

# Specialty metals **supply solutions**



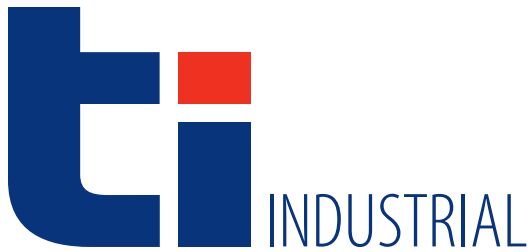
## INDUSTRIAL PRODUCTS HANDBOOK

Pipes, Fittings, and Mill Products

### Titanium Industries Inc.

#### International Metal Supply & Distribution Company

T.I. Industrial focuses the resources and capabilities of T.I. on the global industrial market. We provide performance metals for critical applications in chemical processing, marine, defense, power generation, pulp & paper, desalinization, automotive, motorsports, consumer products and other markets. T.I. has achieved a wide range of OEM and subcontractor approvals, a strong portfolio of service provider LTA's, is ISO 9001:2015 and DOD Registered.



Specialty metals **supply solutions**



## Titanium Industries. Synonymous with Reliability.

**T.I. Industrial** provides global service center inventories at competitive prices, guaranteed quality and the best delivery available to all levels of the industrial supply chain.

### Cutting and Material Processing

- State of the art saws
- In-house processing for quick turnarounds
- Precision tolerances
- Controlled environments

**Net Zero Processing**  
The right size, every time.

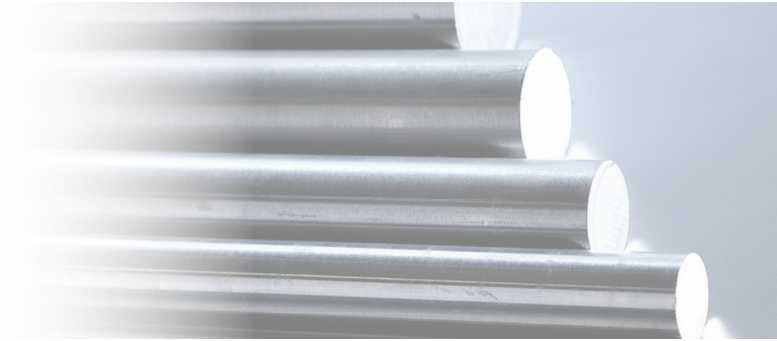
**Customized Solutions**  
Tailored to your business needs and requirements

**Precision Processing**  
Translates to less work and direct savings.



## Popular Industrial Alloys

- Ti CP1 Grade 1,2,3,4
- Ti CP2 Grade 7,12
- Ti 6Al-4V
- Ti 6Al-4V STA
- Ti 6Al-4V ELI
- Ti 6Al-6V-2Sn
- Ti 6Al-2Sn-4Zr-2Mo
- Ti 6Al-2Sn-4Zr-6Mo
- Ti 7Al-4Mo
- SS 15-5
- SS 13-8
- SS 17-4PH
- ATI® S-240™
- Nitronic Alloys™
- Ni 625
- Ni 718
- Ni 718 STA
- Monel™



## Pipes, Fittings, Valves & More

- Elbows
- Tees
- Flanges
- Weld O Lets
- Couplings
- Nipples
- Unions
- Ball Valves
- Weld Caps
- Seamless Pipe
- Welded Pipe
- Stub Ends
- Concentric Reducers
- Eccentric Reducers
- Wire/Weld Wire

## Mill Product Forms

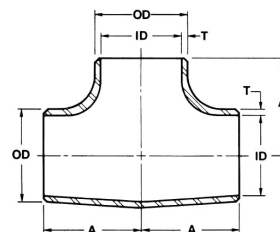
In stock for immediately 24/7 delivery

- Bar
- Billet
- Plate
- Sheet
- Forged Rectangle
- Rolled Rectangle
- Strip
- Tubing

**Titanium Industries** stocks and supplies a broad and comprehensive inventory of varying bars, pipes, fittings, plates, sheets, and much more.

## Processing Capabilities

- Saw Cutting
- Shearing
- Chamfering
- Heat Treatment
- Waterjet Cutting
- Precision Grinding
- Machining
- Trepanning



## Savings & Supply Assurance

- Just-In-Time 24/7 Delivery
- Cut-to-Size Nesting
- Value Pricing
- Commodity Hedging
- Scrap Revert/Tolling
- Conversion Programs
- Demand/Forecasting
- Risk Mitigation



# INDUSTRIAL Global Locations

Strategically placed to best serve the global marketplace

We are a privately held business with a long-term growth plan and quick decisions making processes. T.I. stands ready to support your global initiatives.



## Corporate Head Quarters

**NJ** - Rockaway (+1) (973) 983-1185  
sales@titanium.com

## North America

**CA** - Garden Grove (+1) (562) 906-8188  
sales-losangeles@titanium.com

**CT** - Tolland (+1) (860) 870-3939  
sales-hartford@titanium.com

**FL** - Jacksonville (+1) (904) 288-8300  
sales-jacksonville@titanium.com

**IL** - Aurora (+1) (630) 499-9140  
sales-chicago@titanium.com

**MI** - Plymouth (+1) (734) 335-2805  
sales-michigan@titanium.com

**OH** - Cleveland (+1) (216) 661-4610  
sales-cleveland@titanium.com

**TX** - Hillsboro (+1) (254) 580-2849  
sales-houston@titanium.com

**WA** - Woodinville (+1) (425) 481-7700  
sales-seattle@titanium.com

**Canada** - Montreal (+1) (514) 334-6727  
sales-montreal@titanium.com

## South America

**Brazil** - Sao Paulo (+55) 11 2814 7509  
sales-saopaulo@titanium.com

## Europe

**UK** - Birmingham (+44) (0) 121 782 9708  
sales-birmingham@titanium.com

**Germany** - Duisburg (+49) (0) 203 298 1606  
sales-duisburg@titanium.com

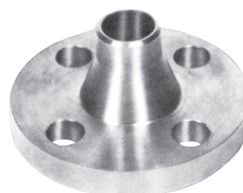
**Italy** - Verona (+39) 045 259 0232

**France** - Annecy (+33) 629 36 0081

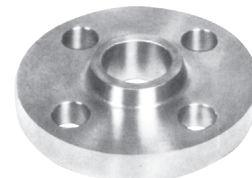
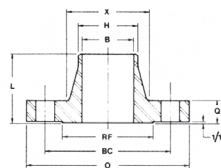
## Asia

**China** - Shanghai (+86) 21 5866 5266  
sales-taipei@titanium.com

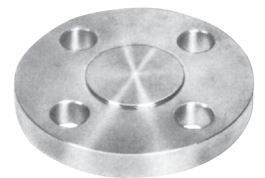
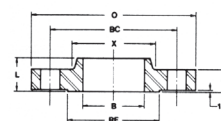
**Taiwan** - Taipei (+886) 2 2298 9668  
sales-taipei@titanium.com



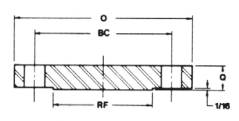
Welding Neck



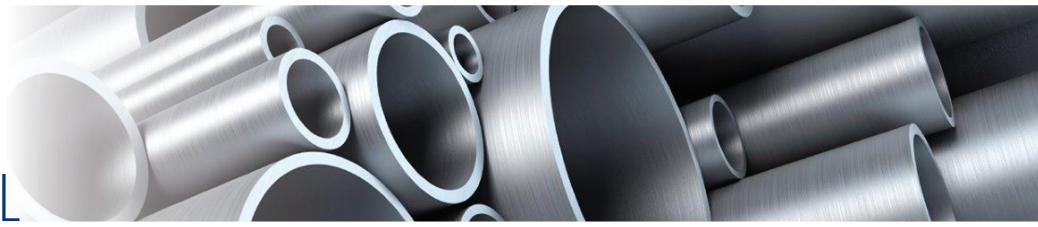
Slip-On



Blind



**Please contact your local representative for an immediate quote**



# Titanium Pipe Dimensions

ANSI/ASME B36.19-1985M (for S sizes) B36.10M (for non S sizes)

