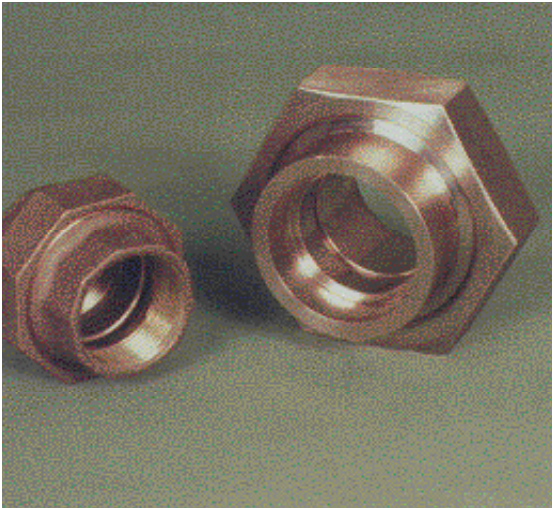
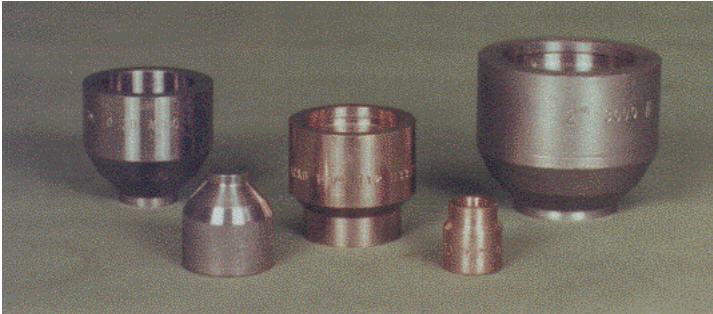
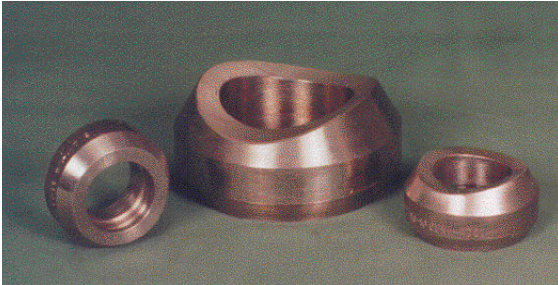
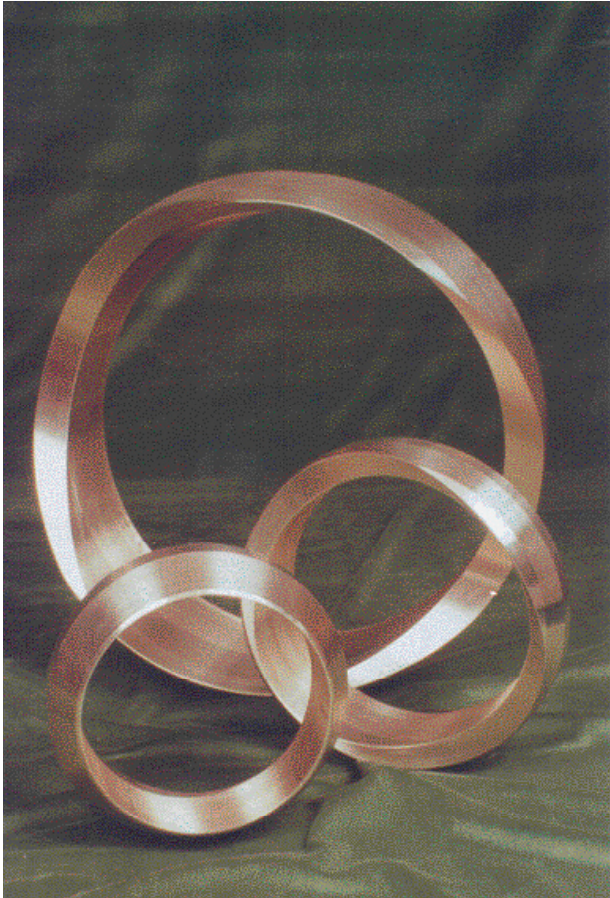


Bosses and Welding Outlets

Branch Outlets in Copper-Nickel, Nickel Alloys, Stainless Steel and Other Corrosion Resistant Alloys

ALASKAN COPPER

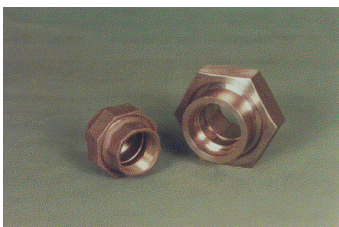


The various Alaskan Copper and Brass Company bosses and welding outlets provide a self-reinforced, one piece connection that restores 100% maximum pipe strength and offers important savings in both installation time and material. The design insures a contoured internal with a gradual transition from the header to the branch allowing full penetration welds while reducing installation costs over tees or other nozzle connections.

Bosses and welding outlets are manufactured in a full line of butt welding, socket-welding and threaded designs, and can be manufactured to non standard dimensions or in alternate alloys in full and reducing sizes. They are available in most ASTM grades of corrosion resistant materials and conform to applicable ASTM/ANSI specifications. Complete documentation can be provided as necessary.

The dimensions designed into Alaskan bosses and welding outlets are standards which have been commonly accepted and specified by the piping industry.

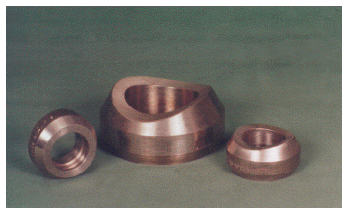
Lightweight welding outlets for use with Schedule 5s and 10s stainless steel piping are also offered.



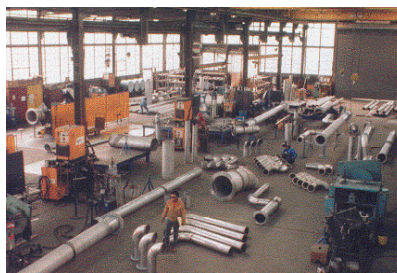
Threaded and socket-welding fittings are stocked in most common sizes and alloys.



These stub ends illustrate some of the many styles available.



Flanges are offered in a wide variety of alloys and configurations.



Prefabricated piping systems, produced by our Fabrication Division, result in reduced field welds and installation cost.



A complete line of fittings per NAVSEA Drawings and Specifications is available.

History

When Alaskan Copper Works was founded as a marine coppersmithing company in 1913, its major activities were forming and brazing piping, kettles, coils and other products made from copper, brass and bronze, primarily for the Pacific Northwest shipbuilding industry.

Beginning in the 1920s, many of the area's growing process industries, such as pulp and paper, which had relied on wood stave and cast iron as corrosion resistant materials for their tanks and piping, welcomed the development of a new weldable alloy, silicon bronze. This alloy had special advantages in cost and corrosion resistance. Alaskan Copper Works participated in the transition to this innovative metal and in the development of the welding techniques necessary for its proper fabrication.

In the 1930s, alloys with even better corrosion resistance, such as the austenitic stainless steels, became available not only to the pulp and paper industry but also to other processing industries beginning to develop such as petrochemicals and food processing. Alaskan Copper Works also participated in the application of this new material and in the development of related special welding and fabricating techniques.



Alaskan Copper Works yesterday.

As the community of metal shops grew, the demand for sheet, plate and other mill products increased and many metal fabricators looked to Alaskan Copper Works for support.

In 1932, the company officially responded to this growing demand and established the Alaskan Copper and Brass Company, a new division devoted exclusively to the distribution of corrosion resistant alloys. The addition of a complete line of aluminum products helped the company become a primary distribution source for customers in industries such as boat building, truck and

trailer, marine and food processing.

Copper-nickel alloys became integrated into the company's distribution network in the early 1960s. These alloys made marine materials more resistant to both quiet and moving sea water than copper, the copper-zinc alloys and galvanized steel or iron.

Today, Alaskan Copper Works offers a full line of seamless and copper-nickel pipe, tubing, butt-welding fittings, pressure fittings, flanges and other components of piping systems. Along with the bosses and welding outlets found in this catalog, the Alaskan Copper and Brass Company offers customers over 13,000 stocking items and the latest in processing services including precision shearing, coil processing, abrasive and carbide blade sawing, computerized plasma cutting and automatic splice welding.

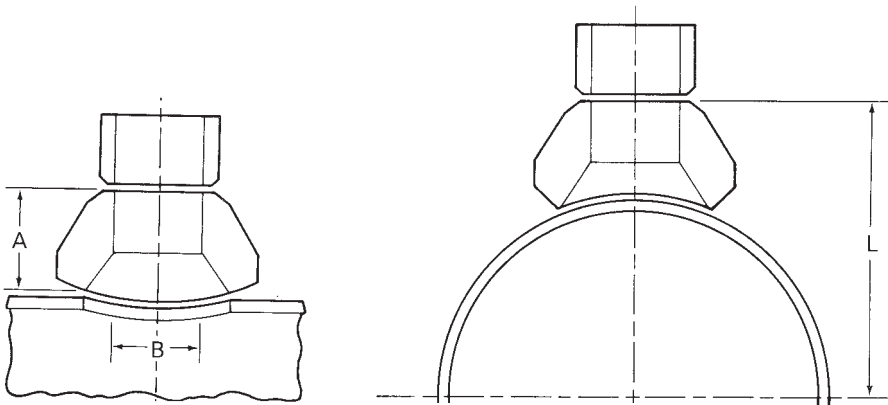
Customer service continues to be the driving force behind the company's success. Our in-house sales staff offers years of experience and the product knowledge to provide quality support for our customers. Together, Alaskan Copper and Brass company and Alaskan Copper Works are the nation's largest combination full service center and manufacturer of corrosion resistant alloy products.



Alaskan Copper Works and Alaskan Copper and Brass Company today.

