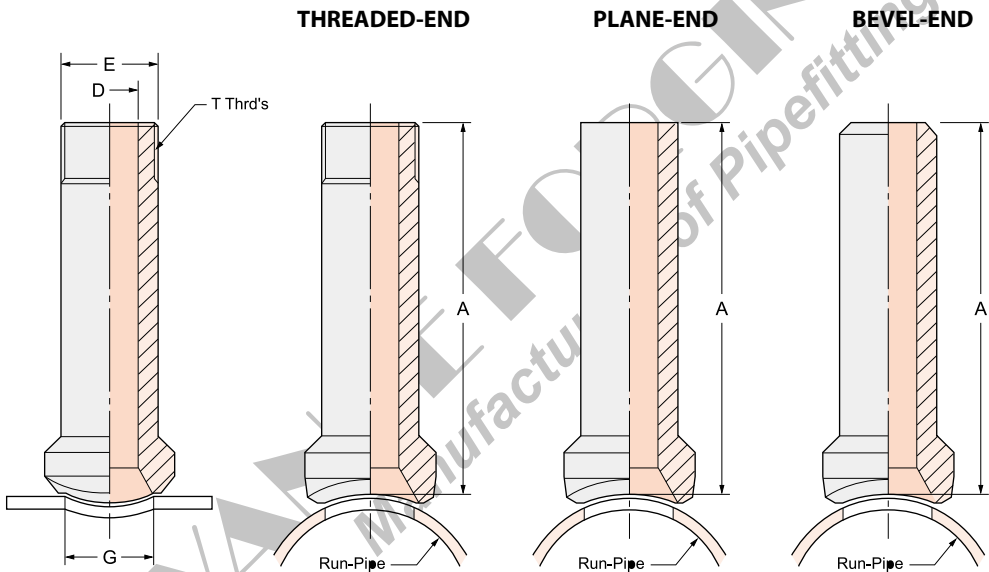
Outlet Size	A		B		C		F	
	3000#	6000#	3000#	6000#	3000#	6000#	3000#	6000#
½	25.4	31.8	34.9	44.5	23.8	19.1	31.8	39.7
¾	27.0	36.5	44.5	50.8	30.2	25.4	36.5	45.2
1	33.3	39.7	54.0	61.9	36.5	33.3	46.0	57.2
1¼	33.3	41.3	65.1	69.9	44.5	38.1	55.6	65.1
1½	34.9	42.9	73.0	82.6	50.8	49.2	61.9	76.2
2	38.1	52.4	88.9	103.2	65.1	69.9	74.6	92.1
2½	46.0	-	103.2	-	76.2	-	87.3	-
3	50.8	-	122.2	-	93.7	-	104.8	-
4	57.2	-	152.4	-	120.7	-	130.2	-

• Dimensions are in millimeters.
• Applicable Run Pipe Sizes are from Out-Let size to 36 inch.
• For the 3000# and 6000# Socketlets and Threadolets, Inside Bore, Thread, Socket Bore and Socket Depth Dimensions are According to ASME B16.11

FORGED OUTLET FITTINGS

Nippolet

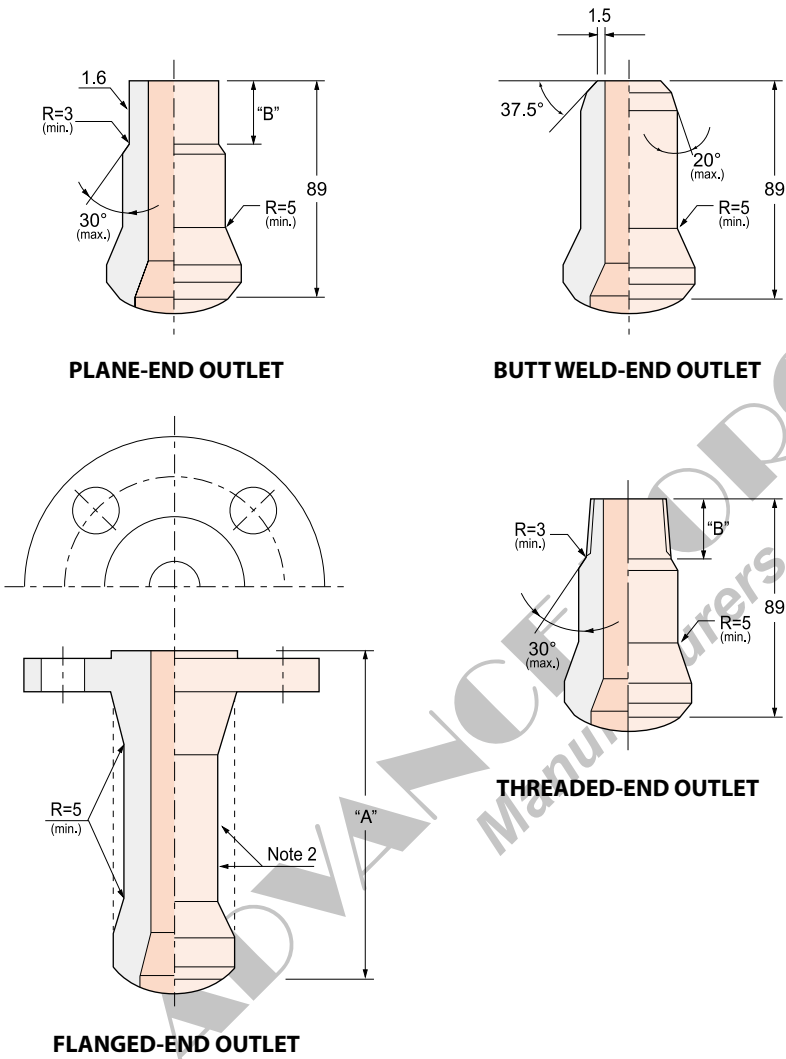
3000#



STD, X-S

Run Pipe Size	Outlet Size T	A	G	D	E	Unit Weight (kg)
36 - ¾	½	88.9	23.9	14.0	21.3	0.36
36 - 1	¾	88.9	30.2	18.8	26.7	0.56
36 - 1¼	1	88.9	36.6	24.4	33.3	0.84
36 - 1½	1¼	88.9	44.5	32.5	42.2	1.22
36 - 2	1½	88.9	50.8	38.1	48.3	2.00
36 - 2½	2	88.9	65.0	49.3	60.5	3.12

FLANGED END OUTLET



Nominal Size DN	"A" (Face of lange to crotch) Class					"B" Min (mm)
	150#	300#	600#	1500#	2500#	
15	150	150	150	150	150	25
20						
25					30	
40						
50						
					165	

NOTE : 1. Dimension are in millimeters
2. Shape only indicative, other shape are also acceptable.

REFERENCES



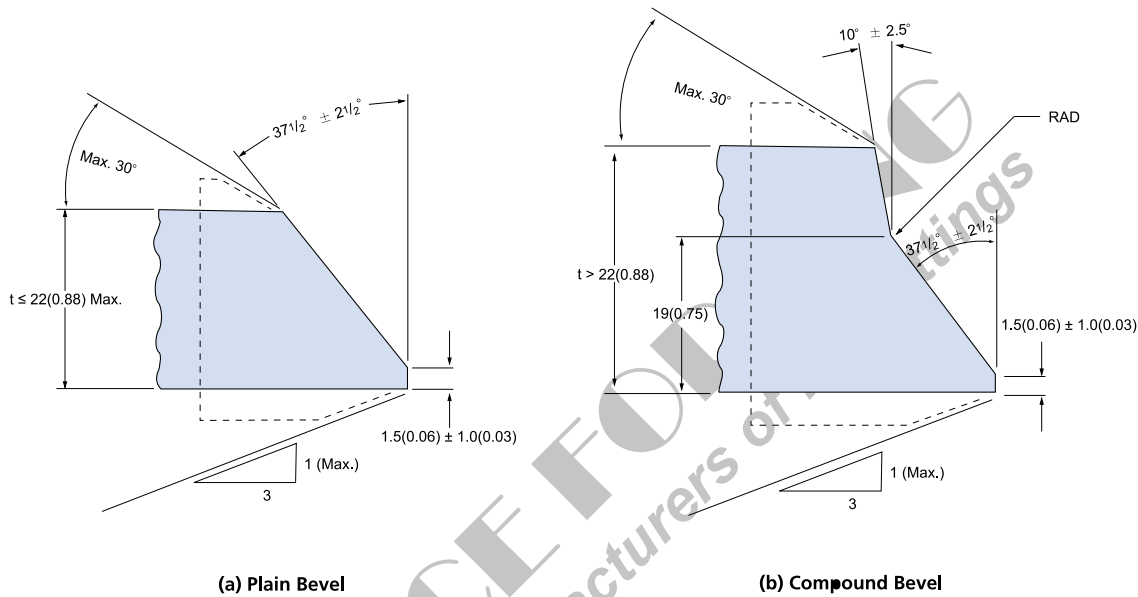
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• Wall Thickness of Welded and Seamless Pipe Carbon, Alloy & Stainless Steel	154

WELDING END PREPARATIONS

ASME B16.9



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 "(b)" above

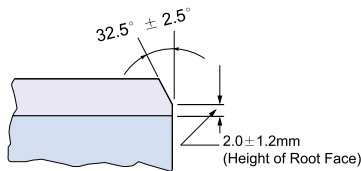
X* = 5(0.19) for carbon steel, ferritic alloy steel or wrought iron;
3(0.12) for austenitic alloy steel

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

WELDING END PREPARATIONS

KS / JIS

1. Steel Butt-Welding Pipe Fittings for Ordinary Use.

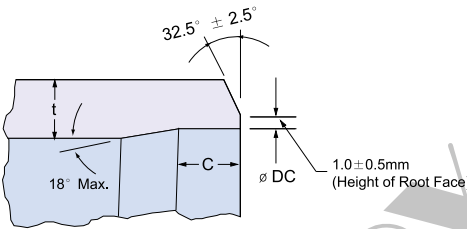


KS B1522
JIS B2311

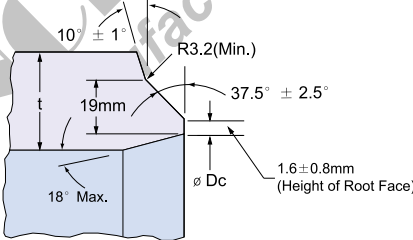
2. Steel Butt-Welding Pipe Fittings for Special Use.

