



**Tube Turns®
Welding Fittings
And Flanges
Catalog 411**

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Tube Turns

Welding Fittings • Flanges

Catalog 411

Tube Turns' Catalog No. 411 has been designed to inform and assist those who are concerned with piping in any of its various phases. Whether you are a piping system designer, piping engineer, piping contractor, or purchasing agent, you will find accurate, informative, and valuable data in this catalog.

Catalog No. 411 is a complete reference work. It includes the more than 12,000 items available in Tube Turns' constantly expanding line of welding fittings, flanges and specialty piping components. And it provides up-to-the-minute information on both the technical and non-technical aspects of piping.



Tube Turns

2900 W. BROADWAY • LOUISVILLE, KENTUCKY 40211

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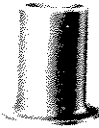
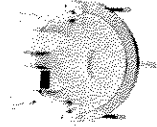
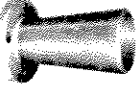
TUBE TURNS CANADA LTD.

21 York St.
Ridgetown, Ontario NOP 2C0

TUBE TURNS de MEXICO, S.A.

Km. 22.5 Carretera Federal A Puebla
Chicoloapan, Edo de Mexico

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Tube Turns

a history of expansion and leadership

Seamless forged welding pipe fittings were used by American Industry for the first time in 1927. These first seamless fittings were the result of a new forging process pioneered by Tube Turns.

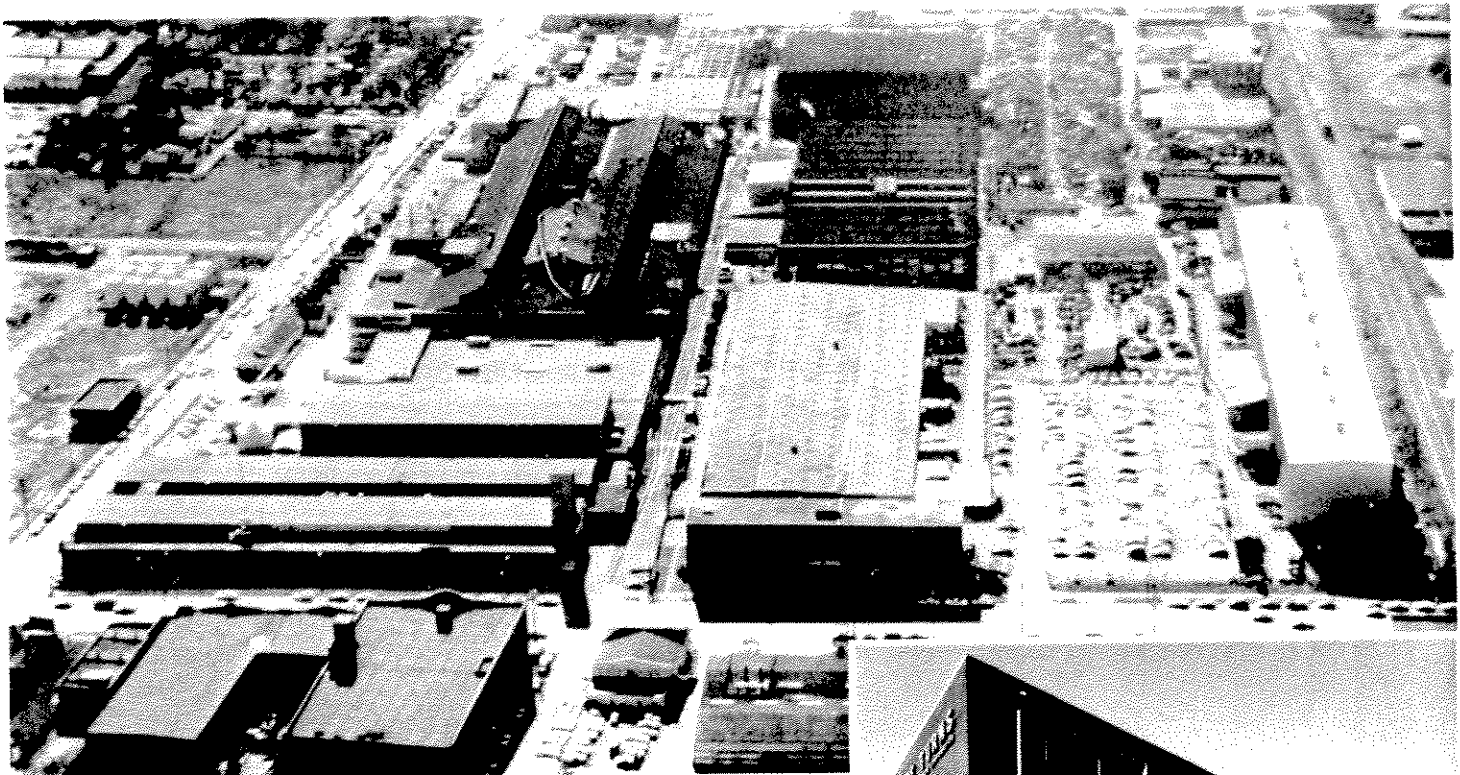
Since 1927, Tube Turns has continued this initial leadership with progress and expansion. From its first small plant of 600 square feet, Tube Turns has enlarged its Louisville manufacturing facilities to over two million square feet.

Keeping pace with the ever-expanding piping requirements of industry, Tube Turns has steadily increased its manufacturing capabilities to broaden

its product line. Welding fittings and flanges are produced in sizes up to 84", in all types, all schedules and all piping materials. Specialty piping components such as hinged closures, insulated joints, etc., have been added to make the Tube Turns line the most complete piping products line available.

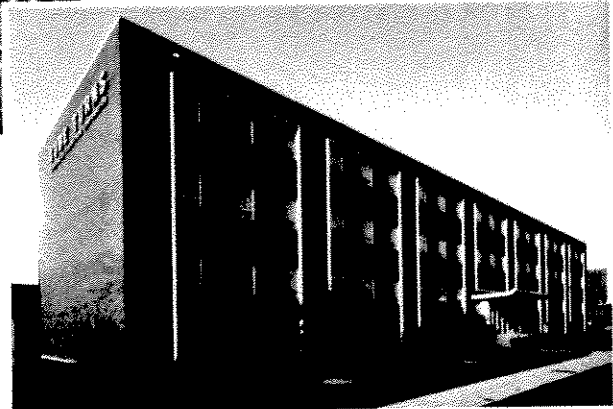
District Sales Offices are located in Atlanta, Chicago and Houston.

Tube Turns products are stocked by, and sold through, authorized distributors and agents located in principal cities throughout the world.



Aerial view of Tube Turns' plant
28th and Broadway, Louisville, Ky.

General Offices:
2900 West Broadway,
Louisville, Ky.



Tube Turns®

Welding Fittings

General Terms And Conditions of Sale

1. Seller offers to sell to Buyer, or accepts Buyer's offer to purchase, on the condition that Buyer assents to the terms contained herein. Buyer's failure to provide Seller with notification of any objection to these terms within a period of five days after receipt of this instrument or Buyer's acceptance of any product shipped hereunder constitutes assent by the Buyer to these terms. Seller's acceptance of Buyer's offer to purchase, or Buyer's acceptance hereof, is limited and restricted to these terms. Seller objects to and refuses to be bound by any terms additional to or different from those contained herein.

2. Prices are subject to change without notice, and all orders are to be invoiced at Seller's prices prevailing at time of shipment.

3. Any taxes which Seller may be required to pay or collect under existing or future law upon or with respect to the sale, purchase, delivery, transportation, storage, processing, use, or consumption of any of the products or services covered hereby, including all taxes upon or measured by receipts from sales or services, shall be for the account of Buyer, who shall promptly pay the amount thereof to Seller upon demand.

4. All accounts are payable in United States funds, free of exchange, collection or other charges. If Buyer fails to fulfill the terms of payment or if Seller shall have any doubt at any time as to Buyer's financial responsibility, Seller may suspend production and/or decline to make shipment or delivery except upon receipt of cash or security satisfactory to Seller.

5. Unless otherwise specifically provided herein, delivery will be made f.o.b. point of shipment, all risks of loss shall pass to Buyer upon delivery to carrier, and Buyer shall be responsible for obtaining insurance if desired. The method and agency of transportation and the routing, unless specified on the face hereof, will be selected by Seller, and Seller reserves the right to ship freight collect. Shipping dates are approximate and are based on prompt receipt of all necessary information.

6. Seller shall not be liable for any delay in performance due to fire, explosion, casualty, strike or other labor difficulties, shortage of material, utility, facility or labor, delay in transportation, breakdown or accident, compliance with or other action taken to carry out the intent or purpose of any law or regulation, or any cause whether similar or dissimilar beyond Seller's reasonable control, and Seller shall have such additional time for performance as may be reasonably necessary under the circumstances and the right to apportion its production among its customers in any manner it sees fit.

7. Any claims for shortages, damaged products, or non-conformance of products with the order must be made in writing within ten (10) days after receipt of shipment, and Seller must be afforded an opportunity to investigate.

8. Cancellation or alteration of an order or return of any product by Buyer may not be made without advance written consent by Seller and, at Seller's option, shall be subject to a cancellation, alteration or return charge acceptable to Seller.

9. Seller warrants that its products are free from defects in material and workmanship at the time of shipment to Buyer.

10. In the event of breach of any warranty hereunder, Seller's sole and exclusive liability shall be at its option either to repair or replace, f.o.b. point of shipment, any defective product, or to accept return, transportation prepaid, of such product and refund the purchase price; in either case provided that such product within 12 months from date of shipment to Buyer is found by Seller to have been

defective at the time of such shipment, that the product has been installed and/or operated in accordance with generally approved practice and in accordance with Seller's instructions, that no repairs, alterations or replacements have been made by others without Seller's written approval, and that Buyer notifies Seller in writing within 15 days after the defect becomes apparent and promptly furnishes full particulars in connection therewith; and provided further that in no event shall the aggregate liability of Seller in connection with breach of any warranty or warranties exceed the purchase price paid for the products purchased hereunder. Seller, may, at its option, require the return of any product, transportation and duties prepaid, to establish any claim of defect made by Buyer. EXCEPT AS EXPRESSLY STATED IN THIS INSTRUMENT, SELLER MAKES NO WARRANTIES, EXPRESS OR IMPLIED, AND DOES NOT WARRANT THAT THE PRODUCTS SOLD HEREUNDER ARE MERCHANTABILITY OR FIT FOR ANY PARTICULAR PURPOSE.

11. Seller will defend at its own expense any suit or legal proceeding instituted against Buyer, and will pay any damages and costs awarded therein against Buyer, insofar as the same are based on a claim that any product furnished hereunder, except as excluded below, in itself constitutes an infringement of any United States patent, provided Buyer gives Seller prompt written notice of such infringement claim and of the institution of such suit or proceeding and also gives Seller all necessary authority, information and reasonable assistance to enable Seller, at Seller's option, to settle or defend the same. In case any said product is held in such suit to constitute an infringement and its use is enjoined, Seller at its own expense will either procure for Buyer the right to continue using said product, or modify same so that it becomes non-infringing, or replace it with a non-infringing product, or remove the product and refund the purchase price paid therefor by Buyer. The foregoing provisions state Seller's entire obligation and liability for patent infringement; and it is understood and agreed that there shall be excluded from the operation of said provisions any and all products furnished in accordance with particular designs, specifications or instructions furnished or expressly or impliedly prescribed by Buyer and not customarily followed by Seller in the course of its general business, and Buyer will indemnify and hold harmless Seller from and against all loss, cost, expense, damage and liability of any nature or kind for or on account of any patented or unpatented invention or trade secret which in compliance with any such designs, specifications or instructions is embodied in any product furnished hereunder.

12. Seller shall not, except as set forth above, be otherwise liable to Buyer or to any person who shall purchase from Buyer, or use, any products supplied hereunder for damages of any kind, including, but not limited to, direct, indirect, special or consequential damages or loss of production or loss of profits resulting from any cause whatsoever, including, but not limited to, any delay, act, error or omission of Seller.

13. Technical information, recommendations and advice as to properties and usages of materials, design, installation and use of products, engineering and other matters are provided as an accommodation and are intended only as suggestions. Although they are believed to be accurate, based on Seller's best knowledge and experience, Seller assumes no obligation or liability for any results obtained in their use or application, and they are not to be construed as establishing any warranty, express or implied.

Positive and permanent identification

Each TUBE TURNS carbon steel welding fitting is permanently identified by low stress marking to designate: nominal pipe size, wall thickness, material type, laboratory control number, and Tube Turns as the manufacturer.

This positive identification on each TUBE TURNS welding fitting is your assurance that the fitting has successfully passed rigid inspection and quality control, and that a complete and accurate record of the metallurgical, chemical and physical properties of the material from which the fitting was made is on file at Tube Turns.

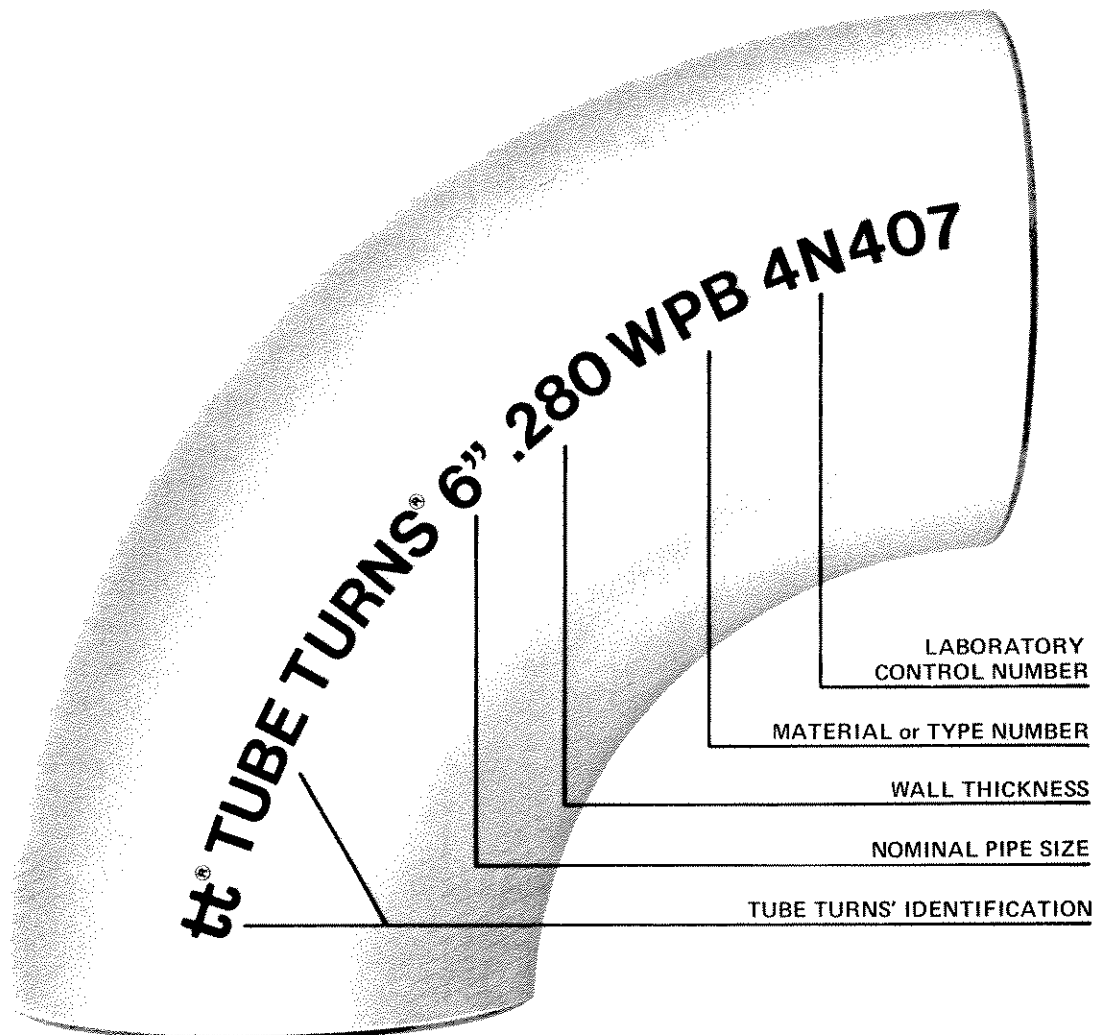
SYMBOLS TO INDICATE GRADE AND COMPOSITION FOR CARBON STEEL BUTT-WELDING FITTINGS

WPB	Seamless Pipe	ASTM A106 Grade B
	Plate	ASTM A515 Gr. 65 or 70
	Forgings	ASTM A105
	Bars*	ASTM A107 Gr. 1025-1030
WPC	Seamless Pipe	ASTM A106 Grade C
	Plate	ASTM A515 Grade 70
	Forgings	ASTM A105

*For fittings 2" nominal size and smaller.

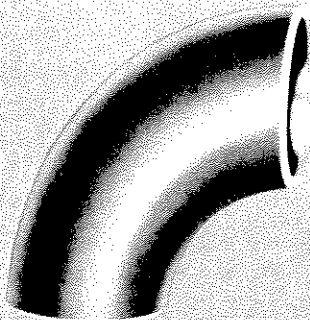
Low Temperature Carbon Steel

WPL6	Seamless & Welded Pipe	ASTM A333 Grade 6
	Seamless & Welded Tube	ASTM A334 Grade 6
	Plate	ASTM A516 Grade 60
	Forgings	ASTM A350 Grade LF2



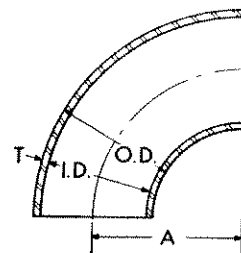
90° ELBOWS

**Light
Weight†**



**Long
Radius**

Part No. 516



ANSI B16.9 ▲

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	PART NUMBER	CENTER TO FACE A	PIPE SCHEDULE NUMBER	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
3	3.500	3.124	.188 ⁽¹⁾	516	4-1/2		4.0	PRICES ON APPLICATION
4	4.500	4.124	.188 ⁽¹⁾	516	6		7.0	
6	6.625	6.187	.219 ⁽¹⁾	516	9		18.2	
8	8.625	8.187	.219 ⁽¹⁾	516	12		31.9	
10	10.750	10.312	.219 ⁽¹⁾	516	15		50	
12	12.750	12.250	.250 ⁽¹⁾	516	18		81	
14	14.000	13.500	.250	516	21	10	106	
16	16.000	15.500	.250	516	24	10	164	
18	18.000	17.500	.250	516	27	10	194	
20	20.000	19.500	.250	516	30	10	241	
24	24.000	23.500	.250	516	36	10	372	

All dimensions are in inches.

When ordering Light Weight Fittings always specify Part Number or wall thickness.

* Grade B fittings are available from stock.

(1) Wall thicknesses are from API 5L pipe specifications and are those thicknesses most commonly used for gas distribution services.

† Pipe Schedule Numbers are in accordance with ANSI B36.10 for sizes 14" and larger.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

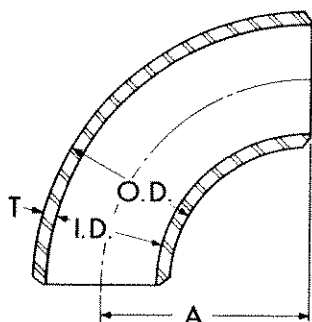
For bevel detail see page 89.

▲ For information on this Standard see page 89.

90° ELBOWS

Standard Weight†

Long Radius



Part No. 1

ANSI B16.9[▲]

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO FACE A	PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1/2	.840	.622	.109	1 1/2	40	.16	
3/4	1.050	.824	.113	1 1/8	40	.16	
1	1.315	1.049	.133	1 1/2	40	.35	
1 1/4	1.660	1.380	.140	1 7/8	40	.6	
1 1/2	1.900	1.610	.145	2 1/4	40	.8	
2	2.375	2.067	.154	3	40	1.5	
2 1/2	2.875	2.469	.203	3 3/4	40	3.0	
3	3.500	3.068	.216	4 1/2	40	4.5	
3 1/2	4.000	3.548	.226	5 1/4	40	6	
4	4.500	4.026	.237	6	40	8.5	
5	5.563	5.047	.258	7 1/2	40	14.5	
6	6.625	6.065	.280	9	40	24	
8	8.625	7.981	.322	12	40	45	
10	10.750	10.020	.365	15	40	84	
12	12.750	12.000	.375	18	ST ⁽¹⁾	123	
14	14.000	13.250	.375	21	30	159	
16	16.000	15.250	.375	24	30	210	
18	18.000	17.250	.375	27	ST ⁽¹⁾	271	
20	20.000	19.250	.375	30	20	343	
22	22.000	21.250	.375	33	20	385	
24	24.000	23.250	.375	36	20	516	
26	26.000	25.250	.375	39	ST ⁽¹⁾	602	
28	28.000	27.250	.375	42	ST ⁽¹⁾	626	
30	30.000	29.250	.375	45	ST ⁽¹⁾	775	
32	32.000	31.250	.375	48	ST ⁽¹⁾	818	
34	34.000	33.250	.375	51	ST ⁽¹⁾	926	
36	36.000	35.250	.375	54	ST ⁽¹⁾	1170	
42	42.000	41.250	.375	63	ST ⁽¹⁾	1810	
48	48.000	47.250	.375	72	ST ⁽¹⁾	2650	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 30" and smaller are furnished seamless. Non-seamless elbows are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Standard Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000,

48,000, 50,000, 52,000, 60,000, 65,000, and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

Odd degree elbows also available.

(1) ST designates Standard Weight (standard wall). Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade. For Dimensional Tolerances see page 88. For bevel detail see page 89.

▲ For information on this Standard see page 89.

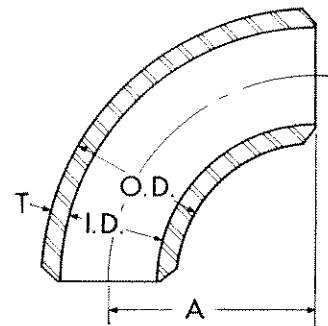
90° ELBOWS

**Extra
Strong†**



**Long
Radius**

Part No. 2



ANSI B16.9 ▲

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO FACE A	PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1/2	.840	.546	.147	1 1/2	80	.20	PRICES ON APPLICATION
3/4	1.050	.742	.154	1 1/8	80	.20	
1	1.315	.957	.179	1 1/2	80	.45	
1 1/4	1.660	1.278	.191	1 7/8	80	.7	
1 1/2	1.900	1.500	.200	2 1/4	80	1.0	
2	2.375	1.939	.218	3	80	2.0	
2 1/2	2.875	2.323	.276	3 3/4	80	4.0	
3	3.500	2.900	.300	4 1/2	80	6.0	
3 1/2	4.000	3.364	.318	5 1/4	80	9.0	
4	4.500	3.826	.337	6	80	12	
5	5.563	4.813	.375	7 1/2	80	21	
6	6.625	5.761	.432	9	80	32	
8	8.625	7.625	.500	12	80	68	
10	10.750	9.750	.500	15	60	108	
12	12.750	11.750	.500	18	XS ⁽¹⁾	150	
14	14.000	13.000	.500	21	XS ⁽¹⁾	193	
16	16.000	15.000	.500	24	40	258	
18	18.000	17.000	.500	27	XS ⁽¹⁾	350	
20	20.000	19.000	.500	30	30	420	
22	22.000	21.000	.500	33	30	508	
24	24.000	23.000	.500	36	XS ⁽¹⁾	606	
26	26.000	25.000	.500	39	20	713	
28	28.000	27.000	.500	42	20	829	
30	30.000	29.000	.500	45	20	953	
32	32.000	31.000	.500	48	20	1090	
34	34.000	33.000	.500	51	20	1230	
36	36.000	35.000	.500	54	20	1380	
42	42.000	41.000	.500	63	XS ⁽¹⁾	2050	
48	48.000	47.000	.500	72	XS ⁽¹⁾	2660	

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 30" and smaller are furnished seamless. Non-seamless elbows are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Extra Strong Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16"

and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

Odd degree elbows also available.

(1) XS designates Extra Strong (extra strong wall).

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

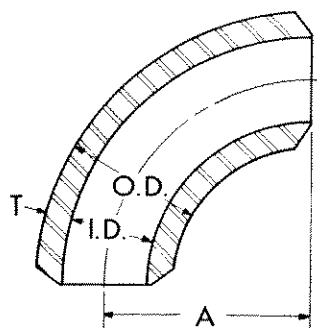
For bevel detail see page 89.

▲ For information on this Standard see page 89.

90° ELBOWS

**Schedule
160 and
Double
Extra
Strong[†]**

**Long
Radius**



ANSI B16.9[▲]

ASTM A234 *

Part Nos. 43 and 11

SCHEDULE 160 — PART NO. 43

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO FACE A	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1	1.315	.815	.250	1½	.6	
1¼	1.660	1.160	.250	1⅞	1.0	
1½	1.900	1.338	.281	2¼	1.5	
2	2.375	1.687	.344	3	3.0	
2½	2.875	2.125	.375	3¾	5.0	
3	3.500	2.624	.438	4½	8.5	
4	4.500	3.438	.531	6	18	
5	5.563	4.313	.625	7½	33	
6	6.625	5.187	.719	9	55	
8	8.625	6.813	.906	12	120	
10	10.750	8.500	1.125	15	230	
12	12.750	10.126	1.312	18	375	

DOUBLE EXTRA STRONG — PART NO. 11

¾	1.050	.434	.308	1⅞	.5	
1	1.315	.599	.358	1½	1.0	
1¼	1.660	.896	.382	1⅞	1.3	
1½	1.900	1.100	.400	2¼	2.0	
2	2.375	1.503	.436	3	4.0	
2½	2.875	1.771	.552	3¾	7.0	
3	3.500	2.300	.600	4½	11.0	
3½	4.000	2.728	.636	5¼	15.0	
4	4.500	3.152	.674	6	20.5	
5	5.563	4.063	.750	7½	34	
6	6.625	4.897	.864	9	62	
8	8.625	6.875	.875	12	120	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All wall thicknesses are in accordance with ANSI B36.10.
Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

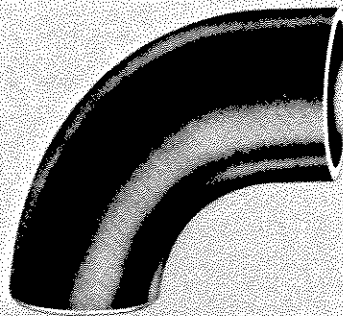
For Dimensional Tolerances see page 88.

For bevel detail see page 89.

▲ For information on this Standard see page 89.

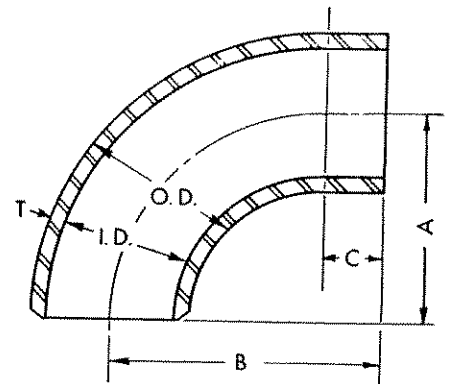
90° ELBOWS

**Standard
Weight
and
Extra
Strong†**



**Long
Tangent
One End**

Part Nos. 1-T and 2-T



ANSI B16.9▲

ASTM A234*

STANDARD WEIGHT — PART NO. 1-T

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	TANGENT LENGTH C	CENTER TO FACE		APPROX. WT. IN POUNDS	LIST PRICE
					SHORT END A	LONG END B		
1½	1.900	1.610	.145	1	2¼	3¼	1.5	
2	2.375	2.067	.154	1¼	3	4¼	1.9	
2½	2.875	2.469	.203	1¼	3¾	5	3.5	
3	3.500	3.068	.216	1¼	4½	5¾	5.4	
3½	4.000	3.548	.226	1½	5¼	6¾	7.6	
4	4.500	4.026	.237	1½	6	7½	10	
5	5.563	5.047	.258	1½	7½	9	17	
6	6.625	6.065	.280	1¾	9	10¾	28	
8	8.625	7.981	.322	1¾	12	13¾	55	
10	10.750	10.020	.365	2	15	17	91	
12	12.750	12.000	.375	2½	18	20½	132	

EXTRA STRONG WALL — PART NO. 2-T

1½	1.900	1.500	.200	1	2¼	3¼	1.4	
2	2.375	1.939	.218	1¼	3	4¼	2.5	
2½	2.875	2.323	.276	1¼	3¾	5	4.6	
3	3.500	2.900	.300	1¼	4½	5¾	7.2	
3½	4.000	3.364	.318	1½	5¼	6¾	10.3	
4	4.500	3.826	.337	1½	6	7½	14	
5	5.563	4.813	.375	1½	7½	9	24	
6	6.625	5.761	.432	1¾	9	10¾	38	
8	8.625	7.625	.500	1¾	12	13¾	75	
10	10.750	9.750	.500	2	15	17	118	
12	12.750	11.750	.500	2½	18	20½	171	

All dimensions are in inches.

Grade B fittings are available from stock.

90° Long Radius Elbows are also available in sizes through 46" with long tangents on one or both ends. For sizes 14" and larger with a tangent on one end, and for all sizes with tangents on both ends, the tangent length normally furnished is equal to one-quarter of the nominal size with the maximum length being 6". Welding ends are beveled on elbows with tangents on both ends.

† All thicknesses agree with those for Standard or for Extra Strong Wall Pipe (see ANSI B36.10).

Pipe Line Welding Fittings, conforming to MSS Standard Practice

SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths.

Odd degree elbows also available.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade. For Dimensional Tolerances see page 88.

Tangent end not beveled. For bevel detail, see page 89.

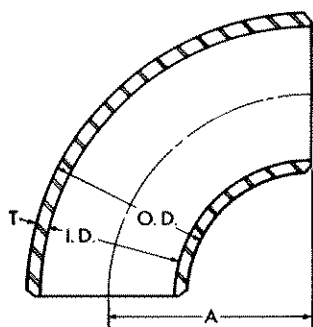
▲ Conforms to ANSI B16.9 except for added tangents. For further information on this Standard, see page 89.

PRICES ON APPLICATION

90° ELBOWS

**Special
Schedules†**

**Long
Radius**



ANSI B16.9[▲]

ASTM A234 *

Part Nos. 201, 301, 401, 601, 801, 1001, 1201, 1401

NOMINAL PIPE SIZE	† PIPE SCHEDULE NUMBER	PART NUMBER	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	CENTER TO FACE A	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
4	120	1201	4.500	3.624	.438	6	15.0	
5	120	1201	5.563	4.563	.500	7½	27.0	
6	120	1201	6.625	5.501	.562	9	43.1	
8	20	201	8.625	8.125	.250	12	36	
8	30	301	8.625	8.071	.277	12	40	
8	60	601	8.625	7.813	.406	12	57	
8	100	1001	8.625	7.437	.594	12	81	
8	120	1201	8.625	7.187	.719	12	96	
8	140	1401	8.625	7.001	.812	12	106	
10	20	201	10.750	10.250	.250	15	56	
10	30	301	10.750	10.136	.307	15	69	
10	80	801	10.750	9.562	.594	15	129	
10	100	1001	10.750	9.312	.719	15	152	
10	120	1201	10.750	9.062	.844	15	176	
10	140	1401	10.750	8.750	1.000	15	204	
12	20	201	12.750	12.250	.250	18	81	
12	30	301	12.750	12.090	.330	18	106	
12	40	401	12.750	11.938	.406	18	130	
12	60	601	12.750	11.626	.562	18	176	
12	80	801	12.750	11.374	.688	18	212	
12	100	1001	12.750	11.062	.844	18	253	
12	120	1201	12.750	10.750	1.000	18	296	
12	140	1401	12.750	10.500	1.125	18	347	
14	40	401	14.000	13.124	.438	21	179	
14	60	601	14.000	12.812	.594	21	238	
18	30	301	18.000	17.124	.438	27	298	
18	40	401	18.000	16.876	.562	27	380	
20	40	401	20.000	18.812	.594	30	494	
24	30	301	24.000	22.876	.562	36	669	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† Pipe Schedule numbers and respective thicknesses are in accordance with ANSI B36.10.

Other thicknesses also available.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

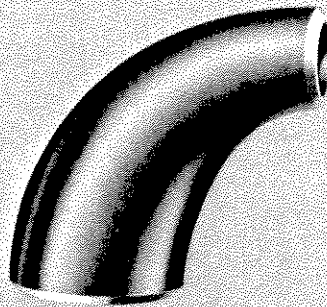
For Dimensional Tolerances see page 88.

For bevel detail see page 89.

▲ For information on this Standard see page 89.

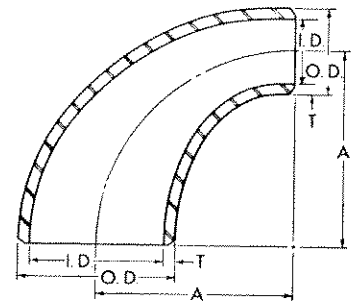
90° REDUCING ELBOWS

**Standard
Weight
and
Extra
Strong†**



**Long
Radius**

Part Nos. 1-R and 2-R



ANSI B16.9 ▲

ASTM A234 *

STANDARD WEIGHT — PART NO. 1-R

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF LARGE END O.D.	INSIDE DIAM. OF LARGE END I.D.	WALL THICK. AT LARGE END T	OUTSIDE DIAM. OF SMALL END O.D.	INSIDE DIAM. OF SMALL END I.D.	WALL THICK. AT SMALL END T	CENTER TO FACE A	APPROX. WEIGHT IN POUNDS	LIST PRICE
2 x 1½	2.375	2.067	.154	1.900	1.610	.145	3	1.5	
2 x 1¼	2.375	2.067	.154	1.660	1.380	.140	3	1.4	
2 x 1	2.375	2.067	.154	1.315	1.049	.133	3	1.3	
2½ x 2	2.875	2.469	.203	2.375	2.067	.154	3¾	2.8	
2½ x 1½	2.875	2.469	.203	1.900	1.610	.145	3¾	2.5	
2½ x 1¼	2.875	2.469	.203	1.660	1.380	.140	3¾	2.3	
3 x 2½	3.500	3.068	.216	2.875	2.469	.203	4½	4.3	
3 x 2	3.500	3.068	.216	2.375	2.067	.154	4½	4.0	
3 x 1½	3.500	3.068	.216	1.900	1.610	.145	4½	3.8	
3½ x 3	4.000	3.548	.226	3.500	3.068	.216	5¼	6.0	
3½ x 2½	4.000	3.548	.226	2.875	2.469	.203	5¼	5.5	
3½ x 2	4.000	3.548	.226	2.375	2.067	.154	5¼	5.0	
4 x 3½	4.500	4.026	.237	4.000	3.548	.226	6	8.5	
4 x 3	4.500	4.026	.237	3.500	3.068	.216	6	8.0	
4 x 2½	4.500	4.026	.237	2.875	2.469	.203	6	7.5	
4 x 2	4.500	4.026	.237	2.375	2.067	.154	6	7.0	
5 x 4	5.563	5.047	.258	4.500	4.026	.237	7½	14.0	
5 x 3½	5.563	5.047	.258	4.000	3.548	.226	7½	13.0	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All thicknesses agree with those for Standard or for Extra Strong Wall pipe respectively (see ANSI B36.10).

Reducing Elbows 8" and larger are furnished non-seamless.

Larger sizes are available on special order.

Pressure-Temperature Ratings for sizes 6" and smaller are identical with those of seamless pipe of the same size, thickness or schedule, and

90° Reducing Elbows

Standard Weight and Extra Strong†

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF LARGE END O.D.	INSIDE DIAM. OF LARGE END I.D.	WALL THICK. AT LARGE END T	OUTSIDE DIAM. OF SMALL END O.D.	INSIDE DIAM. OF SMALL END I.D.	WALL THICK. AT SMALL END T	CENTER TO FACE A	APPROX. WEIGHT IN POUNDS	LIST PRICE
5x3	5.563	5.047	.258	3.500	3.068	.216	7½	12.0	
5x2½	5.563	5.047	.258	2.875	2.469	.203	7½	11.0	
6x5	6.625	6.065	.280	5.563	5.047	.258	9	21.0	
6x4	6.625	6.065	.280	4.500	4.026	.237	9	20.0	
6x3½	6.625	6.065	.280	4.000	3.548	.226	9	19.0	
6x3	6.625	6.065	.280	3.500	3.068	.216	9	17.5	
8x6	8.625	7.981	.322	6.625	6.065	.280	12	40	
8x5	8.625	7.981	.322	5.563	5.047	.258	12	37.5	
8x4	8.625	7.981	.322	4.500	4.026	.237	12	35	
10x8	10.750	10.020	.365	8.625	7.981	.322	15	76	
10x6	10.750	10.020	.365	6.625	6.065	.280	15	67	
10x5	10.750	10.020	.365	5.563	5.047	.258	15	62	
12x10	12.750	12.000	.375	10.750	10.020	.365	18	110	
12x8	12.750	12.000	.375	8.625	7.981	.322	18	102	
12x6	12.750	12.000	.375	6.625	6.065	.280	18	90	
14x12	14.000	13.250	.375	12.750	12.000	.375	21	147	
14x10	14.000	13.250	.375	10.750	10.020	.365	21	140	
14x8	14.000	13.250	.375	8.625	7.981	.322	21	125	
16x14	16.000	15.250	.375	14.000	13.250	.375	24	206	
16x12	16.000	15.250	.375	12.750	12.000	.375	24	199	
16x10	16.000	15.250	.375	10.750	10.020	.365	24	190	
18x16	18.000	17.250	.375	16.000	15.250	.375	27	278	
18x14	18.000	17.250	.375	14.000	13.250	.375	27	271	
18x12	18.000	17.250	.375	12.750	12.000	.375	27	260	
18x10	18.000	17.250	.375	10.750	10.020	.365	27	247	
20x18	20.000	19.250	.375	18.000	17.250	.375	30	352	
20x16	20.000	19.250	.375	16.000	15.250	.375	30	345	
20x14	20.000	19.250	.375	14.000	13.250	.375	30	322	
20x12	20.000	19.250	.375	12.750	12.000	.375	30	298	
20x10	20.000	19.250	.375	10.750	10.020	.365	30	279	

PRICES ON APPLICATION

material grade. On special order welds of non-seamless fittings will be 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved where full equivalence with seamless ratings is specified.

For Dimensional Tolerances see page 88.

For bevel detail, see page 89.

▲ For information on this Standard see page 89.

90° Reducing Elbows

Standard Weight and Extra Strong†

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF LARGE END O.D.	INSIDE DIAM. OF LARGE END I.D.	WALL THICK. AT LARGE END T	OUTSIDE DIAM. OF SMALL END O.D.	INSIDE DIAM. OF SMALL END I.D.	WALL THICK. AT SMALL END T	CENTER TO FACE A	APPROX. WEIGHT IN POUNDS	LIST PRICE
24x22	24.000	23.250	.375	22.000	21.250	.375	36	520	
24x20	24.000	23.250	.375	20.000	19.250	.375	36	502	
24x18	24.000	23.250	.375	18.000	17.250	.375	36	482	
24x16	24.000	23.250	.375	16.000	15.250	.375	36	460	
24x14	24.000	23.250	.375	14.000	13.250	.375	36	433	
24x12	24.000	23.250	.375	12.750	12.000	.375	36	404	

EXTRA STRONG — PART NO. 2-R

2x1½	2.375	1.939	.218	1.900	1.500	.200	3	2.0	
2x1¼	2.375	1.939	.218	1.660	1.278	.191	3	1.8	
2x1	2.375	1.939	.218	1.315	.957	.179	3	1.5	
2½x2	2.875	2.323	.276	2.375	1.939	.218	3¾	3.8	
2½x1½	2.875	2.323	.276	1.900	1.500	.200	3¾	3.5	
2½x1¼	2.875	2.323	.276	1.660	1.278	.191	3¾	3.3	
3x2½	3.500	2.900	.300	2.875	2.323	.276	4½	6.0	
3x2	3.500	2.900	.300	2.375	1.939	.218	4½	5.5	
3x1½	3.500	2.900	.300	1.900	1.500	.200	4½	5.0	
3½x3	4.000	3.364	.318	3.500	2.900	.300	5¼	8.3	
3½x2½	4.000	3.364	.318	2.875	2.323	.276	5¼	7.8	
3½x2	4.000	3.364	.318	2.375	1.939	.218	5¼	7.0	

EXTRA STRONG — PART NO. 2-R

4x3½	4.500	3.826	.337	4.000	3.364	.318	6	11.5	
4x3	4.500	3.826	.337	3.500	2.900	.300	6	10.8	
4x2½	4.500	3.826	.337	2.875	2.323	.276	6	10.0	
4x2	4.500	3.826	.337	2.375	1.939	.218	6	9.3	
5x4	5.563	4.813	.375	4.500	3.826	.337	7½	19.5	
5x3½	5.563	4.813	.375	4.000	3.364	.318	7½	18.0	
5x3	5.563	4.813	.375	3.500	2.900	.300	7½	16.5	
5x2½	5.563	4.813	.375	2.875	2.323	.276	7½	15.5	
6x5	6.625	5.761	.432	5.563	4.813	.375	9	32	
6x4	6.625	5.761	.432	4.500	3.826	.337	9	30	
6x3½	6.625	5.761	.432	4.000	3.364	.318	9	28	
6x3	6.625	5.761	.432	3.500	2.900	.300	9	26	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All thicknesses agree with those for Standard or for Extra Strong Wall pipe respectively (see ANSI B36.10).

Reducing Elbows 8" and larger are furnished non-seamless.

Larger sizes are available on special order.

Pressure-Temperature Ratings for sizes 6" and smaller are identical with those of seamless pipe of the same size, thickness or schedule, and

90° Reducing Elbows

Standard Weight and Extra Strong†

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF LARGE END O.D.	INSIDE DIAM. OF LARGE END I.D.	WALL THICK. AT LARGE END T	OUTSIDE DIAM. OF SMALL END O.D.	INSIDE DIAM. OF SMALL END I.D.	WALL THICK. AT SMALL END T	CENTER TO FACE A	APPROX. WEIGHT IN POUNDS	LIST PRICE
8x6	8.625	7.625	.500	6.625	5.761	.432	12	61	
8x5	8.625	7.625	.500	5.563	4.813	.375	12	57	
8x4	8.625	7.625	.500	4.500	3.826	.337	12	53	
10x8	10.750	9.750	.500	8.625	7.625	.500	15	98	
10x6	10.750	9.750	.500	6.625	5.761	.432	15	88	
10x5	10.750	9.750	.500	5.563	4.813	.375	15	83	
12x10	12.750	11.750	.500	10.750	9.750	.500	18	150	
12x8	12.750	11.750	.500	8.625	7.625	.500	18	128	
12x6	12.750	11.750	.500	6.625	5.761	.432	18	117	
14x12	14.000	13.000	.500	12.750	11.750	.500	21	194	
14x10	14.000	13.000	.500	10.750	9.750	.500	21	185	
14x8	14.000	13.000	.500	8.625	7.625	.500	21	164	
16x14	16.000	15.000	.500	14.000	13.000	.500	24	268	
16x12	16.000	15.000	.500	12.750	11.750	.500	24	260	
16x10	16.000	15.000	.500	10.750	9.750	.500	24	247	
18x16	18.000	17.000	.500	16.000	15.000	.500	27	352	
18x14	18.000	17.000	.500	14.000	13.000	.500	27	346	
18x12	18.000	17.000	.500	12.750	11.750	.500	27	332	
18x10	18.000	17.000	.500	10.750	9.750	.500	27	291	
20x18	20.000	19.000	.500	18.000	17.000	.500	30	444	
20x16	20.000	19.000	.500	16.000	15.000	.500	30	427	
20x14	20.000	19.000	.500	14.000	13.000	.500	30	405	
20x12	20.000	19.000	.500	12.750	11.750	.500	30	374	
20x10	20.000	19.000	.500	10.750	9.750	.500	30	348	
24x22	24.000	23.000	.500	22.000	21.000	.500	36	640	
24x20	24.000	23.000	.500	20.000	19.000	.500	36	621	
24x18	24.000	23.000	.500	18.000	17.000	.500	36	598	
24x16	24.000	23.000	.500	16.000	15.000	.500	36	557	
24x14	24.000	23.000	.500	14.000	13.000	.500	36	524	
24x12	24.000	23.000	.500	12.750	11.750	.500	36	498	

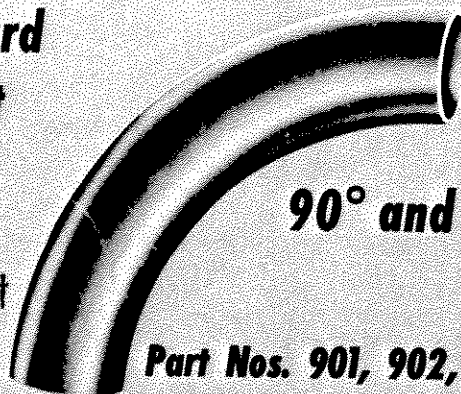
PRICES ON APPLICATION

material grade. On special order welds of non-seamless fittings will be 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved where full equivalence with seamless ratings is specified.

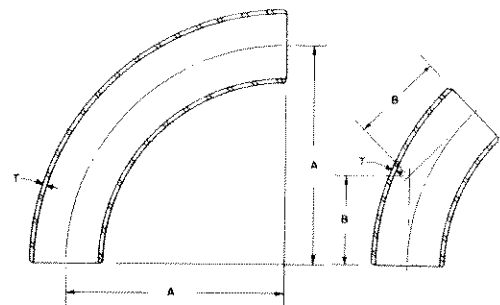
For Dimensional Tolerances see page 88.
For bevel detail, see page 89.
▲ For information on this Standard see page 89.

3R ELBOWS

**Standard
Weight
and
Extra
Strong†**



Part Nos. 901, 902, 905, 906



NOMINAL PIPE SIZE	NOMINAL WALL THICKNESS T		90° 3R ELBOWS			45° 3R ELBOWS		
	STANDARD WALL	EXTRA STRONG WALL	CENTER TO FACE A	APPROX. WEIGHT, LBS.		CENTER TO FACE B*	APPROX. WEIGHT, LBS.	
				STANDARD WALL PART NO. 901	EXTRA STRONG PART NO. 902		STANDARD WALL PART NO. 905	EXTRA STRONG PART NO. 906
2	.154	.218	6	3.0	4.0	2½	1.5	2.0
3	.216	.300	9	9.2	12.4	3¾	4.6	6.1
4	.237	.337	12	17.5	24.1	5	8.7	11.9
6	.280	.432	18	48	64	7½	24	34
8	.322	.500	24	92	140	10	46	69
10	.365	.500	30	164	221	12½	81.5	109
12	.375	.500	36	241	317	15	119	157
14	.375	.500	42	309	407	17½	154	202
16	.375	.500	48	405	534	19⅞	201	265
18	.375	.500	54	514	679	22⅜	256	338
20	.375	.500	60	637	841	24⅞	317	419
22	.375	.500	66	771	1020	27⅝	385	508
24	.375	.500	72	920	1220	29⅓	458	606
26	.375	.500	78	1081	1430	32⅝	539	713
30	.375	.500	90	1441	1910	37¼	720	953
34	.375	.500	102	1854	2464	42¼	926	1230
36	.375	.500	108	2082	2764	44⅓	1040	1380
42	.375	.500	126	2835	3768	52⅓	1416	1883

All dimensions are in inches.

Unless otherwise specified, 14" and smaller 3R Elbows are made from seamless A106 Grade B pipe.

Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000 46,000 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths. Non-seamless elbows are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are 100% radiographed per Par. UW-51, Section VIII of the ASME

Boiler and Pressure Vessel Code and stress relieved.

3R Elbows also are available with tangents.

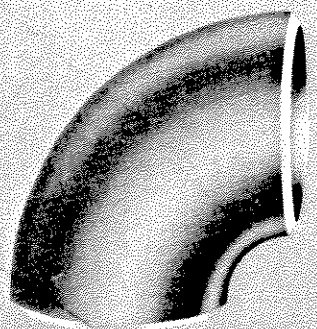
All inquiries and orders should specify grade and wall thickness of matching pipe.

† All thicknesses agree with those for Standard or for Extra Strong Wall Pipe (see ANSI B36.10).

* Dimension "B" for sizes 16" and larger conforms to MSS Standard Practice SP-75, High Test Wrought Welding Fittings.

