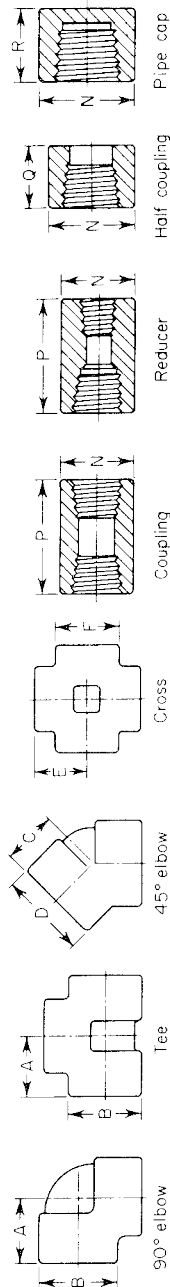


TABLE A2.8 Dimensions of Typical Commercial Forged-Steel Threaded Fittings (ASME B16.11-1996)

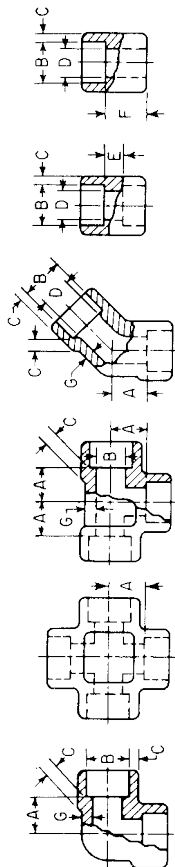


Dimensions, in

	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
Class 2000												
A	0.81	0.81	0.97	1.12	1.31	1.50	1.75	2.00	2.38	3.00	3.38	4.19
B	0.88	0.88	1.00	1.31	1.50	1.81	2.19	2.44	2.97	3.62	4.31	5.756
C	0.69	0.69	0.75	0.88	1.00	1.12	1.31	1.38	1.69	2.06	2.50	3.12
T	0.125	0.125	0.125	0.125	0.125	0.145	0.153	0.158	0.168	0.221	0.236	0.258
Class 3000												
A	0.81	0.97	1.12	1.31	1.50	1.75	2.00	2.38	2.50	3.25	3.75	4.50
B	0.88	1.00	1.31	1.50	1.81	2.19	2.44	2.97	3.31	4.00	4.75	6.00
C	0.69	0.75	0.88	1.00	1.12	1.31	1.38	1.69	1.72	2.06	2.50	3.12
T	0.125	0.13	0.138	0.161	0.170	0.196	0.208	0.219	0.281	0.301	0.348	0.440
N	0.68	0.75	0.88	1.12	1.38	1.75	2.25	2.50	3.00	3.62	4.25	4.75
P	1.25	1.38	1.50	1.88	2.00	2.38	2.62	3.12	3.38	3.62	4.25	4.75
R	0.75	1.00	1.00	1.25	1.44	1.62	1.75	1.75	1.88	2.38	2.58	2.69
Class 6000												
A	0.97	1.12	1.31	1.50	1.75	2.00	2.38	2.50	3.25	3.75	4.19	4.50
B	1.00	1.31	1.50	1.81	2.19	2.44	2.97	3.31	4.00	4.75	5.75	6.00
C	0.75	0.88	1.00	1.12	1.31	1.38	1.69	1.72	2.06	2.50	3.12	3.12
T	0.250	0.260	0.275	0.321	0.336	0.391	0.417	0.436	0.476	0.602	0.655	0.735
N	0.88	1.00	1.25	1.50	1.75	2.25	2.50	3.00	3.62	4.25	5.00	6.25
P	1.25	1.38	1.50	1.88	2.00	2.38	2.62	3.12	3.38	3.62	4.25	4.75
R	...	1.06	1.06	1.31	1.50	1.69	1.81	1.88	2.00	2.50	2.69	2.94

Manufacturers' catalogs should be consulted for dimensions of street elbows and of laterals since these two types of fittings are no longer covered by ANSI Standards.