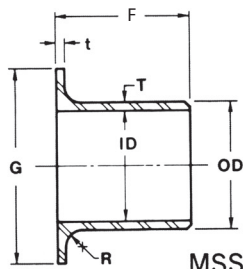
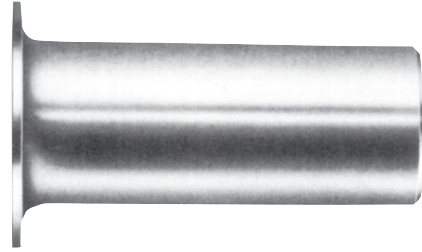
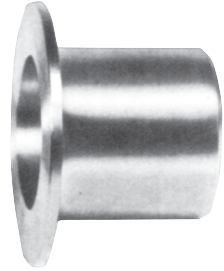
NPS	O.D.	5	5-S	10	10-S	40	40-S	80	80-S
1/8	0.405			0.049	0.049	0.068	0.068	0.095	0.095
				0.107	0.107	0.141	0.141	0.181	0.181
1/4	0.540			0.065	0.065	0.088	0.088	0.119	0.119
				0.190	0.190	0.244	0.244	0.308	0.308
3/8	0.675			0.065	0.065	0.091	0.091	0.126	0.126
				0.244	0.244	0.327	0.327	0.425	0.425
1/2	0.840	0.065	0.065	0.083	0.083	0.109	0.109	0.147	0.147
		0.310	0.310	0.386	0.386	0.490	0.490	0.626	0.626
3/4	1.050	0.065	0.065	0.083	0.083	0.113	0.113	0.154	0.154
		0.393	0.393	0.493	0.493	0.651	0.651	0.848	0.848
1	1.315	0.065	0.065	0.109	0.109	0.133	0.133	0.179	0.179
		0.499	0.499	0.808	0.808	0.966	0.966	1.250	1.250
1-1/4	1.660	0.065	0.065	0.109	0.109	0.140	0.140	0.191	0.191
		0.637	0.637	1.039	1.039	1.308	1.308	1.724	1.724
1-1/2	1.900	0.065	0.065	0.109	0.109	0.145	0.145	0.200	0.200
		0.733	0.733	1.200	1.200	1.564	1.564	2.089	2.089
2	2.375	0.065	0.065	0.109	0.109	0.154	0.154	0.218	0.218
		0.923	0.923	1.518	1.518	2.102	2.102	2.890	2.890
2-1/2	2.875	0.083	0.083	0.120	0.120	0.203	0.203	0.276	0.276
		1.743	1.743	2.032	2.032	3.333	3.333	4.408	4.408
3	3.500	0.083	0.083	0.120	0.120	0.216	0.216	0.300	0.300
		1.743	1.743	2.492	2.492	4.359	4.359	5.899	5.899
3-1/2	4.000	0.083	0.083	0.120	0.120	0.226	0.226	0.318	0.318
		1.998	1.998	2.861	2.861	5.241	5.241	7.195	7.195
4	4.500	0.083	0.083	0.120	0.120	0.237	0.237	0.337	0.337
		2.253	2.253	3.230	3.230	6.208	6.208	8.621	8.621
5	5.563	0.109	0.109	0.134	0.134	0.258	0.258	0.375	0.375
		3.653	3.653	4.470	4.470	8.411	8.411	11.955	11.955
6	6.625	0.109	0.109	0.134	0.134	0.280	0.280	0.432	0.432
		4.364	4.364	5.345	5.345	10.917	10.917	16.440	16.440
8	8.625	0.109	0.109	0.148	0.148	0.322	0.322	0.500	0.500
		4.364	4.364	7.709	7.709	16.429	16.429	24.964	24.964
10	10.750	0.134	0.134	0.165	0.165	0.365	0.365	0.594	*0.500
		8.741	8.741	10.732	10.732	23.293	23.293	37.012	31.493
12	12.750	0.156	0.156	0.180	0.180	0.406	0.375	0.688	*0.500
		12.073	12.073	13.904	13.904	30.796	28.516	50.925	37.638
14	14.000	0.156	0.156	0.250	*0.188	0.438	*0.375	0.750	*0.500
		13.271	13.271	21.123	15.956	36.421	31.397	61.065	41.478
16	16.000	0.165	0.165	0.250	*0.188	0.500	*0.375	0.844	*0.500
		16.055	16.055	24.196	18.267	47.623	36.006	78.516	47.623
18	18.000	0.165	0.165	0.250	*0.188	0.562	*0.375	0.938	*0.500
		18.083	18.083	27.268	20.577	60.222	40.614	98.246	53.768
20	20.000	0.188	0.188	0.250	*0.218	0.594	*0.375	1.031	*0.500
		22.888	22.888	30.341	26.500	70.718	45.223	120.177	59.913
24	24.000	0.218	0.218	0.250	*0.250	0.688	*0.375	1.219	*0.500
		31.858	31.858	36.486	36.486	98.418	54.441	170.513	72.203

1. All dimensions are in inches  
 2. Weight is in pounds based on density of .163 lbs/cubic inch  
 3. Dimensional tolerances to ASME B36.19M and ASME B36.10M

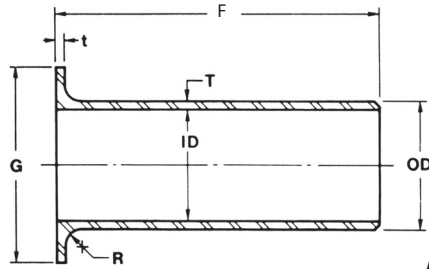
4. \*ASME B36.19 wall thickness does not conform to ASME B36.10M.  
 5. Wall thickness listed is nominal wall thickness  
 6. Sch-10S and Sch-10 do not permit threading in accordance with ASME B1.20.1



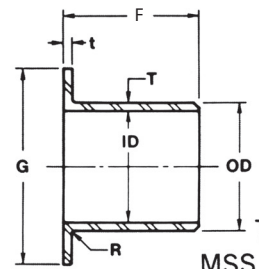
# STUB ENDS



Type A  
MSS Short



Type A  
ANSI Long



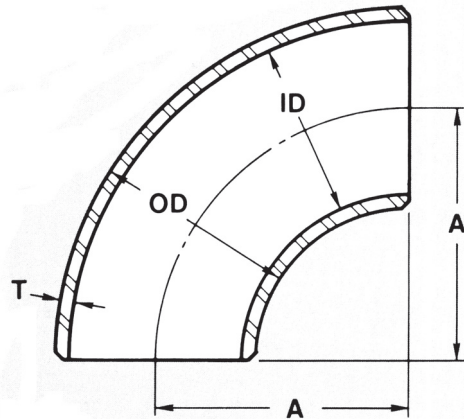
Type B  
MSS Short

Nom. Pipe Size	Outside Diameter (OD)	Lap Diameter (G)	Length (F)		Radius (R)		Schedule 10S Light N.P.S.			Approx. Wt. in Pounds		Schedule 40S Standard N.P.S.				
			Short (MSS)	Long (ANSI)	Type A	Type B	Inside Diameter (ID)	Wall Thickness (T)	Lap Thickness (t) Min.	Short	Long	Inside Diameter (ID)	Wall Thickness (T)	Lap Thickness (t) Min.	Approx. Wt. in Pounds	
															Short	Long
1/2	.840	1-3/8	2	3	1/8	1/32	.674	.083	.083	.09	.12	.622	.109	.109	.11	.15
3/4	1.050	1-11/16	2	3	1/8	1/32	.884	.083	.083	.12	.16	.824	.113	.113	.15	.21
1	1.315	2	2	4	1/8	1/32	1.097	.109	.109	.20	.33	1.049	.133	.133	.22	.39
1-1/4	1.660	2-1/2	2	4	3/16	1/32	1.442	.109	.109	.28	.45	1.380	.140	.140	.32	.55
1-1/2	1.900	2-7/8	2	4	1/4	1/32	1.682	.109	.109	.32	.52	1.610	.145	.145	.39	.68
2	2.375	3-5/8	2-1/2	6	5/16	1/32	2.157	.109	.109	.54	.98	2.067	.154	.154	.77	1.29
2-1/2	2.875	4-1/8	2-1/2	6	5/16	1/32	2.635	.120	.120	.71	1.30	2.469	.203	.203	1.01	1.94
3	3.500	5	2-1/2	6	3/8	1/32	3.260	.120	.120	.92	1.65	3.068	.216	.216	1.43	2.66
3-1/2	4.000	5-1/2	3	6	3/8	1/32	3.760	.120	.120	1.09	1.80	3.548	.226	.226	2.05	3.37
4	4.500	6-3/16	3	6	7/16	1/32	4.260	.120	.120	1.37	2.18	4.026	.237	.237	2.36	3.90
5	5.563	7-5/16	3	8	7/16	1/16	5.295	.134	.134	1.86	3.72	5.047	.258	.258	3.52	6.79
6	6.625	8-1/2	3-1/2	8	1/2	1/16	6.357	.134	.134	2.72	5.06	6.065	.280	.280	4.80	8.68
8	8.625	10-5/8	4	8	1/2	1/16	8.329	.148	.148	4.06	6.63	7.981	.322	.322	7.65	13.50
10	10.750	12-3/4	5	10	1/2	1/16	10.420	.165	.165	6.46	11.00	10.020	.365	.365	12.75	22.50
12	12.750	15	6	10	1/2	1/16	12.390	.180	.180	10.25	15.00	12.000	.375	.375	18.00	28.00
14	14.000	16-1/4	6	12	1/2	1/16	13.624	.188	.188	13.75	21.75	13.250	.375	.375	27.50	36.00
16	16.000	18-1/2	6	12	1/2	1/16	15.624	.188	.188	16.00	25.00	15.250	.375	.375	26.00	42.00
18	18.000	21	6	12	1/2	1/16	17.624	.188	.188	22.00	32.00	17.250	.375	.375	34.50	56.50
20	20.000	23	6	12	1/2	1/16	19.564	.218	.218	27.50	40.75	19.250	.375	.375	38.00	62.00
24	24.000	27-1/4	6	12	1/2	1/16	23.500	.250	.250	34.50	52.80	23.250	.375	.375	48.50	79.50

