

Fittings



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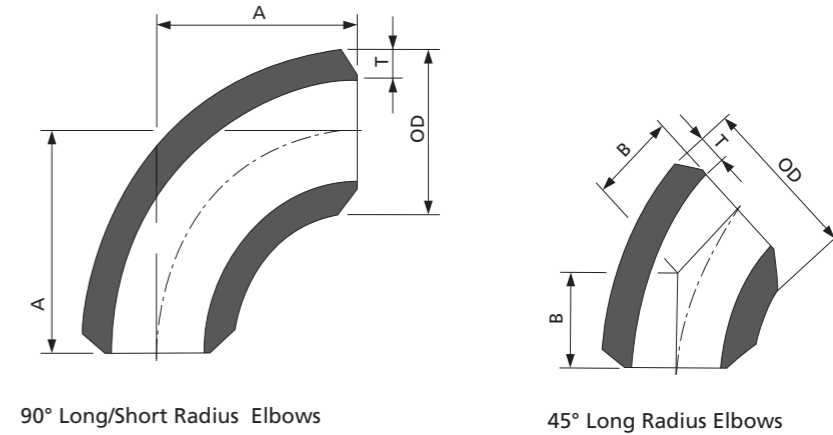
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Factory-Made Wrought Butt welding Fittings

Factory-made wrought butt welding fittings comply with ASME B16.9.

Long and Short Radius Elbows



90° Long/Short Radius Elbows

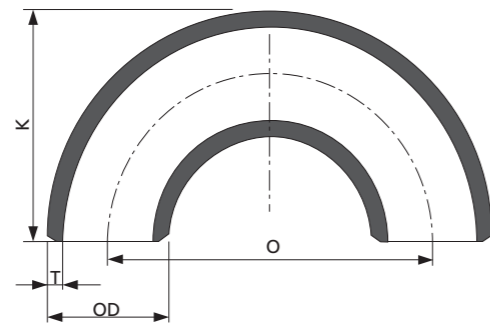
45° Long Radius Elbows

ASME B16.9					
Nominal Size		Outside Diameter at Bevel	Center to End		
			90° Elbows		45° Elbows
NPS	DN	OD	A		B
			Long Radius	Short Radius	Long Radius
1/2	15	21.3	38	-	16
3/4	20	26.7	38	-	19
1	25	33.4	38	25	22
1 1/4	32	42.2	48	32	25
1 1/2	40	48.3	57	38	29
2	50	60.3	76	51	35
2 1/2	65	73	95	64	44
3	80	88.9	114	76	51
3 1/2	90	101.6	133	89	57
4	100	114.3	152	102	64
5	125	141.3	190	127	79
6	150	168.3	229	152	95
8	200	219.1	305	203	127
10	250	273	381	254	159
12	300	323.8	457	305	190
14	350	355.6	533	356	222
16	400	406.4	610	406	254
18	450	457	686	457	286
20	500	508	762	508	318
22	550	559	838	559	343
24	600	610	914	610	381

Notes:

- 1) All dimensions are in millimeters.
- 2) T is same to the wall thickness of pipe, see page 12.

Long and Short Radius Returns

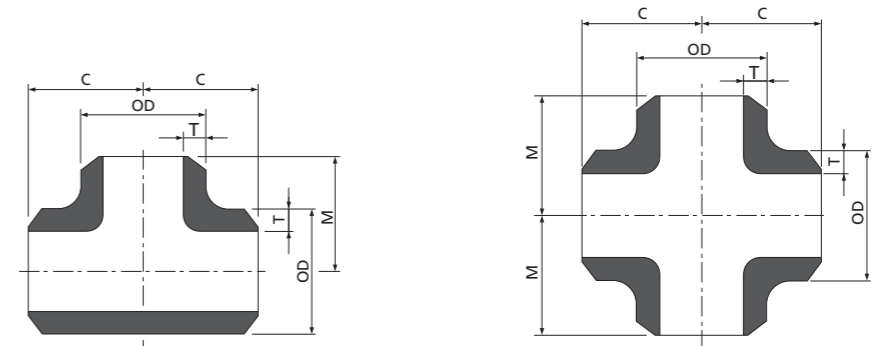


180° Long/Short Radius Returns

ASME B16.9						
Nominal Size		Outside Diameter at Bevel	Center to Center		Back to Face	
NPS	DN		OD	O		K
				Long Radius	Short Radius	Long Radius
1/2	15	21.3	76	-	48	-
3/4	20	26.7	76	-	51	-
1	25	33.4	76	51	56	41
1 1/4	32	42.2	95	64	70	52
1 1/2	40	48.3	114	76	83	62
2	50	60.3	152	102	106	81
2 1/2	65	73	190	127	132	100
3	80	88.9	229	152	159	121
3 1/2	90	101.6	267	178	184	140
4	100	114.3	305	203	210	159
5	125	141.3	381	254	262	197
6	150	168.3	457	305	313	237
8	200	219.1	610	406	414	313
10	250	273	762	508	518	391
12	300	323.8	914	609	619	467
14	350	355.6	1067	711	711	533
16	400	406.4	1219	813	813	610
18	450	457	1372	914	914	686
20	500	508	1524	1016	1016	762
22	550	559	1676	1118	1118	838
24	600	610	1829	1219	1219	914

- Notes:
 1) All dimensions are in millimeters.
 2) T is same to the wall thickness of pipe, see page 12.

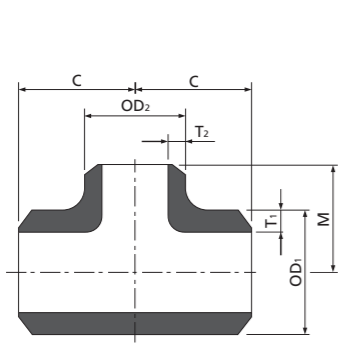
Tees and Crosses



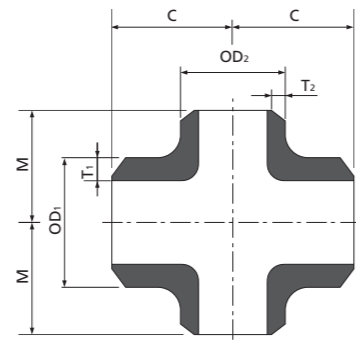
Straight Tee

Straight Cross

ASME B16.9				
Nominal Size		Outside Diameter at Bevel	Center to End	
NPS	DN		C	M
1/2	15	21.3	25	25
3/4	20	26.7	29	29
1	25	33.4	38	38
1 1/4	32	42.2	48	48
1 1/2	40	48.3	57	57
2	50	60.3	64	64
2 1/2	65	73.0	76	76
3	80	88.9	86	86
3 1/2	90	101.6	95	95
4	100	114.3	105	105
5	125	141.3	124	124
6	150	168.3	143	143
8	200	219.1	178	178
10	250	273.0	216	216
12	300	323.8	254	254
14	350	335.6	279	279
16	400	406.4	305	305
18	450	457	343	343
20	500	508	381	381
22	550	559	419	419
24	600	610	432	432



Reducing Tee



Reducing Cross

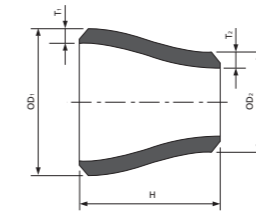
ASME B16.9					
Nominal Size		Outside Diameter at Bevel		Center to End	
NPS	DN	OD ₁	OD ₂	C	M
1/2 X 1/2 X 3/8	15 X 15 X 10	21.3	17.3	25	25
1/2 X 1/2 X 1/4	15 X 15 X 8	21.3	13.7	25	25
3/4 X 3/4 X 1/2	20 X 20 X 15	26.7	21.3	29	29
3/4 X 3/4 X 3/8	20 X 20 X 10	26.7	17.3	29	29
1 X 1 X 3/4	25 X 25 X 20	33.4	26.7	38	38
1 X 1 X 1/2	25 X 25 X 15	33.4	21.3	38	38
1 1/4 X 1 1/4 X 1	32 X 32 X 25	42.2	33.4	48	48
1 1/4 X 1 1/4 X 3/4	32 X 32 X 20	42.2	26.7	48	48
1 1/4 X 1 1/4 X 1/2	32 X 32 X 15	42.2	21.3	48	48
1 1/2 X 1 1/2 X 1 1/4	40 X 40 X 32	48.3	42.2	57	57
1 1/2 X 1 1/2 X 1	40 X 40 X 25	48.3	33.4	57	57
1 1/2 X 1 1/2 X 3/4	40 X 40 X 20	48.3	26.7	57	57
1 1/2 X 1 1/2 X 1/2	40 X 40 X 15	48.3	21.3	57	57
2 X 2 X 1 1/2	50 X 50 X 40	60.3	48.3	64	60
2 X 2 X 1 1/4	50 X 50 X 32	60.3	42.2	64	57
2 X 2 X 1	50 X 50 X 25	60.3	33.4	64	51
2 X 2 X 3/4	50 X 50 X 20	60.3	26.7	64	44