Butt-Welding Outlets

Standard and Extra Strong, Schedules 5s and 10s



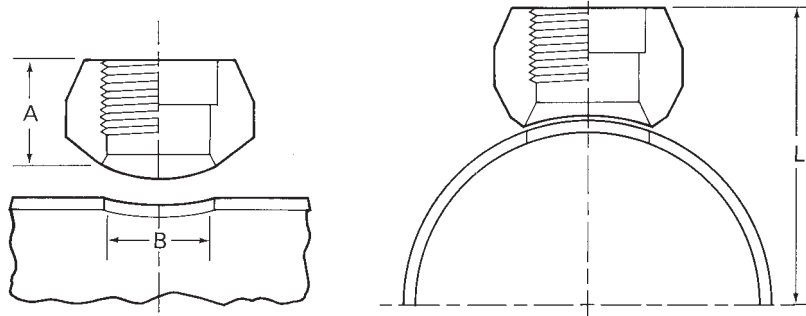
- Provides a self-reinforced, one piece connection.
- Circular design allows use of automatic burning equipment.
- Requires less weld material while restoring 100% pipe or header strength.
- Holes can be cut in the run after welding the outlet to further reduce distortion.
- Available in straight, 90°, 45°, lateral and elbow configurations.
- Manufactured to conform to the design requirements of ANSI B 16.9 and Pressure Piping Code ANSI B 31.1.
- Can be manufactured to non-standard dimensions or in alternate alloys and are available in full and reducing

Outlet Nominal Pipe Size	Standard			Extra Strong			Schedules			
	A	B	Weight	A	B	Weight	5s B	10s B	Weight	
1/8	5/8	.269	.08	5/8	.215	.10	5/8	.307	.06	
1/4	5/8	.364	.08	5/8	.302	.10	5/8	.410	.06	
3/8	3/4	.493	.15	3/4	.423	.15	3/4	.545	.11	
1/2	3/4	.622	.18	3/4	.546	.20	3/4	.710	.16	
3/4	7/8	.824	.25	7/8	.742	.31	7/8	.920	.20	
1	1 1/16	1.044	.50	1 1/16	.952	.47	1 1/16	1.180	1.092	.47
1 1/4	1 1/4	1.380	.80	1 1/4	1.278	.90	1 1/4	1.530	1.442	.59
1 1/2	1 5/16	1.610	1.00	1 5/16	1.500	1.10	1 5/16	1.770	1.682	.66
2	1 1/2	2.067	1.75	1 1/2	1.939	1.75	1 1/2	2.245	2.157	.97
2 1/2	1 5/8	2.469	2.31	1 5/8	2.323	2.63	1 5/8	2.709	2.635	1.61
3	1 3/4	3.068	3.36	1 3/4	2.900	3.82	1 3/4	3.334	3.26	1.90
3 1/2	1 7/8	3.548	4.45	1 7/8	3.364	4.96	1 7/8	3.834	3.760	2.55
4	2	4.026	5.89	2	3.826	6.17	2	4.334	4.260	3.05
5	2 1/4	5.047	6.39	2 1/4	4.813	9.59	2 1/4	5.345	5.295	5.50
6	2 3/8	6.065	12.2	2 3/8	5.761	17.6	2 3/8	6.407	6.357	6.42
8	2 3/4	7.981	21.5	2 3/8	7.625	34.8	2 3/4	8.407	8.329	11.3
10	3 1/16	10.02	37.0	3 1/16	9.750	46.2	3 1/16	10.482	10.420	19.0
12	3 3/8	12.00	42.9	4 1/16	11.75	67.0	3 3/8	12.438	12.390	26.7
14	3 1/2	13.25	62.2	3 15/16	13.00	75.3	3 1/2	13.688	13.624	33.6
16	3 11/16	5.25	81.7	4 3/16	15.00	102	3 11/16	15.670	15.624	42.0
18	3 13/16	7.25	103	4 3/8	17.00	130	3 13/16	17.670	17.624	50.8
20	4	19.25	130	4 11/16	19.00	166	4	19.624	19.564	70.8
24	4 9/16	23.25	195	5 1/2	23.00	262	4 9/16	23.564	23.500	109
26	4 11/16	25.25	231	5 3/4	25.00	316	4 11/16	29.500	29.376	173
30	5 3/8	29.25	335							
36	5 3/8	35.25	478							
48	5 13/16	47.25	1103							

Dimensions are in inches. Weights are in pounds.
See pages 8 and 9 for L dimension.

Threaded and Socket-Welding Outlets

Classes 3000 and 6000, and Lightweight



- Provides a self-reinforced, one piece connection.
- Circular design allows use of automatic burning equipment.
- Requires less weld material while restoring 100% pipe or header strength.
- Holes can be cut in the run after welding the outlet to further reduce distortion.
- Available in full or reducing size branch connections for Classes 3000, 6000 or 9000 branch socket-welding or threaded outlets.
- Manufactured to conform to the design requirements of ANSI B 16.11 and Pressure Piping Code ANSI B 31.1.
- Lightweight threaded and socket-welding outlets for use with Schedule 5s and 10s run pipe conform to ANSI B 16.11 and MSS SP-43.

Classes 3000 and 6000

Outlet Nominal Pipe Size	3000 Threaded			3000 Socket-Welding			6000 Threaded			6000 Socket-Welding		
	A	B	Weight	A	B	Weight	A	B	Weight	A	B	Weight
1/8		.339	.09	3/4	.269	.09	1/8	.437	.269			
1/4	3/4	.437	.09	3/4	.364	.09	1/8	.578	.26			
3/8	13/16	.578	.18	13/16	.493	.17	1/4	.718	.40	1 1/4	.464	.44
1/2	1	.718	.22	1	.622	.26	1 7/16	.922	.68	1 7/16	.612	.73
3/4	1 1/16	.922	.34	1 1/16	.824	.30	1 9/16	1.156	1.08	1 9/16	.810	1.20
1	1 5/16	1.156	.54	1 5/16	1.044	.54	1 5/8	1.500	1.40	1 5/8	1.160	1.46
1 1/4	1 5/16	1.500	.79	1 5/16	1.380	.77	1 11/16	1.734	1.76	1 11/16	1.338	1.78
1 1/2	1 3/8	1.734	.88	1 3/8	1.610	.96	2 1/16	2.218	4.62	2 1/16	1.687	4.67
2	1 1/2	2.218	1.58	1 1/2	2.067	1.49						
2 1/2	1 13/16	2 5/8	2.73	1 9/16	2.469	2.52						
3	2	3 1/4	4.00	1 3/4	3.068	3.50						
3 1/2	2 1/8	3 3/4	5.35	2 1/8	3.548	3.83						
4	2 1/4	4 1/4	6.18	1 7/8	4.026	6.60						
5	2 5/8	4 5/16	10.92	2 5/8	5.047	11.04						
6	2 11/16	6 5/16	14.08	2 11/16	6.065	13.20						

Lightweight

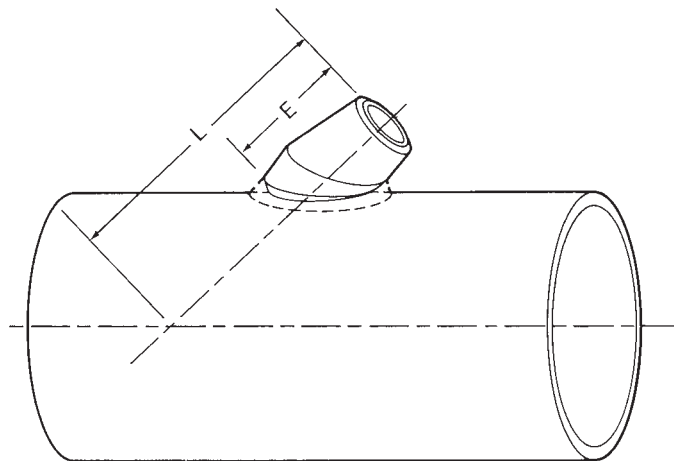
For Use With Schedule 5s and 10s Run Pipe

Outlet Nominal Pipe Size	Threaded		Socket-Welding		Weight	
	A	B	5s B	10s B	5s	10s
1/4						
3/8	1	.719	.710	.674	.24	.24
1/2	1 1/16	.922	.920	.884	.37	.36
1	1 5/16	1.156	1.180	1.092	.49	.48
1 1/4	1 5/16	1.500	1.530	1.442	.62	.60
1 1/2	1 3/8	1.734	1.770	1.682	.74	.73
2	1 1/2	2.219	2.245	2.157	.93	.97

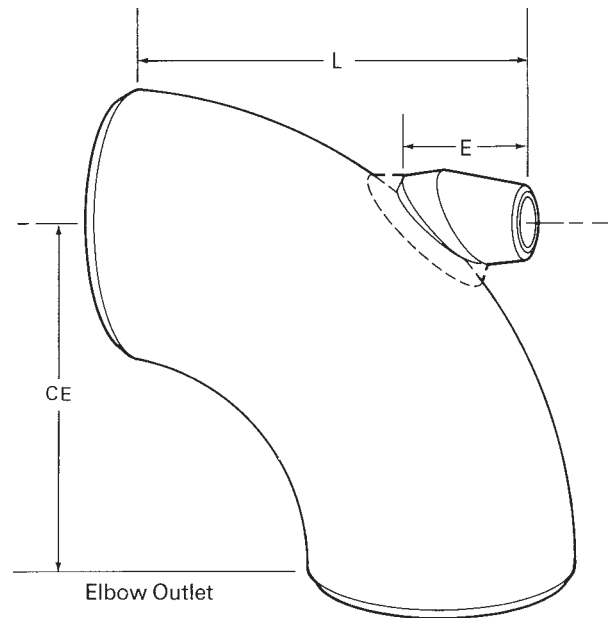
Dimensions are in inches. Weights are in pounds.
See pages 8 and 9 for L dimension.

Lateral and Elbow Outlets

Standard and Extra Strong



Lateral Outlet



Elbow Outlet

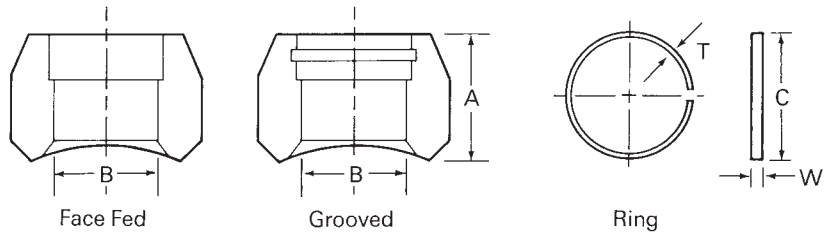
- Provides a self-reinforced, one piece connection.
- Circular design allows use of automatic burning equipment.
- Requires less weld material while restoring 100% pipe or header strength.
- Available in full or reducing size branch connection with threaded or socket-welding outlet ends.
- Available in non-standard sizes, angles and reductions.
- Manufactured to conform to the design requirements of ANSI B 16.9 and Pressure Piping Code ANSI B 31.1.

Outlet Nominal Pipe Size	Standard E	Extra Strong E	Weight
1/4	1 ⁵ / ₈	1 ⁵ / ₈	.49
3/8	1 ⁵ / ₈	1 ⁵ / ₈	.50
1/2	1 ⁵ / ₈	1 ⁷ / ₈	.52
3/4	2 ⁷ / ₈	2 ¹ / ₄	1.26
1 ¹ / ₄	2 ¹ / ₄	2 ¹ / ₂	1.39
1 ¹ / ₂	2 ¹ / ₂	2 ¹¹ / ₁₆	1.53
2	3	3	2.76
2 ¹ / ₂	3 ⁷ / ₁₆	3 ⁷ / ₁₆	4.70
3	3 ⁷ / ₈	3 ⁷ / ₈	6.54
4	4 ³ / ₄	4 ³ / ₄	12.3
6	6 ¹ / ₄	6 ¹ / ₄	24.3
8	7 ¹ / ₂	7 ¹³ / ₁₆	60.0
10	9 ³ / ₁₆	9 ³ / ₁₆	90.5
12	10 ¹ / ₄	11 ⁷ / ₁₆	121.0

Dimensions are in inches. Weights are in pounds.