KS B1541
JIS B2312

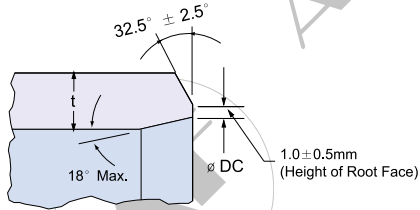
C: In the Case Where t is 22.4mm or Less



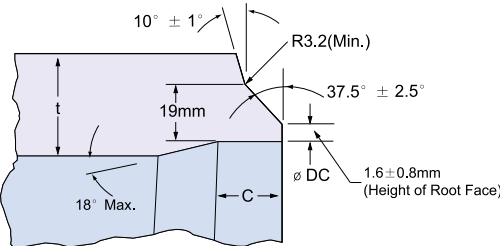
B: In the Case Where t is Over 22.4mm



A: In the Case Where t is 22.4mm or Less



D: In the Case Where t is Over 22.4mm



Where t : nominal wall thickness
Dc : diameter of machining bore
C : length of machining bore

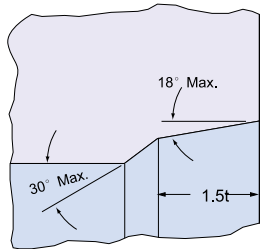
Remarks

- Diameter (Dc) and length (C) of machining bore and dimensional tolerances shall be as agreed between parties concerned.
- Relieving of machining bore may be per formed by providing an inclination of 18° or less from the end face to the limits of 1.5 times the wall thickness, or after cutting to the cylindrical surface to the length of machining bore, providing an inclination of 18° or less to the limits above-indicated, and beyond that portion machining with an inclination of 45° or less.

DIMENSIONAL TOLERANCES

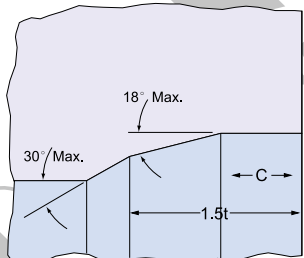
ASME B16.9

For Types A and B of Bevel Shape



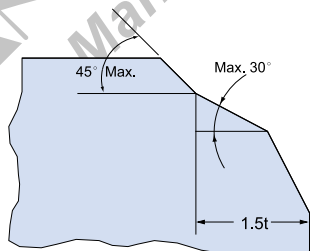
In the figure,
t: nominal wall thickness

For Types C and D of Bevel Shape



In the figure,
t: nominal wall thickness
c: length of machining bore

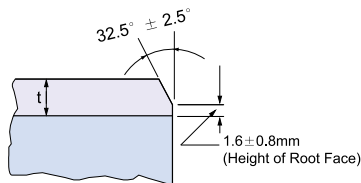
Relieving for outside diameter may be performed by providing an inclination of 30° or less from the end face to the limits of 1.5 times the wall thickness, and beyond that portion machining with an inclination of 45° or less.



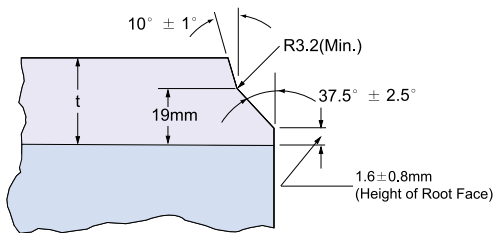
In the figure,
t: nominal wall thickness

3. Steel Plate Butt-Welding Pipe Fittings

Where. $t \leq 22.4 \text{ mm}$



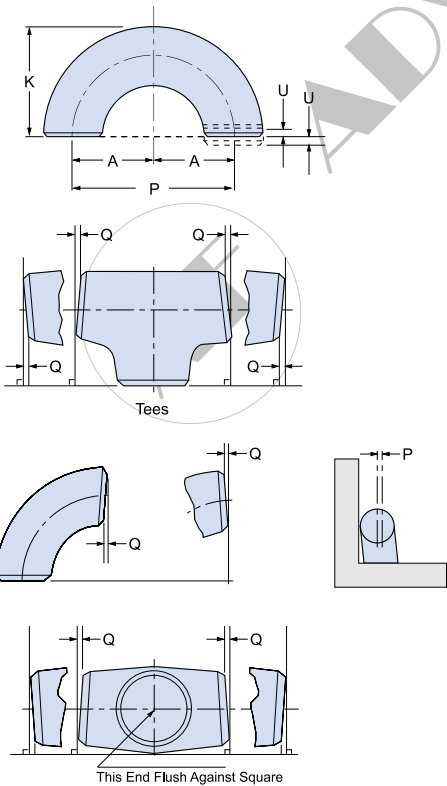
Where. $t > 22.4 \text{ mm}$



Remarks : The shape and dimensions of the special bevel ends are referred to the reference clause stated in KS B1541, JIS B2312.

1. Wrought Steel Butt Welding Fittings

Nominal Pipe Size	All Fittings			90° and 45° Elbows	Tees	Reducers	Caps	180° Returns		
	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
1/2 ~ 2 1/2	+0.06 -0.03	± 0.03	Not less than 87 1/2% of nominal thickness				± 0.12	± 0.25	± 0.25	± 0.03
3 ~ 4	± 0.06	± 0.06		± 0.06	± 0.06	± 0.06				
5 ~ 8	± 0.09 -0.06	± 0.06								
10 ~ 18	+0.16 -0.12	± 0.12		± 0.09	± 0.09	± 0.09	± 0.25	± 0.38		± 0.06
20 ~ 24										
26 ~ 30	+0.25 -0.19	± 0.19		± 0.12	± 0.12					
32 ~ 48				± 0.19	± 0.19	± 0.19	± 0.38	-	-	-



Nominal Pipe Size	Angularity Tolerance	
	Off Angle Q	Off Plane P
1/2 ~ 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.

DIMENSIONAL TOLERANCES

MSS SP-43

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	Concidence of Axis	Center to Bottom of Socket	Bottom to Bottom of Socket	Bottom of Socket to Opposite Face
1/8 ~ 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 1/8 in 12	± 0.03	± 0.06	± 0.03
3/8 ~ 3/4	+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 1/2 ~ 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

Nominal Pipe Size	All Fittings		90° Elbow 45° Elbow Tee	Reducer Lap Joint Stub End	180° Return		
	Outside(1) 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
1/2 ~ 1 1/2	± 0.03	Not less than 87 1/2% of nominal thickness	± 0.06	± 0.06	± 0.25	± 0.25	± 0.03
2 ~ 3 1/2	± 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	± 0.38	± 0.25	± 0.06
20 ~ 24	+0.12 -0.03		± 0.09	± 0.09	± 0.38	± 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
1/2 ~ 1 1/2	± 0.03	Not less than 87 1/2% of nominal thickness	± 0.12	+3 -0.03	+0 -0.03
2 ~ 3 1/2	± 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

KS / JIS

1. Steel Butt-Welding Pipe Fittings for Ordinary Use

{ KS B1522
JIS B2311 }

Item	Type of Pipe Fitting	Nominal Diameter				
		1/2 ~ 2 1/2	3 ~ 4	5 ~ 8	10 ~ 18	20
		Tolerance				
Outside Dia, at end face (OD)	All pipe Fitting	±2	±2.5	±3.5	+5 -4.5	+6.4 -4.8
Inside Dia, at end face (ID)		±2	±2.5	±3.5	±4.5	±4.8
Wall thickness (T)		+Not specified -15%				
Centre-to-end dimension (A,B)	90° Elbow 45° Elbow	±2.0		±3.2		±4.8
Centre-to-centre dimension (P)	180° Elbow	±6.4		±9.5		-
Back-to-face dimension (K)		±6.4				-
Alignment of ends(Max.) (U)		1.6		3.2		-
End-to-end dimension (H)	Reducer	±2.0		±3.2		
Centre-to-end dimension (C,M)	Tee	±2.0		±3.2		
Back-to-face dimension (E)	CAP	±3.2		±6.4		

2. Steel Butt-Welding Pipe Fittings for Special Use and Steel Plate Butt-Welding Pipe Fittings

{ KS B1541, JIS B 2312
KS B1543, JIS B 2313 }

Item	Type of Pipe Fitting	Nominal Diameter						
		1/2 ~ 2 1/2	3 ~ 4	5 ~ 8	10 ~ 18	20 ~ 24	26 ~ 30	32 ~ 36
		Tolerance						
Outside Dia, at end face (OD)	All pipe Fitting	+1.6 -0.8	±1.6	+2.4 -1.6	+4 -3.2	+6.4 -4.8		
Inside Dia, at end face (ID)		±0.8	±1.6		±3.2	±4.8		
Wall thickness (T)		+Not specified -12.5%						
Centre-to-end dimension (A,B)	90° Elbow 45° Elbow	±1.6			±2.4		±3.2	±4.8
Centre-to-centre dimension (P)	180° Elbow	±6.4			±9.5			
Back-to-face dimension (K)		±6.4						
Alignment of ends(Max.) (U)		*± 0.8 **± 1.6	*± 1.6 **± 3.2		-			
End-to-end dimension (H)	Reducer	±1.6			±2.4		±4.8	
Centre-to-end dimension (C,M)	Tee	±1.6			±2.4		±3.2	±4.8
Back-to-face dimension (E)	CAP	±3.2			±6.4			
Outside of end Peripheral length	All pipe Fitting	-					±0.5	

*Application of KS B 1541, JIS B 2312
**Application of KS B 1543, JIS B 2313
• Dimensions are in millimeters.

