

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

ASME B16.9 Buttwelding Fittings are designed and manufactured in accordance with the following specifications:-

ASME B16.9	Factory-Made Wrought Steel Buttwelding Fittings.
MSS-SP-43	Wrought Stainless Steel Butt Weld Fittings.
MSS-SP-75	Specification for High Test Wrought Butt Weld Fittings.
ANSI B31.3	Chemical Plant and Petroleum Refinery Piping.
ASME VIII	Boiler and Pressure Vessel Code.
API 6A	Specification for Wellhead and Christmas Tree Equipment.
NACE MR-01-75	Sulphide Stress Cracking Resistant Metallic Materials for Oilfield Equipment.

Buttwelding Fittings are available in either equal or with reducing configuration to suit various pressure ratings using materials as shown in the table below (for full material details please refer to Section 1):-

PRoPERTY	A234 Gr WPB	A420 Gr WPL6	A182 Gr 316L	A860 Gr WPHY52	A182 F51 UNS 31803	AISI 4130
TENSILE STRENGTH	60,000 PSI 415 MPa	60,000 PSI 415 MPa	70,000 PSI 485 MPa	66,000 PSI 455 MPa	90,000 PSI 620 MPa	105,000 PSI 725 MPa
YIELD STRENGTH	35,000 PSI 240 MPa	35,000 PSI 240 MPa	25,000 PSI 170 MPa	52,000 PSI 360 MPa	65,000 PSI 450 MPa	>80,000 PSI >551 MPa
IMPACT VALUES DEG C	N/A	18J min.av. -45°C	N/A	27J min.av. -50°C	27J min.av. -50°C	42J min.av. -50°C
HARDNESS (MAX.)	197 HB	N/A	N/A	235 HB	237HB	237HB
ELONGATION In 2" or 50mm	Long. 30% Trans. 20%	Long. 30% Trans. 16.5%	30%	32%	25%	18%

GENERAL NOTE: Please contact GonPetro for any special material or dimensional requirements.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

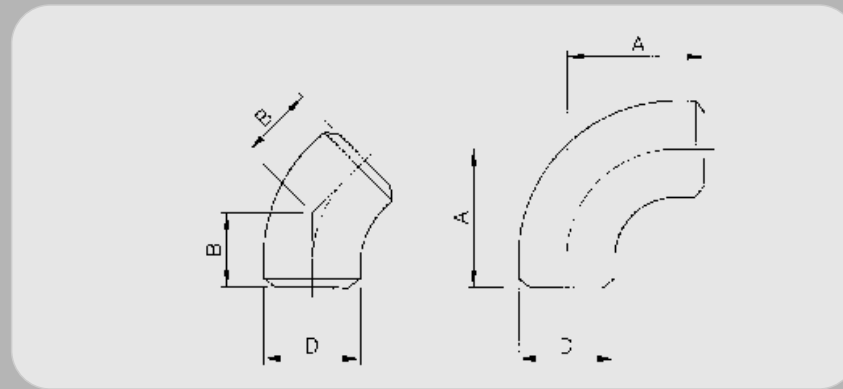


Table 4.1 Dimensions of Long Radius Elbows

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D			Centre-to-End					
				90 deg. Elbows A			45 deg. Elbows B		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
1/2	20	21	22	36	38	40	14	16	18
3/4	26	27	28	36	38	40	17	19	21
1	32	33	34	36	38	40	20	22	24
1 1/4	41	42	43	46	48	50	23	25	27
1 1/2	47	48	49	55	57	59	27	29	31
2	59	60	61	74	76	78	33	35	37
2 1/2	72	73	74	93	95	97	42	44	46
3	88	89	90	112	114	116	49	51	53
3 1/2	101	102	103	131	133	135	55	57	59
4	113	114	116	150	152	154	62	64	66
5	140	141	144	188	190	192	77	79	81
6	167	168	171	227	229	231	93	95	97
8	217	219	221	303	305	307	125	127	129
10	270	273	277	379	381	383	157	159	161

GENERAL NOTE: Dimensions are in mm.

Table 4.1 Dimensions of Long Radius Elbows

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D			Centre-to-End					
				90 deg. Elbows A			45 deg. Elbows B		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
12	321	324	328	454	457	460	187	190	193
14	353	356	360	530	533	536	219	222	225
16	403	406	410	607	610	613	251	254	257
18	454	457	461	683	686	689	283	286	289
20	503	508	514	759	762	765	315	318	321
22	554	559	565	835	838	841	340	343	346
24	605	610	616	911	914	917	378	381	384
26	655	660	667	988	991	994	403	406	409
28	706	711	718	1064	1067	1070	435	438	441
30	757	762	769	1140	1143	1146	467	470	473
32	808	813	820	1214	1219	1224	497	502	507
34	859	864	871	1290	1295	1300	528	533	538
36	909	914	921	1367	1372	1377	560	565	570
38	960	965	972	1443	1448	1453	595	600	605
40	1011	1016	1023	1519	1524	1529	627	632	637
42	1062	1067	1074	1595	1600	1605	655	660	665
44	1113	1118	1125	1671	1676	1681	690	695	700
46	1163	1168	1175	1748	1753	1758	722	727	732
48	1214	1219	1226	1824	1829	1834	754	759	764

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Butt Welding Fittings

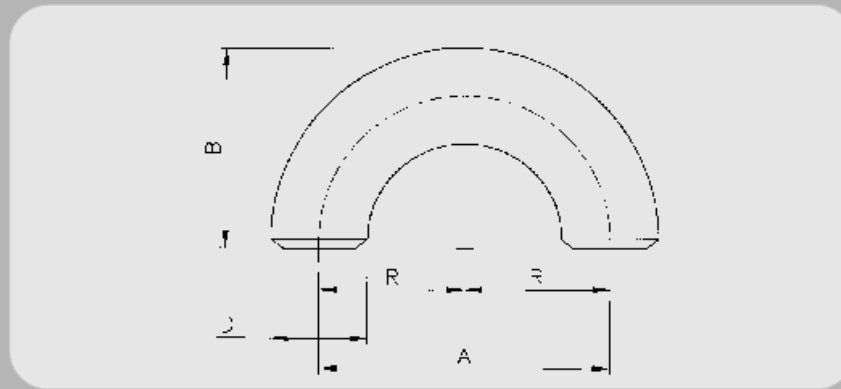


Table 4.2 Dimensions of Long Radius Returns

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D			Centre-to-Centre A			Back-to-Face B		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
1/2	20	21	22	69	76	83	41	48	55
3/4	26	27	28	69	76	83	44	51	58
1	32	33	34	69	76	83	49	56	63
1 1/4	41	42	43	88	95	102	63	70	77
1 1/2	47	48	49	107	114	121	76	83	90
2	59	60	61	145	152	159	99	106	113
2 1/2	72	73	74	184	191	198	125	132	139
3	88	89	90	222	229	236	152	159	166
3 1/2	101	102	103	260	267	274	177	184	191
4	113	114	116	298	305	312	203	210	217
5	140	141	144	374	381	388	255	262	269
6	167	168	171	450	457	464	306	313	320
8	217	219	221	603	610	617	407	414	421
10	270	273	277	752	762	772	511	518	525

GENERAL NOTE: Dimensions are in mm.