NOTE: The L dimension for an elbow outlet is determined by the formula $L = E + OR^2 - CE^2$. Where OR is the outside radius and CE is the center-to-end dimension of the joining elbow. The L dimension of a lateral outlet is determined by the formula $L = E + 1.414 OR$. Where OR is the outside radius of the joining pipe.

Brazing Outlets



- Manufactured to a specific run size with a weld base unless otherwise specified.
- Available in bronze, copper-nickel or special alloys.
- Brazing socket ends comply dimensionally with MIL-F-1183 and can be finished as a face fed socket without a groove, or a grooved socket for use with a pre-inserted silver-brazing ring. Rings are ordered and supplied separately.
- Outlet ends can be made to satisfy threaded (see page 3) or butt welding (see page 2) requirements.

Brazing Outlets

Outlet Nominal Pipe Size	A	B	Weight
1/4	1 ¹ / ₄	.398	.09
3/8	1 ³ / ₁₆	.532	.17
1/2	1	.697	.26
3/4	1 ¹ / ₁₆	.907	.30
1	1 ¹ / ₄	1.171	.54
1 ¹ / ₄	1 ⁵ / ₁₆	1.502	.77
1 ¹ / ₂	1 ³ / ₈	1.742	.96
2	1 ¹ / ₂	2.186	1.49
2 ¹ / ₂	1 ¹³ / ₁₆	2.686	2.42
3	2	3.286	3.50
4	2 ¹ / ₄	4.252	6.60
5	2 ⁵ / ₈	5.278	11.0
6	2 ¹¹ / ₁₆	6.321	13.2
8	2 ³ / ₄	8.286	34.8
10	3 ¹ / ₁₆	10.325	46.2
12	3 ³ / ₈	12.322	67.0

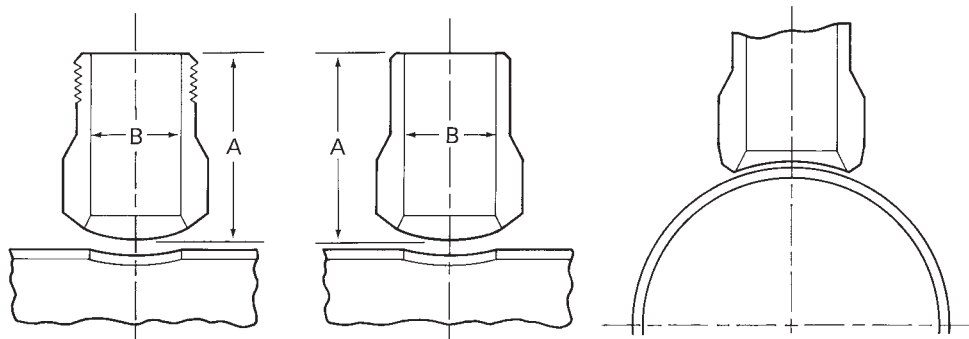
Silver-Brazing Rings for Brazing Outlets

Nominal Pipe Size	C	W	T	Weight
1/4	.639	.063	.035	.001
3/8	.784	.078	.040	.002
1/2	.949	.078	.040	.003
3/4	1.179	.094	.050	.004
1	1.444	.125	.050	.007
1 ¹ / ₄	1.789	.125	.050	.008
1 ¹ / ₂	2.031	.188	.050	.009
2	2.506	.188	.050	.020
2 ¹ / ₂	3.008	.188	.050	.030
3	3.633	.250	.050	.040
4	4.693	.250	.080	.080
5	5.756	.250	.080	.100
6	6.818	.250	.080	.120
8	8.818	.391	.080	.260
10	10.943	.391	.080	.310
12	12.983	.391	.096	.450

Dimensions are in inches. Weights are in pounds. See pages 8 and 9 for L dimension.

Nipple Outlets

Classes 3000 and 6000, Threaded and Plain End



- Provides a self-reinforced, one piece connection.
- Circular design allows use of automatic burning equipment.
- Requires less weld material while restoring 100% pipe or header strength.
- Available in standard lengths of 3¹/₂" or 6¹/₂". Other lengths available as required.
- Eliminates the need for extended body valves and instruments and allows installation of standard configurations.
- Manufactured to conform to burst pressure requirements of ANSI B 16.11 and Pressure Piping Code ANSI B 31.1.

Threaded End

Outlet Nominal Pipe Size	3000 B	6000 B	A	Weight
1/2	.464	.252	3 ¹ / ₂	.45
3/4	.612	.434	3 ¹ / ₂	.64
1	.810	.599	3 ¹ / ₂	.92
1 ¹ / ₄	1.160	.896	3 ¹ / ₂	1.40
1 ¹ / ₂	1.338	1.100	3 ¹ / ₂	1.72
2	1.687	1.503	3 ¹ / ₂	2.50

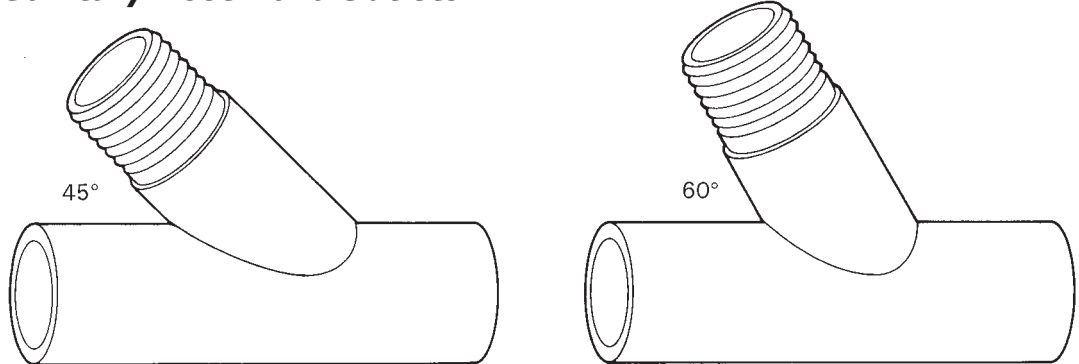
Plain End

Outlet Nominal Pipe Size	3000 B	6000 B	A	Weight
1/2	.546	.464	3 ¹ / ₂	.45
3/4	.742	.612	3 ¹ / ₂	.64
1	.952	.810	3 ¹ / ₂	.92
1 ¹ / ₄	1.278	1.160	3 ¹ / ₂	1.40
1 ¹ / ₂	1.500	1.338	3 ¹ / ₂	1.72
2	1.939	1.687	3 ¹ / ₂	2.50

Dimensions are in inches. Weights are in pounds.

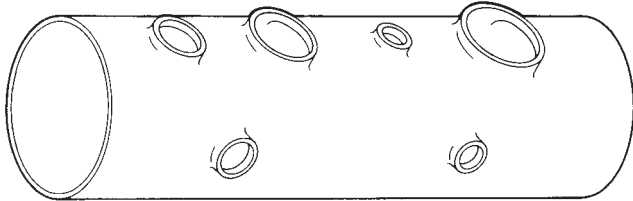
Sanitary, Drawn and Other Outlets

Sanitary Hose Barb Outlets



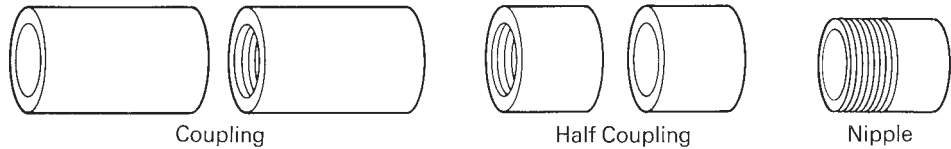
- Provides a self-reinforced, one piece connection.
- Circular design allows use of automatic burning equipment.
- Requires less weld material while restoring 100% pipe or header strength.
- Available in standard 45° and 60° configurations with special angles available as required.
- Stocked in hose sizes 3" and 4" with a length of 7", other sizes available as required.
- Allows flexible hose hookup to systems subjected to excessive vibration or movement.

Drawn Outlets



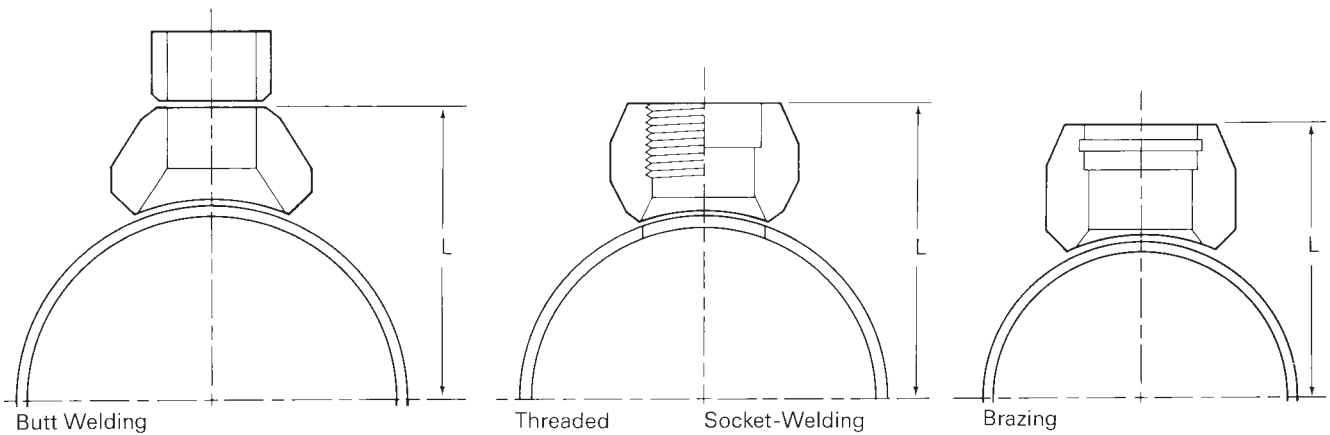
- Alaskan offers an alternate method of branch connections with the drawn outlet. This method provides a smooth 90° transition from the run to the outlet and can combine a variety of outlet sizes and spacings with different orientations.
- Drawn outlets can be supplied in either the same size as the run pipe or in reducing sizes.
- Complex manifolds with various outlet sizes can be supplied to minimize field welding requirements.
- Alaskan can provide complete spooling and pre-fabricated piping services and has a full-time engineering staff to assist in design recommendations as required.

Couplings and Nipples



- Couplings, half couplings and nipples are often used as a cost effective method of providing a branch outlet.
- Nipples may be provided threaded one end in a variety of standard and special lengths.
- Alaskan can manufacture outlets to special design criteria and welcomes your inquiries for one-of-a-kind as well as standard orders.