ASME B16.9					
Nominal Size		Outside Diameter at Bevel		Center to End	
NPS	DN	OD ₁	OD ₂	C	M
2 1/2 X 2 1/2 X 2	65 X 65 X 50	73.0	60.3	76	70
2 1/2 X 2 1/2 X 1 1/2	65 X 65 X 40	73.0	48.3	76	67
2 1/2 X 2 1/2 X 1 1/4	65 X 65 X 32	73.0	42.2	76	64
2 1/2 X 2 1/2 X 1	65 X 65 X 25	73.0	33.4	76	57
3 X 3 X 2 1/2	80 X 80 X 65	88.9	73.0	86	83
3 X 3 X 2	80 X 80 X 50	88.9	60.3	86	76
3 X 3 X 1 1/2	80 X 80 X 40	88.9	48.3	86	73
3 X 3 X 1 1/4	80 X 80 X 32	88.9	42.2	86	70
3 1/2 X 3 1/2 X 3	90 X 90 X 80	101.6	88.9	95	92
3 1/2 X 3 1/2 X 2 1/2	90 X 90 X 65	101.6	73.0	95	89
3 1/2 X 3 1/2 X 2	90 X 90 X 50	101.6	60.3	95	83
3 1/2 X 3 1/2 X 1 1/2	90 X 90 X 40	101.6	48.3	95	79
4 X 4 X 3 1/2	100 X 100 X 90	114.3	101.6	105	102
4 X 4 X 3	100 X 100 X 80	114.3	88.9	105	98
4 X 4 X 2 1/2	100 X 100 X 65	114.3	73.0	105	95
4 X 4 X 2	100 X 100 X 50	114.3	60.3	105	89
4 X 4 X 1 1/2	100 X 100 X 40	114.3	48.3	105	86
5 X 5 X 4	125 X 125 X 50	141.3	114.3	124	117
5 X 5 X 3 1/2	125 X 125 X 50	141.3	101.6	124	114
5 X 5 X 3	125 X 125 X 50	141.3	88.9	124	111
5 X 5 X 2 1/2	125 X 125 X 50	141.3	73.0	124	108
5 X 5 X 2	125 X 125 X 50	141.3	60.3	124	105
6 X 6 X 5	150 X 150 X 125	168.3	141.3	143	137
6 X 6 X 4	150 X 150 X 100	168.3	114.3	143	130
6 X 6 X 3 1/2	150 X 150 X 90	168.3	101.6	143	127
6 X 6 X 3	150 X 150 X 80	168.3	88.9	143	124
6 X 6 X 2 1/2	150 X 150 X 65	168.3	73.0	143	121
8 X 8 X 6	200 X 200 X 150	219.1	168.3	178	168
8 X 8 X 5	200 X 200 X 125	219.1	141.3	178	162
8 X 8 X 4	200 X 200 X 100	219.1	114.3	178	156
8 X 8 X 3 1/2	200 X 200 X 90	219.1	101.6	178	152
10 X 10 X 8	250 X 250 X 200	273.0	219.1	216	203
10 X 10 X 6	250 X 250 X 150	273.0	168.3	216	194
10 X 10 X 5	250 X 250 X 125	273.0	141.3	216	191
10 X 10 X 4	250 X 250 X 100	273.0	114.3	216	184
12 X 12 X 10	300 X 300 X 250	323.8	273.0	254	241
12 X 12 X 8	300 X 300 X 200	323.8	219.1	254	229
12 X 12 X 6	300 X 300 X 150	323.8	168.3	254	219
12 X 12 X 5	300 X 300 X 125	323.8	141.3	254	216
14 X 14 X 12	350 X 350 X 300	355.6	323.8	279	270
14 X 14 X 10	350 X 350 X 250	355.6	273.0	279	257
14 X 14 X 8	350 X 350 X 200	355.6	219.1	279	248
14 X 14 X 6	350 X 350 X 150	355.6	168.3	279	238

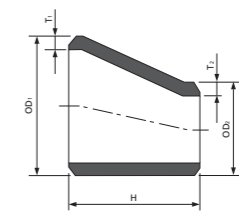
ASME B16.9					
Nominal Size		Outside Diameter at Bevel		Center to End	
NPS	DN	OD ₁	OD ₂	C	M
16 X 16 X 14	400 X 400 X 350	406.4	355.6	305	305
16 X 16 X 12	400 X 400 X 300	406.4	323.8	305	295
16 X 16 X 10	400 X 400 X 250	406.4	273.0	305	283
16 X 16 X 8	400 X 400 X 200	406.4	219.1	305	273
16 X 16 X 6	400 X 400 X 150	406.4	168.3	305	264
18 X 18 X 16	450 X 450 X 400	457	406.4	343	330
18 X 18 X 14	450 X 450 X 350	457	355.6	343	330
18 X 18 X 12	450 X 450 X 300	457	323.8	343	321
18 X 18 X 10	450 X 450 X 250	457	273.0	343	308
18 X 18 X 8	450 X 450 X 200	457	219.1	343	298
20 X 20 X 18	500 X 500 X 450	508	457	381	368
20 X 20 X 16	500 X 500 X 400	508	406.4	381	356
20 X 20 X 14	500 X 500 X 350	508	355.6	381	356
20 X 20 X 12	500 X 500 X 300	508	323.8	381	346
20 X 20 X 10	500 X 500 X 250	508	273.0	381	333
20 X 20 X 8	500 X 500 X 200	508	219.1	381	324
22 X 22 X 20	550 X 550 X 500	559	508	419	406
22 X 22 X 18	550 X 550 X 450	559	457	419	394
22 X 22 X 16	550 X 550 X 400	559	406.4	419	381
22 X 22 X 14	550 X 550 X 350	559	355.6	419	381
22 X 22 X 12	550 X 550 X 300	559	323.8	419	371
22 X 22 X 10	550 X 550 X 250	559	273.0	419	359
24 X 24 X 22	600 X 600 X 550	610	559	432	432
24 X 24 X 20	600 X 600 X 500	610	508	432	432
24 X 24 X 18	600 X 600 X 450	610	457	432	419
24 X 24 X 16	600 X 600 X 400	610	406.4	432	406
24 X 24 X 14	600 X 600 X 350	610	355.6	432	406
24 X 24 X 12	600 X 600 X 300	610	323.8	432	397
24 X 24 X 10	600 X 600 X 250	610	273.0	432	384

Notes:
 1) All dimensions are in millimeters.
 2) T is same to the wall thickness of pipe, see page 12.

Reducers



Concentric Reducer



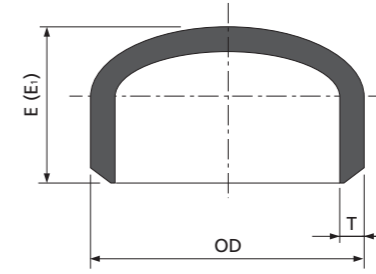
Eccentric Reducer

ASME B16.9				
Nominal Size		Outside Diameter at Bevel		End to End
NPS	DN	OD ₁	OD ₂	H
3/4 X 1/2	20 X 15	26.7	21.3	38
3/4 X 3/8	20 X 10	26.7	17.3	38
1 X 3/4	25 X 20	33.4	26.7	51
1 X 1/2	25 X 15	33.4	21.3	51
1 1/4 X 1	32 X 25	42.2	33.4	51
1 1/4 X 3/4	32 X 20	42.2	26.7	51
1 1/4 X 1/2	32 X 15	42.2	21.3	51
1 1/2 X 1 1/4	40 X 32	48.3	42.2	64
1 1/2 X 1	40 X 25	48.3	33.4	64
1 1/2 X 3/4	40 X 20	48.3	26.7	64
1 1/2 X 1/2	40 X 15	48.3	21.3	124
2 X 1 1/2	50 X 40	60.3	48.3	76
2 X 1 1/4	50 X 32	60.3	42.2	76
2 X 1	50 X 25	60.3	33.4	76
2 X 3/4	50 X 20	60.3	26.7	76
2 1/2 X 2	65 X 50	73.0	60.3	89
2 1/2 X 1 1/2	65 X 40	73.0	48.3	89
2 1/2 X 1 1/4	65 X 32	73.0	42.2	89
2 1/2 X 1	65 X 25	73.0	33.4	89
3 X 2 1/2	80 X 65	88.9	73.0	89
3 X 2	80 X 50	88.9	60.3	89
3 X 1 1/2	80 X 40	88.9	48.3	89
3 X 1 1/4	80 X 32	88.9	42.2	89
3 1/2 X 3	90 X 80	101.6	88.9	102
3 1/2 X 2 1/2	90 X 65	101.6	73.0	102
3 1/2 X 2	90 X 50	101.6	60.3	102
3 1/2 X 1 1/2	90 X 40	101.6	48.3	102
3 1/2 X 1 1/4	90 X 32	101.6	42.2	102
4 X 3 1/2	100 X 90	114.3	101.6	102
4 X 3	100 X 80	114.3	88.9	102
4 X 2 1/2	100 X 65	114.3	73.0	102
4 X 2	100 X 50	114.3	60.3	102
4 X 1 1/2	100 X 40	114.3	48.3	102
5 X 4	125 X 100	114.3	114.3	127
5 X 3 1/2	125 X 90	141.3	101.6	127
5 X 3	125 X 80	141.3	88.9	127