Table 4.2 Dimensions of Long Radius Returns

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D			Centre-to-Centre A			Back-to-Face B		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
12	321	324	328	904	914	924	612	619	626
14	353	356	360	1057	1067	1077	704	711	718
16	403	406	410	1209	1219	1229	806	813	820
18	454	457	461	1362	1372	1382	907	914	921
20	503	508	514	1514	1524	1534	1009	1016	1023
22	554	559	565	1666	1676	1686	1111	1118	1125
24	605	610	616	1819	1829	1839	1212	1219	1226

GENERAL NOTES: Dimensions are in mm.
Dimension R is equal to half of dimension A.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

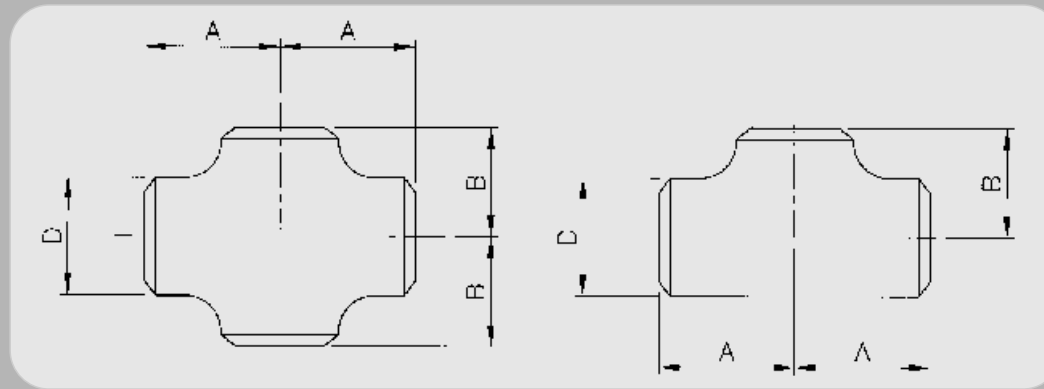


Table 4.3 Dimensions of Straight Tees and Crosses

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D			Centre-to-End					
				Run A			Outlet B		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
1/2	20	21	22	23	25	27	23	25	27
3/4	26	27	28	27	29	31	27	29	31
1	32	33	34	36	38	40	36	38	40
1 1/4	41	42	43	46	48	50	46	48	50
1 1/2	47	48	49	55	57	59	55	57	59
2	59	60	61	62	64	66	62	64	66
2 1/2	72	73	74	74	76	78	74	76	78
3	88	89	90	84	86	88	84	86	88
3 1/2	101	102	103	93	95	97	93	95	97
4	113	114	116	103	105	107	103	105	107
5	140	141	144	122	124	126	122	124	126
6	167	168	171	141	143	145	141	143	145
8	217	219	221	176	178	180	176	178	180
10	270	273	277	214	216	218	214	216	218

GENERAL NOTE: Dimensions are in mm.

Table 4.3 Dimensions of Straight Tees and Crosses

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D			Centre-to-End					
				Run A			Outlet B		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
12	321	324	328	251	254	257	251	254	257
14	353	356	360	276	279	282	276	279	282
16	403	406	410	302	305	308	302	305	308
18	454	457	461	340	343	346	340	343	346
20	503	508	514	378	381	384	378	381	384
22	554	559	565	416	419	422	416	419	422
24	605	610	616	429	432	435	429	432	435
26	655	660	667	492	495	498	492	495	498
28	706	711	718	518	521	524	518	521	524
30	757	762	769	556	559	562	556	559	562
32	808	813	820	592	597	602	592	597	602
34	859	864	871	630	635	640	630	635	640
36	909	914	921	668	673	678	668	673	678
38	960	965	972	706	711	716	706	711	716
40	1011	1016	1023	744	749	754	744	749	754
42	1062	1067	1074	757	762	767	706	711	716
44	1113	1118	1125	808	813	818	757	762	767
46	1163	1168	1175	846	851	856	795	800	805
48	1214	1219	1226	884	889	894	833	838	843

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

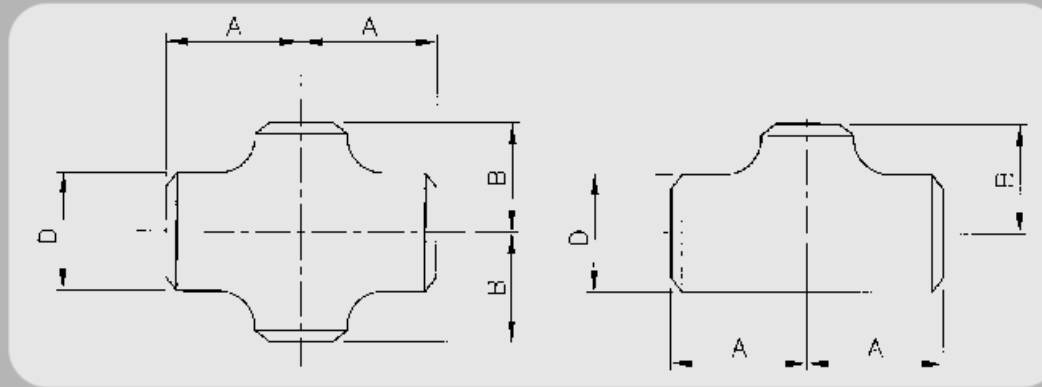


Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
¹ 1/2 x 1/2 x 3/8	20	21	22	16	17	18	23	25	27	23	25	27
1/2 x 1/2 x 1/4	20	21	22	13	14	15	23	25	27	23	25	27
3/4 x 3/4 x 1/2	26	27	28	20	21	22	27	29	31	27	29	31
3/4 x 3/4 x 3/8	26	27	28	16	17	18	27	29	31	27	29	31
1 x 1 x 3/4	32	33	34	26	27	28	36	38	40	36	38	40
1 x 1 x 1/2	32	33	34	20	21	22	36	38	40	36	38	40
¹ 1/4 x 1 1/4 x 1	41	42	43	32	33	34	46	48	50	46	48	50
¹ 1/4 x 1 1/4 x 3/4	41	42	43	26	27	28	46	48	50	46	48	50
¹ 1/4 x 1 1/4 x 1/2	41	42	43	20	21	22	46	48	50	46	48	50
¹ 1/2 x 1 1/2 x 1 1/4	47	48	49	41	42	43	55	57	59	55	57	59
¹ 1/2 x 1 1/2 x 1	47	48	49	32	33	34	55	57	59	55	57	59
¹ 1/2 x 1 1/2 x 3/4	47	48	49	26	27	28	55	57	59	55	57	59
¹ 1/2 x 1 1/2 x 1/2	47	48	49	20	21	22	55	57	59	55	57	59
2 x 2 x 1 1/2	59	60	61	47	48	49	62	64	66	58	60	62

GENERAL NOTE: Dimensions are in mm.

Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
2 x 2 x 1/4	59	60	61	41	42	43	62	64	66	55	57	59
2 x 2 x 1	59	60	61	32	33	34	62	64	66	49	51	53
2 x 2 x 3/4	59	60	61	26	27	28	62	64	66	42	44	46
2 1/2 x 2 1/2 x 2	72	73	74	59	60	61	74	76	78	68	70	72
2 1/2 x 2 1/2 x 1 1/2	72	73	74	47	48	49	74	76	78	65	67	69
2 1/2 x 2 1/2 x 1 1/4	72	73	74	41	42	43	74	76	78	62	64	66
2 1/2 x 2 1/2 x 1	72	73	74	32	33	34	74	76	78	55	57	59
3 x 3 x 2 1/2	88	89	90	72	73	74	84	86	88	81	83	85
3 x 3 x 2	88	89	90	59	60	61	84	86	88	74	76	78
3 x 3 x 1 1/2	88	89	90	47	48	49	84	86	88	71	73	75
3 x 3 x 1 1/4	88	89	90	41	42	43	84	86	88	68	70	72
3 1/2 x 3 1/2 x 3	101	102	103	88	89	90	93	95	97	90	92	94
3 1/2 x 3 1/2 x 2 1/2	101	102	103	72	73	74	93	95	97	87	89	91
3 1/2 x 3 1/2 x 2	101	102	103	59	60	61	93	95	97	81	83	85
3 1/2 x 3 1/2 x 1 1/2	101	102	103	47	48	49	93	95	97	77	79	81
4 x 4 x 3 1/2	113	114	116	101	102	103	103	105	107	100	102	104
4 x 4 x 3	113	114	116	88	89	90	103	105	107	96	98	100
4 x 4 x 2 1/2	113	113	116	72	73	74	103	105	107	93	95	97
4 x 4 x 2	113	114	116	59	60	61	103	105	107	87	89	91
4 x 4 x 1 1/2	113	114	116	47	48	49	103	105	107	84	86	88
5 x 5 x 4	140	141	144	113	114	116	122	124	126	115	117	119

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

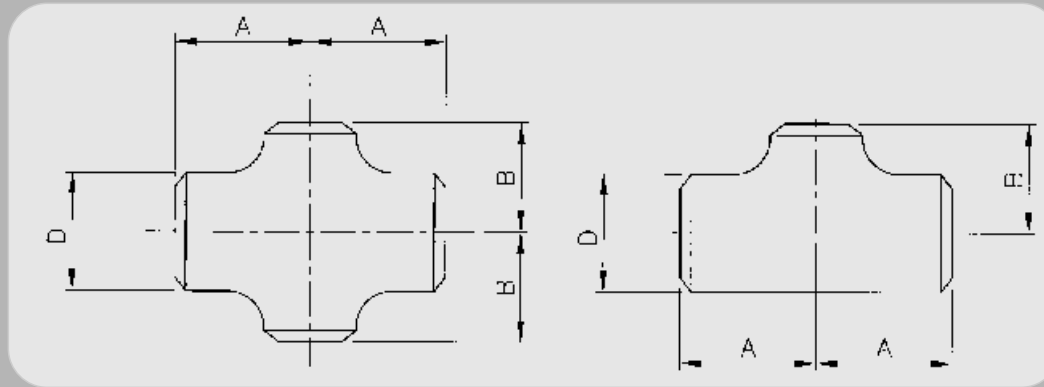


Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
5 x 5 x 3½	140	141	144	101	102	103	122	124	126	112	114	116
5 x 5 x 3	140	141	144	88	89	90	122	124	126	109	111	113
5 x 5 x 2½	140	141	144	72	73	74	122	124	126	106	108	110
5 x 5 x 2	140	141	144	59	60	61	122	124	126	103	105	107
6 x 6 x 5	167	168	171	140	141	144	141	143	145	135	137	139
6 x 6 x 4	167	168	171	113	114	116	141	143	145	128	130	132
6 x 6 x 3½	167	168	171	101	102	103	141	143	145	125	127	129
6 x 6 x 3	167	168	171	88	89	90	141	143	145	122	124	126
6 x 6 x 2½	167	168	171	72	73	74	141	143	145	119	121	123
8 x 8 x 6	217	219	221	167	168	171	176	178	180	166	168	170
8 x 8 x 5	217	219	221	140	141	144	176	178	180	160	162	164
8 x 8 x 4	217	219	221	113	114	116	176	178	180	154	156	158
8 x 8 x 3½	217	219	221	101	102	103	176	178	180	150	152	154
10 x 10 x 8	270	273	277	217	219	221	214	216	218	201	203	205

GENERAL NOTE: Dimensions are in mm.

Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
10 x 10 x 6	270	273	277	167	168	171	214	216	218	192	194	196
10 x 10 x 5	270	273	277	140	141	144	214	216	218	189	191	193
10 x 10 x 4	270	273	277	113	114	116	214	216	218	182	184	186
12 x 12 x 10	321	324	328	270	273	277	251	254	257	238	241	244
12 x 12 x 8	321	324	328	217	219	221	251	254	257	226	229	232
12 x 12 x 6	321	324	328	167	168	171	251	254	257	216	219	222
12 x 12 x 5	321	324	328	140	140	144	251	254	257	213	216	219
14 x 14 x 12	353	356	360	321	324	328	276	279	282	267	270	273
14 x 14 x 10	353	356	360	270	273	277	276	279	282	254	257	260
14 x 14 x 8	353	356	360	217	219	221	276	279	282	245	248	251
14 x 14 x 6	353	356	360	167	168	171	276	279	282	235	238	241
16 x 16 x 14	403	406	410	353	356	360	302	305	308	302	305	308
16 x 16 x 12	403	406	410	321	324	328	302	305	308	292	295	298
16 x 16 x 10	403	406	410	270	273	277	302	305	308	280	283	286
16 x 16 x 8	403	406	410	217	219	221	302	305	308	270	273	276
16 x 16 x 6	403	406	410	167	168	171	302	305	308	261	264	267
18 x 18 x 16	454	457	461	403	406	410	340	343	346	327	330	333
18 x 18 x 14	454	457	461	353	356	360	340	343	346	327	330	333
18 x 18 x 12	454	457	461	321	324	328	340	343	346	318	321	324
18 x 18 x 10	454	457	461	270	273	277	340	343	346	305	308	311
18 x 18 x 8	454	457	461	217	219	221	340	343	346	295	298	301