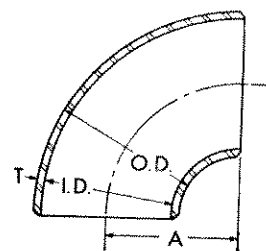
90° ELBOWS

**Standard
Weight†**



**Short
Radius**

Part No. 3



ASTM A234 *

ANSI B16.28 ■

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO FACE A	PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1	1.315	1.049	.133	1	40	.25	
1¼	1.660	1.380	.140	1¼	40	.40	
1½	1.900	1.610	.145	1½	40	.50	
2	2.375	2.067	.154	2	40	1	
2½	2.875	2.469	.203	2½	40	2	
3	3.500	3.068	.216	3	40	3	
3½	4.000	3.548	.226	3½	40	4	
4	4.500	4.026	.237	4	40	6	
5	5.563	5.047	.258	5	40	10	
6	6.625	6.065	.280	6	40	15	
8	8.625	7.981	.322	8	40	32	
10	10.750	10.020	.365	10	40	52	
12	12.750	12.000	.375	12	ST ⁽¹⁾	82	
14	14.000	13.250	.375	14	30	106	
16	16.000	15.250	.375	16	30	136	
18	18.000	17.250	.375	18	ST ⁽¹⁾	172	
20	20.000	19.250	.375	20	20	221	
24	24.000	23.250	.375	24	20	296	
30	30.000	29.250	.375	30	ST ⁽¹⁾	470	
36	36.000	35.250	.375	36	ST ⁽¹⁾	692	
42	42.000	41.250	.375	42	ST ⁽¹⁾	1079	

THE FOLLOWING SIZES ARE NOT COVERED IN ANSI B16.28

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 36" and smaller are furnished seamless. Non-seamless elbows are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Standard Wall Pipe (See ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10.

Pipe Line Welding Fittings are available in sizes 6" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi

minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

Odd degree elbows also available.

(1) ST designates Standard Weight (standard wall).

Pressure-Temperature Ratings for short radius elbows and returns will be in accordance with ANSI B16.28.

■ 90° Short Radius Elbows conform to ANSI B16.28 sizes 24" and smaller.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

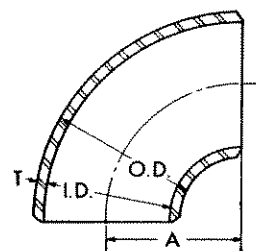
90° ELBOWS

**Extra
Strong†**



**Short
Radius**

Part No. 4



ANSI B16.28 ■

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO FACE A	PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1½	1.900	1.500	.200	1½	80	.7	PRICES ON APPLICATION
2	2.375	1.939	.218	2	80	2.0	
2½	2.875	2.323	.276	2½	80	3.0	
3	3.500	2.900	.300	3	80	4.5	
3½	4.000	3.364	.318	3½	80	6.5	
4	4.500	3.826	.337	4	80	8.5	
5	5.563	4.813	.375	5	80	13.5	
6	6.625	5.761	.432	6	80	23.0	
8	8.625	7.625	.500	8	80	43.0	
10	10.750	9.750	.500	10	60	77	
12	12.750	11.750	.500	12	XS ⁽¹⁾	101	
14	14.000	13.000	.500	14	XS ⁽¹⁾	130	
16	16.000	15.000	.500	16	40	173	
18	18.000	17.000	.500	18	XS ⁽¹⁾	214	
20	20.000	19.000	.500	20	30	275	
24	24.000	23.000	.500	24	XS ⁽¹⁾	390	
THE FOLLOWING SIZES ARE NOT COVERED IN ANSI B16.28							
30	30.000	29.000	.500	30	20	644	
36	36.000	35.000	.500	36	20	913	
42	42.000	41.000	.500	42	XS ⁽¹⁾	1430	

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 36" and smaller are furnished seamless. Non-seamless elbows are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Extra Strong Wall Pipe (See ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10.

Pipe Line Welding Fittings are available in sizes 6" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi

minimum yield strengths. Welds are 100% radiographed per Par UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.
Odd degree elbows also available.

(1) XS designates Extra Strong (extra strong wall).

Pressure-Temperature Ratings for short radius elbows and returns will be in accordance with ANSI B16.28.

■ 90° Short Radius Elbows conform to ANSI B16.28 sizes 24" and smaller.

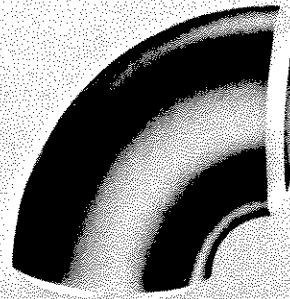
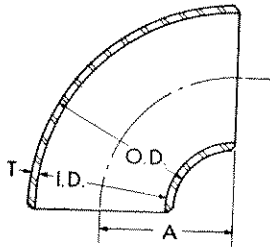
For Dimensional Tolerances see page 88.

For bevel detail see page 89.

90° ELBOWS

**Special
Schedules†**

**Short
Radius**



ASTM A234 *

ANSI B16.28 ■

Part Nos. 203, 303, 403, 603, 803, 1003, 1203, 1403

NOMINAL PIPE SIZE	PIPE SCHEDULE NUMBER	PART NUMBER	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	CENTER TO FACE A	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
4	120	1203	4.500	3.624	.438	4	10.4	
5	120	1203	5.563	4.563	.500	5	18.6	
6	120	1203	6.625	5.501	.562	6	30.0	
8	20	203	8.625	8.125	.250	8	24.4	
8	30	303	8.625	8.071	.277	8	27.0	
8	60	603	8.625	7.813	.406	8	37.0	
8	100	1003	8.625	7.437	.594	8	56.0	
8	120	1203	8.625	7.187	.719	8	66.0	
8	140	1403	8.625	7.001	.812	8	74.0	
10	20	203	10.750	10.250	.250	10	38.2	
10	30	303	10.750	10.136	.307	10	46.0	
10	80	803	10.750	9.562	.594	10	85.0	
10	100	1003	10.750	9.312	.719	10	106.0	
10	120	1203	10.750	9.062	.844	10	123.0	
10	140	1403	10.750	8.750	1.000	10	143.0	
12	20	203	12.750	12.250	.250	12	54.6	
12	30	303	12.750	12.090	.330	12	70.0	
12	40	403	12.750	11.938	.406	12	89.0	
12	60	603	12.750	11.626	.562	12	116	
12	80	803	12.750	11.374	.688	12	140	
14	40	403	14.000	13.124	.438	14	118	
14	60	603	14.000	12.812	.594	14	158	
18	30	303	18.000	17.124	.438	18	197	
18	40	403	18.000	16.876	.562	18	252	
20	40	403	20.000	18.812	.594	20	328	
24	30	303	24.000	22.876	.562	24	451	

PRICES ON APPLICATION

All dimensions are in inches.

Schedule 160 and Double Extra Strong 90° Short Radius Elbows are available. Other thicknesses also available.

* Grade B fittings are available from stock.

† Pipe Schedule numbers and respective thicknesses are in accordance with ANSI B36.10.

Pressure-Temperature Ratings for short radius elbows and returns will be in accordance with ANSI B16.28.

■ 90° Short Radius Elbows conform to ANSI B16.28 sizes 24" and smaller.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

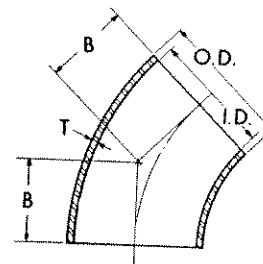
45° ELBOWS

**Light
Weight†**



**Long
Radius**

Part No. 517



ANSI B16.9 ▲

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	PART NUMBER	CENTER TO FACE B	PIPE SCHEDULE NUMBER	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
3	3.500	3.124	.188(1)	517	2		2.0	
4	4.500	4.124	.188(1)	517	2-1/2		3.5	
6	6.625	6.187	.219(1)	517	3-3/4		9.1	
8	8.625	8.187	.219(1)	517	5		15.9	
10	10.750	10.312	.219(1)	517	6-1/4		24.9	
12	12.750	12.250	.250(1)	517	7-1/2		40.5	
14	14.000	13.500	.250	517	8-3/4	10	52	
16	16.000	15.500	.250	517	10	10	82	
18	18.000	17.500	.250	517	11-1/4	10	96	
20	20.000	19.500	.250	517	12-1/2	10	120	
24	24.000	23.500	.250	517	15	10	184	

PRICES ON APPLICATION

All dimensions are in inches.

When ordering Light Weight Fittings always specify Part Number or wall thickness.

* Grade B fittings are available from stock.

(1) Wall thicknesses are from API 5L pipe specifications and are those thicknesses most commonly used for gas distribution services.

† Pipe Schedule Numbers are in accordance with ANSI B36.10 for sizes 14" and larger.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

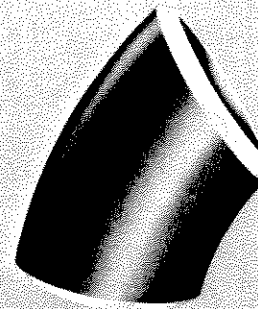
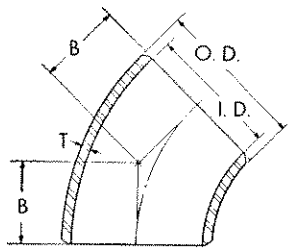
For bevel detail see page 89.

▲ For information on this Standard see page 89.

45° ELBOWS

**Standard
Weight†**

**Long
Radius**



ANSI B16.9 ▲

ASTM A234 *

Part No. 5

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	CENTER TO FACE B	PIPE SCHEDULE NUMBER	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1/2	.840	.622	.109	5/8	40	.10	PRICES ON APPLICATION
3/4	1.050	.824	.113	7/16	40	.10	
1	1.315	1.049	.133	7/8	40	.25	
1 1/4	1.660	1.380	.140	1	40	.4	
1 1/2	1.900	1.610	.145	1 1/8	40	.5	
2	2.375	2.067	.154	1 3/8	40	.8	
2 1/2	2.875	2.469	.203	1 3/4	40	1.7	
3	3.500	3.068	.216	2	40	2.5	
3 1/2	4.000	3.548	.226	2 1/4	40	3.5	
4	4.500	4.026	.237	2 1/2	40	4.0	
5	5.563	5.047	.258	3 1/8	40	7.5	
6	6.625	6.065	.280	3 3/4	40	12	
8	8.625	7.981	.322	5	40	23	
10	10.750	10.020	.365	6 1/4	40	41	
12	12.750	12.000	.375	7 1/2	ST (1)	59	
14	14.000	13.250	.375	8 3/4	30	79	
16	16.000	15.250	.375	10	30	107	
18	18.000	17.250	.375	11 1/4	ST (1)	134	
20	20.000	19.250	.375	12 1/2	20	174	
22	22.000	21.250	.375	13 1/2	20	192	
24	24.000	23.250	.375	15	20	229	
26	26.000	25.250	.375	16	ST (1)	269	
28	28.000	27.250	.375	17 1/4	ST (1)	312	
30	30.000	29.250	.375	18 1/2	ST (1)	358	
32	32.000	31.250	.375	19 3/4	ST (1)	408	
34	34.000	33.250	.375	21	ST (1)	463	
36	36.000	35.250	.375	22 1/4	ST (1)	583	
42	42.000	41.250	.375	26	ST (1)	900	
48	48.000	47.250	.375	29 7/8	ST (1)	1320	

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 30" and smaller are furnished seamless. Non-seamless elbows are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Standard Wall Pipe (See ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield

strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

(1) ST designates Standard Weight (standard wall).

TUBE TURNS 45° long radius elbows are also available with tangents. Odd degree long radius elbows can be furnished on special order with or without tangents to any angle desired.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

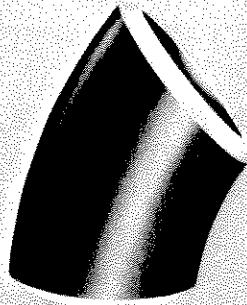
For Dimensional Tolerances see page 88.

For bevel detail see page 89.

▲ For information on this Standard see page 89.

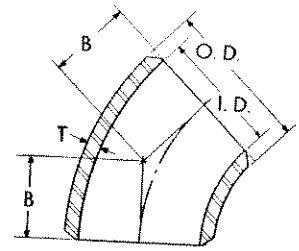
45° ELBOWS

**Extra
Strong†**



**Long
Radius**

Part No. 6



ANSI B16.9[▲]

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	CENTER TO FACE B	PIPE SCHEDULE NUMBER	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1/2	.840	.546	.147	5/8	80	.12	
3/4	1.050	.742	.154	7/16	80	.12	
1	1.315	.957	.179	7/8	80	.30	
1 1/4	1.660	1.278	.191	1	80	.5	
1 1/2	1.900	1.500	.200	1 1/8	80	.6	
2	2.375	1.939	.218	1 3/8	80	1.0	
2 1/2	2.875	2.323	.276	1 3/4	80	2.0	
3	3.500	2.900	.300	2	80	3.5	
3 1/2	4.000	3.364	.318	2 1/4	80	5	
4	4.500	3.826	.337	2 1/2	80	7	
5	5.563	4.813	.375	3 1/8	80	10.5	
6	6.625	5.761	.432	3 3/4	80	16	
8	8.625	7.625	.500	5	80	33	
10	10.750	9.750	.500	6 1/4	60	54	
12	12.750	11.750	.500	7 1/2	XS ⁽¹⁾	74	
14	14.000	13.000	.500	8 3/4	XS ⁽¹⁾	95	
16	16.000	15.000	.500	10	40	128	
18	18.000	17.000	.500	11 1/4	XS ⁽¹⁾	175	
20	20.000	19.000	.500	12 1/2	30	215	
22	22.000	21.000	.500	13 1/2	30	253	
24	24.000	23.000	.500	15	XS ⁽¹⁾	302	
26	26.000	25.000	.500	16	20	355	
28	28.000	27.000	.500	17 1/4	20	413	
30	30.000	29.000	.500	18 1/2	20	475	
32	32.000	31.000	.500	19 3/4	20	541	
34	34.000	33.000	.500	21	20	615	
36	36.000	35.000	.500	22 1/4	20	686	
42	42.000	41.000	.500	26	XS ⁽¹⁾	1020	
48	48.000	47.000	.500	29 7/8	XS ⁽¹⁾	1320	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 30" and smaller are furnished seamless. Non-seamless elbows are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Extra Strong Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000,

48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

(1) XS designates Extra Strong (extra strong wall).

TUBE TURNS 45° long radius elbows are also available with tangents. Odd degree long radius elbows can be furnished on special order with or without tangents to any angle desired.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

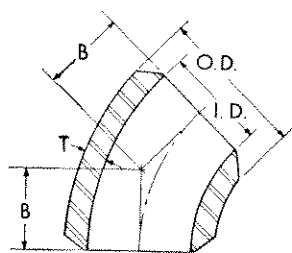
For bevel detail see page 89.

▲ For information on this Standard see page 89.

45° ELBOWS

**Schedule
160 and
Double
Extra
Strong†**

**Long
Radius**



ANSI B16.9[▲]

ASTM A234 *

Part Nos. 44 and 12

SCHEDULE 160 — PART NO. 44

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	CENTER TO FACE B	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
3/4	1.050	.612	.219	7/16	.15	
1	1.315	.815	.250	7/8	.4	
1 1/4	1.660	1.160	.250	1	.6	
1 1/2	1.900	1.338	.281	1 1/8	.8	
2	2.375	1.687	.344	1 3/8	1.6	
2 1/2	2.875	2.125	.375	1 3/4	3.0	
3	3.500	2.624	.438	2	4.5	
4	4.500	3.438	.531	2 1/2	8.5	
5	5.563	4.313	.625	3 1/8	14	
6	6.625	5.187	.719	3 3/4	25	
8	8.625	6.813	.906	5	56	
10	10.750	8.500	1.125	6 1/4	109	
12	12.750	10.126	1.312	7 1/2	182	

DOUBLE EXTRA STRONG — PART NO. 12

3/4	1.050	.434	.308	• 11/16	.2	
1	1.315	.599	.358	7/8	.5	
1 1/4	1.660	.896	.382	1	.7	
1 1/2	1.900	1.100	.400	1 1/8	1.0	
2	2.375	1.503	.436	1 3/8	2.0	
2 1/2	2.875	1.771	.552	1 3/4	3.5	
3	3.500	2.300	.600	2	5.5	
3 1/2	4.000	2.728	.636	2 1/4	8	
4	4.500	3.152	.674	2 1/2	10	
5	5.563	4.063	.750	3 1/8	18	
6	6.625	4.897	.864	3 3/4	30	
8	8.625	6.875	.875	5	56	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All wall thicknesses are in accordance with ANSI B36.10.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

• Center to face dim. "B", for 3/4" Double Extra Strong 45° Elbow L.R.

Part No. 12, exceeds ANSI B16.9 in order to provide 37 1/2° bevels at both ends of elbow.

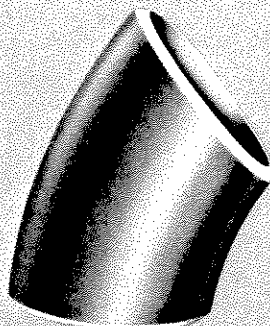
For Dimensional Tolerances see page 88.

For bevel detail see page 89.

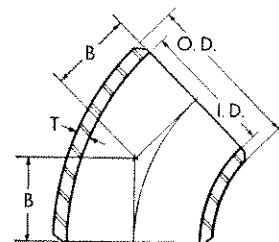
▲ For information on this Standard see page 89.

45° ELBOWS

**Special
Schedules†**



**Long
Radius**



Part Nos. 205, 305, 405, 605, 805, 1005, 1205, 1405

ANSI B16.9 ▲

ASTM A234 *

NOMINAL PIPE SIZE	PIPE SCHEDULE NUMBER	PART NUMBER	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	CENTER TO FACE B	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
4	120	1205	4.500	3.624	.438	2½	7.3	
5	120	1205	5.563	4.563	.500	3¼	13.0	
6	120	1205	6.625	5.501	.562	3¾	21.0	
8	20	205	8.625	8.125	.250	5	18.2	
8	30	305	8.625	8.071	.277	5	20.0	
8	60	605	8.625	7.813	.406	5	28.0	
8	100	1005	8.625	7.437	.594	5	40.0	
8	120	1205	8.625	7.187	.719	5	47.0	
8	140	1405	8.625	7.001	.812	5	53.0	
10	20	205	10.750	10.250	.250	6¼	28.4	
10	30	305	10.750	10.136	.307	6¼	34.0	
10	80	805	10.750	9.562	.594	6¼	63.0	
10	100	1005	10.750	9.312	.719	6¼	75.0	
10	120	1205	10.750	9.062	.844	6¼	86.0	
10	140	1405	10.750	8.750	1.000	6¼	98.0	
12	20	205	12.750	12.250	.250	7½	41.0	
12	30	305	12.750	12.090	.330	7½	52.7	
12	40	405	12.750	11.938	.406	7½	64.3	
12	60	605	12.750	11.626	.562	7½	87	
12	80	805	12.750	11.374	.688	7½	104	
12	100	1005	12.750	11.062	.844	7½	127	
12	120	1205	12.750	10.750	1.000	7½	148	
12	140	1405	12.750	10.500	1.125	7½	174	
14	40	405	14.000	13.124	.438	8¾	89	
14	60	605	14.000	12.812	.594	8¾	117	
18	30	305	18.000	17.124	.438	11¼	149	
18	40	405	18.000	16.876	.562	11¼	188	
20	40	405	20.000	18.812	.594	12½	245	
24	30	305	24.000	22.876	.562	15	333	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† Pipe Schedule numbers and respective thicknesses are in accordance with ANSI B36.10.

Other thicknesses also available.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

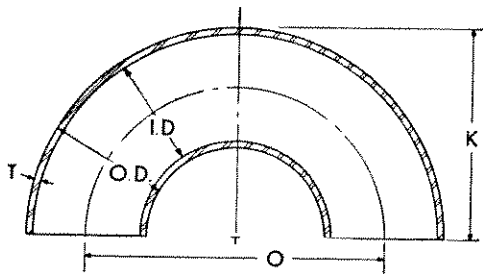
For bevel detail see page 89.

▲ For information on this Standard see page 89.

180° RETURNS

Light Weight†

Long Radius



ANSI B16.9▲

ASTM A234 *

Part No. 518

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	PART NUMBER	CENTER TO CENTER O	BACK TO FACE K	†PIPE SCHEDULE NUMBER	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
3	3.500	3.124	.188	518	9	6-1/4		7.0	
4	4.500	4.124	.188(1)	518	12	8-1/4		14.1	
6	6.625	6.187	.219(1)	518	18	12-5/16		36.4	
8	8.625	8.187	.219(1)	518	24	16-5/16		63.8	
10	10.750	10.312	.219(1)	518	30	20-3/8		100	
12	12.750	12.250	.250(1)	518	36	24-3/8		162	
14	14.000	13.500	.250	518	42	28	10	218	
16	16.000	15.500	.250	518	48	32	10	332	
18	18.000	17.500	.250	518	54	36	10	422	
20	20.000	19.500	.250	518	60	40	10	498	
24	24.000	23.500	.250	518	72	48	10	718	

PRICES ON APPLICATION

All dimensions are in inches.

When ordering Light Weight Fittings always specify Part Number or wall thickness.

* Grade B fittings are available from stock.

(1) Wall thicknesses are from API 5L pipe specifications and are those thicknesses most commonly used for gas distribution services.

† Pipe Schedule Numbers are in accordance with ANSI B36.10 for sizes 14" and larger.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

▲ For information on this Standard see page 89.

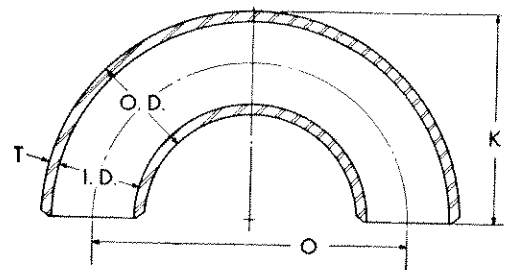
180° RETURNS

Standard Weight†

Long Radius



Part No. 7



ANSI B16.9[▲]

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO CENTER O	BACK TO FACE K	PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE	
1/2	.840	.622	.109	3	1 5/16	40	.35	PRICES ON APPLICATION	
3/4	1.050	.824	.113	2 1/4	1 11/16	40	.35		
1	1.315	1.049	.133	3	2 3/16	40	.7		
1 1/4	1.660	1.380	.140	3 3/4	2 3/4	40	1.0		
1 1/2	1.900	1.610	.145	4 1/2	3 1/4	40	1.6		
2	2.375	2.067	.154	6	4 3/16	40	2.5		
2 1/2	2.875	2.469	.203	7 1/2	5 3/16	40	5.5		
3	3.500	3.068	.216	9	6 1/4	40	8		
3 1/2	4.000	3.548	.226	10 1/2	7 1/4	40	12.5		
4	4.500	4.026	.237	12	8 1/4	40	18		
5	5.563	5.047	.258	15	10 5/16	40	29		
6	6.625	6.065	.280	18	12 5/16	40	48		
8	8.625	7.981	.322	24	16 5/16	40	99		
10	10.750	10.020	.365	30	20 3/8	40	168		
12	12.750	12.000	.375	36	24 3/8	ST ⁽¹⁾	255		
14	14.000	13.250	.375	42	28	30	319		
16	16.000	15.250	.375	48	32	30	422		
18	18.000	17.250	.375	54	36	ST ⁽¹⁾	517		
20	20.000	19.250	.375	60	40	20	632		
22	22.000	21.250	.375	66	44	20	771		
24	24.000	23.250	.375	72	48	20	902		
THESE SIZES ARE NOT COVERED BY ANSI B16.9									
26	26.000	25.250	.375	78	52	ST ⁽¹⁾	1191		
30	30.000	29.250	.375	90	60	ST ⁽¹⁾	1541		

All dimensions are in inches.

* Grade B fittings are available from stock.

† All thicknesses agree with those for Standard Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10.

(1) ST designates Standard Weight (standard wall).

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

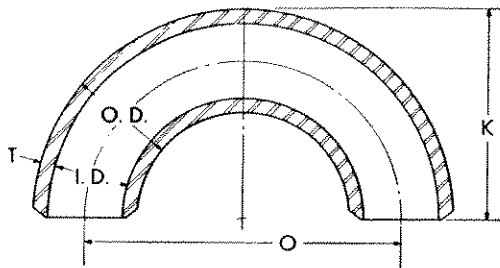
For bevel detail see page 89.

▲ For information on this Standard see page 89.

180° RETURNS

Extra Strong†

Long Radius



ANSI B16.9[▲]

ASTM A234 *

Part No. 8

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO CENTER O	BACK TO FACE K	PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1/2	.840	.546	.147	3	1 5/16	80	.45	
3/4	1.050	.742	.154	2 1/4	1 11/16	80	.45	
1	1.315	.957	.179	3	2 3/16	80	1.0	
1 1/4	1.660	1.278	.191	3 3/4	2 3/4	80	1.5	
1 1/2	1.900	1.500	.200	4 1/2	3 1/4	80	2	
2	2.375	1.939	.218	6	4 3/16	80	4	
2 1/2	2.875	2.323	.276	7 1/2	5 3/16	80	8	
3	3.500	2.900	.300	9	6 1/4	80	12	
3 1/2	4.000	3.364	.318	10 1/2	7 1/4	80	18	
4	4.500	3.826	.337	12	8 1/4	80	24	
5	5.563	4.813	.375	15	10 5/16	80	42	
6	6.625	5.761	.432	18	12 5/16	80	69	
8	8.625	7.625	.500	24	16 5/16	80	139	
10	10.750	9.750	.500	30	20 3/8	60	218	
12	12.750	11.750	.500	36	24 3/8	XS (1)	308	
14	14.000	13.000	.500	42	28	XS (1)	393	
16	16.000	15.000	.500	48	32	40	530	
18	18.000	17.000	.500	54	36	XS (1)	664	
20	20.000	19.000	.500	60	40	30	830	
22	22.000	21.000	.500	66	44	30	1020	
24	24.000	23.000	.500	72	48	XS (1)	1220	
THESE SIZES ARE NOT COVERED BY ANSI B16.9								
26	26.000	25.000	.500	78	52	20	1430	
30	30.000	29.000	.500	90	60	20	1910	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All thicknesses agree with those for Extra Strong Wall Pipe (See ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10.

(1) XS designates Extra Strong (extra strong wall).

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

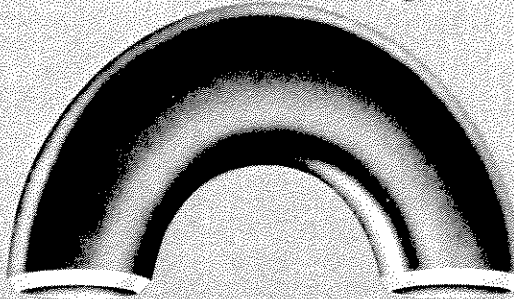
▲ For information on this Standard see page 89.

180° RETURNS

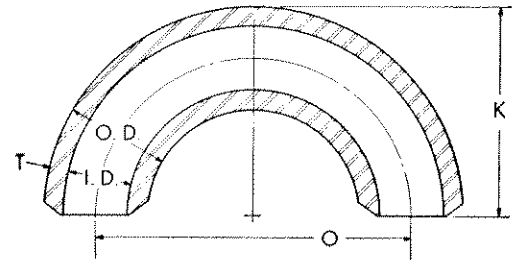
Schedule 160

Long Radius

**and
Double
Extra
Strong†**



Part Nos. 45 and 12½



ANSI B16.9 ▲

ASTM A234 *

SCHEDULE 160 — PART NO. 45

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO CENTER O	BACK TO FACE K	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1	1.315	.815	.250	3	2 ³ / ₁₆	1.2	
1¼	1.660	1.160	.250	3¾	2¾	2.0	
1½	1.900	1.338	.281	4½	3¼	3.0	
2	2.375	1.687	.344	6	4 ³ / ₁₆	7.0	
2½	2.875	2.125	.375	7½	5 ³ / ₁₆	10.5	
3	3.500	2.624	.438	9	6¼	17.5	
4	4.500	3.438	.531	12	8¼	38	
5	5.563	4.313	.625	15	10 ⁵ / ₁₆	66	
6	6.625	5.187	.719	18	12 ⁵ / ₁₆	109	
8	8.625	6.813	.906	24	16 ⁵ / ₁₆	237	
10	10.750	8.500	1.125	30	20 ³ / ₈	460	
12	12.750	10.126	1.312	36	24 ³ / ₈	762	

DOUBLE EXTRA STRONG — PART NO. 12½

2	2.375	1.503	.436	6	4 ³ / ₁₆	6.0	
2½	2.875	1.771	.552	7½	5 ³ / ₁₆	13.5	
3	3.500	2.300	.600	9	6¼	22	
3½	4.000	2.728	.636	10½	7¼	32	
4	4.500	3.152	.674	12	8¼	43	
5	5.563	4.063	.750	15	10 ⁵ / ₁₆	77	
6	6.625	4.897	.864	18	12 ⁵ / ₁₆	125	
8	8.625	6.875	.875	24	16 ⁵ / ₁₆	237	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All wall thicknesses are in accordance with ANSI B36.10. Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

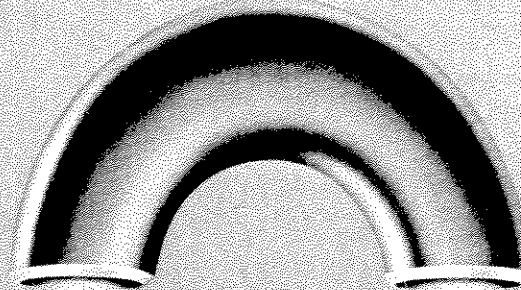
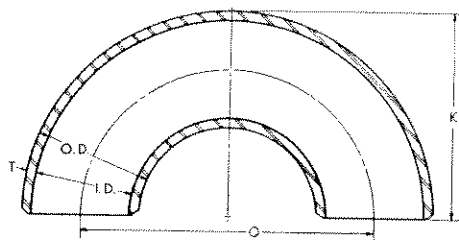
For bevel detail see page 89.

▲ For information on this Standard see page 89.

180° RETURNS

Special Schedules†

Long Radius



ANSI B16.9 ▲

ASTM A234*

Part Nos. 207, 307, 407, 607, 807, 1007, 1207, 1407

NOMINAL PIPE SIZE	PIPE SCHEDULE NUMBER	PART NUMBER	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	CENTER TO CENTER O	BACK TO FACE K	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
4	120	1207	4.500	3.624	.438	12	8 $\frac{1}{4}$	30	
5	120	1207	5.563	4.563	.500	15	10 $\frac{5}{16}$	54	
6	120	1207	6.625	5.501	.562	18	12 $\frac{5}{16}$	87	
8	20	207	8.625	8.125	.250	24	16 $\frac{5}{16}$	73	
8	30	307	8.625	8.071	.277	24	16 $\frac{5}{16}$	80	
8	60	607	8.625	7.813	.406	24	16 $\frac{5}{16}$	115	
8	100	1007	8.625	7.437	.594	24	16 $\frac{5}{16}$	163	
8	120	1207	8.625	7.187	.719	24	16 $\frac{5}{16}$	194	
8	140	1407	8.625	7.001	.812	24	16 $\frac{5}{16}$	216	
10	20	207	10.750	10.250	.250	30	20 $\frac{3}{8}$	114	
10	30	307	10.750	10.136	.307	30	20 $\frac{3}{8}$	139	
10	80	807	10.750	9.562	.594	30	20 $\frac{3}{8}$	259	
10	100	1007	10.750	9.312	.719	30	20 $\frac{3}{8}$	308	
10	120	1207	10.750	9.062	.844	30	20 $\frac{3}{8}$	356	
10	140	1407	10.750	8.750	1.000	30	20 $\frac{3}{8}$	414	
12	20	207	12.750	12.250	.250	36	24 $\frac{3}{8}$	164	
12	30	307	12.750	12.090	.330	36	24 $\frac{3}{8}$	213	
12	40	407	12.750	11.938	.406	36	24 $\frac{3}{8}$	260	
12	60	607	12.750	11.626	.562	36	24 $\frac{3}{8}$	353	
12	80	807	12.750	11.374	.688	36	24 $\frac{3}{8}$	427	
12	100	1007	12.750	11.062	.844	36	24 $\frac{3}{8}$	506	
12	120	1207	12.750	10.750	1.000	36	24 $\frac{3}{8}$	592	
12	140	1407	12.750	10.500	1.125	36	24 $\frac{3}{8}$	694	
14	40	407	14.000	13.124	.438	42	28	358	
14	60	607	14.000	12.812	.594	42	28	479	
18	30	307	18.000	17.124	.438	54	36	597	
18	40	407	18.000	16.876	.562	54	36	761	
20	40	407	20.000	18.812	.594	60	40	991	
24	30	307	24.000	22.876	.562	72	48	1343	

PRICES ON APPLICATION

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† Pipe Schedule numbers and respective thicknesses are in accordance with ANSI B36.10.

Other thicknesses also available.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

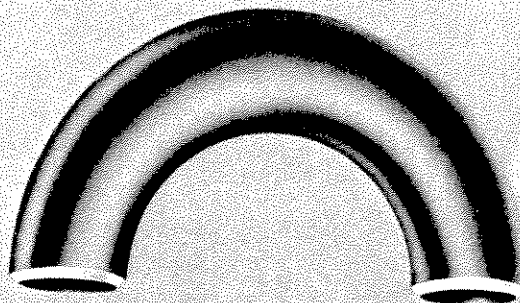
For Dimensional Tolerances see page 88.

For bevel detail see page 89.

▲ For information on this Standard see page 89.

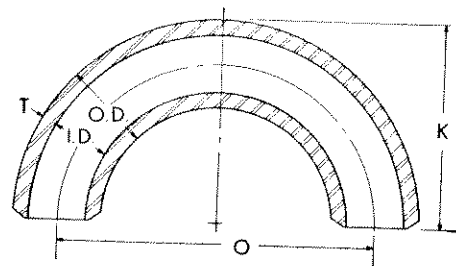
180° RETURNS

Standard Weight† and Extra Strong†



Extra
Long
Radius

Part Nos. 19 and 19A



ASTM A234 *

STANDARD WEIGHT — PART NO. 19

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO CENTER O	BACK TO FACE K	†PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1	1.315	1.049	.133	4	2 5/8	40	.9	
1 1/4	1.660	1.380	.140	5	3 5/16	40	1.5	
1 1/2	1.900	1.610	.145	6	3 15/16	40	2.0	
2	2.375	2.067	.154	8	5 3/16	40	4.0	
2 1/2	2.875	2.469	.203	10	6 7/16	40	8.0	

EXTRA STRONG — PART NO. 19-A

1	1.315	.957	.179	4	2 5/8	80	1.3	
1 1/4	1.660	1.278	.191	5	3 5/16	80	2.0	
1 1/2	1.900	1.500	.200	6	3 15/16	80	3.5	
2	2.375	1.939	.218	8	5 3/16	80	5.5	
2 1/2	2.875	2.323	.276	10	6 7/16	80	10.5	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† Pipe Schedule Numbers and respective thicknesses are in accordance with ANSI B36.10.

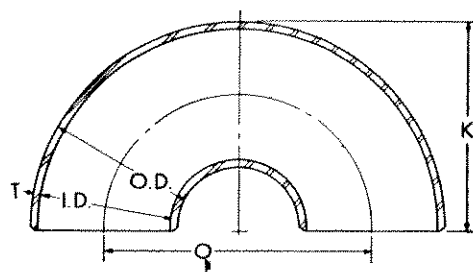
Extra Long Radius (2R) TUBE TURNS returns are designed for flat coil construction, hence are made only in sizes commonly used in this type of work.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.
For Dimensional Tolerances see page 88.
For bevel detail see page 89.

180° RETURNS

Standard Weight†

Short Radius



ASTM A234 *

ANSI B16.28 ■

Part No. 9

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO CENTER O	BACK TO FACE K	PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1	1.315	1.049	.133	2	1 5/8	40	.5	
1 1/4	1.660	1.380	.140	2 1/2	2 1/16	40	.8	
1 1/2	1.900	1.610	.145	3	2 7/16	40	1	
2	2.375	2.067	.154	4	3 3/16	40	2	
2 1/2	2.875	2.469	.203	5	3 15/16	40	4	
3	3.500	3.068	.216	6	4 3/4	40	6	
3 1/2	4.000	3.548	.226	7	5 1/2	40	9	
4	4.500	4.026	.237	8	6 1/4	40	12	
5	5.563	5.047	.258	10	7 3/4	40	22	
6	6.625	6.065	.280	12	9 5/16	40	33	
8	8.625	7.981	.322	16	12 5/16	40	68	
10	10.750	10.020	.365	20	15 3/8	40	108	
12	12.750	12.000	.375	24	18 3/8	ST (1)	176	
14	14.000	13.250	.375	28	21	30	202	
16	16.000	15.250	.375	32	24	30	270	
18	18.000	17.250	.375	36	27	ST (1)	335	
20	20.000	19.250	.375	40	30	20	423	
24	24.000	23.250	.375	48	36	20	610	

PRICES ON APPLICATION

THE FOLLOWING SIZES ARE NOT COVERED BY ANSI B16.28

30	30.000	29.250	.375	60	45	ST (1)	956
36	36.000	35.250	.375	72	54	ST (1)	1387

All dimensions are in inches

* Grade B fittings are available from stock.

† All thicknesses agree with those for Standard Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10.

Other thicknesses also available.

(1) ST designates Standard Weight (standard wall).

Pressure-Temperature Ratings for short radius elbows and returns will be in accordance with ANSI B16.28.

■ 180° Short Radius Returns conform to ANSI B16.28, sizes 24" and smaller.

For Dimensional Tolerances see page 88.

For bevel detail see page 89

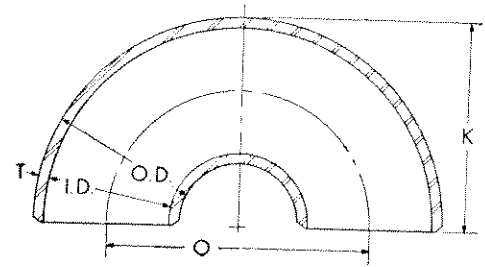
180° RETURNS

Extra Strong[†]

Short Radius



Part No. 10



ANSI B16.28 ■

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	CENTER TO CENTER O	BACK TO FACE K	PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1½	1.900	1.500	.200	3	2 7/16	80	1.5	
2	2.375	1.939	.218	4	3 3/16	80	3	
2½	2.875	2.323	.276	5	3 15/16	80	5	
3	3.500	2.900	.300	6	4 3/4	80	8	
3½	4.000	3.364	.318	7	5 1/2	80	12	
4	4.500	3.826	.337	8	6 1/4	80	16	
5	5.563	4.813	.375	10	7 3/4	80	28	
6	6.625	5.761	.432	12	9 5/16	80	48	
8	8.625	7.625	.500	16	12 5/16	80	93	
10	10.750	9.750	.500	20	15 3/8	60	152	
12	12.750	11.750	.500	24	18 3/8	XS (1)	210	
14	14.000	13.000	.500	28	21	XS (1)	270	
16	16.000	15.000	.500	32	24	40	352	
18	18.000	17.000	.500	36	27	XS (1)	450	
20	20.000	19.000	.500	40	30	30	560	
24	24.000	23.000	.500	48	36	XS (1)	802	
30	30.000	29.000	.500	60	45	20	1270	
36	36.000	35.000	.500	72	54	20	1838	

THE FOLLOWING SIZES ARE NOT COVERED BY ANSI B16.28

PRICES ON APPLICATION

All dimensions are in inches

* Grade B fittings are available from stock

† All thicknesses agree with those for Extra Strong Wall Pipe (see ANSI B36 10) Pipe Schedule Numbers are in accordance with ANSI B36 10

(1) XS designates Extra Strong (extra strong wall)

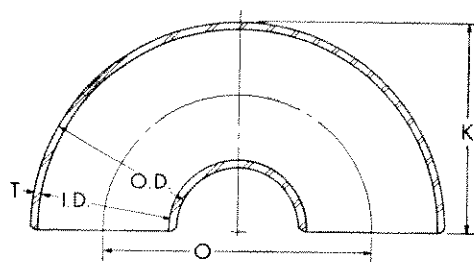
Pressure-Temperature Ratings for short radius elbows and returns will be in accordance with ANSI B16 28

■ 180° Short Radius Returns conform to ANSI B16 28, sizes 24" and smaller
For Dimensional Tolerances see page 88
For bevel detail see page 89

180° RETURNS

Special Schedules†

Short Radius



ASTM A234*

ANSI B16.28■



Part Nos. 209, 309, 409, 609, 809, 1009, 1209, 1409

NOMINAL PIPE SIZE	PIPE SCHEDULE NUMBER	PART NUMBER	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICK- NESS T	CENTER TO CENTER O	BACK TO FACE K	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
4	120	1209	4.500	3.624	.438	8	6 ¹ / ₄	20.8	
5	120	1209	5.563	4.563	.500	10	7 ³ / ₄	37.2	
6	120	1209	6.625	5.501	.562	12	9 ⁵ / ₁₆	60.0	
8	20	209	8.625	8.125	.250	16	12 ⁵ / ₁₆	48.8	
8	30	309	8.625	8.071	.277	16	12 ⁵ / ₁₆	53.0	
8	60	609	8.625	7.813	.406	16	12 ⁵ / ₁₆	76.0	
8	100	1009	8.625	7.437	.594	16	12 ⁵ / ₁₆	112.0	
8	120	1209	8.625	7.187	.719	16	12 ⁵ / ₁₆	133.0	
8	140	1409	8.625	7.001	.812	16	12 ⁵ / ₁₆	149.0	
10	20	209	10.750	10.250	.250	20	15 ³ / ₈	76.4	
10	30	309	10.750	10.136	.307	20	15 ³ / ₈	92	
10	80	809	10.750	9.562	.594	20	15 ³ / ₈	172	
10	100	1009	10.750	9.312	.719	20	15 ³ / ₈	212	
10	120	1209	10.750	9.062	.844	20	15 ³ / ₈	246	
10	140	1409	10.750	8.750	1.000	20	15 ³ / ₈	286	
12	20	209	12.750	12.250	.250	24	18 ³ / ₈	109	
12	30	309	12.750	12.090	.330	24	18 ³ / ₈	142	
12	40	409	12.750	11.938	.406	24	18 ³ / ₈	180	
12	60	609	12.750	11.626	.562	24	18 ³ / ₈	235	
12	80	809	12.750	11.374	.688	24	18 ³ / ₈	283	
14	40	409	14.000	13.124	.438	28	21	239	
14	60	609	14.000	12.812	.594	28	21	318	
18	30	309	18.000	17.124	.438	36	27	398	
18	40	409	18.000	16.876	.562	36	27	506	
20	40	409	20.000	18.812	.594	40	30	659	
24	30	309	24.000	22.876	.562	48	36	907	

PRICES ON APPLICATION

All dimensions are in inches.

Schedule 160 and Double Extra Strong 180° Short Radius Returns are available, other thicknesses also available.

* Grade B fittings are available from stock.

† Pipe Schedule numbers and respective thicknesses are in accordance with ANSI B36.10.

Pressure-Temperature Ratings for short radius elbows and returns will be in accordance with ANSI B16.28.

■ 180° Short Radius Returns conform to ANSI B16.28, sizes 24" and smaller.

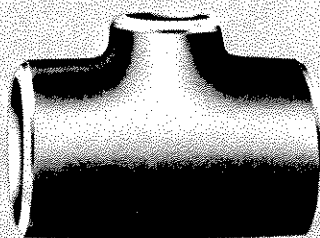
For Dimensional Tolerances see page 88

For bevel detail see page 89.

TEES *Light Weight†*

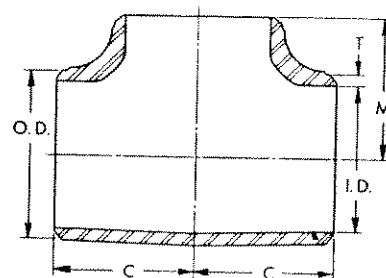
STRAIGHT

REDUCING OUTLET



Part No. 520

Part No. 522



ANSI B16.9[▲]

ASTM A234[▲]

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	PART NUMBER		CENTER TO END C & M ⁽¹⁾	PIPE SCHEDULE NUMBER	APPROXIMATE WEIGHT IN POUNDS ⁽¹⁾	LIST PRICE
				STRAIGHT	REDUCING OUTLET				
3	3.500	3.124	.188 ⁽²⁾	520	522	3-3/8		8.50	
4	4.500	4.124	.188 ⁽²⁾	520	522	4-1/8		12.6	
6	6.625	6.187	.219 ⁽²⁾	520	522	5-5/8		29.3	
8	8.625	8.187	.219 ⁽²⁾	520	522	7		53.7	
10	10.750	10.312	.219 ⁽²⁾	520	522	8-1/2		91.2	
12	12.750	12.250	.250 ⁽²⁾	520	522	10		132	
14	14.000	13.500	.250 ⁽²⁾	520	522	11	10	172	
16	16.000	15.500	.250 ⁽²⁾	520	522	12	10	219	
18	18.000	17.500	.250 ⁽²⁾	520	522	13-1/2	10	282	
20	20.000	19.500	.250	520	522	15	10	354	
24	24.000	23.500	.250	520	522	17	10	493	

PRICES ON APPLICATION

All dimensions are in inches.

When ordering Light Weight Fittings always specify Part Number or wall thickness.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch and are radiographed per the requirements of ASTM A234 and stress relieved.

(1) Dimensions given are for Straight Tees. For Reducing Outlet Tees, refer to Standard Weight Tees, ppl 37-42.

(2) Wall thicknesses are from API 5L pipe specifications and are those thicknesses most commonly used for gas distribution services.

(3) Reducing Tees also furnished.

Tees are taper bored at ends to match pipe wall thicknesses.

† Pipe Schedule Numbers are in accordance with ANSI B36.10 for size 14" and larger.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

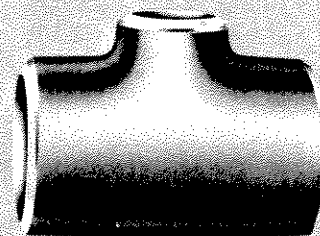
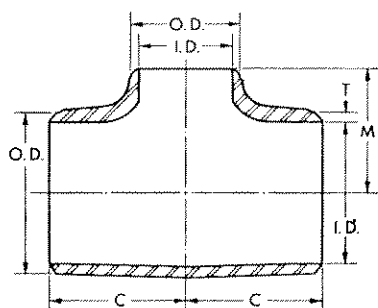
For bevel detail, see page 89.

▲ For information on this Standard see page 89.

TEES Standard Weight†

STRAIGHT

REDUCING OUTLET



Part No. 20

Part No. 22

ANSI B16.9 ▲

ASTM A234 *

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK-NESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C		O. D.	I. D.		M		
1/2	1/4	.840	.622	.109	1	40	.540	.364	.088	1	.25	
	3/8	.840	.622	.109	1	40	.675	.493	.091	1	.25	
	1/2	.840	.622	.109	1	40	.840	.622	.109	1	.25	
3/4	3/8	1.050	.824	.113	1 1/8	40	.675	.493	.091	1 1/8	.38	
	1/2	1.050	.824	.113	1 1/8	40	.840	.622	.109	1 1/8	.38	
	3/4	1.050	.824	.113	1 1/8	40	1.050	.824	.113	1 1/8	.40	
1	3/8	1.315	1.049	.133	1 1/2	40	.675	.493	.091	1 1/2	.75	
	1/2	1.315	1.049	.133	1 1/2	40	.840	.622	.109	1 1/2	.75	
	3/4	1.315	1.049	.133	1 1/2	40	1.050	.824	.113	1 1/2	.75	
	1	1.315	1.049	.133	1 1/2	40	1.315	1.049	.133	1 1/2	.80	
1 1/4	1/2	1.660	1.380	.140	1 7/8	40	.840	.622	.109	1 7/8	1.4	
	3/4	1.660	1.380	.140	1 7/8	40	1.050	.824	.113	1 7/8	1.4	
	1	1.660	1.380	.140	1 7/8	40	1.315	1.315	.133	1 7/8	1.4	
	1 1/4	1.660	1.380	.140	1 7/8	40	1.660	1.380	.140	1 7/8	1.4	
1 1/2	1/2	1.900	1.610	.145	2 1/4	40	.840	.622	.109	2 1/4	2	
	3/4	1.900	1.610	.145	2 1/4	40	1.050	.824	.113	2 1/4	2	
	1	1.900	1.610	.145	2 1/4	40	1.315	1.049	.133	2 1/4	2	
	1 1/4	1.900	1.610	.145	2 1/4	40	1.660	1.380	.140	2 1/4	2	
	1 1/2	1.900	1.610	.145	2 1/4	40	1.900	1.610	.145	2 1/4	2	
2	3/4	2.375	2.067	.154	2 1/2	40	1.050	.824	.113	1 3/4	3	
	1	2.375	2.067	.154	2 1/2	40	1.315	1.049	.133	2	3	
	1 1/4	2.375	2.067	.154	2 1/2	40	1.660	1.380	.140	2 1/4	3	
	1 1/2	2.375	2.067	.154	2 1/2	40	1.900	1.610	.145	2 3/8	3	
	2	2.375	2.067	.154	2 1/2	40	2.375	2.067	.154	2 1/2	3	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch and are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Standard Wall Pipe (See ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice

SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved. Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail, see page 89.