ASME B16.9				
Nominal Size		Outside Diameter at Bevel		End to End
NPS	DN	OD ₁	OD ₂	H
5 X 2 1/2	125 X 65	141.3	73.0	127
5 X 2	125 X 50	141.3	60.3	127
6 X 5	150 X 125	168.3	141.3	140
6 X 4	150 X 100	168.3	114.3	140
6 X 3 1/2	150 X 90	168.3	101.6	140
6 X 3	150 X 80	168.3	88.9	140
6 X 2 1/2	150 X 65	168.3	73.0	140
8 X 6	200 X 150	219.1	168.3	152
8 X 5	200 X 125	219.1	141.3	152
8 X 4	200 X 100	219.1	114.3	152
8 X 3 1/2	200 X 90	219.1	101.6	152
10 X 8	250 X 200	273.0	219.1	178
10 X 6	250 X 150	273.0	168.3	178
10 X 5	250 X 125	273.0	141.3	178
10 X 4	250 X 100	273.0	114.3	178
12 X 10	300 X 250	323.8	273.0	203
12 X 8	300 X 200	323.8	219.1	203
12 X 6	300 X 150	323.8	168.3	203
12 X 5	300 X 125	323.8	141.3	203
14 X 12	350 X 300	355.6	323.8	330
14 X 10	350 X 250	355.6	273.0	330
14 X 8	350 X 200	355.6	219.1	330
14 X 6	350 X 150	355.6	168.3	330
16 X 14	400 X 350	406.4	355.6	356
16 X 12	400 X 300	406.4	323.8	356
16 X 10	400 X 250	406.4	273.0	356
16 X 8	400 X 200	406.4	219.1	356
18 X 16	450 X 400	457	406.4	381
18 X 14	450 X 350	457	355.6	381
18 X 12	450 X 300	457	323.8	381
18 X 10	450 X 250	457	273.0	381
20 X 18	500 X 450	508	457	508
20 X 16	500 X 400	508	406.4	508
20 X 14	500 X 350	508	355.6	508
20 X 12	500 X 300	508	323.8	508
22 X 20	550 X 500	559	508	508
22 X 18	550 X 450	559	457	508
22 X 16	550 X 400	559	406.4	508
22 X 14	550 X 350	559	355.6	508
24 X 22	600 X 550	610	559	508
24 X 20	600 X 500	610	508	508
24 X 18	600 X 450	610	457	508
24 X 16	600 X 400	610	406.4	508

Notes:
 1) All dimensions are in millimeters.
 2) T is same to the wall thickness of pipe, see page 12.

Caps

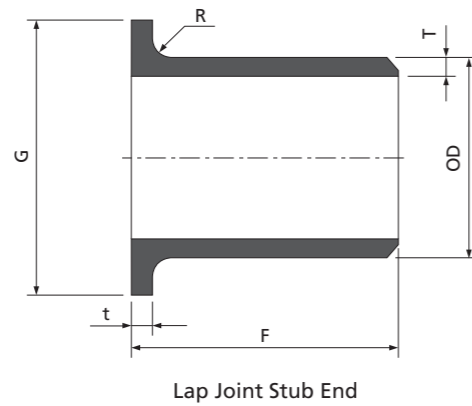


Cap

ASME B16.9					
Nominal Size		Outside Diameter at Bevel	Length		Limiting Wall Thickness for Length E
NPS	DN	OD	E	E ₁	
1/2	15	21.3	25	25	4.57
3/4	20	26.7	25	25	3.81
1	25	33.4	38	38	4.57
1 1/4	32	42.2	38	38	4.83
1 1/2	40	48.3	38	38	5.08
2	50	60.3	38	44	5.59
2 1/2	65	73	38	51	7.11
3	80	88.9	51	64	7.62
3 1/2	90	101.6	64	76	8.13
4	100	114.3	64	76	8.64
5	125	141.3	76	89	9.65
6	150	168.3	89	102	10.92
8	200	219.1	102	127	12.7
10	250	273	127	152	12.7
12	300	323.8	152	178	12.7
14	350	355.6	165	191	12.7
16	400	406.4	178	203	12.7
18	450	457	203	229	12.7
20	500	508	229	254	12.7
22	550	559	254	254	12.7
24	600	610	267	305	12.7

Notes:
 1) Length E applies for the thickness not exceeding the Limiting Wall Thickness, Length E1 applies for the thickness exceeding the Limiting Wall Thickness.
 2) All dimensions are in millimeters.
 3) T is same to the wall thickness of pipe, see page 12.

Lap Joint Stub Ends



ASME B16.9							
Nominal Size		OD		F		Radius of Fillet	Diameter of Lap
NPS	DN	Max.	Min.	Long Pattern	Short Pattern	R	G
1/2	15	22.8	20.5	76	51	3	35
3/4	20	28.1	25.9	76	51	3	43
1	25	35	32.6	102	51	3	51
1 1/4	32	43.6	41.4	102	51	5	64
1 1/2	40	49.9	47.5	102	51	6	73
2	50	62.4	59.5	152	64	8	92
2 1/2	65	75.3	72.2	152	64	8	105
3	80	91.3	88.1	152	64	10	127
3 1/2	90	104	100.8	152	76	10	140
4	100	116.7	113.5	152	76	11	157
5	125	144.3	140.5	203	76	11	186
6	150	171.3	167.5	203	89	13	216
8	200	222.1	218.3	203	102	13	270
10	250	277.2	272.3	254	127	13	324
12	300	328	323.1	254	152	13	381
14	350	359.9	354.8	305	152	13	413
16	400	411	405.6	305	152	13	470
18	450	462	456	305	152	13	533
20	500	514	507	305	152	13	584
22	550	565	558	305	152	13	641
24	600	616	609	305	152	13	692

Notes:

- 1) When the short pattern is used on the larger flanges with PN 50 and PN 110(300 and 600 LB) and on flanges with PN 150(900 LB) and above, or the long pattern is used on the larger flange with PN 260 and PN 420(1500 and 2500LB), the length of the cylinder may be added to be feasible the welding, the adding length shall be negotiated by manufacturer and purchaser.
- 2) The thickness of joint shall be added if the tongue and groove, male and female contact surface of flange are used, and the adding thickness shall increase (not be included in) the base length F.
- 3) The lap joint diameter G shall conform to the standard machined face indicated in ASME B16.5 , and the back of joint shall be machined to conform to the surface of installation. When ring joint facings used, the size K specified in ASME B 16.5 Shall apply.
- 4) All dimensions are in millimeters.
- 5) T is same to the wall thickness of pipe, see page 12.

Tolerances

Nominal Size		All Fittings		45° & 90° Elbows & Tees, Crosses	180° Returns			Caps	Reducers & Lap Joint Stub Ends	Lap Joint Stub Ends		
NPS	DN	Outside Diameter at Bevel	Inside Diameter at End	A, B, C, M	O	K	U	E	F, H	G	R	T
1/2-2 1/2	15-65	+1.6 -0.8	±0.8	±2	±6	±6	±1	±3	±2	0 -1	0 -1	1.6 0
3-3 1/2	80-90	±1.6	±1.6	±2	±6	±6	±1	±3	±2	0 -1	0 -1	1.6 0
4	100	±1.6	±1.6	±2	±6	±6	±1	±3	±2	0 -1	0 -2	1.6 0
5-8	125-200	+2.4 -1.6	±1.6	±2	±6	±6	±1	±6	±2	0 -1	0 -2	1.6 0
10-18	250-450	+4 -3.2	±3.2	±2	±10	±6	±2	±6	±2	0 -2	0 -2	3.2 0
20-24	500-600	+6.4 -4.8	±4.8	±2	±10	±6	±2	±6	±2	0 -2	0 -2	3.2 0

Notes:

- 1) The inside diameter and the nominal wall thickness shall be specified by purchaser.
- 2) If purchaser dose not specify the thickness tolerance, 87.5% of the nominal thickness shall be the min. thickness.
- 3) Out -of-round is the sum of absolute values of plus and minus tolerance.
- 4) When the wall thickness needs increasing to meet the design requirement, the tolerance may exceed the ones indicated in the above list.
- 5) All dimensions are in millimeters.

Nominal Size		Q	P
NPS	DN		
1/2-4	15-100	1	2
5-8	125-200	2	4
10-12	250-300	3	5
14-16	350-400	3	6
18-24	450-600	4	10