3. Steel Socket-Wedling Pipe Fittings for Special

{ KS B1542
JIS B2316 }

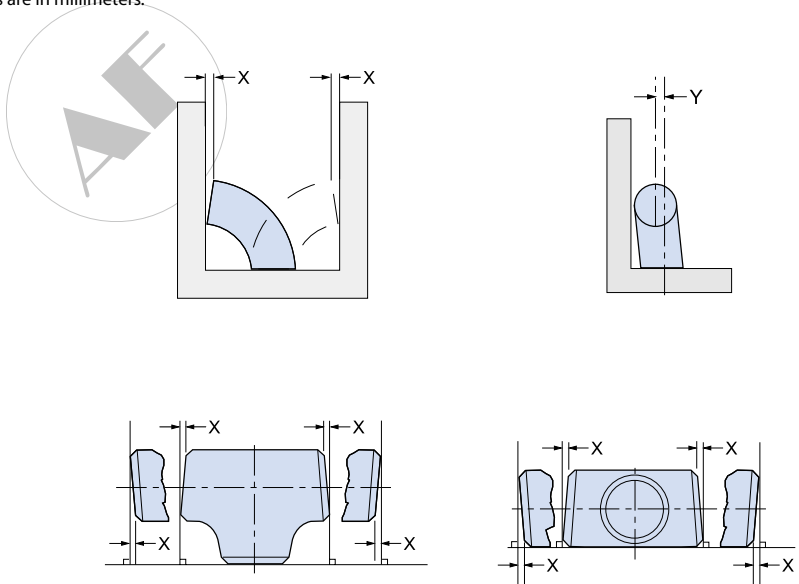
Item	Type of Pipe Fitting	Nominal Diameter			
		1/8 and 1/4	3/8 to 3/4	1 to 2	2 1/2 and 3
		Tolerance			
Inside Diameter of Socket	All pipe Fittings	+0.3 0			+0.4 0
Bore diameter		±0.4			±0.8
Eccentricity of inside Diameter of socket to bore diameter		±0.8			
Inclination of socket hole to fitting bore axis		1.5/300 Max.			
Distance from centre to bottom of socket	45° Elbow 90° Elbow cross	±0.8	±1.5	±2	±2.5
Laying length	Full coupling	±1.5	±3	±4	±5
Laying length	Half coupling	±0.8	±1.5	±2	±2.5

4. Right Angle for Shaft-Center of Pipe Fittings

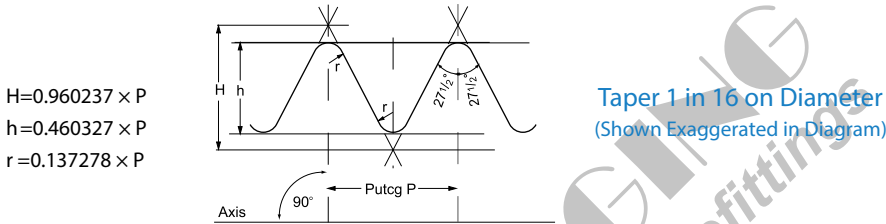
{ KS B1522, JIS B 2311
KS B1541, JIS B 2312
KS B1543, JIS B 2313 }

Item	Type of Pipe Fittling	Nominal Diameter						
		1/2 ~ 4	5 ~ 8	10 ~ 12	14 ~ 16	18 ~ 24	26 ~ 30	32 ~ 42
		Tolerance						
Off Angle (X)	All pipe Fitting	0.8	1.6	2.4		3.2	4.8	
Off Plane (Y)		1.6	3.2	4.8	6.4	9.5		12.7
							19.1	

• Dimensions are in millimeters.



3. BS21-1973 British Standard Taper Pipe Threads. (Except Dryseal)



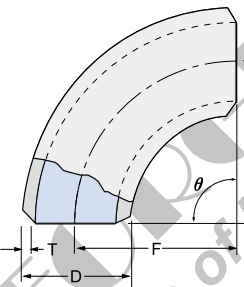
BSP Size (Nominal Bore of Pipe)	No. of Threads per inch	Pitch		Depth of thread		BASIC-Diameters at Grage Plane						Gauge Length							
						Major (Gauge Diameter)		Effective		Minor		Basic		Tolerance Plus and Minus		Max.		Min.	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
1/2	14	0.07143	1.814	0.0457	1.162	0.825	20.955	0.7793	19.793	0.7336	18.631	0.3214	8.2	0.0714	1.8	0.3928	10.0	0.2500	6.4
3/4	14	0.07143	1.814	0.0457	1.162	1.041	26.441	0.9953	25.279	0.9496	24.117	0.3750	9.5	0.0714	1.8	0.4464	11.3	0.3036	7.7
1	11	0.09091	2.039	0.0582	1.479	1.309	33.249	1.2508	31.770	1.1926	30.291	0.4091	10.4	0.0909	2.3	0.5000	12.7	0.3182	8.1
1 1/4	11	0.09091	2.039	0.0582	1.479	1.650	41.910	1.5918	40.431	1.5335	38.952	0.5000	12.7	0.0909	2.3	0.5909	15.0	0.4091	10.4
1 1/2	11	0.09091	2.039	0.0582	1.479	1.882	47.803	1.8238	46.324	1.7656	44.845	0.5000	12.7	0.0909	2.3	0.5909	15.0	0.4091	10.4
2	11	0.09091	2.039	0.0582	1.479	2.347	59.614	2.2888	58.135	2.2306	56.656	0.6250	15.9	0.0909	2.3	0.7159	18.2	0.5341	13.6
2 1/2	11	0.09091	2.039	0.0582	1.479	2.960	75.184	2.9018	73.705	2.8436	72.226	0.6875	17.5	0.1364	3.5	0.8239	21.0	0.5511	14.0
3	11	0.09091	2.039	0.0582	1.479	3.460	87.884	3.4018	86.405	3.3436	84.926	0.8125	20.6	0.1364	3.5	0.9486	24.1	0.6761	17.1
4	11	0.09091	2.039	0.0582	1.479	4.450	113.030	4.3918	111.551	4.3336	110.072	1.000	25.4	0.1364	3.5	1.1364	28.9	0.8636	21.9
5	11	0.09091	2.039	0.0582	1.479	5.450	138.430	5.3918	136.951	5.3336	135.472	1.1250	28.6	0.1364	3.5	1.2614	32.1	0.9886	25.1
6	11	0.09091	2.039	0.0582	1.479	6.450	163.830	6.3918	162.351	6.3336	160.872	1.1250	28.6	0.1364	3.5	1.2614	32.1	0.9886	25.1

BSP Size (Nominal Bore of Pipe)	No. of Threads per inch	Length of Useful Thread on Pipe End Not Less Than.						Fitting Allowance		Wrenhing Allowance		Tolerance of Position of Gauge Plane Relative to Face of Internally Taper Threaded Parts (Plus and Minuts)		BSP Size (Nominal Bore of Pipe)
		For Basic Gauge Length		For Max. Gauge Length		For Min. Gauge Length								
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	
1/2	14	0.5178	13.2	0.5892	15.0	0.4464	11.4	0.1964	5.0	0.1071	2.7	0.0893	2.3	1/2
3/4	14	0.5714	14.5	0.6428	16.3	0.5000	12.7	0.1964	5.0	0.1071	2.7	0.0893	2.3	3/4
1	11	0.6591	16.8	0.7500	19.1	0.5682	14.5	0.2500	6.4	0.1364	3.5	0.1136	2.9	1
1 1/4	11	0.7500	19.1	0.8509	21.4	0.6591	16.8	0.2500	6.4	0.1364	3.5	0.1136	2.9	1 1/4
1 1/2	11	0.7200	19.1	0.8409	21.4	0.6591	16.8	0.2500	6.4	0.1364	3.5	0.1136	2.9	1 1/2
2	11	0.9204	23.4	1.0113	25.7	0.8295	21.1	0.2954	7.5	0.1818	4.6	0.1136	2.9	2
2 1/2	11	1.0511	26.7	1.1875	30.2	0.9247	23.2	0.3636	9.2	0.2273	5.8	0.1364	3.5	2 1/2
3	11	1.1761	29.8	1.3125	33.3	1.0397	26.3	0.3636	9.2	0.2273	5.8	0.1364	3.5	3
4	11	1.4091	35.8	1.5455	39.3	1.2727	32.3	0.4091	10.4	0.2727	6.9	0.1364	3.5	4
5	11	1.5795	40.1	1.7159	43.6	1.4431	36.6	0.4545	11.5	0.3182	8.1	0.1364	3.5	5
6	11	1.5795	40.1	1.7159	43.6	1.4431	36.6	0.4545	11.5	0.3182	8.1	0.1364	3.5	6

APPROX WEIGHT EQUATION

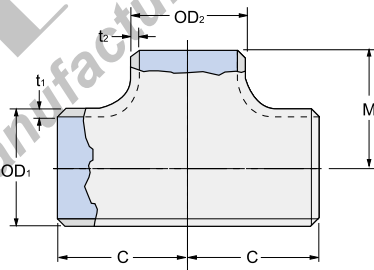
1. ELBOW

$W = 15.4864 \times \theta / 360 \times F \times T \times (D - T) \times 10^{-5}$
W = Weight (kg)
F = Center to End (mm)
D = Outside Diameter (mm)
T = Wall Thickness (mm)
 θ = Angle