- All dimensions are in inches
- Dimensional tolerances conform to ASME B16.9
- Fitting wall thicknesses conform with standard schedule 10S and 40S ASME B36.19M wall pipe.
- Stub End Faces are supplied with a serrated spiral finish per ASME B16.5. Other surface finishes can be supplied on special order.
- Butt welding fittings are permanently marked by electro-chemical etching in accordance with ASME B16.9
- Estimated fitting weights are based on a density of .163 lbs/cubic inch

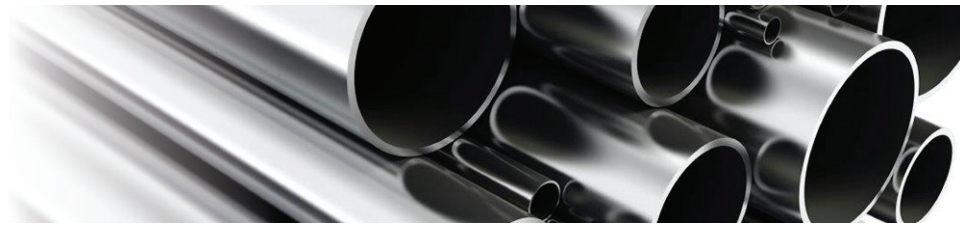


# 90° ELBOW — Long Radius

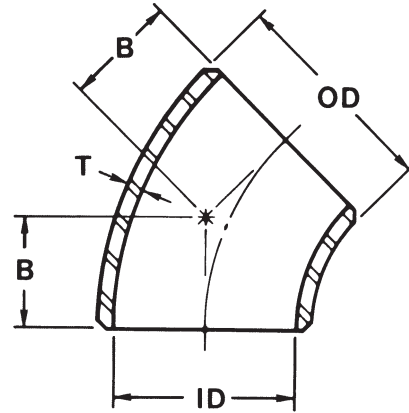


NOM PIPE SIZE	OUTSIDE DIAMETER (OD)	CENTER TO FACE (A)	SCHEDULE 10S Light N.P.S.			SCHEDULE 40S Standard N.P.S.		
			Inside Diameter (ID)	Wall Thickness (T)	Approx. Wt. in Pounds	Inside Diameter (ID)	Wall Thickness (T)	Approx. Wt in Pounds
1/2	.840	1-1/2	.674	.083	.08	.622	.109	.10
3/4	1.050	1-1/8	.884	.083	.09	.824	.113	.11
1	1.315	1-1/2	1.097	.109	.17	1.049	.133	.20
1-1/4	1.660	1-7/8	1.442	.109	.29	1.380	.140	.32
1-1/2	1.900	2-1/4	1.682	.109	.39	1.610	.145	.50
2	2.375	3	2.157	.109	.65	2.067	.154	.89
2-1/2	2.875	3-3/4	2.635	.120	1.08	2.469	.203	1.72
3	3.500	4-1/2	3.260	.120	1.54	3.068	.216	2.75
3-1/2	4.000	5-1/4	3.760	.120	2.14	3.548	.226	3.57
4	4.500	6	4.260	.120	2.72	4.026	.237	5.26
5	5.563	7-1/2	5.295	.134	4.58	5.047	.258	8.65
6	6.625	9	6.357	.134	6.86	6.065	.280	13.75
8	8.625	12	8.329	.148	13.50	7.981	.322	27.00
10	10.750	15	10.420	.165	25.00	10.020	.365	48.50
12	12.750	18	12.390	.180	34.00	12.000	.375	75.00
14	14.000	21	13.624	.188	46.00	13.250	.375	89.00
16	16.000	24	15.624	.188	60.00	15.250	.375	116.00
18	18.000	27	17.624	.188	75.00	17.250	.375	154.00
20	20.000	30	19.564	.218	126.00	19.250	.375	189.00
24	24.000	36	23.500	.250	177.00	23.250	.375	265.00

1. All dimensions are in inches
2. Dimensional tolerances conform to ASME B16.9
3. Fitting wall thicknesses conform with standard schedule 10S and 40S ASME B36.19M wall pipe.
4. Butt welding fittings are permanently marked by electro-chemical etching in accordance with ASME B16.9
5. Estimated fitting weights are based on a density of .163 lbs/cubic inch



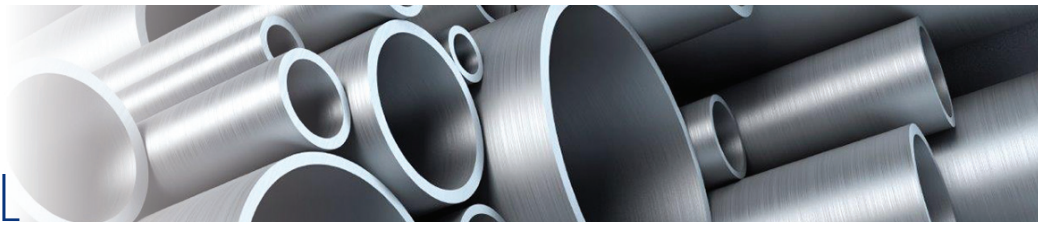
# 45° ELBOW — Long Radius



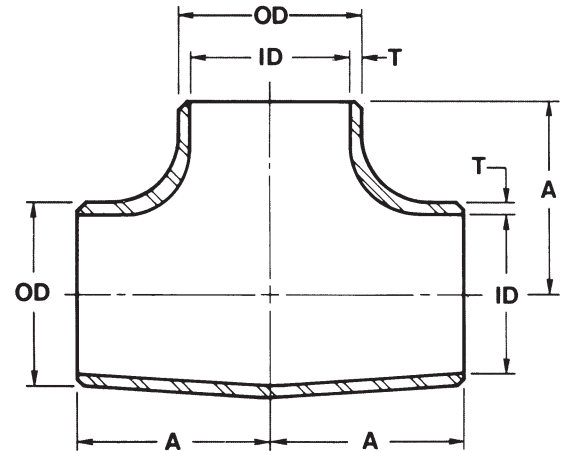
NOM PIPE SIZE	OUTSIDE DIAMETER (OD)	CENTER TO FACE (B)	SCHEDULE 10S Light N.P.S.			SCHEDULE 40S Standard N.P.S.		
			Wall Thickness (T)	Inside Diameter (ID)	Approx. Wt. in Pounds	Wall Thickness (T)	Inside Diameter (ID)	Approx. Wt in Pounds
1/2	.840	5/8	.083	.674	.04	.109	.622	.05
3/4	1.050	7/16	.083	.884	.04	.113	.824	.05
1	1.315	7/8	.109	1.097	.11	.133	1.049	.14
1-1/4	1.660	1	.109	1.442	.14	.140	1.380	.22
1-1/2	1.900	1-1/8	.109	1.682	.22	.145	1.610	.28
2	2.375	1-3/8	.109	2.157	.32	.154	2.067	.50
2-1/2	2.875	1-3/4	.120	2.635	.61	.203	2.469	.97
3	3.500	2	.120	3.260	.79	.216	3.068	1.36
3-1/2	4.000	2-1/4	.120	3.760	.95	.226	3.548	1.79
4	4.500	2-1/2	.120	4.260	1.36	.237	4.026	2.63
5	5.563	3-1/8	.134	5.295	2.29	.258	5.047	4.33
6	6.625	3-3/4	.134	6.357	3.43	.280	6.065	6.86
8	8.625	5	.148	8.329	6.75	.322	7.981	13.50
10	10.750	6-1/4	.165	10.420	12.50	.365	10.020	24.50
12	12.750	7-1/2	.180	12.390	17.00	.375	12.000	37.50
14	14.000	8-3/4	.188	13.624	23.00	.375	13.250	44.50
16	16.000	10	.188	15.624	30.00	.375	15.250	58.00
18	18.000	11-1/4	.188	17.624	38.00	.375	17.250	75.00
20	20.000	12-1/2	.218	19.564	63.00	.375	19.250	94.00
24	24.000	15	.250	23.500	89.00	.375	23.250	133.00