TABLE A2.9 Dimensions of Typical Commercial Forged-Steel Socket-Welding Fittings*
(ASME B16.11-1996)



Nominal pipe size	Socket bore diameter† B	Depth of socket min.	Wall thickness, minimum						Bore diameter of fitting D			Center to bottom of socket (A)						Laying lengths	
			Class 3000		Class 6000		Class 9000		Class 3000	Class 6000	Class 9000	90° ells, tees, crosses‡			45° ells‡				
			Socket C	Body G	Socket C	Body G	Socket C	Body G				Class 3000	Class 6000	Class 9000	Class 3000	Class 6000	Class 9000	Couplings‡ E	Half couplings‡ F
1/8	0.420	0.38	0.125	0.095	0.135	0.124	...	...	0.254	0.141	...	0.44	0.44	...	0.31	0.31	...	0.25	0.62
1/4	0.430	0.38	0.130	0.119	0.158	0.195	...	...	0.284	0.171	...	0.44	0.53	...	0.31	0.31	...	0.25	0.62
3/8	0.565	0.38	0.130	0.119	0.158	0.195	...	...	0.349	0.265	...	0.44	0.53	...	0.31	0.31	...	0.25	0.62
1/2	0.690	0.38	0.138	0.126	0.172	0.158	...	...	0.478	0.344	...	0.53	0.62	...	0.31	0.44	...	0.25	0.69
3/4	0.855	0.38	0.161	0.147	0.204	0.188	0.322	0.294	0.508	0.374	...	0.607	0.451	0.222	0.44	0.50	0.62	0.38	0.88
1	1.065	0.50	0.168	0.154	0.238	0.219	0.337	0.308	0.607	0.451	0.222	0.809	0.599	0.404	0.44	0.50	0.62	0.38	0.94
1 1/4	1.330	0.50	0.196	0.179	0.273	0.250	0.392	0.358	0.809	0.599	0.404	1.034	0.800	0.569	0.50	0.56	0.75	0.38	1.12
1 1/2	1.675	0.50	0.208	0.191	0.273	0.250	0.418	0.382	1.064	0.830	0.629	1.365	1.145	0.866	0.56	0.69	0.81	0.50	1.19
2	1.925	0.50	0.218	0.200	0.307	0.281	0.438	0.400	1.395	1.175	0.926	1.651	1.431	1.070	0.69	0.81	0.88	0.50	1.25
2 1/2	2.406	0.62	0.238	0.218	0.374	0.344	0.477	0.436	1.595	1.323	1.070	1.831	1.611	1.130	0.81	1.00	1.00	0.50	1.62
3	2.921	0.62	0.301	0.276	...	0.375	...	...	2.052	1.674	1.473	2.252	2.032	1.533	1.00	1.12	1.12	0.75	1.69
4	3.535	0.62	0.327	0.300	...	0.438	...	...	2.439	1.704	1.533	2.622	2.402	1.533	1.12	...	...	0.75	1.75
	4.545	0.75	0.368	0.337	...	0.531	...	...	2.999	...	...	3.252	3.032	...	1.25	...	...	0.75	1.88

* Dimensions for caps and reducers are not standardized. Refer to manufacturer's literature for dimensions.

† Values are lower/upper limits.

‡ For tolerances, refer to Table A2.10.

TABLE A2.10 Center-to-Bottom and Laying Length Tolerances for Classes 3000, 6000, and 9000 Socket-Welding Fittings (from ASME B16.11-1996)

NPS	Tolerances plus or minus		
	<i>A</i>	<i>E</i>	<i>F</i>
1/8	0.03	0.06	0.03
1/4	0.03	0.06	0.03
3/8	0.06	0.12	0.06
1/2	0.06	0.12	0.06
3/4	0.06	0.12	0.06
1	0.08	0.16	0.08
1 1/4	0.08	0.16	0.08
1 1/2	0.08	0.16	0.08
2	0.08	0.16	0.08
2 1/2	0.10	0.20	0.10
3	0.10	0.20	0.10
4	0.10	0.20	0.10

Refer to Table A2.9 for nomenclature.