Length Dimensions for Outlets



Run Nominal Pipe Size	Schedule or Weight	Outlet Nominal Pipe Size												
		1/8	1/2	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	
3/8	*	1	1											
1/2	*	1 1/16	1 1/16	1 3/16	1 1/16									
3/4	*	1 3/16	1 3/16	1 1/4	1 1/4	1 7/16								
1	*	1 5/16	1 5/16	1 3/8	1 3/8	1 1/2	1 11/16							
1 1/4	*	1 7/16	1 7/16	1 9/16	1 9/16	1 11/16	1 7/8	2 1/16						
1 1/2	*	1 9/16	1 9/16	1 11/16	1 11/16	1 13/16	2	2 3/16	2 1/4					
2	*	1 13/16	1 13/16	1 15/16	1 15/16	2 1/16	2 1/4	2 1/16	2 1/2	2 11/16				
2 1/2	*	2 1/16	2 1/16	2 3/16	2 3/16	2 5/16	2 1/2	2 11/16	2 3/4	2 5/16	3 1/16			
3	*	2 3/8	2 3/8	2 1/2	2 1/2	2 5/8	2 13/16	3	3 1/16	3 1/4	3 3/8	3 1/2		
3 1/2	*	2 5/8	2 5/8	2 3/4	2 3/4	2 7/8	3 1/16	3 1/4	3 5/16	3 1/2	3 5/8	3 3/4	3 7/8	
4	*	2 7/8	2 7/8	3	3	3 1/8	3 5/16	3 1/2	3 9/16	3 3/4	3 7/8	4	4 1/8	
5	*	3 1/16	3 1/16	3 9/16	3 9/16	3 11/16	3 7/8	4 1/16	4 1/8	4 5/16	4 7/16	4 9/16	4 11/16	
6	*	3 5/16	3 5/16	4 1/16	4 1/16	4 3/16	4 3/8	4 9/16	4 5/8	4 13/16	4 15/16	5 1/16	5 3/16	
8	*	4 15/16	4 15/16	5 1/16	5 1/16	5 3/16	5 3/8	5 9/16	5 5/8	5 13/16	5 15/16	6 1/16	6 3/16	
10	*	6	6	6 7/8	6 7/8	6 1/4	6 1/16	6 5/8	6 11/16	6 7/8	7	7 1/8	7 1/4	
12	*	7	7	7 1/8	7 1/8	7 1/4	7 1/16	7 5/8	7 11/16	7 7/8	8	8 1/8	8 1/4	
14	*	7 5/8	7 5/8	7 3/4	7 5/8	7 7/8	8 1/16	8 1/4	8 5/16	8 1/2	8 5/8	8 3/4	8 7/8	
16	*	8 5/8	8 5/8	8 3/4	8 3/4	8 7/8	9 1/16	9 1/4	9 5/16	9 1/2	9 5/8	9 3/4	9 7/8	
18	*	9 5/8	9 5/8	9 3/4	9 3/4	9 7/8	10 1/16	10 1/4	10 5/16	10 1/2	10 5/8	10 3/4	10 7/8	
20	*	10 5/8	10 5/8	10 3/4	10 3/4	10 7/8	11 1/16	11 1/4	11 5/16	11 1/2	11 5/8	11 3/4	11 7/8	
24	*	12 5/8	12 5/8	12 3/4	12 3/4	12 7/8	13 1/16	13 1/4	13 5/16	13 1/2	13 5/8	13 3/4	13 7/8	

Dimensions are in inches. Root gap is not included in the L dimensions shown.

* Lengths shown are for schedules 5s and 10s, Regular and Extra Strong.

Run Nominal Pipe Size	Schedule or Weight	Outlet Nominal Pipe Size																			
		4	5	6	8	10	12	14	16	18	20	24									
4	*	4 ^{1/4}																			
5	*	4 ^{13/16}	5 ^{1/16}																		
6	**	5 ^{5/16}	5 ^{9/16}	5 ^{11/16}																	
	***	5 ^{5/16}	5 ^{9/16}	6 ^{3/8}																	
8	**	6 ^{5/16}	6 ^{9/16}	6 ^{11/16}	7 ^{1/16}																
	***	6 ^{5/16}	6 ^{9/16}	7 ^{3/8}	8 ^{3/16}																
10	**	7 ^{3/8}	7 ^{5/8}	7 ^{3/4}	8 ^{1/8}	8 ^{7/16}															
	***	7 ^{3/8}	7 ^{5/8}	8 ^{7/16}	9 ^{1/4}	8 ^{7/8}															
12	**	8 ^{3/8}	8 ^{5/8}	8 ^{3/4}	9 ^{1/8}	9 ^{7/16}	9 ^{3/4}														
	***	8 ^{3/8}	8 ^{5/8}	9 ^{7/16}	10 ^{1/4}	10 ^{1/16}	10 ^{5/16}														
14	**	9	9 ^{1/4}	9 ^{3/8}	9 ^{3/4}	10 ^{1/16}	10 ^{3/8}	10 ^{1/2}													
	***	9	9 ^{1/4}	10 ^{1/16}	10 ^{7/8}	10 ^{11/16}	10 ^{1/16}	10 ^{1/8}													
16	**	10	10 ^{1/4}	10 ^{3/8}	10 ^{3/4}	11 ^{1/16}	11 ^{3/8}	11 ^{1/2}	11 ^{11/16}												
	***	10	10 ^{1/4}	11 ^{1/16}	11 ^{7/8}	11 ^{11/16}	12 ^{1/16}	11 ^{15/16}	12 ^{7/16}												
18	**	11	11 ^{1/4}	11 ^{3/8}	11 ^{3/4}	12 ^{1/16}	12 ^{3/8}	12 ^{1/2}	12 ^{11/16}	13 ^{1/16}											
	***	11	11 ^{1/4}	12 ^{1/16}	12 ^{7/8}	12 ^{11/16}	13 ^{1/16}	12 ^{15/16}	13 ^{3/16}	13 ^{11/16}											
20	**	12	12 ^{1/4}	12 ^{3/8}	12 ^{3/4}	13 ^{1/16}	13 ^{3/8}	13 ^{1/2}	13 ^{11/16}	13 ^{13/16}	14 ^{5/8}										
	***	12	12 ^{1/4}	13 ^{1/16}	13 ^{7/8}	14 ^{1/16}	13 ^{15/16}	14 ^{3/16}	14 ^{3/8}	15	15										
24	**	14	14 ^{1/4}	14 ^{3/8}	14 ^{3/4}	15 ^{1/16}	15 ^{3/8}	15 ^{1/2}	15 ^{11/16}	15 ^{13/16}	16	17 ^{3/8}									
	***	14	14 ^{1/4}	15 ^{1/16}	15 ^{7/8}	15 ^{11/16}	16 ^{1/16}	15 ^{15/16}	16 ^{3/16}	16 ^{3/8}	16 ^{11/16}	17 ^{1/2}									

Dimensions are in inches. Root gap is not included in the L dimensions shown.

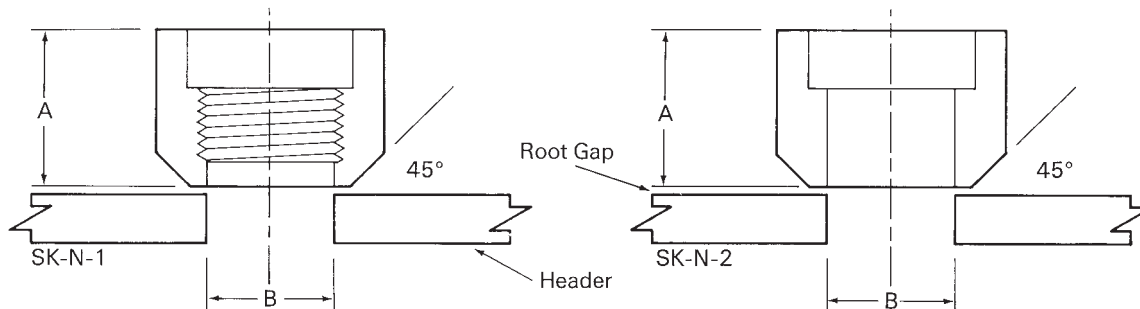
* Lengths shown are for Schedules 5s and 10s, Regular and Extra Strong.

** Lengths shown are for Schedules 5s, 10s and Regular.

*** Length shown is for Extra Strong.

Bosses

SK-N-1 and SK-N-2



- A weld-on connection which provides a self-reinforced, one piece connection.
- Circular design allows use of automatic burning equipment.
- Requires less weld material while restoring 100% pipe or header strength.
- Bosses provide a contoured internal joint with a gradual transition from header to branch allowing full penetration welds while reducing installation cost over tees or other nozzle connections.
- Stocked in NPS sizes 1/4" through 2" with other sizes available as required.

SK-N-1

A Socket-Welding and Threaded Combination For Use When Hydrotesting is Required

Classes 3000 and 6000

Outlet Nominal Pipe Size	A	B	Weight	
			3000	6000
1/2	1 1/2	23/32	.20	.40
3/4	2	15/16	.30	.50
1	2	1 5/32	.50	.90
1	2	1 1/2	.90	1.3
1 1/2	2	1 3/4	1.2	2.0
2	2 1/2	2	1.8	2.8

SK-N-2

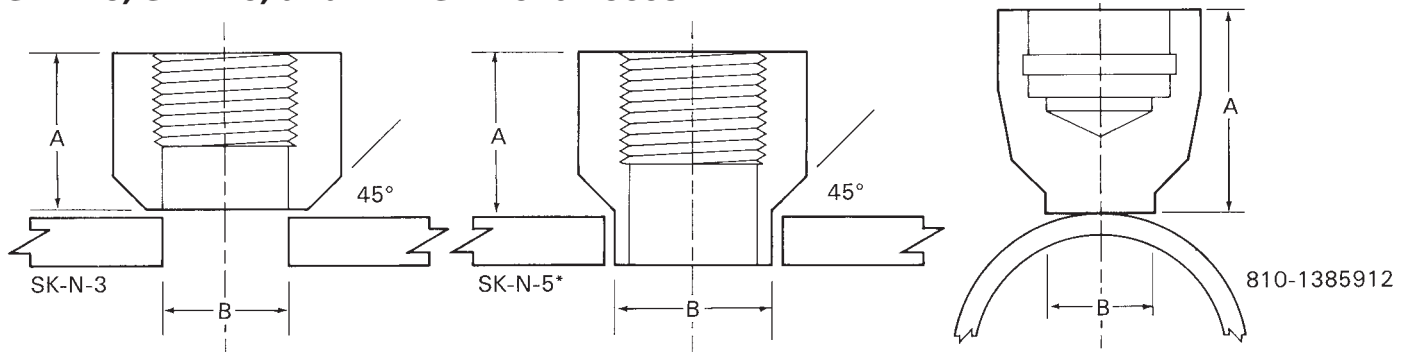
For Use When A Socket-Welding Outlet End is Required

Classes 3000 and 6000

Outlet Nominal Pipe Size	A	B	Weight	
			3000	6000
1/2	1 1/2		.20	.40
3/4	2	Branch	.30	.50
1	2	Pipe	.50	.90
1	2	ID	.90	1.3
1 1/2	2		1.2	2.0
2	2 1/2		1.8	2.8

Dimensions are in inches. Weights are in pounds.