1. All dimensions are in inches
2. Dimensional tolerances conform to ASME B16.9
3. Fitting wall thicknesses conform with standard schedule 10S and 40S ASME B36.19M wall pipe.
4. Butt welding fittings are permanently marked by electro-chemical etching in accordance with ASME B16.9
5. Estimated fitting weights are based on a density of .163 lbs/cubic inch



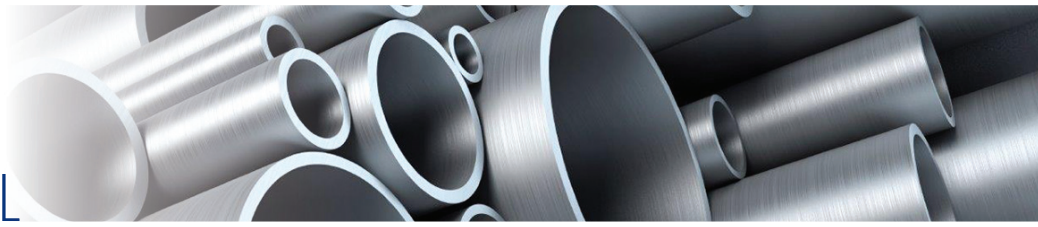


# STRAIGHT TEE

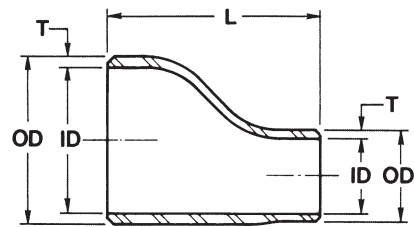
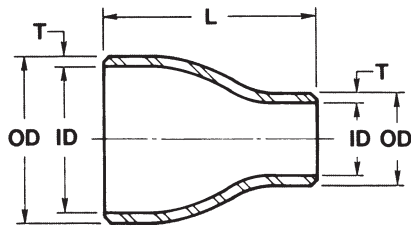
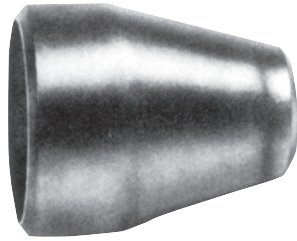


NOM PIPE SIZE	OUTSIDE DIAMETER (OD)	CENTER TO FACE (A)	SCHEDULE 10S Light N.P.S.			SCHEDULE 40S Standard N.P.S.		
			Wall Thickness (T)	Inside Diameter (ID)	Approx. Wt. in Pounds	Wall Thickness (T)	Inside Diameter (ID)	Approx. Wt in Pounds
1/2	.840	1	.083	.674	.12	.109	.622	.13
3/4	1.050	1-1/8	.083	.884	.16	.113	.824	.22
1	1.315	1-1/2	.109	1.097	.36	.133	1.049	.37
1-1/4	1.660	1-7/8	.109	1.442	.63	.140	1.380	.75
1-1/2	1.900	2-1/4	.109	1.682	.86	.145	1.610	1.09
2	2.375	2-1/2	.109	2.157	1.07	.154	2.067	1.62
2-1/2	2.875	3	.120	2.635	1.77	.203	2.469	2.77
3	3.500	3-3/8	.120	3.260	2.23	.216	3.068	4.18
3-1/2	4.000	3-3/4	.120	3.760	3.36	.226	3.548	5.15
4	4.500	4-1/8	.120	4.260	4.36	.237	4.026	6.65
5	5.563	4-7/8	.134	5.295	7.69	.258	5.047	12.00
6	6.625	5-5/8	.134	6.357	10.25	.280	6.065	14.00
8	8.625	7	.148	8.329	14.75	.322	7.981	26.25
10	10.750	8-1/2	.165	10.420	33.75	.365	10.020	45.50
12	12.750	10	.180	12.390	49.75	.375	12.000	78.00
14	14.000	11	.188	13.624	61.25	.375	13.250	100.00
16	16.000	12	.188	15.624	74.25	.375	15.250	126.00
18	18.000	13-1/2	.188	17.624	96.75	.375	17.250	164.00
20	20.000	15	.218	19.564	130.00	.375	19.250	205.00
24	24.000	17	.250	23.500	196.00	.375	23.250	285.00

1. All dimensions are in inches
2. Dimensional tolerances conform to ASME B16.9
3. Fitting wall thicknesses conform with standard schedule 10S and 40S ASME B36.19M wall pipe.
4. Butt welding fittings are permanently marked by electro-chemical etching in accordance with ASME B16.9
5. Estimated fitting weights are based on a density of .163 lbs/cubic inch

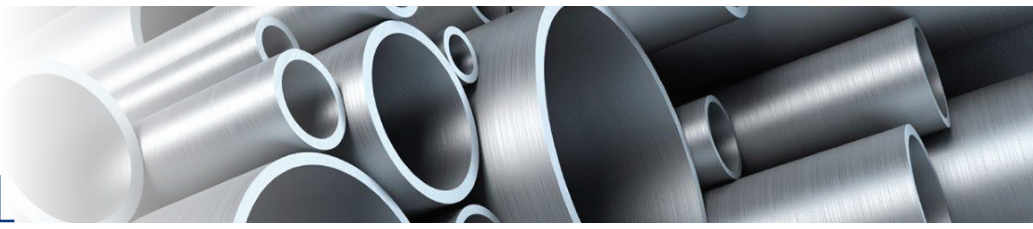


# CONCENTRIC AND ECCENTRIC REDUCERS

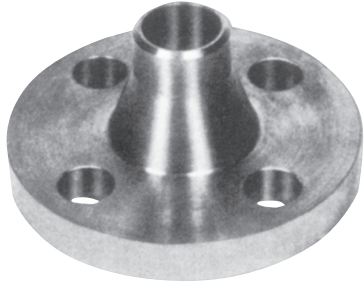


NOM PIPE SIZE	OUTSIDE DIAMETER		LENGTH (L)	SCHEDULE 10S Light N.P.S.				SCHEDULE 40S Standard N.P.S.				Approx. Wt. in Pounds	
	Large End (OD)	Small End (OD)		LARGE END		SMALL END		LARGE END		SMALL END			
				Inside Diameter (ID)	Wall Thick. (T)	Inside Diameter (ID)	Wall Thick. (T)	Inside Diameter (ID)	Wall Thick. (T)	Inside Diameter (ID)	Wall Thick. (T)		
3/4 x 1/2	1.050	.840	2	.884	.083	.674	.083	.13	.824	.113	.622	.109	.18
1 x 1/2	1.315	.840	2	1.097	.109	.674	.083	.15	1.049	.133	.622	.109	.19
1 x 3/4	1.315	1.050	2	1.097	.109	.884	.083	.17	1.049	.133	.824	.113	.21
1-1/2 x 1/2	1.900	.840	2-1/2	1.682	.109	.674	.083	.21	1.610	.145	.622	.109	.29
1-1/2 x 3/4	1.900	1.050	2-1/2	1.682	.109	.884	.083	.22	1.610	.145	.824	.113	.30
1-1/2 x 1	1.900	1.315	2-1/2	1.682	.109	1.097	.109	.25	1.610	.145	1.049	.133	.33
2 x 3/4	2.375	1.050	3	2.157	.109	.884	.083	.32	2.067	.154	.824	.113	.46
2 x 1	2.375	1.315	3	2.157	.109	1.097	.109	.35	2.067	.154	1.049	.133	.51
2 x 1-1/2	2.375	1.900	3	2.157	.109	1.682	.109	.39	2.067	.154	1.610	.145	.57
3 x 1	3.500	1.315	3-1/2	3.260	.120	1.097	.109	.59	3.068	.216	1.049	.133	1.04
3 x 2	3.500	2.375	3-1/2	3.260	.120	2.157	.109	.69	3.068	.216	2.067	.154	1.26
4 x 2	4.500	2.375	4	4.260	.120	2.157	.109	.99	4.026	.237	2.067	.154	1.98
4 x 3	4.500	3.500	4	4.260	.120	3.260	.120	1.10	4.026	.237	3.068	.216	2.20
6 x 3	6.625	3.500	5-1/2	6.357	.134	3.260	.120	2.29	6.065	.280	3.068	.216	5.02
6 x 4	6.625	4.500	5-1/2	6.357	.134	4.260	.120	2.47	6.065	.280	4.026	.237	5.14
8 x 4	8.625	4.500	6	8.329	.148	4.260	.120	3.80	7.981	.322	4.026	.237	8.26
8 x 6	8.625	6.625	6	8.329	.148	6.357	.134	4.03	7.981	.322	6.065	.280	8.75
10 x 6	10.750	6.625	7	10.420	.165	6.357	.134	6.31	10.020	.365	6.065	.280	14.00
10 x 8	10.750	6.625	7	10.420	.165	8.329	.148	6.55	10.020	.365	7.981	.322	14.50
12 x 6	12.750	6.625	8	12.390	.180	6.357	.134	9.37	12.000	.375	6.065	.280	19.50
12 x 8	12.750	8.625	8	12.390	.180	8.329	.148	9.67	12.000	.375	7.981	.322	20.00
12 x 10	12.750	10.750	8	12.390	.180	10.420	.165	10.00	12.000	.375	10.020	.365	21.00