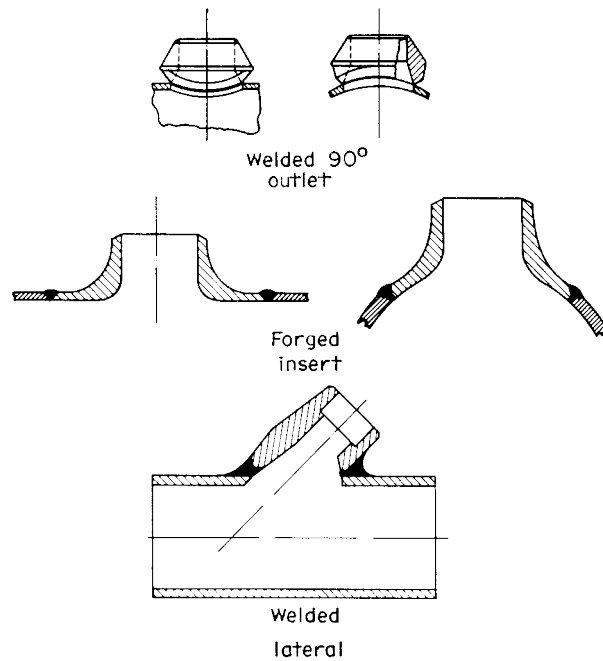
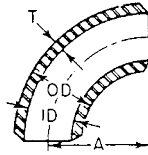


FIGURE A2.4 Typical welding outlet fittings.

TABLE A2.11 Dimensions of Typical Commercial 90° Long-Radius Butt-Welding Elbows (ASME B16.9-1993)



Nominal pipe size	Outside diameter (OD)	Inside diameter (ID)	Wall thickness <i>T</i>	Center to face <i>A</i>	Pipe schedule number*	Weight (approx) (lb†)
Standard						
½	0.840	0.622	0.109	1½	40	0.2
¾	1.050	0.824	0.113	1⅝	40	0.2
1	1.315	1.049	0.133	1½	40	0.4
1¼	1.660	1.380	0.140	1⅝	40	0.6
1½	1.900	1.610	0.145	2¼	40	0.9
2	2.375	2.067	0.154	3	40	1.4
2½	2.875	2.469	0.203	3¾	40	2.9
3	3.500	3.068	0.216	4½	40	4.5
3½	4.000	3.548	0.226	5¼	40	6.4
4	4.500	4.026	0.237	6	40	8.7
5	5.563	5.047	0.258	7½	40	14.7
6	6.625	6.065	0.280	9	40	22.9
8	8.625	7.981	0.322	12	40	46.0
10	10.750	10.020	0.365	15	40	81
12	12.750	12.000	0.375	18	●‡	119
14	14.000	13.250	0.375	21	30	154
16	16.000	15.250	0.375	24	30	201
18	18.000	17.250	0.375	27	●‡	256
20	20.000	19.250	0.375	30	20	317
22	22.000	21.250	0.375	33	20	385
24	24.000	23.250	0.375	36	20	458
26	26.000	25.250	0.375	39	●‡	539
28	28.000	27.250	0.375	42	●‡	626
30	30.000	29.250	0.375	45	●‡	720
32	32.000	31.250	0.375	48	●‡	818
34	34.000	33.250	0.375	51	●‡	926
36	36.000	35.250	0.375	54	●‡	1040
42	42.000	41.250	0.375	63	●‡	1420

TABLE A2.11 Dimensions of Typical Commercial 90° Long-Radius Butt-Welding Elbows (ASME B16.9-1993) (*Continued*)