SK-N-3, SK-N-5, and NAVSEA 810-1385912



SK-N-3

For Use When A Threaded Outlet End is Required

Classes 3000 and 6000

Outlet Nominal Pipe Size	A	B	Weight	
			3000	6000
1/2	1 1/2	23/32	20	40
3/4	2	15/16	30	50
1	2	1 5/32	50	90
1	2	1 1/2	90	1.3
1 1/2	2	1 3/4	1.2	2.0
2	2 1/2	2 7/32	1.8	2.8

SK-N-5

For Use When A Socket-Welding Outlet End is Required

Classes 3000 and 6000

Outlet Nominal Pipe Size	A	B	Weight	
			3000	6000
1/2	1 1/2	1	.30	.40
3/4	2	1 3/16	.40	.40
1	2	1 7/16	.50	.90
1 1/4	2	1 3/4	.90	1.1
1 1/2	2	2	1.3	1.9
2	2 1/2	2 1/2	1.9	2.6

NAVSEA 810-1385912

Drawing for Non-Ferrous Piping

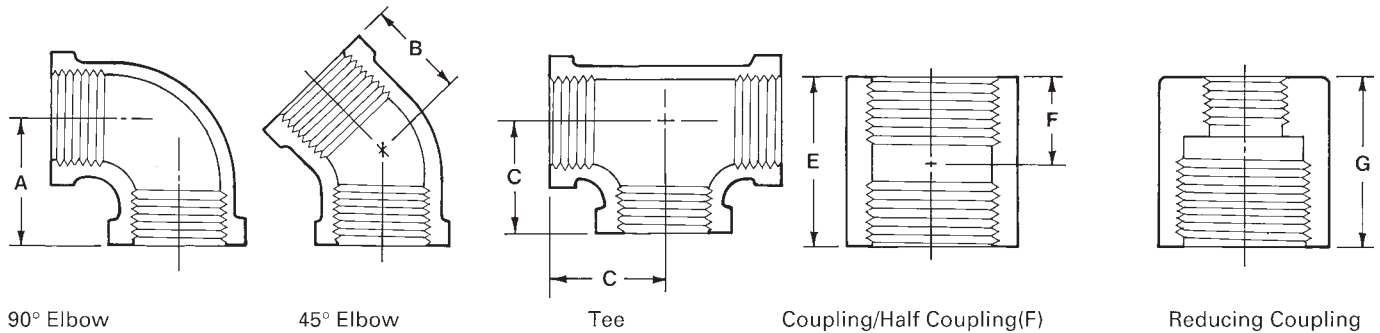
Outlet Nominal

Pipe Size	A	B	Weight
1/4	1 1/8	.374	.110
3/8	1 5/16	.435	.180
1/2	1 3/8	.600	.340
3/4	1 5/8	.810	.510
1	1 7/8	1.000	.910
1 1/4	2 3/16	1.300	1.58
1 1/2	2 3/8	1.494	2.60
2	2 11/16	1.875	4.05

Dimensions are in inches. Weights are in pounds.

*SK-N-5 can be modified to conform to Shipyard Standard MS-06-SB-01.

Forged Threaded Fittings



- Wall thickness, center-to-center and center-to-end dimensions will meet or exceed the applicable specifications.
- Class 150 threaded fittings conform to ANSI B 16.3, Class 3000 threaded fittings conform to ANSI B 16.11.
- Fittings are available in non-standard sizes and most corrosion resistant alloys.
- Mating ends of the fittings can be threaded or finished in a combination of ends when required.
- Crosses available upon request.
- Block pattern fittings available in all corrosion resistant alloys.
- Class 6000 also available.

Class 150

Nominal Pipe Size	A(90s)	B(45s)	C(tees)	E(coup)	F(half coup)	G(red. coup)
1/8	11/16	3/4	11/16	1	1/2	
1/4	13/16	3/4	13/16	1 1/16	17/32	1
3/8	15/16	13/16	15/16	1 5/32	37/64	1 1/8
1/2	1 1/8	7/8	1 1/8	1 5/16	21/32	1 1/4
3/4	1 5/16	1	1 5/16	1 1/2	3/4	1 7/16
1	1 1/2	1 1/8	1 1/2	1 3/4	7/8	1 11/16
1 1/4	1 3/4	1 5/16	1 3/4	2	1	2 1/16
1 1/2	1 15/16	1 7/16	1 15/16	2 5/32	1 5/64	2 5/16
2	2 1/4	1 11/16	2 1/4	2 1/2	1 1/4	2 13/16
2 1/2	2 23/32	1 15/16	2 23/32	2 7/8	1 7/16	3 1/4
3	3 3/32	2 3/16	3 3/32	3 3/16	1 19/32	3 11/16
4	3 13/16	2 5/8	3 13/16	3 11/16	1 27/32	4 3/8

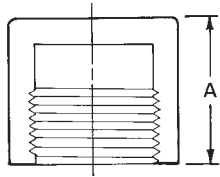
Class 3000

Nominal Pipe Size	A(90s)	B(45s)	C(tees)	E(Coup)	F(half coup)	G(red coup)
1/8	13/16	11/16	13/16	1 1/4	5/8	1 1/4
1/4	31/32	3/4	31/32	1 3/8	11/16	1 3/8
3/8	1 1/8	7/8	1 1/8	1 1/2	3/4	1 1/2
1/2	1 5/16	1	1 5/16	1 7/8	15/16	1 7/8
3/4	1 1/2	1 1/8	1 1/2	2	1	2
1	1 3/4	1 5/16	1 3/4	2 3/8	1 3/16	2 3/8
1 1/4	2	1 3/8	2	2 5/8	1 5/16	2 5/8
1 1/2	2 3/8	1 11/16	2 3/8	3 1/8	1 9/16	3 1/8
2	2 1/2	1 23/32	2 1/2	3 3/8	1 11/16	3 3/8
2 1/2	3 1/4	2 1/16	3 1/4	3 5/8	1 13/16	3 5/8
3	3 3/4	2 1/2	3 3/4	4 1/4	2 1/8	4 1/4
4	4 1/2	3 1/8	4 1/2	4 3/4	2 3/8	4 3/4

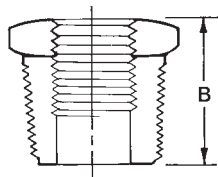
Dimensions are in inches.

Shape fittings such as elbows, tees, crosses and laterals may be machined from plate.

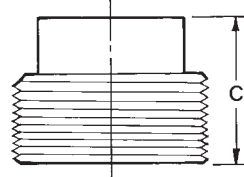
Round fittings such as couplings, caps and plugs may be machined from solid round bar.



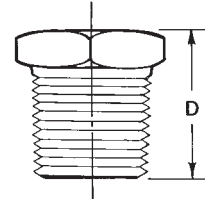
Cap



Hexagon Bushing



Square Head Plug



Hexagon Head Plug

Class 150

Nominal Pipe Size	A(caps)	B(Hex bush)	C(square)	D(Hex plug)
1/8	1/2		11/16	5/8
1/4	5/8	21/32	11/16	3/4
3/8	3/4	3/4	13/16	7/8
1/2	7/8	13/16	15/16	15/16
3/4	1	15/16	1 1/8	1 1/16
1	1 5/32	1 1/16	1 5/16	1 3/16
1 1/4	1 9/32	1 3/16	1 7/16	1 7/16
1 1/2	1 21/64	1 1/4	1 1/2	1 1/2
2	1 29/64	1 3/8	1 9/16	1 5/8
2 1/2	1 45/64	1 7/8	1 15/16	
3	1 13/16	1 7/8	2 1/8	
4	2 5/64	2 1/8	2 1/2	

Class 3000

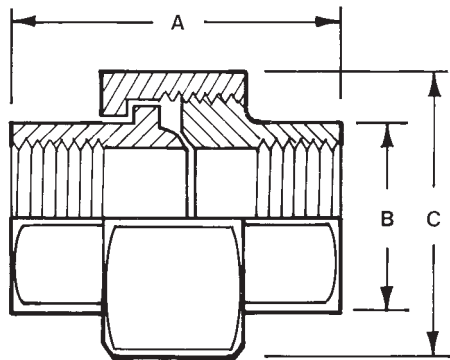
Nominal Pipe Size	A(caps)	B(hex bush)	C(square)	D(hex plug)
1/8	3/4		5/8	5/8
1/4	1	9/16	11/16	11/16
3/8	1	21/32	13/16	13/16
1/2	1 1/4	3/4	15/16	7/8
3/4	1 7/16	27/32	1 1/16	1
1	1 5/8	1	1 1/4	1 1/8
1 1/4	1 3/4	1 3/32	1 3/8	1 3/8
1 1/2	1 3/4	1 1/8	1 7/16	1 7/16
2	1 7/8	1 7/32	1 9/16	1 9/16
2 1/2	2 3/8	1 7/16	1 13/16	1 13/16
3	2 9/16	1 17/32	1 15/16	1 15/16
4	2 11/16	1 3/4	2 1/2	2 1/2

Dimensions are in inches.

Shape fittings such as elbows, tees, crosses and laterals may be machined from plate.

Round fittings such as couplings, caps and plugs may be machined from solid round bar.

Threaded Unions

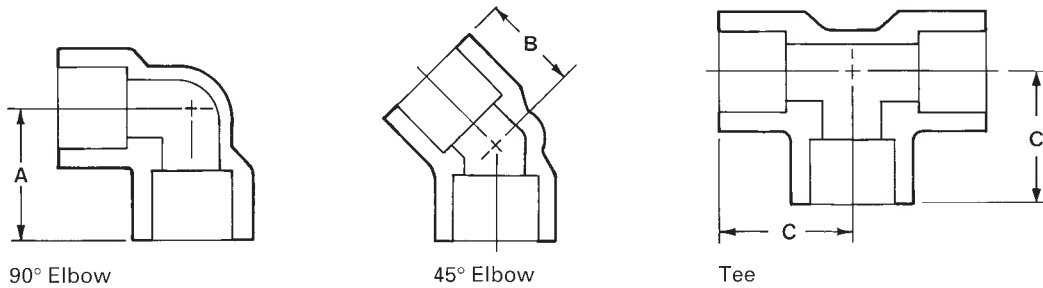


- Unions and fittings shall be made from forgings or bar stock by machining or forging or by a combination of these operations.
- Unless otherwise specified, random samples shall be selected with lot acceptance based on sampling requirements of MIL-STD-105-D.
- Each of the samples shall be subjected to visual and dimensional inspection to determine compliance with the requirements of this drawing.
- Each fitting or component shall be capable of withstanding a hydro test pressure of $1\frac{1}{2}$ times the rated working pressure with no leakage or deformation.
- The dimensions for manufacturing shall meet or exceed the minimum requirements of NAVSEA Dwg. 810-1385884-Rev. J., or MSS SP-83 (Ground joint unions).