Nominal Size		Normal Wall Thickness T																
Outside Diameter		SCH5S	SCH10S	SCH10	SCH20	SCH30	SCH40S	STD	SCH40	SCH60	SCH80	XS	SCH80S	SCH100	SCH120	SCH140	SCH160	XXS
1/8	6	-	1.24	-	-	-	1.73	1.73	1.73	-	2.41	2.41	2.41	-	-	-	-	-
1/4	8	-	1.65	-	-	-	2.24	2.24	2.24	-	3.02	3.02	3.02	-	-	-	-	-
3/8	10	-	1.65	-	-	-	2.31	2.31	2.31	-	3.2	3.2	3.2	-	-	-	-	-
1/2	15	1.65	2.11	-	-	-	2.77	2.77	2.77	-	3.73	3.73	3.73	-	-	-	-	4.78
3/4	20	1.65	2.11	-	-	-	2.87	2.87	2.87	-	3.91	3.91	3.91	-	-	-	-	5.56
1	25	1.65	2.77	-	-	-	3.38	3.38	3.38	-	4.55	4.55	4.55	-	-	-	-	6.35
1 1/4	32	1.65	2.77	-	-	-	3.56	3.56	3.56	-	4.85	4.85	4.85	-	-	-	-	6.35
1 1/2	40	1.65	2.77	-	-	-	3.68	3.68	3.68	-	5.08	5.08	5.08	-	-	-	-	7.14
2	50	1.65	2.77	-	-	-	3.91	3.91	3.91	-	5.54	5.54	5.54	-	-	-	-	8.74
2 1/2	65	2.11	3.05	-	-	-	5.16	5.16	5.16	-	7.01	7.01	7.01	-	-	-	-	9.53
3	80	2.11	3.05	-	-	-	5.49	5.49	5.49	-	7.62	7.62	7.62	-	-	-	-	11.13
3 1/2	90	2.11	3.05	-	-	-	5.74	5.74	5.74	-	8.08	8.08	8.08	-	-	-	-	11.13
4	100	2.11	3.05	-	-	-	6.02	6.02	6.02	-	8.56	8.56	8.56	-	-	-	-	13.49
5	125	2.77	3.4	-	-	-	6.55	6.55	6.55	-	9.53	9.53	9.53	-	-	-	-	15.88
6	150	2.77	3.4	-	-	-	7.11	7.11	7.11	-	10.97	10.97	10.97	-	-	-	-	18.26
8	200	2.77	3.76	-	-	6.35	8.18	8.18	8.18	10.31	12.7	12.7	12.7	15.09	18.26	20.62	23.01	22.23
10	250	3.4	4.19	-	-	6.35	7.8	9.27	9.27	12.7	12.7	12.7	12.7	15.09	18.26	21.44	25.4	28.58
12	300	3.96	4.57	-	-	6.35	8.38	9.53	9.53	14.27	12.7	12.7	12.7	17.48	21.44	25.4	28.58	33.32
14	350	3.96	4.78	6.35	7.92	6.35	9.53	-	9.53	15.09	-	-	19.05	23.83	27.79	31.75	35.71	-
16	400	4.19	4.78	6.35	7.92	6.35	9.53	-	9.53	16.66	-	-	21.44	26.19	30.96	36.53	40.49	-
18	450	4.19	4.78	6.35	7.92	6.35	9.53	-	9.53	14.27	-	-	23.83	29.36	34.96	39.67	45.24	-
20	500	4.78	5.54	6.35	9.53	12.7	-	-	9.53	20.62	-	-	26.19	32.54	38.1	44.45	50.01	-
22	550	4.78	5.54	6.35	9.53	12.7	-	-	9.53	22.23	-	-	28.58	34.93	41.28	47.63	53.98	-
24	600	5.54	6.35	6.35	9.53	14.27	-	-	9.53	17.48	-	-	30.96	38.89	46.02	52.37	59.54	-

SCH5S, 10S, 40S, 80S applies for stainless steel.

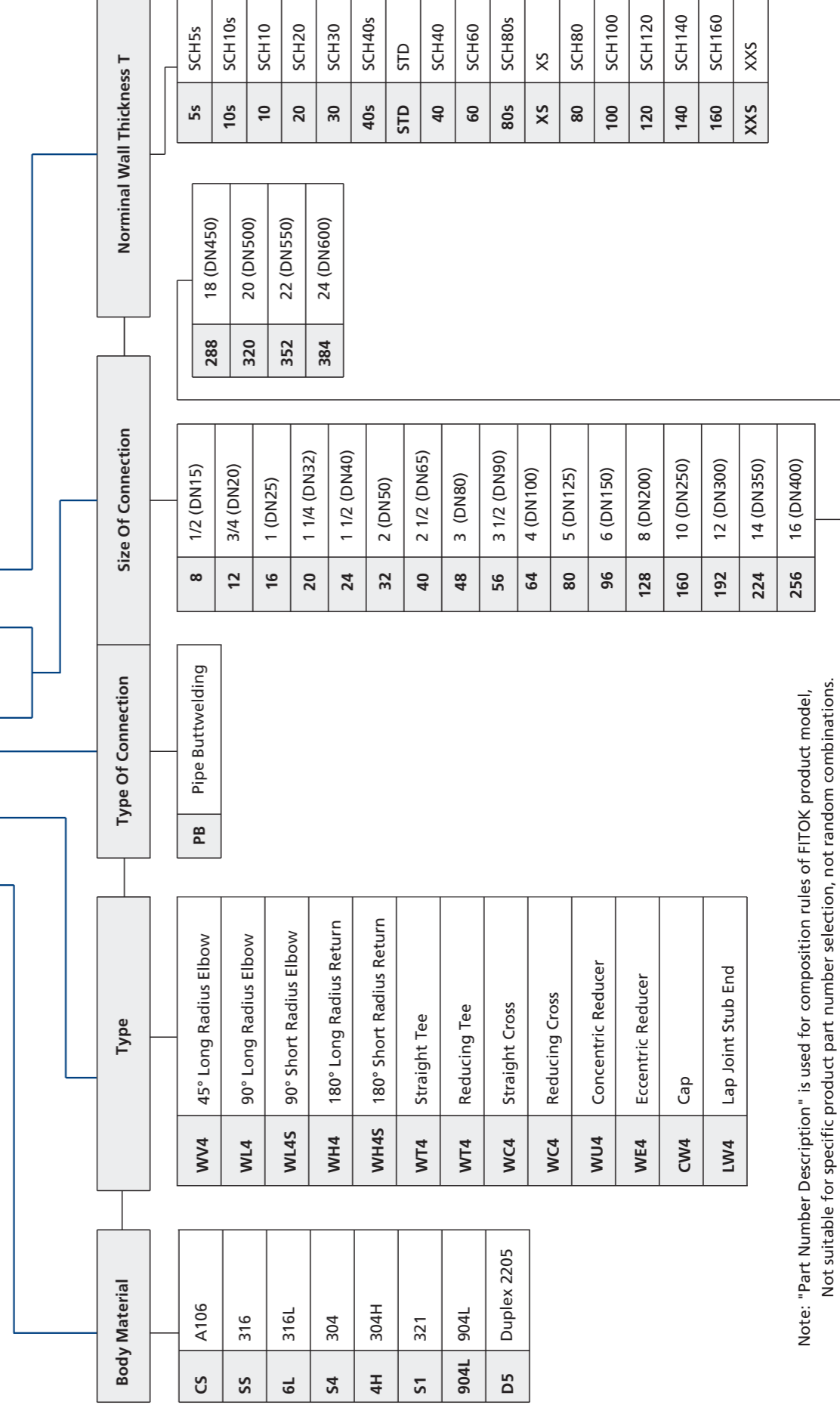
Note:

1) All dimensions are in millimeters.

Factory-Made Wrought Butt Welding Fittings

Part Number Description

6L – WT4 – PB32 – PB16 – 40S

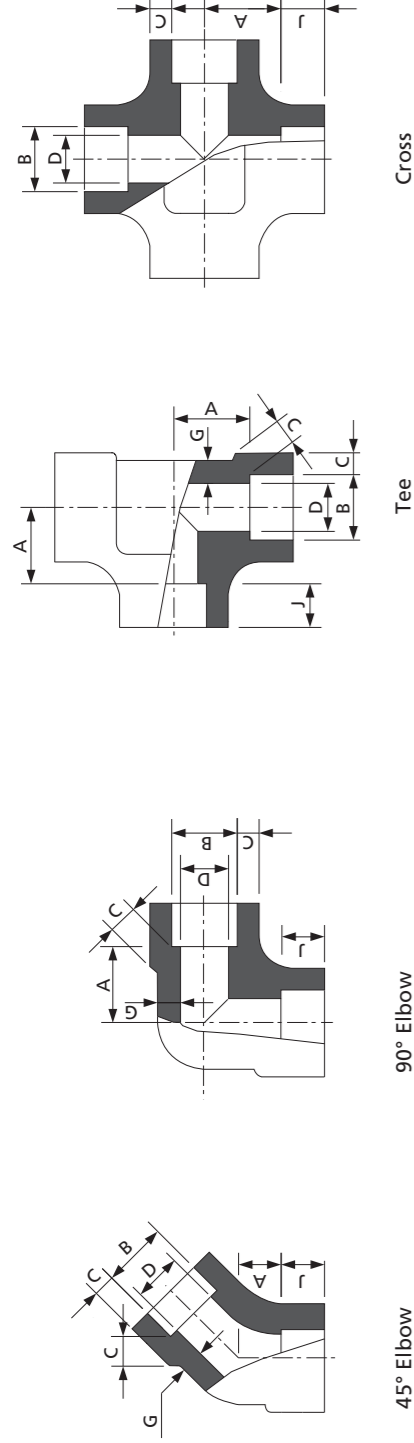


Note: "Part Number Description" is used for composition rules of FITOK product model, Not suitable for specific product part number selection, not random combinations. If in doubt, please contact FITOK company or authorized agents.

Forged Fittings, Socket-Welding and Threaded

Forged Fittings Socket-Welding and Threaded comply with ASME B16.11.