Nominal pipe size	Outside diameter (OD)	Inside diameter (ID)	Wall thickness <i>T</i>	Center to face <i>A</i>	Pipe schedule number*	Weight (approx) (lb†)
Extra strong						
½	0.840	0.546	0.147	1½	80	0.3
¾	1.050	0.742	0.154	1⅝	80	0.3
1	1.315	0.957	0.179	1½	80	0.5
1¼	1.660	1.278	0.191	1⅞	80	0.8
1½	1.900	1.500	0.200	2¼	80	1.0
2	2.375	1.939	0.218	3	80	2.0
2½	2.875	2.323	0.276	3¾	80	3.8
3	3.500	2.900	0.300	4½	80	6.1
3½	4.000	3.364	0.318	5¼	80	8.7
4	4.500	3.826	0.337	6	80	11.9
5	5.563	4.813	0.375	7½	80	20.6
6	6.625	5.761	0.432	9	80	34.1
8	8.625	7.625	0.500	12	80	69
10	10.750	9.750	0.500	15	60	109
12	12.750	11.750	0.500	18	●‡	157
14	14.000	13.000	0.500	21	●‡	202
16	16.000	15.000	0.500	24	40	265
18	18.000	17.000	0.500	27	●‡	338
20	20.000	19.000	0.500	30	30	419
22	22.000	21.000	0.500	33	30	508
24	24.000	23.000	0.500	36	●‡	606
26	26.000	25.000	0.500	39	20	713
28	28.000	27.000	0.500	42	20	829
30	30.000	29.000	0.500	45	20	953
32	32.000	31.000	0.500	48	20	1090
34	34.000	33.000	0.500	51	20	1230
36	36.000	35.000	0.500	54	20	1380
42	42.000	41.000	0.500	63	●‡	1880
Schedule 160†						
1	1.315	0.815	0.250	1½	160	0.6
1¼	1.660	1.160	0.250	1⅞	160	1.0
1½	1.900	1.338	0.281	2¼	160	1.4
2	2.375	1.689	0.343	3	160	2.9
2½	2.875	2.125	0.375	3¾	160	4.9
3	3.500	2.624	0.438	4½	160	8.3
4	4.500	3.438	0.531	6	160	17.6
5	5.563	4.313	0.625	7½	160	32.2
6	6.625	5.189	0.718	9	160	53
8	8.625	6.813	0.906	12	160	117
10	10.750	8.500	1.125	15	160	226
12	12.750	10.126	1.312	18	160	375

TABLE A2.11 Dimensions of Typical Commercial 90° Long-Radius Butt-Welding Elbows (ASME B16.9-1993) (*Continued*)

Nominal pipe size	Outside diameter (OD)	Inside diameter (ID)	Wall thickness <i>T</i>	Center to face <i>A</i>	Pipe schedule number*	Weight (approx) (lb†)
Double extra strong						
¾	1.050	0.434	0.308	1⅞	●‡	0.4
1	1.315	0.599	0.358	1½	●‡	0.7
1¼	1.660	0.896	0.382	1⅞	●‡	1.2
1½	1.900	1.100	0.400	2¼	●‡	1.8
2	2.375	1.503	0.436	3	●‡	3.4
2½	2.875	1.771	0.552	3¾	●‡	6.5
3	3.500	2.300	0.600	4½	●‡	10.7
3½	4.000	2.728	0.636	5¼	●‡	15.4
4	4.500	3.152	0.674	6	●‡	21.2
5	5.563	4.063	0.750	7½	●‡	37.2
6	6.625	4.897	0.864	9	●‡	61
8	8.625	6.875	0.875	12	●‡	114

* Pipe schedule numbers in accordance with ASME B36.10M.

† Weights are not tabulated in ASME B16.9.

‡ This size and thickness does not correspond with any schedule number.

Wrought-Steel Butt-Welding Fittings

Wrought-steel welding fittings include elbows, tees, crosses, reducers, laterals, lap-joint stub ends, caps, and saddles.

Wrought-steel fittings are made to the dimensional requirements of ASME B16.9 in sizes NPS ½ (DN 15) through NPS 48 (DN 1200). Also, short-radius elbows and returns are produced in accordance with ASME B16.28 in sizes NPS ½ (DN 15) through NPS 24 (DN 600). The wrought fitting materials conform to ASTM A234, A403, or A420, the grades of which have chemical and physical properties equivalent to that of the mating pipe. ASME B16.9 requires that the pressure-temperature rating of the fitting equal or exceed that of the mating pipe of the same or equivalent material, same size, and same nominal wall thickness. The pressure-temperature rating may be established by analysis or by proof testing. Short-radius elbows and returns (fitting centerline bend radius is equal to the fitting NPS) manufactured under ASME B16.28 are rated at 80 percent of the rating calculated for seamless straight pipe of the same size and nominal thickness and same or equivalent material. Therefore, both standards require that, in lieu of specifying any pressure rating, the pipe wall thickness and pipe material type with which the fittings are intended to be used be identified on the fitting.

Pressure testing of the fittings is not required by either standard. However, the fittings are required to be capable of withstanding, without leakage, a test pressure equal to that prescribed in the specification of the pipe with which the fitting is recommended to be used.

Both ASME B16.9 and B16.28 prescribe dimensions and manufacturing tolerances of wrought butt-welded fittings. The standards establish laying dimensions,