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

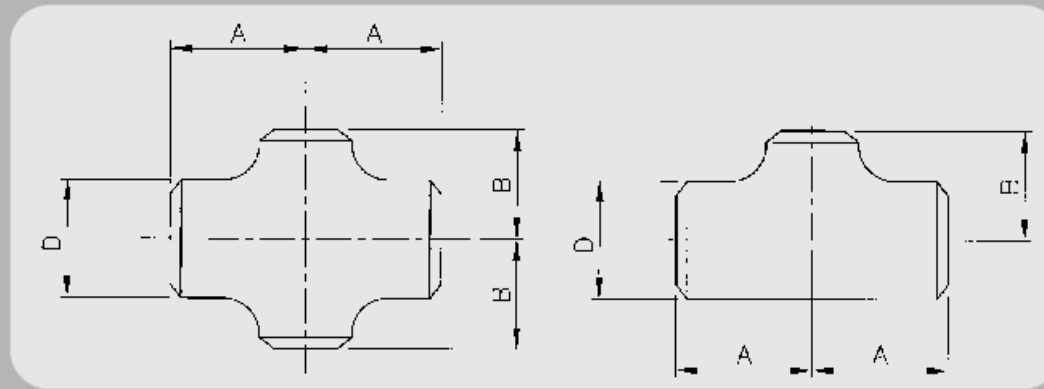


Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
20 x 20 x 18	503	508	514	454	457	461	378	381	384	365	368	371
20 x 20 x 16	503	508	514	403	406	410	378	381	384	353	356	359
20 x 20 x 14	503	508	514	353	356	360	378	381	384	353	356	359
20 x 20 x 12	503	508	514	321	324	328	378	381	384	343	346	349
20 x 20 x 10	503	508	514	270	273	277	378	381	384	330	333	336
20 x 20 x 8	503	508	514	217	219	221	378	381	384	321	324	327
22 x 22 x 20	554	559	565	503	508	514	416	419	422	403	406	409
22 x 22 x 18	554	559	565	454	457	461	416	419	422	391	394	397
22 x 22 x 16	554	559	565	403	406	410	416	419	422	378	381	384
22 x 22 x 14	554	559	565	353	356	360	416	419	422	378	381	384
22 x 22 x 12	554	559	565	321	324	328	416	419	422	368	371	374
22 x 22 x 10	554	559	565	270	273	277	416	419	422	356	359	362
24 x 24 x 22	605	610	616	554	559	565	429	432	435	429	432	435
24 x 24 x 20	605	610	616	503	508	514	429	432	435	429	432	435

GENERAL NOTE: Dimensions are in mm.

Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
24 x 24 x 18	605	610	616	454	457	461	429	432	435	416	419	422
24 x 24 x 16	605	610	616	403	406	410	429	432	435	403	406	409
24 x 24 x 14	605	610	616	353	356	360	429	432	435	403	406	409
24 x 24 x 12	605	610	616	321	324	328	429	432	435	394	397	400
24 x 24 x 10	605	610	616	270	273	277	429	432	435	381	384	387
26 x 26 x 24	655	660	667	605	610	616	492	495	498	480	483	486
26 x 26 x 22	655	660	667	554	559	565	492	495	498	467	470	473
26 x 26 x 20	655	660	667	503	508	514	492	495	498	454	457	460
26 x 26 x 18	655	660	667	454	457	461	492	495	498	441	444	447
26 x 26 x 16	655	660	667	403	406	410	492	495	498	429	432	435
26 x 26 x 14	655	660	667	353	356	360	492	495	498	429	432	435
26 x 26 x 12	655	660	667	321	324	328	492	495	498	419	422	425
28 x 28 x 26	706	711	718	655	660	667	518	521	524	518	521	524
28 x 28 x 24	706	711	718	605	610	616	518	521	524	505	508	511
28 x 28 x 22	706	711	718	554	559	565	518	521	524	492	495	498
28 x 28 x 20	706	711	718	503	508	514	518	521	524	480	483	486
28 x 28 x 18	706	711	718	454	457	461	518	521	524	467	470	473
28 x 28 x 16	706	711	718	403	406	410	518	521	524	454	457	460
28 x 28 x 14	706	711	718	353	356	360	518	521	524	454	457	460
28 x 28 x 12	706	711	718	321	324	328	518	521	524	445	448	451
30 x 30 x 28	757	762	769	706	711	718	556	559	562	543	546	549
30 x 30 x 26	757	762	769	655	660	667	556	559	562	543	546	549

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

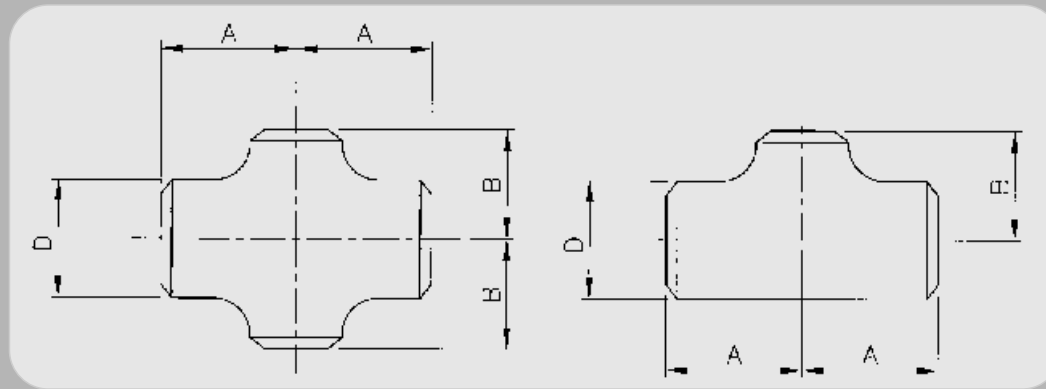


Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
30 x 30 x 24	757	762	769	605	610	616	556	559	562	530	533	536
30 x 30 x 22	757	762	769	554	559	565	556	559	562	518	521	524
30 x 30 x 20	757	762	769	503	508	514	556	559	562	505	508	511
30 x 30 x 18	757	762	769	454	457	461	556	559	562	492	495	498
30 x 30 x 16	757	762	769	403	406	410	556	559	562	480	483	486
30 x 30 x 14	757	762	769	353	356	360	556	559	562	480	483	486
30 x 30 x 12	757	762	769	321	324	328	556	559	562	470	473	476
30 x 30 x 10	757	762	769	270	273	277	556	559	562	457	460	463
32 x 32 x 30	808	813	820	757	762	769	592	597	602	579	584	589
32 x 32 x 28	808	813	820	706	711	718	592	597	602	567	572	577
32 x 32 x 26	808	813	820	655	660	667	592	597	602	567	572	577
32 x 32 x 24	808	813	820	605	610	616	592	597	602	554	559	564
32 x 32 x 22	808	813	820	554	559	565	592	597	602	541	546	551
32 x 32 x 20	808	813	820	503	508	514	592	597	602	528	533	538

GENERAL NOTE: Dimensions are in mm.

Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
32 x 32 x 18	808	813	820	454	457	461	592	597	602	516	521	526
32 x 32 x 16	808	813	820	403	406	410	592	597	602	503	508	513
32 x 32 x 14	808	813	820	353	356	360	592	597	602	503	508	513
34 x 34 x 32	859	864	871	808	813	820	630	635	640	617	622	627
34 x 34 x 30	859	864	871	757	762	769	630	635	640	605	610	615
34 x 34 x 28	859	864	871	706	711	718	630	635	640	592	597	602
34 x 34 x 26	859	864	871	655	660	667	630	635	640	592	597	602
34 x 34 x 24	859	864	871	605	610	616	630	635	640	579	584	589
34 x 34 x 22	859	864	871	554	559	565	630	635	640	567	572	577
34 x 34 x 20	859	864	871	503	508	514	630	635	640	554	559	564
34 x 34 x 18	859	864	871	454	457	461	630	635	640	541	546	551
34 x 34 x 16	859	864	871	403	406	410	630	635	640	528	533	538
36 x 36 x 34	909	914	921	859	864	871	668	673	678	655	660	665
36 x 36 x 32	909	914	921	808	813	820	668	673	678	643	648	653
36 x 36 x 30	909	914	921	757	762	769	668	673	678	630	635	640
36 x 36 x 28	909	914	921	706	711	718	668	673	678	617	622	627
36 x 36 x 26	909	914	921	655	660	667	668	673	678	617	622	627
36 x 36 x 24	909	914	921	605	610	616	668	673	678	605	610	615
36 x 36 x 22	909	914	921	554	559	565	668	673	678	592	597	602
36 x 36 x 20	909	914	921	503	508	514	668	673	678	579	584	589
36 x 36 x 18	909	914	921	454	457	461	668	673	678	567	572	577
36 x 36 x 16	909	914	921	403	406	410	668	673	678	554	559	564