▲ For information on this Standard see page 89.

Tees

Straight and Reducing Outlet, Standard Weight†

Straight—Part No. 20 Reducing Outlet—Part No. 22

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C		O. D.	I. D.		M		
2½	1	2.875	2.469	.203	3	40	1.315	1.049	.133	2¼	5	
	1¼	2.875	2.469	.203	3	40	1.660	1.380	.140	2½	5	
	1½	2.875	2.469	.203	3	40	1.900	1.610	.145	2⅝	5	
	2	2.875	2.469	.203	3	40	2.375	2.067	.154	2¾	5	
	2½	2.875	2.469	.203	3	40	2.875	2.469	.203	3	5	
3	1	3.500	3.068	.216	3¾	40	1.315	1.049	.133	2⅝	7.0	
	1¼	3.500	3.068	.216	3¾	40	1.660	1.380	.140	2¾	7.0	
	1½	3.500	3.068	.216	3¾	40	1.900	1.610	.145	2⅞	7.0	
	2	3.500	3.068	.216	3¾	40	2.375	2.067	.154	3	7.0	
	2½	3.500	3.068	.216	3¾	40	2.875	2.469	.203	3¼	7.0	
	3	3.500	3.068	.216	3¾	40	3.500	3.068	.216	3⅝	7.5	
3½	1½	4.000	3.548	.226	3¾	40	1.900	1.610	.145	3⅞	9	
	2	4.000	3.548	.226	3¾	40	2.375	2.067	.154	3¼	9	
	2½	4.000	3.548	.226	3¾	40	2.875	2.469	.203	3½	9	
	3	4.000	3.548	.226	3¾	40	3.500	3.068	.216	3⅝	9	
	3½	4.000	3.548	.226	3¾	40	4.000	3.548	.226	3¾	10	
4	1½	4.500	4.026	.237	4⅞	40	1.900	1.610	.145	3⅞	12	
	2	4.500	4.026	.237	4⅞	40	2.375	2.067	.154	3½	11.5	
	2½	4.500	4.026	.237	4⅞	40	2.875	2.469	.203	3¾	11.5	
	3	4.500	4.026	.237	4⅞	40	3.500	3.068	.216	3⅞	11.5	
	3½	4.500	4.026	.237	4⅞	40	4.000	3.548	.226	4	12	
	4	4.500	4.026	.237	4⅞	40	4.500	4.026	.237	4⅞	13	
5	2	5.563	5.047	.258	4⅞	40	2.375	2.067	.154	4⅞	19	
	2½	5.563	5.047	.258	4⅞	40	2.875	2.469	.203	4¼	19	
	3	5.563	5.047	.258	4⅞	40	3.500	3.068	.216	4⅝	19	
	3½	5.563	5.047	.258	4⅞	40	4.000	3.548	.226	4½	19	
	4	5.563	5.047	.258	4⅞	40	4.500	4.026	.237	4⅝	19	
	5	5.563	5.047	.258	4⅞	40	5.563	5.047	.258	4⅞	21	
6	2½	6.625	6.065	.280	5⅝	40	2.875	2.469	.203	4¾	26	
	3	6.625	6.065	.280	5⅝	40	3.500	3.068	.216	4⅞	26	
	3½	6.625	6.065	.280	5⅝	40	4.000	3.548	.226	5	26	
	4	6.625	6.065	.280	5⅝	40	4.500	4.026	.237	5⅞	26	
	5	6.625	6.065	.280	5⅝	40	5.563	5.047	.258	5⅝	29	
	6	6.625	6.065	.280	5⅝	40	6.625	6.065	.280	5⅝	29	
8	3	8.625	7.981	.322	7	40	3.500	3.068	.216	6	53	
	3½	8.625	7.981	.322	7	40	4.000	3.548	.226	6	53	
	4	8.625	7.981	.322	7	40	4.500	4.026	.237	6⅞	53	
	5	8.625	7.981	.322	7	40	5.563	5.047	.258	6⅝	53	
	6	8.625	7.981	.322	7	40	6.625	6.065	.280	6⅝	53	
	8	8.625	7.981	.322	7	40	8.625	7.981	.322	7	54	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch and are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Standard Wall Pipe (See ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice

SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail, see page 89.

▲ For information on this Standard see page 89.

Tees

Straight and Reducing Outlet, Standard Weight†

Straight—Part No. 20 Reducing Outlet—Part No. 22

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C		O. D.	I. D.		M ★		
10	4	10.750	10.020	.365	8½	40	4.500	4.026	.237	7¼	86	
	5	10.750	10.020	.365	8½	40	5.563	5.047	.258	7½	86	
	6	10.750	10.020	.365	8½	40	6.625	6.065	.280	7⅝	86	
	8	10.750	10.020	.365	8½	40	8.625	7.981	.322	8	86	
	10	10.750	10.020	.365	8½	40	10.750	10.020	.365	8½	88	
12	5	12.750	12.000	.375	10	ST ⁽¹⁾	5.563	5.047	.258	8½	141	
	6	12.750	12.000	.375	10	ST ⁽¹⁾	6.625	6.065	.280	8⅝	141	
	8	12.750	12.000	.375	10	ST ⁽¹⁾	8.625	7.981	.322	9	141	
	10	12.750	12.000	.375	10	ST ⁽¹⁾	10.750	10.020	.365	9½	141	
	12	12.750	12.000	.375	10	ST ⁽¹⁾	12.750	12.000	.375	10	128	
14	6	14.000	13.250	.375	11	30	6.625	6.065	.280	9⅝	170	
	8	14.000	13.250	.375	11	30	8.625	7.981	.322	9¾	170	
	10	14.000	13.250	.375	11	30	10.750	10.020	.365	10⅛	170	
	12	14.000	13.250	.375	11	30	12.750	12.000	.375	10⅝	170	
	14	14.000	13.250	.375	11	30	14.000	13.250	.375	11	176	
16	6	16.000	15.250	.375	12	30	6.625	6.065	.280	10⅝	242	
	8	16.000	15.250	.375	12	30	8.625	7.981	.322	10¾	242	
	10	16.000	15.250	.375	12	30	10.750	10.020	.365	11⅛	242	
	12	16.000	15.250	.375	12	30	12.750	12.000	.375	11⅝	242	
	14	16.000	15.250	.375	12	30	14.000	13.250	.375	12	242	
	16	16.000	15.250	.375	12	30	16.000	15.250	.375	12	200	
18	8	18.000	17.250	.375	13½	ST ⁽¹⁾	8.625	7.981	.322	11¾	312	
	10	18.000	17.250	.375	13½	ST ⁽¹⁾	10.750	10.020	.365	12⅞	312	
	12	18.000	17.250	.375	13½	ST ⁽¹⁾	12.750	12.000	.375	12⅞	312	
	14	18.000	17.250	.375	13½	ST ⁽¹⁾	14.000	13.250	.375	13	312	
	16	18.000	17.250	.375	13½	ST ⁽¹⁾	16.000	15.250	.375	13	312	
	18	18.000	17.250	.375	13½	ST ⁽¹⁾	18.000	17.250	.375	13½	318	
20	8	20.000	19.250	.375	15	20	8.625	7.981	.322	12¾	357	
	10	20.000	19.250	.375	15	20	10.750	10.020	.365	13⅞	357	
	12	20.000	19.250	.375	15	20	12.750	12.000	.375	13⅞	357	
	14	20.000	19.250	.375	15	20	14.000	13.250	.375	14	357	
	16	20.000	19.250	.375	15	20	16.000	15.250	.375	14	357	
	18	20.000	19.250	.375	15	20	18.000	17.250	.375	14½	357	
	20	20.000	19.250	.375	15	20	20.000	19.250	.375	15	369	
22	10	22.000	21.250	.375	16½	ST ⁽¹⁾	10.750	10.020	.365	14⅞	375	
	12	22.000	21.250	.375	16½	ST ⁽¹⁾	12.750	12.000	.375	14⅝	377	
	14	22.000	21.250	.375	16½	ST ⁽¹⁾	14.000	13.250	.375	15	380	
	16	22.000	21.250	.375	16½	ST ⁽¹⁾	16.000	15.250	.375	15	394	
	18	22.000	21.250	.375	16½	ST ⁽¹⁾	18.000	17.250	.375	15½	408	
	20	22.000	21.250	.375	16½	ST ⁽¹⁾	20.000	19.250	.375	16	423	
	22	22.000	21.250	.375	16½	ST ⁽¹⁾	22.000	21.250	.375	16½	464	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch and are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Standard Wall Pipe (See ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10.

Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000,

48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

(1) ST designates Standard Weight (standard wall).

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail, see page 89.

▲ For information on this Standard see page 89.

** Outlet dimension "M" is recommended but not mandatory for reducing tees only with run sizes 14" and larger per ANSI B16.9 - 1971.

tees

Straight and Reducing Outlet, Standard Weight†

Straight—Part No. 20 Reducing Outlet—Part No. 22

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C		O. D.	I. D.	OF BRANCH	M **		
24	10	24.000	23.250	.375	17	20	10.750	10.020	.365	15 1/8	492	
	12	24.000	23.250	.375	17	20	12.750	12.000	.375	15 5/8	493	
	14	24.000	23.250	.375	17	20	14.000	13.250	.375	16	494	
	16	24.000	23.250	.375	17	20	16.000	15.250	.375	16	496	
	18	24.000	23.250	.375	17	20	18.000	17.250	.375	16 1/2	499	
	20	24.000	23.250	.375	17	20	20.000	19.250	.375	17	499	
	22	24.000	23.250	.375	17	20	22.000	21.250	.375	17	500	
	24	24.000	23.250	.375	17	20	24.000	23.250	.375	17	560	
26	12	26.000	25.250	.375	19 1/2	ST(1)	12.750	12.000	.375	16 3/8	516	
	14	26.000	25.250	.375	19 1/2	ST(1)	14.000	13.250	.375	17	527	
	16	26.000	25.250	.375	19 1/2	ST(1)	16.000	15.250	.375	17	544	
	18	26.000	25.250	.375	19 1/2	ST(1)	18.000	17.250	.375	17 1/2	562	
	20	26.000	25.250	.375	19 1/2	ST(1)	20.000	19.250	.375	18	581	
	22	26.000	25.250	.375	19 1/2	ST(1)	22.000	21.250	.375	18 1/2	598	
	24	26.000	25.250	.375	19 1/2	ST(1)	24.000	23.250	.375	19	616	
	26	26.000	25.250	.375	19 1/2	ST(1)	26.000	25.250	.375	19 1/2	710	
28	12	28.000	27.250	.375	20 1/2	ST(1)	12.750	12.000	.375	17 5/8	585	
	14	28.000	27.250	.375	20 1/2	ST(1)	14.000	13.250	.375	18	597	
	16	28.000	27.250	.375	20 1/2	ST(1)	16.000	15.250	.375	18	616	
	18	28.000	27.250	.375	20 1/2	ST(1)	18.000	17.250	.375	18 1/2	636	
	20	28.000	27.250	.375	20 1/2	ST(1)	20.000	19.250	.375	19	656	
	22	28.000	27.250	.375	20 1/2	ST(1)	22.000	21.250	.375	19 1/2	676	
	24	28.000	27.250	.375	20 1/2	ST(1)	24.000	23.250	.375	20	696	
	26	28.000	27.250	.375	20 1/2	ST(1)	26.000	25.250	.375	20 1/2	716	
30	28	28.000	27.250	.375	20 1/2	ST(1)	28.000	27.250	.375	20 1/2	729	
	10	30.000	29.250	.375	22	ST(1)	10.750	10.020	.365	18 1/8	651	
	12	30.000	29.250	.375	22	ST(1)	12.750	12.000	.375	18 5/8	669	
	14	30.000	29.250	.375	22	ST(1)	14.000	13.250	.375	19	681	
	16	30.000	29.250	.375	22	ST(1)	16.000	15.250	.375	19	704	
	18	30.000	29.250	.375	22	ST(1)	18.000	17.250	.375	19 1/2	727	
	20	30.000	29.250	.375	22	ST(1)	20.000	19.250	.375	20	749	
	22	30.000	29.250	.375	22	ST(1)	22.000	21.250	.375	20 1/2	772	
30	24	30.000	29.250	.375	22	ST(1)	24.000	23.250	.375	21	795	
	26	30.000	29.250	.375	22	ST(1)	26.000	25.250	.375	21 1/2	817	
	28	30.000	29.250	.375	22	ST(1)	28.000	27.250	.375	21 1/2	834	
	30	30.000	29.250	.375	22	ST(1)	30.000	29.250	.375	22	926	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch and are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Standard Wall Pipe (See ANSI

B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

(1) ST designates Standard Weight (standard wall).

Tees

Straight and Reducing Outlet, Standard Weight†

Straight—Part No. 20 Reducing Outlet—Part No. 22

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C		O. D.	I. D.	BRANCH	M **		
32	14	32.000	31.250	.375	23½	ST ⁽¹⁾	14.000	13.250	.375	20	783	
	16	32.000	31.250	.375	23½	ST ⁽¹⁾	16.000	15.250	.375	20	806	
	18	32.000	31.250	.375	23½	ST ⁽¹⁾	18.000	17.250	.375	20½	830	
	20	32.000	31.250	.375	23½	ST ⁽¹⁾	20.000	19.250	.375	21	854	
	22	32.000	31.250	.375	23½	ST ⁽¹⁾	22.000	21.250	.375	21½	878	
	24	32.000	31.250	.375	23½	ST ⁽¹⁾	24.000	23.250	.375	22	902	
	26	32.000	31.250	.375	23½	ST ⁽¹⁾	26.000	25.250	.375	22½	926	
	28	32.000	31.250	.375	23½	ST ⁽¹⁾	28.000	27.250	.375	22½	944	
	30	32.000	31.250	.375	23½	ST ⁽¹⁾	30.000	29.250	.375	23	967	
	32	32.000	31.250	.375	23½	ST ⁽¹⁾	32.000	31.250	.375	23½	991	
34	16	34.000	33.250	.375	25	ST ⁽¹⁾	16.000	15.250	.375	21	907	
	18	34.000	33.250	.375	25	ST ⁽¹⁾	18.000	17.250	.375	21½	933	
	20	34.000	33.250	.375	25	ST ⁽¹⁾	20.000	19.250	.375	22	960	
	22	34.000	33.250	.375	25	ST ⁽¹⁾	22.000	21.250	.375	22½	986	
	24	34.000	33.250	.375	25	ST ⁽¹⁾	24.000	23.250	.375	23	1013	
	26	34.000	33.250	.375	25	ST ⁽¹⁾	26.000	25.250	.375	23½	1039	
	28	34.000	33.250	.375	25	ST ⁽¹⁾	28.000	27.250	.375	23½	1059	
	30	34.000	33.250	.375	25	ST ⁽¹⁾	30.000	29.250	.375	24	1085	
	32	34.000	33.250	.375	25	ST ⁽¹⁾	32.000	31.250	.375	24½	1111	
	34	34.000	33.250	.375	25	ST ⁽¹⁾	34.000	33.250	.375	25	1136	
36	16	36.000	35.250	.375	26½	ST ⁽¹⁾	16.000	15.250	.375	22	1015	
	18	36.000	35.250	.375	26½	ST ⁽¹⁾	18.000	17.250	.375	22½	1044	
	20	36.000	35.250	.375	26½	ST ⁽¹⁾	20.000	19.250	.375	23	1072	
	22	36.000	35.250	.375	26½	ST ⁽¹⁾	22.000	21.250	.375	23½	1100	
	24	36.000	35.250	.375	26½	ST ⁽¹⁾	24.000	23.250	.375	24	1129	
	26	36.000	35.250	.375	26½	ST ⁽¹⁾	26.000	25.250	.375	24½	1158	
	28	36.000	35.250	.375	26½	ST ⁽¹⁾	28.000	27.250	.375	24½	1181	
	30	36.000	35.250	.375	26½	ST ⁽¹⁾	30.000	29.250	.375	25	1207	
	32	36.000	35.250	.375	26½	ST ⁽¹⁾	32.000	31.250	.375	25½	1237	
	34	36.000	35.250	.375	26½	ST ⁽¹⁾	34.000	33.250	.375	26	1264	
	36	36.000	35.250	.375	26½	ST ⁽¹⁾	36.000	35.250	.375	26½	1294	

PRICES ON APPLICATION

** Outlet dimension "M" is recommended but not mandatory per ANSI B16.9 - 1971 for the following run sizes:
14" and larger for reducing tees
26" and larger for straight tees

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail, see page 89.

▲ For information on this Standard see page 89.

Tees

Straight and Reducing Outlet, Standard Weight†

Straight—Part No. 20 Reducing Outlet—Part No. 22

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C		O. D.	I. D.		M **		
42	16	42.000	41.250	.375	30		16.000	15.250	.375	25	1536	
	18	42.000	41.250	.375	30		18.000	17.250	.375	25½	1548	
	20	42.000	41.250	.375	30		20.000	19.250	.375	26	1561	
	22	42.000	41.250	.375	30		22.000	21.250	.375	26	1570	
	24	42.000	41.250	.375	30		24.000	23.250	.375	26	1579	
	26	42.000	41.250	.375	30		26.000	25.250	.375	27½	1598	
	28	42.000	41.250	.375	30		28.000	27.250	.375	27½	1607	
	30	42.000	41.250	.375	30		30.000	29.250	.375	28	1620	
	32	42.000	41.250	.375	30		32.000	31.250	.375	28	1629	
	34	42.000	41.250	.375	30		34.000	33.250	.375	28	1640	
	36	42.000	41.250	.375	30		36.000	35.250	.375	28	1649	
	42	42.000	41.250	.375	30		42.000	41.250	.375	28	1782	
	16	48.000	47.250	.375	35		16.000	15.250	.375	28	2038	
	18	48.000	47.250	.375	35		18.000	17.250	.375	28½	2051	
48	20	48.000	47.250	.375	35		20.000	19.250	.375	29	2064	
	22	48.000	47.250	.375	35		22.000	21.250	.375	29	2077	
	24	48.000	47.250	.375	35		24.000	23.250	.375	29	2083	
	26	48.000	47.250	.375	35		26.000	25.250	.375	30	2103	
	28	48.000	47.250	.375	35		28.000	27.250	.375	30	2113	
	30	48.000	47.250	.375	35		30.000	29.250	.375	30	2124	
	32	48.000	47.250	.375	35		32.000	31.250	.375	31	2138	
	34	48.000	47.250	.375	35		34.000	33.250	.375	31	2152	
	36	48.000	47.250	.375	35		36.000	35.250	.375	31	2165	
	38	48.000	47.250	.375	35		38.000	37.250	.375	32	2181	
	40	48.000	47.250	.375	35		40.000	39.250	.375	32	2194	
	42	48.000	47.250	.375	35		42.000	41.250	.375	32	2212	
	44	48.000	47.250	.375	35		44.000	43.250	.375	33	2226	
	46	48.000	47.250	.375	35		46.000	45.250	.375	33	2249	
	48	48.000	47.250	.375	35		48.000	47.250	.375	33	2331	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch and are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Standard Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16"

and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000, and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

** Outlet dimension "M" for run sizes 26" and larger is recommended but not mandatory per ANSI B16.9 - 1971.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

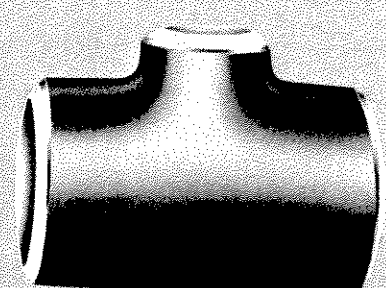
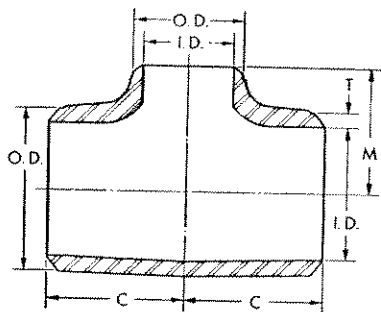
For bevel detail, see page 89.

▲ For information on this Standard see page 89.

TEES *Extra Strong*[†]

STRAIGHT

REDUCING OUTLET



ANSI B16.9[▲]

ASTM A234 *

Part No. 21

Part No. 23

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK-NESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C		O. D.	I. D.		M		
1/2	1/4	.840	.546	.147	1	80	.540	.302	.119	1	.30	
	3/8	.840	.546	.147	1	80	.675	.423	.126	1	.30	
	1/2	.840	.546	.147	1	80	.840	.546	.147	1	.40	
3/4	3/8	1.050	.742	.154	1 1/8	80	.675	.423	.126	1 1/8	.5	
	1/2	1.050	.742	.154	1 1/8	80	.840	.546	.147	1 1/8	.5	
	3/4	1.050	.742	.154	1 1/8	80	1.050	.742	.154	1 1/8	.5	
1	3/8	1.315	.957	.179	1 1/2	80	.675	.423	.126	1 1/2	.9	
	1/2	1.315	.957	.179	1 1/2	80	.840	.546	.147	1 1/2	.9	
	3/4	1.315	.957	.179	1 1/2	80	1.050	.742	.154	1 1/2	.9	
	1	1.315	.957	.179	1 1/2	80	1.315	.957	.179	1 1/2	1.0	
1 1/4	1/2	1.660	1.278	.191	1 7/8	80	.840	.546	.147	1 7/8	1.6	
	3/4	1.660	1.278	.191	1 7/8	80	1.050	.742	.154	1 7/8	1.6	
	1	1.660	1.278	.191	1 7/8	80	1.315	.957	.179	1 7/8	1.6	
	1 1/4	1.660	1.278	.191	1 7/8	80	1.660	1.278	.191	1 7/8	1.6	
1 1/2	1/2	1.900	1.500	.200	2 1/4	80	.840	.546	.147	2 1/4	2.5	
	3/4	1.900	1.500	.200	2 1/4	80	1.050	.742	.154	2 1/4	2.5	
	1	1.900	1.500	.200	2 1/4	80	1.315	.957	.179	2 1/4	2.5	
	1 1/4	1.900	1.500	.200	2 1/4	80	1.660	1.278	.191	2 1/4	2.5	
2	3/4	2.375	1.939	.218	2 1/2	80	1.050	.742	.154	1 3/4	3.5	
	1	2.375	1.939	.218	2 1/2	80	1.315	.957	.179	2	3.5	
	1 1/4	2.375	1.939	.218	2 1/2	80	1.660	1.278	.191	2 1/4	3.5	
	1 1/2	2.375	1.939	.218	2 1/2	80	1.900	1.500	.200	2 3/8	3.5	
	2	2.375	1.939	.218	2 1/2	80	2.375	1.939	.218	2 1/2	4	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch and are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Standard Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16"

and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000, and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail, see page 89.

▲ For information on this Standard see page 89.

Tees

Straight and Reducing Outlet, Extra Strong†

Straight—Part No. 21 Reducing Outlet—Part No. 23

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C		O. D.	I. D.		M		
2½	1	2.875	2.323	.276	3	80	1.315	.957	.179	2¼	6	
	1¼	2.875	2.323	.276	3	80	1.660	1.278	.191	2½	6	
	1½	2.875	2.323	.276	3	80	1.900	1.500	.200	2¾	6	
	2	2.875	2.323	.276	3	80	2.375	1.939	.218	3¼	6	
	2½	2.875	2.323	.276	3	80	2.875	2.323	.276	3	6	
3	1	3.500	2.900	.300	3¾	80	1.315	.957	.179	2⅝	9	
	1¼	3.500	2.900	.300	3¾	80	1.660	1.278	.191	2¾	9	
	1½	3.500	2.900	.300	3¾	80	1.900	1.500	.200	2⅞	9	
	2	3.500	2.900	.300	3¾	80	2.375	1.939	.218	3	9	
	2½	3.500	2.900	.300	3¾	80	2.875	2.323	.276	3¼	9	
3½	3	3.500	2.900	.300	3¾	80	3.500	2.900	.300	3¾	10	
	1½	4.000	3.364	.318	3¾	80	1.900	1.500	.200	3⅞	12	
	2	4.000	3.364	.318	3¾	80	2.375	1.939	.218	3¼	12	
	2½	4.000	3.364	.318	3¾	80	2.875	2.323	.276	3½	12	
	3	4.000	3.364	.318	3¾	80	3.500	2.900	.300	3⅝	12	
4	3½	4.000	3.364	.318	3¾	80	4.000	3.364	.318	3¾	13	
	1½	4.500	3.826	.337	4⅞	80	1.900	1.500	.200	3⅞	16	
	2	4.500	3.826	.337	4⅞	80	2.375	1.939	.218	3½	16	
	2½	4.500	3.826	.337	4⅞	80	2.875	2.323	.276	3¾	16	
	3	4.500	3.826	.337	4⅞	80	3.500	2.900	.300	3⅞	16	
5	3½	4.500	3.826	.337	4⅞	80	4.000	3.364	.318	4	16	
	4	4.500	3.826	.337	4⅞	80	4.500	3.826	.337	4⅞	16	
	2	5.563	4.813	.375	4⅞	80	2.375	1.939	.218	4⅞	25	
	2½	5.563	4.813	.375	4⅞	80	2.875	2.323	.276	4¼	25	
	3	5.563	4.813	.375	4⅞	80	3.500	2.900	.300	4⅝	25	
6	3½	5.563	4.813	.375	4⅞	80	4.000	3.364	.318	4½	25	
	4	5.563	4.813	.375	4⅞	80	4.500	3.826	.337	4⅝	25	
	5	5.563	4.813	.375	4⅞	80	5.563	4.813	.375	4⅞	27	
	2½	6.625	5.761	.432	5⅝	80	2.875	2.323	.276	4¾	38	
	3	6.625	5.761	.432	5⅝	80	3.500	2.900	.300	4⅞	38	
8	3½	6.625	5.761	.432	5⅝	80	4.000	3.364	.318	5	38	
	4	6.625	5.761	.432	5⅝	80	4.500	3.826	.337	5⅞	38	
	5	6.625	5.761	.432	5⅝	80	5.563	4.813	.375	5⅝	38	
	6	6.625	5.761	.432	5⅝	80	6.625	5.761	.432	5⅝	38	
	3	8.625	7.625	.500	7	80	3.500	2.900	.300	6	75	
8	3½	8.625	7.625	.500	7	80	4.000	3.364	.318	6	75	
	4	8.625	7.625	.500	7	80	4.500	3.826	.337	6⅞	75	
	5	8.625	7.625	.500	7	80	5.563	4.813	.375	6⅝	75	
	6	8.625	7.625	.500	7	80	6.625	5.761	.432	6⅝	75	
	8	8.625	7.625	.500	7	80	8.625	7.625	.500	7	75	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch and are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Extra Strong Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice

SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000 60,000 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail, see page 89.

▲ For information on this Standard see page 89.

Tees

Straight and Reducing Outlet, Extra Strong†

Straight—Part No. 21 Reducing Outlet—Part No.23

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH M **	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C		O. D.	I. D.				
10	4	10.750	9.750	.500	8½	60	4.500	3.826	.337	7¼	114	
	5	10.750	9.750	.500	8½	60	5.563	4.813	.375	7½	114	
	6	10.750	9.750	.500	8½	60	6.625	5.761	.432	7⅝	114	
	8	10.750	9.750	.500	8½	60	8.625	7.625	.500	8	114	
	10	10.750	9.750	.500	8½	60	10.750	9.750	.500	8½	114	
12	5	12.750	11.750	.500	10	XS ⁽¹⁾	5.563	4.813	.375	8½	165	
	6	12.750	11.750	.500	10	XS ⁽¹⁾	6.625	5.761	.432	8⅝	165	
	8	12.750	11.750	.500	10	XS ⁽¹⁾	8.625	7.625	.500	9	165	
	10	12.750	11.750	.500	10	XS ⁽¹⁾	10.750	9.750	.500	9½	165	
	12	12.750	11.750	.500	10	XS ⁽¹⁾	12.750	11.750	.500	10	157	
14	6	14.000	13.000	.500	11	XS ⁽¹⁾	6.625	5.761	.432	9⅜	207	
	8	14.000	13.000	.500	11	XS ⁽¹⁾	8.625	7.625	.500	9¾	207	
	10	14.000	13.000	.500	11	XS ⁽¹⁾	10.750	9.750	.500	10⅛	207	
	12	14.000	13.000	.500	11	XS ⁽¹⁾	12.750	11.750	.500	10⅝	207	
	14	14.000	13.000	.500	11	XS ⁽¹⁾	14.000	13.000	.500	11	203	
16	6	16.000	15.000	.500	12	40	6.625	5.761	.432	10⅜	261	
	8	16.000	15.000	.500	12	40	8.625	7.625	.500	10¾	261	
	10	16.000	15.000	.500	12	40	10.750	9.750	.500	11⅛	261	
	12	16.000	15.000	.500	12	40	12.750	11.750	.500	11⅝	261	
	14	16.000	15.000	.500	12	40	14.000	13.000	.500	12	261	
18	16	16.000	15.000	.500	12	40	16.000	15.000	.500	12	260	
	8	18.000	17.000	.500	13½	XS ⁽¹⁾	8.625	7.625	.500	11¾	362	
	10	18.000	17.000	.500	13½	XS ⁽¹⁾	10.750	9.750	.500	12⅛	362	
	12	18.000	17.000	.500	13½	XS ⁽¹⁾	12.750	11.750	.500	12⅝	362	
	14	18.000	17.000	.500	13½	XS ⁽¹⁾	14.000	13.000	.500	13	362	
20	16	18.000	17.000	.500	13½	XS ⁽¹⁾	16.000	15.000	.500	13	362	
	18	18.000	17.000	.500	13½	XS ⁽¹⁾	18.000	17.000	.500	13½	333	
	8	20.000	19.000	.500	15	30	8.625	7.625	.500	12¾	475	
	10	20.000	19.000	.500	15	30	10.750	9.750	.500	13⅛	475	
	12	20.000	19.000	.500	15	30	12.750	11.750	.500	13⅝	475	
22	14	20.000	19.000	.500	15	30	14.000	13.000	.500	14	475	
	16	20.000	19.000	.500	15	30	16.000	15.000	.500	14	475	
	18	20.000	19.000	.500	15	30	18.000	17.000	.500	14½	475	
	20	20.000	19.000	.500	15	30	20.000	19.000	.500	15	500	
	10	22.000	21.000	.500	16½	XS ⁽¹⁾	10.750	9.750	.500	14⅛	451	
22	12	22.000	21.000	.500	16½	XS ⁽¹⁾	12.750	11.750	.500	14⅝	468	
	14	22.000	21.000	.500	16½	XS ⁽¹⁾	14.000	13.000	.500	15	479	
	16	22.000	21.000	.500	16½	XS ⁽¹⁾	16.000	15.000	.500	15	497	
	18	22.000	21.000	.500	16½	XS ⁽¹⁾	18.000	17.000	.500	15½	514	
	20	22.000	21.000	.500	16½	XS ⁽¹⁾	20.000	19.000	.500	16	532	
	22	22.000	21.000	.500	16½	XS ⁽¹⁾	22.000	21.000	.500	16½	586	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch and are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Extra Strong Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000,

48,000, 50,000, 52,000 60,000 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

(1) XS designates Extra Strong (extra strong wall).

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail, see page 89.

▲ For information on this Standard see page 89.

** Outlet dimension "M" is recommended but not mandatory for reducing tees only with run sizes 14" and larger per ANSI B16.9 - 1971.

Straight and Reducing Outlet, Extra Strong† Straight—Part No. 21 Reducing Outlet—Part No. 23

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK-NESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C		O. D.	I. D.		M **		
24	10	24.000	23.000	.500	17	XS ⁽¹⁾	10.750	9.750	.500	15 1/8	659	
	12	24.000	23.000	.500	17	XS ⁽¹⁾	12.750	11.750	.500	15 5/8	660	
	14	24.000	23.000	.500	17	XS ⁽¹⁾	14.000	13.000	.500	16	660	
	16	24.000	23.000	.500	17	XS ⁽¹⁾	16.000	15.000	.500	16	664	
	18	24.000	23.000	.500	17	XS ⁽¹⁾	18.000	17.000	.500	16 1/2	666	
	20	24.000	23.000	.500	17	XS ⁽¹⁾	20.000	19.000	.500	17	669	
	22	24.000	23.000	.500	17	XS ⁽¹⁾	22.000	21.000	.500	17	671	
	24	24.000	23.000	.500	17	XS ⁽¹⁾	24.000	23.000	.500	17	695	
26	12	26.000	25.000	.500	19 1/2	XS ⁽¹⁾	12.750	11.750	.500	16 5/8	649	
	14	26.000	25.000	.500	19 1/2	XS ⁽¹⁾	14.000	13.000	.500	17	662	
	16	26.000	25.000	.500	19 1/2	XS ⁽¹⁾	16.000	15.000	.500	17	684	
	18	26.000	25.000	.500	19 1/2	XS ⁽¹⁾	18.000	17.000	.500	17 1/2	706	
	20	26.000	25.000	.500	19 1/2	XS ⁽¹⁾	20.000	19.000	.500	18	728	
	22	26.000	25.000	.500	19 1/2	XS ⁽¹⁾	22.000	21.000	.500	18 1/2	749	
	24	26.000	25.000	.500	19 1/2	XS ⁽¹⁾	24.000	23.000	.500	19	771	
	26	26.000	25.000	.500	19 1/2	XS ⁽¹⁾	26.000	25.000	.500	19 1/2	794	
28	12	28.000	27.000	.500	20 1/2	XS ⁽¹⁾	12.750	11.750	.500	17 5/8	735	
	14	28.000	27.000	.500	20 1/2	XS ⁽¹⁾	14.000	13.000	.500	18	750	
	16	28.000	27.000	.500	20 1/2	XS ⁽¹⁾	16.000	15.000	.500	18	775	
	18	28.000	27.000	.500	20 1/2	XS ⁽¹⁾	18.000	17.000	.500	18 1/2	800	
	20	28.000	27.000	.500	20 1/2	XS ⁽¹⁾	20.000	19.000	.500	19	823	
	22	28.000	27.000	.500	20 1/2	XS ⁽¹⁾	22.000	21.000	.500	19 1/2	850	
	24	28.000	27.000	.500	20 1/2	XS ⁽¹⁾	24.000	23.000	.500	20	870	
	26	28.000	27.000	.500	20 1/2	XS ⁽¹⁾	26.000	25.000	.500	20 1/2	895	
30	28	28.000	27.000	.500	20 1/2	XS ⁽¹⁾	28.000	27.000	.500	20 1/2	910	
	10	30.000	29.000	.500	22	XS ⁽¹⁾	10.750	9.750	.500	18 1/8	827	
	12	30.000	29.000	.500	22	XS ⁽¹⁾	12.750	11.750	.500	18 5/8	846	
	14	30.000	29.000	.500	22	XS ⁽¹⁾	14.000	13.000	.500	19	865	
	16	30.000	29.000	.500	22	XS ⁽¹⁾	16.000	15.000	.500	19	890	
	18	30.000	29.000	.500	22	XS ⁽¹⁾	18.000	17.000	.500	19 1/2	920	
	20	30.000	29.000	.500	22	XS ⁽¹⁾	20.000	19.000	.500	20	945	
	22	30.000	29.000	.500	22	XS ⁽¹⁾	22.000	21.000	.500	20 1/2	970	
30	24	30.000	29.000	.500	22	XS ⁽¹⁾	24.000	23.000	.500	21	995	
	26	30.000	29.000	.500	22	XS ⁽¹⁾	26.000	25.000	.500	21 1/2	1020	
	28	30.000	29.000	.500	22	XS ⁽¹⁾	28.000	27.000	.500	21 1/2	1040	
	30	30.000	29.000	.500	22	XS ⁽¹⁾	30.000	29.000	.500	22	1065	

PRICES ON APPLICATION

All dimensions are in inches.

Grade B fittings are available from stock.

Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch are radiographed per the requirements of ASTM A234 and stress relieved.

† All thicknesses agree with those for Extra Strong Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

Tees

Straight and Reducing Outlet, Extra Strong†

Straight—Part No. 21 Reducing Outlet—Part No. 23

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN O. D.	INSIDE DIAM. OF RUN I. D.	WALL THICK. OF RUN T	CENTER TO END C	PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH O. D.	INSIDE DIAM. OF BRANCH I. D.	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH M **	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH											
32	14	32.000	31.000	.500	23½	XS ⁽¹⁾	14.000	13.000	.500	20	980	
	16	32.000	31.000	.500	23½	XS ⁽¹⁾	16.000	15.000	.500	20	1010	
	18	32.000	31.000	.500	23½	XS ⁽¹⁾	18.000	17.000	.500	20½	1040	
	20	32.000	31.000	.500	23½	XS ⁽¹⁾	20.000	19.000	.500	21	1065	
	22	32.000	31.000	.500	23½	XS ⁽¹⁾	22.000	21.000	.500	21½	1095	
	24	32.000	31.000	.500	23½	XS ⁽¹⁾	24.000	23.000	.500	22	1125	
	26	32.000	31.000	.500	23½	XS ⁽¹⁾	26.000	25.000	.500	22½	1155	
	28	32.000	31.000	.500	23½	XS ⁽¹⁾	28.000	27.000	.500	22½	1175	
	30	32.000	31.000	.500	23½	XS ⁽¹⁾	30.000	29.000	.500	23	1205	
	32	32.000	31.000	.500	23½	XS ⁽¹⁾	32.000	31.000	.500	23½	1230	
34	16	34.000	33.000	.500	25	XS ⁽¹⁾	16.000	15.000	.500	21	1145	
	18	34.000	33.000	.500	25	XS ⁽¹⁾	18.000	17.000	.500	21½	1175	
	20	34.000	33.000	.500	25	XS ⁽¹⁾	20.000	19.000	.500	22	1205	
	22	34.000	33.000	.500	25	XS ⁽¹⁾	22.000	21.000	.500	22½	1240	
	24	34.000	33.000	.500	25	XS ⁽¹⁾	24.000	23.000	.500	23	1270	
	26	34.000	33.000	.500	25	XS ⁽¹⁾	26.000	25.000	.500	23½	1300	
	28	34.000	33.000	.500	25	XS ⁽¹⁾	28.000	27.000	.500	23½	1325	
	30	34.000	33.000	.500	25	XS ⁽¹⁾	30.000	29.000	.500	24	1355	
	32	34.000	33.000	.500	25	XS ⁽¹⁾	32.000	31.000	.500	24½	1390	
	34	34.000	33.000	.500	25	XS ⁽¹⁾	34.000	33.000	.500	25	1420	
36	16	36.000	35.000	.500	26½	XS ⁽¹⁾	16.000	15.000	.500	22	1280	
	18	36.000	35.000	.500	26½	XS ⁽¹⁾	18.000	17.000	.500	22½	1315	
	20	36.000	35.000	.500	26½	XS ⁽¹⁾	20.000	19.000	.500	23	1345	
	22	36.000	35.000	.500	26½	XS ⁽¹⁾	22.000	21.000	.500	23½	1380	
	24	36.000	35.000	.500	26½	XS ⁽¹⁾	24.000	23.000	.500	24	1415	
	26	36.000	35.000	.500	26½	XS ⁽¹⁾	26.000	25.000	.500	24½	1440	
	28	36.000	35.000	.500	26½	XS ⁽¹⁾	28.000	27.000	.500	24½	1475	
	30	36.000	35.000	.500	26½	XS ⁽¹⁾	30.000	29.000	.500	25	1510	
	32	36.000	35.000	.500	26½	XS ⁽¹⁾	32.000	31.000	.500	25½	1540	
	34	36.000	35.000	.500	26½	XS ⁽¹⁾	34.000	33.000	.500	26	1575	
	36	36.000	35.000	.500	26½	XS ⁽¹⁾	36.000	35.000	.500	26½	1610	

PRICES ON APPLICATION

(1) XS designates Extra Strong (extra strong wall).

** Outlet dimension "M" is recommended but not mandatory per ANSI B16.9 - 1971 for the following run sizes:

14" and larger for reducing tees
26" and larger for straight tees

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail, see page 89.

▲ For information on this Standard see page 89.

Tees

Straight and Reducing Outlet, Extra Strong†

Straight—Part No. 21 Reducing Outlet—Part No. 23

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN O. D.	INSIDE DIAM. OF RUN I. D.	WALL THICK. OF RUN T	CENTER TO END C	†PIPE SCHEDULE NUMBER	OUTSIDE DIAM. OF BRANCH O. D.	INSIDE DIAM. OF BRANCH I. D.	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH M **	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH											
42	16	42.000	41.000	.500	30		16.000	15.000	.500	25	1748	
	18	42.000	41.000	.500	30		18.000	17.000	.500	25½	1772	
	20	42.000	41.000	.500	30		20.000	19.000	.500	26	1791	
	22	42.000	41.000	.500	30		22.000	21.000	.500	26	1815	
	24	42.000	41.000	.500	30		24.000	23.000	.500	26	1844	
	26	42.000	41.000	.500	30		26.000	25.000	.500	27½	1853	
	28	42.000	41.000	.500	30		28.000	27.000	.500	27½	1871	
	30	42.000	41.000	.500	30		30.000	29.000	.500	28	1894	
	32	42.000	41.000	.500	30		32.000	31.000	.500	28	1906	
	34	42.000	41.000	.500	30		34.000	33.000	.500	28	1920	
	36	42.000	41.000	.500	30		36.000	35.000	.500	28	1931	
	42	42.000	41.000	.500	30		42.000	41.000	.500	28	2081	
48	16	48.000	47.000	.500	35		16.000	15.000	.500	28	2358	
	18	48.000	47.000	.500	35		18.000	17.000	.500	28½	2376	
	20	48.000	47.000	.500	35		20.000	19.000	.500	29	2342	
	22	48.000	47.000	.500	35		22.000	21.000	.500	29	2410	
	24	48.000	47.000	.500	35		24.000	23.000	.500	29	2420	
	26	48.000	47.000	.500	35		26.000	25.000	.500	30	2443	
	28	48.000	47.000	.500	35		28.000	27.000	.500	30	2458	
	30	48.000	47.000	.500	35		30.000	29.000	.500	30	2473	
	32	48.000	47.000	.500	35		32.000	31.000	.500	31	2490	
	34	48.000	47.000	.500	35		34.000	33.000	.500	31	2508	
	36	48.000	47.000	.500	35		36.000	35.000	.500	31	2525	
	38	48.000	47.000	.500	35		38.000	37.000	.500	32	2544	
	40	48.000	47.000	.500	35		40.000	39.000	.500	32	2561	
	42	48.000	47.000	.500	35		42.000	41.000	.500	32	2583	
	44	48.000	47.000	.500	35		44.000	43.000	.500	33	2601	
	46	48.000	47.000	.500	35		46.000	45.000	.500	33	2629	
	48	48.000	47.000	.500	35		48.000	47.000	.500	33	2664	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† Unless otherwise indicated on quotation, 20" and smaller are furnished seamless. Non-seamless tees are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are located opposite the branch and are radiographed per the requirements of ASTM A234 and stress relieved.

‡ All thicknesses agree with those for Extra Strong Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16"

and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved.

** Outlet dimension "M" for run sizes 26" and larger is recommended but not mandatory per ANSI B16.9 - 1971.

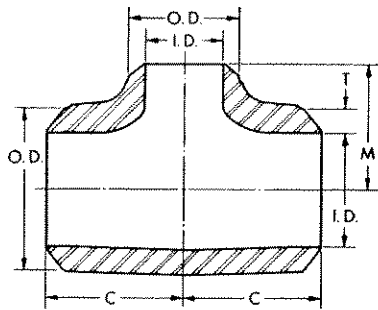
Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail, see page 89.

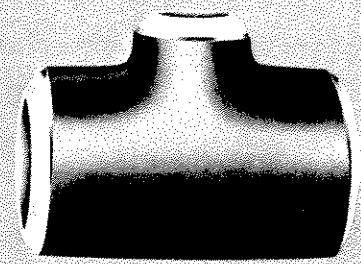
▲ For information on this Standard see page 89.

TEES Schedule 160†



STRAIGHT

REDUCING OUTLET



ANSI B16.9 *

ASTM A234 *

Part No. 47

Part No. 48

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN O. D.	INSIDE DIAM. OF RUN I. D.	WALL THICK. OF RUN T	CENTER TO END C	OUTSIDE DIAM. OF BRANCH O. D.	INSIDE DIAM. OF BRANCH I. D.	WALL THICK-NESS OF BRANCH	CENTER TO END OF BRANCH M	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH										
1/2	1/2	.840	.464	.188	1	.840	.464	.188	1	.34	
3/4	3/8	1.050	.612	.219	1 1/8	.675	.301†	.187‡	1 1/8	.52	
	1/2	1.050	.612	.219	1 1/8	.840	.464	.188	1 1/8	.52	
	3/4	1.050	.612	.219	1 1/8	1.050	.612	.219	1 1/8	.55	
1	3/8	1.315	.815	.250	1 1/2	.675	.301†	.187‡	1 1/2	.99	
	1/2	1.315	.815	.250	1 1/2	.840	.464	.188	1 1/2	1.00	
	3/4	1.315	.815	.250	1 1/2	1.050	.612	.219	1 1/2	1.01	
	1	1.315	.815	.250	1 1/2	1.315	.815	.250	1 1/2	1.2	
1 1/4	1/2	1.660	1.160	.250	1 7/8	.840	.464	.188	1 7/8	1.7	
	3/4	1.660	1.160	.250	1 7/8	1.050	.612	.219	1 7/8	1.7	
	1	1.660	1.160	.250	1 7/8	1.315	.815	.250	1 7/8	1.8	
	1 1/4	1.660	1.160	.250	1 7/8	1.660	1.160	.250	1 7/8	2.0	
1 1/2	1/2	1.900	1.338	.281	2 1/4	.840	.464	.188	2 1/4	2.6	
	3/4	1.900	1.338	.281	2 1/4	1.050	.612	.219	2 1/4	2.6	
	1	1.900	1.338	.281	2 1/4	1.315	.815	.250	2 1/4	2.6	
	1 1/4	1.900	1.338	.281	2 1/4	1.660	1.160	.250	2 1/4	2.8	
	1 1/2	1.900	1.338	.281	2 1/4	1.900	1.338	.281	2 1/4	3.0	
2	3/4	2.375	1.687	.344	2 1/2	1.050	.612	.219	1 3/4	4.3	
	1	2.375	1.687	.344	2 1/2	1.315	.815	.250	2	4.4	
	1 1/4	2.375	1.687	.344	2 1/2	1.660	1.160	.250	2 1/4	4.4	
	1 1/2	2.375	1.687	.344	2 1/2	1.900	1.338	.281	2 3/8	4.6	
	2	2.375	1.687	.344	2 1/2	2.375	1.687	.344	2 1/2	5.0	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† Pipe Schedule Numbers are in accordance with ANSI B36.10.

‡ These are Tube Turns dimensions, since there is no American Standard for 3/8" Schedule 160 pipe.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

▲ For information on this Standard see page 89.