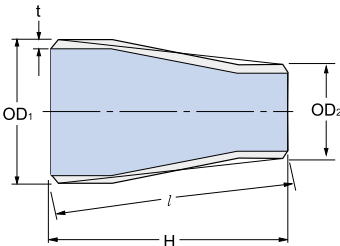
2. TEE

$W = [0.02466 \{ 2Ct_1(OD_1 - t_1) + t_2(OD_2 - t_2) \} \times (M - OD_1/2)] \times 10^{-3} \times K$
W = Weight (kg)
C = Center to End (mm)
OD₁ = Outside Diameter (mm)
t₁ = Wall Thickness (mm)
OD₂ = Outside Diameter (mm)
t₂ = Wall Thickness (mm)
M = Center to End (mm)
K = 1 (PLATE)
K = 1.363 (PIPE)



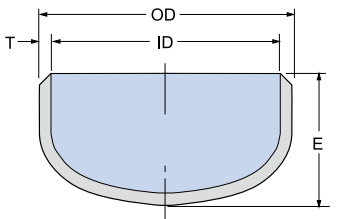
3. REDUCER

$W = 1.232t_1(OD_1 + OD_2 - 2t_1)\ell \times 10^{-5}$
 $\ell = \sqrt{H^2 + (OD_1 - OD_2)^2}$
W = Weight (kg)
H = End to End (mm)
OD₁ = Large Size Outside Diameter (mm)
OD₂ = Small Size
t₁ = Wall Thickness (mm)



4. CAP

$W = 7.85 \times \frac{\pi}{4} (OD + E)^2 \times T \times 10^{-6}$
W = Weight (kg)
OD = Outside Diameter (mm)
T = Wall Thickness (mm)
E = End to End (mm)



BUTT-WELDING FITTINGS APPROX WEIGHT

• 90° ELBOWS

Nominal Pipe Size	Long							Short							Nominal Pipe Size
	SGP	STD	S 40	X-S	S 80	XX-S	S 160	SGP	STD	S 40	X-S	S 80	XX-S	S 160	
1/2	0.08	0.08	0.08	0.10	0.10	0.15	0.12	-	-	-	-	-	-	-	1/2
3/4	0.10	0.11	0.11	0.14	0.14	0.22	0.13	-	-	-	-	-	-	-	3/4
1	0.15	0.16	0.16	0.20	0.20	0.36	0.25	0.10	0.11	0.11	0.14	0.14	0.22	0.17	1
1 1/4	0.26	0.26	0.26	0.35	0.35	0.64	0.42	0.17	0.18	0.18	0.23	0.23	0.39	0.28	1 1/4
1 1/2	0.35	0.37	0.37	0.50	0.50	0.93	0.65	0.24	0.25	0.25	0.33	0.33	0.57	0.43	1 1/2
2	0.64	0.66	0.66	0.90	0.90	1.69	1.33	0.43	0.44	0.44	0.60	0.60	1.13	0.89	2
2 1/2	1.12	1.29	1.29	1.79	1.79	3.43	2.33	0.75	0.91	0.91	1.19	1.19	2.19	1.46	2 1/2
3	1.58	2.04	2.04	2.74	2.74	5.25	3.83	1.05	1.36	1.36	1.83	1.83	3.49	2.55	3
4	2.91	3.84	3.84	5.36	5.36	10.20	8.02	1.94	2.56	2.56	3.58	3.58	6.79	5.35	4
5	4.49	6.48	6.48	9.13	9.13	17.60	14.70	2.99	4.32	4.32	6.09	6.09	11.80	9.79	5
6	7.09	9.94	9.94	15.00	15.00	29.10	24.20	4.73	6.63	6.63	10.00	10.00	19.50	16.20	6
8	14.40	20.10	20.10	30.50	30.50	51.40	53.20	9.61	13.40	13.40	20.30	20.30	34.30	35.50	8
10	25.40	35.40	35.40	47.70	57.00	92.80	103.00	16.90	23.60	23.60	31.80	38.00	61.00	68.60	10
12	38.10	52.00	57.00	68.70	94.00	134.00	171.00	25.40	34.60	38.00	45.80	63.00	89.50	114.00	12
14	56.70	67.90	79.10	89.90	133.00	-	236.00	37.80	45.30	53.00	60.00	89.00	-	158.00	14
16	74.30	89.00	118.00	118.00	195.00	-	350.00	49.50	59.10	79.00	78.30	130.00	-	234.00	16
18	94.20	113.00	169.00	150.00	275.00	-	495.00	62.80	75.30	113.00	99.90	183.00	-	330.00	18
20	116.00	140.00	220.00	186.00	373.00	-	676.00	77.70	93.10	147.00	124.00	249.00	-	451.00	20
22	141.00	169.00	267.00	225.00	493.00	-	886.00	94.10	113.00	178.00	150.00	329.00	-	591.00	22
24	168.00	202.00	366.00	268.00	636.00	-	1160.00	112.00	135.00	244.00	179.00	424.00	-	773.00	24
26	198.00	237.00	430.00	315.00	-	-	-	132.00	158.00	287.00	210.00	-	-	-	26
28	230.00	276.00	500.00	367.00	-	-	-	154.00	184.00	334.00	245.00	-	-	-	28
30	264.00	316.00	575.00	421.00	-	-	-	176.00	211.00	383.00	281.00	-	-	-	30
32	301.00	361.00	654.00	480.00	-	-	-	201.00	241.00	436.00	320.00	-	-	-	32
34	340.00	408.00	739.00	543.00	-	-	-	227.00	272.00	493.00	362.00	-	-	-	34
36	380.00	457.00	904.00	608.00	-	-	-	253.00	304.00	603.00	405.00	-	-	-	36
38	425.00	510.00	-	679.00	-	-	-	283.00	340.00	-	453.00	-	-	-	38
40	471.00	565.00	-	753.00	-	-	-	314.00	377.00	-	502.00	-	-	-	40
42	518.00	622.00	-	828.00	-	-	-	346.00	416.00	-	554.00	-	-	-	42
44	570.00	684.00	-	912.00	-	-	-	380.00	456.00	-	608.00	-	-	-	44
46	623.00	748.00	-	997.00	-	-	-	415.00	499.00	-	665.00	-	-	-	46
48	677.00	814.00	-	1085.00	-	-	-	452.00	543.00	-	724.00	-	-	-	48
50	735.00	884.00	-	1178.00	-	-	-	490.00	589.00	-	786.00	-	-	-	50
52	796.00	956.00	-	1305.00	-	-	-	530.00	637.00	-	870.00	-	-	-	52
54	857.00	1031.00	-	1375.00	-	-	-	572.00	688.00	-	917.00	-	-	-	54
56	926.00	1109.00	-	1480.00	-	-	-	616.00	740.00	-	976.00	-	-	-	56
58	991.00	1190.00	-	1588.00	-	-	-	661.00	794.00	-	1059.00	-	-	-	58
60	1060.00	1274.00	-	1700.00	-	-	-	707.00	849.00	-	1133.00	-	-	-	60

• 45° ELBOWS

Nominal Pipe Size	Long							Short							Nominal Pipe Size
	SGP	STD	S 40	X-S	S 80	XX-S	S 160	SGP	STD	S 40	X-S	S 80	XX-S	S 160	
1/2	0.04	0.04	0.04	0.05	0.05	-	-	-	-	-	-	-	-	-	1/2
3/4	0.05	0.06	0.06	0.07	0.07	-	-	-	-	-	-	-	-	-	3/4
1	0.08	0.08	0.08	0.10	0.10	0.18	0.13	-	-	-	-	-	-	-	1
1 1/4	0.13	0.13	0.13	0.18	0.18	0.32	0.21	-	-	-	-	-	-	-	1 1/4
1 1/2	0.18	0.19	0.19	0.25	0.25	0.47	0.33	-	-	-	-	-	-	-	1 1/2
2	0.32	0.33	0.33	0.45	0.45	0.85	0.67	-	-	-	-	-	-	-	2
2 1/2	0.60	0.69	0.69	0.90	0.90	1.72	1.17	-	-	-	-	-	-	-	2 1/2
3	0.79	1.02	1.02	1.37	1.37	2.63	1.92	-	-	-	-	-	-	-	3
4	1.46	1.92	1.92	2.68	2.68	5.09	4.01	-	-	-	-	-	-	-	4
5	2.25	3.24	3.24	4.57	4.57	8.80	7.35	-	-	-	-	-	-	-	5
6	3.55	4.97	4.97	7.50	7.50	1.72	12.10	-	-	-	-	-	-	-	6
8	7.20	10.10	10.10	15.30	15.30	2.63	26.60	-	-	-	-	-	-	-	8
10	12.70	17.70	17.70	23.90	28.50	5.09	51.50	-	-	-	-	-	-	-	10
12	19.00	26.00	28.50	34.40	47.00	8.80	85.50	-	-	-	-	-	-	-	12
14	28.40	34.00	40.10	45.00	66.50	14.50	118.00	-	-	-	-	-	-	-	14
16	37.20	44.50	59.00	59.00	97.50	25.70	175.00	-	-	-	-	-	-	-	16
18	47.10	56.50	84.50	75.50	138.00	41.00	247.00	-	-	-	-	-	-	-	18
20	58.30	70.00	110.00	93.00	187.00	65.00	338.00	-	-	-	-	-	-	-	20
22	70.50	84.50	-	113.00	257.00	-	443.00	-	-	-	-	-	-	-	22
24	84.10	101.00	183.00	134.00	318.00	-	580.00	-	-	-	-	-	-	-	24
26	99.00	119.00	-	158.00	-	-	-	-	-	-	-	-	-	-	26
28	115.00	138.00	-	184.00	-	-	-	-	-	-	-	-	-	-	28
30	132.00	158.00	-	211.00	-	-	-	-	-	-	-	-	-	-	30
32	150.00	180.00	327.00	240.00	-	-	-	-	-	-	-	-	-	-	32
34	170.00	204.00	369.00	272.00	-	-	-	-	-	-	-	-	-	-	34
36	190.00	228.00	452.00	304.00	-	-	-	-	-	-	-	-	-	-	36
38	212.00	255.00	-	339.00	-	-	-	-	-	-	-	-	-	-	38
40	235.00	282.00	-	376.00	-	-	-	-	-	-	-	-	-	-	40
42	259.00	311.00	-	414.00	-	-	-	-	-	-	-	-	-	-	42
44	285.00	342.00	-	456.00	-	-	-	-	-	-	-	-	-	-	44
46	312.00	374.00	-	498.00	-	-	-	-	-	-	-	-	-	-	46
48	339.00	407.00	-	542.00	-	-	-	-	-	-	-	-	-	-	48