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

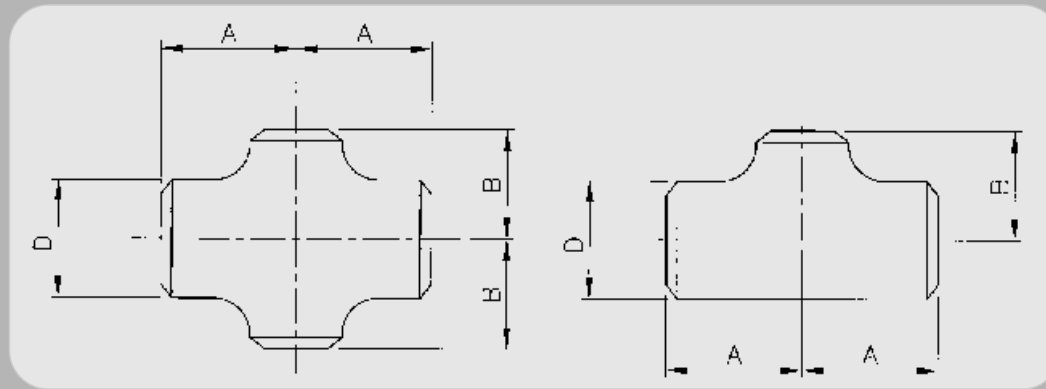


Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
38 x 38 x 36	960	965	972	909	914	921	706	711	716	706	711	716
38 x 38 x 34	960	965	972	859	864	871	706	711	716	693	698	703
38 x 38 x 32	960	965	972	808	813	820	706	711	716	681	686	691
38 x 38 x 30	960	965	972	757	762	769	706	711	716	668	673	678
38 x 38 x 28	960	965	972	706	711	718	706	711	716	643	648	653
38 x 38 x 26	960	965	972	655	660	667	706	711	716	643	648	653
38 x 38 x 24	960	965	972	605	610	616	706	711	716	630	635	640
38 x 38 x 22	960	965	972	554	559	565	706	711	716	617	622	627
38 x 38 x 20	960	965	972	503	508	514	706	711	716	605	610	615
38 x 38 x 18	960	965	972	454	457	461	706	711	716	592	597	602
40 x 40 x 38	1011	1016	1023	960	965	972	744	749	754	744	749	754
40 x 40 x 36	1011	1016	1023	909	914	921	744	749	754	732	737	742
40 x 40 x 34	1011	1016	1023	859	864	871	744	749	754	719	724	729
40 x 40 x 32	1011	1016	1023	808	813	820	744	749	754	706	711	716

GENERAL NOTE: Dimensions are in mm.

Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
40 x 40 x 30	1011	1016	1023	757	762	769	744	749	754	693	698	703
40 x 40 x 28	1011	1016	1023	706	711	718	744	749	754	668	673	678
40 x 40 x 26	1011	1016	1023	655	660	667	744	749	754	668	673	678
40 x 40 x 24	1011	1016	1023	605	610	616	744	749	754	655	660	665
40 x 40 x 22	1011	1016	1023	554	559	565	744	749	754	643	648	653
40 x 40 x 20	1011	1016	1023	503	508	514	744	749	754	630	635	640
40 x 40 x 18	1011	1016	1023	454	457	461	744	749	754	617	622	627
42 x 42 x 40	1062	1067	1074	1011	1016	1023	757	762	767	706	711	716
42 x 42 x 38	1062	1067	1074	960	968	972	757	762	767	706	711	716
42 x 42 x 36	1062	1067	1074	909	914	921	757	762	767	706	711	716
42 x 42 x 34	1062	1067	1074	859	864	871	757	762	767	706	711	716
42 x 42 x 32	1062	1067	1074	808	813	820	757	762	767	706	711	716
42 x 42 x 30	1062	1067	1074	757	762	769	757	762	767	706	711	716
42 x 42 x 28	1062	1067	1074	706	711	718	757	762	767	693	698	703
42 x 42 x 26	1062	1067	1074	655	660	667	757	762	767	693	698	703
42 x 42 x 24	1062	1067	1074	605	610	616	757	762	767	655	660	665
42 x 42 x 22	1062	1067	1074	554	559	565	757	762	767	655	660	665
42 x 42 x 20	1062	1067	1074	503	508	514	757	762	767	655	660	665
42 x 42 x 18	1062	1067	1074	454	457	461	757	762	767	643	648	653
42 x 42 x 16	1062	1067	1074	403	406	410	757	762	767	630	635	640
44 x 44 x 42	1113	1118	1125	1062	1067	1074	808	813	818	757	762	767
44 x 44 x 40	1113	1118	1125	1011	1016	1023	808	813	818	744	749	754

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

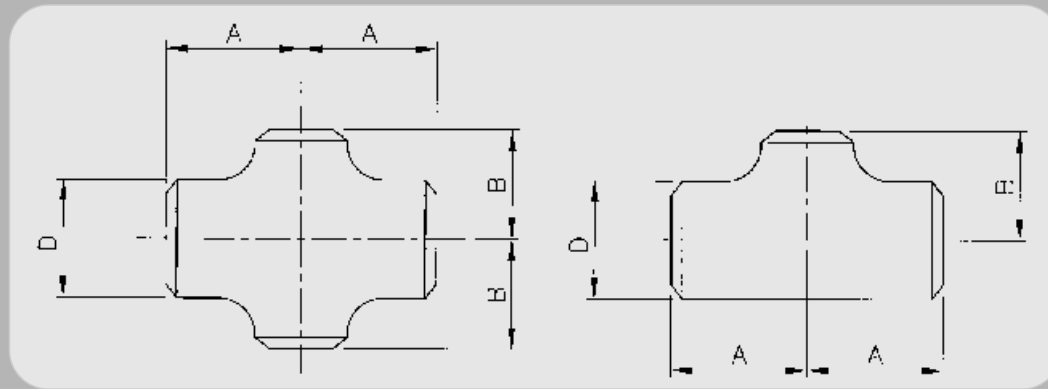


Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
44 x 44 x 38	1113	1118	1125	960	965	972	808	813	818	732	737	742
44 x 44 x 36	1113	1118	1125	909	914	921	808	813	818	719	724	729
44 x 44 x 34	1113	1118	1125	859	864	871	808	813	818	719	724	729
44 x 44 x 32	1113	1118	1125	808	813	820	808	813	818	706	711	716
44 x 44 x 30	1113	1118	1125	757	762	764	808	813	818	706	711	716
44 x 44 x 28	1113	1118	1125	706	711	718	808	813	818	693	698	703
44 x 44 x 26	1113	1118	1125	655	660	667	808	813	818	693	698	703
44 x 44 x 24	1113	1118	1125	605	610	616	808	813	818	693	698	703
44 x 44 x 22	1113	1118	1125	554	559	565	808	813	818	681	686	691
44 x 44 x 20	1113	1118	1125	503	508	514	808	813	818	681	686	691
46 x 46 x 44	1163	1168	1175	1113	1118	1125	846	851	856	795	800	805
46 x 46 x 42	1163	1168	1175	1062	1067	1074	846	851	856	782	787	792
46 x 46 x 40	1163	1168	1175	1011	1016	1023	846	851	856	770	775	780
46 x 46 x 38	1163	1168	1175	960	965	972	846	851	856	757	762	767

GENERAL NOTE: Dimensions are in mm.