Tees

Straight and Reducing Outlet, Schedule 160†

Straight—Part No. 47 Reducing Outlet—Part No. 48

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN O. D.	INSIDE DIAM. OF RUN I. D.	WALL THICK. OF RUN T	CENTER TO END C	OUTSIDE DIAM. OF BRANCH O. D.	INSIDE DIAM. OF BRANCH I. D.	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH M	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH										
2½	1	2.875	2.125	.375	3	1.315	.815	.250	2¼	6.8	
	1¼	2.875	2.125	.375	3	1.660	1.160	.250	2½	6.9	
	1½	2.875	2.125	.375	3	1.900	1.338	.281	2⅝	7.1	
	2	2.875	2.125	.375	3	2.375	1.687	.344	2¾	7.3	
	2½	2.875	2.125	.375	3	2.875	2.125	.375	3	8.0	
3	1¼	3.500	2.624	.438	3⅜	1.660	1.160	.250	2¾	10.9	
	1½	3.500	2.624	.438	3⅜	1.900	1.338	.281	2⅞	11.1	
	2	3.500	2.624	.438	3⅜	2.375	1.687	.344	3	11.2	
	2½	3.500	2.624	.438	3⅜	2.875	2.125	.375	3¼	11.5	
	3	3.500	2.624	.438	3⅜	3.500	2.624	.438	3⅝	12.0	
4	1½	4.500	3.438	.531	4⅞	1.900	1.338	.281	3⅜	20.6	
	2	4.500	3.438	.531	4⅞	2.375	1.687	.344	3½	20.7	
	2½	4.500	3.438	.531	4⅞	2.875	2.125	.375	3¾	20.9	
	3	4.500	3.438	.531	4⅞	3.500	2.624	.438	3⅞	21.1	
	4	4.500	3.438	.531	4⅞	4.500	3.438	.531	4⅞	23	
5	2	5.563	4.313	.625	4⅞	2.375	1.687	.344	4⅞	35	
	2½	5.563	4.313	.625	4⅞	2.875	2.125	.375	4¼	35	
	3	5.563	4.313	.625	4⅞	3.500	2.624	.438	4⅜	36	
	4	5.563	4.313	.625	4⅞	4.500	3.438	.531	4⅝	36	
	5	5.563	4.313	.625	4⅞	5.563	4.313	.625	4⅞	40	
6	2½	6.625	5.187	.719	5⅝	2.875	2.125	.375	4¾	56	
	3	6.625	5.187	.719	5⅝	3.500	2.624	.438	4⅞	56	
	4	6.625	5.187	.719	5⅝	4.500	3.438	.531	5⅞	56	
	5	6.625	5.187	.719	5⅝	5.563	4.313	.625	5⅜	57	
	6	6.625	5.187	.719	5⅝	6.625	5.187	.719	5⅝	60	
8	4	8.625	6.813	.906	7	4.500	3.438	.531	6⅞	113	
	5	8.625	6.813	.906	7	5.563	4.313	.625	6⅜	114	
	6	8.625	6.813	.906	7	6.625	5.187	.719	6⅝	114	
	8	8.625	6.813	.906	7	8.625	6.813	.906	7	120	
10	4	10.750	8.500	1.125	8½	4.500	3.438	.531	7¼	210	
	5	10.750	8.500	1.125	8½	5.563	4.313	.625	7½	209	
	6	10.750	8.500	1.125	8½	6.625	5.187	.719	7⅝	210	
	8	10.750	8.500	1.125	8½	8.625	6.813	.906	8	212	
	10	10.750	8.500	1.125	8½	10.750	8.500	1.125	8½	222	
12	5	12.750	10.126	1.312	10	5.563	4.313	.625	8½	341	
	6	12.750	10.126	1.312	10	6.625	5.187	.719	8⅝	340	
	8	12.750	10.126	1.312	10	8.625	6.813	.906	9	340	
	10	12.750	10.126	1.312	10	10.750	8.500	1.125	9½	344	
	12	12.750	10.126	1.312	10	12.750	10.126	1.312	10	360	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† Pipe Schedule Numbers are in accordance with ANSI B36.10.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

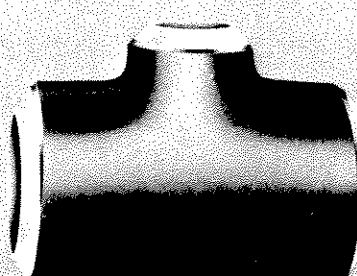
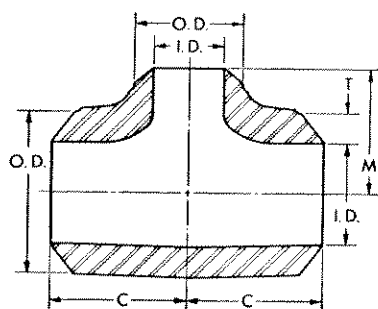
For bevel detail see page 89.

▲ For information on this Standard see page 89.

TEES Double Extra Strong†

STRAIGHT

REDUCING OUTLET



Part No. 46

Part No. 49

ANSI B16.9▲

ASTM A234*

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICKNESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C	O. D.	I. D.		M		
1/2	1/2	.840	.252	.294	1	.840	.252	.294	1	.38	
3/4	1/2	1.050	.434	.308	1 1/8	.840	.252	.294	1 1/8	.58	
	3/4	1.050	.434	.308	1 1/8	1.050	.434	.308	1 1/8	.60	
1	1/2	1.315	.599	.358	1 1/2	.840	.252	.294	1 1/2	1.19	
	3/4	1.315	.599	.358	1 1/2	1.050	.434	.308	1 1/2	1.21	
	1	1.315	.599	.358	1 1/2	1.315	.599	.358	1 1/2	1.4	
1 1/4	1/2	1.660	.896	.382	1 7/8	.840	.252	.294	1 7/8	2.2	
	3/4	1.660	.896	.382	1 7/8	1.050	.434	.308	1 7/8	2.2	
	1	1.660	.896	.382	1 7/8	1.315	.599	.358	1 7/8	2.3	
	1 1/4	1.660	.896	.382	1 7/8	1.660	.896	.382	1 7/8	2.5	
1 1/2	1/2	1.900	1.100	.400	2 1/4	.840	.252	.294	2 1/4	3.2	
	3/4	1.900	1.100	.400	2 1/4	1.050	.434	.308	2 1/4	3.2	
	1	1.900	1.100	.400	2 1/4	1.315	.599	.358	2 1/4	3.3	
	1 1/4	1.900	1.100	.400	2 1/4	1.660	.896	.382	2 1/4	3.4	
	1 1/2	1.900	1.100	.400	2 1/4	1.900	1.100	.400	2 1/4	4.0	
2	3/4	2.375	1.503	.436	2 1/2	1.050	.434	.308	1 3/4	5.1	
	1	2.375	1.503	.436	2 1/2	1.315	.599	.358	2	5.1	
	1 1/4	2.375	1.503	.436	2 1/2	1.660	.896	.382	2 1/4	5.3	
	1 1/2	2.375	1.503	.436	2 1/2	1.900	1.100	.400	2 3/8	5.5	
	2	2.375	1.503	.436	2 1/2	2.375	1.503	.436	2 1/2	6.0	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All thicknesses agree with those for Double Extra Strong Wall Pipe (see ANSI B36.10).

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

▲ For information on this Standard see page 89.

Tees

Straight and Reducing Outlet, Double Extra Strong†

Straight—Part No. 46 Reducing Outlet—Part No. 49

NOMINAL PIPE SIZE		OUTSIDE DIAM. OF RUN	INSIDE DIAM. OF RUN	WALL THICK. OF RUN	CENTER TO END	OUTSIDE DIAM. OF BRANCH	INSIDE DIAM. OF BRANCH	WALL THICK- NESS OF BRANCH	CENTER TO END OF BRANCH	APPROX. WEIGHT IN POUNDS	LIST PRICE
RUN	BRANCH	O. D.	I. D.	T	C	O. D.	I. D.	BRANCH	M		
2½	1	2.875	1.771	.552	3	1.315	.599	.358	2¼	8.9	
	1¼	2.875	1.771	.552	3	1.660	.896	.382	2½	9.0	
	1½	2.875	1.771	.552	3	1.900	1.100	.400	2¾	9.2	
	2	2.875	1.771	.552	3	2.375	1.503	.436	2¾	9.3	
	2½	2.875	1.771	.552	3	2.875	1.771	.552	3	10.0	
3	1¼	3.500	2.300	.600	3¾	1.660	.896	.382	2¾	13.7	
	1½	3.500	2.300	.600	3¾	1.900	1.100	.400	2¾	13.8	
	2	3.500	2.300	.600	3¾	2.375	1.503	.436	3	13.9	
	2½	3.500	2.300	.600	3¾	2.875	1.771	.552	3¼	14.3	
	3	3.500	2.300	.600	3¾	3.500	2.300	.600	3¾	15.0	
3½	1½	4.000	2.728	.636	3¾	1.900	1.100	.400	3¼	18.6	
	2	4.000	2.728	.636	3¾	2.375	1.503	.436	3¼	18.6	
	2½	4.000	2.728	.636	3¾	2.875	1.771	.552	3½	19.2	
	3	4.000	2.728	.636	3¾	3.500	2.300	.600	3½	19.6	
	3½	4.000	2.728	.636	3¾	4.000	2.728	.636	3¾	22.0	
4	1½	4.500	3.152	.674	4¼	1.900	1.100	.400	3¾	24.6	
	2	4.500	3.152	.674	4¼	2.375	1.503	.436	3½	24.6	
	2½	4.500	3.152	.674	4¼	2.875	1.771	.552	3¾	25	
	3	4.500	3.152	.674	4¼	3.500	2.300	.600	3¾	25	
	3½	4.500	3.152	.674	4¼	4.000	2.728	.636	4	26	
	4	4.500	3.152	.674	4¼	4.500	3.152	.674	4¼	27	
5	2	5.563	4.063	.750	4¾	2.375	1.503	.436	4¼	41	
	2½	5.563	4.063	.750	4¾	2.875	1.771	.552	4¼	41	
	3	5.563	4.063	.750	4¾	3.500	2.300	.600	4¾	41	
	3½	5.563	4.063	.750	4¾	4.000	2.728	.636	4½	41	
	4	5.563	4.063	.750	4¾	4.500	3.152	.674	4¾	42	
	5	5.563	4.063	.750	4¾	5.563	4.063	.750	4¾	44	
6	2½	6.625	4.897	.864	5½	2.875	1.771	.552	4¾	64	
	3	6.625	4.897	.864	5½	3.500	2.300	.600	4¾	64	
	3½	6.625	4.897	.864	5½	4.000	2.728	.636	5	64	
	4	6.625	4.897	.864	5½	4.500	3.152	.674	5¼	65	
	5	6.625	4.897	.864	5½	5.563	4.063	.750	5¾	65	
	6	6.625	4.897	.864	5½	6.625	4.897	.864	5½	68	
8	3½	8.625	6.875	.875	7	4.000	2.728	.636	6	111	
	4	8.625	6.875	.875	7	4.500	3.152	.674	6¼	111	
	5	8.625	6.875	.875	7	5.563	4.063	.750	6¾	111	
	6	8.625	6.875	.875	7	6.625	4.897	.864	6¾	113	
	8	8.625	6.875	.875	7	8.625	6.875	.875	7	120	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All thicknesses agree with those for Double Extra Strong Wall Pipe (see ANSI B36.10).

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

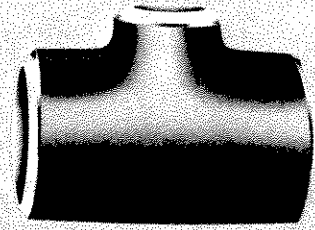
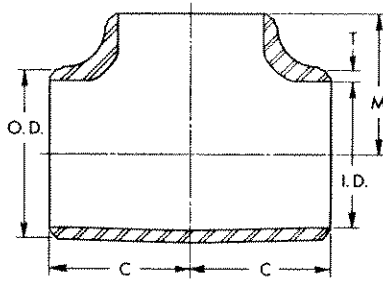
For bevel detail see page 89.

▲ For information on this Standard see page 89.

TEES *Special Schedules†*

STRAIGHT

REDUCING OUTLET



ANSI B16.9[▲]

ASTM A234 *

Part Nos. 220, 320, 420, 620, 820, 1020, 1220, 1420 **Part Nos. 222, 322, 422, 622, 822, 1022, 1222, 1422**

NOMINAL PIPE SIZE	PIPE SCHEDULE NUMBER	PART NUMBER		OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	CENTER TO END C & M ⁽¹⁾	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
		STRAIGHT	REDUCING OUTLET						
4	120	1220	1222	4.500	3.624	.438	4 1/8	23.5	
5	120	1220	1222	5.563	4.563	.500	4 7/8	44.5	
6	120	1220	1222	6.625	5.501	.562	5 5/8	64	
8	20	220	222	8.625	8.125	.250	7	54	
8	30	320	322	8.625	8.071	.277	7	57	
8	60	620	622	8.625	7.813	.406	7	76	
8	100	1020	1022	8.625	7.437	.594	7	97	
8	120	1220	1222	8.625	7.187	.719	7	115	
8	140	1420	1422	8.625	7.001	.812	7	133	
10	20	220	222	10.750	10.250	.250	8 1/2	73	
10	30	320	322	10.750	10.136	.307	8 1/2	81	
10	80	820	822	10.750	9.562	.594	8 1/2	161	
10	100	1020	1022	10.750	9.312	.719	8 1/2	180	
10	120	1220	1222	10.750	9.062	.844	8 1/2	215	
10	140	1420	1422	10.750	8.750	1.000	8 1/2	241	
12	20	220	222	12.750	12.250	.250	10	120	
12	30	320	322	12.750	12.090	.330	10	136	
12	40	420	422	12.750	11.938	.406	10	147	
12	60	620	622	12.750	11.626	.562	10	226	
12	80	820	822	12.750	11.374	.688	10	245	
12	100	1020	1022	12.750	11.062	.844	10	304	
12	120	1220	1222	12.750	10.750	1.000	10	353	
12	140	1420	1422	12.750	10.500	1.125	10	404	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† Pipe Schedule Numbers and respective thicknesses are in accordance with ANSI B36.10.

Other thicknesses also available.

(1) Dimensions given are for Straight Tees. For Reducing Outlet Tees, refer to Standard Weight Tees pp. 37-42.

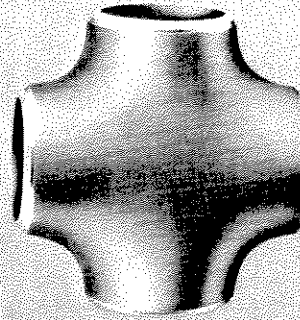
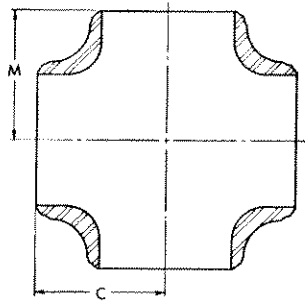
Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

▲ For information on this Standard see page 89.

WELDING CROSSES



**Straight
and
Reducing
Outlet**

† Standard Weight Part Nos. 82–82A

† Extra Strong Part Nos. 83–83A

ANSI B16.9^{*}

ASTM A234^{*}

NOMINAL PIPE SIZE		CENTER TO END OF RUN C†	CENTER TO END OF BRANCH M†	STANDARD WEIGHT		EXTRA STRONG	
				APPROX. WEIGHT IN POUNDS	LIST PRICE		APPROX. WEIGHT IN POUNDS
RUN	BRANCH				STRAIGHT OUTLET PART NO. 82	REDUCING OUTLET PART NO. 82A	
1¼	¾	1⅞	1⅞	1.1			1.4
	1	1⅞	1⅞	1.3			1.5
	1¼	1⅞	1⅞	1.5			1.9
1½	¾	2¼	2¼	1.6			2.0
	1	2¼	2¼	1.8			2.2
	1¼	2¼	2¼	1.9			2.4
	1½	2¼	2¼	2.3			2.8
2	1	2½	2	2.5			3.2
	1¼	2½	2¼	2.7			3.4
	1½	2½	2⅜	2.9			3.7
	2	2½	2½	3.4			4.2
2½	1	3	2¼	4.4			5.4
	1¼	3	2½	4.5			5.6
	1½	3	2⅝	4.7			5.8
	2	3	2¾	4.9			6.0
	2½	3	3	5.9			7.2
3	1	3⅜	2⅝	6.3			8.0
	1¼	3⅜	2¾	6.4			8.1
	1½	3⅜	2⅞	6.6			8.4
	2	3⅜	3	6.7			8.5
	2½	3⅜	3¼	7.3			8.9
	3	3⅜	3⅜	8.3			10.3

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All dimensions are in inches.

^{*} Grade B fittings are available from stock.

† Center to end of run and of branch is same for Standard Weight and Extra Strong.

Larger sizes and other thicknesses also available.

Unless otherwise indicated on quotation, 18" x 10" and smaller are furnished seamless. Non-seamless crosses are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

Welding Crosses

Part Nos. 82, 82A, 83, 83A

NOMINAL PIPE SIZE		CENTER TO END OF RUN C†	CENTER TO END OF BRANCH M†	STANDARD WEIGHT		EXTRA STRONG			
RUN	BRANCH			APPROX. WEIGHT IN POUNDS	LIST PRICE		APPROX. WEIGHT IN POUNDS	LIST PRICE	
					STRAIGHT OUTLET PART NO. 82	REDUCING OUTLET PART NO. 82A		STRAIGHT OUTLET PART NO. 83	REDUCING OUTLET PART NO. 83A
3½	1½	3¾	3⅛	8.58			11.1		
	2	3¾	3¼	8.59			11.2		
	2½	3¾	3½	9.21			11.8		
	3	3¾	3⅝	9.59			12.2		
	3½	3¾	3¾	10.8			13.8		
4	1½	4⅛	3⅜	11.0			14.4		
	2	4⅛	3½	11.1			14.4		
	2½	4⅛	3¾	11.5			15.0		
	3	4⅛	3⅞	11.9			15.4		
	3½	4⅛	4	12.4			15.9		
	4	4⅛	4⅛	13.9			17.8		
5	2	4⅞	4⅛	17.2			23.1		
	2½	4⅞	4¼	17.7			23.6		
	3	4⅞	4⅜	17.9			23.8		
	3½	4⅞	4½	18.2			24.2		
	4	4⅞	4⅝	18.8			24.8		
	5	4⅞	4⅞	21.6			28.2		
6	2½	5⅝	4¾	25.8			36		
	3	5⅝	4⅞	26.0			37		
	3½	5⅝	5	26.3			37		
	4	5⅝	5⅛	26.6			37		
	5	5⅝	5⅜	27.7			38		
	6	5⅝	5⅝	31.5			43.4		
8	3	7	6	47			68		
	3½	7	6	48			68		
	4	7	6⅛	48			68		
	5	7	6⅜	48			69		
	6	7	6⅝	49			70		
	8	7	7	57.1			79.8		
10	4	8½	7¼	81			105		
	5	8½	7½	81			105		
	6	8½	7⅝	82			106		
	8	8½	8	84			110		
	10	8½	8½	96			123		

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† Wall thicknesses and equivalent Schedule Numbers are same as for Standard Weight and Extra Strong Tees, pp. 37-48. Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.
For bevel detail see page 89.
▲ For information on this standard see page 89.

Welding Crosses

Part Nos. 82, 82A, 83, 83A

NOMINAL PIPE SIZE		CENTER TO END OF RUN C †	CENTER TO END OF BRANCH M †	STANDARD WEIGHT		EXTRA STRONG			
RUN	BRANCH			APPROX. WEIGHT IN POUNDS	LIST PRICE		APPROX. WEIGHT IN POUNDS	LIST PRICE	
					STRAIGHT OUTLET PART NO. 82	REDUCING OUTLET PART NO. 82A		STRAIGHT OUTLET PART NO. 83	REDUCING OUTLET PART NO. 83A
12	5	10	8 1/2	116			149		
	6	10	8 5/8	117			150		
	8	10	9	118			153		
	10	10	9 1/2	123			155		
	12	10	10	139			174		
14	6	11	9 3/8	134			174		
	8	11	9 3/4	136			176		
	10	11	10 1/8	138			178		
	12	11	10 5/8	144			186		
	14	11	11	168			214		
16	6	12	10 3/8	172			226		
	8	12	10 3/4	172			226		
	10	12	11 1/8	176			230		
	12	12	11 5/8	182			234		
	14	12	12	188			240		
18	16	12	12	216			274		
	8	13 1/2	11 3/4	224			290		
	10	13 1/2	12 1/8	226			292		
	12	13 1/2	12 5/8	228			296		
	14	13 1/2	13	234			300		
20	16	13 1/2	13	236			300		
	18	13 1/2	13 1/2	278			352		
	8	15	12 3/4	276			358		
	10	15	13 1/8	278			360		
	12	15	13 5/8	282			362		
22	14	15	14	284			364		
	16	15	14	290			370		
	18	15	14 1/2	298			380		
	20	15	15	348			438		
	10	16 1/2	14 1/8	357			464		
24	12	16 1/2	14 5/8	364			473		
	14	16 1/2	15	367			477		
	16	16 1/2	15	370			480		
	18	16 1/2	15 1/2	372			482		
	20	16 1/2	16	372			483		
26	22	16 1/2	16 1/2	428			531		
	10	17	15 1/8	422			544		
	12	17	15 5/8	424			546		
	14	17	16	426			546		
	16	17	16	432			554		
28	18	17	16 1/2	436			558		
	20	17	17	442			562		
	22	17	17	451			567		
	24	17	17	488			610		

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All dimensions are in inches.

* Grade B fittings are available from stock.

† Center to end of run and of branch is same for Standard Weight and Extra Strong.

Larger sizes and other thicknesses also available.

Unless otherwise indicated on quotation, 18" x 10" and smaller are furnished seamless. Non-seamless crosses are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

† Wall thicknesses and equivalent Schedule Numbers are same as for Standard Weight and Extra Strong Tees, p. 37-48.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

* For information on this standard see page 89.

** Outlet dimension "M" for run sizes 14" is recommended but not mandatory per ANSI B16.9 - 1971.

Welding Crosses

Part Nos. 82, 82A, 83, 83A

NOMINAL PIPE SIZE		CENTER TO END OF RUN C†	CENTER TO END OF BRANCH M† * *	STANDARD WEIGHT		EXTRA STRONG			
				APPROX. WEIGHT IN POUNDS	LIST PRICE		APPROX. WEIGHT IN POUNDS	LIST PRICE	
RUN	BRANCH				STRAIGHT OUTLET PART NO. 82	REDUCING OUTLET PART NO. 82A		STRAIGHT OUTLET PART NO. 83	REDUCING OUTLET PART NO. 83A
26	12	19½	16⅝	504			656		
	14	19½	17	508			662		
	16	19½	17	515			670		
	18	19½	17½	519			676		
	20	19½	18	521			679		
	22	19½	18½	525			684		
	24	19½	19	527			686		
	26	19½	19½	625			774		
28	12	20½	17⅝	571			744		
	14	20½	18	575			751		
	16	20½	18	584			762		
	18	20½	18½	589			769		
	20	20½	19	592			774		
	22	20½	19½	597			781		
	24	20½	20	601			785		
	26	20½	20½	604			788		
30	28	20½	20½	717			886		
	10	22	18⅝	641			835		
	12	22	18⅝	654			851		
	14	22	19	659			860		
	16	22	19	669			873		
	18	22	19½	674			882		
	20	22	20	678			889		
	22	22	20½	685			897		
	24	22	21	690			903		
	26	22	21½	694			908		
32	28	22	21½	700			911		
	30	22	22	841			1038		
	14	23½	20	748			976		
	16	23½	20	759			991		
	18	23½	20½	766			1002		
	20	23½	21	770			1010		
	22	23½	21½	778			1020		
	24	23½	22	784			1028		
	26	23½	22½	789			1035		
	28	23½	22½	797			1040		
	30	23½	23	801			1044		
	32	23½	23½	977			1204		

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All dimensions are in inches.

* Grade B fittings are available from stock.

† Center to end of run and of branch is same for Standard Weight and Extra Strong.

Larger sizes and other thicknesses also available.

Unless otherwise indicated on quotation, 18" x 10" and smaller are furnished seamless. Non-seamless crosses are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

† Wall thicknesses and equivalent Schedule Numbers are same as for Standard Weight and Extra Strong Tees, p. 37-48.

** Outlet dimensions "M" for run sizes 26" and larger is recommended but not mandatory per ANSI B16.9 - 1971.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

▲ For information on this standard see page 89.

Welding Crosses

Part Nos. 82, 82A, 83, 83A

NOMINAL PIPE SIZE		CENTER TO END OF RUN C†	CENTER TO END OF BRANCH M† **	STANDARD WEIGHT		EXTRA STRONG			
RUN	BRANCH			APPROX. WEIGHT IN POUNDS	LIST PRICE		APPROX. WEIGHT IN POUNDS	LIST PRICE	
					STRAIGHT OUTLET PART NO. 82	REDUCING OUTLET PART NO. 82A		STRAIGHT OUTLET PART NO. 83	REDUCING OUTLET PART NO. 83A
34	16	25	21	856		1117			
	18	25	21½	863		1129			
	20	25	22	868		1139			
	22	25	22½	876		1150			
	24	25	23	884		1160			
	26	25	23½	890		1169			
	28	25	23½	900		1177			
	30	25	24	905		1182			
	32	25	24½	909		1186			
	34	25	25	1125		1384			
36	16	26½	22	958		1250			
	18	26½	22½	966		1264			
	20	26½	23	971		1275			
	22	26½	23½	980		1288			
	24	26½	24	989		1299			
	26	26½	24½	996		1309			
	28	26½	24½	1008		1320			
	30	26½	25	1014		1327			
	32	26½	25½	1019		1333			
	34	26½	26	1024		1337			
36	26½	26½	1282		1574				
42	16	30	25	1272		1660			
	18	30	25½	1282		1676			
	20	30	26	1293		1689			
	22	30	26	1305		1707			
	24	30	26	1316		1723			
	26	30	27½	1334		1743			
	28	30	27½	1351		1761			
	30	30	28	1344		1763			
	32	30	28	1360		1778			
	34	30	28	1368		1787			
36	30	28	1382		1797				
42	30	28	1653		2033				
48	22	35	29	1715		2253			
	24	35	29	1743		2279			
	26	35	30	1743		2288			
	28	35	30	1766		2315			
	30	35	30	1787		2340			
	32	35	31	1789		2345			
	34	35	31	1809		2368			
	36	35	31	1831		2388			
	38	35	32	1828		2391			
	40	35	32	1849		2408			
42	35	32	1867		2423				
44	35	33	1868		2425				
46	35	33	1883		2437				
48	35	33	2034		2569				

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All dimensions are in inches.

* Grade B fittings are available from stock.

† Center to end of run and of branch is same for Standard Weight and Extra Strong.

Larger sizes and other thicknesses also available.

Unless otherwise indicated on quotation, 18" x 10" and smaller are furnished seamless. Non-seamless crosses are marked to indicate that they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

† Wall thicknesses and equivalent Schedule Numbers are same as for Standard Weight and Extra Strong Tees, p. 37-48.

** Outlet dimensions "M" for run sizes 26" and larger is recommended but not mandatory per ANSI B16.9 - 1971.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

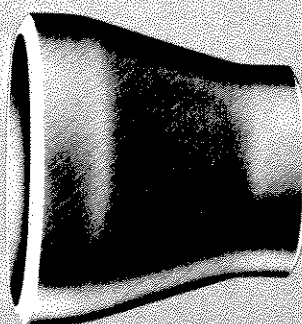
For bevel detail see page 89.

▲ For information on this standard see page 89.

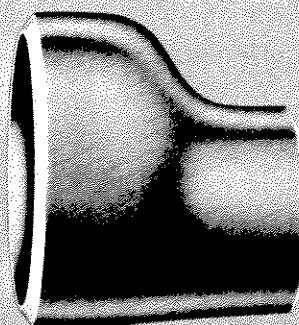
REDUCERS

Light Weight

**Concentric
Part No. 590**



**Eccentric
Part No. 592**



ANSI B16.9[▲]

ASTM A234^{*}

NOMINAL PIPE SIZE		NOMINAL WALL THICKNESS				LENGTH	APPROX. WEIGHT IN POUNDS	NOMINAL PIPE SIZE		NOMINAL WALL THICKNESS				LENGTH	APPROX. WEIGHT IN POUNDS
		LARGE END		SMALL END						LARGE END		SMALL END			
LG. END	SM. END	SCH 10 ¹	API 5L ²	SCH 10 ¹	API 5L ²			LG. END	SM. END	SCH 10 ¹	API 5L ²	SCH 10 ¹	API 5L ²		
3	1-1/4		.188		.140	3-1/2	1.70	12	6		.250		.219	8	31
	1-1/2		.188		.145		1.89		8		.250		.219		31
	2		.188		.154		2.00		10		.250		.219		31
	2-1/2		.188		.203		2.16								
4						4	3.4	14	6	.250	.250		.219	13	60
	1-1/2		.188		.145		3.4		8	.250	.250		.219		60
	2		.188		.154		3.4		10	.250	.250		.219		60
	2-1/2		.188		.203		3.4		12	.250	.250		.250		60
						16	3.4	8	.250	.250		.219	14	71	
	3		.188		.188		3.4	10	.250	.250		.219		71	
	3-1/2		.188				3.4	12	.250	.250		.250		71	
								14	.250	.250	.250	.250		71	
6	2-1/2		.219		.203	5-1/2	7.8	18	10	.250	.250		.219	15	89
	3		.219		.188		7.8		12	.250	.250		.250		89
	3-1/2		.219				7.8		14	.250	.250	.250	.250		89
	4		.219		.188		7.8		16	.250	.250	.250	.250		89
8	3-1/2		.219			6	12.5	20	12	.250	.250		.250	20	134
	4		.219		.188		12.5		14	.250	.250	.250	.250		134
	6		.219		.219		12.5		16	.250	.250	.250	.250		134
									18	.250	.250	.250	.250		134
10	4		.219		.188	7	21.1	24	16	.250	.250	.250	.250	20	158
	6		.219		.219		21.1		18	.250	.250	.250	.250		158
	8		.219		.219		21.1		20	.250	.250	.250	.250		158

All dimensions are in inches.

When ordering Light Weight Fittings, always specify Part Number or wall thickness.

* Grade B fittings are available from stock.

(1) Wall thicknesses are in accordance with ANSI B36.10 for 14" and larger.

(2) Wall thicknesses are from API 5L pipe specifications.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

Reducers are taper bored at ends to match pipe wall thickness.

For Dimensional Tolerances see page 88.

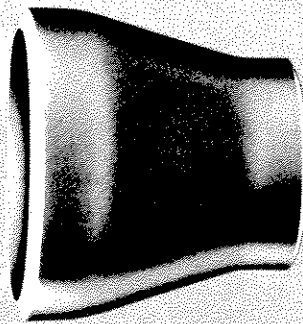
For bevel detail see page 89.

▲ For information on this Standard see page 89.

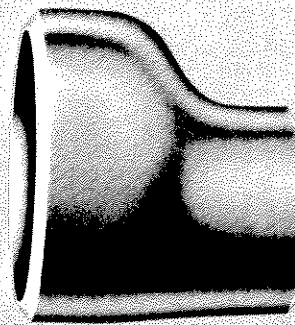
REDUCERS

Standard Weight†

Concentric
Part No. 90



Eccentric
Part No. 92



ANSI B16.9[▲]

ASTM A234 *

NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE	NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
LG. END	SM. END				LG. END	SM. END			
¾	¾	1½	.21	PRICES ON APPLICATION	4	1½	4	3.5	PRICES ON APPLICATION
	½	1½	.21			2	4	3.5	
1	¾	2	.30			2½	4	3.5	
	½	2	.30			3	4	3.5	
	¾	2	.30			3½	4	3.5	
1¼	½	2	.44		5	2	5	5.5	
	¾	2	.44			2½	5	5.5	
	1	2	.44			3	5	5.5	
1½	½	2½	.56			3½	5	5.5	
	¾	2½	.56			4	5	5.5	
	1	2½	.56		6	2½	5½	8	
	1¼	2½	.56			3	5½	8	
2	¾	3	1.0			3½	5½	8	
	1	3	1.0			4	5½	8	
	1¼	3	1.0			5	5½	8.5	
	1½	3	1.0			6	6	13	
2½	1	3½	1.5		8	3½	6	13	
	1¼	3½	1.5			4	6	13	
	1½	3½	1.5			5	6	13	
3	2	3½	1.5			6	6	13	
	1¼	3½	2.5		10	4	7	21	
	1½	3½	2.5			5	7	22	
	2	3½	2.5			6	7	22	
3½	2½	3½	2.5			8	7	23	
	1¼	4	3.0		12	5	8	32	
	1½	4	3.0			6	8	33	
	2	4	3.0			8	8	34	
	2½	4	3.0			10	8	34	
	3	4	3.0						

All dimensions are in inches.

* Grade B fittings are available from stock.

† Ends agree in O.D., I.D., and wall thickness with matching size Standard Weight pipe. (See ANSI B36.10).

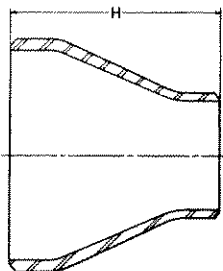
Unless otherwise indicated on quotation, 24" and smaller reducers are furnished seamless. Non-seamless reducers are marked to indicate that

they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

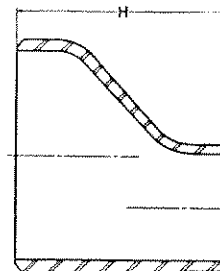
Eccentric reducers 34" and larger and 42" concentric reducers are fabricated as cones similar to Venturi type.

Pipe Line Welding Fittings, conforming to MSS Standard Practice

Concentric



Eccentric



ANSI B16.9 [▲]

ASTM A234*

NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE	NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE	
LG. END	SM. END				LG. END	SM. END				
14	6	13	61	PRICES ON APPLICATION	30	20	24	220	PRICES ON APPLICATION	
	8	13	61			24	24	220		
	10	13	65			26	24	220		
	12	13	65			28	24	220		
16	8	14	73		32	CONC. ECC.				
	10	14	73			24	24	255	221	
	12	14	73			26	24	255	229	
	14	14	73			28	24	255	237	
18	10	15	91			30	24	255	245	
	12	15	91		34	24	24	275	229	
	14	15	91			26	24	275	237	
	16	15	91			30	24	280	253	
20	12	20	120			32	24	285	261	
	14	20	149		36	24	24	280	237	
	16	20	120			26	24	290	245	
	18	20	136			30	24	295	261	
22	14	20	148			32	24	300	269	
	16	20	151			34	24	300	277	
	18	20	154		42	24	24	335		
	20	20	157			26	24	335		
24	16	20	162			30	24	340		
	18	20	162			32	24	345		
	20	20	162			34	24	345		
	22	20	162			36	24	345		
26	18	24	200		48	40	28	455		
	20	24	200			42	28	460		
	22	24	200			44	28	465		
	24	24	200			46	28	470		
28	18	24	210							
	20	24	210							
	24	24	210							
	26	24	210							

SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved. Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

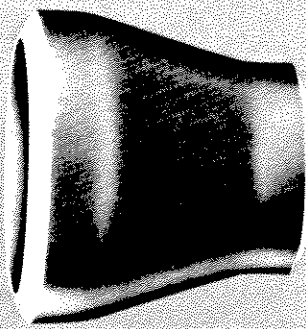
For length H see illustration on opposite page.
For Dimensional Tolerances see page 88.
For bevel detail, see page 89.

▲ For information on this Standard see page 89.

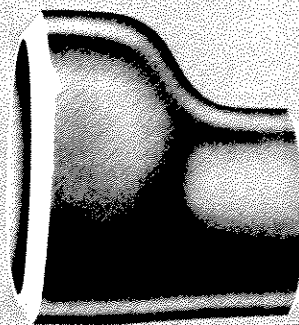
REDUCERS

Extra Strong[†]

**Concentric
Part No. 91**



**Eccentric
Part No. 93**



ANSI B16.9[▲]

ASTM A234 *

NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE	NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
LG. END	SM. END				LG. END	SM. END			
3/4	3/8	1 1/2	.24	PRICES ON APPLICATION	3 1/2	1 1/4	4	4	PRICES ON APPLICATION
	1/2	1 1/2	.26			1 1/2	4	4	
1	3/8	2	.37			2	4	4	
	1/2	2	.37			2 1/2	4	4	
	3/4	2	.37			3	4	4	
1 1/4	1/2	2	.5		4	1 1/2	4	5	
	3/4	2	.5			2	4	5	
	1	2	.5			2 1/2	4	5	
1 1/2	1/2	2 1/2	.7			3	4	5	
	3/4	2 1/2	.7			3 1/2	4	5	
	1	2 1/2	.7		5	2	5	7	
	1 1/4	2 1/2	.7			2 1/2	5	7	
2	3/4	3	1.2			3	5	7	
	1	3	1.2			3 1/2	5	7	
	1 1/4	3	1.2		6	2 1/2	5 1/2	11	
	1 1/2	3	1.2			3	5 1/2	11	
2 1/2	1	3 1/2	2			3 1/2	5 1/2	11	
	1 1/4	3 1/2	2			4	5 1/2	11	
	1 1/2	3 1/2	2		8	5	5 1/2	11	
	2	3 1/2	2			3 1/2	6	18	
3	1 1/4	3 1/2	3			4	6	18	
	1 1/2	3 1/2	3			5	6	18	
	2	3 1/2	3		10	6	6	18	
	2 1/2	3 1/2	3			4	7	29	
						5	7	29	
						6	7	29	
						8	7	29	

All dimensions are in inches.

* Grade B fittings are available from stock.

† Ends agree in O.D., I.D., and wall thickness with matching size Extra Strong Wall Pipe (See ANSI B36.10).

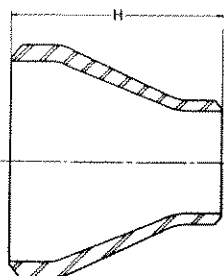
Unless otherwise indicated on quotation, 24" and smaller reducers are furnished seamless. Non-seamless reducers are marked to indicate that

they are fabricated from rolled cylinders with one longitudinal seam weld. Welds are radiographed per the requirements of ASTM A234 and stress relieved.

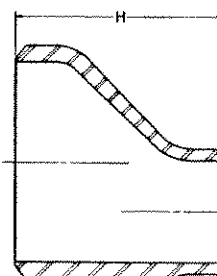
Eccentric reducers 34" and larger and 42" concentric reducers are fabricated as cones similar to Venturi type.

Pipe Line Welding Fittings, conforming to MSS Standard Practice

Concentric



Eccentric



ANSI B16.9[▲]

ASTM A234*

NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE	NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
LG. END	SM. END				LG. END	SM. END			
12	5	8	43	PRICES ON APPLICATION	28	18	24	290	PRICES ON APPLICATION
	6	8	43			20	24	290	
	8	8	43			24	24	290	
	10	8	43			26	24	290	
14	6	13	90		30	20	24	315	
	8	13	90			24	24	315	
	10	13	90			26	24	315	
	12	13	90			28	24	315	
16	8	14	100		32	CONC. ECC.			
	10	14	100			24	24	335	293
	12	14	100			26	24	335	304
	14	14	100			28	24	335	315
18	10	15	115			30	24	335	325
	12	15	115		34	24	24	365	304
	14	15	115			26	24	370	315
	16	15	115			30	24	375	336
20	12	20	180			32	24	375	347
	14	20	180		36	24	24	385	315
	16	20	180			26	24	390	325
	18	20	180			30	24	395	347
22	14	20	195			32	24	395	357
	16	20	198			34	24	400	368
	18	20	202		42	24	24	445	
	20	20	207			26	24	450	
24	16	20	210			30	24	455	
	18	20	210			32	24	455	
	20	20	210			34	24	460	
	22	20	210			36	24	460	
26	18	24	272		48	40	28	605	
	20	24	272			42	28	610	
	22	24	272			44	28	615	
	24	24	272			46	28	620	

SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths. Welds are 100% radiographed per Par. UW-51 of Section VIII of the ASME Boiler and Pressure Vessel Code and stress relieved. Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For length H see illustration on opposite page.

For Dimensional Tolerances see page 88.

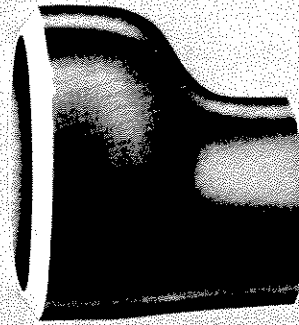
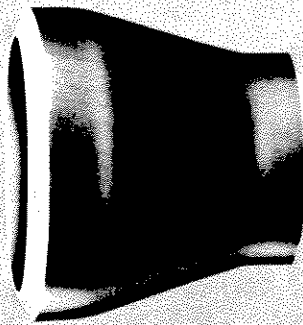
For bevel detail, see page 89.

▲ For information on this Standard see page 89.

REDUCERS

Schedule 160 and Double Extra Strong[†]

**Concentric
Part Nos. 85
and 94**



**Eccentric
Part Nos. 99
and 95**

ANSI B16.9[▲]

ASTM A234^{*}

SCHEDULE 160 — PART NOS. 85 AND 99

SCHEDULE 160 — PART NOS. 85 AND 99

NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE	NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
LG. END	SM. END				LG. END	SM. END			
3/4	3/8	1 1/2	.29	PRICES ON APPLICATION	4	1 1/2	4	5.7	PRICES ON APPLICATION
	1/2	1 1/2	.29			2	4	5.6	
1	3/8	2	.42			2 1/2	4	5.5	
	1/2	2	.42			3	4	6.6	
	3/4	2	.42		5	2	5	12	
1 1/4	1/2	2	.63			2 1/2	5	12	
	3/4	2	.63			3	5	12	
	1	2	.63			4	5	12	
1 1/2	1/2	2 1/2	.9		6	2 1/2	5 1/2	18	
	3/4	2 1/2	.9			3	5 1/2	18	
	1	2 1/2	.9			4	5 1/2	18	
	1 1/4	2 1/2	.9			5	5 1/2	18	
2	3/4	3	1.6		8	4	6	30	
	1	3	1.6			5	6	30	
	1 1/4	3	1.6			6	6	30	
	1 1/2	3	1.6		10	4	7	50	
2 1/2	1	3 1/2	2.7			5	7	50	
	1 1/4	3 1/2	2.7			6	7	50	
	1 1/2	3 1/2	2.7			8	7	58	
	2	3 1/2	2.7		12	5	8	78	
3	1 1/4	3 1/2	3.8			6	8	75	
	1 1/2	3 1/2	3.8			8	8	86	
	2	3 1/2	3.8			8	8	86	
	2 1/2	3 1/2	3.8			10	8	94	

All dimensions are in inches.

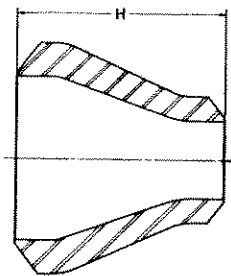
* Grade B fittings are available from stock.

† All wall thicknesses are in accordance with ANSI B36.10.

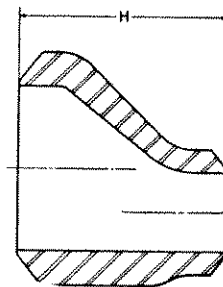
Ends agree in O.D., I.D., and wall thickness with matching size Schedule 160 pipe. (see ANSI B36.10).

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size thickness or schedule, and material grade.

Concentric



Eccentric



ANSI B16.9[▲]

ASTM A234 *

DOUBLE EXTRA STRONG — PART NOS. 94 AND 95

NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
LG. END	SM. END			
3/4	1/2	1 1/2	.34	PRICES ON APPLICATION
1	3/8	2	.50	
	1/2	2	.50	
	3/4	2	.50	
1 1/4	1/2	2	.75	
	3/4	2	.75	
	1	2	.75	
1 1/2	1/2	2 1/2	1.0	
	3/4	2 1/2	1.0	
	1	2 1/2	1.0	
	1 1/4	2 1/2	1.0	
2	3/4	3	2.0	
	1	3	2.0	
	1 1/4	3	2.0	
	1 1/2	3	2.0	
2 1/2	1	3 1/2	3.2	
	1 1/4	3 1/2	3.2	
	1 1/2	3 1/2	3.2	
	2	3 1/2	3.2	
3	1 1/4	3 1/2	4.5	
	1 1/2	3 1/2	4.5	
	2	3 1/2	4.5	
	2 1/2	3 1/2	4.5	

DOUBLE EXTRA STRONG — PART NOS. 94 AND 95

NOMINAL PIPE SIZE		LENGTH H	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
LG. END	SM. END			
3 1/2	1 1/4	4	6.5	PRICES ON APPLICATION
	1 1/2	4	6.5	
	2	4	6.5	
	2 1/2	4	6.5	
	3	4	6.5	
4	1 1/2	4	7	
	2	4	7	
	2 1/2	4	7	
	3	4	7	
	3 1/2	4	7	
5	2	5	13	
	2 1/2	5	13	
	3	5	13	
	3 1/2	5	13	
	4	5	13	
6	2 1/2	5 1/2	20	
	3	5 1/2	20	
	3 1/2	5 1/2	20	
	4	5 1/2	20	
	5	5 1/2	20	
8	3 1/2	6	30	
	4	6	30	
	5	6	30	
	6	6	30	

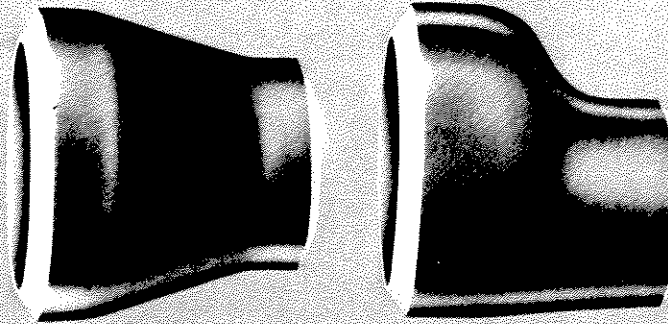
For length H see illustration on opposite page.
For Dimensional Tolerances see page 88.

For bevel detail see page 89.
▲ For information on this Standard see page 89.

REDUCERS

Special Schedules†

Concentric
Part Nos.
490 and 890



Eccentric
Part Nos.
492 and 892

ANSI B16.9 ▲

ASTM A234 *

NOMINAL PIPE SIZE		PIPE SCHEDULE NUMBER	PART NUMBER		LENGTH	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
LG END	SM END		CONCENTRIC	ECCENTRIC			
10	4	80	890	892	7	25.3	PRICES ON APPLICATION
	5	80	890	892	7	28.7	
	6	80	890	892	7	29.8	
	8	80	890	892	7	31.4	
12	4	40	490	492	8	29.8	
	5	40	490	492	8	30.5	
	6	40	490	492	8	31.1	
	8	40	490	492	8	32.1	
	10	40	490	492	8	33.4	
12	4	80	890	892	8	38.5	
	5	80	890	892	8	39.1	
	6	80	890	892	8	40.6	
	8	80	890	892	8	42.1	
	10	80	890	892	8	43.6	

All dimensions are in inches.

* Grade B fittings are available from stock.

† Pipe Schedule Numbers are in accordance with ANSI B36.10.

Ends agree in O.D., I.D., and wall thickness with pipe they are to match.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For length H see illustration on page 65.

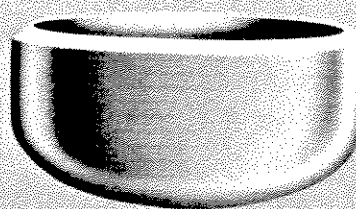
For Dimensional Tolerances see page 88.

For bevel detail see page 89.

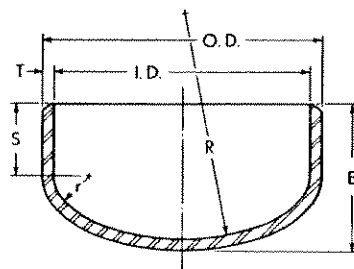
▲ For information on this Standard see page 89.

CAPS

Light Weight†



Part No. 580



ANSI B16.9[▲]

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	PART NUMBER	LENGTH E	TANGENT S	DISH RADIUS R†	KNUCKLE RADIUS r†	PIPE SCHEDULE NUMBER	APPROX. WEIGHT IN POUNDS	LIST PRICE
3	3.500	3.124	.188 ⁽¹⁾	580	2	1.02	2.69	.51		2.00	
4	4.500	4.124	.188 ⁽¹⁾	580	2-1/2	1.26	3.52	.67		2.40	
6	6.625	6.187	.219 ⁽¹⁾	580	3-1/2	1.70	5.31	1.01		6.4	
8	8.625	8.187	.219 ⁽¹⁾	580	4	1.68	6.98	1.33		11.3	
10	10.750	10.312	.219 ⁽¹⁾	580	5	2.13	8.77	1.67		19.5	
12	12.750	12.250	.250 ⁽¹⁾	580	6	2.62	10.50	2.00		28.5	
14	14.000	13.500	.250	580	6-1/2	2.81	11.60	2.21	10	35.3	
16	16.000	15.500	.250	580	7	2.81	13.34	2.54	10	44.3	
18	18.000	17.500	.250	580	8	3.31	15.08	2.88	10	57.1	
20	20.000	19.500	.250	580	9	3.81	16.84	3.21	10	71.7	
24	24.000	23.500	.250	580	10-1/2	4.31	20.34	3.88	10	102	

PRICES ON APPLICATION

All dimensions are in inches.