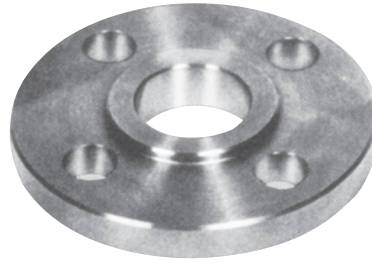
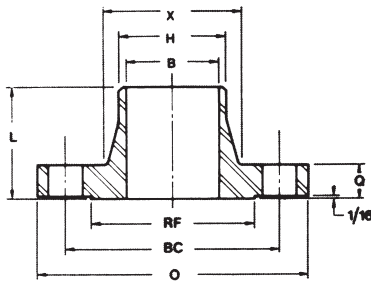
1. All dimensions are in inches
2. Dimensional tolerances conform to ASME B16.9
3. Fitting wall thicknesses conform with standard schedule 10S and 40S ASME B36.19M wall pipe.
4. Butt welding fittings are permanently marked by electro-chemical etching in accordance with ASME B16.9
5. Estimated fitting weights are based on a density of .163 lbs/cubic inch



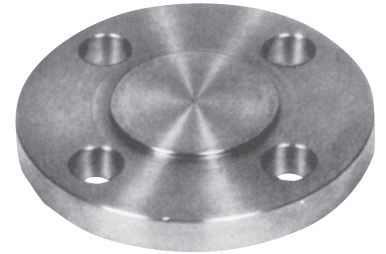
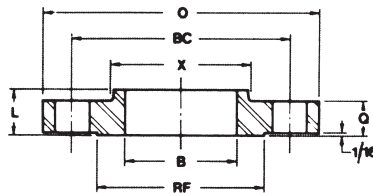
# 150 lb. FLANGES



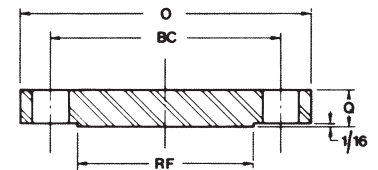
**Welding Neck**



**Slip-On**

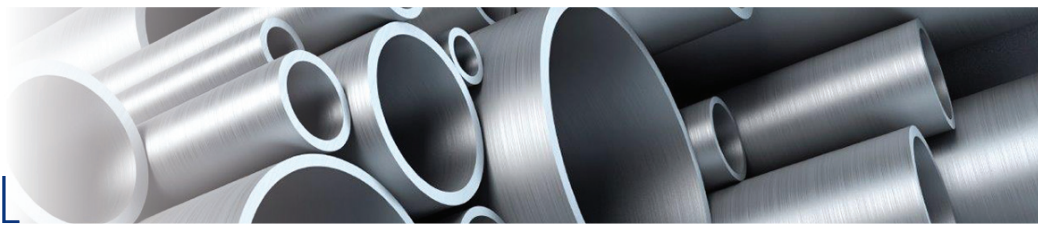


**Blind**

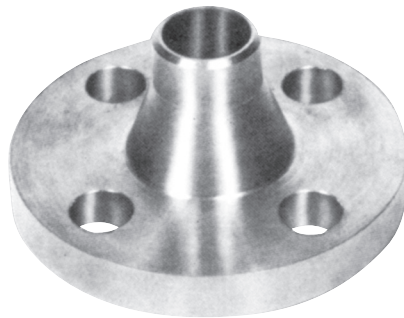


Nom. Pipe Size	Flange Diameter (O)	Flange Thickness (Q)	Hub Dia. At Base (X)	Raised Face Dia. (RF)	Hub Dia. At Welding Point (H)	Bore Diameter (B)		Length Through Hub (L)		Drilling and Bolting			Weight		
						Welding Neck	Slip On	Welding Neck	Slip On	No. of Holes	Dia. of Bolts	Dia. of Bolt Circle (BC)	Welding Neck	Slip On	Blind
1/2	3-1/2	7/16	1-3/16	1-3/8	.84	.62	.88	1-7/8	5/8	4	1/2	2-3/8	.94	.94	1.26
3/4	3-7/8	1/2	1-1/2	1-11/16	1.05	.82	1.09	2-1/16	5/8	4	1/2	2-3/4	1.26	1.26	1.56
1	4-1/4	9/16	1-15/16	2	1.32	1.05	1.36	2-3/16	11/16	4	1/2	3-1/8	1.56	1.56	1.70
1-1/4	4-5/8	5/8	2-5/16	2-1/2	1.66	1.38	1.70	2-1/4	13/16	4	1/2	3-1/2	1.88	1.88	1.88
1-1/2	5	11/16	2-9/16	2-7/8	1.90	1.61	1.95	2-7/16	7/8	4	1/2	3-7/8	2.50	2.50	2.20
2	6	3/4	3-1/16	3-5/8	2.38	2.07	2.44	2-1/2	1	4	5/8	4-3/4	3.76	3.13	2.50
2-1/2	7	7/8	3-9/16	4-1/8	2.88	2.47	2.94	2-3/4	1-1/8	4	5/8	5-1/2	5.02	4.37	4.05
3	7-1/2	15/16	4-1/4	5	3.50	3.07	3.57	2-3/4	1-3/16	4	5/8	6	6.26	5.32	5.63
3-1/2	8-1/2	15/16	4-13/16	5-1/2	4.00	3.55	4.07	2-13/16	1-1/4	8	5/8	7	7.37	6.87	8.45
4	9	15/16	5-5/16	6-3/16	4.50	4.03	4.57	3	1-5/16	8	5/8	7-1/2	9.40	8.13	10.75
5	10	15/16	6-7/16	7-5/16	5.56	5.05	5.66	3-1/2	1-7/16	8	3/4	8-1/2	12.00	9.40	12.00
6	11	1	7-9/16	8-1/2	6.63	6.07	6.72	3-1/2	1-9/16	8	3/4	9-1/2	15.00	12.25	17.00
8	13-1/2	1-1/8	9-11/16	10-5/8	8.63	7.98	8.72	4	1-3/4	8	3/4	11-3/4	24.50	18.25	28.75
10	16	1-3/16	12	12-3/4	10.75	10.02	10.88	4	1-15/16	12	7/8	14-1/4	32.50	25.50	42.50
12	19	1-1/4	14-3/8	15	12.75	12.00	12.88	4-1/2	2-3/16	12	7/8	17	50.00	38.75	67.00
14	21	1-3/8	15-3/4	16-1/4	14.00	13.25	14.14	5	2-1/4	12	1	18-3/4	62.25	52.00	80.00
16	23-1/2	1-7/16	18	18-1/2	16.00	15.25	16.16	5	2-1/2	16	1	21-1/4	78.00	57.00	103.00
18	25	1-9/16	19-7/8	21	18.00	17.25	18.18	5-1/2	2-11/16	16	1-1/8	22-3/4	86.00	74.00	127.00
20	27-1/2	1-11/16	22	23	20.00	19.25	20.20	5-11/16	2-7/8	20	1-1/8	25	104.00	94.00	166.00
24	32	1-7/8	26-1/8	27-1/4	24.00	23.25	24.25	6	3-1/4	20	1-1/4	29-1/2	159.00	128.00	251.00

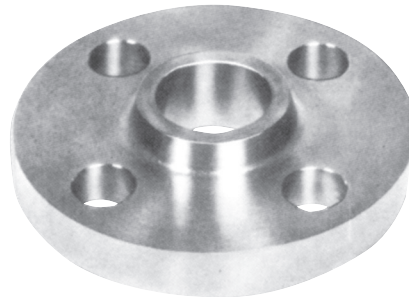
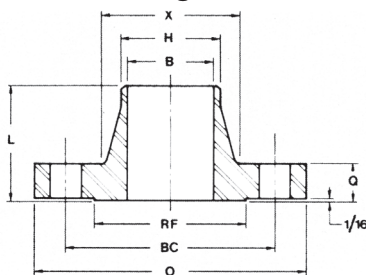
1. All dimensions are in inches
2. Dimensional tolerances conform to ASME B16.5
3. Flange bore diameters agree with standard ASME B36.9M Sch-40S wall pipe. Other bore diameters can be supplied on special order.
4. Flat Face Flanges are supplied with a serrated spiral finish per ASME B16.5 Other gasket surface finishes can be supplied on special order.
5. Flanges are permanently marked by electro-chemical etching in accordance with ASME B16.5
6. Estimated flange weights are based on a density of .163 lbs/cubic inch
7. The 1/16" RF is included in thickness "Q" and length through hub "L".