Socket-Welding Fittings

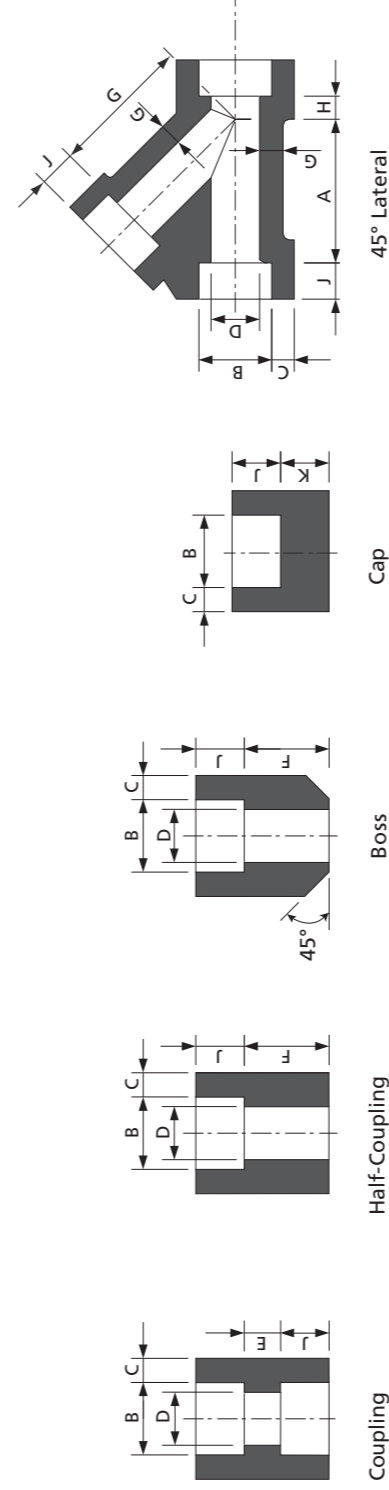


ASME B16.11																							
Nominal Size	Socket Bore Dia.	Bore Dia. of Fittings			Socket Wall Thickness						Body Wall		Depth of Socket		Center to Bottom of Socket								
		D		C		3000		6000		9000		G min		J min	A		90° Elbows, Tees, Crosses		45° Elbows				
NPS	DN	3000	6000	9000	ave	min	ave	min	ave	min	3000	6000	9000		3000	6000	9000	3000	6000	9000	3000	6000	9000
1/8	6	10.9	3.2	-	3.18	3.18	3.96	3.43	-	-	2.41	3.15	-	9.5	11	11	-	-	8	8	-	-	
1/4	8	14.3	5.6	-	3.78	3.3	4.6	4.01	-	-	3.02	3.68	-	9.5	11	13.5	-	-	8	8	-	-	
3/8	10	17.7	8.4	-	4.01	3.5	5.03	4.37	-	-	3.2	4.01	-	9.5	13.5	15.5	-	-	8	11	-	-	
1/2	15	21.9	15	5.6	4.67	4.09	5.97	5.18	9.53	8.18	3.73	4.78	7.47	9.5	15.5	19	25.5	11	12.5	15.5	13	14	19
3/4	20	27.3	20.2	14.8	4.9	4.27	6.96	6.04	9.78	8.56	3.91	5.56	7.82	12.5	19	22.5	28.5	13	14	19	17.5	20.5	22.5
1	25	34	25.9	19.9	5.69	4.98	7.92	6.93	11.38	9.96	4.55	6.35	9.09	12.5	22.5	27	32	14	17.5	20.5	17.5	20.5	22.5
1 1/4	32	42.8	34.3	28.7	6.07	5.28	7.92	6.93	12.14	10.62	4.85	6.35	9.7	12.5	27	32	35	17.5	20.5	22.5	17.5	20.5	22.5
1 1/2	40	48.9	40.1	33.2	6.35	5.54	8.92	7.8	12.7	11.12	5.08	7.14	10.15	12.5	32	38	38	20.5	25.5	25.5	20.5	25.5	25.5
2	50	61.2	51.7	42.1	6.93	6.04	10.92	9.5	13.84	12.12	5.54	8.74	11.07	16	38	41	54	25.5	28.5	28.5	25.5	28.5	28.5
2 1/2	65	73.9	61.2	-	8.76	7.62	-	-	-	-	7.01	-	-	16	41	-	-	28.5	-	-	-	-	-
3	80	89.9	76.4	-	9.52	8.3	-	-	-	-	7.62	-	-	16	57	-	-	32	-	-	-	-	-
4	100	115.5	100.7	-	10.69	9.35	-	-	-	-	8.56	-	-	19	66.5	-	-	41	-	-	-	-	-

Notes:

- 1) All dimensions are in millimeters.
- 2) The even thickness around the socket bore shall not be less than the average value, the thickness at partial areas can be the min. one.
- 3) Considering the tolerance of outside diameter of pipe, the diameters of some socket bore can be a little larger than the ones specified in B16.11.
- 4) When the sizes of the connecting pipes are not conformed to the ones specified in this catalog, the sizes of the connecting pipes shall be provided in the purchase specification.

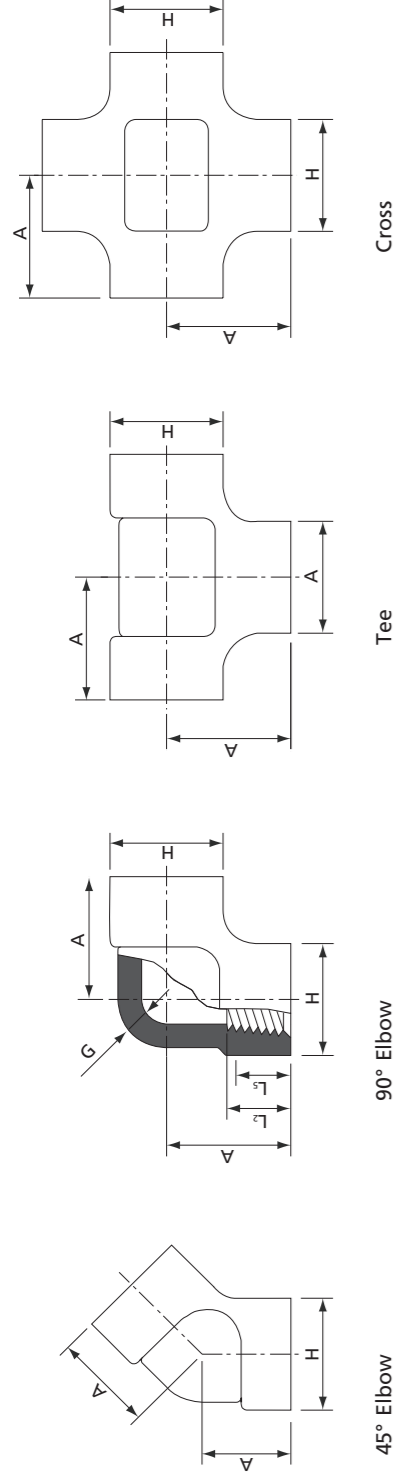
Socket-Welding Fittings



ASME B16.11																			
Nominal Size	Socket Bore Dia.	Bore Dia. of Fittings			Socket Wall Thickness						Body Wall		Depth of Socket		Laying Lengths		End Wall Thickness		
		D		C		3000		6000		9000		G min		J min	F	K min			
NPS	DN	3000	6000	9000	ave	min	ave	min	ave	min	3000	6000	9000			E	F	3000	6000
1/8	6	10.9	3.2	-	3.18	3.18	3.96	3.43	-	-	2.41	3.15	-	9.5	16	16	4.8	6.4	-
1/4	8	14.3	5.6	-	3.78	3.3	4.6	4.01	-	-	3.02	3.68	-	9.5	16	16	4.8	6.4	-
3/8	10	17.7	8.4	-	4.01	3.5	5.03	4.37	-	-	3.2	4.01	-	9.5	17.5	17.5	4.8	6.4	-
1/2	15	21.9	15	5.6	4.67	4.09	5.97	5.18	9.53	8.18	3.73	4.78	7.47	9.5	22.5	22.5	6.4	7.9	11.2
3/4	20	27.3	20.2	14.8	4.9	4.27	6.96	6.04	9.78	8.56	3.91	5.56	7.82	12.5	24	24	6.4	7.9	12.7
1	25	34	25.9	19.9	5.69	4.98	7.92	6.93	11.38	9.96	4.55	6.35	9.09	12.5	28.5	28.5	9.6	11.2	14.2
1 1/4	32	42.8	34.3	28.7	6.07	5.28	7.92	6.93	12.14	10.62	4.85	6.35	9.7	12.5	30	30	9.6	11.2	14.2
1 1/2	40	48.9	40.1	33.2	6.35	5.54	8.92	7.8	12.7	11.12	5.08	7.14	10.15	12.5	32	32	11.2	12.7	15.7
2	50	61.2	51.7	42.1	6.93	6.04	10.92	9.5	13.84	12.12	5.54	8.74	11.07	16	19	19	12.7	15.7	19
2 1/2	65	73.9	61.2	-	8.76	7.62	-	-	-	-	7.01	-	-	16	19	19	15.7	19	-
3	80	89.9	76.4	-	9.52	8.3	-	-	-	-	7.62	-	-	16	19	19	19	22.4	-
4	100	115.5	100.7	-	10.69	9.35	-	-	-	-	8.56	-	-	19	19	19	22.4	28.4	-

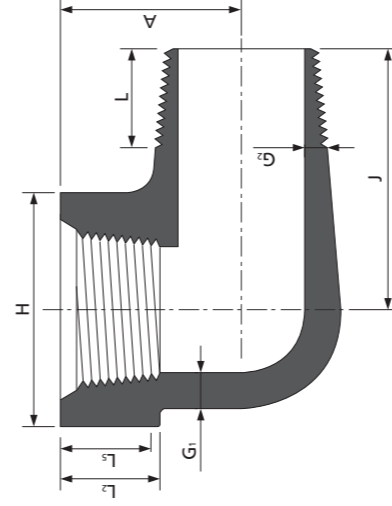
Notes (continued):

- 5) When the fittings are reducing, the structure sizes shall be same as the ones of the straight fittings and B J D shall be machined per the according reducing ends.
- 6) Couplings can be the concentric or eccentric type.
- 7) Fitting can also be manufactured as the mixed connections of SW and THRD.