When ordering Light Weight Fittings always specify Part Number or wall thickness.

* Grade B fittings are available from stock.

† Pipe Schedule Numbers are in accordance with ANSI B36.10 for 14" and larger.

(1) Wall thicknesses are from API 5L pipe specifications and are those thicknesses most commonly used for gas distribution services.

Welding Caps are formed from steel plate and are stress relieved after forming. Caps are of an ellipsoidal shape in which the minor axis is equal to half the major axis.

† Radii "R" and "r" closely approximate the actual semi-ellipsoidal shape of the TUBE TURNS welding cap.

Caps conform to ASME Boiler and Pressure Vessel Code requirements. Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

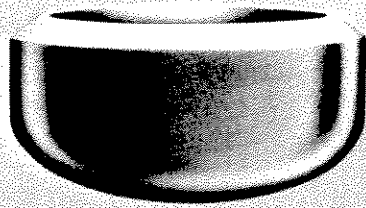
For Dimensional Tolerances see page 88.

For bevel detail see page 89.

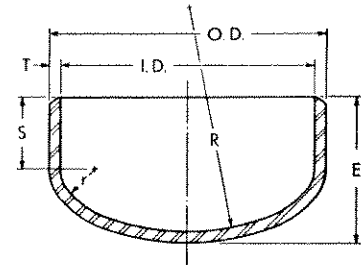
▲ For information on this Standard see page 89.

CAPS

Standard Weight†



Part No. 80



ANSI B16.9[▲]

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	LENGTH E	TANGENT S	DISH RADIUS R†	KNUCKLE RADIUS r†	PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1/2	.840	.622	.109	1	.74	.54	.10	40	.07	
3/4	1.050	.824	.113	1	.68	.72	.14	40	.11	
1	1.315	1.049	.133	1 1/2	1.10	.92	.17	40	.25	
1 1/4	1.660	1.380	.140	1 1/2	1.02	1.35	.23	40	.3	
1 1/2	1.900	1.610	.145	1 1/2	.95	1.41	.27	40	.35	
2	2.375	2.067	.154	1 1/2	.83	1.81	.34	40	.5	
2 1/2	2.875	2.469	.203	1 1/2	.68	2.15	.41	40	.8	
3	3.500	3.068	.216	2	1.02	2.69	.51	40	1.5	
3 1/2	4.000	3.548	.226	2 1/2	1.39	3.11	.59	40	2.0	
4	4.500	4.026	.237	2 1/2	1.26	3.52	.67	40	2.5	
5	5.563	5.047	.258	3	1.48	4.42	.84	40	5	
6	6.625	6.065	.280	3 1/2	1.70	5.31	1.01	40	7	
8	8.625	7.981	.322	4	1.68	6.98	1.33	40	12	
10	10.750	10.020	.365	5	2.13	8.77	1.67	40	20	
12	12.750	12.000	.375	6	2.62	10.50	2.00	ST ⁽¹⁾	29	
14	14.000	13.250	.375	6 1/2	2.81	11.60	2.21	30	35	
16	16.000	15.250	.375	7	2.81	13.34	2.54	30	44	
18	18.000	17.250	.375	8	3.31	15.08	2.88	ST ⁽¹⁾	58	
20	20.000	19.250	.375	9	3.81	16.84	3.21	20	79	
22	22.000	21.250	.375	10	4.31	18.60	3.54	20	86	
24	24.000	23.250	.375	10 1/2	4.31	20.34	3.88	20	105	
26	26.000	25.250	.375	10 1/2	3.81	22.10	4.21	ST ⁽¹⁾	110	
28	28.000	27.250	.375	10 1/2	3.31	23.85	4.54	ST ⁽¹⁾	119	
30	30.000	29.250	.375	10 1/2	2.81	25.60	4.88	ST ⁽¹⁾	125	
32	32.000	31.250	.375	10 1/2	2.31	27.35	5.21	ST ⁽¹⁾	143	
34	34.000	33.250	.375	10 1/2	1.81	29.10	5.54	ST ⁽¹⁾	160	
36	36.000	35.250	.375	10 1/2	1.31	30.85	5.88	ST ⁽¹⁾	175	
42	42.000	41.250	.375	12	1.31	36.10	6.88	ST ⁽¹⁾	230	
48	48.000	47.250	.375	13 1/2	1.31	41.36	7.88	ST ⁽¹⁾	292	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All thicknesses agree with those for Standard Wall Pipe (see ANSI B36.10), Pipe Schedule Numbers are in accordance with ANSI B36.10).

Pipe Line Welding Fittings, conforming to MSS Standard Practice SP-75, High Test Wrought Welding Fittings, are available in sizes 16" and larger with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths.

(1) ST designates Standard Weight (standard wall).

Welding Caps are formed from steel plate and are stress relieved after

forming. Caps are of an ellipsoidal shape in which the minor axis is equal to half the major axis.

‡ Radii "R" and "r" closely approximate the actual semi-ellipsoidal shape of the TUBE TURNS welding cap.

Caps conform to ASME Boiler and Pressure Vessel Code requirements. Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

Dimensional Tolerances see page 88.

For bevel detail see page 89.

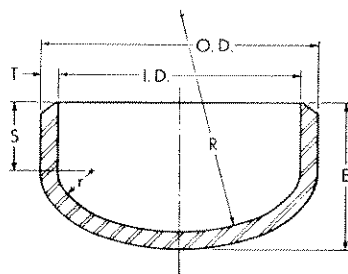
▲ For information on this Standard see page 89.

CAPS

Extra Strong[†]



Part No. 81



ANSI B16.9[▲]

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL THICKNESS T	LENGTH E	TANGENT S	DISH RADIUS R [†]	KNUCKLE RADIUS r [†]	PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1/2	.840	.546	.147	1	.72	.48	.09	80	.09	
3/4	1.050	.742	.154	1	.66	.65	.12	80	.13	
1	1.315	.957	.179	1 1/2	1.08	.83	.16	80	.3	
1 1/4	1.660	1.278	.191	1 1/2	.99	1.12	.21	80	.4	
1 1/2	1.900	1.500	.200	1 1/2	.92	1.31	.25	80	.5	
2	2.375	1.939	.218	1 1/2	.80	1.70	.32	80	.7	
2 1/2	2.875	2.323	.276	1 1/2	.64	2.01	.39	80	1	
3	3.500	2.900	.300	2	.98	2.56	.48	80	2	
3 1/2	4.000	3.364	.318	2 1/2	1.34	2.94	.56	80	3	
4	4.500	3.826	.337	2 1/2	1.21	3.35	.64	80	4	
5	5.563	4.813	.375	3	1.42	4.22	.80	80	6	
6	6.625	5.761	.432	3 1/2	1.63	5.04	.96	80	10	
8	8.625	7.625	.500	4	1.59	6.68	1.27	80	18	
10	10.750	9.750	.500	5	2.06	8.54	1.62	60	28	
12	12.750	11.750	.500	6	2.56	10.28	1.96	XS ⁽¹⁾	36	
14	14.000	13.000	.500	6 1/2	2.75	11.39	2.17	XS ⁽¹⁾	48	
16	16.000	15.000	.500	7	2.75	13.12	2.50	40	60	
18	18.000	17.000	.500	8	3.25	14.86	2.83	XS ⁽¹⁾	78	
20	20.000	19.000	.500	9	3.75	16.65	3.17	30	100	
22	22.000	21.000	.500	10	4.25	18.38	3.50	30	115	
24	24.000	23.000	.500	10 1/2	4.25	20.13	3.83	XS ⁽¹⁾	145	
26	26.000	25.000	.500	10 1/2	3.75	21.88	4.17	20	155	
28	28.000	27.000	.500	10 1/2	3.25	23.63	4.50	20	164	
30	30.000	29.000	.500	10 1/2	2.75	25.38	4.83	20	175	
32	32.000	31.000	.500	10 1/2	2.25	27.13	5.17	20	189	
34	34.000	33.000	.500	10 1/2	1.75	28.88	5.5	20	206	
36	36.000	35.000	.500	10 1/2	1.25	30.63	5.83	20	220	
42	42.000	41.000	.500	12	1.25	35.89	6.83	XS ⁽¹⁾	300	
48	48.000	47.000	.500	13 1/2	1.25	41.13	7.83	XS ⁽¹⁾	374	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All thicknesses agree with those for Extra Strong Wall Pipe (See ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10. Welding Caps are formed from steel plate and are stress relieved after forming. Caps are of an ellipsoidal shape in which the minor axis is equal to half the major axis.

‡ Radii "R" and "r" closely approximate the actual semi-ellipsoidal shape of the TUBE TURNS welding cap.

Caps conform to ASME Boiler and Pressure Vessel Code.

Pipe Line welding caps are available with physical properties to match pipe with 42,000, 46,000, 48,000, 50,000, 52,000, 60,000, 65,000 and over psi minimum yield strengths.

(1) XS designates Extra Strong (extra strong wall).

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

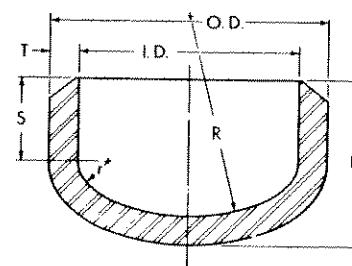
▲ For information on this Standard see page 89.

CAPS

Schedule 160 and Double Extra Strong[†]



Part Nos. 84 and 87



ANSI B16.9 [▲]

ASTM A234 *

SCHEDULE 160 — PART NO. 84

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	LENGTH E	TANGENT S	DISH RADIUS R [‡]	KNUCKLE RADIUS r [‡]	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1	1.315	.815	.250	1½	1.05	.71	.14	.4	
1¼	1.660	1.160	.250	1½	.96	1.00	.20	.5	
1½	1.900	1.338	.281	1½	.88	1.17	.22	.7	
2	2.375	1.687	.344	1¾	.98	1.47	.28	1.3	
2½	2.875	2.125	.375	2	1.09	1.90	.35	2.0	
3	3.500	2.624	.438	2½	1.41	2.29	.44	3.5	
4	4.500	3.438	.531	3	1.61	3.02	.57	6.7	
5	5.563	4.313	.625	3½	1.80	3.77	.72	10.5	
6	6.625	5.187	.719	4	1.98	4.54	.86	16.0	
8	8.625	6.813	.906	5	2.39	5.96	1.14	29.0	
10	10.750	8.500	1.125	6	2.75	7.43	1.42	58.9	
12	12.750	10.126	1.312	7	3.16	8.85	1.69	95.4	

DOUBLE EXTRA STRONG — PART NO. 87

1	1.315	.599	.358	1½	.99	.52	.10	.5	
1¼	1.660	.896	.382	1½	.89	.79	.15	.6	
1½	1.900	1.100	.400	1½	.82	.96	.18	.75	
2	2.375	1.503	.436	1¾	.94	1.32	.25	1.5	
2½	2.875	1.771	.552	2	1.00	1.56	.30	2.1	
3	3.500	2.300	.600	2½	1.32	2.01	.38	3.7	
3½	4.000	2.728	.636	3	1.68	2.38	.46	5.0	
4	4.500	3.152	.674	3	1.54	2.76	.52	6.7	
5	5.563	4.063	.750	3½	1.73	3.55	.68	10.5	
6	6.625	4.897	.864	4	1.91	4.29	.82	16.0	
8	8.625	6.875	.875	5	2.41	5.99	1.15	29.0	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All wall thicknesses are in accordance with ANSI B36.10.

Welding Caps are formed from steel plate and are stress relieved after forming. Caps are of an ellipsoidal shape in which the minor axis is equal to half the major axis.

‡ Radii "R" and "r" closely approximate the actual semi-ellipsoidal shape of the TUBE TURNS welding cap.

Caps conform to ASME Boiler and Pressure Vessel Code requirements. Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

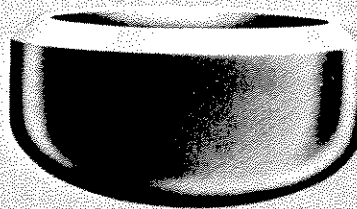
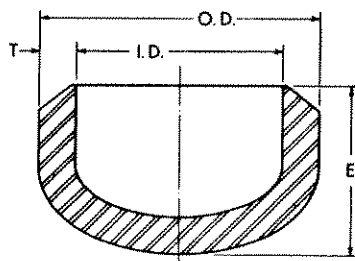
For Dimensional Tolerances see page 88.

For bevel detail see page 89.

▲ For information on this Standard see page 89.

CAPS

Special Schedules†



ANSI B16.9 ▲

ASTM A234 *

Part Nos. 280, 380, 480, 680, 1080, 1280, 1480

NOMINAL PIPE SIZE	PIPE SCHEDULE NUMBER	PART NUMBER	OUTSIDE DIAMETER O.D.	INSIDE DIAMETER I.D.	WALL THICKNESS T	LENGTH E	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
4	120	1280	4.500	3.624	.438	3	5.1	
5	120	1280	5.563	4.563	.500	3½	8.6	
6	120	1280	6.625	5.501	.562	4	13.3	
8	20	280	8.625	8.125	.250	4	8.7	
8	30	380	8.625	8.071	.277	4	9.6	
8	60	680	8.625	7.813	.406	4	26.5	
8	100	1080	8.625	7.437	.594	5	37.8	
8	120	1280	8.625	7.187	.719	5	27.9	
8	140	1480	8.625	7.001	.812	5	51.0	
10	20	280	10.750	10.250	.250	5	13.7	
10	30	380	10.750	10.136	.307	5	16.8	
10	80	880	10.750	9.562	.594	6	59.0	
10	100	1080	10.750	9.312	.719	6	71.4	
10	120	1280	10.750	9.062	.844	6	49.4	
10	140	1480	10.750	8.750	1.000	6	96.0	
12	20	280	12.750	12.250	.250	6	19.7	
12	30	380	12.750	12.090	.330	6	26.0	
12	40	480	12.750	11.938	.406	6	51.0	
12	60	680	12.750	11.626	.562	7	66.7	
12	80	880	12.750	11.374	.688	7	82.0	
12	100	1080	12.750	11.062	.844	7	118.0	
12	120	1280	12.750	10.750	1.000	7	81.1	
12	140	1480	12.750	10.500	1.125	7	155.0	
14	40	480	14.000	13.124	.438	6½	71.0	
14	60	680	14.000	12.812	.594	7½	95.0	
18	30	380	18.000	17.124	.438	8	66.8	
18	40	480	18.000	16.876	.562	9	120	
20	40	480	20.000	18.812	.594	10	143	
24	30	380	24.000	22.876	.562	12	147	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† Pipe Schedule Numbers and respective thicknesses are in accordance with ANSI B36.10.

Welding Caps are formed from steel plate and are stress relieved after forming. They are of an ellipsoidal shape in which the minor axis is equal to half the major axis.

Caps conform to ASME Boiler and Pressure Vessel Code requirements. Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

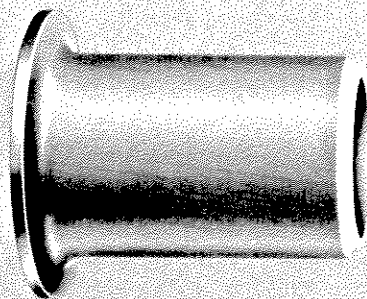
For Dimensional Tolerances see page 88.

For bevel detail see page 89.

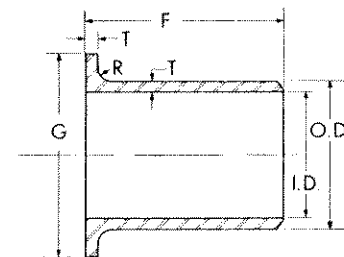
▲ For information on this Standard see page 89.

LAP JOINT STUB ENDS

Standard Weight†



Part No. 40-A



ANSI B16.9 ▲

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL and LAP THICKNESS T ²	‡ LENGTH F	DIAMETER G	RADIUS R	† PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1/2	.840	.622	.109	3	1 3/8	1/8	40	.3	
3/4	1.050	.824	.113	3	1 11/16	1/8	40	.4	
1	1.315	1.049	.133	4	2	1/8	40	.7	
1 1/4	1.660	1.380	.140	4	2 1/2	3/16	40	1.0	
1 1/2	1.900	1.610	.145	4	2 7/8	1/4	40	1.2	
2	2.375	2.067	.154	6	3 5/8	5/16	40	2.5	
2 1/2	2.875	2.469	.203	6	4 1/8	5/16	40	3.5	
3	3.500	3.068	.216	6	5	3/8	40	5.0	
3 1/2	4.000	3.548	.226	6	5 1/2	3/8	40	6.0	
4	4.500	4.026	.237	6	6 3/16	7/16	40	6.5	
5	5.563	5.047	.258	8	7 5/16	7/16	40	12	
6	6.625	6.065	.280	8	8 1/2	1/2	40	16	
8	8.625	7.981	.322	8	10 5/8	1/2	40	24	
10	10.750	10.020	.365	10	12 3/4	1/2	40	40	
12	12.750	12.000	.375	10	15	1/2	ST (1)	49	
14	14.000	13.250	.375	12	16 1/4	1/2	30	64	
16	16.000	15.250	.375	12	18 1/2	1/2	30	74	
18	18.000	17.250	.375	12	21	1/2	ST (1)	85	
20	20.000	19.250	.375	12	23	1/2	20	95	
22	22.000	21.250	.375	12	25 1/4	1/2	20	106	
24	24.000	23.250	.375	12	27 1/4	1/2	20	116	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All thicknesses agree with those for Standard Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10.

‡ Length "F" applies to facing shown. Other facings usually require increasing the length of the fitting, and/or the diameter of lap.

Other lengths and thicknesses are also available, price and dimensions on application.

(2) The basic minimum lap thickness shall not be less than nominal pipe wall thickness.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

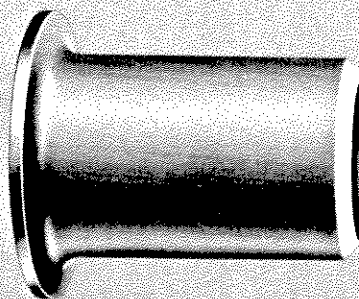
For bevel detail see page 89.

For information on this Standard see page 89.

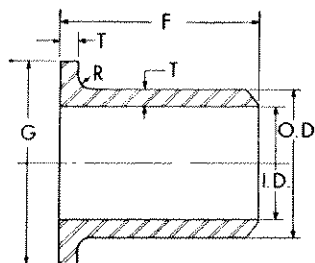
▲ For gasket surface finishes see page 98.

LAP JOINT STUB ENDS

Extra Strong[†]



Part No. 42-A



ANSI B16.9[▲]

ASTM A234 *

NOMINAL PIPE SIZE	OUTSIDE DIAMETER O. D.	INSIDE DIAMETER I. D.	WALL and LAP THICKNESS T ²	† LENGTH F	DIAMETER G	RADIUS R	† PIPE SCHEDULE NUMBERS	APPROXIMATE WEIGHT IN POUNDS	LIST PRICE
1/2	.840	.546	.147	3	1 3/8	1/8	80	.4	
3/4	1.050	.742	.154	3	1 11/16	1/8	80	.5	
1	1.315	.957	.179	4	2	1/8	80	1.0	
1 1/4	1.660	1.278	.191	4	2 1/2	3/16	80	1.2	
1 1/2	1.900	1.500	.200	4	2 7/8	1/4	80	1.5	
2	2.375	1.939	.218	6	3 5/8	5/16	80	3.0	
2 1/2	2.875	2.323	.276	6	4 1/8	5/16	80	4.5	
3	3.500	2.900	.300	6	5	3/8	80	6.5	
3 1/2	4.000	3.364	.318	6	5 1/2	3/8	80	8	
4	4.500	3.826	.337	6	6 3/16	7/16	80	9	
5	5.563	4.813	.375	8	7 5/16	7/16	80	16	
6	6.625	5.761	.432	8	8 1/2	1/2	80	21	
8	8.625	7.625	.500	8	10 5/8	1/2	80	33	
10	10.750	9.750	.500	10	12 3/4	1/2	60	48	
12	12.750	11.750	.500	10	15	1/2	XS (1)	58	
14	14.000	13.000	.500	12	16 1/4	1/2	XS (1)	75	
16	16.000	15.000	.500	12	18 1/2	1/2	40	87	
18	18.000	17.000	.500	12	21	1/2	XS (1)	101	
20	20.000	19.000	.500	12	23	1/2	30	114	
22	22.000	21.000	.500	12	25 1/4	1/2	30	127	
24	24.000	23.000	.500	12	27 1/4	1/2	XS (1)	138	

PRICES ON APPLICATION

All dimensions are in inches.

* Grade B fittings are available from stock.

† All thicknesses agree with those for Standard Wall Pipe (see ANSI B36.10). Pipe Schedule Numbers are in accordance with ANSI B36.10.

‡ Length "F" applies to facing shown. Other facings usually require increasing the length of the fitting, and/or the diameter of lap.

Other lengths and thicknesses are also available, price and dimensions on application.

(1) XS designates Extra Strong (extra strong wall).

(2) The basic minimum lap thickness shall not be less than nominal pipe wall thickness.

Pressure-Temperature Ratings are identical with those of seamless pipe of the same size, thickness or schedule, and material grade.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

For information on this Standard see page 89.

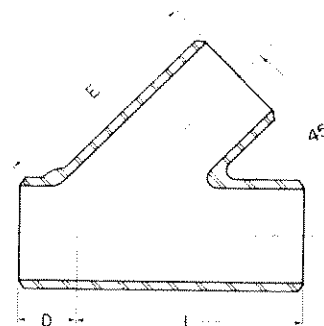
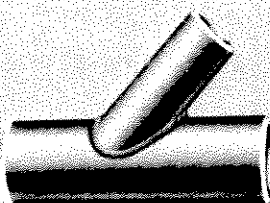
▲ For gasket surface finishes see page 98.

WELDING LATERALS

STRAIGHT



REDUCING OUTLET



Standard Weight — Part Nos. 26 and 26-A
Extra Strong — Part Nos. 27 and 27-A

NOMINAL PIPE SIZE			MADE FROM STANDARD WALL PIPE†		MADE FROM EXTRA STRONG WALL PIPE†			
	DIMENSIONS		APPROX. WT. IN POUNDS	LIST PRICE		APPROX. WT. IN POUNDS	LIST PRICE	
	L and E	D		STRAIGHT PART 26	REDUCING PART 26-A		STRAIGHT PART 27	REDUCING PART 27-A
1	3½	1¾	1.08			1.39		
1¼	4¼	2	1.73			2.30		
1½	5	2½	2.48			3.33		
2	6	3¼	4.0	PRICES ON APPLICATION	PRICES ON APPLICATION	5.6	PRICES ON APPLICATION	PRICES ON APPLICATION
2½	7	3½	7.3			9.7		
3	7¾	3¾	10.2			13.9		
3½	8¾	4	13.2			18.1		
4	8½	4½	15.9			22.2		
5	11	4¾	26.8			38.3		
6	12½	5¼	38			58		
8	15¼	6¼	69			107		
10	18	7	114			154		
12	21½	8	166			219		
14	25	10	218			289		
16	28½	12	288			381		
18	32	13	361			479		
20	35	14	435			580		
24	41¼	16¼	613			817		

PRICES ON APPLICATION

PRICES ON APPLICATION

PRICES ON APPLICATION

PRICES ON APPLICATION

All dimensions are in inches.

Grade B fittings are available from stock.

Dimensions of Reducing Outlet, and prices and dimensions of laterals made from Schedule 160 and Double Extra Strong Wall Pipe on request.

† Parts No. 26 and 26-A fabricated from seamless Standard Wall pipe. Parts No. 27 and 27-A fabricated from seamless Extra Strong Wall Pipe.

The working pressure of any fabricated lateral must be rated at only 40% of the allowable working pressure established for the pipe from which the lateral is made. Dimensions and prices of 100% strength laterals will be furnished on request.

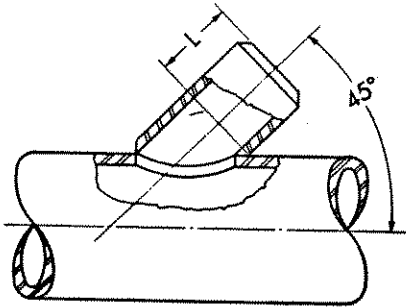
All wall thicknesses are in accordance with ANSI B36.10.

For Dimensional Tolerances see page 88.

For bevel detail see page 89.

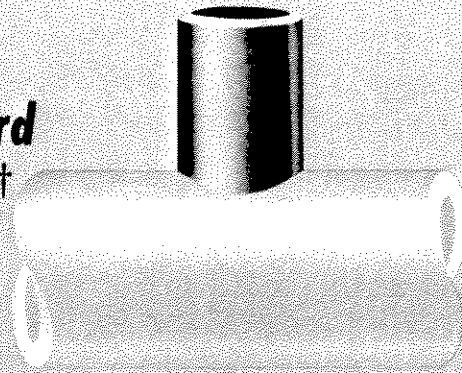
SHAPED NIPPLES

90° and 45° to Header



**Standard
Weight†**

**Extra
Strong†**



**90° Part No. 100
45° Part No. 102**

**90° Part No. 101
45° Part No. 103**

NOMINAL PIPE SIZE	SHAPED TO FIT HEADER SIZES	LENGTH L	APPROX. WT. LBS.		APPROX. WT. LBS.		LIST PRICE
			90° Standard Wt. PART No. 100	90° Extra Strong PART No. 101	45° Standard Wt. PART No. 102	45° Extra Strong PART No. 103	
2	2 to 24	3	1.1	1.5	1.4	2.0	PRICES ON APPLICATION
2½	2½ to 24	3	1.6	2.1	2.0	2.6	
3	3 to 24	3	2.1	3.0	3.1	4.0	
3½	3½ to 24	3	2.8	3.5	3.8	5.0	
4	4 to 24	4	4.3	5.5	5.3	7.5	
5	5 to 24	4	6.0	9.0	8.0	12	
6	6 to 24	4	8.0	12.0	12.0	17	
8	8 to 24	4	13	19.0	20.0	29	
10	10 to 24	5	23	31.0	35.0	47	
12	12 to 24	5	30	38.0	46.0	60	
14	14 to 24	6	35	45	69	90	
16	16 to 24	6	42	54	89	116	
18	18 to 24	6	48	65	111	144	
20	20 to 24	6	59	77	136	177	
24	24	6	79	108	201	261	

All dimensions are in inches.

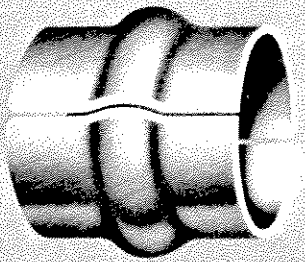
Grade B fittings are available from stock.

† All wall thicknesses are in accordance with ANSI B36.10.

Both ends are properly beveled, and shaped ends are accurately formed to follow the contour of the header pipe.

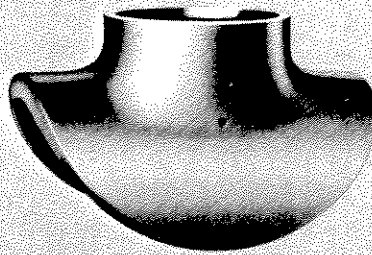
Other sizes, thicknesses and lengths are available on request.
For Dimensional Tolerances see page 88.

SLEEVES

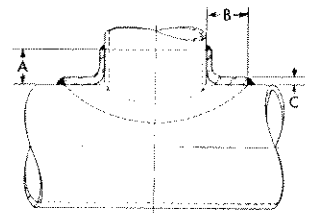
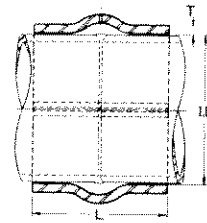


Part No. 104

SADDLES



Part No. 86



ASTM A234*

NOMINAL PIPE SIZE	SLEEVES				SADDLES				
	INSIDE DIAM. I.D.	THICK- NESS T	OVER-ALL LENGTH L	APPROX. WT. IN POUNDS	NOMINAL HEADER SIZES	DIMENSIONS			APPROX. WT. IN POUNDS
						A	B	C	
1	1.315	$\frac{3}{8}$	4	2.0	1 thru 36	1	$1\frac{5}{16}$	$\frac{3}{8}$	1.5
1 $\frac{1}{4}$	1.660	$\frac{3}{8}$	4	2.5	1 $\frac{1}{4}$ thru 36	$1\frac{1}{8}$	$1\frac{1}{2}$	$\frac{3}{8}$	2.0
1 $\frac{1}{2}$	1.900	$\frac{3}{8}$	4	2.9	1 $\frac{1}{2}$ thru 36	$1\frac{1}{8}$	$1\frac{5}{8}$	$\frac{3}{8}$	2.5
2	2.375	$\frac{3}{8}$	4	3.6	2 thru 36	$1\frac{1}{4}$	$1\frac{3}{4}$	$\frac{3}{8}$	4.0
2 $\frac{1}{2}$	2.875	$\frac{3}{8}$	4	4.4	2 $\frac{1}{2}$ thru 36	$1\frac{1}{4}$	$1\frac{3}{4}$	$\frac{3}{8}$	5.0
3	3.500	$\frac{3}{8}$	4	5.1	3 thru 36	$1\frac{1}{2}$	2	$\frac{3}{8}$	6.5
3 $\frac{1}{2}$	4.000	$\frac{3}{8}$	4	5.8	3 $\frac{1}{2}$ thru 36	$1\frac{1}{2}$	2	$\frac{3}{8}$	7.5
4	4.500	$\frac{3}{8}$	4	6.5	4 thru 36	$1\frac{1}{2}$	2	$\frac{3}{8}$	9
5	5.563	$\frac{3}{8}$	5	11	5 thru 36	$1\frac{3}{4}$	2	$\frac{3}{8}$	11
6	6.625	$\frac{3}{8}$	6	17	6 thru 36	$1\frac{3}{4}$	$2\frac{1}{2}$	$\frac{3}{8}$	16
8	8.625	$\frac{1}{2}$	8	33	8 thru 36	$2\frac{1}{4}$	3	$\frac{5}{8}$	28
10	10.750	$\frac{1}{2}$	10	50	10 thru 36	$2\frac{3}{4}$	$3\frac{1}{2}$	$\frac{5}{8}$	54
12	12.750	$\frac{1}{2}$	12	66	12 thru 36	$3\frac{1}{4}$	4	$\frac{5}{8}$	65
14	14.000	$\frac{1}{2}$	12	79	14 thru 36	$3\frac{1}{4}$	4	$\frac{5}{8}$	75
16	16.000	$\frac{1}{2}$	12	90	16 thru 36	$3\frac{1}{2}$	4	$\frac{5}{8}$	90
18	18.000	$\frac{1}{2}$	12	101	18 thru 36	$3\frac{1}{2}$	4	$\frac{5}{8}$	110
20	20.000	$\frac{1}{2}$	12	112	20 thru 36	4	5	$\frac{5}{8}$	140
22	22.000	$\frac{1}{2}$	12	122					
24	24.000	$\frac{1}{2}$	12	133	24 thru 36	4	5	$\frac{5}{8}$	180
26	26.000	$\frac{1}{2}$	12	144	26 thru 36	$4\frac{1}{2}$	6	$\frac{5}{8}$	240
30	30.000	$\frac{1}{2}$	12	166	30 thru 36	$4\frac{1}{2}$	8	$\frac{5}{8}$	365

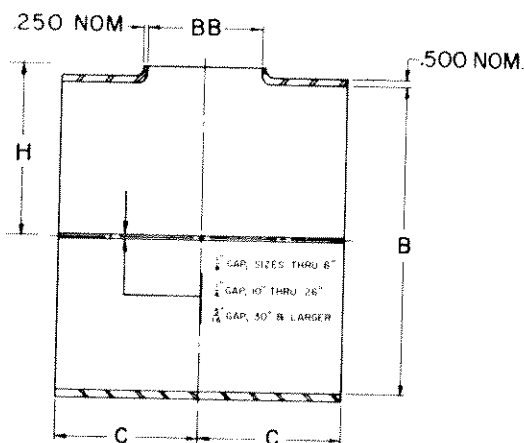
All dimensions are in inches.

Made from A515 Grade 70 Plate.

Sleeves are used as mechanical reinforcement and are not intended as pressure containing parts. Vent holes are provided to prevent build up of pressure under the sleeve.

Saddles are used to reinforce intersecting welded junctions and are not intended to be used as pressure-containing fittings. A vent hole prevents pressure build-up between saddle and header.

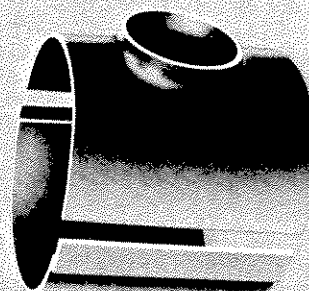
High yield saddles are available on application.



ASTM A234

FULL-ENCIRCLEMENT

SADDLES



Part No. 88

NOMINAL PIPE SIZE O.D.		INSIDE DIAM. OF SADDLE B	INSIDE DIAM. OF OUTLET BB	CENTER TO END C	CENTER TO END OF BRANCH (MIN.) H	NOMINAL PIPE SIZE O.D.		INSIDE DIAM. OF SADDLE B	INSIDE DIAM. OF OUTLET BB	CENTER TO END C	CENTER TO END OF BRANCH (MIN.) H	NOMINAL PIPE SIZE O.D.		INSIDE DIAM. OF SADDLE B	INSIDE DIAM. OF OUTLET BB	CENTER TO END C	CENTER TO END OF BRANCH (MIN.) H
RUN	BR					RUN	BR					RUN	BR				
6	6	6.625	6.750	6 $\frac{5}{8}$	4 $\frac{3}{4}$	18	18	18.000	18.125	18	11 $\frac{1}{4}$	24	24	26.000	24.125	24	15 $\frac{1}{2}$
	4	6.625	4.625	4 $\frac{1}{2}$	4 $\frac{3}{8}$		16	18.000	16.125	16	11 $\frac{1}{4}$		20	26.000	20.125	20	15 $\frac{1}{2}$
	3 $\frac{1}{2}$	6.625	4.125	4	4 $\frac{1}{2}$		14	18.000	14.125	14	11		18	26.000	18.125	18	15 $\frac{1}{4}$
	3	6.625	3.625	3 $\frac{1}{2}$	4 $\frac{1}{2}$		12	18.000	12.875	12 $\frac{3}{4}$	11		16	26.000	16.125	16	15 $\frac{1}{4}$
	2	6.625	2.500	2 $\frac{3}{8}$	4 $\frac{1}{2}$		10	18.000	10.875	10 $\frac{3}{4}$	10 $\frac{3}{4}$		14	26.000	14.125	14	15
8	8	8.625	8.750	8 $\frac{5}{8}$	5 $\frac{3}{4}$	20	20	20.000	20.125	20	12 $\frac{1}{2}$	26	26	26.000	24.125	24	17 $\frac{1}{2}$
	6	8.625	6.750	6 $\frac{5}{8}$	5 $\frac{3}{4}$		18	20.000	18.125	18	12 $\frac{1}{4}$		20	26.000	20.125	20	17 $\frac{1}{2}$
	4	8.625	4.625	4 $\frac{1}{2}$	5 $\frac{5}{8}$		16	20.000	16.125	16	12 $\frac{1}{4}$		18	26.000	18.125	18	17 $\frac{1}{4}$
	2	8.625	2.500	2 $\frac{3}{8}$	5 $\frac{1}{2}$		14	20.000	14.125	14	12		16	26.000	16.125	16	17 $\frac{1}{4}$
							12	20.000	12.875	12 $\frac{3}{4}$	12		14	26.000	14.125	14	17
10	10	10.750	10.875	10 $\frac{3}{4}$	7 $\frac{1}{8}$	24	24	24.000	24.125	24	14 $\frac{1}{2}$	30	30	30.000	28.125	28	19 $\frac{1}{2}$
	8	10.750	8.750	8 $\frac{5}{8}$	6 $\frac{3}{4}$		20	24.000	20.125	20	14 $\frac{1}{2}$		24	30.000	24.125	24	20 $\frac{1}{2}$
	6	10.750	6.750	6 $\frac{5}{8}$	6 $\frac{3}{4}$		18	24.000	18.125	18	14 $\frac{1}{4}$		20	30.000	20.125	20	20 $\frac{1}{2}$
	4	10.750	4.625	4 $\frac{1}{2}$	6 $\frac{3}{4}$		16	24.000	16.125	16	14 $\frac{1}{4}$		18	30.000	18.125	18	20 $\frac{1}{4}$
							14	24.000	14.125	14	14		16	30.000	16.125	16	20 $\frac{1}{4}$
12	12	12.750	12.875	12 $\frac{3}{4}$	8 $\frac{3}{8}$	26	26	26.000	26.125	26	15 $\frac{1}{2}$	32	32	32.000	30.125	30	21 $\frac{1}{2}$
	10	12.750	10.875	10 $\frac{3}{4}$	8 $\frac{1}{8}$		24	26.000	24.125	24	15 $\frac{1}{2}$		24	32.000	24.125	24	21 $\frac{1}{2}$
	8	12.750	8.750	8 $\frac{5}{8}$	7 $\frac{1}{8}$		20	26.000	20.125	20	15 $\frac{1}{4}$		20	32.000	20.125	20	21 $\frac{1}{2}$
	6	12.750	6.750	6 $\frac{5}{8}$	7 $\frac{1}{8}$		18	26.000	18.125	18	15 $\frac{1}{4}$		18	32.000	18.125	18	21 $\frac{1}{2}$
	4	12.750	4.625	4 $\frac{1}{2}$	7 $\frac{3}{4}$		16	26.000	16.125	16	15 $\frac{1}{4}$		16	32.000	16.125	16	21 $\frac{1}{2}$
14	14	14.000	14.125	14	9	28	28	28.000	28.125	28	16 $\frac{1}{2}$	34	34	34.000	32.125	32	22 $\frac{1}{2}$
	12	14.000	12.875	12 $\frac{3}{4}$	9		26	28.000	26.125	26	16 $\frac{1}{2}$		26	34.000	26.125	26	22 $\frac{1}{2}$
	10	14.000	10.875	10 $\frac{3}{4}$	8 $\frac{3}{4}$		24	28.000	24.125	24	16 $\frac{1}{2}$		24	34.000	24.125	24	22 $\frac{1}{2}$
	8	14.000	8.750	8 $\frac{5}{8}$	8 $\frac{1}{2}$		20	28.000	20.125	20	16 $\frac{1}{2}$		20	34.000	20.125	20	22 $\frac{1}{2}$
	6	14.000	6.750	6 $\frac{5}{8}$	8 $\frac{1}{2}$		18	28.000	18.125	18	16 $\frac{1}{4}$		18	34.000	18.125	18	22 $\frac{1}{4}$
16	16	16.000	16.125	16	10 $\frac{1}{4}$	30	30	30.000	30.125	30	17 $\frac{1}{2}$	36	36	36.000	34.125	34	23 $\frac{1}{2}$
	14	16.000	14.125	14	10		28	30.000	28.125	28	17 $\frac{1}{2}$		28	36.000	28.125	28	23 $\frac{1}{2}$
	12	16.000	12.875	12 $\frac{3}{4}$	10		26	30.000	26.125	26	17 $\frac{1}{2}$		26	36.000	26.125	26	23 $\frac{1}{2}$
	10	16.000	10.875	10 $\frac{3}{4}$	9 $\frac{3}{4}$		24	30.000	24.125	24	17 $\frac{1}{2}$		24	36.000	24.125	24	23 $\frac{1}{2}$
	8	16.000	8.750	8 $\frac{5}{8}$	9 $\frac{1}{2}$		20	30.000	20.125	20	17 $\frac{1}{2}$		20	36.000	20.125	20	23 $\frac{1}{2}$

All dimensions are in inches.

In accordance with ANSI B31.8, these fittings will fully reinforce branch connections in pipe of the following wall thickness and yield strength.

- | | |
|-------------------|-------------------|
| (a) .500 — 35,000 | (c) .375 — 46,000 |
| (b) .406 — 42,000 | (d) .312 — 52,000 |

TUBE TURNS full-encirclement saddles are manufactured from carbon steel cylinders with 35,000 psi minimum yield strength. Full-encircle-

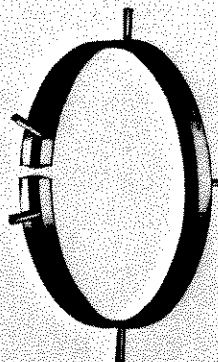
ment saddles with yields higher than 35,000 psi are available upon application. Saddles are not designed to carry internal pressure but are to be used as a reinforcement.

Longitudinal side straps are furnished tack welded to the bottom half of TUBE TURNS full-encirclement saddles, unless otherwise specified. Saddles with longitudinal side straps shop welded to either half are available upon application.

TUBE TURNS full-encirclement saddles with the longitudinal split located in the outlet and backwall are also available.

Groove Type WELDING RINGS

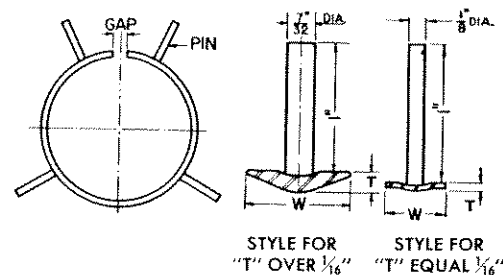
With Knock-off Spacer Pins



Standard Weight
Part No. 96G

Extra Strong
Part No. 97G

Double Extra Strong—Part No. 98-G



LOW-CARBON STEEL *

NOMINAL PIPE SIZE	RING WIDTH W	RING THICK- NESS T	NO. OF PINS	STD. PKG. (RINGS PER CARTON)	APPROX. WT. PER PKG. LBS.	STANDARD WEIGHT PART NO. 96G		EXTRA STRONG PART NO. 97G		XX STRONG PART NO. 98G		LIST PRICE
						RING O. D.	GAP DIM.	RING O. D.	GAP DIM.	RING O. D.	GAP DIM.	
3/4	15/32	1/16	3	25	1 3/4	.824	3/32					
1	15/32	1/16	3	25	2	1.049	3/32	.957	3/32			
1 1/4	15/32	1/16	3	25	2	1.380	3/32	1.278	3/32	.896	3/32	
1 1/2	15/32	1/16	3	25	2 1/2	1.610	3/32	1.500	3/32	1.100	3/32	
2	5/8	1/8	3	25	4	2.067	3/32	1.939	3/32	1.503	3/32	
2 1/2	5/8	1/8	3	25	5 1/4	2.469	1/8	2.323	1/8	1.771	3/32	
3	5/8	1/8	3	25	5 3/4	3.068	1/8	2.900	1/8	2.300	1/8	
3 1/2	25/32†	5/32†	4†	25	8 3/4	3.548	1/8	3.364	1/8	2.728	1/8	
4	25/32	5/32	4	25	9 3/4	4.026	1/8	3.826	1/8	3.152	1/8	
5	25/32	5/32	4	25	13 1/4	5.047	1/8	4.813	1/8	4.063	1/8	
6	25/32	5/32	4	25	15	6.065	5/32	5.761	5/32	4.897	1/8	
8	15/16	3/16	5	25	23	7.981	5/32	7.625	5/32	6.875	5/32	
10	15/16	3/16	5	10	13	10.020	3/16	9.750	3/16			
12	15/16	3/16	5	10	14 1/2	12.000	7/32	11.750	7/32			
14	15/16	3/16	5	10	18 1/2	13.250	7/32	13.000	7/32			
16	15/16	3/16	5	10	20	15.250	1/4	15.000	1/4			
18	15/16	3/16	5	10	22	17.250	1/4	17.000	1/4			
20	15/16	3/16	5	10	25	19.250	1/4	19.000	1/4			
24	15/16	3/16	5	10	29	23.250	1/4	23.000	1/4			

PRICES ON APPLICATION

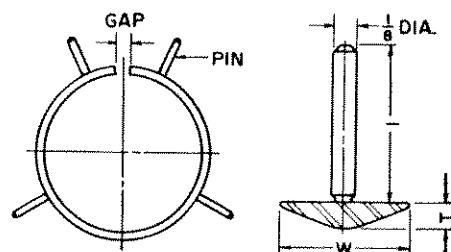
All dimensions are in inches.

Rings for large O.D. pipe also available.

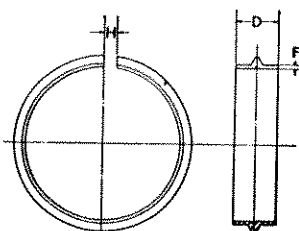
* Low-carbon steel of good welding quality.

Gap dimensions are resulting gap when the welding ring is installed in pipe having nominal inside diameter corresponding to the ring O.D.

† 3 1/2" Double Extra Strong has 5/8" width, 1/8" thickness and 3 pins.



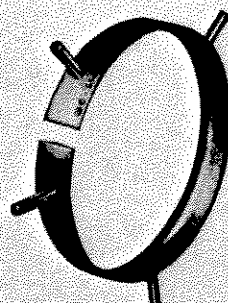
FLAT TYPE



RIDGE TYPE

WELDING RINGS

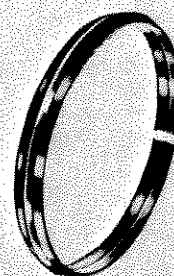
Flat Type



Standard Wt.—Part No. 96F

Extra Strong—Part No. 97F

Ridge Type



Standard Wt.—Part No. 96R

Extra Strong—Part No. 97R

NOMINAL PIPE SIZE	FLAT TYPE							RIDGE TYPE					
	RING WIDTH W	RING THICK- NESS T	GAP DIM.	STD. PKG. (RINGS PER CARTON)	APPROX. WT. PER PKG. LBS.	STANDARD WEIGHT PART 96F RING O.D.	EXTRA STRONG PART 97F RING O.D.	RING WIDTH D	RING THICK- NESS F	GAP DIM. H	APPROX. WT. PER 100 PCS.	STANDARD WEIGHT PART 96R RING O.D.	EXTRA STRONG PART 97R RING O.D.
3/4								3/8	.042	3/32	1 3/8	.824	.742
1								1/2	.047	3/32	2 3/8	1.049	.957
1 1/4								1/2	.047	3/32	3 1/8	1.380	1.278
1 1/2								1/2	.047	3/32	3 3/8	1.610	1.500
2	5/8	1/8	3/32	25	4	2.067	1.939	5/8	.047	3/32	5 3/8	2.067	1.939
2 1/2	5/8	1/8	1/8	25	5 1/4	2.469	2.323	5/8	.047	3/16	7 1/4	2.469	2.323
3	5/8	1/8	1/8	25	5 3/4	3.068	2.900	5/8	.047	3/16	9 5/8	3.068	2.900
3 1/2	25/32	5/32	1/8	25	8 3/4	3.548	3.364	5/8	.065	3/16	11 1/8	3.548	3.364
4	25/32	5/32	1/8	25	9 3/4	4.026	3.826	13/16	.065	3/16	23	4.026	3.826
5	25/32	5/32	1/8	25	13 1/4	5.047	4.813	13/16	.090	1/4	38	5.047	4.813
6	25/32	5/32	5/32	10	8	6.065	5.761	13/16	.090	1/4	44 3/8	6.065	5.761
8	15/16	3/16	5/32	10	12	7.981	7.625	13/16	.090	1/4	54 7/8	7.981	7.625
10	15/16	3/16	3/16	10	13	10.020	9.750	13/16	.090	1/4	67 7/8	10.020	9.750
12	15/16	3/16	7/32	10	14 1/2	12.000	11.750	13/16	.090	1/4	86 1/4	12.000	11.750
14	15/16	3/16	7/32	10	18 1/2	13.250	13.000						
16	15/16	3/16	1/4	10	20	15.250	15.000						
18	15/16	3/16	1/4	10	22	17.250	17.000						
20	15/16	3/16	1/4	10	25	19.250	19.000						
22	15/16	3/16	1/4	10	27	21.250	21.000						
24	15/16	3/16	1/4	10	29	23.250	23.000						

All dimensions are in inches.

Ring material is low carbon steel of good welding quality.

Sizes 2-3 incl. have 3 pins; 3 1/2-6 incl. have 4 pins; 8 and larger have 5 pins.

Flat type rings for large O.D. pipe also are available.

All dimensions are in inches.

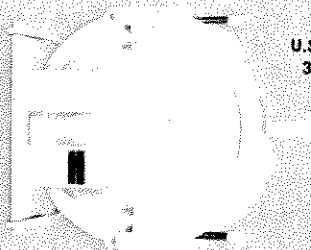
Width of ridge for size 3/4 = 3/32, sizes 1-4 incl. = 1/8, sizes 2 and larger = 3/16.