• CAP

Unit: kg							
Nominal Pipe Size	SGP	STD	S 40	X-S	S 80	XX-S	S 160
1/2	0.03	0.04	0.04	0.05	0.05	0.10	0.06
3/4	0.04	0.05	0.05	0.07	0.07	0.13	0.09
1	0.08	0.11	0.11	0.15	0.15	0.29	0.20
1 1/4	0.11	0.14	0.14	0.20	0.20	0.39	0.25
1 1/2	0.15	0.17	0.17	0.24	0.24	0.50	0.35
2	0.23	0.24	0.24	0.33	0.33	0.68	0.54
2 1/2	0.34	0.42	0.42	0.57	0.57	1.33	0.77
3	0.51	0.67	0.67	0.92	0.92	2.18	1.40
4	0.88	1.17	1.17	1.68	1.68	3.80	2.76
5	1.29	1.90	1.90	2.73	2.73	6.22	4.85
6	1.99	2.83	2.83	4.38	4.38	9.85	7.81
8	3.61	5.11	5.11	7.91	7.91	16.40	15.20
10	6.33	8.92	8.92	12.20	16.40	28.35	28.90
12	9.43	13.10	13.10	17.40	26.40	39.40	47.70
14	13.20	15.90	18.60	21.20	34.90	-	61.20
16	16.60	20.00	26.70	26.70	49.00	-	92.80
18	21.20	25.50	41.50	34.10	69.00	-	131.00
20	26.40	31.80	54.10	42.50	93.70	-	179.00
22	31.50	38.80	61.40	51.70	116.00	-	219.00
24	36.60	45.10	90.10	60.10	160.00	-	307.00
26	41.00	50.50	92.30	67.30	-	-	-
28	45.50	56.20	103.00	74.90	-	-	-
30	50.30	62.10	114.00	82.80	-	-	-
32	55.40	68.40	126.00	91.20	-	-	-
34	62.30	75.40	138.00	100.00	-	-	-
36	68.00	81.90	164.00	109.00	-	-	-
38	79.00	94.70	-	126.00	-	-	-
40	95.00	102.00	-	137.00	-	-	-
42	98.00	110.00	-	147.00	-	-	-
44	103.00	126.00	-	167.00	-	-	-
46	111.00	134.00	-	179.00	-	-	-
48	118.00	143.00	-	191.00	-	-	-

BUTT-WELDING FITTINGS APPROX WEIGHT

• REDUCER

Nominal Pipe Size	SGP	STD	S 40	X-S	S 80	XX-S	S 160
3/4 x 1/2	0.06	0.06	0.06	0.08	0.08	-	-
1 x 3/4	0.11	0.12	0.12	0.15	0.15	0.25	0.19
1 x 1/2	0.10	0.11	0.11	0.14	0.14	0.22	0.17
1 1/4 x 1	0.16	0.16	0.16	0.21	0.21	0.35	0.25
1 1/4 x 3/4	0.15	0.15	0.15	0.19	0.19	0.31	0.23
1 1/4 x 1/2	0.13	0.14	0.14	0.18	0.18	-	-
1 1/2 x 1 1/4	0.24	0.25	0.25	0.33	0.33	0.57	0.43
1 1/2 x 1	0.21	0.22	0.22	0.30	0.30	0.50	0.38
1 1/2 x 3/4	0.20	0.21	0.21	0.27	0.27	0.45	0.35
1 1/2 x 1/2	0.18	0.18	0.18	0.24	0.24	0.40	0.32
2 x 1 1/2	0.37	0.38	0.38	0.51	0.51	0.91	0.75
2 x 1 1/4	0.35	0.36	0.36	0.48	0.48	0.85	0.70
2 x 1	0.31	0.33	0.33	0.44	0.44	0.77	0.64
2 x 3/4	0.29	0.30	0.30	0.40	0.40	0.69	0.58
2 1/2 x 2	0.60	0.73	0.73	0.95	0.95	1.68	1.20
2 1/2 x 1 1/2	0.55	0.67	0.67	0.87	0.87	1.51	1.08
2 1/2 x 1 1/4	0.52	0.64	0.64	0.83	0.83	1.42	1.02
2 1/2 x 1	0.48	0.56	0.56	0.73	0.73	1.23	0.93
3 x 2 1/2	0.73	0.94	0.94	1.25	1.25	2.25	1.71
3 x 2	0.66	0.85	0.85	1.13	1.13	2.01	1.57
3 x 1 1/2	0.62	0.79	0.79	1.04	1.04	1.83	1.44
3 x 1 1/4	0.59	0.75	0.75	1.00	1.00	1.74	1.37
4 x 3	1.10	1.45	1.45	2.02	2.02	3.65	3.00
4 x 2 1/2	1.04	1.37	1.37	1.90	1.90	3.41	2.76
4 x 2	0.97	1.27	1.27	1.76	1.76	3.11	2.58
4 x 1 1/2	0.91	1.19	1.19	1.64	1.64	2.89	2.41
5 x 4	1.74	2.50	2.50	3.52	3.52	6.47	5.59
5 x 3	1.58	2.27	2.27	3.18	3.18	5.78	5.30
5 x 2 1/2	1.50	2.16	2.16	3.02	3.02	5.46	4.70
5 x 2	1.41	2.03	2.03	2.85	2.85	5.12	4.43
6 x 5	2.55	3.57	3.57	5.38	5.38	9.89	8.63
6 x 4	2.36	3.30	3.30	4.96	4.96	8.98	7.88
6 x 3	2.18	3.04	3.04	4.56	4.56	8.21	7.21
6 x 2 1/2	2.09	2.94	2.94	4.38	4.38	7.88	6.80
8 x 6	4.17	5.71	5.71	8.63	8.63	14.30	15.00
8 x 5	3.87	5.40	5.40	8.14	8.14	13.40	14.00
8 x 4	3.67	5.10	5.10	7.68	7.68	12.60	13.10
10 x 8	6.87	9.58	9.58	12.90	15.40	24.30	27.50
10 x 6	6.32	8.78	8.78	11.80	14.20	22.10	25.10
10 x 5	6.06	8.42	8.42	11.30	14.50	21.10	23.90
10 x 4	5.80	8.20	8.20	11.00	14.00	20.50	22.60
12 x 10	9.97	13.60	14.70	18.00	24.80	35.00	44.60
12 x 8	9.29	12.70	13.70	16.70	22.70	33.00	41.00
12 x 6	8.69	11.80	12.80	15.60	21.40	32.00	38.00
12 x 5	8.39	11.70	12.60	15.30	20.60	31.00	36.40
14 x 12	21.20	25.40	29.50	33.60	49.80	-	88.50
14 x 10	19.70	23.60	27.40	31.20	46.10	-	81.60
14 x 8	18.30	21.80	25.40	28.90	42.20	-	74.70
14 x 6	16.90	20.30	23.60	26.80	39.10	-	68.30
16 x 14	25.90	31.00	41.10	41.10	67.70	-	121.00
16 x 12	24.10	29.60	39.20	39.20	65.00	-	116.00
16 x 10	22.40	27.80	36.80	36.80	60.80	-	108.00
16 x 8	21.70	26.20	34.50	34.50	56.60	-	99.90
18 x 16	31.50	37.80	56.20	50.10	91.40	-	165.00
18 x 14	29.80	35.70	53.00	47.40	86.40	-	155.00
18 x 12	27.70	33.20	51.70	44.00	83.00	-	149.00
18 x 10	27.10	32.70	48.40	43.20	78.50	-	140.00
20 x 18	47.00	56.40	88.40	74.90	150.00	-	-
20 x 16	44.70	53.50	83.90	71.10	142.00	-	-
20 x 14	42.40	50.80	79.60	67.40	136.00	-	233.00
20 x 12	40.80	49.20	76.90	65.10	130.00	-	-