Class 3000

Nominal Pipe Size	A	B	C
$\frac{1}{4}$	$1\frac{5}{8}$	$\frac{7}{8}$	$1\frac{3}{8}$
$\frac{3}{8}$	$1\frac{13}{16}$	$1\frac{1}{32}$	$1\frac{5}{8}$
$\frac{1}{2}$	$1\frac{15}{16}$	$1\frac{1}{4}$	$1\frac{27}{32}$
$\frac{3}{4}$	$2\frac{1}{4}$	$1\frac{15}{32}$	$2\frac{3}{16}$
1	$2\frac{1}{2}$	$1\frac{5}{8}$	$2\frac{1}{2}$
$1\frac{1}{4}$	$1\frac{13}{16}$	$2\frac{1}{32}$	$3\frac{1}{16}$
$1\frac{1}{2}$	3	$2\frac{5}{16}$	$3\frac{13}{32}$
2	$3\frac{3}{8}$	$2\frac{27}{32}$	$4\frac{3}{32}$

Socket-Welding Fittings

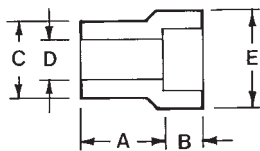


- Wall thickness, center-to-center and center-to-end dimensions will meet or exceed the applicable specifications.
- Class 3000 socket-welding fittings conform to ANSI B 16.11.
- Class 3000 reducing inserts conform to MSS-SP-79.
- Fittings are available in non-standard sizes and most corrosion resistant alloys.
- Mating ends of the fittings can be socket-welding or finished in a combination of ends when required.
- Crosses available upon request.
- Block pattern fittings available in all corrosion resistant alloys.
- Class 9000 and 1500 also available.

Class 3000

Nominal Pipe Size	A(90s)	B(45s)	C(tees)
1/8	13/16	11/16	13/16
1/4	13/16	11/16	13/16
3/8	29/32	11/16	29/32
1/2	1	13/16	1
3/4	1 1/4	1	1 1/4
1	1 3/8	1 1/16	1 3/8
1 1/4	1 9/16	1 3/16	1 9/16
1 1/2	1 3/4	1 5/16	1 3/4
2	2 1/8	1 5/8	2 1/8
2 1/2	2 1/4	1 3/4	2 1/4
3	2 7/8	1 7/8	2 7/8

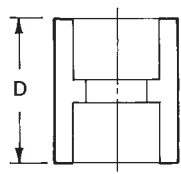
Class 3000 Reducing Inserts



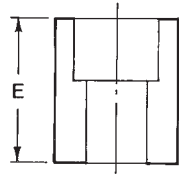
Nominal Pipe Size	A	B	C	D	E
3/4x1/2	7/8	3/8	1 3/64	5/8	3/4
1x3/4	15/16	1/2	1 5/16	13/16	1 3/16
1 1/4x1	1	1/2	1 21/32	1 3/64	1 25/32
1 1/2x1 1/4	1 1/8	1/2	1 29/32	1 3/8	1 17/32
2x1 1/2	1 1/4	1/2	2 3/8	1 39/64	2 27/64

Dimensions are in inches.

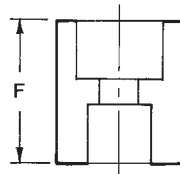
Socket-Welding Fittings Continued



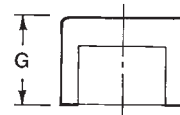
Coupling



Half Coupling



Reducing Coupling



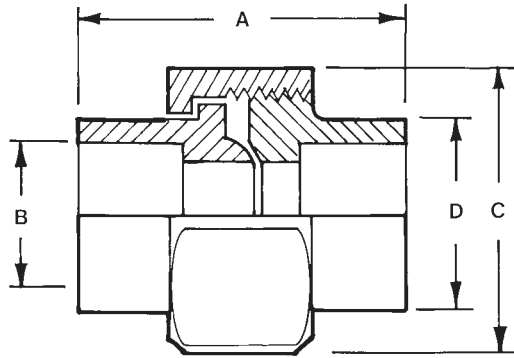
Cap

- Wall thickness, center-to-center and center-to-end dimensions will meet or exceed the applicable specifications.
- Class 150 threaded fittings conform to ANSI B 16.3, Class 3000 threaded fittings conform to ANSI B 16.11.
- Fittings are available in non-standard sizes and most corrosion resistant alloys.
- Mating ends of the fittings can be threaded or finished in a combination of ends when required.
- Crosses available upon request.
- Block pattern fittings available in all corrosion resistant alloys.
- Class 6000 also available.

Class 3000

Nominal Pipe Size	D(coup)	E(half coup)	F(red. coup.)	G(Caps)
1/8	1	1	1	11/16
1/4	1	1	1	11/16
3/8	1	1 1/16	1	3/4
1/2	1 1/8	1 1/4	1 1/8	7/8
3/4	1 3/8	1 3/16	1 3/8	1
1	1 1/2	1 5/8	1 1/2	1 1/16
1 1/4	1 1/2	1 5/16	1 1/2	1 3/16
1 1/2	1 1/2	1 3/4	1 1/2	1 1/4
2	2 1/8	2 1/4	2	1 1/2
2 1/2	2 1/8	2 5/16	2 1/2	1 1/2
3	2 1/8	2 3/8	3	1 3/4
4	2 1/4	2 5/8	4	1 7/8

Socket-Welding Unions



- Unions and fittings shall be made from forgings or bar stock by machining or forging or by a combination of these operations.
- Unless otherwise specified, random samples shall be selected with lot acceptance based on sampling requirements of MIL-STD-105-D.
- Each of the samples shall be subjected to visual and dimensional inspection to determine compliance with the requirements of this drawing.
- Each fitting or component shall be capable of withstanding a hydro test pressure of 1½ times the rated working pressure with no leakage or deformation.
- The dimensions for manufacturing shall meet or exceed the minimum requirements of NAVSEA Dwg. 810-1385884-Rev. J., or MSS SP-83 (Ground joint unions).
- All components can be produced from the following material; Union Nuts* and Fittings: UNS C70600 (90-10) , UNS C71500 (70-30), and Ni-Cu (Monel™).
- Unless otherwise specified the material used shall be; Union Nuts: Class 3000 PSI Bronze (Brass) 6000 PSI Ni-Cu (Monel™) Fittings: Class 3000 & 6000 PSI 70-30 Cu-Ni.
- Socket-Weld ends can be adapted for silver brazing rings (MIL F-1183).

Class 3000

Nominal Pipe Size	A	B	C	D	E
1/8	1 5/8	7/8	1 3/8	5/8	.420
1/4	1 5/8	7/8	1 3/8	3/8	.550
3/8	1 13/16	1 1/4	1 5/8	7/16	.690
1/2	1 15/16	1 1/32	1 27/32	1/2	.885
3/4	2 1/4	1 15/32	2 3/16	9/16	1.065
1	2 1/2	1 51/64	2 1/2	41/64	1.330
1 1/4	2 13/16	2 11/64	3 1/16	11/16	1.675
1 1/2	3	2 15/32	3 13/32	3/4	1.915
2	3 3/8	3 1/32	4 3/32	7/8	2.406

Dimensions are in inches.

*Union nuts can be produced from Bronze (Brass).

Commercial and NAVSEA Flanges

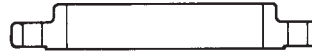
Solid Copper Nickel Flanges, Classes 150, 250, 300 and 700



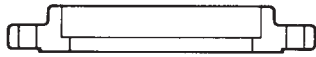
Weld Neck
DWG 810-1385992
DWG 810-1385861



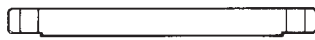
Weld Neck
ANSI B16.5



Slip-On
ANSI B16.5
DWG 810-4715319



Socket-Welding
ANSI B16.5
DWG 810-4715319



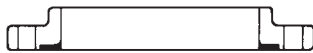
Blind
ANSI B16.5



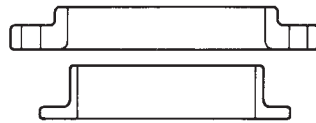
Silver-Brazing
DWG 810-1385947

- Solid 90-10 and 70-30 copper-nickel flanges are available in sizes $\frac{1}{2}$ " nominal and larger.
- Flanges can be supplied as slip-on, threaded, socket-welding, weld neck or blind.
- Silver-brazing flange ends comply dimensionally with MIL-F-1183 and can be finished as a face fed socket without a groove, or a grooved socket for use with a pre-inserted silver-brazing ring. Rings are ordered and supplied separately.
- Flanges may be ordered manufactured from material conforming to the requirements of MIL-C-24679 or ASTM B 171, alloys UNS C70600 (90-10) and UNS C71500 (70-30).

Special Copper-Nickel Flanges, Classes 150, 250, and 300



Overlay
ANSI B16.5



Composite
ANSI B16.5



Clad
ANSI B16.5

- These special flanges offer an economical alternative to the solid copper-nickel flanges listed above and are available in sizes $\frac{1}{2}$ " nominal and larger.
- Overlay slip-on flanges utilize a forged steel slip-on flange which is weld overlaid with copper-nickel material on the gasket and wetted surfaces.
- Composite flange sets are generally used instead of weld neck flanges when butt welding to a pipe or fitting is necessary but a loose backing flange is desired for ease of installation.
- Clad blind flanges utilize a forged steel blind flange which is clad with copper-nickel material on the wetted surfaces.

NOTE: Alaskan also stocks a complete line of MSS and ANSI style stainless steel flanges and can manufacture flanges to special dimensions, specifications and alloys.

Specifications

ANSI (American National Standards Institute)

B 16.3

This specification covers dimensions, ratings, testing, tolerances, markings and minimum material requirements for malleable-iron threaded fittings 150 lb and 300 lb. Used for dimensions and tolerances of threaded fittings from 1/8" to 6" nominal pipe size.

B 16.5

This specification covers pipe flanges and flanged fittings, including ratings for 150, 300, 400, 600, 900, 1500 and 2500 lb. Used for dimensions and tolerances of threaded, slip-on, socket-welding, weld neck, lap-joint and blind flanges for the above ratings and/or to denote commercial drilling. Sizes covered are from 1/2" through 24" nominal pipe size.

B 16.9

This specification covers butt-weld fittings. Used for dimensions and tolerances, ratings, testing and marking of butt-weld fittings from 1/2" through 48" nominal pipe size. For specifications covering low pressure corrosion resistant butt-welding fittings, see MSS SP-43.

B 16.11

This specification covers dimensions, finish, tolerances, testing, marking, material and minimum performance requirements for forged carbon and alloy steel fittings both socket-welding and threaded. Dimensional standards are commonly used for other alloys such as copper-nickel.

B 16.15

This specification covers 125 and 250 lb cast bronze threaded fittings. Used for dimensions and tolerances of cast, forged or machined threaded fittings from 1/8" through 4" nominal pipe size with 125 or 250 lb rating. Certain requirements also pertain to wrought or cast plugs, bushings, couplings and caps.

B 16.28

This specification covers butt-weld short radius elbows and returns. Used for dimensions, tolerances, testing and marking from 1/2" through 24" nominal pipe size.

MSS Standard Practices

SP-51

This specification covers 150 lb corrosion resistant cast flanges and flanged fittings.

SP-79

This specification covers dimensions, finish, tolerances and marking for socketwelding reducing inserts for use with B 16.11. Reducing inserts may be made to special dimensions other than those covered by this standard by agreement between manufacturer and the purchaser. This standard is used for dimensions and tolerances for 3000 lb and 6000 lb socketweld reducing inserts.