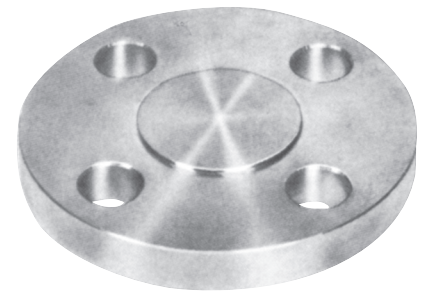
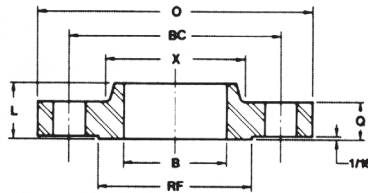
# 300 lb. FLANGES



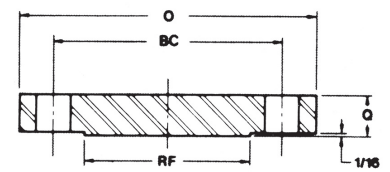
**Welding Neck**



**Slip-On**

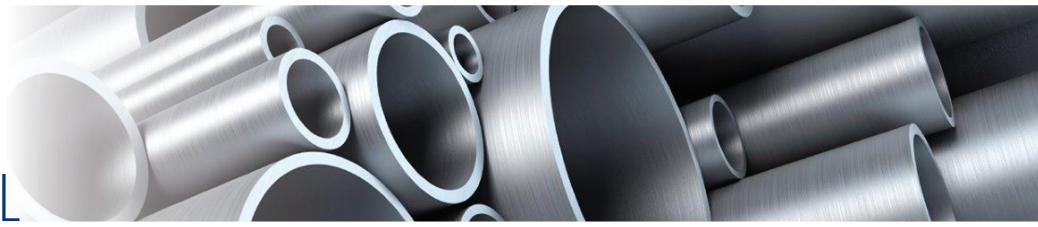


**Blind**

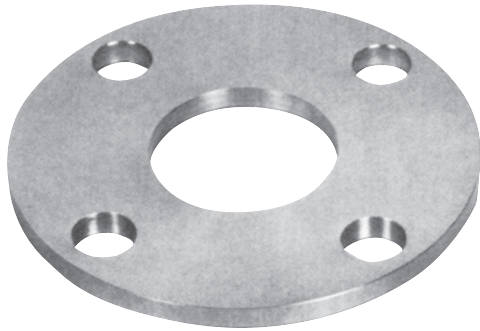


Nom. Pipe Size	Flange Diameter (O)	Flange Thickness (Q)	Hub Dia. At Base (X)	Raised Face Dia. (RF)	Hub Dia. At Welding Point (H)	Bore Diameter (B)		Length Through Hub (L)		Drilling and Bolting			Weight		
						Welding Neck	Slip On	Welding Neck	Slip On	No. of Holes	Dia. of Bolts	Dia. of Bolt Circle (BC)	Welding Neck	Slip On	Blind
1/2	3-3/4	9/16	1-1/2	1-3/8	.84	.62	.88	2-1/16	7/8	4	1/2	2-5/8	1.88	1.26	1.56
3/4	4-5/8	5/8	1-7/8	1-11/16	1.05	.82	1.09	2-1/4	1	4	5/8	2-1/4	2.50	1.56	1.88
1	4-7/8	11/16	2-1/8	2	1.32	1.05	1.36	2-7/16	1-1/16	4	5/8	3-1/2	2.81	1.88	2.50
1-1/4	5-1/4	3/4	2-1/2	2-1/2	1.66	1.38	1.70	2-9/16	1-1/16	4	5/8	3-7/8	3.44	2.50	3.44
1-1/2	6-1/8	13/16	2-3/4	2-7/8	1.90	1.61	1.95	2-11/16	1-3/16	4	3/4	4-1/2	4.69	4.05	4.37
2	6-1/2	7/8	3-5/16	3-5/8	2.38	2.07	2.44	2-3/4	1-5/16	8	5/8	5	5.63	4.37	5.32
2-1/2	7-1/2	1	3-15/16	4-1/8	2.88	2.47	2.94	3	1-1/2	8	3/4	5-7/8	6.87	6.56	7.51
3	8-1/4	1-1/8	4-5/8	5	3.50	3.07	3.57	3-1/8	1-11/16	8	3/4	6-5/8	9.39	8.76	10.00
3-1/2	9	1-3/16	5-1/4	5-1/2	4.00	3.55	4.07	3-3/16	1-3/4	8	3/4	7-1/4	12.00	10.75	12.50
4	10	1-1/4	5-3/4	6-3/16	4.50	4.03	4.57	3-3/8	1-7/8	8	3/4	7-7/8	14.75	13.75	17.50
5	11	1-3/8	7	7-5/16	5.56	5.05	5.66	3-7/8	2	8	3/4	9-1/4	20.75	17.50	22.00
6	12-1/2	1-7/16	8-1/8	8-1/2	6.63	6.07	6.72	3-7/8	2-1/16	12	3/4	10-5/8	27.00	23.75	30.00
8	15	1-5/8	10-1/4	10-5/8	8.63	7.98	8.72	4-3/8	2-7/16	12	7/8	13	42.50	35.75	50.00
10	17-1/2	1-7/8	12-5/8	12-3/4	10.75	10.02	10.88	4-5/8	2-5/8	16	1	15-1/4	55.50	50.75	78.25
12	20-1/2	2	14-3/4	15	12.75	12.00	12.88	5-1/8	2-7/8	16	1-1/8	17-3/4	84.00	69.75	113.00
14	23	2-1/8	16-3/4	16-1/4	14.00	13.25	14.14	5-5/8	3	20	1-1/8	20-1/4	114.00	103.00	144.00
16	25-1/2	2-1/4	19	18-1/2	16.00	15.25	16.16	5-3/4	3-1/4	20	1-1/4	22-1/2	150.00	138.00	188.00
18	28	2-3/8	21	21	18.00	17.25	18.18	6-1/4	3-1/2	24	1-1/4	24-3/4	186.00	175.00	239.00
20	30-1/2	2-1/2	23-1/8	23	20.00	19.25	20.20	6-3/8	3-3/4	24	1-1/4	27	231.00	204.00	300.00
24	36	2-3/4	27-5/8	27-1/4	24.00	23.25	24.25	6-5/8	4-3/16	24	1-1/2	32	333.00	306.00	461.00

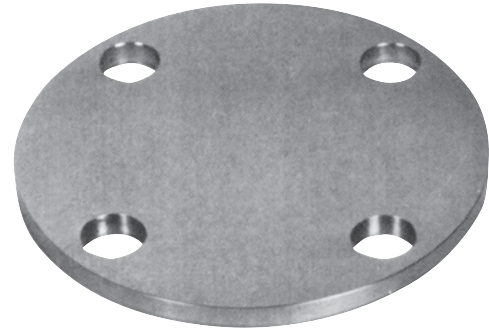
- All dimensions are in inches
- Dimensional tolerances conform to ASME B16.5
- Flange bore diameters agree with standard ASME B36.9M Sch-40S wall pipe. Other bore diameters can be supplied on special order.
- Flat Face Flanges are supplied with a serrated spiral finish per ASME B16.5 Other gasket surface finishes can be supplied on special order.
- Flanges are permanently marked by electro-chemical etching in accordance with ASME B16.5
- Estimated flange weights are based on a density of .163 lbs/cubic inch