Nominal Size		Center-to-End				Outside Diameter of Band			Wall Thickness			Length of Thread		
NPS	DN	A				H			G min			L5 min	L2 min	
		90° Elbows, Tees, Crosses		45° Elbows		2000	3000	6000	2000	3000	6000			
1/8	6	2000	21	25	17	19	22	25	3000	3000	3000	6000	6.4	6.7
1/4	8	21	25	28	17	22	25	33	33	33	33	6000	8.1	10.2
3/8	10	25	28	33	19	25	33	38	38	38	38	6000	9.1	10.4
1/2	15	28	33	38	22	28	38	46	46	46	46	6000	10.9	13.6
3/4	20	33	38	44	25	33	46	56	56	56	56	6000	12.7	13.9
1	25	38	44	51	28	35	56	62	62	62	62	6000	14.7	17.3
1 1/4	32	44	51	60	33	43	62	75	75	75	75	6000	17	18
1 1/2	40	51	60	64	35	44	62	84	84	84	84	6000	17.8	18.4
2	50	60	64	83	43	52	75	102	102	102	102	6000	19	19.2
2 1/2	65	76	83	95	52	64	92	121	121	121	121	6000	23.6	28.9
3	80	86	95	106	64	79	109	146	146	146	146	6000	25.9	30.5
4	100	106	114	114	79	79	146	152	152	152	152	6000	27.7	33

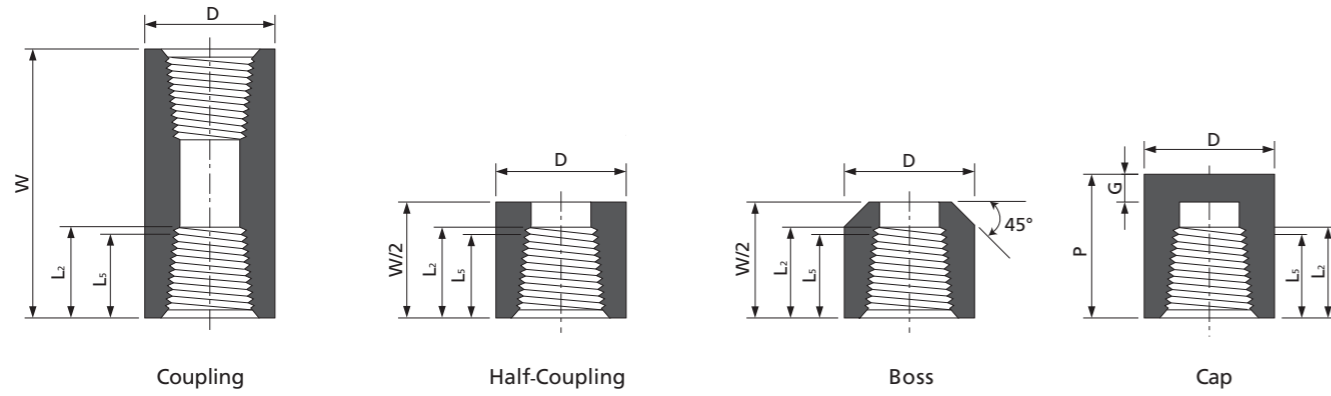
Notes:
 1) All dimensions are in millimeters.
 2) Thread shall be machined per ASME B1.20.1.



Nominal Size		Center-to-Female End Street Ells			Center to Male End Street Ells			Outside Diameter of Band			Min. Wall Thickness			Length of Thread			Length Male Thread
NPS	DN	A			J			H			G1			G2			
		3000	6000	6000	3000	6000	6000	3000	6000	6000	3000	6000	3000	6000	6000	6000	
1/8	6	19	22	25	25	32	32	19	25	25	3000	3000	3000	6000	6.4	6.7	10
1/4	8	22	25	28	32	38	38	25	32	32	330	330	330	330	8.1	10.2	11
3/8	10	25	28	33	38	41	41	32	38	38	351	351	351	351	9.1	10.4	13
1/2	15	28	35	38	41	48	48	38	44	44	409	409	409	409	10.9	13.6	14
3/4	20	35	44	44	48	57	57	44	51	51	432	432	432	432	12.7	13.9	16
1	25	44	51	51	57	66	66	51	62	62	498	498	498	498	14.7	17.3	19
1 1/4	32	51	54	54	66	71	71	62	70	70	528	528	528	528	17	18	21
1 1/2	40	54	64	64	71	84	84	70	84	84	556	556	556	556	17.8	18.4	21
2	50	64	83	83	84	105	105	84	102	102	714	714	714	714	19	19.2	22

Notes:
 1) All dimensions are in millimeters.
 2) Thread shall be machined per ASME B1.20.1.

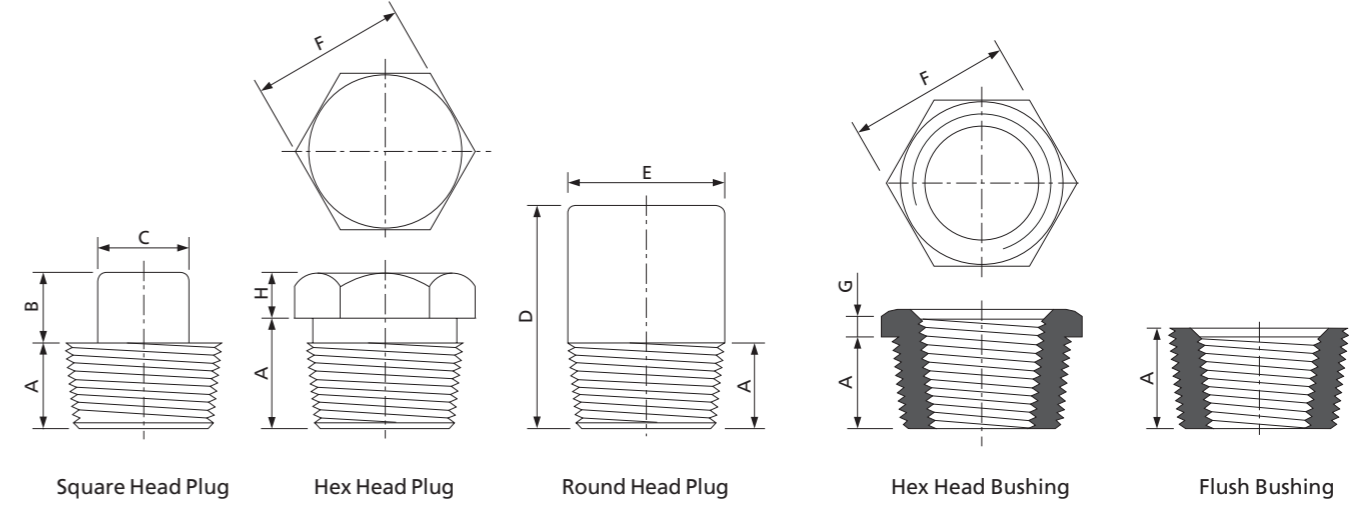
Threaded Fittings



ASME B16.11											
Nominal Size		End-to-End		End-to-End		Outside Diameter		End Wall		Length of Thread	
NPS	DN	W		P		D		G min		L 5 min	L 2 min
		3000 & 6000	3000	6000	3000	6000	3000	6000			
1/8	6	32	19	-	16	22	4.8	-	6.4	6.7	
1/4	8	35	25	27	19	25	4.8	6.4	8.1	10.2	
3/8	10	38	25	27	22	32	4.8	6.4	9.1	10.4	
1/2	15	48	32	33	28	38	6.4	7.9	10.9	13.6	
3/4	20	51	37	38	35	44	6.4	7.9	12.7	13.9	
1	25	60	41	43	44	57	9.7	11.2	14.7	17.3	
1 1/4	32	67	44	46	57	64	9.7	11.2	17	18	
1 1/2	40	79	44	48	64	76	11.2	12.7	17.8	18.4	
2	50	86	48	51	76	92	12.7	15.7	19	19.2	
2 1/2	65	92	60	64	92	108	15.7	19	23.6	28.9	
3	80	108	65	68	108	127	19	22.4	25.9	30.5	
4	100	121	68	75	140	159	22.4	28.4	27.7	33	

Notes:
 1) All dimensions are in millimeters.
 2) Thread shall be machined per ASME B1.20.1.

Threaded Fittings



ASME B16.11									
Nominal Size		Length	Square Height	Width Flats	Head Diameter	Length	Hex Height		Hex Width Flats
NPS	DN	A min	B min	C min	E nom	D min	H min	G min	F nom
		1/8	6	10	6	7	10	35	6
1/4	8	11	6	10	14	41	6	3	16
3/8	10	13	8	11	18	41	8	4	18
1/2	15	14	10	14	21	44	8	5	22
3/4	20	16	11	16	27	44	10	6	27
1	25	19	13	21	33	51	10	6	36
1 1/4	32	21	14	24	43	51	14	7	46
1 1/2	40	21	16	28	48	51	16	8	50
2	50	22	18	32	60	64	18	9	65
2 1/2	65	27	19	36	73	70	19	10	75
3	80	28	21	41	89	70	21	10	90
4	100	32	25	65	114	76	25	13	115

Notes:
 1) All dimensions are in millimeters.
 2) Thread shall be machined per ASME B1.20.1.