Table 4.4 Dimensions of Reducing outlet Tees and Reducing outlet Crosses

Nominal Pipe Size (NPS)	Outside diameter of reducing Tees & Crosses						Centre-end lengths Tees & Crosses					
	Run D			Outlet D			Run A			Outlet B		
	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.
46 x 46 x 36	1163	1168	1175	909	914	921	846	851	856	757	762	767
46 x 46 x 34	1163	1168	1175	859	864	871	846	851	856	744	749	754
46 x 46 x 32	1163	1168	1175	808	813	820	846	851	856	744	749	754
46 x 46 x 30	1163	1168	1175	757	762	764	846	851	856	732	737	742
46 x 46 x 28	1163	1168	1175	706	711	718	846	851	856	732	737	742
46 x 46 x 26	1163	1168	1175	655	660	667	846	851	856	732	737	742
46 x 46 x 24	1163	1168	1175	605	610	616	846	851	856	719	724	729
46 x 46 x 22	1163	1168	1175	554	559	565	846	851	856	719	724	729
48 x 48 x 46	1214	1219	1226	1163	1168	1175	884	889	894	833	838	843
48 x 48 x 44	1214	1219	1226	1113	1118	1125	884	889	894	833	838	843
48 x 48 x 42	1214	1219	1226	1062	1067	1074	884	889	894	808	813	818
48 x 48 x 40	1214	1219	1226	1011	1016	1023	884	889	894	808	813	818
48 x 48 x 38	1214	1219	1226	960	965	972	884	889	894	808	813	818
48 x 48 x 36	1214	1219	1226	909	914	921	884	889	894	782	787	792
48 x 48 x 34	1214	1219	1226	859	864	871	884	889	894	782	787	792
48 x 48 x 32	1214	1219	1226	808	813	820	884	889	894	782	787	792
48 x 48 x 30	1214	1219	1226	757	762	769	884	889	894	757	762	767
48 x 48 x 28	1214	1219	1226	706	711	718	884	889	894	757	762	767
48 x 48 x 26	1214	1219	1226	655	660	667	884	889	894	757	762	767
48 x 48 x 24	1214	1219	1226	605	610	616	884	889	894	732	737	742
48 x 48 x 22	1214	1219	1226	554	559	565	884	889	894	732	737	742

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

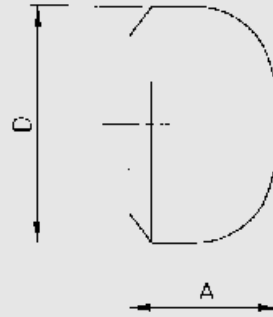


Table 4.5 Dimensions of Caps

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D			Length (1) A1			Limiting wall thickness for length A1	Length (2) A2		
	Min.	Nom.	Max.	Min.	Nom.	Max.		Min.	Nom.	Max.
1/2	20	21	22	21	25	29	3.73	21	25	29
3/4	26	27	28	21	25	29	3.91	21	25	29
1	32	33	34	34	38	42	4.55	34	38	42
1 1/4	41	42	43	34	38	42	4.85	34	38	42
1 1/2	47	48	49	34	38	42	5.08	34	38	42
2	59	60	61	34	38	42	5.54	40	44	48
2 1/2	72	73	74	34	38	42	7.01	47	51	55
3	88	89	90	47	51	55	7.62	60	64	68
3 1/2	101	102	103	60	64	68	8.08	72	76	80
4	113	114	116	60	64	68	8.56	72	76	80
5	140	141	144	69	76	83	9.53	82	89	96
6	167	168	171	82	89	96	10.97	95	102	109
8	217	219	221	95	102	109	12.70	120	127	134
10	270	273	277	120	127	134	12.70	145	152	159

GENERAL NOTE: Dimensions are in mm.

Table 4.5 Dimensions of Caps

Nominal Pipe Size (NPS)	Outside Diameter at Bevel D			Length (1) A1			Limiting wall thickness for length A1	Length (2) A2		
	Min.	Nom.	Max.	Min.	Nom.	Max.		Min.	Nom.	Max.
12	321	324	328	145	152	159	12.70	171	178	185
14	353	356	360	158	165	172	12.70	184	191	198
16	403	406	410	171	178	185	12.70	196	203	210
18	454	457	461	196	203	210	12.70	222	229	236
20	503	508	514	222	229	236	12.70	247	254	261
22	554	559	565	247	254	261	12.70	247	254	261
24	605	610	616	260	267	274	12.70	298	305	312
26	655	660	667	257	267	277	...	...	...	...
28	706	711	718	257	267	277	...	...	...	...
30	757	762	769	257	267	277	...	...	...	...
32	808	813	820	257	267	277	...	...	...	...
34	859	864	871	257	267	277	...	...	...	...
36	909	914	921	257	267	277	...	...	...	...
38	960	965	972	295	305	315	...	...	...	...
40	1011	1016	1023	295	305	315	...	...	...	...
42	1062	1067	1074	295	305	315	...	...	...	...
44	1113	1118	1125	333	343	353	...	...	...	...
46	1163	1168	1175	333	343	353	...	...	...	...
48	1214	1219	1226	333	343	353	...	...	...	...

GENERAL NOTES: Dimensions are in mm.

(1) Length A1 applies for thickness not exceeding that given in column "Limiting Wall Thickness for Length A1".

(2) Length A2 applies for thickness greater than given in column "Limiting Wall Thickness for Length A1" for NPS 24 and smaller. For NPS 26 and larger, length A2 shall be by agreement between manufacturer and purchaser.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

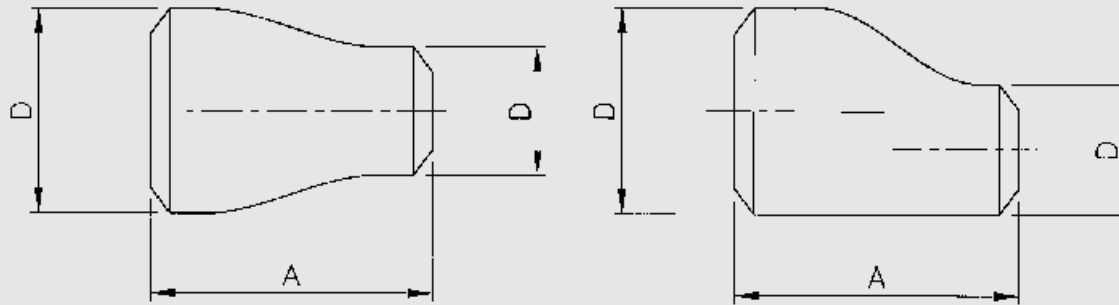


Table 4.6 Dimensions of Reducers

Nominal Pipe Size (NPS)	O.D. of Large End D			O.D. of Small End D			End-to-End Length of Reducers A		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
$\frac{3}{4} \times \frac{1}{2}$	26	27	28	20	21	23	36	38	40
$\frac{3}{4} \times \frac{3}{8}$	26	27	28	16	17	18	36	38	40
1 $\times \frac{3}{4}$	32	33	34	26	27	28	49	51	53
1 $\times \frac{1}{2}$	32	33	34	20	21	22	49	51	53
1 $\frac{1}{4} \times 1$	41	42	43	32	33	34	49	51	53
1 $\frac{1}{4} \times \frac{3}{4}$	41	42	43	26	27	28	49	51	53
1 $\frac{1}{4} \times \frac{1}{2}$	41	42	43	20	21	22	49	51	53
1 $\frac{1}{2} \times 1\frac{1}{4}$	47	48	49	41	42	43	62	64	66
1 $\frac{1}{2} \times 1$	47	48	49	32	33	34	62	64	66
1 $\frac{1}{2} \times \frac{3}{4}$	47	48	49	26	27	28	62	64	66
1 $\frac{1}{2} \times \frac{1}{2}$	47	48	49	20	21	22	62	64	66
2 $\times 1\frac{1}{2}$	59	60	61	47	48	49	74	76	78
2 $\times 1\frac{1}{4}$	59	60	61	41	42	43	74	76	78
2 $\times 1$	59	60	61	32	33	34	74	76	78

GENERAL NOTE: Dimensions are in mm.