Unit : kg							
Nominal Pipe Size	SGP	STD	S 40	X-S	S 80	XX-S	S 160
22 x 20	52.10	62.40	98.00	82.90	181.00	-	-
22 x 18	49.50	59.40	93.20	78.90	172.00	-	-
22 x 16	47.00	56.40	98.40	74.80	164.00	-	-
22 x 14	45.30	54.30	83.60	72.10	156.00	-	-
24 x 22	57.10	68.40	124.00	91.00	215.00	-	-
24 x 20	54.80	65.70	119.00	87.30	206.00	-	-
24 x 18	52.60	63.00	114.00	83.80	197.00	-	-
24 x 16	50.40	60.50	109.00	80.30	185.00	-	-
26 x 24	74.50	89.40	162.00	119.00	-	-	-
26 x 22	71.50	85.80	155.00	114.00	-	-	-
26 x 20	68.50	82.10	148.00	109.00	-	-	-
26 x 18	66.30	79.50	142.00	106.00	-	-	-
28 x 26	80.60	96.60	175.00	129.00	-	-	-
28 x 24	77.50	93.00	168.00	124.00	-	-	-
28 x 22	74.50	89.40	162.00	119.00	-	-	-
28 x 20	72.40	88.80	155.00	115.00	-	-	-
30 x 28	86.60	104.00	188.00	138.00	-	-	-
30 x 26	83.60	100.00	182.00	133.00	-	-	-
30 x 24	80.60	96.60	175.00	129.00	-	-	-
30 x 22	78.50	94.20	168.00	125.00	-	-	-
32 x 30	92.60	111.00	202.00	148.00	-	-	-
32 x 28	89.60	108.00	195.00	143.00	-	-	-
32 x 26	86.60	104.00	188.00	138.00	-	-	-
32 x 24	84.60	102.00	184.00	135.00	-	-	-
34 x 32	98.70	118.00	215.00	158.00	-	-	-
34 x 30	95.60	115.00	208.00	153.00	-	-	-
34 x 28	92.60	111.00	205.00	148.00	-	-	-
34 x 26	90.70	109.00	200.00	145.00	-	-	-
36 x 34	104.60	125.60	250.00	167.30	-	-	-
36 x 32	101.60	122.00	243.00	162.40	-	-	-
36 x 30	98.60	118.40	238.00	157.60	-	-	-
36 x 28	95.60	114.70	234.00	152.80	-	-	-
38 x 36	112.00	133.00	-	177.00	-	-	-
38 x 34	108.00	129.00	-	172.00	-	-	-
38 x 32	105.00	126.00	-	167.00	-	-	-
38 x 30	103.00	124.00	-	165.00	-	-	-
40 x 38	117.00	140.00	-	187.00	-	-	-
40 x 36	114.00	137.00	-	182.00	-	-	-
40 x 34	111.00	133.00	-	177.00	-	-	-
40 x 32	109.00	131.00	-	174.00	-	-	-
42 x 40	123.00	147.00	-	196.00	-	-	-
42 x 38	120.00	144.00	-	192.00	-	-	-
42 x 36	117.00	140.00	-	187.00	-	-	-
42 x 34	115.00	138.00	-	184.00	-	-	-
44 x 42	129.00	155.00	-	206.00	-	-	-
44 x 40	126.00	151.00	-	201.00	-	-	-
44 x 38	123.00	147.00	-	196.00	-	-	-
44 x 36	121.00	146.00	-	194.00	-	-	-
46 x 44	157.00	189.00	-	252.00	-	-	-
46 x 42	154.00	185.00	-	246.00	-	-	-
46 x 40	150.00	180.00	-	241.00	-	-	-
46 x 38	148.00	178.00	-	237.00	-	-	-
48 x 46	164.00	197.00	-	263.00	-	-	-
48 x 44	161.00	193.00	-	257.00	-	-	-
48 x 42	157.00	189.00	-	252.00	-	-	-
48 x 40	155.00	186.00	-	248.00	-	-	-

• STAILNESS STEEL FITTINGS

Unit : kg															
Nominal Pipe Size	90° Elbow(L)			90° Elbow(S)			Tee			Reducer			Cap		
	S5s	S10s	S20s	S5s	S10s	S20s	S5s	S10s	S20s	S5s	S10s	S20s	S5s	S10s	S20s
1/2	0.05	0.06	0.07	-	-	-	0.05	0.07	0.08	-	-	-	0.02	0.03	0.03
3/4	0.05	0.06	0.09	-	-	-	0.07	0.10	0.11	0.03	0.04	0.05	0.03	0.04	0.04
1	0.08	0.13	0.14	0.05	0.08	0.09	0.12	0.20	0.22	0.06	0.09	0.10	0.05	0.09	0.10
1 1/4	0.12	0.20	0.22	0.08	0.13	0.15	0.20	0.33	0.36	0.07	0.12	0.13	0.07	0.11	0.12
1 1/2	0.17	0.28	0.30	0.11	0.19	0.20	0.30	0.46	0.50	0.11	0.18	0.20	0.08	0.13	0.14
2	0.29	0.47	0.59	0.19	0.31	0.39	0.38	0.63	0.79	0.16	0.27	0.34	0.10	0.17	0.21
2 1/2	0.55	0.79	0.94	0.37	0.52	0.63	0.71	1.00	1.18	0.30	0.43	0.50	0.16	0.23	0.28
3	0.81	1.16	1.51	0.54	0.77	1.00	0.96	1.38	1.78	0.37	0.52	0.69	0.25	0.37	0.48
4	1.40	2.00	2.60	0.93	1.33	1.74	1.50	2.15	2.80	0.56	0.80	1.04	0.41	0.59	0.78
5	2.83	3.46	4.97	1.89	2.31	3.31	2.85	3.48	5.01	1.09	1.33	1.92	0.81	0.99	1.44
6	4.06	4.96	7.09	2.71	3.31	4.73	3.89	4.75	6.83	1.46	1.78	2.55	1.13	1.39	1.99
8	7.07	9.55	15.90	4.71	6.37	10.70	6.26	8.43	14.30	2.01	2.72	4.56	1.76	2.38	4.05
10	13.50	16.60	25.00	9.01	11.10	16.70	11.50	14.20	21.50	3.66	4.49	6.77	3.35	4.13	6.23
12	22.40	25.80	35.70	15.00	17.20	23.90	18.80	21.60	30.20	5.88	6.78	9.40	5.54	6.39	8.89
14	28.80	34.60	56.90	19.20	23.10	37.80	22.70	27.30	44.80	10.80	13.00	21.20	6.62	7.99	13.20
16	39.80	45.30	74.50	26.50	30.20	49.50	29.60	33.70	55.20	13.90	15.80	25.90	8.82	10.10	16.70
18	50.40	57.40	94.50	33.60	38.30	62.80	37.40	42.70	70.00	17.20	19.20	29.80	11.30	12.90	21.30
20	71.00	82.10	142.00	47.30	54.70	95.00	52.80	61.00	104.00	28.60	33.10	56.00	16.00	18.50	31.80
22	85.90	99.50	170.00	57.30	66.30	114.00	63.80	74.10	126.20	31.70	36.70	62.50	19.50	22.60	38.80
24	118.00	136.00	202.00	79.00	90.40	135.00	81.40	93.90	139.40	40.20	46.00	68.60	26.20	30.10	45.10

COMPARISON OF ASTM SPECIFICATIONS AND SIMILAR STANDARDS

Steel Composition	ASTM Specification and Grade				KS Specification and Grade		
	Marking Symbol	Pipe	Plate	forging	Marking Symbol	Pipe	Plate
Carbon Steel	-	A120	A283-A	-	SPP	SPP	SB41
	-	A53-B	A284	-	PS38(W), PS38, PT38(W), PT38	SPPS38	SWS41B
	-	A53-B	A284	-	PS42(W), PS42, PT42(W), PT42	SPPS42	SWS41B
					HT38, HT38(W)	SPHT38	SBB42
	WPB	A106-B	A515-60 or 70 A516-60 or 70	A105	HT42, HT42(W)	SPHT42	SBB42
Low Temperature Steel	WPC	A106-C	A515-70 A516-70	A105	HT49, HT49(W)	SPHT49	SBB49
	WPL6	A333 and A334-6	A516-60	A350-LF2	PL39	SPHL39	SLAL39
	WPL3	A333 and A334-3	A203-D	A350-LF3	-	-	-
	WPL9	A333 and A334-9	A203-A	A350-LF9	-	-	-
Alloy Steel	WP1	A335-P1	A203-B	A182-F1	PA12, FA12	SPA12	SBB46M
	WP12	A335-P12	A387-12	A182-F12	PA22, FA22	SPA22	SCMV2
	WP11	A335-P11	A387-11	A182-F11	PA23, FA23	SPA23	SCMV3
	WP22	A335-P22	A387-22	A182-F22	PA24, FA24	SPA24	SCMV4
	WP7	A335-P5	A387-5	A182-F5	PA25, FA25	SPA25	SCMV6
	WP5	A335-P7	A387-7	A182-F7	-	-	-
	WP9	A335-P9	A387-9	A182-F9	-	-	-
	WP91	A335-P91	A387-91	A182-F91	-	-	-
	WP304	A312-TP304	A240-Type 304	A182-F304	STS304, STS304W, STS304F	STS304TP	STS304
	WP304H	A312-TP304H	A240-Type 304H	A182-F304H	-	-	-
Stainless Steel	WP304L	A312-TP304L	A240-Type 304L	A182-F304L	STS304L, STS304LW, STS304LF	STS304LTP	STS304L
	WP309	A312-TP309	A240-Type 309S	-	STS309S, STS309SW, STS309SF	STS309STP	STS309S
	WP310	A312-TP310	A240-Type 310S	A182-F310	STS310S, STS310SW, STS310SF	STS310STP	STS310S
	WP316	A312-TP316	A240-Type 316	A182-F316	STS316, STS316W, STS316F	STS316TP	STS316
	WP316H	A312-TP316H	A240-Type 316H	A182-F316H	STS316H, STS316HF	STS316HTP	-
	WP316L	A312-TP316L	A240-Type 316L	A182-F316L	STS316L, STS316LW, STS316LF	STS316LTP	STS316L
	WP317L	A312-TP317L	A240-Type 317L	A182-F317L	STS317L, STS317LW	STS317LTP	STS317L
	WP321	A312-TP321	A240-Type 321	A182-F321	STS321, STS321W, STS321F	STS321TP	STS321
	WP321H	A312-TP321H	A240-Type 321H	A182-F321H	-	-	-
	WP347	A312-TP347	A240-Type 347	A182-F347	STS347, STS347W, STS347F	STS347TP	STS347
	WP347H	A312-TP347H	A240-Type 347H	A182-F347H	STS347H, STS347HF	STS347HTP	-