SP-83

This specification covers envelope and other dimensions, finish, tolerances, testing, marking and minimum performance requirements for forged carbon steel pipe unions. Unions designated as 3000 lb socket-welding or threaded.

SP-97

This specification covers the dimensions, finish, tolerances, testing, marking, material and minimum strength requirements for 90 degree carbon steel forged branch outlet fittings of butt-welding, socketwelding and threaded types. Threaded and socket-welding outlets shall be designated as class 3000 lb and 6000lb. Fittings may be made to special dimensions, size shape, tolerances or of other wrought materials.

Specifications

Military Specifications

MIL-C-15726F

This specification covers copper-nickel alloy rods, flat products (flat wire, strip, sheet, bar and plate). Includes alloys C71500 (70-30) and C70600 (90-10). Sets forth chemical and physical requirements for copper-nickel alloys. These products are available in soft and hard tempers.

MIL-C-24679

This specification covers copper-nickel forgings in alloy C70600 (90-10) and C71500 (70-30). Previously included in MIL-C-15726E.

MIL-F-20042

This specification covers 50, 100, 150, 250 and 400lb silver-brazed bronze pipe and bulkhead flanges for use with water, oil, gas or steam service not to exceed 425 Deg. F. Used to denote Navy drilling for flanges of any alloy for the sizes and ratings listed in the table below.

MIL-F-20670

150lb slip on and weld neck flanges and carbon steel. Used for dimensions and tolerances for alloys other than carbon steel.

ASTM Standards

B 151

This specification covers copper nickel alloy rod and bar, various annealed and drawn tempers. Alaskan stocks rod and bar in Alloys C70600 (90-10) and C71500 (70-30). This material is certified to MIL-C-15626F and meets the requirements of ASTM B 151.

B 171 (ASME SB-171 is generally identical)

This specification covers plate and sheet intended for use as tube plates in surface condensers and heat exchangers. Alaskan stocks tube plates in alloys C70600 (90-10) and C71500 (70-30).

B 466

This specification includes alloy C70600 (90-10) and alloy C71500 (70-30) seamless copper-nickel pipe intended for general engineering purposes.

B 467

This specification covers alloy C70600 (90-10) and alloy C71500 (70-30) welded copper-nickel pipe and tube intended for general engineering purposes. Alaskan pipe and tube of this specification are rolled and straight-seam welded from ASTM B 171 annealed sheet, strip or plate.

B 608

This specification covers welded copper alloy pipe intended for use in brackish water or sea-water piping systems. Alaskan manufactures B 608 pipe from ASTM B 171 annealed sheet, strip or plate in the copper-nickel alloys C70600 (90-10) and C71500 (70-30). See pages 4 and 5 for sizes carried in stock.

Drawings on File (Partial List)

000-2488877 Special Threaded Outlet

This is a NAVSEA drawing that specifies the dimensions and tolerances for the manufacturing of special threaded outlets. These items are commonly made of copper-nickel or stainless steel but other materials may be specified.

000-2529430 Master Dwg CuNi Flanges

This is a Newport News Shipbuilding master drawing DWG 100 for copper-nickel flanges.

009-1889864 Oxygen/Nitrogen 4500# Fittings

This is a NAVSEA drawing that specifies the dims. and tolerances for the manufacturing of fittings for oxygen/nitrogen service @ 4500 PSI. These items are commonly made of copper-nickel or stainless steel but other materials may be specified.

215684 700# Flanged UT Fittings

A Newport News shipbuilding drawing for 700 lb flanged fittings that must meet ultrasonic testing procedures.

255389 Flanged & Sil-Braze Elbows

A Newport News Shipbuilding drawing for flanged and silver-brazing elbows.

257003 SW Forged Fittings

2621-053-01 Bosses

2621-092-01 Couplings & Reducers

2621-166-01 Elbows

2621-625-01 Plugs & Caps

516-4712046 Divers Breathing Systems

A Norfolk Naval Shipyard drawing for diver's breathing systems.

516-4712045 Helium and Oxy System fittings

A Norfolk Naval Shipyard drawing for helium and oxygen systems fittings.

545-1611165 Sil-Braze & Bulkhead Fittings

This is a NAVSEA drawing which specifies the dimension and tolerances for the manufacturing of silver-brazing and bulkhead fittings. These items are commonly made of copper-nickel but other materials may be specified.

545-1701701 SW, NPS, & OD Fittings

A NAVSEA and Portsmouth Naval Shipyard drawing for socket-welding, nominal pipe size and OD fittings.

714-4537110 Flask Assembly

A San Francisco Naval Shipyard drawing for flask assembly.

803-1385884 6000 lb BW, SW Unions & Adapters

A NAVSEA drawing for 6000 lb butt weld and socket welding unions and adapters.

803-2177934 700 lb Weld Neck Valves

A NAVSEA drawing 700 lb copper-nickel valves.

810-1385945 700 lb Weld Neck Flanges

A NAVSEA drawing 700 lb weld neck flanges.

810-1385879 700 lb BW Fittings

A NAVSEA drawing for 700 lb butt-welded fittings.

810-1385880 90-10 Class 200 BW Fittings

NAVSEA Dwg, basic spec for mfg. of 90-10 & 70-30 copper-nickel fittings for shipboard use. Seamless and welded, maximum temp 150° F and 200 PSI. Commercial copper-nickel fittings are usually the same standards as stainless steel.

810-1385883 3000 lb Sil-Braze Unions

A NAVSEA drawing for 3000 lb Sil-Brazing unions.

810-1385892 3000 lb Sil-Braze OD Fittings

A NAVSEA drawing for 3000 lb Silver-Brazing unions.

810-1385892 Sil-Braze Butterfly Flanges

A NAVSEA drawing for Silver-Brazing butterfly flanges.

810-1385912 Boss for Non-Ferrous Piping

A NAVSEA drawing for a 3000 PSI boss outlet, as recommended by the department of the Navy.

810-1385915 100 lb Flanges & Fittings

A NAVSEA drawing for 100 lb flanges and fittings.

810-1385939 1500 lb & 3000 lb Sil-Braze Fittings

A NAVSEA Drawing for 1500 lb and 300 lb sil-braze fittings.

810-1385941 3000 lb Silicon Bronze WOG Fittings

A NAVSEA drawing for 3000 lb Silicon bronze WOG Fittings.

810-1385942 Ultrasonic NPS Fittings

A NAVSEA drawing for UT NPS Fittings.

810-1385944 3000 lb Sil-Braze Fittings for UT

A NAVSEA drawing for 3000 lb sil-braze UT Fittings.

810-1385945 800 lb-1500 lb NPS Bushing for UT

Drawings on File (Partial List)

810-1385947 700 lb Sil-Braze Bronze UT Flange
A NAVSEA drawing for 700 lb Sil-braze bronze UT Flange.

810-1385950 Boss for Non-Ferrous UT Piping
A NAVSEA drawing for non-ferrous UT Piping.

810-1385951 3000 lb UT CuNi Sil-Braze Bushing
A NAVSEA drawing for 3000 lb copper-nickel.

810-1385992 250 lb WOG CuNi Weld Neck Flange
A NAVSEA drawing for a solid copper-nickel flange, similar in configuration to weld neck style.

810-4715319 CuNi SW & SO Flanges
A common Navship drawing for copper-nickel socket-welding and slip-on.

820-2177966 NiCrFe, Cres SW Fittings
A NAVSEA drawing for nickel-copper, nickel-chromium-iron and corrosion resistant socket-welding fittings.

820-2177967 NiCu, NiCrFe, Cres BW Fittings
A NAVSEA drawing for nickel-copper, nickel-chromium-iron and corrosion resistant butt welding fittings.

845-1707011 Socket, Butt & Flange Fittings
A NAVSEA drawing for socket, butt, flanged, pipe and special fittings as required.

845-1889587 700 lb Angle Gate Valves
A NAVSEA drawing for 700 lb angle gate valves.

845-1889613 1/2" to 2" EB Type Boss
A NAVSEA/General Dynamics Electric Boat drawing for 1/8" to 2" electric boat type boss.

845-1889897 1/4" - 2 1/2" 700 lb SW Flanges
A NAVSEA drawing for copper-nickel and nickel-copper socketweld flanges, 1/4" - 2 1/2" inclusive.

845-2068540 Instrumentation Fittings
A NAVSEA drawing for instrumentation fittings.

845-2180682 1/8" to 2 1/2" SW Fittings 3000 lb UT CuNi Sil-Braze Bushing
A NAVSEA drawing for 1/8" to 2 1/2" socket-welding fittings.

845-4788654 SW Tees, Laterals & Crosses

S-3-39 CuNi Weld Flanges

Warranty

Alaskan sells its products under terms and conditions of sale which appear on applicable quotations, acknowledgments or invoices. Under these terms, Alaskan warrants to Purchaser, but not to anyone else, that the goods will conform to the express specifications shown on the applicable quotation, acknowledgement or invoice.

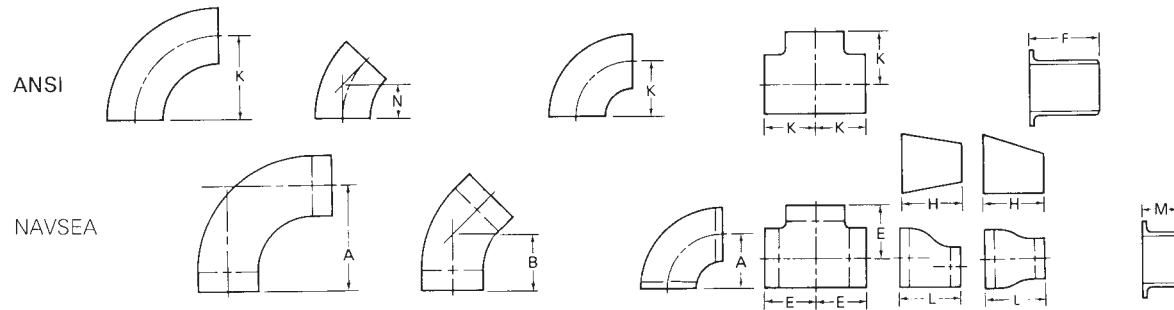
Alaskan makes no other warranty of any kind, express or implied, (including no warranty of merchantability, fitness for particular purpose, usage or trade) to any person or entity with regard to the goods or services covered hereby and forbids Purchaser to represent otherwise to anyone with which it deals.

Purchaser must inspect the goods, at its sole expense, within ten (10) days of the receipt thereof and notify Alaskan of any claimed defect, shortage or inaccuracy therein within ten (10) days thereafter or it shall be held to have waived its right to seek remedy thereof or recovery thereon from Alaskan. No goods shall be deemed defective if the alleged defect is discoverable only by inspection means more stringent than those requested by Purchaser in connection with the placing of its order. If Purchaser shall have timely notified Alaskan of alleged defects in the goods and made the goods available for inspection and testing by Alaskan, Alaskan shall determine whether defects exist which are attributable to it, rather than to Purchaser's improper installation, use or maintenance and, if it determines that there are, proceed to remedy the defects under the options available to it in the following paragraph.