Table 4.6 Dimensions of Reducers

Nominal Pipe Size (NPS)	O.D. of Large End D			O.D. of Small End D			End-to-End Length of Reducers A		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
2 x ¾	59	60	61	26	27	28	74	76	78
2 ½ x 2	72	73	74	59	60	61	87	89	91
2 ½ x 1½	72	73	74	47	48	49	87	89	91
2 ½ x 1¼	72	73	74	41	42	43	87	89	91
2 ½ x 1	72	73	74	32	33	34	87	89	91
3 x 2½	88	89	90	72	73	74	87	89	91
3 x 2	88	89	90	59	60	61	87	89	91
3 x 1½	88	89	90	47	48	49	87	89	91
3 x 1¼	88	89	90	41	42	43	87	89	91
3 ½ x 3	100	102	103	88	89	90	100	102	104
3 ½ x 2½	100	102	103	72	73	74	100	102	104
3 ½ x 2	100	102	103	59	60	61	100	102	104
3 ½ x 1½	100	102	103	47	48	49	100	102	104
3 ½ x 1¼	100	102	103	41	42	43	100	102	104
4 x 3½	113	114	116	101	102	103	100	102	104
4 x 3	113	114	116	88	89	90	100	102	104
4 x 2½	113	114	116	72	73	74	100	102	104
4 x 2	113	114	116	59	60	61	100	102	104
4 x 1½	113	114	116	47	48	49	100	102	104
5 x 4	140	141	144	113	114	116	125	127	129
5 x 3½	140	141	144	101	102	103	125	127	129
5 x 3	140	141	144	88	89	90	125	127	129

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

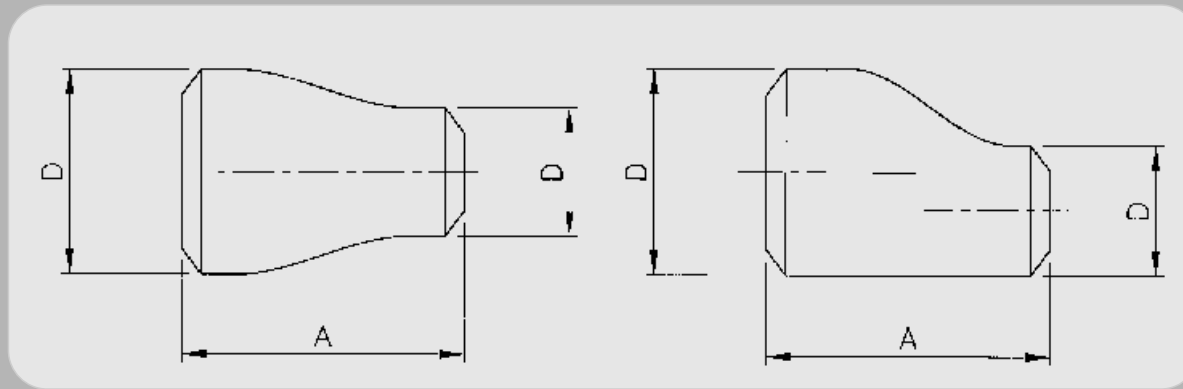


Table 4.6 Dimensions of Reducers

Nominal Pipe Size (NPS)	O.D. of Large End D			O.D. of Small End D			End-to-End Length of Reducers A		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
5 x 2½	140	141	144	72	73	74	125	127	129
5 x 2	140	141	144	59	60	61	125	127	129
6 x 5	167	168	171	140	141	142	138	140	142
6 x 4	167	168	171	113	114	116	138	140	142
6 x 3½	167	168	171	101	102	103	138	140	142
6 x 3	167	168	171	88	89	90	138	140	142
6 x 2½	167	168	171	72	73	74	138	140	142
8 x 6	217	219	221	167	168	171	150	152	154
8 x 5	217	219	221	140	141	144	150	152	154
8 x 4	217	219	221	113	114	116	150	152	154
8 x 3½	217	219	221	101	102	103	150	152	154
10 x 8	270	273	277	217	219	221	176	178	180
10 x 6	270	273	277	167	168	171	176	178	180
10 x 5	270	273	277	140	141	144	176	178	180

GENERAL NOTE: Dimensions are in mm.

Table 4.6 Dimensions of Reducers

Nominal Pipe Size (NPS)	O.D. of Large End D			O.D. of Small End D			End-to-End Length of Reducers A		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
10 x 4	270	273	277	113	114	116	176	178	180
12 x 10	321	324	328	270	273	277	200	203	206
12 x 8	321	324	328	217	219	221	200	203	206
12 x 6	321	324	328	167	168	171	200	203	206
12 x 5	321	324	328	140	141	144	200	203	206
14 x 12	353	356	360	321	324	328	327	330	333
14 x 10	353	356	360	270	273	277	327	330	333
14 x 8	353	356	360	217	219	221	327	330	333
14 x 6	353	356	360	167	168	171	327	330	333
16 x 14	403	406	410	353	356	360	353	356	359
16 x 12	403	406	410	321	324	328	353	356	359
16 x 10	403	406	410	270	273	277	353	356	359
16 x 8	403	406	410	217	219	221	353	356	359
18 x 16	454	457	461	403	406	410	378	381	384
18 x 14	454	457	461	353	356	360	378	381	384
18 x 12	454	457	461	321	324	328	378	381	384
18 x 10	454	457	461	270	273	277	378	381	384
20 x 18	503	508	514	454	457	461	505	508	511
20 x 16	503	508	514	403	406	410	505	508	511
20 x 14	503	508	514	353	356	360	505	508	511
20 x 12	503	508	514	321	324	328	505	508	511
22 x 20	554	559	565	503	508	514	505	508	511