JIS Specification and Grade			B.S.Specification and grade	DIN Specification and Grade	Steel Composition
Marking Symbol	Pipe	Plate	Pipe	Pipe	
FSGP or SGP	SGP(STPY400)	SS400	1387-M	2440-ST33-1	Carbon Steel
PG370(W), PS370(W), PT370(W), PT370	STPG370	SM41B	3602-ERW 23	1626-ST37	Carbon Steel
PG410(W), PS410(W), PT410(W), PT410	STPG410	SM41B	3602-ERW 27	-	Carbon Steel
PS370, PT370(W)	STPT370	S842	3602-Steel 23	17175-ST35.8	Carbon Steel
PS410, PT410(W)	STPT410	S842	3602-Steel 27	17175-ST45.8	Carbon Steel
PS480, PT480(W)	STPT480	S849	3602-Steel 35	-	Carbon Steel
PL380(W)	STPL380	-	3603-Steel 27 LT 30	-	Carbon Steel
PL450(W)	STPL450	-	3603-Steel 503 LT 100	-	3 1/2% Ni Steel
PL690(W)	STPL690	-	-	-	2% Ni-1% Cu Steel
PA12(W), FA12	STPA12	-	-	17175-15 Mo3	Carbon-Molybdenum Steel
PA22(W), FA22	STPA22	-	3603-HF620	17175-13 Cr Mo44	1% Cr-1/2% Molybdenum Steel
PA23(W), FA23	STPA23	-	3603-HF621	-	1 1/4% Cr-1/2% Molybdenum Steel
PA24(W), FA24	STPA24	SCMV4	3603-HF622, 27	17175-10 Cr Mo910	2 1/4% Cr-1% Molybdenum Steel
PA25(W), FA25	STPA25	-	3603-HF625	-	5% Cr-1/2% Molybdenum Steel
-	-	-	-	-	7% Cr-1/2% Molybdenum Steel
PA26(W), FA26	STPA26	-	-	-	9% Cr-1% Molybdenum Steel
-	-	-	-	-	9% Cr-1% Mo-0.2%V+Cb+N
SUS304, SUS304W, SUS304F	SUS304TP	SUS304	3605-801	17440-X5 Cr Ni189	18% Cr-8% Ni Steel
SUS304H, SUS304HF	SUS304HTP	-	3605-811	-	18% Cr-8% Ni-(0.04-0.10)% C Steel
SUS304L, SUS304LW	SUS304LTP	SUS304L	3605-811L	17440-X2 Cr Ni189	18% Ni-0.035% C Steel
SUS309S, SUS309SW, SUS309SF	SUS309STP	SUS309S	-	-	22% Cr-12% Ni Steel
SUS310S, SUS310SW, SUS310SF	SUS310STP	SUS310S	3605-805S	-	25% Cr-20% Ni Steel
SUS316, SUS316W, SUS316F	SUS316TP	SUS316	3605-845	17440-X5 Cr Ni Mo1810	18% Cr-8% Ni-Mo Steel
SUS316H, SUS316HF	SUS316HTP	-	3605-855	-	18% Cr-8% Ni-Mo(0.04-0.10)% C Steel
SUS316L, SUS316LW	SUS316LTP	SUS316L	3605-845L	17440-X2 Cr Ni Mo1810	18% Cr-8% Ni-Mo-0.035% C Steel
SUS317L	SUS317LTP	SUS317L	-	-	18% Cr-12% Ni-3.5% Mo-Low C
SUS321, SUS321W, SUS321F	SUS321TP	SUS321	3605-822Ti	17440-X10 Cr Ni Ti189	18% Cr-8% Ni-Ti Steel
SUS321H, SUS321HF	SUS321HTP	-	3605-832Ti	-	18% Cr-8% Ni-Ti(0.04-0.10)% C Steel
SUS347, SUS347W, SUS347F	SUS347TP	SUS347	3605-822Nb	17440-X1 Cr Ni Nb189	18% Cr-8% Ni-Cb+Ta Steel
SUS347H, SUS347HF	SUS347HTP	-	3605-832Nb	-	18% Cr-8% Ni-Cb+Ta(0.04-0.10)% C Steel

MATERIALS SPECIFICATIONS FOR BUTT-WELDING FITTINGS ASTM MATERIALS

Marking Symbol		Materials	Form	Chemical Composition (Percent)					
				Max. or Range (Unless otherwise indicated)					
				C	Si	Mn	P	S	Ni
A234	WPB	A160 Gr. B	P	0.30	0.10 Min.	0.29-1.06	0.048	0.058	-
		A515 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	0.10 Min.	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	0.36-0.69	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	-
	WP9	A335 Gr. 9	P	0.15	0.25-1.00	0.30-0.60	0.025	0.025	-
		A387 Gr. 9	PL	0.15	1.00	0.30-0.60	0.030	0.030	-
	WP91	A335 Gr. 91	P	0.08-0.12	0.20-0.50	0.30-0.60	0.020	0.010	0.400
A387 Gr. 91		PL	0.08-0.12	0.20-0.50	0.30-0.60	0.020	0.010	0.400	
A403	WP304	A312 Gr. TP304	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	8.00-10.05
	WP304H	A312 Gr. TP304H	P	0.04-0.10	0.75	2.00	0.045	0.030	8.00-11.00
		A240 Type 304	PL	0.04-0.10	1.00	2.00	0.045	0.030	8.00-10.05
	WP304L	A312 Gr. TP304L	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 Type 309S	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 Type 310S	PL	0.08	1.50	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 Type 316	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	0.04-0.10	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 Type 316L	PL	0.030	1.00	2.00	0.045	0.035	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	0.75	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 Type 321		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 Type 347	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 Type 347H*	PL	0.08	1.00	2.00	0.045	0.030	9.00-13.00	
WP S31254	A312 S31254	P	0.020	0.80	1.00	0.030	0.010	17.5-18.5	
	A240 S31254	PL							
A420	WPL6	A333 and A334 Gr.6	P	0.30	0.10 Min.	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
WPL8	A333 and A334 Gr.8	P	0.20	-	0.40-1.06	0.025	0.025	1.60-2.24	
	A203 Gr.A	PL	0.17	0.15-0.40	0.70	0.035	0.040	2.10-2.50	
A815	S31803	A790 S31803	P	0.030	1.0	2.0	0.030	0.020	4.50-6.50
		A240 S31803	PL						
	S32750	A790 S32750	P	0.030	0.8	1.2	0.035	0.020	6.0-8.0
S32760	A240 S32750	PL							
	A790 S32760	P	0.05	1.00	1.00	0.030	0.010	6.00-8.00	
A860	WPHY42	API 5L Gr.X42	P	0.28	-	1.25	0.04	0.05	-
		A572 Gr.42	PL						
WPHY60	API 5L Gr.X60	P	0.26	-	1.35	0.04	0.05	-	
	A572 Gr.60	PL							
WPHY65	API 5L Gr.X65	P	0.26	-	1.40	0.04	0.05	-	
	A572 Gr.65	PL							

• Asterisks(*) denote that the carbon content shall be 0.04 to 0.10% Daggers(+) denote that the minimum tensile strength shall be 65,000 psi (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%

Chemical Composition (Percent)			Other Elements	Mechanical				Marking Symbol
Max. or Range (Unless otherwise indicated)				tensile Strength Min. or Range Ksi (Mpa)		Yied Strength Min. Ksi (Mpa)	Longitudinal Elongation in 2 in (50mm) Min. %	
Cr	Mo	Ti						
-	-	-	-	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
0.74-0.21	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	-	-	60-85	(415-585)	35(240)	22	
1.90-2.62	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	
4.00-6.00	0.45-0.65	-	-	60	(414)	30(207)	30	WP5
4.00-6.00	0.40-0.70	-	-	60-85	(415-585)	30(205)	18	
8.00-10.00	0.90-1.10	-	-	60	(414)	30(205)	30	WP9
8.00-10.00	0.90-1.10	-	-	60-85	(415-585)	30(205)	18	
8.00-9.50	0.85-1.05	-	V:0.18-0.25 Cb:0.06-10	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)	25(172)	35	WP304H
18.00-20.00	-	-	-	75	(515)	25(175)	40	
18.00-20.00	-	-	-	65	(448)	30(207)	30	WP304L
18.00-20.00	-	-	-	65	(448)	30(205)	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	(515)	30(205)	35	WP317L
18.00-20.00	3.00-4.00	-	N-0.10	80	(550)	35(240)	40	
17.00-19.00	-	5°C-0.60	-	70	(483)	30(207)	35	WP321
17.00-19.00	-	5°C-0.70	-	65	(448)	30(205)	40	
17.00-20.00	-	4°C-0.60	-	75	(517)	30(207)	35	WP321H
17.00-19.00	-	4°C-0.70	-	75	(515)	30(205)	40	
17.00-20.00	-	-	Ca+Ta10°C-1.00	75	(517)	30(207)	35	WP347
17.00-19.00	-	-	Ca+Ta10°C-1.00	75	(515)	30(205)	40	
17.00-20.00	-	-	Ca+Ta 8°C-1.00	75	(517)	30(207)	30	WP347H
17.00-19.00	-	-	Ca+Ta10°C-1.00	75	(515)	30(205)	40	
19.50-20.50	6.00-6.50	-	N:0.18-0.22 Cu:0.50-1.00	94	650	44(300)	35	S31254
-	-	-	-	60	(141)	35(241)	30	WPL6
-	-	-	-	60-80	(415-550)	35(220)	25	
-	-	-	-	65	(448)	35(241)	30	WPL3
-	-	-	-	65-85	(450-585)	37(255)	23	
-	-	-	Cu-0.75-1.25	63	(435)	46(315)	28	WPL8
-	-	-	-	65-85	(450-585)	37(255)	23	
21.00-23.00	2.50-3.50	-	N:0.08-0.20	90	620	65(450)	25	S31803
24.00-26.00	3.00-5.00	-	N:0.24-0.32 Cu:0.5	116	795	80(550)	15	S32750
24.00-26.00	3.00-4.00	N:0.20-0.30 Cu:0.50-1.00 W:0.50-1.00 Cr+3.3 Mo+16N=40min.		108 109-130	750 750-895	80(550)	25	S32760
-	-	-	-	60	414	42(289)	- 24	WPHY42
-	-	0.03 Min.	Cb:0.005min. V:0.02min.	75	517	60(413)	- 18	WPHY60
-	-	-	Cb:0.005min. V:0.02min.	77 80	530 550	65(448)	- 17	WPHY65