Purchaser's sole and exclusive remedy for defective goods and services shall be, at Alaskan's option, repair, replacement or refund of purchase price. Alaskan shall not be liable under any circumstances, including, but not limited to, any claim for breach of warranty (express or implied), tort (including negligence) or strict liability, for any actual, incidental, contingent, special or consequential damages arising from or out of this agreement or the goods or services purchased any kind, express or implied, (including hereunder, including but not limited to, no liability for loss of profit or revenue, loss of use of goods or services or other items to be furnished to Purchaser hereunder, cost of capital, cost of substitute equipment, additional costs incurred by Purchaser at its plant or in the field (whether by way of correction or otherwise) or claims of Purchaser's customers or other third parties for damages.

Dimensional Summary

Welding Fittings: ANSI and NAVSEA 810-1385880D

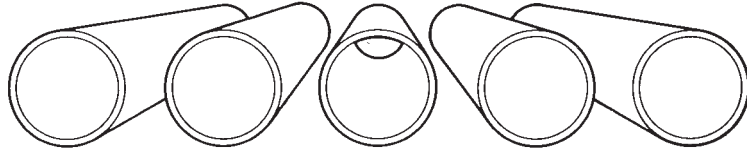


Nominal Pipe Size	Outside Diameter	B 16.9 LR 90 K	NAVSEA LR 90 A	B 16.9 LR 45 N	NAVSEA LR 45 B	B 16.28 SR 90 K	NAVSEA SR 90 A	NAVSEA Tee or Cross E,K	B 16.9 NAVSEA Reducer L,H	B 16.9 ANSI Stub End F	MSS Stub End M
1/2	.840	1 1/2		5/8				1		3	2
3/4	1.05	1 1/8		7/16				1 1/8	1 1/2	3	2
1	1.31	1 1/2	2	7/8	1 1/8	1		1 1/2	2	4	2
1	1.66	1 7/8	2 7/16	1	1 11/32	1 1/4		1 7/8	2	4	2
1 1/2	1.90	2 1/4	2 15/16	1 1/8	1 5/8	1 1/2		2 1/4	2 1/2	4	2
2	2.375	3	3 23/32	1 3/8	1 31/32	2		2 1/2	3	6	2 1/2
2 1/2	2.875	3 3/4	4 5/8	1 3/4	2 7/16	2 1/2		3	3 1/2	6	2 1/2
3	3.5	4 1/2	5 13/32	1 7/8	2 49/64	3	3 29/32	3 3/8	3 1/2	6	2 1/2
4	4.5	6	6 31/32	2 1/2	3 29/64	4	4 31/32	4 1/8	4 1/8	6	3
5	5.562	7 1/2	8 19/32	3 1/8	4 13/64	5	6 3/32	4 7/8	5	8	3
6	6.625	9	10 11/64	3 3/4	4 29/64	6	7 11/64	5 5/8	5 1/2	8	3 1/2
8	8.625	12	13 3/8	5	6 11/32	8	9 3/8	7	6	8	4
10	10.75	15	16 9/16	6 1/4	7 25/32	10	11 9/16	8 1/2	7	10	5
12	12.75	18	19 11/16	7 1/2	9 9/64	12	11 11/16	10	8	10	6
14	21	21 1/2	8 3/4	9 1/4	14	14 11/16	11	13	12	12	6
16	24	24 1/2	10	10 1/2	16	16 1/2	12	14	12	12	6
18	27	27 1/2	11 1/4	11 3/4	18	18 1/2	13 1/2	15	12	12	6
20	30	30 1/2	12 1/2	13	20	20 1/2	15	20	12	12	6
22	33	33 1/2	13 1/2	14	22	22 1/2	16 1/2	20	12		
24	36	36 1/2	15	15 1/2	24	24 1/2	17	20	12	6	
26	39		16		26		19 1/2	24			
28	42		17 1/4		28		20 1/2	24			
30	45		18 1/2	19	30		30 1/2	22			
32	48		19 3/4		32		23 1/2	24			
34	51		21		34		25	24			
36	54		22 1/4	22 1/4	36	36 1/2	26 1/2	24			
38	57		23 5/8		38		28	24			
40	60		24 7/8		40		29 1/2	24			
42	63		26 1/8		42			24			
44	66		27 3/8		44			24			
46	69		28 5/8		46			28			
48	72		29 7/8		48			28			

Note: Dimensions for welding fittings with OD and ID tubing size diameters are identical to the fitting dimensions above. Dimensions are in inches.

*Sizes 26" through 48" are per Alaskan Standard.

Pipe and Tubing: ANSI and MIL-T-16420K



Nominal Pipe Size	Wall thicknesses per ANSI B 36.19 (average)							Wall thicknesses per MIL-T-16420K (minimum)					
	Outside Diameter	Sch 5s	Sch 10s	Sch 40s	Sch 80s	Regular* Thickness	Extra* Strong	Class 50	Class 200	Class 700	Class 1650	Class 3300	Class 6000
1/8	.405		.049	.068	.095	.062	.100			.058	.095		
1/4	.540		.065	.088	.119	.082	.123		.065	.065	.042	.072	.120
3/8	.675		.065	.091	.126	.090	.127		.065	.072	.049	.095	.148
1/2	.840	.065	.083	.109	.147	.107	.149		.065	.072	.058	.120	.203
3/4	1.05	.065	.083	.113	.154	.114	.157		.065	.083	.083	.148	.238
1	1.31	.065	.109	.133	.179	.126	.182		.065	.095	.095	.180	.300
1 1/4	1.66	.065	.109	.140	.191	.146	.194		.072	.095	.120	.220	.380
1 1/2	1.90	.065	.109	.145	.200	.150	.203		.072	.109	.134	.250	.425
2	2.375	.065	.109	.154	.218	.156	.221		.083	.120	.165	.340	.520
2 1/2	2.875	.083	.120	.203	.276	.187	.280		.083	.134	.203	.380	
3	3.5	.083	.120	.216	.300	.219	.304		.095	.165	.250	.458	
3 1/2	4	.083	.120	.226	.318	.250	.321		.095	.180	.284		
4	4.5	.083	.120	.237	.337	.250	.341		.109	.203	.340		
5	5.562	.109	.134	.258	.375	.250	.375		.125	.220	.425		
6	6.625	.109	.134	.280	.432	.250	.437		.134	.259			
8	8.625	.109	.148	.322	.500				.148	.340			
10	10.75	.134	.165	.365	.500			.134	.187	.380			
12	12.75	.156	.180	.375	.500			.156	.250	.454			
	14	.156	.188	.375	.500			.165	.250				
	16	.165	.188	.375	.500			.165	.250				
	18	.165	.188	.375	.500			.180	.250				
	20	.188	.218	.375	.500			.180	.250				
	22	.188	.218	.375	.500			.180	.250				
	24	.218	.250	.375	.500			.250					
	26			.375	.500								
	28			.375	.500								
	30	.250	.312	.375	.500			.250					
	32			.375	.500								
	34			.375	.500								
	36			.375	.500								
	38			.375	.500								
	40			.375	.500	.312							
	42			.375	.500								
	44			.375	.500								
	46			.375	.500								
	48			.375	.500								

Wall thicknesses for Class 200 size 14" through 24" are per Alaskan Standard. Alaskan will use the schedule thickness shown for all sizes not specified by a standard unless otherwise directed.

Dimensions are in inches.

*Regular and extra strong thicknesses are per ASTM B466.

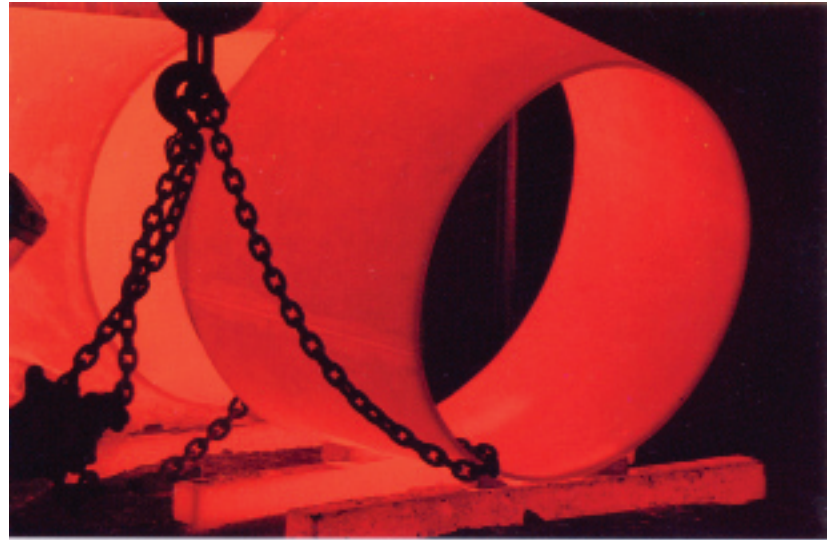
Quality Control

Quality control is achieved through a program designed to get the right instructions to the right people so the product is fabricated correctly the first time.

Alaskan Copper Works maintains documented quality control programs which meet the requirements of the ASME Code Section VIII, Division 1, Section III, Division 1, NCA-3800, 10CFR50 Appendix B and Military Specification MIL-I-45208A. These programs are continually analyzed, revised and improved to meet the increasing challenges and complexity of specifications for piping, fittings, and custom fabrication.

Our current quality control programs require the assignment of responsibility and the maintenance of detailed procedures for engineering, drafting, layout, purchasing, scheduling, fabrication, examination, documentation and packaging.

The facilities at Alaskan Copper Works for radiography, liquid penetrant examination, ultrasonic gaging, hydrostatic testing and dimensional checking enhance the effectiveness of our quality control programs. Alaskan Copper Works currently holds an ASME Certificate of Authorization to manufacture products with either "U" or "UM" stamping in accordance with Section VIII, Division 1 of the code.



Heat treatment stress relieves fittings after forming.



Hydrotesting testing checks for leaks and structural integrity.



Radiographic inspection checks the integrity of welds.



Liquid penetrant examination locates surface defects which may be too small to see visually.



A specialized film reader and digital densitometer are used in interpreting radiographic film.



Angle standard being used to check the dimensional requirements of prefabricated piping items.

Alaskan Copper & Brass Company and Alaskan Copper Works are the nation's largest combination full service center and manufacturer of corrosion resistant alloy products.

The following publications from Alaskan Copper & Brass Company and Alaskan Copper Works are available upon request.

• Mill Products Stock List

*Copper, Brass, Bronze,
Aluminum and Stainless Steel
Sheet, Plate, Bar, Pipe
Tubing, Fittings and Flanges*

Alaskan Copper & Brass Company

Fax (206) 382-7335 Portland, Oregon Fax (503) 238-6849 Vancouver, B.C. FAX (604) 937-0838



• Stainless Steel Piping Products

*Stainless Steel and Other
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Alaskan Copper Works
Stainless Products
Division

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• Fabrication Division

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Exchangers, Pressure Vessels, Tanks,
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Alaskan Copper Works
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• Bosses and Welding Outlets

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