Tolerances

Tolerances For Fittings						
Nominal Size		All Fittings		Elbows, Tees & Crosses	Couplings	Half-Couplings
		Socket Bore Dia.	Bore Dia. Of Fittings	Center to Bottom of Socket	Laying Lengths	Laying Lengths
NPS	DN	B	D	A, H	E	F
1/8 ~ 1/4	6 ~ 8	+0.4 0	+1.5 0	±1.0	±1.5	±1.0
3/8 ~ 3/4	10 ~ 20	+0.4 0	+1.5 0	±1.5	±3.0	±1.5
1 ~ 1 1/2	25 ~ 40	+0.4 0	+1.5 0	±2.0	±4.0	±2.0
2	50	+0.5 0	+1.5 0	±2.0	±4.0	±2.0
2 1/2 ~ 3	65 ~ 80	+0.5 0	+3.0 0	±2.5	±5.0	±2.5
4	100	+0.5 0	+3.0 0	±2.5	±5.0	±2.5

Tolerances For Fittings				
Nominal Size		Elbows, Tees & Crosses	Couplings	Half - couplings
		Center-to-End	End-to-End	End-to-End
NPS	DN	A, J	W	W/2
1/8 ~ 1/4	6 ~ 8	±1.0	±1.0	±1.0
3/8 ~ 3/4	10 ~ 20	±1.5	±1.5	±1.5
1 ~ 2	25 ~ 50	±2.0	±2.0	±2.0
2 1/2 ~ 4	65 ~ 100	±2.5	±2.5	±2.5

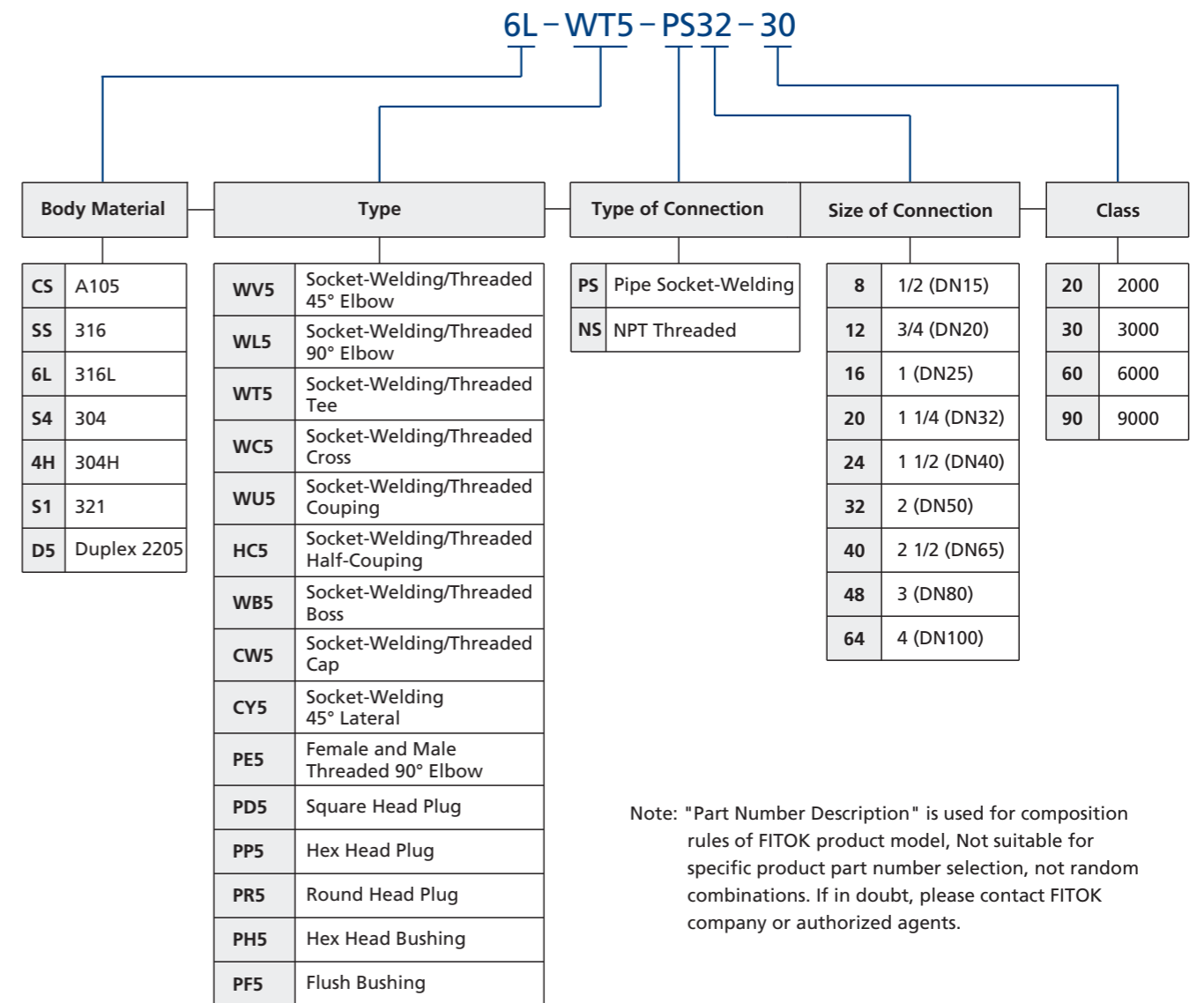
Note:
1) All dimensions are in millimeters.

Class with Schedule

Class Of The Fittings VS The Grade Of The Connecting Pipes					
Joint Type	Class	Grade of Connecting Pipes	Joint Type	Class	Grade of Connecting Pipes
Socket-Welding	3000	Sch80, XS	Threaded	2000	Sch80, XS
	6000	Sch160		3000	Sch160
	9000	XXS		6000	XXS

Note:
1) In this table, it is not restricted to use the pipes with thinner or thicker thickness than the connecting fittings. The actually used pipes can be thinner or thicker than the ones indicated in the table. When using thicker pipes, the fittings shall govern the pressure bearing; when using thinner pipes, the pipes shall govern the pressure bearing.

Outlet Part Number Description

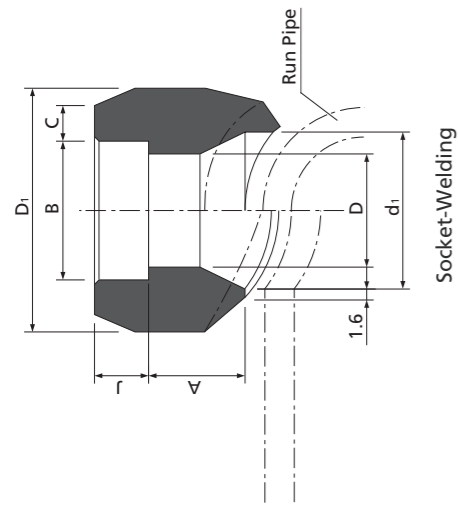


Note: "Part Number Description" is used for composition rules of FITOK product model, Not suitable for specific product part number selection, not random combinations. If in doubt, please contact FITOK company or authorized agents.

Integrally Reinforced Forged Branch Outlet Fittings

Socket-Welding , Threaded and Butt-welding comply with MSS SP-97

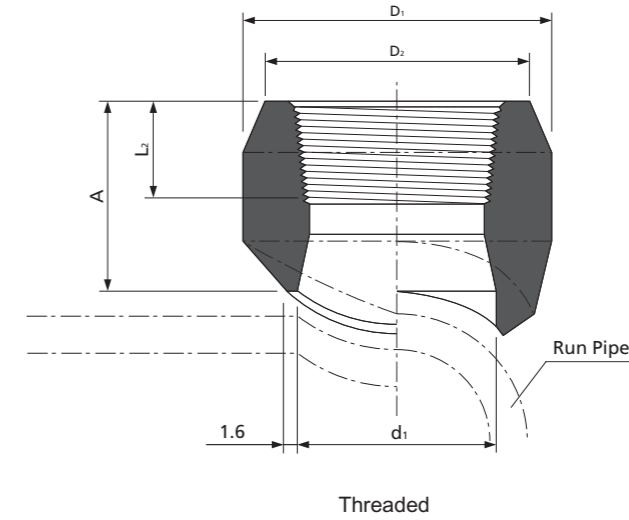
Socket-Welding Fittings



MSS SP-97												
Outlet Sizes		Run Pipe Sizes		Socket Bore Dia.	Bore Dia. of Fittings	Depth of Socket	Face of Fitting to Crotch		Outside Diameter of Fitting		Socket Wall Thickness	Cut Hole Dia.
NPS	DN	NPS	DN	B	D	J min	A max	D1 min	C min	D1 min	C min	d1 nom
1/8	6	1/4 ~ 36	8 ~ 900	10.8	6.1	9.5	10	27	3.18	27	3.18	16
1/4	8	3/8 ~ 36	10 ~ 900	14.2	8.5	9.5	10	27	3.78	27	3.78	16
3/8	10	1/2 ~ 36	15 ~ 900	17.6	11.8	9.5	13	30	4.01	30	4.01	19
1/2	15	3/4 ~ 36	20 ~ 900	21.8	15	9.5	16	38	4.67	38	4.67	24
3/4	20	1 ~ 36	25 ~ 900	27.2	20.2	12.5	16	47	4.9	47	5.97	30
1	25	1 1/4 ~ 36	32 ~ 900	33.9	25.9	12.5	22	56	5.69	56	7.92	36
1 1/4	32	1 1/2 ~ 36	40 ~ 900	42.7	34.3	12.5	22	66	6.07	66	7.92	45
1 1/2	40	2 ~ 36	50 ~ 900	48.8	40.1	12.5	24	75	6.35	75	8.92	51
2	50	2 1/2 ~ 36	65 ~ 900	61.2	51.7	16	24	90	6.93	90	10.92	65
2 1/2	65	3 ~ 36	80 ~ 900	73.9	61.2	16	25	105	8.76	105	-	76
3	80	4 ~ 36	100 ~ 900	89.8	76.4	16	30	124	9.52	124	-	94
4	100	5 ~ 36	125 ~ 900	115.2	100.7	19	30	154	10.69	154	-	121