Height of ridge for 3/4 = 1/16, 1-1/2 incl. = 5/64, 2-3 1/2 incl. = 1/8, 4-12 = 5/62.

Rings for pipe other than Standard Weight or Extra Strong in sizes 3/4-12 incl. can be supplied.

DOUBLE-BOLT—HORIZONTAL

FOR ANSI CLASSES 150, 300, 600, 900, AND 1500 SERVICES
CLASSES 150-H, 300-H, 600-H, 900-H, 1500-H



U.S. PATENT
3,077,360

CLASS 150-H — DOUBLE-BOLT (HORIZONTAL)

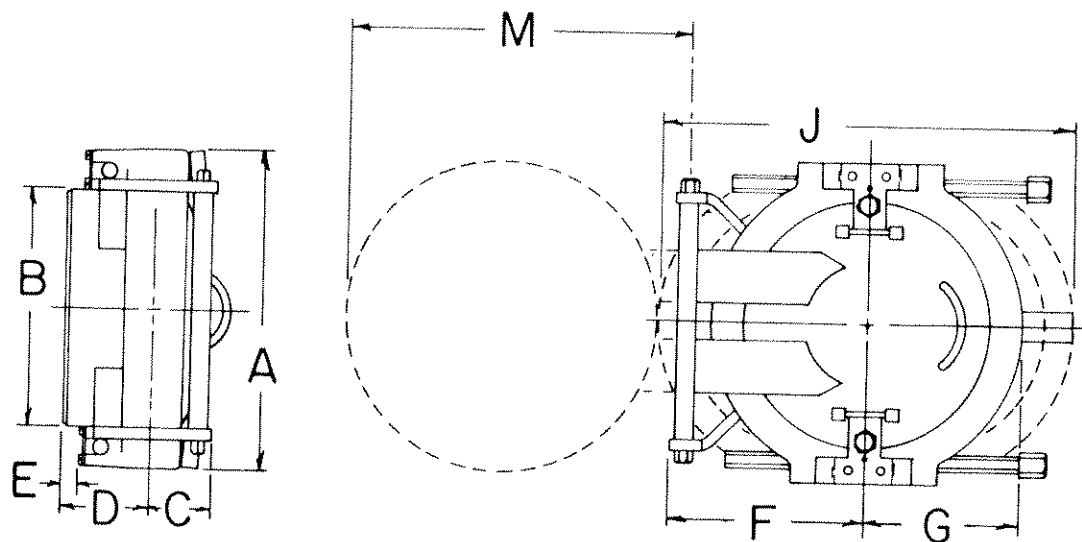
NOMINAL SIZE	OVER-ALL A	O.D. AT WELDING BEVEL B	BACK TO FACE MAX. C	HUB LENGTH D	CLEAR HUB LENGTH E	CENTER TO HINGE END F	CENTER TO FREE END G	YOKE CLEAR- ANCE J	OPENING CLEAR- ANCE M	APPROX. WEIGHT LBS.
8	12-11/16	8-5/8	2-7/16	4	7/8	7-1/8	5-1/2	15-1/8	11-3/16	60
10	14-13/16	10-3/4	2-9/16	4-1/4	1-1/16	7-15/16	6-3/4	18-1/8	13-1/8	80
12	16-13/16	12-3/4	2-1/2	4-1/4	1	8-9/16	7-3/4	20-3/8	14-3/4	110
14	18-3/16	14	2-9/16	4-1/4	15/16	9-5/16	8-7/16	22	16-1/8	130
16	20-7/8	16	2-9/16	4-5/8	13/16	10-3/8	9-1/2	24-7/8	18-1/4	160
18	22-7/8	18	2-9/16	4-5/8	13/16	11-1/2	10-1/2	27-1/8	20-1/4	190
20	24-7/8	20	3	4-5/8	3/4	12-13/16	11-1/2	29-3/8	22-9/16	220
22	26-7/8	22	3-1/8	4-5/8	3/4	14	12-9/16	32-1/8	24-11/16	260
24	28-7/8	24	3-1/8	4-5/8	3/4	15	13-5/8	34-5/8	26-11/16	310
26	30-7/8	26	3-3/16	5	1-1/32	16-1/16	14-11/16	37-3/8	28-13/16	370
28	32-7/8	28	3-3/8	5	31/32	17-9/16	15-3/4	39-7/8	31-5/16	440
30	34-7/8	30	3-1/2	5-1/2	1-11/32	19	16-15/16	43	33-3/8	530
32	37-5/8	32	3-7/8	5-1/2	25/32	20-3/8	18	45-3/8	35-3/4	600
34	39-5/8	34	3-7/8	5-1/2	25/32	21-3/8	19	47-5/8	37-3/4	680
36	41-5/8	36	4	6	1-5/32	22-3/8	20-1/16	50	39-3/4	780
38	44-1/8	38	4	6	1-5/32	23-3/8	21-1/8	52-3/8	41-3/4	880
40	46-1/8	40	4-1/8	6	1-1/32	24-7/16	22-5/16	55-5/8	43-7/8	990
42	48-1/8	42	4-1/2	6-1/8	1-1/32	25-7/16	23-5/16	57-7/8	45-7/8	1150

CLASS 300-H — DOUBLE-BOLT (HORIZONTAL)

8	12-1/16	8-5/8	2-7/16	4	25/32	7-1/8	5-1/2	15-1/8	11-3/16	60
10	14-13/16	10-3/4	2-9/16	4-1/4	11/16	7-15/16	6-3/4	18-1/8	13-1/8	80
12	16-13/16	12-3/4	2-5/8	4-1/4	1-1/8	8-1/2	7-3/4	21	14-11/16	110
14	18-3/16	14	2-3/4	4-1/4	1-1/8	9-5/16	8-7/16	22-13/16	16-1/8	140
16	20-15/16	16	3-3/16	5	1-5/32	12-3/8	9-1/2	25-7/8	19-15/16	170
18	23-1/8	18	3-9/16	5-1/4	1-1/32	12-5/8	11-3/16	30-1/8	21-3/4	480
20	25-1/4	20	4	5-5/8	1-5/32	13-7/8	12-5/16	33-1/8	24	620
22	27-3/4	22	4-1/8	6-1/4	1-1/4	16-3/16	13-1/8	36-3/16	27-1/16	750
24	30-9/16	24	4-1/2	6-1/2	1-9/32	16	14-11/16	38-7/16	28-1/8	900
26	32-1/2	26	4-13/16	6-3/4	1-9/32	19-1/2	15-7/16	42	32-1/8	1120
28	34-3/4	28	5	7-1/2	1-5/16	20-1/2	16-1/2	44-9/16	34-1/8	1380
30	36-7/8	30	5-1/8	7-3/4	1-7/16	21-11/16	17-11/16	47-11/16	36-7/16	1700
32	35-7/8	32	5-3/16	7-3/4	1-3/8	22-11/16	18-3/4	50-3/16	38-7/16	2000
34	42-1/4	34	5-7/16	8-1/4	1-3/8	21-7/8	20	53-7/16	38-3/4	2320
36	44-1/4	36	5-7/16	8-1/2	1-9/32	23-3/8	21-1/16	56	40-3/4	2750
38	46-3/8	38	5-5/8	8-3/4	1-11/16	24-5/8	22-1/4	59-1/16	43-1/8	3280
40	48-7/8	40	5-13/16	9-1/4	1-11/16	25-5/8	23-3/8	62-1/16	45-3/16	3450
42	55	42	5-15/16	9-1/2	1-20/32	26-3/4	24-1/2	64-7/16	47-3/8	4000

CLASS 600-H — DOUBLE-BOLT (HORIZONTAL)

8	12-3/4	8-5/8	2-7/8	4-3/16	25/32	8-1/8	5-15/16	16-3/4	12-5/16	90
10	14-7/8	10-3/4	3-1/8	4-7/16	13/16	9	7-3/16	20	14-5/16	150
12	17-5/8	12-3/4	3-5/16	5-3/16	7/8	9-3/8	8-1/4	22-3/8	15-5/8	180

**CLASS 600-H — DOUBLE-BOLT (HORIZONTAL)**

NOMINAL SIZE	OVER-ALL A	O.D. AT WELDING BEVEL B	BACK TO FACE MAX. C	HUB LENGTH D	CLEAR HUB LENGTH E	CENTER TO HINGE END F	CENTER TO FREE END G	YOKE CLEAR-ANCE J	OPENING CLEAR-ANCE M	APPROX. WEIGHT LBS.
14	19	14	3-15/16	5-1/4	7/8	9-15/16	9	24-7/8	16-7/8	220
16	21-7/8	16	4-1/4	6-1/16	29/32	13-3/16	10-11/16	29-1/8	21-3/16	350
18	24-7/8	18	4-9/16	6-1/4	7/8	14-1/4	12-1/4	33-3/4	23-11/16	480
20	27-1/8	20	4-13/16	7	15/16	15-5/16	13-1/2	37	25-5/16	620
22	29-1/8	22	5-1/2	8	1-3/16	16-3/16	14-1/2	39-3/4	27-3/16	750
24	32-1/8	24	5-5/8	8-3/8	1-3/16	17-7/8	15-3/8	42-1/2	29-13/16	900
26	34-3/8	26	5-11/16	8-9/16	1-1/4	18-1/2	16-11/16	46-1/4	31-5/8	1120
28	36-1/16	28	5-13/16	8-3/4	1-5/16	19-3/4	17-7/8	49-1/2	33-13/16	1380
30	38-9/16	30	6-3/16	9-1/2	1-3/8	20-11/16	19	52-1/4	35-3/4	1700
32	40-13/16	32	6-1/4	9-1/2	1-3/8	21-7/8	20-1/4	55-1/8	38-1/16	2000
34	43-13/16	34	6-1/4	10	1-5/16	22-15/16	21-1/2	58-1/8	40-1/4	2320
36	45-13/16	36	6-11/16	10-1/4	1-5/16	24-11/16	22-1/2	60-5/8	42-3/8	2750
38	48-7/16	38	6-11/16	10-3/4	1-3/8	25-7/8	23-5/8	63-1/4	44-9/16	3280
40	50-7/16	40	6-13/16	10-3/4	1-3/8	26-3/4	24-3/4	65-3/4	46-7/16	3450
42	53-1/16	42	7-3/16	11-7/8	1-7/16	27-13/16	26	69-1/2	48-5/8	4000

CLASS 900-H — DOUBLE-BOLT (HORIZONTAL)

8	12-13/16	8-5/8	3-7/16	4-9/16	25/32	9	6-1/4	18-7/16	13-5/16	120
10	15-15/16	10-3/4	3-11/16	5-3/8	13/16	11-1/16	7-3/4	22-1/4	16-3/8	210
12	18-15/16	12-3/4	4-9/16	6-3/8	1	12-1/2	9-3/16	25-7/8	19	335
14	20-1/2	14	4-11/16	6-5/8	1-7/32	13-1/8	9-15/16	28-1/16	20-1/4	405
16	23	16	5-1/8	7-1/2	1-9/32	15-11/16	11-1/4	31-1/4	23-3/16	585
18	25-1/16	18	5-3/8	7-13/16	1	17	12-1/4	35	25-13/16	790
20	28-3/8	20	5-15/16	8-1/2	1-1/8	17-7/8	13-1/2	37-5/8	27-3/4	935
22	30-1/2	22	6-1/4	8-3/4	1-3/16	19-1/8	14-13/16	40-7/8	30-1/8	1225
24	33-1/8	24	6-5/8	9-1/2	1-9/32	20-7/16	16-1/8	44-1/2	32-9/16	1665
26	35-1/8	26	7	9-3/4	1-9/32	21-3/4	17-1/2	47-3/4	35	2095
28	38-1/4	28	7-3/16	10-1/2	1-11/32	24	18-3/4	51	37-13/16	2535
30	40-3/8	30	8-5/16	10-13/16	1-7/16	25-3/16	20-1/16	54	40-1/8	3100
32	43	32	8-5/8	11-1/2	1-1/2	26-3/4	21-5/16	57-1/2	42-3/4	3690
34	45-3/4	34	8-1/16	12-1/2	1-5/8	27-3/4	22-5/8	61	44-7/8	4125
36	48-5/8	36	10	13-5/16	1-13/16	30	23-15/16	64-1/2	47-3/4	5175
38	50-5/8	38	9-11/16	13-3/8	1-11/16	31-5/16	25-3/16	67-5/8	50-1/8	5660
40	53-3/4	40	9-3/4	13-3/4	1-11/16	32-5/8	26-1/2	70-3/4	52-9/16	6580
42	55-7/8	42	10-9/16	14-1/8	1-7/8	34	27-13/16	74-1/8	55-1/16	7560

All dimensions are in inches.

When ordering, please specify pressure class, nominal size, bore, material and service conditions.

TUBE TURNS Hinged Closures are regularly furnished in carbon steel; however, the horizontal type is also available to match high yield strength steels. Horizontal closures are also available in other metals and alloys and in other sizes and pressure classes on special order.

Chain-and-sprocket drives are available at extra cost.

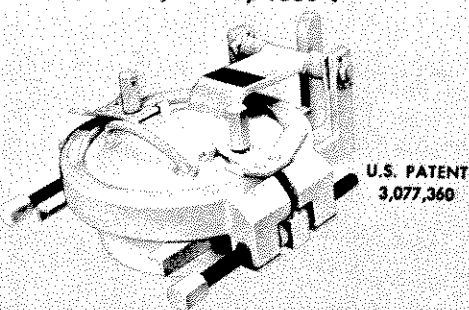
Attached break-over wrenches are available at extra cost.

Lifting eyes are provided on horizontal types 16" and larger.

Pressure ratings up to 250° F for pipe line service for all sizes are those given in ANSI B16.5. For temperatures higher than 250°F and for ASME applications, consult Tube Turns, stating temperature, pressure and media.

DOUBLE-BOLT—VERTICAL

FOR ANSI CLASSES 150, 300, 600, 900 AND 1500 SERVICES
CLASSES 150-HV, 300-V, 600-V, 900-V, 1500-V



CLASS 150-HV — DOUBLE-BOLT (VERTICAL)

NOMINAL SIZE	OVER-ALL A	O.D. AT WELDING BEVEL B	BACK TO FACE MAX. C	HUB LENGTH D	CLEAR HUB LENGTH E	CENTER TO HEAD STOP F	CENTER TO FREE END G	YOKE CLEAR-ANCE J	OPENING CLEAR-ANCE K	APPROX. WEIGHT LBS.
8	12-11/16	8-5/8	4-3/16	4	7/8	9-9/16	5-1/2	15-1/8	12-3/8	60
10	14-13/16	10-3/4	4-9/16	4-1/4	1-1/16	11-1/4	6-3/4	18-1/8	15-3/16	80
12	16-13/16	12-3/4	4-3/8	4-1/4	1	12-9/16	7-3/4	20-7/16	17-1/2	110
14	18-3/16	14	4-5/16	4-1/4	15/16	13-1/2	8-7/16	22	19	130
16	20-7/8	16	4-13/16	4-5/8	13/16	14-1/4	9-1/2	24-15/16	19-7/8	170
18	22-7/8	18	5-1/16	4-5/8	13/16	15-5/8	10-1/2	27-3/16	22-1/2	200
20	24-7/8	20	6	4-5/8	3/4	16-3/4	11-1/2	29-7/16	24-3/8	230
22	26-7/8	22	6-1/4	4-5/8	3/4	18-7/16	12-9/16	32-1/4	27-3/16	270
24	28-7/8	24	6	4-5/8	3/4	19-5/8	13-5/8	34-5/8	28-5/16	320
26	30-7/8	26	5-9/16	5	1-1/32	21-1/4	14-11/16	37-1/2	31-1/4	380
28	32-7/8	28	6-5/8	5	31/32	23-7/16	15-3/4	40	33-1/16	450
30	34-7/8	30	7-1/2	5-1/2	1-11/32	25-1/8	16-15/16	43-1/8	35-11/16	540
32	37-5/8	32	9-1/2	5-1/2	25/32	29-1/8	18	45-9/16	37-7/16	620
34	39-5/8	34	9-1/2	5-1/2	25/32	29-13/16	19	47-13/16	39-11/16	700
36	41-5/8	36	9-3/8	6	1-5/32	28-1/2	20-1/16	50-1/4	39-15/16	810
38	44-1/8	38	9-3/8	6	1-5/32	29-3/4	21-1/8	52-9/16	42-7/16	910
40	46-1/8	40	9-1/4	6	1-1/32	31-1/4	22-5/16	55-13/16	44-15/16	1030
42	48-1/8	42	9-5/8	6-1/8	1-1/32	32-1/2	23-5/16	58-3/16	46-9/16	1200

CLASS 300-V — DOUBLE-BOLT (VERTICAL)

8	12-11/16	8-5/8	4-3/16	4	25/32	9-9/16	5-1/2	15-1/8	12-3/8	60
10	14-13/16	10-3/4	4-9/16	4-1/4	1-1/16	11-1/4	6-3/4	18-1/8	15-3/16	80
12	16-13/16	12-3/4	4-1/2	4-1/4	1-1/8	12-9/16	7-3/4	20-13/16	17-1/2	120
14	18-3/16	14	4-1/2	4-1/4	1-1/8	13-9/16	8-7/16	22-13/16	19-3/16	150
16	20-15/16	16	7-13/16	5	1-5/32	15-1/16	9-1/2	25-7/8	20-3/16	180
18	23-1/8	18	8-13/16	5-1/4	1-1/32	17-7/8	11-3/16	30-7/16	23-7/8	500
20	25-1/4	20	8-1/4	5-5/8	1-5/32	18-11/16	12-5/16	33-1/8	25-7/16	640
22	27-3/4	22	8-1/16	6-1/4	1-1/4	20	13-1/8	35-7/8	27-3/4	780
24	30-9/16	24	8-1/2	6-1/2	1-9/32	22-9/16	14-11/16	38-9/16	30-5/16	930

All dimensions are in inches.

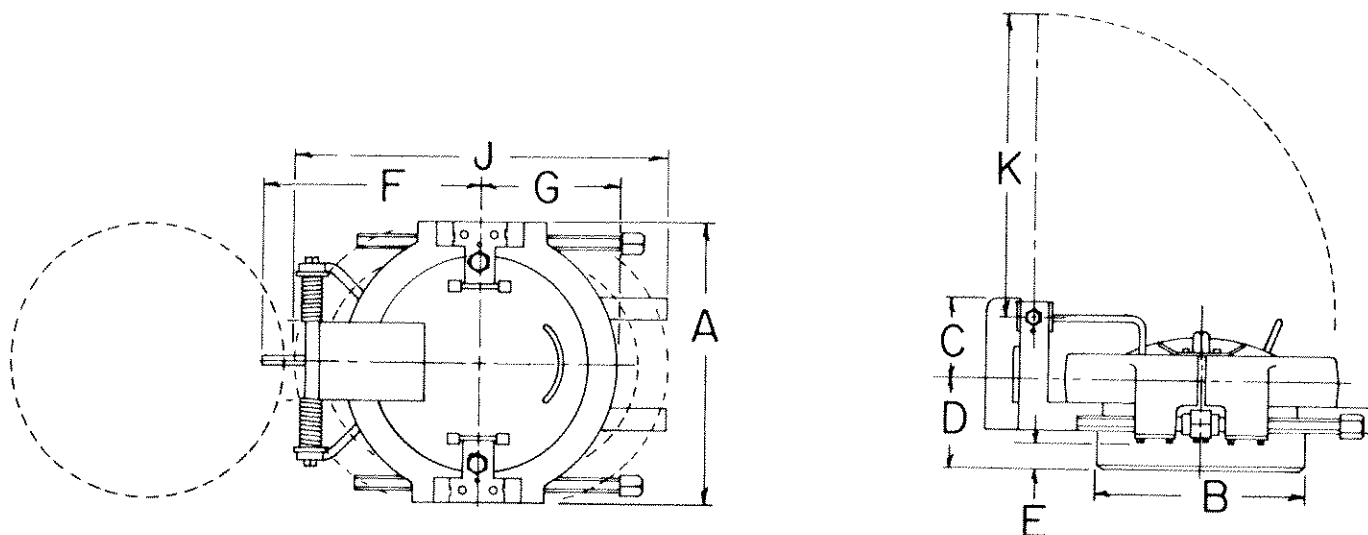
When ordering, please specify pressure class, nominal size, bore, material and service conditions.

TUBE TURNS Hinged Closures are regularly furnished in carbon steel; however, closures are also available in other metals and alloys and in other sizes and pressure classes on special order.

Vertical Hinged Closures (except Class 1500-V) are furnished with spring-loaded or counter-balanced heads. The use of counter-balance weights is recommended for large size or heavy Closures. They can be provided by Tube Turns on special order.

Chain-and-sprocket drives are available at extra cost.

Attached break-over wrenches are available at extra cost.



CLASS 300-V — DOUBLE-BOLT (VERTICAL)

NOMINAL SIZE	OVER-ALL	O.D. AT WELDING BEVEL	BACK TO FACE MAX.	HUB LENGTH	CLEAR HUB LENGTH	CENTER TO HEAD STOP	CENTER TO FREE END	YOKE CLEAR-ANCE	OPENING CLEAR-ANCE	APPROX. WEIGHT LBS.
	A	B	C	D	E	F	G	J	K	
26	32-1/2	26	9-3/16	6-3/4	1-9/32	24-3/16	15-7/8	42-3/16	32-9/16	1160
28	34-3/4	28	10-1/8	7-1/2	1-5/16	25-9/16	16-1/2	44-3/8	34-7/8	1420
30	36-7/8	30	10-1/2	7-3/4	1-7/16	27	17-11/16	47-11/16	36-3/4	1750

CLASS 600-V — DOUBLE-BOLT (VERTICAL)

8	12-3/4	8-5/8	4-1/2	4-3/16	25/32	10-3/16	5-15/16	16-7/8	13-5/16	90
10	14-7/8	10-3/4	5-1/8	4-7/16	13/16	12-1/4	7-3/16	20-1/4	16-3/8	160
12	17-5/8	12-3/4	5-13/16	5-3/16	7/8	13-3/16	8-1/4	22-5/8	16-1/2	190
14	19-3/16	14	6-1/16	5-1/4	7/8	14-5/16	9	25-1/8	18-9/16	230
16	21-7/8	16	7	6-1/16	29/32	17-1/16	10-11/16	29-3/8	22-1/4	360
18	24-7/8	18	7-3/16	6-1/4	7/8	19-5/8	12-1/4	34	25-3/16	500
20	27-1/8	20	11-11/16	7	15/16	21-7/8	13-1/2	37-1/4	28-1/2	640
22	29-1/8	22	13-7/8	8	1-3/16	23-1/8	14-1/2	40	29-13/16	780
24	32-1/8	24	12-1/4	8-3/8	1-3/16	23-3/4	15-3/8	42-3/4	31-13/16	930
26	34-3/8	26	12-1/8	8-9/16	1-1/4	25-7/8	16-11/16	46-1/2	33-3/16	1160
28	36-1/16	28	12-3/4	8-3/4	1-5/16	27-3/4	17-7/8	49-7/8	36-1/8	1420
30	38-9/16	30	13-3/8	9-1/2	1-3/8	29-3/4	19	52-3/4	36-3/8	1750

CLASS 900-V — DOUBLE-BOLT (VERTICAL)

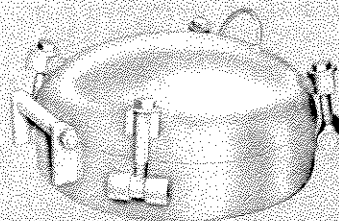
8	12-13/16	8-5/8	4-13/16	4-9/16	25/32	11-1/8	6-1/4	18-7/16	14-7/16	150
10	15-15/16	10-3/4	7-1/16	5-3/8	13/16	12-15/16	7-3/4	22-1/4	16-3/4	230
12	18-15/16	12-3/4	7-7/8	6-3/8	1	15-3/8	9-3/16	25-7/8	19-15/16	370
14	20-1/2	14	8-1/8	6-5/8	1-7/32	16-1/8	9-15/16	28-1/16	20-11/16	470
16	23	16	8-5/16	7-1/2	1-9/32	17-7/8	11-1/4	31-1/4	23-1/2	630
18	25-1/16	18	9-1/2	7-13/16	1	20-1/2	12-1/4	35	26-3/8	

Lifting eyes are provided on vertical types when required.
Pressure ratings up to 250°F for pipe line service for all sizes are those given in ANSI B16.5. For temperatures higher than 250°F and for

ASME-applications, consult Tube Turns, stating temperature, pressure and media.

T-BOLT HINGED CLOSURES FOR NOMINAL PRESSURES

CLASS 75-TB AND 150-TB



U.S. PATENT
3,187,929

CLASS 75-TB — T-BOLT (HORIZONTAL)

NOM. PIPE SIZE	OVER-ALL A	O.D. AT WELDING BEVEL B	BACK TO FACE C	HUB LENGTH D	CLEAR HUB * LENGTH E	CENTER TO HINGE END F	FACE TO HINGE G	SWING BOLT CLEAR- ANCE J	OPENING CLEAR- ANCE K	NO. BOLTS	APPROX. WEIGHT LBS.
10	13 ¹ / ₄	10 ³ / ₄	27 ¹ / ₁₆	2 ¹ / ₈	⁵ / ₈	7 ⁵ / ₈		17 ¹ / ₄	12 ¹ / ₄	3	30
12	16	12 ³ / ₄	2 ¹⁵ / ₁₆	2 ⁵ / ₈	³ / ₄	8 ¹⁵ / ₁₆		20 ³ / ₄	14 ¹ / ₄	4	50
14	17 ¹ / ₄	14	3 ¹ / ₄	27 ⁷ / ₈	1	9 ⁹ / ₁₆		22	15 ¹ / ₂	4	60
16	19 ¹ / ₄	16	3 ³ / ₄	27 ⁷ / ₈	1	10 ¹ / ₂		24	17 ¹ / ₂	4	70
18	21 ¹ / ₄	18	4 ¹ / ₄	3 ³ / ₈	1 ³ / ₈	11 ¹¹ / ₁₆		29 ¹ / ₄	19 ¹ / ₂	4	95
20	23 ¹ / ₄	20	4 ³ / ₄	37 ⁷ / ₈	1 ¹¹ / ₁₆	12 ¹⁵ / ₁₆		31 ¹ / ₄	21 ¹¹ / ₁₆	4	115
22	25 ¹ / ₄	22	5 ¹ / ₄	4 ³ / ₈	2 ³ / ₈	13 ¹⁵ / ₁₆		33 ¹ / ₄	23 ¹¹ / ₁₆	5	140
24	27 ¹³ / ₁₆	24	5 ³ / ₄	4 ³ / ₈	1 ¹³ / ₁₆	15		37 ¹ / ₂	25 ¹¹ / ₁₆	5	165
26	29 ¹³ / ₁₆	26	6 ¹ / ₄	37 ⁷ / ₈	1 ⁵ / ₁₆	16 ¹ / ₄		39 ¹ / ₂	28	6	180
28	31 ¹³ / ₁₆	28	6 ³ / ₄	3 ³ / ₈	1 ¹ / ₈	17 ¹ / ₄		41 ¹ / ₂	30	6	200
30	33 ¹³ / ₁₆	30	7 ¹ / ₄	3 ³ / ₈	1 ⁷ / ₈	18 ⁵ / ₁₆		44 ¹ / ₂	32	8	230
32	35 ¹³ / ₁₆	32	7 ³ / ₄	4 ³ / ₈	2	19 ⁵ / ₈		46 ¹ / ₂	34	9	265
34	38 ³ / ₄	34	8 ¹ / ₄	4 ³ / ₈	1 ³ / ₈	20 ⁵ / ₈		50 ¹ / ₂	36	9	325
36	40 ³ / ₄	36	8 ¹¹ / ₁₆	4 ¹ / ₂	1 ³ / ₈	21 ⁹ / ₁₆		52 ¹ / ₂	38	9	410
38	42 ³ / ₄	38	9 ³ / ₁₆	4 ¹ / ₂	1 ⁵ / ₈	22 ⁹ / ₁₆		54 ¹ / ₂	40	10	450
40	44 ³ / ₄	40	9 ¹¹ / ₁₆	4 ¹ / ₂	1 ⁵ / ₈	22 ³ / ₄		56 ¹ / ₂	42	10	480
42	46 ³ / ₄	42	10 ³ / ₁₆	4 ¹ / ₂	1 ⁵ / ₈	24 ¹³ / ₁₆		60 ³ / ₄	44 ¹ / ₄	10	550

Hinge is centered on face

All dimensions are in inches.

When ordering, please specify pressure class, nominal size, bore, material and service conditions.

TUBE TURNS T-Bolt Hinged Closures are regularly furnished in carbon steel; however, they are available in stainless steel, aluminum and other metals and alloys.

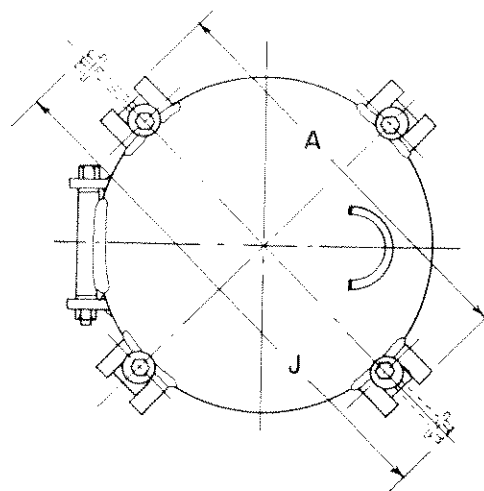
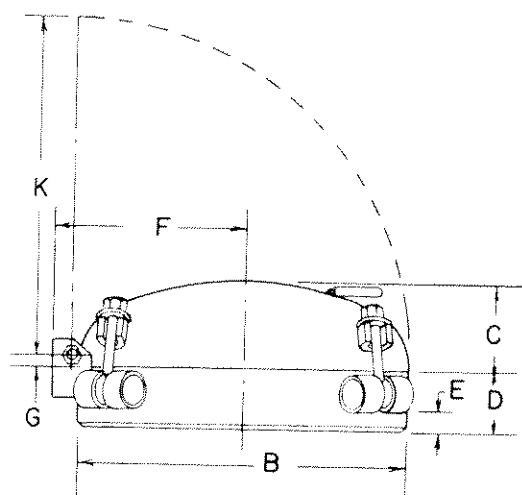
Scissor-type hinge is furnished on sizes 26" through 42" Class 75-TB and sizes 10" through 42" Class 150-TB Closures.

T-Bolt Closures with longer hubs; Closures made to I.D. dimensions; or Closures equipped with Sight Glasses, Break-Over Wrenches and other appurtenances are available on special order.

T-Bolt Closures with spring-loaded heads for vertical installation are furnished in sizes 10" — 42" on special order. Need for spring-loading can be determined by reference to the Table below:

Class 300-TB Closures are also available.

CLOSURE SIZE	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
Weight of Head (lbs)	7	12	19	22	32	41	53	67	74	100	112	125	139	169	184	269	295	322	346
Force of Lift Head (lbs)	4	9	12	15	20	26	32	40	44	58	62	71	76	90	106	149	168	186	231



CLASS 150-TB — T-BOLT (HORIZONTAL)

NOM. PIPE SIZE	OVER-ALL	O.D. AT WELDING BEVEL	BACK TO FACE	HUB LENGTH	CLEAR HUB LENGTH	CENTER TO HINGE END	FACE TO HINGE	SWING BOLT CLEARANCE	OPENING CLEARANCE	NO. BOLTS	APPROX. WEIGHT LBS.
	A	B	C	D	E	F	G	J	K		
6	9 ¹ / ₈	6 ⁵ / ₈	1 ⁷ / ₁₆	1 ¹¹ / ₁₆	5 ¹ / ₁₆	5 ¹ / ₂		13	5 ¹ / ₈	3	15
8	11 ¹ / ₈	8 ⁵ / ₈	1 ¹⁵ / ₁₆	1 ⁵ / ₈	1 ¹ / ₄	6 ⁵ / ₈		15	8 ³ / ₈	3	20
10	13 ¹ / ₄	10 ³ / ₄	2 ⁷ / ₁₆	2 ¹ / ₈	5 ⁵ / ₈	7 ⁵ / ₈		18 ¹ / ₂	12 ¹ / ₄	5	35
12	16	12 ³ / ₄	2 ¹⁵ / ₁₆	2 ⁵ / ₈	3 ¹ / ₄	8 ¹⁵ / ₁₆		22 ¹ / ₂	14 ¹ / ₄	5	55
14	17 ¹ / ₄	14	3 ¹ / ₄	2 ⁷ / ₈	1	9 ⁹ / ₁₆		23 ³ / ₄	15 ¹ / ₂	5	65
16	19 ¹ / ₄	16	3 ³ / ₄	2 ⁷ / ₈	1	10 ¹ / ₂		25 ³ / ₄	17 ¹ / ₂	7	80
18	21 ¹ / ₄	18	4 ¹ / ₄	3 ³ / ₈	1 ³ / ₈	11 ¹¹ / ₁₆		29 ³ / ₄	19 ¹ / ₂	6	100
20	23 ¹ / ₄	20	4 ³ / ₄	3 ⁷ / ₈	1 ¹¹ / ₁₆	12 ¹⁵ / ₁₆		31 ³ / ₄	21 ¹¹ / ₁₆	7	125
22	25 ¹ / ₄	22	5 ¹ / ₄	4 ³ / ₈	2 ³ / ₈	13 ¹⁵ / ₁₆		33 ³ / ₄	23 ¹¹ / ₁₆	8	150
24	27 ¹³ / ₁₆	24	5 ³ / ₄	4 ³ / ₈	1 ³ / ₁₆	15		37 ⁵ / ₈	25 ¹¹ / ₁₆	8	180
26	29 ¹³ / ₁₆	26	6 ¹ / ₄	3 ⁷ / ₈	1 ⁵ / ₁₆	16 ¹ / ₄		39 ³ / ₄	28	9	200
28	31 ¹³ / ₁₆	28	6 ³ / ₄	3 ³ / ₈	1 ¹ / ₈	17 ¹ / ₄		42 ¹ / ₈	30	11	225
30	33 ¹³ / ₁₆	30	7 ¹ / ₄	3 ³ / ₈	7 ⁷ / ₈	18 ⁵ / ₁₆		44 ¹ / ₂	32	12	250
32	36 ³ / ₄	32	7 ³ / ₄	4 ³ / ₈	1 ¹ / ₈	19 ⁵ / ₈		48 ¹ / ₂	34	10	310
34	38 ³ / ₄	34	8 ¹ / ₄	4 ³ / ₈	1 ⁵ / ₁₆	20 ⁵ / ₈		52 ¹ / ₄	36	10	380
36	40 ³ / ₄	36	8 ¹¹ / ₁₆	4 ¹ / ₂	1 ³ / ₈	21 ⁹ / ₁₆		54 ¹ / ₄	38	11	460
38	42 ³ / ₄	38	9 ³ / ₁₆	4 ¹ / ₂	1 ⁵ / ₈	22 ⁵ / ₈		56 ¹ / ₂	40	12	500
40	44 ³ / ₄	40	9 ¹¹ / ₁₆	4 ¹ / ₂	1 ⁵ / ₈	22 ⁵ / ₈		58 ⁷ / ₈	42	13	550
42	46 ³ / ₄	42	10 ³ / ₁₆	4 ¹ / ₂	1 ⁵ / ₈	24 ¹³ / ₁₆		61	44 ¹ / ₄	14	600

Hinge is centered on face

(Refer to page 84 for Notes applicable to both Class 75-TB and 150-TB T-Bolt Closures.)

ASME MAXIMUM PRESSURE RATINGS (PSI AT 250° F) OF TUBE-TURN T-BOLT HINGED CLOSURES†

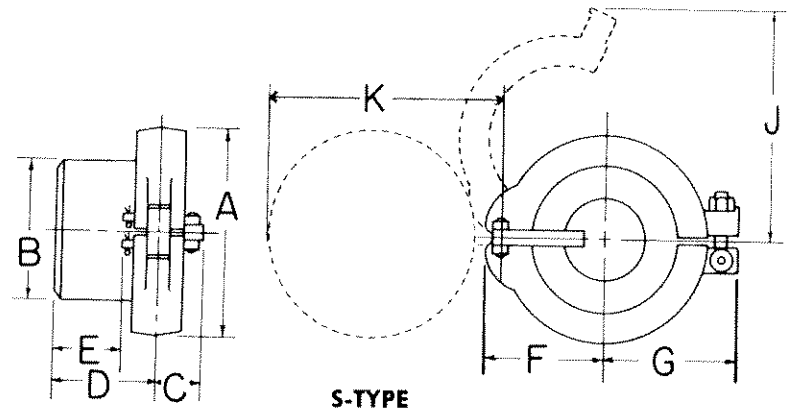
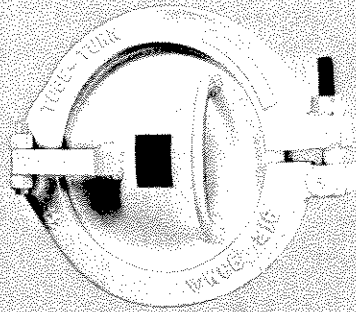
CLOSURE SIZE	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
CLASS 75-TB																			
Carbon Steel			90	140	120	90	100	90	90	100	100	90	100	100	100	100	110	90	100
Stainless Steel*			90	140	120	90	100	90	90	100	100	80	100	100	90	100	100	80	90
CLASS 150-TB																			
Carbon Steel	240	140	150	170	140	150	150	150	140	160	150	160	150	150	150	170	160	160	160
Stainless Steel*	240	140	150	170	140	150	150	150	140	160	150	160	150	140	140	170	160	160	160

For temperatures higher than 250°F and for ASME applications, consult Tube Turns stating temperature, pressure and media.
Ratings apply to stainless steel Closures with carbon steel bolts and

attachments and elastomeric O-Rings; Closures of all stainless steel and with other than elastomeric O-Rings are rated lower.

SINGLE-BOLT

HINGED CLOSURES
SWING BOLT
For ANSI Classes 150, 300,
and 600 Services
Classes 150-S, 300-S, and 600-S



CLASSES 150-S, 300-S, 600-S — SINGLE-BOLT (SWING)

NOMINAL SIZE	OVER-ALL A	O.D. AT WELDING BEVEL B	BACK TO FACE MAX. C	HUB LENGTH D	CLEAR HUB LENGTH E	CENTER TO HINGE END F	CENTER TO FREE END G	YOKE CLEAR- ANCE J	OPENING CLEAR- ANCE K	APPROX. WEIGHT LBS.
2	4 ⁷ / ₈	2 ³ / ₈	1 ¹ / ₂	3 ³ / ₈	2 ¹ / ₁₆	2 ⁵ / ₈	3 ⁵ / ₈	6 ¹ / ₈	4 ¹ / ₁₆	10
3	6 ¹ / ₄	3 ¹ / ₂	1 ¹¹ / ₁₆	3 ¹ / ₂	2 ¹ / ₄	3 ³ / ₈	4 ¹ / ₄	7 ⁵ / ₁₆	5 ¹ / ₄	15
4	7 ³ / ₈	4 ¹ / ₂	1 ⁷ / ₈	4 ¹ / ₄	2 ⁷ / ₈	4 ³ / ₁₆	5	8 ⁵ / ₁₆	6 ⁹ / ₁₆	25
6	9 ⁷ / ₈	6 ⁵ / ₈	2 ¹ / ₈	4 ¹ / ₄	2 ¹³ / ₁₆	5 ⁷ / ₁₆	6 ¹ / ₄	10 ¹³ / ₁₆	9	50
8	11 ⁷ / ₈	8 ⁵ / ₈	2 ³ / ₈	4 ¹ / ₄	2 ⁷ / ₁₆	6 ³ / ₈	7 ³ / ₈	13 ¹¹ / ₁₆	10 ³ / ₄	70

All dimensions are in inches.

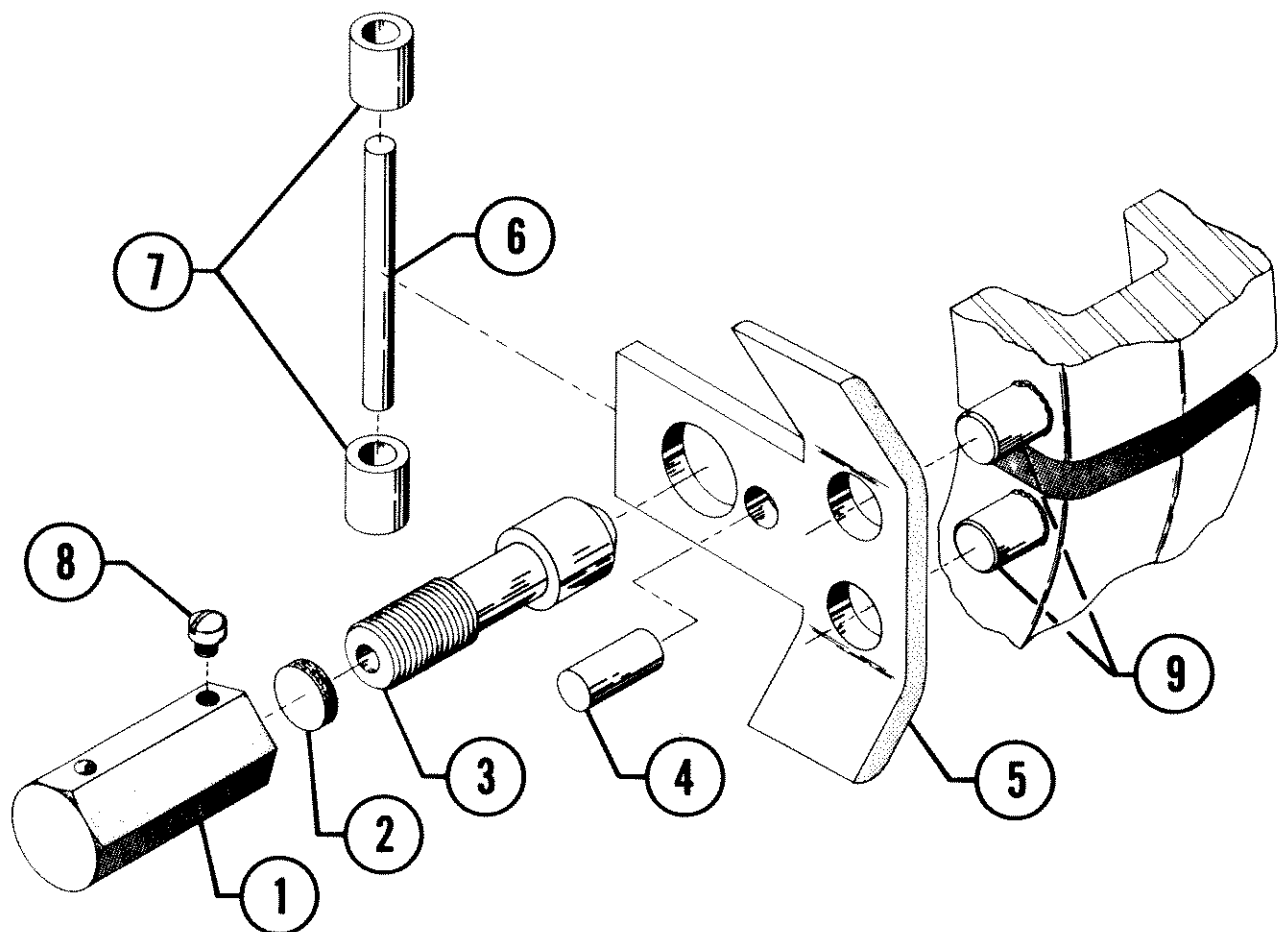
When ordering, please specify pressure class, nominal size, bore, material and service conditions.

TUBE TURNS Hinged Closures are regularly furnished in mild carbon steel; however, they are also available in other metals and alloys.

Pressure ratings up to 250°F for pipe line service. For temperatures higher than 250°F and for ASME-applications, consult Tube Turns, stating temperature, pressure and media.

Tube Turns® Hinged Closures

PRESSURE WARNING DEVICE WITH YOKE POSITIONING ELEMENT
FOR DOUBLE BOLT TYPE (HORIZONTAL & VERTICAL)



1. Holding Screw
2. Asbestos Gasket
3. Nipple
4. Plate Stop
5. Positioning Element

6. Hinge Pin
7. Hinge
8. Set Screw
9. Positioning Lugs

DIMENSIONAL TOLERANCES of Steel Butt Welding Fittings Listed in This Catalog

Listed below are the Dimensional Tolerances to which TUBE TURNS® welding fittings are manufactured. These tolerances are in accordance with ANSI B16.9 for all dimensions that have been established by that standard.

The limits given are the maximum permitted, and TUBE TURNS® products will normally run much closer to nominal dimensions than to permitted extremes.

WALL THICKNESS

The wall thickness shall not at any point be less than 87½% of nominal thickness.

OUTSIDE DIAMETER

The outside diameter to beginning of chamfer shall not vary from nominal more than:

For sizes up to and incl. 2½"	 +1/16" - 1/32"
For sizes 3" thru 4"	 +1/16" - 1/16"
For sizes 5" thru 8"	 +3/32" - 1/16"
For sizes 10" thru 18"	 +5/32" - 1/8"
For sizes 20" thru 48"	 +1/4" - 3/16"

INSIDE DIAMETER

The inside diameter at welding ends shall not vary from nominal more than:

For sizes up to and including 2½"	 ±1/32"
For sizes 3" thru 8"	 ±1/16"
For sizes 10" thru 18"	 ±1/8"
For sizes 20" thru 48"	 ±3/16"

WELDING BEVEL

The welding bevel dimensions shall not vary from nominal more than:

Bevel angles, 37½° and 20°	 ±2½°
10°	 ±1°
1/16" land on end	 ±1/32"

CENTER-TO-END OF 90° ELBOWS, 45° ELBOWS, TEES, CROSSES, AND LATERALS†

The center-to-end dimension shall not vary from nominal more than:

For sizes up to and including 8"	 ±1/16"
For sizes 10" thru 24"	 ±3/32"
For sizes 26" thru 30"	 ±1/8"
For sizes 32" thru 48"	 ±3/16"

CENTER-TO-CENTER OF 180° RETURNS

The center-to-center dimension shall not vary from nominal more than:

Sizes up to and including 8"	 +1/4"
Sizes 10" and larger*	 +3/8"

BACK-TO-FACE OF 180° RETURNS

The back-to-face dimension shall not vary from nominal more than:

All sizes*	 ±1/4"
------------	-------------

ALIGNMENT OF ENDS OF 180° RETURNS

For sizes up to and including 8"	 ±1/32"
For sizes 10" thru 24"	 ±1/16"
For sizes 26" thru 48"*	 ±3/16"

END-TO-END OF REDUCERS, LAPPED-JOINT STUB ENDS, AND SHAPED WELDING NIPPLES†

The end-to-end dimension shall not vary from nominal more than:

For sizes up to and including 8"	 ±1/16"
For sizes 10" thru 24"	 ±3/32"
For sizes 26" thru 48"	 ±3/16"

FILLET RADIUS OF LAPPED-JOINT STUB ENDS

This dimension shall not vary from nominal more than:

For sizes up to and including 3½"	 +0" - 1/32"
For sizes 4" and larger*	 +0" - 1/16"

LAP THICKNESS, LAPPED-JOINT STUB ENDS

This dimension shall not vary from nominal more than:

All sizes*	 -0" + 1/16"
------------	-------------------

END-TO-FACE OF WELDING CAPS

This dimension shall not vary from nominal more than:

For sizes up to and including 4"	 ±1/8"
For sizes 5" thru 24"	 ±1/4"
For sizes 26" thru 48"	 ±3/8"

* Tolerances for sizes above 24" are not established in ANSI B16.9.

† Laterals & Shaped Welding Nipples are not covered by ANSI B16.9.