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

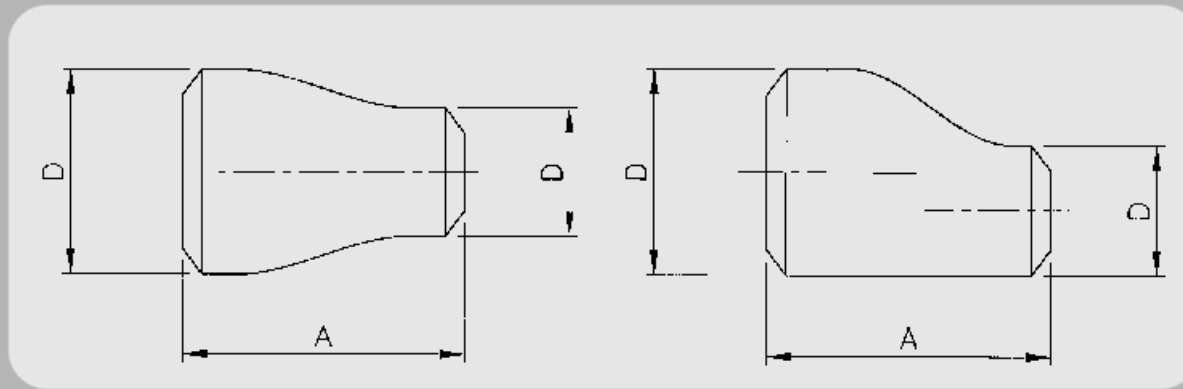


Table 4.6 Dimensions of Reducers

Nominal Pipe Size (NPS)	O.D. of Large End D			O.D. of Small End D			End-to-End Length of Reducers A		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
22 x 18	554	559	565	454	457	461	505	508	511
22 x 16	554	559	565	403	406	410	505	508	511
22 x 14	554	559	565	353	356	360	505	508	511
24 x 22	605	610	616	554	559	565	505	508	511
24 x 20	605	610	616	503	508	514	505	508	511
24 x 18	605	610	616	454	457	461	505	508	511
24 x 16	605	610	616	403	406	410	505	508	511
26 x 24	655	660	667	605	610	616	607	610	613
26 x 22	655	660	667	554	559	565	607	610	613
26 x 20	655	660	667	503	508	514	607	610	613
26 x 18	655	660	667	454	457	461	607	610	613
28 x 26	706	711	718	655	660	667	607	610	613
28 x 24	706	711	718	605	610	616	607	610	613
28 x 20	706	711	718	503	508	514	607	610	613

GENERAL NOTE: Dimensions are in mm.

Table 4.6 Dimensions of Reducers

Nominal Pipe Size (NPS)	O.D. of Large End D			O.D. of Small End D			End-to-End Length of Reducers A		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
28 x 18	706	711	718	454	457	461	607	610	613
30 x 28	757	762	769	706	711	718	607	610	613
30 x 26	757	762	769	655	660	667	607	610	613
30 x 24	757	762	769	605	610	616	607	610	613
30 x 20	757	762	769	503	508	514	607	610	613
32 x 30	808	813	820	757	762	769	605	610	615
32 x 28	808	813	820	706	711	718	605	610	615
32 x 26	808	813	820	655	660	667	605	610	615
32 x 24	808	813	820	605	610	616	605	610	615
34 x 32	859	864	871	808	813	820	605	610	615
34 x 30	859	864	871	757	762	769	605	610	615
34 x 26	859	864	871	655	660	667	605	610	615
34 x 24	859	864	871	605	610	616	605	610	615
36 x 34	909	914	921	859	864	871	605	610	615
36 x 32	909	914	921	808	813	820	605	610	615
36 x 30	909	914	921	757	762	769	605	610	615
36 x 26	909	914	921	655	660	667	605	610	615
36 x 24	909	914	921	605	610	616	605	610	615
38 x 36	960	965	972	909	914	921	605	610	615
38 x 34	960	965	972	859	864	871	605	610	615
38 x 32	960	965	972	808	813	820	605	610	615
38 x 30	960	965	972	757	762	769	605	610	615

GENERAL NOTE: Dimensions are in mm.

Section 4. Factory-Made Wrought Steel Buttwelding Fittings

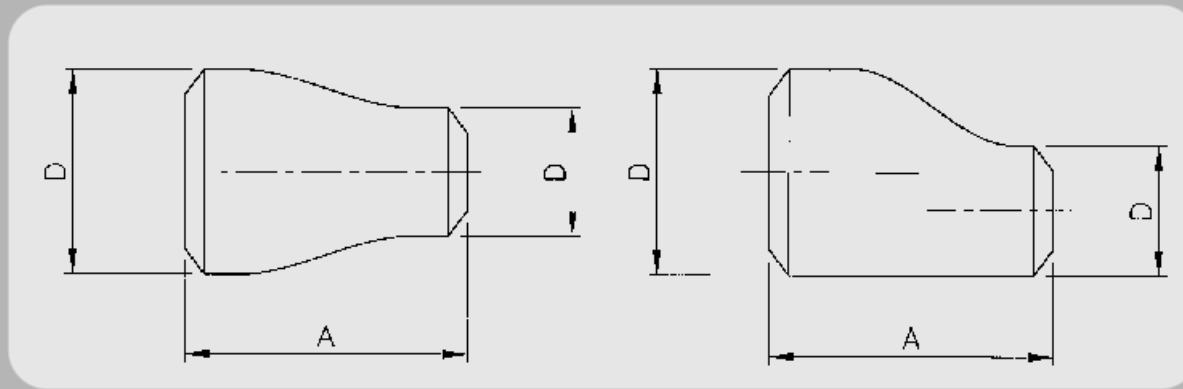


Table 4.6 Dimensions of Reducers

Nominal Pipe Size (NPS)	O.D. of Large End D			O.D. of Small End D			End-to-End Length of Reducers A		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
38 x 28	960	965	972	706	711	718	605	610	615
38 x 26	960	965	972	655	660	667	605	610	615
40 x 38	1011	1016	1023	960	965	972	605	610	615
40 x 36	1011	1016	1023	909	914	921	605	610	615
40 x 34	1011	1016	1023	859	864	871	605	610	615
40 x 32	1011	1016	1023	808	813	820	605	610	615
40 x 30	1011	1016	1023	757	762	769	605	610	615
42 x 40	1062	1067	1074	1011	1016	1023	605	610	615
42 x 38	1062	1067	1074	960	965	972	605	610	615
42 x 36	1062	1067	1074	909	914	921	605	610	615
42 x 34	1062	1067	1074	859	864	871	605	610	615
42 x 32	1062	1067	1074	808	813	820	605	610	615
42 x 30	1062	1067	1074	757	762	769	605	610	615
44 x 42	1113	1118	1125	1062	1067	1074	605	610	615

GENERAL NOTE: Dimensions are in mm.

Table 4.6 Dimensions of Reducers

Nominal Pipe Size (NPS)	O.D. of Large End D			O.D. of Small End D			End-to-End Length of Reducers A		
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.
44 x 40	1113	1118	1125	1011	1016	1023	605	610	615
44 x 38	1113	1118	1125	960	965	972	605	610	615
44 x 36	1113	1118	1125	909	914	921	605	610	615
46 x 44	1163	1168	1175	1113	1118	1125	706	711	716
46 x 42	1163	1168	1175	1062	1067	1074	706	711	716
46 x 40	1163	1168	1175	1011	1016	1023	706	711	716
46 x 38	1163	1168	1175	960	965	972	706	711	716
48 x 46	1214	1219	1226	1163	1168	1175	706	711	716
48 x 44	1214	1219	1226	1113	1118	1125	706	711	716
48 x 42	1214	1219	1226	1062	1067	1074	706	711	716
48 x 40	1214	1219	1226	1011	1016	1023	706	711	716

GENERAL NOTE: Dimensions are in mm.