Notes:
 1) All dimensions are in millimeters.
 2) "B" Minimum Socket Depths per ASME B16.11

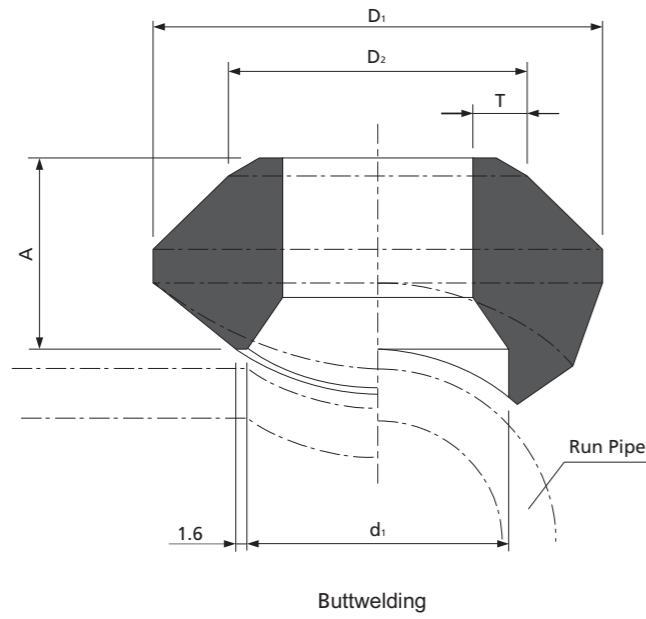
Threaded Fittings



MSS SP-97												
Outlet Sizes		Run Pipe Sizes		Face of Fitting to Crotch	Outside Diameter of Fitting	Outside Diameter at End of Branch		Length of Thread	Cut Hole Dia.			
NPS	DN	NPS	DN	A		D1 min		D2 min		L min	d1 nom	
				3000	6000	3000	6000	3000	6000		3000	6000
1/8	6	1/4 ~ 36	8 ~ 900	19	-	27	-	22	-	6.7	16	-
1/4	8	3/8 ~ 36	10 ~ 900	19	-	27	-	22	-	10.2	16	-
3/8	10	1/2 ~ 36	15 ~ 900	21	-	30	-	25	-	10.4	19	-
1/2	15	3/4 ~ 36	20 ~ 900	25	32	38	45	33	42	13.6	24	19
3/4	20	1 ~ 36	25 ~ 900	27	37	47	52	39	48	13.9	30	25
1	25	1 1/4 ~ 36	32 ~ 900	33	40	56	63	48	58	17.3	36	33
1 1/4	32	1 1/2 ~ 36	40 ~ 900	33	41	66	72	58	67	18	45	38
1 1/2	40	2 ~ 36	50 ~ 900	35	43	75	83	64	77	18.4	51	49
2	50	2 1/2 ~ 36	65 ~ 900	38	52	90	104	77	93	19.2	65	59
2 1/2	65	3 ~ 36	80 ~ 900	46	-	105	-	94	-	28.9	76	-
3	80	4 ~ 36	100 ~ 900	51	-	124	-	114	-	30.5	94	-
4	100	5 ~ 36	125 ~ 900	57	-	154	-	140	-	33	121	-

Notes:
 1) All dimensions are in millimeters.
 2) Threads shall be machined per ASME B1.20.1.

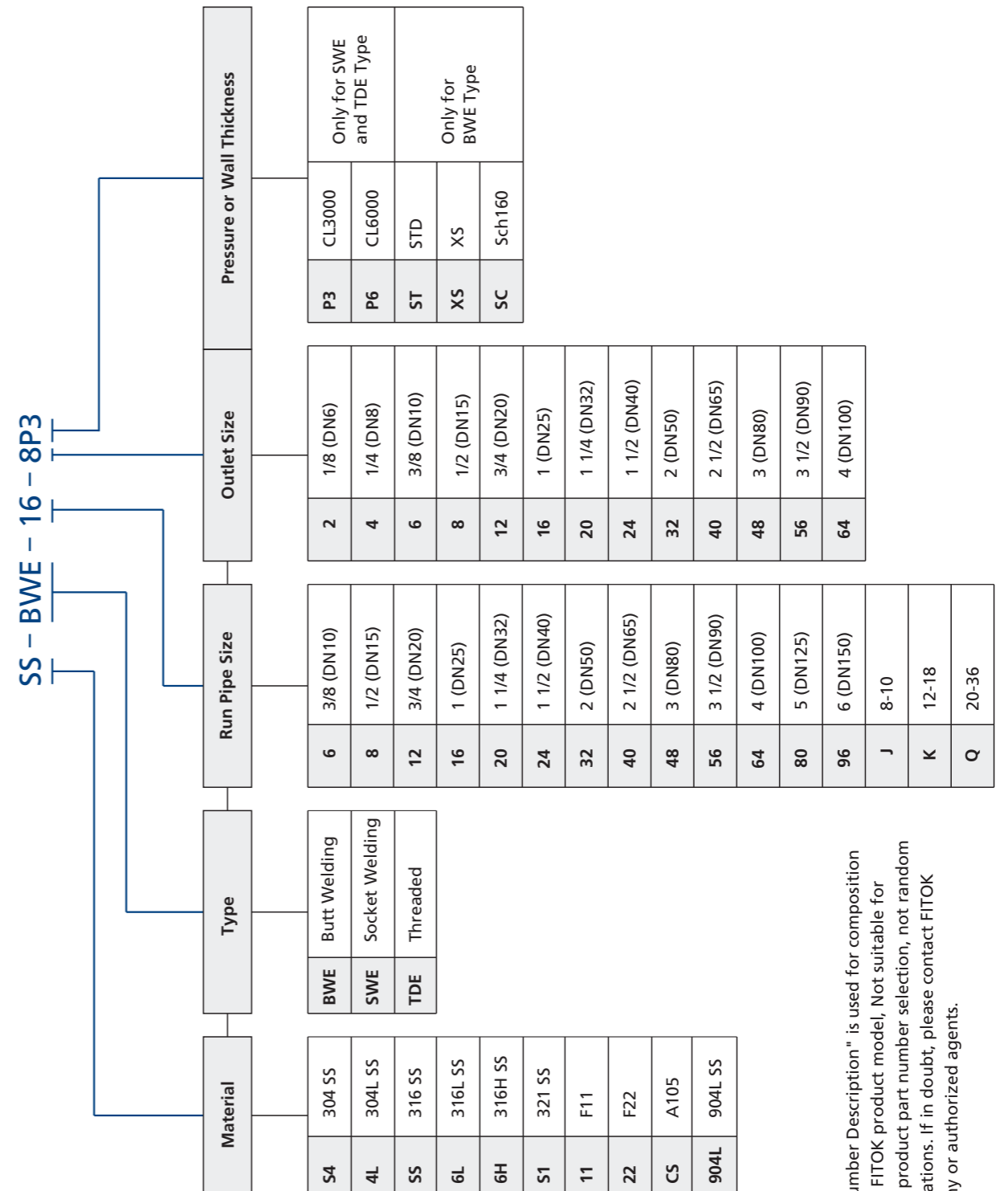
Buttwelding Fittings



MSS SP-97												
Outlet Sizes		Run Pipe Sizes		Face of Fitting to crotch			Outside Diameter of Fitting			Cut Hole Dia.		
NPS	DN	NPS	DN	A			D ₁ min			d ₁ nom		
				STD	XS	SCH160	STD	XS	SCH160	STD	XS	SCH160
1/8	6	1/4 ~ 36	8 ~ 900	16	16	-	24	24	-	16	16	-
1/4	8	3/8 ~ 36	10 ~ 900	16	16	-	26	26	-	16	16	-
3/8	10	1/2 ~ 36	15 ~ 900	19	19	-	30	30	-	19	19	-
1/2	15	3/4 ~ 36	20 ~ 900	19	19	28	36	36	36	24	24	14
3/4	20	1 ~ 36	25 ~ 900	22	22	32	43	43	46	30	30	19
1	25	1 1/4 ~ 36	32 ~ 900	27	27	38	55	55	51	36	36	25
1 1/4	32	1 1/2 ~ 36	40 ~ 900	32	32	44	66	66	63	45	45	33
1 1/2	40	2 ~ 36	50 ~ 900	33	33	51	74	74	71	51	51	38
2	50	2 1/2 ~ 36	65 ~ 900	38	38	55	90	90	82	65	65	43
2 1/2	65	3 ~ 36	80 ~ 900	41	41	62	104	104	98	76	76	54
3	80	3 1/2 ~ 36	90 ~ 900	44	44	73	124	124	122	93	93	73
3 1/2	90	4 ~ 36	100 ~ 900	48	48	-	138	138	-	113	113	-
4	100	5 ~ 36	125 ~ 900	51	51	84	154	154	154	120	120	98

Notes:
 1) All dimensions are in millimeters.
 2) D₂ is same to the outside diameter of pipe and
 T is same to the wall thickness of pipe, see page 12.

Part Number Description



Note: "Part Number Description" is used for composition rules of FITOK product model, Not suitable for specific product part number selection, not random combinations. If in doubt, please contact FITOK company or authorized agents.