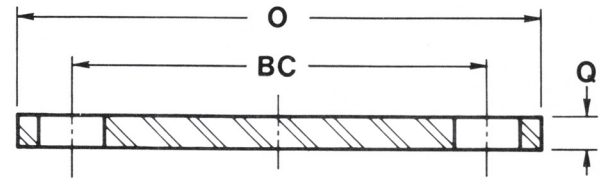
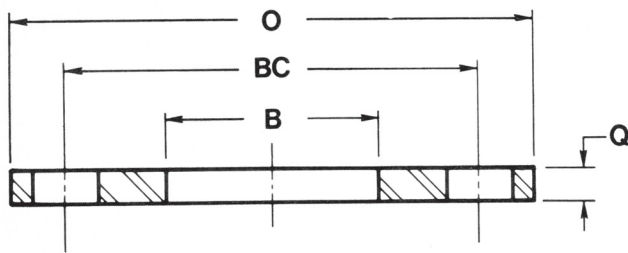
# LOW PRESSURE PLATE FLANGES



Slip-On

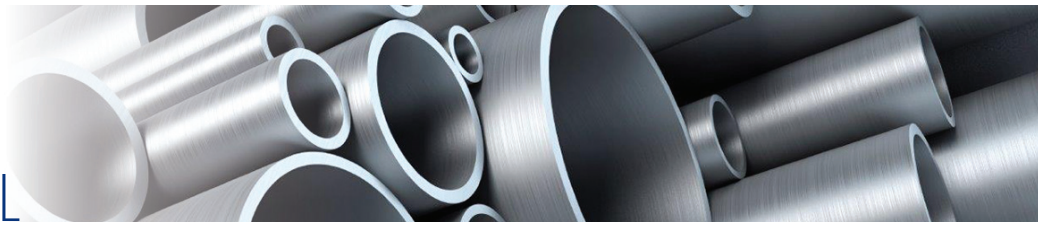


Blind

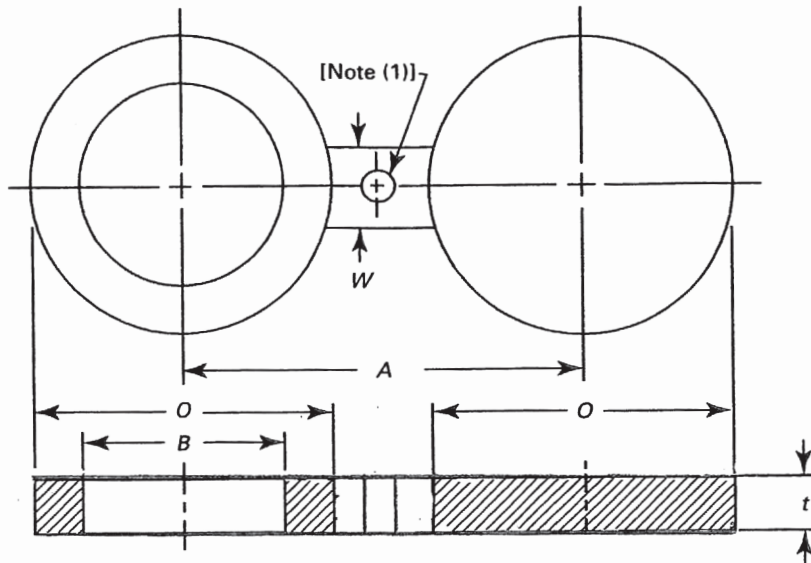


Nominal Pipe Size	Diameter (O)	Bore (B)	Bolt Circle Diameter (BC)	Bolt Diameter	No. of Bolt Holes	Flange Thickness (Q)	Weight in Pounds	
							Slip-On	Blind
1/2	3-1/2	.88	2-3/8	1/2	4	3/8	.48	.51
3/4	3-7/8	1.09	2-3/4	1/2	4	3/8	.59	.65
1	4-1/4	1.36	3-1/8	1/2	4	3/8	.70	.79
1-1/4	4-5/8	1.70	3-1/2	1/2	4	3/8	.81	.95
1-1/2	5	1.95	3-7/8	1/2	4	3/8	.94	1.12
2	6	2.44	4-3/4	5/8	4	3/8	1.33	1.62
2-1/2	7	2.94	5-1/2	5/8	4	1/2	2.44	2.99
3	7-1/2	3.57	6	5/8	4	1/2	2.64	3.46
4	9	4.57	7-1/2	5/8	8	1/2	3.70	4.90
5	10	5.66	8-1/2	3/4	8	5/8	4.95	7.50
6	11	6.72	9-1/2	3/4	8	5/8	5.58	9.20
8	13-1/2	8.72	11-3/4	3/4	8	5/8	8.01	14.00
10	16	10.88	14-1/4	7/8	12	3/4	12.00	24.50
12	19	12.88	17	7/8	12	3/4	17.50	33.50

1. All dimensions are in inches
2. Dimensional tolerances conform to ASME B16.5
3. Flange bore diameters agree with standard ASME B36.9M Sch-40S wall pipe. Other bore diameters can be supplied on special order.
4. Flat Face Flanges are supplied with a serrated spiral finish per ASME B16.5 Other gasket surface finishes can be supplied on special order.
5. Flanges are permanently marked by electro-chemical etching in accordance with ASME B16.5
6. Estimated flange weights are based on a density of .163 lbs/cubic inch

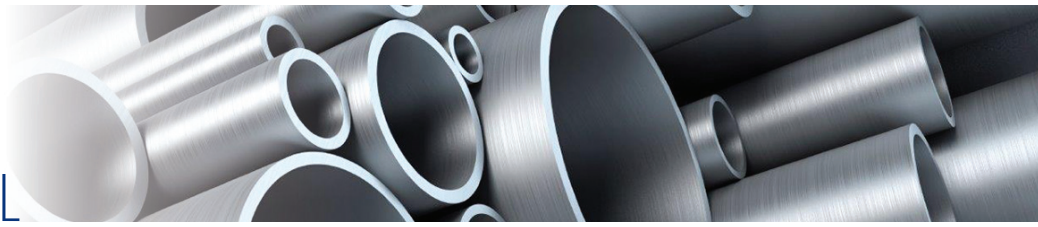


# FLAT FACE FIGURE-8 LINE BLANKS

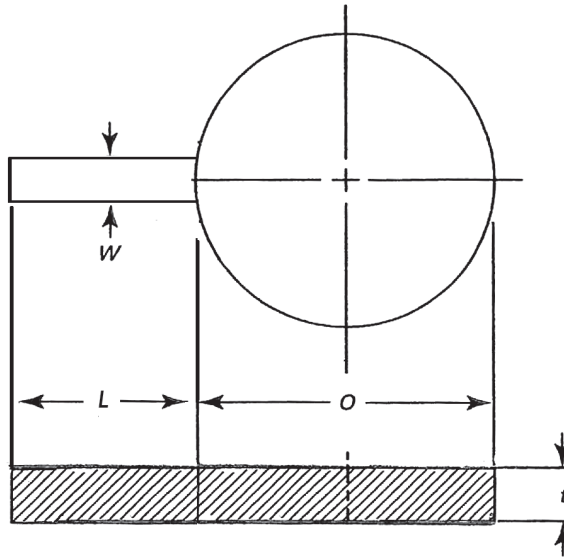


NPS	Inside Diameter, B, in.	Web Width, W, in.	Dimensions of Class 150			Dimensions of Class 300		
			Outside Diameter, O, in.	Centerline Dimension, A, in.	Thickness, t, in.	Outside Diameter, O, in.	Centerline Dimension, A, in.	Thickness, t, in.
1/2	0.62	1.50	1.75	2.38	0.12	2.00	2.62	0.25
3/4	0.82	1.50	2.12	2.75	0.12	2.50	3.25	0.25
1	1.05	1.50	2.50	3.12	0.12	2.75	3.50	0.25
1-1/4	1.66	1.50	2.88	3.50	0.25	3.12	3.88	0.25
1-1/2	1.90	1.50	3.25	3.88	0.25	3.62	4.50	0.25
2	2.38	2.00	4.00	4.75	0.25	4.25	5.00	0.38
2-1/2	2.88	2.00	4.75	5.50	0.25	5.00	5.88	0.38
3	3.50	2.50	5.25	6.00	0.25	5.75	6.62	0.38
3-1/2	4.00	2.50	6.25	7.00	0.38	6.38	7.25	0.50
4	4.50	2.50	6.75	7.50	0.38	7.00	7.88	0.50
5	5.56	3.00	7.62	8.50	0.38	8.38	9.25	0.62
6	6.62	3.00	8.62	9.50	0.50	9.75	10.62	0.62
8	8.62	3.00	10.88	11.75	0.50	12.00	13.00	0.88
10	10.75	4.00	13.25	14.25	0.62	14.12	15.25	1.00
12	12.75	4.00	16.00	17.00	0.75	16.50	17.75	1.12
14	14.00	4.25	17.62	18.75	0.75	19.00	20.25	1.25
16	16.00	4.25	20.12	21.25	0.88	21.12	22.50	1.50
18	18.00	4.50	21.50	22.75	1.00	23.38	24.75	1.62
20	20.00	4.75	23.75	25.00	1.12	25.62	27.00	1.75
24	24.00	5.50	28.12	29.50	1.25	30.38	32.00	2.00