ANSI STANDARD

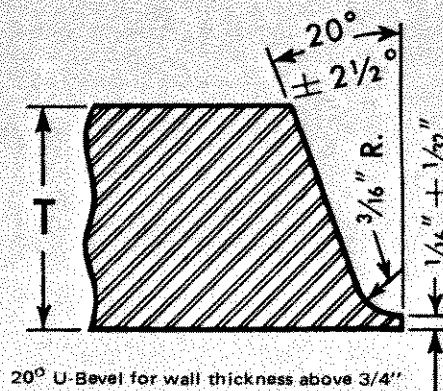
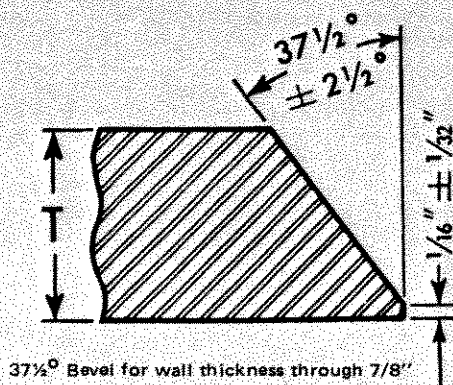
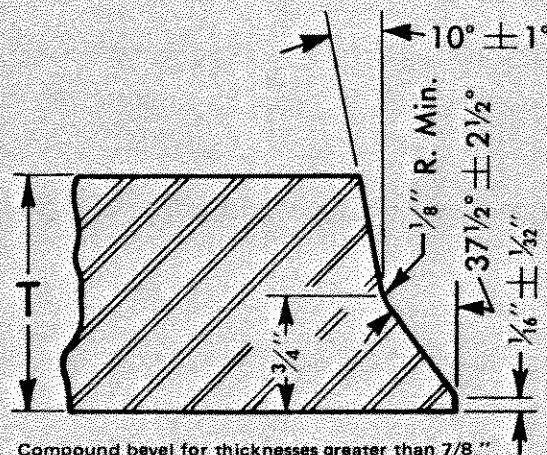
AMERICAN NATIONAL STANDARD (ANSI-B16.9)

The following size ranges of Welding Fittings are covered by ANSI B16.9. "STEEL BUTT-WELDING FITTINGS."

90° Long Radius Elbows	1/2" to 48" incl.
45° Long Radius Elbows	1/2" to 48" incl.
90° Long Radius Reducing Elbows	2" x 1" to 24" x 22" incl.
Tees, Straight and Reducing Outlets	1/2" to 48" incl.
Crosses, Straight and Reducing Outlets	1/2" to 48" incl.
Welding Caps	1/2" to 48" incl.
Lapped-Joint Stub Ends	1/2" to 24" incl.
Welding Reducers	3/4" x 3/8" to 48" x 46" incl.
Long Radius Return Bends	1/2" to 24" incl.

BEVELING STANDARDS

For wall thicknesses through 7/8", a straight 37½° bevel with a 1/16" land is provided for fittings and flanges. For wall thicknesses greater than 7/8", a compound bevel is furnished. Also, for wall thicknesses above 3/4" a U-bevel can be furnished, if specified. U-bevels, while not included in B16.9, are often used when welding is done by the Tungsten-Inert Gas Method. Fittings with compound bevels can be satisfactorily welded to pipe and fittings with U-bevels.

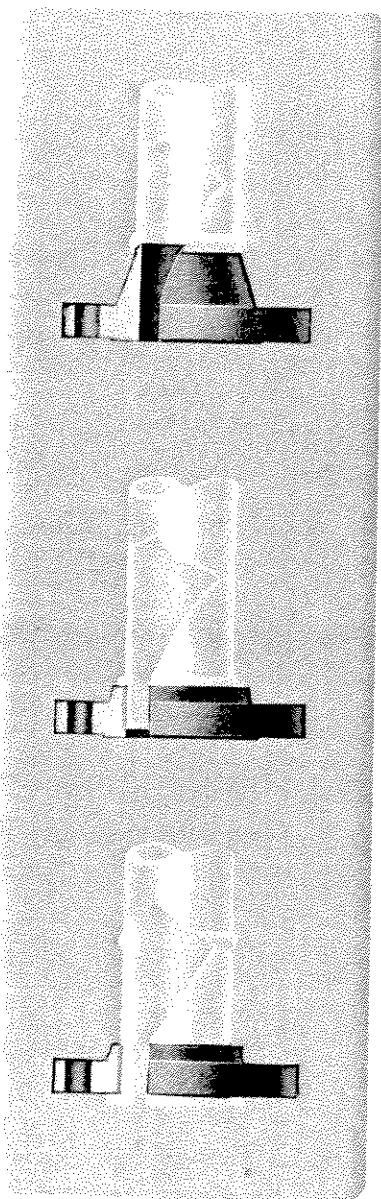


Note: All Nominal Pipe Sizes in materials covered by ANSI B16.9 are beveled as shown. For other bevels, prices on application.

Tube Turns®

Forged Flanges

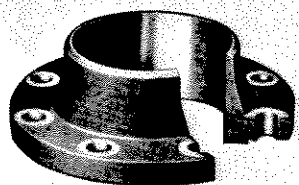
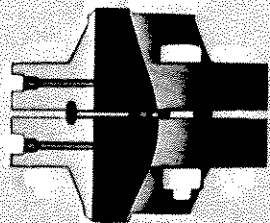
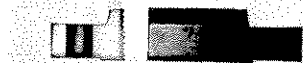
The selection and application of forged steel companion flanges



WELDING NECK FLANGES are distinguished from other types by their long tapered hub and gentle transition of thickness in the region of the butt weld joining them to the pipe. The long tapered hub provides an important reinforcement of the flange proper from the standpoint of strength and resistance to dishing. The smooth transition from flange thickness to pipe wall thickness effected by the taper is extremely beneficial under conditions of repeated bending, caused by line expansion or other variable forces, and produces an endurance strength of welding neck flanged assemblies⁽¹⁾ equivalent to that of a butt welded joint between pipes, which, in practice, is the same as that of unwelded pipe. Thus this type of flange is preferred for every severe service condition, whether this results from high pressure or from sub-zero or elevated temperature, and whether loading conditions are substantially constant or fluctuate between wide limits.

SLIP-ON FLANGES continue to be preferred to welding neck flanges by many users on account of their initially lower cost, the reduced accuracy required in cutting the pipe to length, and the somewhat greater ease of alignment of the assembly; however, their final installed cost is probably not much, if any, less than that of welding neck flanges. Their calculated strength under internal pressure is of the order of two-thirds that of welding neck flanges, and their life under fatigue is about one-third that of the latter. For these reasons, slip-on flanges are limited to sizes $\frac{1}{2}$ " to $2\frac{1}{2}$ " in the Class 1500 standard and are not shown in the Class 2500 standard.⁽²⁾

LAP JOINT FLANGES are primarily employed with lap joint stubs, the combined initial cost of the two items being approximately one-third higher than that of comparable welding neck flanges. Their pressure-holding ability is little, if any, better than that of slip-on flanges and the fatigue life of the assembly is only one-tenth that of welding neck flanges. The chief use of lap joint flanges in carbon or low alloy steel piping systems is in services necessitating frequent dismantling for inspection and cleaning and where the ability to swivel flanges and to align bolt holes materially simplifies the erection of large diameter or unusually stiff piping. Their use at points where severe bending stress occurs should be avoided.



THREADED FLANGES made of steel, are confined to special applications. Their chief merit lies in the fact that they can be assembled without welding; this explains their use in extremely high pressure services, particularly at or near atmospheric temperature, where alloy steel is essential for strength and where the necessary post-weld heat treatment is impractical. Threaded flanges are unsuited for conditions involving temperature or bending stresses of any magnitude, particularly under cyclic conditions, where leakage through the threads may occur in relatively few cycles of heating or stress; seal welding is sometimes employed to overcome this, but cannot be considered as entirely satisfactory.

SOCKET WELDING FLANGES were initially developed for use on small-size high pressure piping. Their initial cost is about 10% greater than that of slip-on flanges; when provided with an internal weld as illustrated, their static strength is equal to, but their fatigue strength 50% greater than double welded slip-on flanges. Smooth, pocketless bore conditions can readily be attained (by grinding the internal weld) without having to bevel the flange face and, after welding, to reface the flange as would be required with slip-on flanges. The internally welded socket type flange is becoming increasingly popular in chemical process piping for this reason.

ORIFICE FLANGES are widely used in conjunction with orifice meters for measuring the rate of flow of liquids and gases. They are basically the same as standard welding neck, slip-on and screwed flanges except for the provision of radial, tapped holes in the flange ring for meter connections and additional bolts to act as jack screws to facilitate separating the flanges for inspection or replacement of the orifice plate. In choosing the type of orifice flange, the considerations affecting the choice of welding neck, slip-on and screwed standard flanges apply with equal force.

BLIND FLANGES are used to blank off the ends of piping, valves and pressure vessel openings. From the standpoint of internal pressure and bolt loading, blind flanges, particularly in the larger sizes, are the most highly stressed of all American Standard flange types; however, since the maximum stresses in a blind flange are bending stresses at the center, they can safely be permitted to be higher than in other types of flanges. Where temperature is a service factor, or repeated severe water hammer, consideration should be given to closures made of welding neck flanges and caps.

SPECIAL FLANGES are made in welding neck, slip-on, threaded and blind types. Tube Turns facilities are not limited to manufacture of standardized flanges. Large diameter flanges with drilling to match cast iron standard, Pressure Vessel flanges, and TEMA Heat Exchanger flanges are regularly furnished. In addition flanges are supplied to match non-standard oil pipe line gate valves.

(1) In Tube Turns tests of all types of flanged assemblies, fatigue failure invariably occurred in the pipe or in an unusually weak weld, never in the flange proper. The type of flange, however, and particularly the method of attachment, greatly influence the number of cycles required to cause fracture.

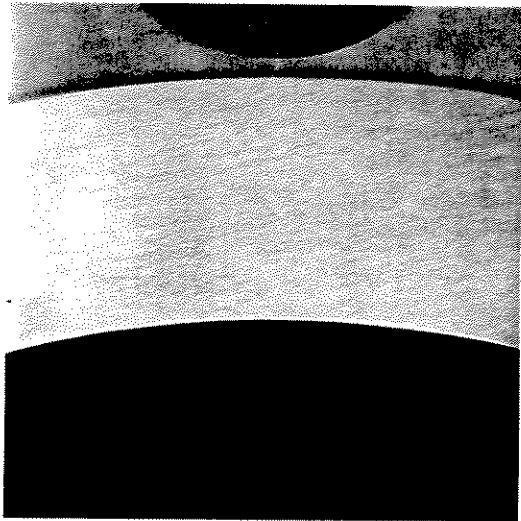
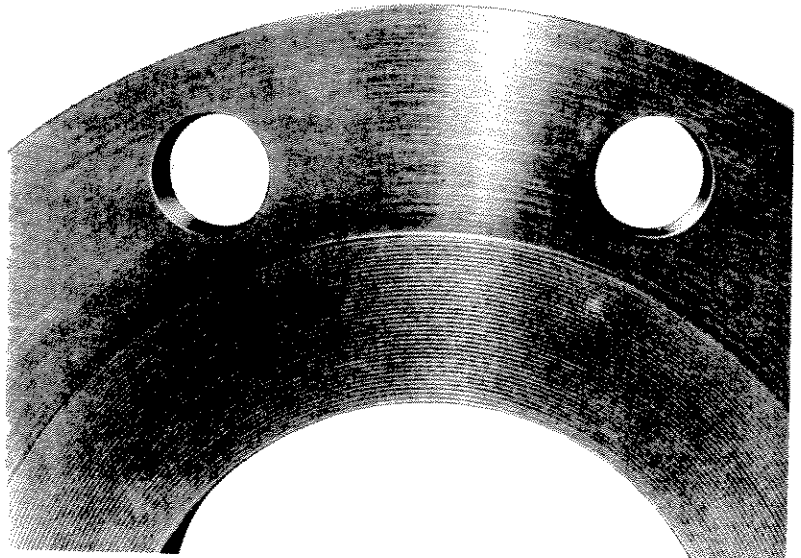
(2) ANSI B16.5-1973 - Steel Pipe Flanges, Flanged Valves, and Fittings.

Tube Turns[®] gasket surface finishes

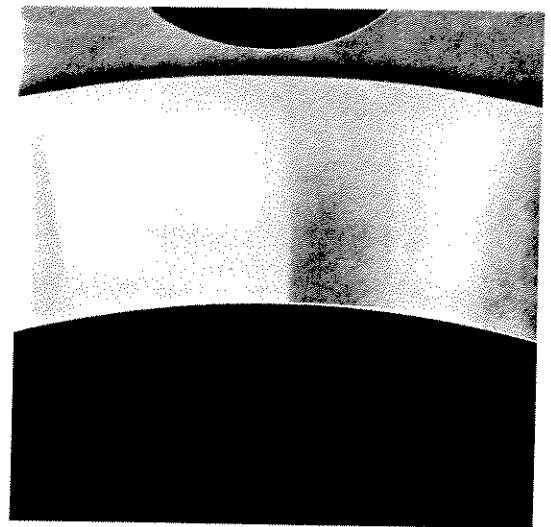
100% SERRATED GASKET SURFACE FINISH

TUBE TURNS flanges and lap joint stub ends provided with raised faces are furnished from stock with a modified spiral serrated gasket surface finish having from 24 to 40 grooves per inch (.6 to 1 mm pitch). The cutting tool employed has an approximate .06 in. (1.6 mm) or greater radius. The resultant surface finish is judged by visual comparison with AARRH Standards (See ANSI B46.1) and not by instruments having stylus tracers and electronic amplification. The finishes have a 500 microinch maximum roughness for Class 150 and 300 flanges and 250 microinch maximum roughness for Class 400 and higher rated flanges.

Other Tube Turns gasket surface finishes available, at extra charge, are Smooth Plane Finish and Cold Water Finish.



SMOOTH PLANE FINISH
Produced by machining to provide a smooth surface.



COLD WATER FINISH
Produced by using a wide, formed tool at high speeds, resulting in a mirrorlike finish.

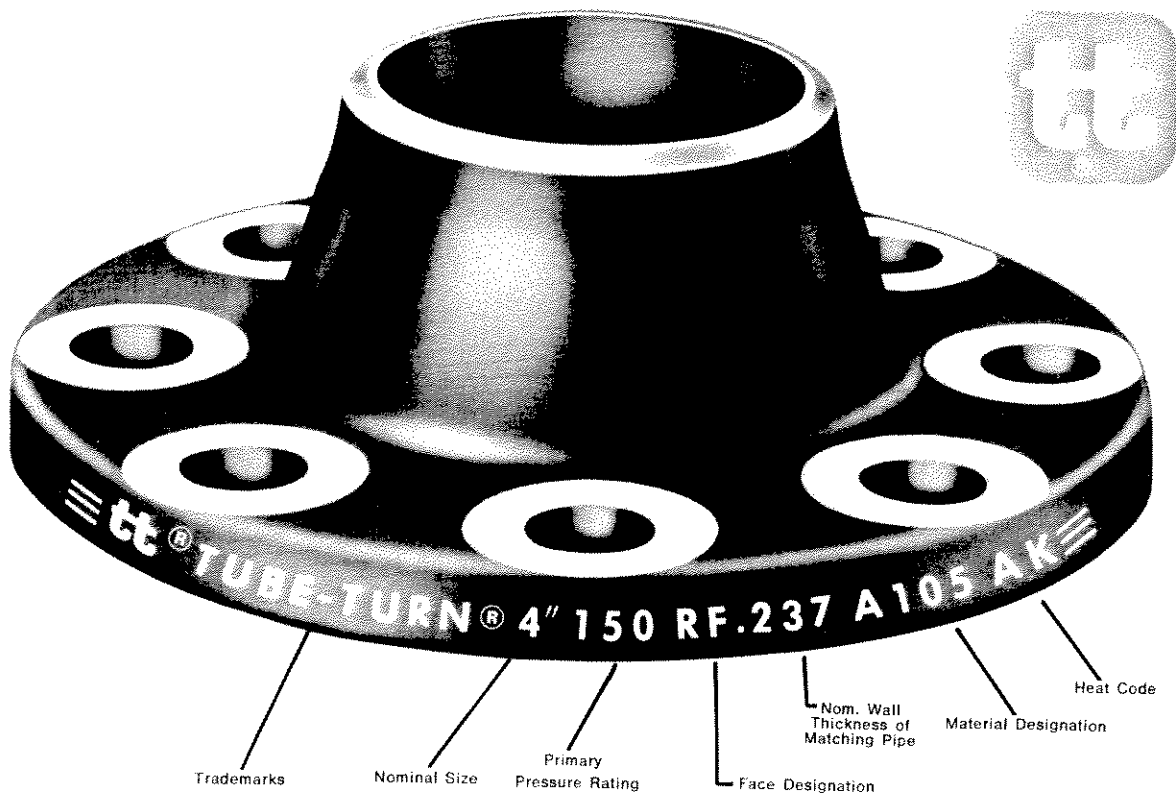
Manufacturing standards

Tube Turns flanges listed in this catalog are manufactured to conform to the latest accepted and approved designs as published by the American National Standards Institute, the ASME Boiler and Pressure Vessel Code, the American Petroleum Institute, the American Water Works Association, and

the Manufacturers Standardization Society. Materials are in rigid conformance with the ASTM and ASME specifications applicable, or to customer's specific requirements. The most commonly used carbon steel material standard is listed below.

ASTM† SPECIFICATION	TYPE OF STEEL	CHEMICAL COMPOSITION	MINIMUM MECHANICAL REQUIREMENTS	HEAT TREATMENT
A105	Carbon	C-0.22 to 0.35 Mn - 0.60 to 1.05	TS - 70,000 YS - 36,000	Flanges with primary service pressure ratings over 300 psi shall be heat treated.

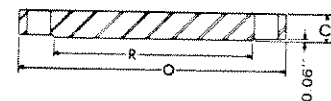
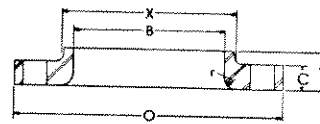
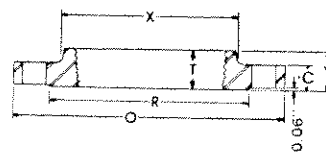
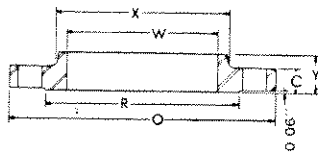
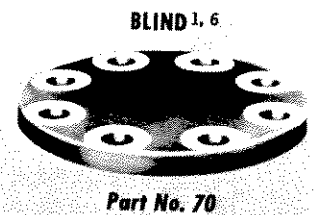
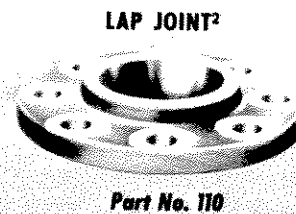
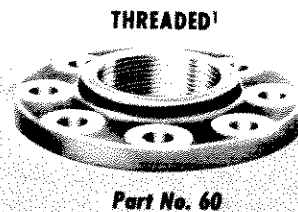
† The ASME Boiler Code Material Specification Numbers are the same as ASTM except that the letter S is prefixed thereto.



Flange identification marking

Tube Turns flanges are permanently marked with all necessary information for easy identification, and in compliance with American National Standards Insti-

tute requirements and appropriate American Society for Testing of Materials and American Society of Mechanical Engineers specifications.



ANSI B16.5 ASTM A105[▲]

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICK. OF ⁵ FLANGE C	DIAM. OF RAISED FACE R	DIAM. OF HUB AT BASE X	LENGTH THRU HUB ⁵			MINIMUM THREAD ⁷ LENGTH T	DIAM. OF BORE			DIAM. OF HUB AT BEVEL H ¹⁰	RADIUS OF FILLET r	DEP OF SOCKET Z
					WELDING NECK Y	SLIP-ON, ⁶ THREADED, SOCKET Y	LAP JOINT Y		WELDING NECK, ⁸ SOCKET J	SLIP-ON, SOCKET W	LAP JOINT B			
1/2	3.50	0.44	1.38	1.19	1.88	0.62	0.62	0.62	0.62	0.88	0.90	0.84	0.12	0.38
3/4	3.88	0.50	1.69	1.50	2.06	0.62	0.62	0.62	0.82	1.09	1.11	1.05	0.12	0.44
1	4.25	0.56	2.00	1.94	2.19	0.69	0.69	0.69	1.05	1.36	1.38	1.32	0.12	0.50
1-1/4	4.62	0.62	2.50	2.31	2.25	0.81	0.81	0.81	1.38	1.70	1.72	1.66	0.19	0.56
1-1/2	5.00	0.69	2.88	2.56	2.44	0.88	0.88	0.88	1.61	1.95	1.97	1.90	0.25	0.62
2	6.00	0.75	3.62	3.06	2.50	1.00	1.00	1.00	2.07	2.44	2.46	2.38	0.31	0.69
2-1/2	7.00	0.88	4.12	3.56	2.75	1.12	1.12	1.12	2.47	2.94	2.97	2.88	0.31	0.75
3	7.50	0.94	5.00	4.25	2.75	1.19	1.19	1.19	3.07	3.57	3.60	3.50	0.38	0.81
3-1/2	8.50	0.94	5.50	4.81	2.81	1.25	1.25	1.25	3.55	4.07	4.10	4.00	0.38	0.88
4	9.00	0.94	6.19	5.31	3.00	1.31	1.31	1.31	4.03	4.57	4.60	4.50	0.44	0.94
5	10.00	0.94	7.31	6.44	3.50	1.44	1.44	1.44	5.05	5.66	5.69	5.56	0.44	0.94
6	11.00	1.00	8.50	7.56	3.50	1.56	1.56	1.56	6.07	6.72	6.75	6.63	0.50	1.06
8	13.50	1.12	10.62	9.69	4.00	1.75	1.75	1.75	7.98	8.72	8.75	8.63	0.50	1.25
10	16.00	1.19	12.75	12.00	4.00	1.94	1.94	1.94	10.02	10.88	10.92	10.75	0.50	1.31
12	19.00	1.25	15.00	14.38	4.50	2.19	2.19	2.19	12.00	12.88	12.92	12.75	0.50	1.56
14	21.00	1.38	16.25	15.75	5.00	2.25	SEE NOTE 2	2.25	13.25*	14.14	SEE NOTE 2	14.00	SEE NOTE 2	1.62
16	23.50	1.44	18.50	18.00	5.00	2.50		2.50	15.25*	16.16		16.00		1.75
18	25.00	1.56	21.00	19.88	5.50	2.69		2.69	17.25*	18.18		18.00		1.94
20	27.50	1.69	23.00	22.00	5.69	2.88		2.88	19.25*	20.20		20.00		2.12
24	32.00	1.88	27.25	26.12	6.00	3.25		3.25	23.25*	24.25		24.00		2.50

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

For standard facings see pages 112 & 113.

For Large Diameter ANSI Type Flanges and Pressure Vessel Flanges see pages 156 through 170.

(1) Flange dimensions and drilling are in accordance with ANSI B16.5.

(2) Lap joint flanges 10" and larger are stocked to slip-on dimensions. ANSI type also available.

(3) Socket type flanges conform to ANSI B16.5 for sizes 1/2 thru 3".

Other sizes conform to dimensions of slip-on flanges except for alteration of the bore to provide the socket.

(4) Slip-on and threaded reducing flanges are designated by the size of the tapping or nominal pipe size of the bore and the outside diameter of the flange. Other dimensions are same as straight sizes. Reducing welding neck flanges available on application.

(5) The 0.06" raised face is included in thickness "C" and length thru hub "Y".

(6) Blind flanges 1/2" through 2 1/2" are furnished with hubs, having outside diameter and height the same as Class 150 slip-on flanges.

FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.

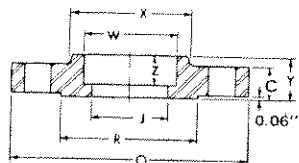
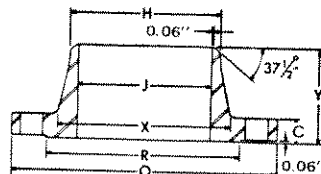
SOCKET TYPE³

Part No. 150

REDUCING⁴Slip-on—Part No. 120
Threaded—Part No. 130WELDING NECK¹

Part No. 30

CLASS 150 FLANGES

Internal Weld
Bevel Optional

Part No. 30

DRILLING				LENGTH OF BOLTS			APPROXIMATE WEIGHT IN POUNDS						NOMINAL PIPE SIZE
DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF BOLTS	DIAM. OF BOLT HOLES	STUD BOLTS ⁹		MACHINE BOLTS	WELDING NECK	SLIP-ON AND THREADED	LAP JOINT	BLIND	SOCKET TYPE AND THREADED		
				0.06" RAISED FACE	RING JOINT	0.06" R F							
2.38	4	1/2	0.62	2.50		2.00	2	2	2	2	2	1/2	
2.75	4	1/2	0.62	2.50		2.25	2	2	2	2	2	3/4	
3.12	4	1/2	0.62	2.75	3.25	2.25	2	2.3	2.3	2.5	2.3	1	
3.50	4	1/2	0.62	2.75	3.25	2.50	4	2.5	2.5	3	2.5	1-1/4	
3.88	4	1/2	0.62	3.00	3.50	2.50	5	3	3.3	4	3	1-1/2	
4.75	4	5/8	0.75	3.25	3.75	2.75	6.5	5	5.3	6	5	2	
5.50	4	5/8	0.75	3.50	4.00	3.00	10	8	8.3	10.5	8.3	2-1/2	
6.00	4	5/8	0.75	3.75	4.25	3.25	12.5	9	9.5	12.5	9.3	3	
7.00	8	5/8	0.75	3.75	4.25	3.25	15	12	12	15	12.5	3-1/2	
7.50	8	5/8	0.75	3.75	4.25	3.25	16	13	13	17	13.5	4	
8.50	8	3/4	0.88	4.00	4.50	3.25	21	14	14	21	14.5	5	
9.50	8	3/4	0.88	4.00	4.50	3.50	25	18	18	28	19	6	
11.75	8	3/4	0.88	4.25	4.75	3.75	40	27	27	47	28	8	
14.25	12	7/8	1.00	4.75	5.25	4.00	56	37	38	69	40	10	
17.00	12	7/8	1.00	4.75	5.25	4.25	86	59	61	102	62	12	
18.75	12	1	1.12	5.25	5.75	4.50	111	80	SEE NOTES	137	84	14	
21.25	16	1	1.12	5.50	6.00	4.75	141	101		177	106	16	
22.75	16	1-1/8	1.25	6.00	6.50	5.00	153	112		214	118	18	
25.00	20	1-1/8	1.25	6.25	6.75	5.50	188	141	SEE NOTES	276	149	20	
29.50	20	1-1/4	1.38	7.00	7.50	6.00	270	197		425	210	24	

(7) Thread length for Class 150 flanges is American Standard for Pipe Threads ANSI B2.1.

(8) Flanges will be furnished bored to these dimensions (Standard Wall pipe I.D. ANSI B36.10) unless otherwise ordered. Extra Strong Wall bore also furnished from stock.

(9) In conformance with ANSI B16.5, stud lengths do not include point heights or laps. For lapped to lapped add thickness of two laps. For lapped to any other facing add the amount that such facing and one lap will cause the flange to be separated.

(10) When flanges are intended for service with higher yield strength pipe, the thickness of the hub at the bevel may be greater than that of the pipe to which the flange is joined.

(11) Flanges with a straight taper hub for use with thin wall, high strength pipe (similar to MSS SP 44 flanges) are available on special order.

* Bores for sizes 14" and larger correspond to Standard Wall pipe. These bores are not listed in ANSI B16.5.

For welding neck flange bevel details see page 177.

For gasket surface finishes see page 94.

For Ring type joint details see page 114.

For dimensional tolerances see page 176.

For ordering instructions see page 178.

SLIP-ON¹

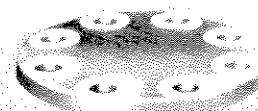
Part No. 51

THREADED¹

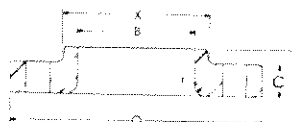
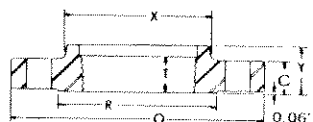
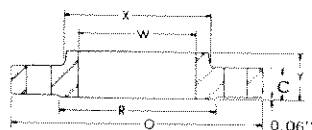
Part No. 61

LAP JOINT²

Part No. 111

BLIND^{3, 6}

Part No. 71

ANSI B16.5 ASTM A105[▲]

NOM. PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICK. OF ⁵ FLANGE C	THICK. OF BLIND FLANGE C	DIAM. OF RAISED FACE R	DIAM. OF HUB AT BASE X	LENGTH THRU HUB ⁵			MINIMUM THREAD ⁷ LENGTH T	DIAM. OF BORE			DIAM. OF HUB AT BEVEL H ¹⁰	RADIUS OF FILLET r
						WELDING NECK Y	SLIP-ON, ⁶ THREADED, SOCKET Y	LAP JOINT Y		WELDING NECK, ⁸ SOCKET J	SLIP-ON, SOCKET W	LAP JOINT B		
1/2	3.75	0.56	0.56	1.38	1.50	2.06	0.88	0.88	0.62	0.62	0.88	0.90	0.84	0.12
3/4	4.62	0.62	0.62	1.69	1.88	2.25	1.00	1.00	0.62	0.82	1.09	1.11	1.05	0.12
1	4.88	0.69	0.69	2.00	2.12	2.44	1.06	1.06	0.69	1.05	1.36	1.38	1.32	0.12
1-1/4	5.25	0.75	0.75	2.50	2.50	2.56	1.06	1.06	0.81	1.38	1.70	1.72	1.66	0.19
1-1/2	6.12	0.81	0.81	2.88	2.75	2.69	1.19	1.19	0.88	1.61	1.95	1.97	1.90	0.25
2	6.50	0.88	0.88	3.62	3.31	2.75	1.31	1.31	1.12	2.07	2.44	2.46	2.38	0.31
2-1/2	7.50	1.00	1.00	4.12	3.94	3.00	1.50	1.50	1.25	2.47	2.94	2.97	2.88	0.31
3	8.25	1.12	1.12	5.00	4.62	3.12	1.69	1.69	1.25	3.07	3.57	3.60	3.50	0.38
3-1/2	9.00	1.19	1.19	5.50	5.25	3.19	1.75	1.75	1.44	3.55	4.07	4.10	4.00	0.38
4	10.00	1.25	1.25	6.19	5.75	3.38	1.88	1.88	1.44	4.03	4.57	4.60	4.50	0.44
5	11.00	1.38	1.38	7.31	7.00	3.88	2.00	2.00	1.69	5.05	5.66	5.69	5.56	0.44
6	12.50	1.44	1.44	8.50	8.12	3.88	2.06	2.06	1.81	6.07	6.72	6.75	6.63	0.50
8	15.00	1.62	1.62	10.62	10.25	4.38	2.44	2.44	2.00	7.98	8.72	8.75	8.63	0.50
10	17.50	1.88	1.88	12.75	12.62	4.62	2.62	SEE NOTE 2	2.19	10.02	10.88	SEE NOTE 2	10.75	SEE NOTE 2
12	20.50	2.00	2.00	15.00	14.75	5.12	2.88		2.38	12.00	12.88		12.75	
14	23.00	2.12	2.12	16.25	16.75	5.62	3.00		2.50	13.25*	14.14		14.00	
16	25.50	2.25	2.25	18.50	19.00	5.75	3.25		2.69	15.25*	16.16		16.00	
18	28.00	2.38	2.38	21.00	21.00	6.25	3.50		2.75	17.25*	18.18		18.00	
20	30.50	2.50	2.50	23.00	23.12	6.38	3.75	SEE NOTE 2	2.88	19.25*	20.20	SEE NOTE 2	20.00	SEE NOTE 2
24	36.00	2.75	2.75	27.25	27.62	6.62	4.19		3.25	23.25*	24.25		24.00	

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

For standard facings see pages 112 & 113.

For Large Diameter ANSI Type Flanges and Pressure Vessel Flanges see pages 156 through 170.

- (1) Flange dimensions and drilling are in accordance with ANSI B16.5.
- (2) Lap joint flanges over 12" are stocked to slip-on dimensions. ANSI type also available.
- (3) Socket type flanges conform to ANSI B16.5 for sizes 1/2" thru 3". Other sizes conform to dimensions of slip-on flanges except for alteration of the bore to provide the socket.
- (4) Slip-on and threaded reducing flanges are designated by the size of the

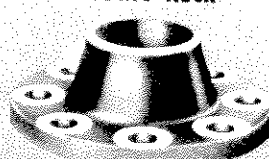
tapping or nominal pipe size of the bore and the outside diameter of the flange. Other dimensions are the same as straight sizes. Reducing welding neck flanges available on application.

- (5) The 0.06" raised face is included in thickness "C" and length thru hub "Y".
- (6) Blind flanges 1/2" through 1 1/4" are furnished with hubs, having outside diameter and height the same as Class 300 slip on flanges.
- (7) Thread length for Class 300 flanges is American Standard for Pipe Threads ANSI B2.1.
- (8) Flanges will be furnished bored to these dimensions (Standard Wall pipe I.D. ANSI B36.10) unless otherwise ordered. Extra Strong Wall bore also furnished from stock.
- (9) In conformance with ANSI B16.5, stud lengths do not include point heights or laps. For lapped to lapped add thickness of two laps. For lapped to any other facing add the amount that such facing and one lap will cause the flange to be separated.

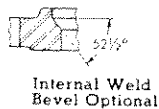
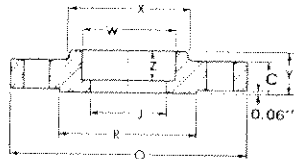
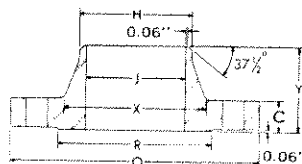
FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.

SOCKET TYPE³

Part No. 151
REDUCING⁴

Slip-on—Part No. 121
Threaded—Part No. 131
WELDING NECK¹

Part No. 31

CLASS 300 **FLANGES**


 Internal Weld
 Bevel Optional

Part No. 31

DEPTH OF SOCKET Z	DRILLING				LENGTH OF BOLTS			APPROXIMATE WEIGHT IN POUNDS					NOMINAL PIPE SIZE
	DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF BOLTS	DIAM. OF BOLT HOLES	STUD BOLTS ⁹		MACHINE BOLTS 0.06" R.F.	WELDING NECK	SLIP-ON AND THREADED	LAP JOINT	BLIND	SOCKET TYPE	
					0.06" RAISED FACE	RING JOINT							
0.38	2.62	4	1/2	0.62	2.75	3.00	2.25	4	2	2	2	2	1/2
0.44	3.25	4	5/8	0.75	3.00	3.50	2.50	4	3	3	3.3	3	3/4
0.50	3.50	4	5/8	0.75	3.25	3.75	2.75	5	3.5	3.8	4	3.5	1
0.56	3.88	4	5/8	0.75	3.25	3.75	2.75	6	4	4.3	5	4	1-1/4
0.62	4.50	4	3/4	0.88	3.75	4.25	3.00	9	6	6.3	7	6.3	1-1/2
0.69	5.00	8	5/8	0.75	3.50	4.25	3.00	8.5	7	7.5	8	7.3	2
0.75	5.88	8	3/4	0.88	4.00	4.75	3.50	10.5	10	11	12	10.5	2-1/2
0.81	6.62	8	3/4	0.88	4.25	5.00	3.75	11	14	14	16	14.5	3
0.88	7.25	8	3/4	0.88	4.50	5.25	3.75	20	17	17	20	17.5	3-1/2
0.94	7.88	8	3/4	0.88	4.50	5.25	4.00	21	22	22	27	23	4
	9.25	8	3/4	0.88	4.75	5.50	4.25	31	28	28	36		5
	10.62	12	3/4	0.88	5.00	5.75	4.25	41	38	39	50		6
	13.00	12	7/8	1.00	5.50	6.25	4.75	70	56	58	81		8
	15.25	16	1	1.12	6.25	7.00	5.50	94	78		120		10
	17.75	16	1-1/8	1.25	6.75	7.50	6.00	140	117		178		12
	20.25	20	1-1/8	1.25	7.00	7.75	6.25	190	166	SEE NOTE 2	242		14
	22.50	20	1-1/4	1.38	7.50	8.25	6.50	250	208		312		16
	24.75	24	1-1/4	1.38	7.75	8.50	6.75	305	258		392		18
	27.00	24	1-1/4	1.38	8.25	9.00	7.25	380	320		494		20
	32.00	24	1-1/2	1.62	9.25	10.25	8.00	540	478		760		24

(10) When flanges are intended for service with higher yield strength pipe, the thickness of the hub at the bevel may be greater than that of the pipe to which the flange is joined.

(11) Flanges with a straight taper hub for use with thin wall, high strength pipe (similar to MSS SP-44 flanges) are available on special order.

* Bores for sizes 14" and larger correspond to Standard Wall pipe. These bores are not listed in ANSI B16.5.

For welding neck flange bevel details see page 177.

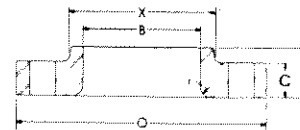
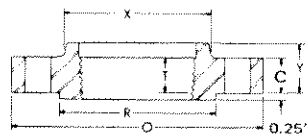
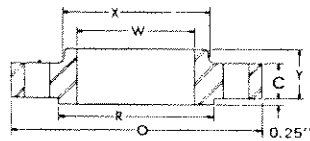
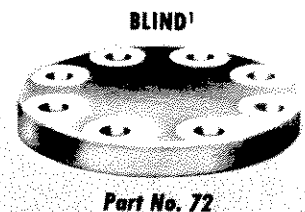
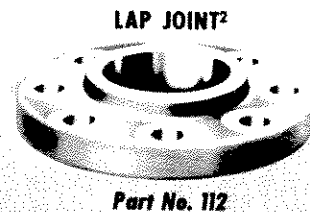
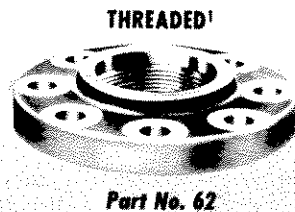
For gasket surface finishes see page 94.

For ring type joint details see page 115.

For dimensional tolerances see page 176.

For Large Diameter ANSI Type Flanges and Pressure Vessel Flanges, see page 156 through 170.

For ordering instructions see page 178.



ANSI B16.5 ASTM A105 ▲
For sizes ½" through 3½" use class 600 flanges.

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICK. OF FLANGE C	THICK. OF BLIND FLANGE C	DIAM. OF RAISED FACE R	DIAM. OF HUB AT BASE X	LENGTH THRU HUB ⁴			MINIMUM THREAD ⁵ LENGTH T	DIAM. OF BORE		
						WELDING NECK Y	SLIP-ON, THREADED Y	LAP JOINT Y		WELDING NECK, ⁶ J	SLIP-ON W	LAP JOINT B
4	10.00	1.38	1.38	6.19	5.75	3.50	2.00	2.00	1.44	3.83	4.57	4.60
5	11.00	1.50	1.50	7.31	7.00	4.00	2.12	2.12	1.69	4.81	5.66	5.69
6	12.50	1.62	1.62	8.50	8.12	4.06	2.25	2.25	1.81	5.76	6.72	6.75
8	15.00	1.88	1.88	10.62	10.25	4.62	2.69	2.69	2.00	7.63	8.72	8.75
10	17.50	2.12	2.12	12.75	12.62	4.88	2.88		2.19	9.75	10.88	
12	20.50	2.25	2.25	15.00	14.75	5.38	3.12		2.38	11.75	12.88	
14	23.00	2.38	2.38	16.25	16.75	5.88	3.31	SEE NOTE 2	2.50	13.00	14.14	SEE NOTE 2
16	25.50	2.50	2.50	18.50	19.00	6.00	3.69		2.69	15.00	16.16	
18	28.00	2.62	2.62	21.00	21.00	6.50	3.88		2.75	17.00	18.18	
20	30.50	2.75	2.75	23.00	23.12	6.62	4.00		2.88	19.00	20.20	
24	36.00	3.00	3.00	27.25	27.62	6.88	4.50		3.25	23.00	24.25	

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced. For standard flange facings see pages 112 & 113.

For Pressure Vessel Flanges see page 156 through 170.

For Large Diameter ANSI Type Flanges and Pressure Vessel Flanges see pages 156 through 170.

(1) Flange dimensions and drilling are in accordance with ANSI B16.5 for steel flanges.

(2) Lap joint flanges 10" and larger are stocked to slip-on dimensions. ANSI type also available.

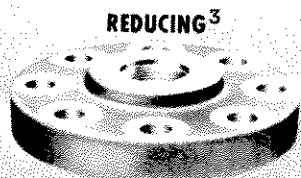
(3) Slip-on and threaded reducing flanges are designated by the size of the tapping or nominal pipe size of the bore and the outside diameter of the flange. Other dimensions are same as straight sizes. Reducing welding neck flanges available on application.

(4) The 0.25" raised face is not included in thickness "C" and length thru hub "Y".

(5) Thread lengths are American Standard for Pipe Threads ANSI B2.1, which is identical with the API Line Pipe Thread.

(6) Flanges will be furnished bored to these dimensions (Extra Strong Wall

FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.

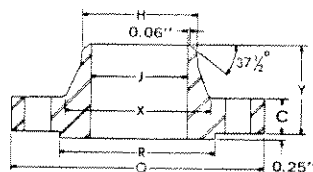


REDUCING³
Slip-on—Part No. 122
Threaded—Part No. 132



WELDING NECK¹
Part No. 32

CLASS 400 FLANGES



Part No. 32

For sizes ½" through 3½" use class 600 flanges.

DIAM. OF HUB AT BEVEL H"	RADIUS OF FILLET r	DRILLING				LENGTH OF STUD BOLTS ⁷			APPROXIMATE WEIGHT IN POUNDS				NOMINAL PIPE SIZE
		DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF BOLTS	DIAM. OF BOLT HOLES	0.25" RAISED FACE	RING JOINT	MALE & FEMALE, TONGUE & GROOVE	WELDING NECK	SLIP-ON AND THREADED	LAP JOINT	BLIND	
4.50	0.44	7.88	8	7/8	1.00	5.50	5.75	5.25	31	26.5	25	31	4
5.56	0.44	9.25	8	7/8	1.00	5.75	6.00	5.50	39	32	30	41	5
6.63	0.50	10.62	12	7/8	1.00	6.00	6.25	5.75	52	43	40	57	6
8.63	0.50	13.00	12	1	1.12	6.75	7.00	6.50	82	67	63	95	8
10.75	SEE NOTE 2	15.25	16	1-1/8	1.25	7.50	7.75	7.25	116	92	SEE NOTE 2	147	10
12.75		17.75	16	1-1/4	1.38	8.00	8.25	7.75	162	133		214	12
14.00		20.25	20	1-1/4	1.38	8.25	8.50	8.00	212	187		284	14
16.00		22.50	20	1-3/8	1.50	8.75	9.00	8.50	268	238		364	16
18.00		24.75	24	1-3/8	1.50	9.00	9.25	8.75	344	291		466	18
20.00	SEE NOTE 2	27.00	24	1-1/2	1.62	9.75	10.00	9.50	427	354	SEE NOTE 2	591	20
24.00		32.00	24	1-3/4	1.88	10.75	11.25	10.50	616	525		881	24

pipe I.D. ANSI B36.10) unless otherwise ordered. These bores are not listed in ANSI B16.5. Standard Wall bore also furnished from stock.

(7) In conformance with ANSI B16.5, stud lengths do not include point heights or laps. For lapped to lapped add thickness of two laps. For lapped to any other facing add the amount that such facing and one lap will cause the flange to be separated.

(8) When flanges are intended for service with higher yield strength pipe, the thickness of the hub at the bevel may be greater than that of the pipe to which the flange is joined.

(9) Flanges with a straight taper hub for use with thin wall, high strength pipe (similar to MSS SP-44 flanges) are available on special order.

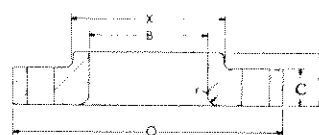
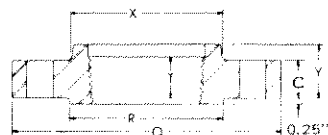
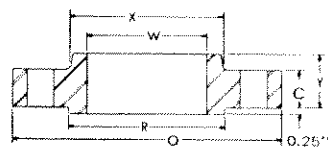
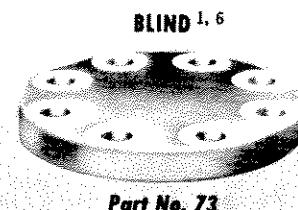
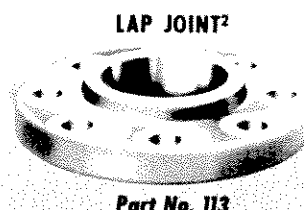
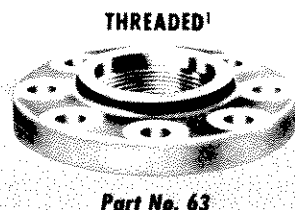
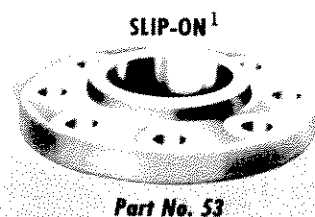
For welding neck flange bevel details see page 177.

For gasket surface finishes see page 94.

For ring type joint details see page 115.

For dimensional tolerances see page 176.

For ordering instructions see page 178.



ANSI B16.5 ASTM A105 [▲]

NOM. PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICK. OF ⁵ FLANGE C	THICK. OF BLIND FLANGE C	DIAM. OF RAISED FACE R	DIAM. OF HUB AT BASE X	LENGTH THRU HUB ⁵			MINIMUM THREAD ⁷ LENGTH T	DIAM. OF BORE			DIAM. OF HUB AT BEVEL H ¹⁰	RADIUS OF FILLET r
						WELDING NECK Y	SLIP-ON, ⁶ THREADED, SOCKET Y	LAP JOINT Y		WELDING NECK, ⁸ SOCKET J	SLIP-ON, SOCKET W	LAP JOINT B		
1/2	3.75	0.56	0.56	1.38	1.50	2.06	0.88	0.88	0.62	0.55	0.88	0.90	0.84	0.12
3/4	4.62	0.62	0.62	1.69	1.88	2.25	1.00	1.00	0.62	0.74	1.09	1.11	1.05	0.12
1	4.88	0.69	0.69	2.00	2.12	2.44	1.06	1.06	0.69	0.96	1.36	1.38	1.32	0.12
1-1/4	5.25	0.81	0.81	2.50	2.50	2.62	1.12	1.12	0.81	1.28	1.70	1.72	1.66	0.19
1-1/2	6.12	0.88	0.88	2.88	2.75	2.75	1.25	1.25	0.88	1.50	1.95	1.97	1.90	0.25
2	6.50	1.00	1.00	3.62	3.31	2.88	1.44	1.44	1.12	1.94	2.44	2.46	2.38	0.31
2-1/2	7.50	1.12	1.12	4.12	3.94	3.12	1.62	1.62	1.25	2.32	2.94	2.97	2.88	0.31
3	8.25	1.25	1.25	5.00	4.62	3.25	1.81	1.81	1.38	2.90	3.57	3.60	3.50	0.38
3-1/2	9.00	1.38	1.38	5.50	5.25	3.38	1.94	1.94	1.56	3.36	4.07	4.10	4.00	0.38
4	10.75	1.50	1.50	6.19	6.00	4.00	2.12	2.12	1.62	3.83	4.57	4.60	4.50	0.44
5	13.00	1.75	1.75	7.31	7.44	4.50	2.38	2.38	1.88	4.81	5.66	5.69	5.56	0.44
6	14.00	1.88	1.88	8.50	8.75	4.62	2.62	2.62	2.00	5.76	6.72	6.75	6.63	0.50
8	16.50	2.19	2.19	10.62	10.75	5.25	3.00	3.00	2.25	7.63	8.72	8.75	8.63	0.50
10	20.00	2.50	2.50	12.75	13.50	6.00	3.38	SEE NOTE 2	2.56	9.75	10.88	SEE NOTE 2	10.75	SEE NOTE 2
12	22.00	2.62	2.62	15.00	15.75	6.12	3.62		2.75	11.75	12.88		12.75	
14	23.75	2.75	2.75	16.25	17.00	6.50	3.69		2.88	To be Speci- fied by Pur- chaser	14.14		14.00	
16	27.00	3.00	3.00	18.50	19.50	7.00	4.19		3.06		16.16		16.00	
18	29.25	3.25	3.25	21.00	21.50	7.25	4.62		3.12		18.18		18.00	
20	32.00	3.50	3.50	23.00	24.00	7.50	5.00	SEE NOTE 2	3.25		20.20	SEE NOTE 2	20.00	SEE NOTE 2
24	37.00	4.00	4.00	27.25	28.25	8.00	5.50		3.62		24.25		24.00	

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

For standard flange facings see pages 112 & 113.

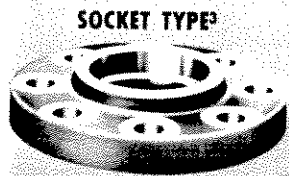
For Large Diameter ANSI Type Flanges and Pressure Vessel Flanges see pages 156 through 170.