MATERIALS SPECIFICATIONS FOR JIS MATERIALS

Marking Symbol	JIS Code Number & Materials	Chemical Composition (percent)					
		C	Si	Mn	P	S	Ni
SGP	G3452, SGP	-	-	-	0.050 Max.	0.050 Max.	-
PG370	G3454, STPG370	0.25 Max.	0.35 Max.	0.30-0.90	0.040 Max.	0.040 Max.	-
PG410	G3454, STPG410	0.30 Max.	0.35 Max.	0.30-1.00	0.040 Max.	0.040 Max.	-
PT370	G3456, STPT370	0.25 Max.	0.10-0.35	0.30-0.90	0.035 Max.	0.035 Max.	-
PT410	G3456, STPT410	0.30 Max.	0.10-0.35	0.30-1.00	0.035 Max.	0.035 Max.	-
PT480	G3456, STPT480	0.33 Max.	0.10-0.35	0.30-1.00	0.035 Max.	0.035 Max.	-
STS370	G3455, STS370	0.25 Max.	0.10-0.35	0.30-1.10	0.035 Max.	0.035 Max.	-
STS410	G3455, STS410	0.30 Max.	0.10-0.35	0.30-1.40	0.035 Max.	0.035 Max.	-
STS480	G3455, STS480	0.33 Max.	0.10-0.35	0.30-1.50	0.035 Max.	0.035 Max.	-
PY400	G3457, STPY400	-	-	-	0.050 Max.	0.050 Max.	-
SUS304	G3459, SUS304TP	0.08 Max.	1.00 Max.	2.00 Max.	0.040 Max.	0.030 Max.	8.00-11.00
SUS304H	G3459, SUS304HTP	0.04-1.00	0.75 Max.	2.00 Max.	0.040 Max.	0.030 Max.	8.00-11.00
SUS304L	G3459, SUS304LTP	0.03 Max.	1.00 Max.	2.00 Max.	0.040 Max.	0.030 Max.	9.00-13.00
SUS316	G3459, SUS16TP	0.08 Max.	1.00 Max.	2.00 Max.	0.040 Max.	0.030 Max.	10.00-14.00
SUS316H	G3459, SUS316HTP	0.04-0.10	0.75 Max.	2.00 Max.	0.030 Max.	0.030 Max.	11.00-14.00
SUS316L	G3459, SUS316LTP	0.03 Max.	1.00 Max.	2.00 Max.	0.040 Max.	0.030 Max.	12.00-16.00
PL380	G3460, STPL380	0.25 Max.	0.35 Max.	1.35 Max.	0.035 Max.	0.035 Max.	-
PL450	G3460, STPL450	0.18 Max.	0.10-0.35	0.30-0.60	0.030 Max.	0.030 Max.	3.00-3.80
SS400	G3101, SS400	-	-	-	0.050 Max.	0.050 Max.	-
SM400B	G3106, SM400B	0.20 Max.	0.35 Max.	0.60-1.20	0.040 Max.	0.040 Max.	-
SM490B	G3106, SM490B	0.18 Max.	0.55 Max.	1.50 Max.	0.040 Max.	0.040 Max.	-
SB410	G3103, SB410	0.24 Max.	0.15-0.30	0.90 Max.	0.035 Max.	0.040 Max.	-
SB450	G3103, SB450	0.28 Max.	0.15-0.30	0.90 Max.	0.035 Max.	0.040 Max.	-
S20C	G4051, S20C	0.18-0.23	0.15-0.35	0.30-0.60	0.030 Max.	0.035 Max.	-
S25C	G4051, S25C	0.22-0.28	0.15-0.35	0.30-0.60	0.030 Max.	0.035 Max.	-
S45C	G4051, S45C	0.42-0.48	0.15-0.30	0.30-0.90	0.030 Max.	0.035 Max.	-
SF45	G3201, SF45	0.60 Max.	0.15-0.50	0.30-1.20	0.030 Max.	0.035 Max.	-
SF50	G3201, SF50	0.60 Max.	0.15-0.50	0.30-1.20	0.030 Max.	0.035 Max.	-

Chemical Composition (percent)		Mechanical Requirements			Reduction of Area	Hardness (HB)	Marking Symbol
Cr	Mo	Tensile Strength kgf/mm ² (N/mm ²)	Yield Strength kgf/mm ² (N/mm ²)	Elongation(%) Test Piece No.			
-	-	30 Min. (294) Min.	-	(11.12) 30 Min. (5) 25 Min.	-	-	SGP
-	-	38 Min. (373) Min.	22 Min. (216) Min.	(11.12) 30 Min. (5) 25 Min.	-	-	PG370
-	-	42 Min. (412) Min.	25 Min. (245) Min.	(11.12) 25 Min. (5) 20 Min.	-	-	PG410
-	-	38 Min. (373) Min.	22 Min. (216) Min.	(11.12) 30 Min. (5) 25 Min.	-	-	PT370
-	-	42 Min. (412) Min.	25 Min. (245) Min.	(11.12) 25 Min. (5) 20 Min.	-	-	PT410
-	-	49 Min. (481) Min.	28 Min. (275) Min.	(11.12) 25 Min. (5) 20 Min.	-	-	PT480
-	-	38 Min. (373) Min.	22 Min. (216) Min.	(11.12) 30 Min. (5) 25 Min.	-	-	STS370
-	-	42 Min. (412) Min.	25 Min. (245) Min.	(11.12) 25 Min. (5) 20 Min.	-	-	STS410
-	-	49 Min. (481) Min.	28 Min. (275) Min.	(11.12) 25 Min. (5) 20 Min.	-	-	STS480
-	-	41 Min. (402) Min.	23 Min. (226) Min.	(5) 18 Min.	-	-	PY400
18.00-20.00	-	53 Min. (520) Min.	21 Min. (206) Min.	(11.12) 35 Min. (5) 25 Min.	-	-	SUS304
18.00-20.00	-	53 Min. (520) Min.	21 Min. (206) Min.	(11.12) 35 Min. (5) 25 Min.	-	-	SUS304H
18.00-20.00	-	49 Min. (481) Min.	18 Min. (177) Min.	(11.12) 35 Min. (5) 25 Min.	-	-	SUS304L
16.00-18.00	2.00-3.00	53 Min. (520) Min.	21 Min. (206) Min.	(11.12) 35 Min. (5) 25 Min.	-	-	SUS316
16.00-18.00	2.00-3.00	53 Min. (520) Min.	21 Min. (206) Min.	(11.12) 35 Min. (5) 25 Min.	-	-	SUS316H
16.00-18.00	2.00-3.00	49 Min. (481) Min.	18 Min. (177) Min.	(11.12) 35 Min. (5) 25 Min.	-	-	SUS316L
-	-	39 Min. (382) Min.	21 Min. (206) Min.	(11.12) 35 Min. (5) 25 Min.	-	-	PL380
-	-	46 Min. (451) Min.	25 Min. (245) Min.	(11.12) 30 Min. (5) 20 Min.	-	-	PL450
-	-	41-52 (402-510)	16tMax. 25 Min. (245)	(5) 21 Min. (14) 17 Min.	-	-	SS400
-	-	41-52 (402-510)	16tMax. 25 Min. (245)	(5) 23 Min. (1A) 18 Min.	-	-	SM400B
-	-	50-62 (490-608)	16tMax. 33 Min. (324)	(5) 22 Min. (1A) 17 Min.	-	-	SM490B
-	-	42-56 (412-549)	23 Min. (226) Min.	(1A) 21 Min. (10) 25 Min.	-	-	SB410
-	-	46-60 Min. (451-588)	25 Min. (245) Min.	(1A) 19 Min. (10) 23 Min.	-	-	SB450
-	-	41 Min. (402) Min.	(N) 25 Min. (245) Min.	28 Min.	-	116-174	S20C
-	-	45 Min. (441) Min.	(N) 27 Min. (265) Min.	27 Min.	-	123-183	S25C
-	-	58 Min. (569) Min.	(N) 35 Min. (343) Min.	20 Min.	-	167-227	S45C
-	-	45-55 (444-539)	(N) 23 Min. (226) Min.	(14A)(A) 24 Min. (T) 19 Min.	(A) 45 (T) 35	121 Min.	SF45
-	-	50-60 (490-588)	(N) 25 Min. (245) Min.	(14A)(A) 22 Min. (T) 17 Min.	(A) 40 (T) 30	134 Min.	SF50

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	1/8	10.50	10.29	-	-	1.24	-	1.5	-	-	1.73
8	1/4	13.80	13.72	-	-	1.65	-	2.0	-	-	2.24
10	3/8	17.30	17.14	-	-	1.65	-	2.0	-	-	2.31
15	1/2	21.70	21.34	2.8	1.65	2.11	-	2.5	-	-	2.77
20	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 1/4	42.70	42.16	3.5	1.65	2.77	-	3.0	-	-	3.56
40	1 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 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 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 Advance Forging Standard as no internationally
Recognized Standards for these wall thickness have been established.

Nominal Wall Thickness											Unit: mm
STD	Sch 40	Sch 60	Sch 80s	X-S	Sch 80	Sch 100	Sch 120	Sch 140	Sch 160	XX-S	Nominal Pipe Size Inch
1.73	1.73	2.20	2.41	2.41	2.41	-	-	-	3.15	4.83	1/8
2.24	2.24	2.40	3.02	3.02	3.02	-	-	-	3.68	6.05	1/4
2.31	2.31	2.80	3.20	3.20	3.20	-	-	-	4.01	6.40	3/8
2.77	2.77	3.20	3.73	3.73	3.73	-	-	-	4.78	7.47	1/2
2.87	2.87	3.40	3.91	3.91	3.91	-	-	-	5.56	7.82	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 1/4
3.68	3.68	4.50	5.08	5.08	5.08	-	-	-	7.14	10.16	1 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 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 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	50.01	-	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