1. Hole size (where required due to bolt spacing) shall be the same as the flange bolt hole and located such that it will not interfere with bolting between two flanges
2. All dimensions are in inches from ASME B16.48
3. Construction - cut from sheet and plate

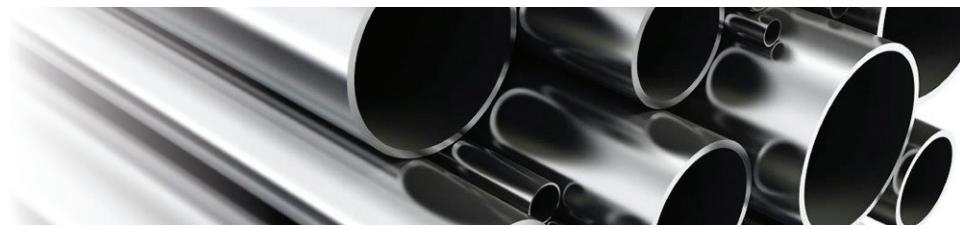


# FLAT FACE PADDLE BLANKS

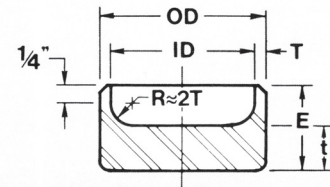
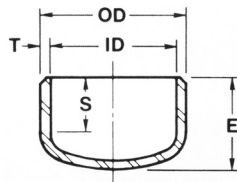


NPS	HANDLE WIDTH <i>W</i>	HANDLE LENGTH <i>L</i>	Dimensions of Class 150		Dimensions of Class 300	
			Outside Diameter, <i>O</i> , in.	Thickness, <i>t</i> , in.	Outside Diameter, <i>O</i> , in.	Thickness, <i>t</i> , in.
1/2	.500	3.00	1.75	0.12	2.00	0.25
3/4	.500	3.00	2.12	0.12	2.50	0.25
1	1.00	4.00	2.50	0.12	2.75	0.25
1-1/4	1.00	4.00	2.88	0.25	3.12	0.25
1-1/2	1.00	4.00	3.25	0.25	3.62	0.25
2	1.00	4.00	4.00	0.25	4.25	0.38
2-1/2	1.00	4.00	4.75	0.25	5.00	0.38
3	1.00	4.00	5.25	0.25	5.75	0.38
3-1/2	1.00	4.00	6.25	0.38	6.38	0.50
4	1.00	4.00	6.75	0.38	7.00	0.50
5	1.00	4.00	7.62	0.38	8.38	0.62
6	1.00	4.00	8.62	0.50	9.75	0.62
8	1.00	4.00	10.88	0.50	12.00	0.88
10	1.00	5.00	13.25	0.62	14.12	1.00
12	1.50	5.00	16.00	0.75	16.50	1.12
14	1.50	5.00	17.62	0.75	19.00	1.25
16	1.50	5.00	20.12	0.88	21.12	1.50
18	1.50	5.00	21.50	1.00	23.38	1.62
20	1.50	5.00	23.75	1.12	25.62	1.75
24	1.50	5.00	28.12	1.25	30.38	2.00

1. All dimensions are in inches
2. Diameter (*O*) and thickness (*t*) are from ASME B16.48
3. (*W*) Handle width and (*L*) length are not specified in ASME B16.48
4. Construction - cut from sheet and plate



# Standard 2:1 Elliptical and Machined Pipe Caps



Nom. Pipe Size	Outside Diameter (OD)	STANDARD 2:1 ELLIPTICAL PIPE CAP							MACHINED PIPE CAP (*)						
		Tangent Length (S)	Length (E)	SCHEDULE 10S Light N.P.S.			SCHEDULE 40S Standard N.P.S.			SCHEDULE 10S Light N.P.S.			SCHEDULE 40S Standard N.P.S.		
				Inside Diameter (ID)	Wall Thickness (T)	Approx. Wt. in Pounds	Inside Diameter (ID)	Wall Thickness (T)	Approx. Wt. in Pounds	Length (E)	Head Thickness (t)	Approx. Wt. in Pounds	Length (E)	Head Thickness	Approx. Wt. in Pounds
1/2	.840	.74	1	.674	.083	.05	.622	.109	.06	3/4	.281	.04	13/16	.312	.05
3/4	1.050	.68	1	.884	.083	.07	.824	.113	.07	3/4	.312	.06	7/8	.375	.08
1	1.315	1.10	1-1/2	1.097	.109	.11	1.049	.133	.16	7/8	.406	.12	1	.437	.14
1-1/4	1.660	1.02	1-1/2	1.442	.109	.16	1.380	.140	.22	15/16	.468	.21	1-1/16	.531	.27
1-1/2	1.900	.95	1-1/2	1.682	.109	.18	1.610	.145	.29	1	.500	.28	1-1/8	.562	.33
2	2.375	.83	1-1/2	2.157	.109	.22	2.067	.154	.34	1-1/16	.562	.47	1-1/4	.656	.57
2-1/2	2.875	.68	1-1/2	2.635	.120	.32	2.469	.203	.57	1-3/16	.656	.78	1-1/2	.812	1.04
3	3.500	1.02	2	3.260	.120	.50	3.068	.216	.89	1-1/4	.718	1.23	1-5/8	.937	1.72
3-1/2	4.000	1.40	2-1/2	3.760	.120	.71	3.548	.226	1.29	1-1/4	.750	1.66	1-3/4	1.031	2.43
4	4.500	1.26	2-1/2	4.260	.120	.82	4.026	.237	1.54	1-5/16	.812	2.24	1-7/8	1.125	3.31
5	5.563	1.48	3	5.295	.134	1.29	5.047	.258	2.32	1-1/2	.937	3.91	2-1/16	1.281	5.63
6	6.625	1.70	3-1/2	6.357	.134	1.72	6.065	.280	4.07	1-11/16	1.125	5.82	2-5/16	1.468	9.00
8	8.625	1.68	4	8.329	.148	3.15	7.981	.322	7.15	DIMENSIONS FOR SIZES OVER 6 INCHES TO BE SPECIFIED BY PURCHASER					
10	10.750	2.13	5	10.420	.165	6.18	10.020	.365	11.60						
12	12.750	2.63	6	12.390	.180	8.25	12.000	.375	16.50						
14	14.000	2.81	6-1/2	13.624	.188	10.25	13.250	.375	20.50						
16	16.000	2.81	7	15.624	.188	18.25	15.250	.375	27.75						
18	18.000	3.31	8	17.624	.188	22.75	17.250	.375	34.00						
20	20.000	3.81	9	19.564	.218	34.25	19.250	.375	43.00						
24	24.000	4.31	10-1/2	23.500	.250	43.50	23.250	.375	56.00						

1. All dimensions are in inches
2. Dimensional tolerances conform to ASME B16.9
3. Fitting wall thicknesses conform with standard schedule 10S and 40S ASME B36.19M wall pipe.
4. Butt welding fittings are permanently marked by electro-chemical etching in accordance with ASME B16.9
5. Estimated fitting weights are based on a density of .163 lbs/cubic inch





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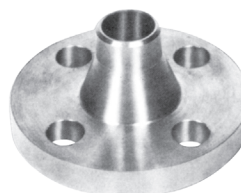
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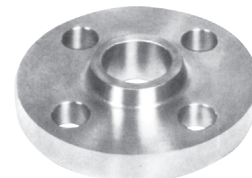
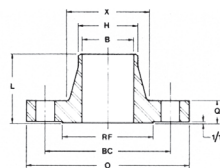
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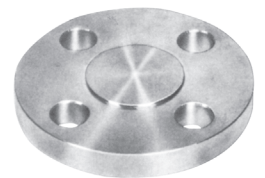
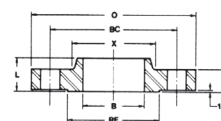
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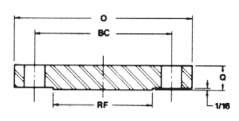
Welding Neck



Slip-On



Blind



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