- (1) Flange dimensions, drilling and bolt lengths are in accordance with ANSI B16.5 for steel flanges.
- (2) Lap joint flanges 10" and larger are stocked to slip-on dimensions. ANSI type also available.
- (3) Socket type flanges conform to ANSI B16.5 for sizes 1/2" thru 3". Other

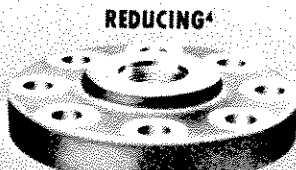
sizes conform to dimensions of slip-on flanges except for alteration of the bore to provide the socket.

- (4) Slip-on and threaded reducing flanges are designated by the size of the tapping or nominal pipe size of the bore and the outside diameter of the flange. Other dimensions are same as straight sizes. Reducing welding neck flanges available on application.
- (5) The 0.25" raised face is not included in thickness "C" and length thru hub "Y".
- (6) Blind flanges 1/2" thru 3" (except 2") are furnished with hubs, having outside diameter and height the same as class 600 slip-on flanges.
- (7) Thread lengths are proportionately longer than API or American Standard for Pipe Threads and satisfy the general requirement for longer threads for the higher pressures.

FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.



Part No. 152

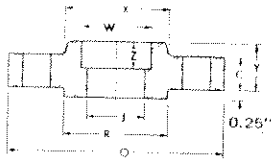


Slip-on—Part No. 123
Threaded—Part No. 133

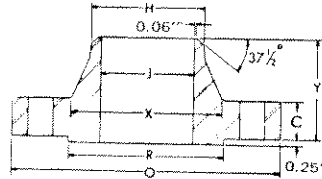


Part No. 33

CLASS 600 FLANGES



Internal Weld
Bevel Optional



Part No. 33

DEPTH OF SOCKET Z	DRILLING				LENGTH OF BOLTS ⁹			APPROXIMATE WEIGHT IN POUNDS					NOMINAL PIPE SIZE
	DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF BOLTS	DIAM. OF BOLT HOLES	0.25" RAISED FACE	RING JOINT	MALE & FEMALE, TONGUE & GROOVE	WELDING NECK	SLIP-ON AND THREADED	LAP JOINT	BLIND	SOCKET TYPE	
.38	2.62	4	1/2	0.62	3.25	3.00	3.00	4	2	2	2	2	1/2
.44	3.25	4	5/8	0.75	3.50	3.50	3.25	6	3.3	3	3.5	3.3	3/4
.50	3.50	4	5/8	0.75	3.75	3.75	3.50	6	4	3.8	4.5	4.3	1
.56	3.88	4	5/8	0.75	4.00	4.00	3.75	8	5	4.8	6	5.3	1-1/4
.62	4.50	4	3/4	0.88	4.25	4.25	4.00	10	7	6.8	8.5	7.3	1-1/2
.69	5.00	8	5/8	0.75	4.25	4.50	4.00	12	9	8.5	10	9.5	2
.75	5.88	8	3/4	0.88	4.75	5.00	4.50	18	12.8	12	15	13.5	2-1/2
.81	6.62	8	3/4	0.88	5.00	5.25	4.75	20	16.3	15.5	22	17	3
.88	7.25	8	7/8	1.00	5.50	5.75	5.25	25	22.5	21	28	23	3-1/2
	8.50	8	7/8	1.00	5.75	6.00	5.50	40	35.5	34	41		4
	10.50	8	1	1.12	6.50	6.75	6.25	66	58	56	68		5
	11.50	12	1	1.12	6.75	7.00	6.50	77	70	67	84		6
	13.75	12	1-1/8	1.25	7.75	7.75	7.50	113	104	99	136		8
	17.00	16	1-1/4	1.38	8.50	8.75	8.25	185	165		222		10
	19.25	20	1-1/4	1.38	8.75	9.00	8.50	224	198		282		12
	20.75	20	1-3/8	1.50	9.25	9.50	9.00	334	233		346		14
	23.75	20	1-1/2	1.62	10.00	10.25	9.75	462	336		490		16
	25.75	20	1-5/8	1.75	10.75	11.00	10.50	531	408		621		18
	28.50	24	1-5/8	1.75	11.50	11.75	11.25	678	520		812		20
	33.00	24	1-7/8	2.00	13.00	13.25	12.75	959	730		1190		24

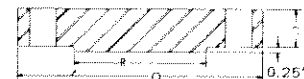
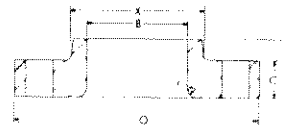
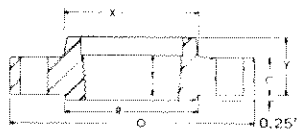
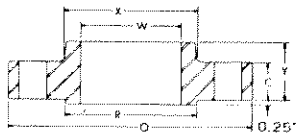
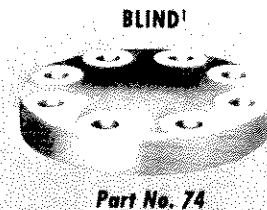
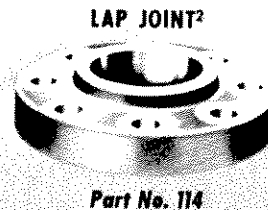
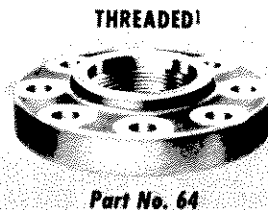
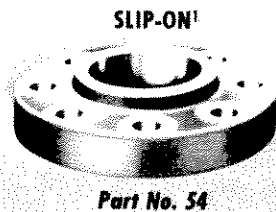
SEE NOTE 2

(8) Flanges will be furnished bored to these dimensions (Extra Strong Wall Pipe I.D. ANSI B36.10) unless otherwise ordered. These bores are not listed in ANSI B16.5. Standard Wall bore also furnished from stock.

(9) In conformance with ANSI B16.5, stud lengths do not include point heights or laps. For lapped to lapped add thickness of two laps. For lapped to any other facing add the amount that such facing and one lap will cause the flange to be separated.

(10) When flanges are intended for service with higher yield strength pipe, the thickness of the hub at the bevel may be greater than that of the pipe to which the flange is joined.

(11) Flanges with a straight taper hub for use with thin wall, high strength pipe (similar to MSS SP-44 flanges) are available on special order.
For welding neck flange bevel details see page 177.
For gasket surface finishes see page 94.
For dimensional tolerances see page 176.
For ring type joint details see page 115.
For ordering instructions see page 178.



ANSI B16.5 ASTM A105 ▲
For sizes ½" through 2½" use class 1500 flanges.

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICK. OF 4 FLANGE C	THICK. OF BLIND FLANGE C	DIAM. OF RAISED FACE R	DIAM. OF HUB AT BASE X	LENGTH THRU HUB 4			MINIMUM THREAD 5 LENGTH T	DIAM. OF BORE		
						WELDING NECK Y	SLIP-ON, THREADED Y	LAP JOINT Y		WELDING NECK, 6 J	SLIP-ON W	LAP JOINT B
3	9.50	1.50	1.50	5.00	5.00	4.00	2.12	2.12	1.62		3.57	3.60
4	11.50	1.75	1.75	6.19	6.25	4.50	2.75	2.75	1.88		4.57	4.60
5	13.75	2.00	2.00	7.31	7.50	5.00	3.12	3.12	2.12		5.66	5.69
6	15.00	2.19	2.19	8.50	9.25	5.50	3.38	3.38	2.25		6.72	6.75
8	18.50	2.50	2.50	10.62	11.75	6.38	4.00		2.50		8.72	
10	21.50	2.75	2.75	12.75	14.50	7.25	4.25		2.81		10.88	
12	24.00	3.12	3.12	15.00	16.50	7.88	4.62	SEE NOTE 2	3.00		12.88	SEE NOTE 2
14	25.25	3.38	3.38	16.25	17.75	8.38	5.12		3.25		14.14	
16	27.75	3.50	3.50	18.50	20.00	8.50	5.25		3.38		16.16	
18	31.00	4.00	4.00	21.00	22.25	9.00	6.00		3.50		18.18	
20	33.75	4.25	4.25	23.00	24.50	9.75	6.25		3.62		20.20	
24	41.00	5.50	5.50	27.25	29.50	11.50	8.00		4.00		24.25	

To be Specified by Purchaser

SEE NOTE 2

SEE NOTE 2

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA105). For stainless steel and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

For standard flange facings see pages 112 & 113.

For Large Diameter ANSI Type Flanges and Pressure Vessel Flanges see pages 156 through 170.

(1) Flange dimensions, drilling and bolt lengths are in accordance with ANSI B16.5 for steel flanges.

(2) Lap joint flanges 8" and larger are stocked to slip-on dimensions, ANSI type also available.

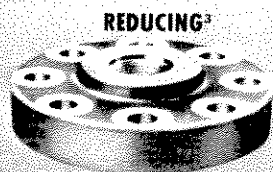
(3) Slip-on and threaded reducing flanges are designated by the size of the tapping or nominal pipe size of the bore and the outside diameter of the flange. Other dimensions are same as straight sizes. Reducing welding neck flanges available on application.

(4) The 0.25" raised face is not included in thickness "C" and length thru hub "Y".

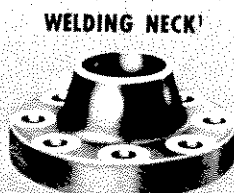
(5) Thread lengths are proportionately longer than API or American Standard for Pipe Threads and satisfy the general requirement for longer threads for the higher pressures.

FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.

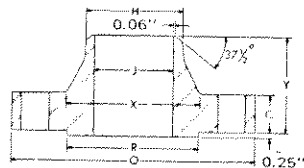
CLASS 900 FLANGES



Slip-on—Part No. 124
Threaded—Part No. 134



Part No. 34



Part No. 34

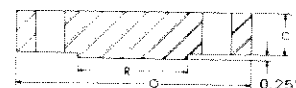
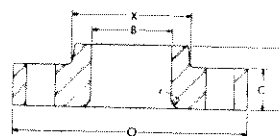
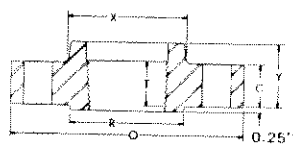
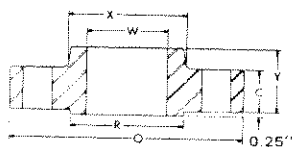
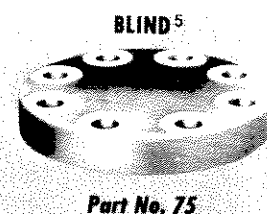
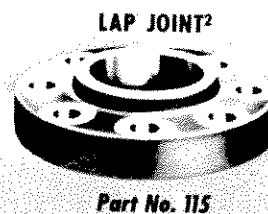
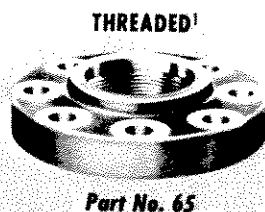
For sizes 1/2" through 2 1/2" use class 1500 flanges.

NOMINAL PIPE SIZE	RADIUS OF FILLET r	DRILLING				LENGTH OF STUD BOLTS ⁶			APPROXIMATE WEIGHT IN POUNDS				NOMINAL PIPE SIZE
		DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF BOLTS	DIAM. OF BOLT HOLES	0.25" RAISED FACE	RING JOINT	MALE & FEMALE, TONGUE & GROOVE	WELDING NECK	SLIP-ON AND THREADED	LAP JOINT	BLIND	
3.50	0.38	7.50	8	7/8	1.00	5.75	6.00	5.50	32	28.5	27	31	3
1.50	0.44	9.25	8	1-1/8	1.25	6.75	7.00	6.50	51	47.5	46	52	4
5.56	0.44	11.00	8	1-1/4	1.38	7.50	7.75	7.25	86	76	73	85	5
6.63	0.50	12.50	12	1-1/8	1.25	7.75	7.75	7.50	110	97	94	110	6
8.63		15.50	12	1-3/8	1.50	8.75	9.00	8.50	187	164		190	8
0.75		18.50	16	1-3/8	1.50	9.25	9.50	9.00	268	234		280	10
2.75	SEE NOTE 2	21.00	20	1-3/8	1.50	10.00	10.25	9.75	372	308		394	12
4.00		22.00	20	1-1/2	1.62	10.75	11.25	10.50	562	357		471	14
6.00		24.25	20	1-5/8	1.75	11.25	11.75	11.00	685	431		593	16
8.00		27.00	20	1-7/8	2.00	12.75	13.50	12.50	924	600		840	18
0.00		29.50	20	2	2.12	13.50	14.25	13.50	1164	737		1064	20
4.00		35.50	20	2-1/2	2.62	17.25	17.75	17.00	2107	1395		1995	24

(6) In conformance with ANSI B16.5, stud lengths do not include point heights or laps. For lapped to lapped add thickness of two laps. For lapped to any other facing add the amount that such facing and one lap will cause the flange to be separated.

(7) When flanges are intended for service with higher yield strength pipe, the thickness of the hub at the bevel may be greater than that of the pipe to which the flange is joined.

(8) Flanges with a straight taper hub for use with light wall, high strength pipe (similar to MSS SP-44 flanges) are available on special order. For welding neck flange bevel details see page 177. For gasket surface finishes see page 94. For ring type joint details see page 116. For dimensional tolerances see page 176. For ordering instructions see page 178.



ANSI B16.5 ASTM A105 ▲

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICK. OF FLANGE C	DIAM. OF RAISED FACE R	DIAM. OF HUB AT BASE X	LENGTH THRU HUB ⁴			MINIMUM THREAD ⁶ LENGTH T	DIAM. OF BORE			DIAM OF HUB AT BEVEL H ⁸	RADIUS OF FILLET r
					WELDING NECK Y	THREADED SOCKET Y	LAP JOINT Y		WELDING NECK SOCKET J	SLIP-ON, SOCKET W	LAP JOINT B		
1/2	4.75	0.88	1.38	1.50	2.38	1.25	1.25	0.88	To be Specified by Purchaser	0.88	0.90	0.84	0.12
3/4	5.12	1.00	1.69	1.75	2.75	1.38	1.38	1.00		1.09	1.11	1.05	0.12
1	5.88	1.12	2.00	2.06	2.88	1.62	1.62	1.12		1.36	1.38	1.32	0.12
1-1/4	6.25	1.12	2.50	2.50	2.88	1.62	1.62	1.19		1.70	1.72	1.66	0.19
1-1/2	7.00	1.25	2.88	2.75	3.25	1.75	1.75	1.25		1.95	1.97	1.90	0.25
2	8.50	1.50	3.62	4.12	4.00	2.25	2.25	1.50		2.44	2.46	2.38	0.31
2-1/2	9.62	1.62	4.12	4.88	4.12	2.50	2.50	1.88		2.94	2.97	2.88	0.31
3	10.50	1.88	5.00	5.25	4.62		2.88	2.00			3.60	3.50	0.38
4	12.25	2.12	6.19	6.38	4.88		3.56	2.25			4.60	4.50	0.44
5	14.75	2.88	7.31	7.75	6.12		4.12	2.50			5.69	5.56	0.44
6	15.50	3.25	8.50	9.00	6.75		4.69	2.75			6.75	6.63	0.50
8	19.00	3.62	10.62	11.50	8.38		5.62	3.00			8.75	8.63	0.50
10	23.00	4.25	12.75	14.50	10.00		SEE NOTE 2	3.31			SEE NOTE 2	10.75	SEE NOTE 2
12	26.50	4.88	15.00	17.75	11.12			3.62				12.75	
14	29.50	5.25	16.25	19.50	11.75			9.50				14.18	
16	32.50	5.75	18.50	21.75	12.25			10.25				16.19	
18	36.00	6.38	21.00	23.50	12.88		10.88		18.20	18.00	0.50		
20	38.75	7.00	23.00	25.25	14.00		11.50		20.25	20.00	0.50		
24	46.00	8.00	27.25	30.00	16.00		13.00		24.25	24.00	0.50		

To be Specified by Purchaser

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA 105). For stainless steel and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced. For standard flange facings see pages 112 & 113.

For Large Diameter ANSI Type Flanges and Pressure Vessel Flanges see pages 156 through 170.

(1) Flange dimensions, drilling and bolt lengths are in accordance with ANSI B16.5 for steel flanges. Class 1500 Slip-on and Socket Type flanges are not shown in ANSI B16.5 in sizes above 2 1/2".

(2) Lap joint flanges in sizes 10" and 12" are not stocked.

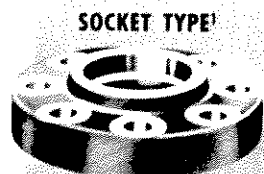
(3) Slip-on and threaded reducing flanges are designated by the size of the tapping or nominal pipe size of the bore and the outside diameter of the flange. Other dimensions are same as straight sizes Reducing welding neck flanges available on application.

(4) The 0.25" raised face is not included in thickness "C" and length thru hub "Y".

(5) Blind Flanges 1/2" thru 2" (except 3/4" and 1") are furnished with hubs, having outside diameter and height the same as class 1500 Slip-on flanges.

(6) Thread lengths are proportionately longer than API or American

FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.



Part No. 1558

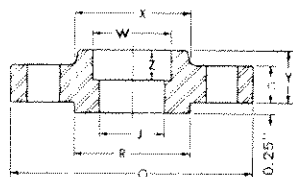


Slip-on—Part No. 125
Threaded—Part No. 135

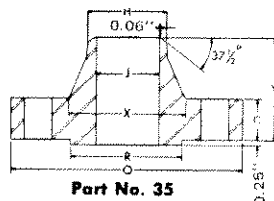


Part No. 35

CLASS 1500 FLANGES



Internal Weld Bevel Optional



Part No. 35

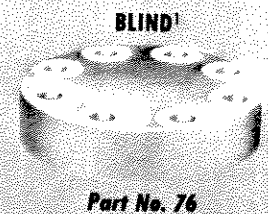
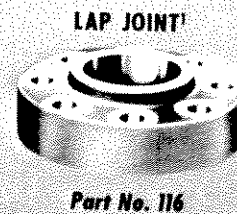
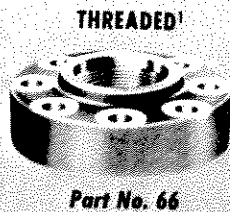
NOMINAL PIPE SIZE	DRILLING				LENGTH OF STUD BOLTS ⁷			APPROXIMATE WEIGHT IN POUNDS					NOMINAL PIPE SIZE
	DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF BOLTS	DIAM. OF BOLT HOLES	0.25" RAISED FACE	RING JOINT	MALE & FEMALE, TONGUE & GROOVE	WELDING NECK	SLIP-ON AND THREADED	LAP JOINT	BLIND	SOCKET TYPE	
1/2	3.25	4	3/4	0.88	4.25	4.25	4.00	7	4.3	4.3	4.5	9	1/2
3/4	3.50	4	3/4	0.88	4.50	4.50	4.25	7	5.8	5.8	6	9	3/4
1	4.00	4	7/8	1.00	5.00	5.00	4.75	9	8.5	8.3	8.5	9	1
1 1/4	4.38	4	7/8	1.00	5.00	5.00	4.75	10	9.5	9.3	10.5	10	1-1/4
1 1/2	4.88	4	1	1.12	5.50	5.50	5.25	14	13.5	13	14	14	1-1/2
2	6.50	8	7/8	1.00	5.75	5.75	5.50	25	23	22	25	25	2
2 1/2	7.50	8	1	1.12	6.25	6.25	6.00	36	33.5	32	33	36	2-1/2
3	8.00	8	1-1/8	1.25	7.00	7.00	6.75	48	43.5	41	44		3
4	9.50	8	1-1/4	1.38	7.75	7.75	7.50	73	65	63	69		4
5	11.50	8	1-1/2	1.62	9.75	9.75	9.50	132	120	117	132		5
6	12.50	12	1-3/8	1.50	10.25	10.50	10.00	164	140	136	161		6
8	15.50	12	1-5/8	1.75	11.50	12.00	11.25	273	236	230	275		8
10	19.00	12	1-7/8	2.00	13.25	13.75	13.00	454	399	SEE NOTE 2	474		10
12	22.50	16	2	2.12	14.75	15.50	14.50	690	601		715		12
14	25.00	16	2-1/4	2.38	16.00	17.00	15.75						14
16	27.75	16	2-1/2	2.62	17.50	18.50	17.25	WEIGHTS ON APPLICATION	WEIGHTS ON APPLICATION	WEIGHTS ON APPLICATION	WEIGHTS ON APPLICATION		16
18	30.50	16	2-3/4	2.88	19.50	20.50	19.00						18
20	32.75	16	3	3.12	21.50	22.50	21.00						20
24	39.00	16	3-1/2	3.62	24.50	25.75	24.00						24

Standard for Pipe Threads and satisfy the general requirement for longer threads for the higher pressures.

- (7) In conformance with ANSI B16.5, stud lengths do not include point heights or laps. For lapped to lapped add thickness of two laps. For lapped to any other facing add the amount that such facing and one lap will cause the flange to be separated.
- (8) When flanges are intended for service with higher yield strength pipe, the thickness of the hub at the bevel may be greater than that of the pipe to which the flange is joined. Under these conditions a single

taper hub may be provided and the outside diameter of the hub at the base. (Dimension X) may be modified.

- (9) Flanges with a straight taper hub for use with light wall, high strength pipe (similar to MSS SP-44 flanges) are available on special order. For welding neck flange bevel details see page 177. For gasket surface finishes see page 94. For ring type joint details see page 117. For dimensional tolerances see page 176. For ordering instructions see page 178.



ANSI B16.5 ASTM A105 ▲

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICK OF FLANGE C	DIAM. OF RAISED FACE R	DIAM. OF HUB AT BASE X	LENGTH THRU HUB ⁽¹⁾			MINIMUM THREAD ⁽²⁾ LENGTH T	DIAM. OF BORE		DIAM OF HUB AT BEVEL H/6	RAD O FIL ⁽³⁾ r
					WELDING NECK Y	THREADED Y	LAP JOINT Y		WELDING NECK ⁽⁴⁾ J	LAP JOINT B		
1/2	5.25	1.19	1.38	1.69	2.88	1.56	1.56	1.12		0.90	0.84	0.1
3/4	5.50	1.25	1.69	2.00	3.12	1.69	1.69	1.25		1.11	1.05	0.1
1	6.25	1.38	2.00	2.25	3.50	1.88	1.88	1.38		1.38	1.32	0.1
1-1/4	7.25	1.50	2.50	2.88	3.75	2.06	2.06	1.50		1.72	1.66	0.1
1-1/2	8.00	1.75	2.88	3.12	4.38	2.38	2.38	1.75		1.97	1.90	0.2
2	9.25	2.00	3.62	3.75	5.00	2.75	2.75	2.00		2.46	2.38	0.3
2-1/2	10.50	2.25	4.12	4.50	5.62	3.12	3.12	2.25		2.97	2.88	0.3
3	12.00	2.62	5.00	5.25	6.62	3.62	3.62	2.50		3.60	3.50	0.3
4	14.00	3.00	6.19	6.50	7.50	4.25	4.25	2.75		4.60	4.50	0.44
5	16.50	3.62	7.31	8.00	9.00	5.12	5.12	3.00		5.69	5.56	0.44
6	19.00	4.25	8.50	9.25	10.75	6.00	6.00	3.25		6.75	6.63	0.50
8	21.75	5.00	10.62	12.00	12.50	7.00	7.00	3.75		8.75	8.63	0.50
10	26.50	6.50	12.75	14.75	16.50	9.00	9.00	4.25		10.92	10.75	0.50
12	30.00	7.25	15.00	17.38	18.25	10.00	10.00	4.75		12.92	12.75	0.50

To be Specified by Purchaser

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA 105). For stainless steel and other alloys see page 180. Flanges are furnished faced, drilled and spot faced or back faced. For standard flanges facings see pages 112 & 113.

For Large Diameter ANSI Type Flanges and Pressure Vessel Flanges see pages 156 through 170.

(1) Flange dimensions, drilling and bolt lengths are in accordance with ANSI B16.5 for steel flanges. Class 2500.

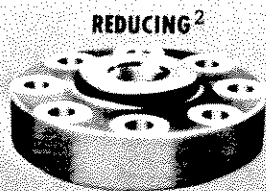
(2) Threaded reducing flanges are designated; by the size of the tapping

or nominal pipe size of the bore and the outside diameter of the flange; Other dimensions are same as straight sizes. Reducing welding neck flanges available on application.

(3) The 0.25" raised face is not included in thickness "C" and length thru hub "Y".

(4) Thread lengths are proportionately longer than API or American Standard for Pipe Threads and satisfy the general requirement for longer threads for the higher pressures.

FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.

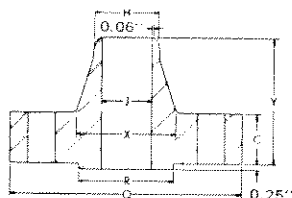


Threaded—Part No. 136



Part No. 36

CLASS 2500 FLANGES



Part No. 36

DRILLING				LENGTH OF STUD BOLTS ⁵			APPROXIMATE WEIGHT IN POUNDS				NOMINAL PIPE SIZE
DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF BOLTS	DIAM. OF BOLT HOLES	0.25" RAISED FACE	RING JOINT	MALE & FEMALE, TONGUE & GROOVE	WELDING NECK	THREADED	LAP JOINT	BLIND	
3.50	4	3/4	0.88	5.25	5.25	5.00	8	7	7	7	1/2
3.75	4	3/4	0.88	5.25	5.25	5.00	9	8.5	8.5	8.5	3/4
4.25	4	7/8	1.00	5.75	5.75	5.50	13	11.8	11.5	12	1
5.12	4	1	1.12	6.25	6.50	6.00	20	17	17	18	1-1/4
5.75	4	1-1/8	1.25	7.00	7.25	6.75	28	23.5	23	25	1-1/2
6.75	8	1	1.12	7.25	7.50	7.00	42	35.5	34	36	2
7.75	8	1-1/8	1.25	8.00	8.25	7.75	52	50.5	49	53	2-1/2
9.00	8	1-1/4	1.38	9.00	9.25	8.75	94	76	74	80	3
10.75	8	1-1/2	1.62	10.25	10.75	10.00	146	115	113	123	4
12.75	8	1-3/4	1.88	12.00	12.75	11.75	244	191	187	206	5
14.50	8	2	2.12	13.75	14.50	13.50	378	291	287	321	6
17.25	12	2	2.12	15.25	16.00	15.00	576	426	419	485	8
21.25	12	2-1/2	2.62	19.50	20.50	19.25	1068	806	794	927	10
24.38	12	2-3/4	2.88	21.50	22.50	21.25	1608	1141	1127	1332	12

(5) In conformance with ANSI B16.5, stud lengths do not include point heights or laps. For lapped to lapped add thickness of two laps. For lapped to any other facing add the amount that such facing and one lap will cause the flange to be separated.

(6) When flanges are intended for service with higher yield strength pipe, the thickness of the hub at the bevel may be greater than that of the pipe to which the flange is joined.

(7) Flanges with a straight taper hub for use with thin wall, high strength pipe (similar to MSS SP-44 flanges) are available on special order. For welding neck flange bevel details see page 177. For ring type joint details see page 118. For dimensional tolerances see page 176. For gasket surface finishes see page 94. For ordering instructions see page 178.

CARBON STEEL PRESSURE-TEMPERATURE RATING

The pressure-temperature ratings shown below were taken from the 1977 edition of ANSI B16.5. All pressures are in pounds per square inch gage (PSIG). When ratings below are used, consult the necessary code(s) to assure proper application of such ratings. These ratings are for material group 1.1 which includes A105 carbon steel.

**B16.5
1977**

Service Temperature Deg F		Carbon Steel Pressure Temperature ratings						
		150	300	400	600	900	1500	2500
-20 to	100	285	740	990	1480	2220	3705	6170
	200	260	675	900	1350	2025	3375	5625
	300	230	655	875	1315	1970	3280	5470
	400	200	635	845	1270	1900	3170	5280
	500	170	600	800	1200	1795	2995	4990
	600	140	550	730	1095	1640	2735	4560
	650	125	535	715	1075	1610	2685	4475
	700	110	535	710	1065	1600	2665	4440
	750	95	505	670	1010	1510	2520	4200
	800	80	410	550	825	1235	2060	3430
	850	65	270	355	535	805	1340	2230
	900	50	170	230	345	515	860	1430
	950	35	105	140	205	310	515	860
	1000	20	50	70	105	155	260	430

- (1) Carbon steel flanges should not be used for applications requiring prolonged exposure to temperatures above 800° F due to the possibility of graphitization.
- (2) When shock resulting from sudden stoppage of flow is expected, the shock pressure may be safely approximated by multiplying the velocity of flow through the line in feet per second by the factor 60. The sum of the normal line pressure plus the shock pressure thus calculated should be used to determine the appropriate pressure class of flange.

The pressure-temperature ratings shown below were taken from the 1973 edition of ANSI B16.5. The table below is shown as Table 2.1 in the 1973 B16.5 code and represents ratings for materials group 1.1 in the code, in which is included A105 carbon steel. When ratings below are used, consult the necessary code(s) to assure proper application of such ratings.

A105 B16.5
1973

TEMPERATURE IN °F		WORKING PRESSURES IN PSI						
		150	300	400	600	900	1500	2500
- 20 TO	100	285	740	985	1480	2220	3705	6170
	200	260	675	900	1350	2025	3375	5625
	300	250	655	875	1310	1970	3280	5470
	400	245	635	845	1265	1900	3170	5280
	500	230	600	800	1195	1795	2995	4990
	600	210	545	730	1095	1640	2735	4560
	650	205	535	715	1075	1610	2685	4475
	700	205	535	710	1065	1600	2665	4440
	750	195	505	670	1010	1510	2520	4200
	800	160	410	550	825	1235	2055	3430
	850	105	265	355	535	800	1335	2230
	900	65	170	230	345	515	855	1430
	950	40	105	135	205	310	515	855
	1000	20	50	70	105	155	255	430

- (1) Carbon steel flanges should not be used for applications requiring prolonged exposure to temperatures above 800° F due to the possibility of graphitization.
- (2) When shock resulting from sudden stoppage of flow is expected, the shock pressure may be safely approximated by multiplying the velocity of flow through the line in feet per second by the factor 60. The sum of the normal line pressure plus the shock pressure thus calculated should be used to determine the appropriate pressure class of flange.

American national standard flange facings

The table below gives facing dimensions in accordance with ANSI Standard B16.5 for Classes 150, 300, 400, 600, 900, 1500 and 2500 American National Standard Flanges. The

facings are shown on the opposite page. Complete ring joint facing dimensions for all Standards are given on pages 114 to 119.

NOMINAL PIPE SIZE	OUTSIDE DIAMETER ³			I. D. OF LARGE AND SMALL TONGUE ^{3,5}	OUTSIDE DIAMETER ³			I. D. OF LARGE AND SMALL GROOVE ^{3,5}	HEIGHT		DEPTH OF GROOVE OR FEMALE
	RAISED FACE, LAPPED, LARGE MALE AND LARGE TONGUE ⁵ R	SMALL MALE ^{4,5} S	SMALL TONGUE ⁵ T		LARGE FEMALE AND LARGE GROOVE ⁵ W	SMALL FEMALE ^{4,5} X	SMALL GROOVE ⁵ Y		RAISED FACE CLASS 150 AND 300 ST'DS ¹	RAISED FACE, LARGE AND SMALL MALE AND TONGUE CLASSES 400- 2500 ST'DS ²	
1/2	1.38	0.72	1.38	1.00	1.44	0.78	1.44	0.94	0.06	0.25	0.19
3/4	1.69	0.94	1.69	1.31	1.75	1.00	1.75	1.25	0.06	0.25	0.19
1	2.00	1.19	1.88	1.50	2.06	1.25	1.94	1.44	0.06	0.25	0.19
1-1/4	2.50	1.50	2.25	1.88	2.56	1.56	2.31	1.81	0.06	0.25	0.19
1-1/2	2.88	1.75	2.50	2.12	2.94	1.81	2.56	2.06	0.06	0.25	0.19
2	3.62	2.25	3.25	2.88	3.69	2.31	3.31	2.81	0.06	0.25	0.19
2-1/2	4.12	2.69	3.75	3.38	4.19	2.75	3.81	3.31	0.06	0.25	0.19
3	5.00	3.31	4.62	4.25	5.06	3.38	4.69	4.19	0.06	0.25	0.19
3-1/2	5.50	3.81	5.12	4.75	5.56	3.88	5.19	4.69	0.06	0.25	0.19
4	6.19	4.31	5.69	5.19	6.25	4.38	5.75	5.12	0.06	0.25	0.19
5	7.31	5.38	6.81	6.31	7.38	5.44	6.88	6.25	0.06	0.25	0.19
6	8.50	6.38	8.00	7.50	8.56	6.44	8.06	7.44	0.06	0.25	0.19
8	10.62	8.38	10.00	9.38	10.69	8.44	10.06	9.31	0.06	0.25	0.19
10	12.75	10.50	12.00	11.25	12.81	10.56	12.06	11.19	0.06	0.25	0.19
12	15.00	12.50	14.25	13.50	15.06	12.56	14.31	13.44	0.06	0.25	0.19
14	16.25	13.75	15.50	14.75	16.31	13.81	15.56	14.69	0.06	0.25	0.19
16	18.50	15.75	17.62	16.75	18.56	15.81	17.69	16.69	0.06	0.25	0.19
18	21.00	17.75	20.12	19.25	21.06	17.81	20.19	19.19	0.06	0.25	0.19
20	23.00	19.75	22.00	21.00	23.06	19.81	22.06	20.94	0.06	0.25	0.19
24	27.25	23.75	26.25	25.25	27.31	23.81	26.31	25.19	0.06	0.25	0.19

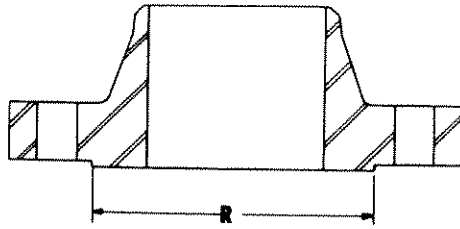
All dimensions are in inches.

- (1) Regular facing for Class 150 and Class 300 steel flanged fittings and companion flange standards is a 0.06" raised face included in the minimum flange thickness. An 0.06" raised face may be supplied also on Classes 400, 600, 900, 1500 and 2500 flanges, but it must be added to the minimum thickness.
- (2) Regular facing for Classes 400, 600, 900, 1500 and 2500 flange standards is a 0.25" raised face not included in minimum flange thickness dimensions.
- (3) Tolerance of plus or minus 0.02" is allowed on the inside and outside diameters of all facings except for the outside diameter of the 0.06" thick raised face, which has a tolerance of plus or minus 0.03".
- (4) For small male and female joints care should be taken in the use of these dimensions to insure that pipe used is thick enough to permit

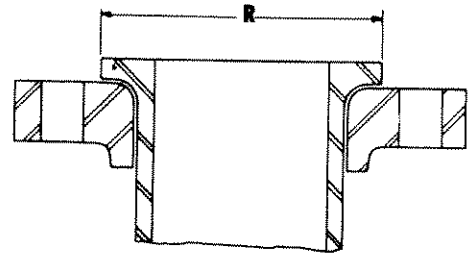
sufficient bearing surface to prevent the crushing of the gasket. The dimensions apply particularly on lines where the joint is made on the end of the pipe. Threaded companion flanges for small male and female joints are furnished with plain face and are threaded with American Standard Locknut Thread.

- (5) Gaskets for male-female and tongue-groove joints shall cover the bottom of the recess with minimum clearances, taking into account the tolerances prescribed in Note 3.
- (6) Facing finishes for raised face flanges are normally provided as shown on page 94. When other type facings are specified, they will be furnished as specified in ANSI B16.5.

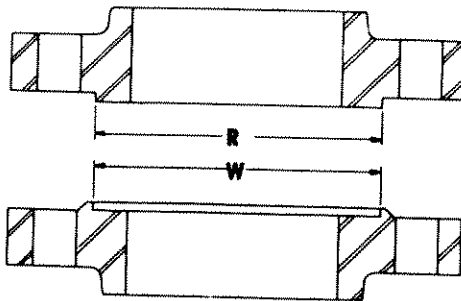
American national standard flange facings



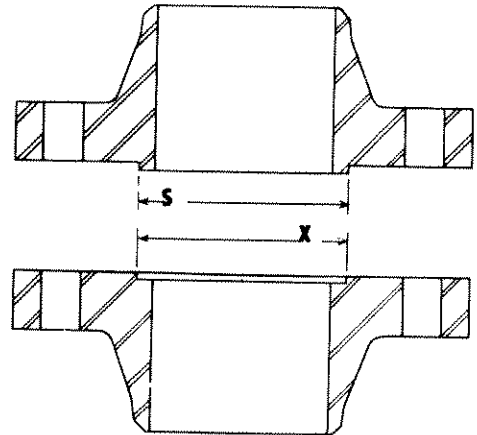
RAISED FACE



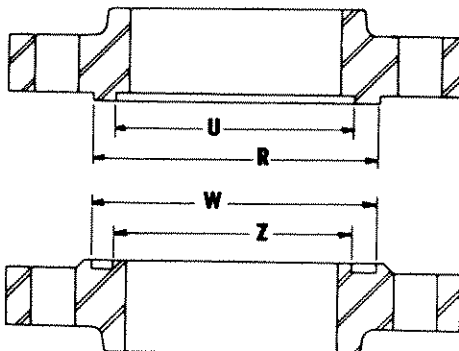
LAPPED JOINT



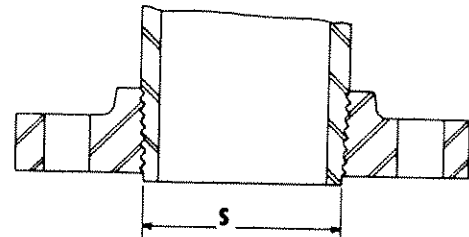
LARGE MALE — FEMALE



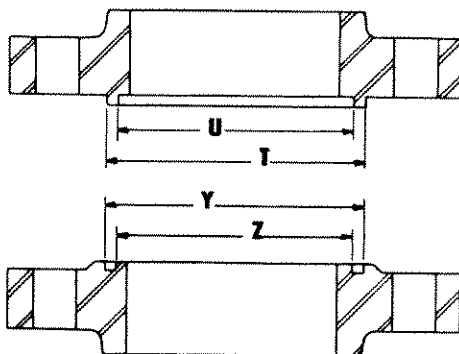
SMALL MALE and FEMALE



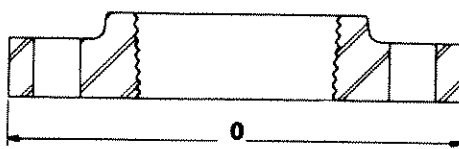
LARGE TONGUE and GROOVE*



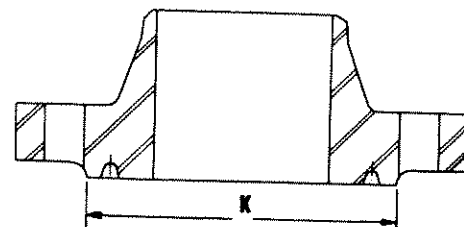
SMALL MALE and FEMALE



SMALL TONGUE and GROOVE*



FLAT FACE



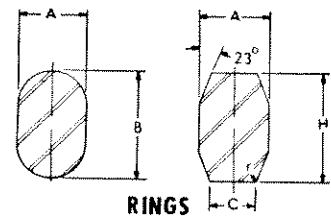
RING JOINT

* Welding Neck Flanges, sizes 1½" and smaller, with bores larger than Schedule 40, and Slip-On Flanges 1½" and smaller cannot be furnished except by modification of facing dimensions.

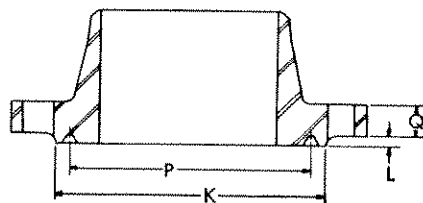
See specific page showing flange type desired to obtain "O" and "K" dimension for flat face and ring joint flanges.

Facing Dimensions For Tube Turns® CLASS 150 RING JOINT FLANGES

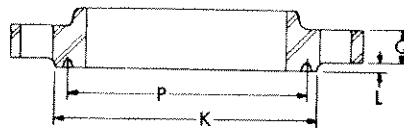
ANSI B16.5 ASTM A105▲



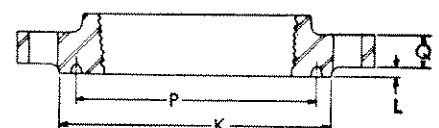
Octagonal Groove
(per ANSI B16.5)
furnished unless
otherwise ordered



WELDING NECK



SLIP-ON



THREADED

NOMINAL PIPE SIZE	PITCH DIAMETER OF RING AND GROOVE P	WIDTH OF RING A	HEIGHT OF RING		WIDTH OF FLAT ON OCTAGONAL RINGS C	WIDTH OF GROOVE D	DEPTH OF GROOVE ¹ L	DIAMETER OF RAISED FACE FOR RING JOINT OR LAPPED K	RING NUMBER	APPROXIMATE DISTANCE BETWEEN FLANGES OF RING JOINTS WHEN RING IS COMPRESSED ²
			OVAL B	OCTAG- ONAL H						
1	1.875	5/16	9/16	1/2	.206	0.344	0.250	2.50	R 15	0.16
1-1/4	2.250	5/16	9/16	1/2	.206	0.344	0.250	2.88	R 17	0.16
1-1/2	2.562	5/16	9/16	1/2	.206	0.344	0.250	3.25	R 19	0.16
2	3.250	5/16	9/16	1/2	.206	0.344	0.250	4.00	R 22	0.16
2-1/2	4.000	5/16	9/16	1/2	.206	0.344	0.250	4.75	R 25	0.16
3	4.500	5/16	9/16	1/2	.206	0.344	0.250	5.25	R 29	0.16
3-1/2	5.188	5/16	9/16	1/2	.206	0.344	0.250	6.06	R 33	0.16
4	5.875	5/16	9/16	1/2	.206	0.344	0.250	6.75	R 36	0.16
5	6.750	5/16	9/16	1/2	.206	0.344	0.250	7.62	R 40	0.16
6	7.625	5/16	9/16	1/2	.206	0.344	0.250	8.62	R 43	0.16
8	9.750	5/16	9/16	1/2	.206	0.344	0.250	10.75	R 48	0.16
10	12.000	5/16	9/16	1/2	.206	0.344	0.250	13.00	R 52	0.16
12	15.000	5/16	9/16	1/2	.206	0.344	0.250	16.00	R 56	0.16
14	15.625	5/16	9/16	1/2	.206	0.344	0.250	16.75	R 59	0.12
16	17.875	5/16	9/16	1/2	.206	0.344	0.250	19.00	R 64	0.12
18	20.375	5/16	9/16	1/2	.206	0.344	0.250	21.50	R 68	0.12
20	22.000	5/16	9/16	1/2	.206	0.344	0.250	23.50	R 72	0.12
24	26.500	5/16	9/16	1/2	.206	0.344	0.250	28.00	R 76	0.12

▲ Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA105). For stainless steel and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced. For standard flanges facings see pages 112 & 113.

All dimensions are in inches.

Dimension "Q" is given on pages showing flanges and does not include facing height "L".

Groove Radius "r" is 0.03" when "A" is 7/16" or less, and 0.06" when A is over 7/16" but under 1".

(1) The depth of groove is added to the minimum flange thickness.

(2) For calculating the "laying length" of fittings with ring joints the space dimensions given in this table must be added.

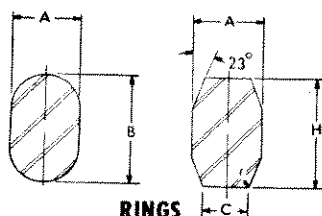
Ring Joint Grooves in flanges are suitable for either octagonal or oval rings.

For Dimensional Tolerances, see page 176.

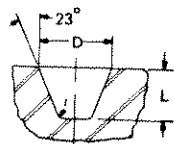
For welding neck flange bevel details see page 177.

For ordering instructions see page 178.

FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.

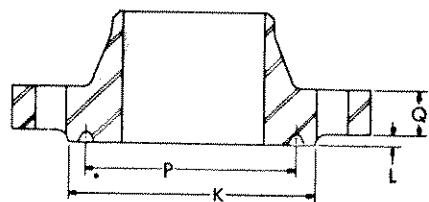


RINGS

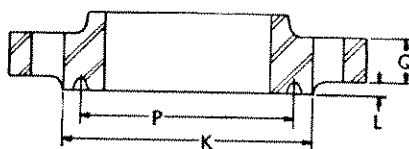


GROOVE

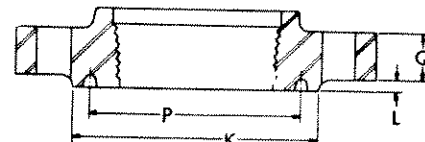
Octagonal Groove
(per ANSI B16.5)
furnished unless
otherwise ordered



WELDING NECK



SLIP-ON



THREADED

Facing Dimensions For Tube Turns® CLASSES 300, 400 and 600 RING JOINT FLANGES

ANSI B16.5 ASTM A105[▲]

NOMINAL PIPE SIZE	PITCH DIAMETER OF RING AND GROOVE P	WIDTH OF RING A	HEIGHT OF RING		WIDTH OF FLAT ON OCTAGONAL RINGS C	WIDTH OF GROOVE D	DEPTH OF GROOVE ¹ L	DIAMETER OF RAISED FACE FOR RING JOINT OR LAPPED K	RING NUMBER	APPROX. DISTANCE BETWEEN FLANGES OF RING JOINTS WHEN RING IS COMPRESSED ²		
			OVAL B	OCTAG- ONAL H						300 CL	400 CL	600 CL
1/2	1.344	1/4	7/16	3/8	0.170	0.281	0.219	2.00	R 11	0.12	0.12	0.12
3/4	1.688	5/16	9/16	1/2	0.206	0.344	0.250	2.50	R 13	0.16	0.16	0.16
1	2.000	5/16	9/16	1/2	0.206	0.344	0.250	2.75	R 16	0.16	0.16	0.16
1-1/4	2.375	5/16	9/16	1/2	0.206	0.344	0.250	3.12	R 18	0.16	0.16	0.16
1-1/2	2.688	5/16	9/16	1/2	0.206	0.344	0.250	3.56	R 20	0.16	0.16	0.16
2	3.250	7/16	11/16	5/8	0.305	0.469	0.312	4.25	R 23	0.22	0.19	0.19
2-1/2	4.000	7/16	11/16	5/8	0.305	0.469	0.312	5.00	R 26	0.22	0.19	0.19
3	4.875*	7/16	11/16	5/8	0.305	0.469	0.312	5.75	R 31*	0.22	0.19	0.19
3-1/2	5.188	7/16	11/16	5/8	0.305	0.469	0.312	6.25	R 34	0.22	0.19	0.19
4	5.875	7/16	11/16	5/8	0.305	0.469	0.312	6.88	R 37	0.22	0.22	0.19
5	7.125	7/16	11/16	5/8	0.305	0.469	0.312	8.25	R 41	0.22	0.22	0.19
6	8.312	7/16	11/16	5/8	0.305	0.469	0.312	9.50	R 45	0.22	0.22	0.19
8	10.625	7/16	11/16	5/8	0.305	0.469	0.312	11.88	R 49	0.22	0.22	0.19
10	12.750	7/16	11/16	5/8	0.305	0.469	0.312	14.00	R 53	0.22	0.22	0.19
12	15.000	7/16	11/16	5/8	0.305	0.469	0.312	16.25	R 57	0.22	0.22	0.19
14	16.500	7/16	11/16	5/8	0.305	0.469	0.312	18.00	R 61	0.22	0.22	0.19
16	18.500	7/16	11/16	5/8	0.305	0.469	0.312	20.00	R 65	0.22	0.22	0.19
18	21.000	7/16	11/16	5/8	0.305	0.469	0.312	22.62	R 69	0.22	0.22	0.19
20	23.000	1/2	3/4	11/16	0.341	0.531	0.375	25.00	R 73	0.22	0.22	0.19
24	27.250	5/8	7/8	13/16	0.413	0.656	0.438	29.50	R 77	0.25	0.25	0.22

▲ Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA105). For stainless steel and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced. For standard flanges see pages 112 & 113.

All dimensions are in inches.

Dimension "Q" is given on pages showing flanges and does not include facing height "L".

The dimensions of the rings and grooves of ring joint flanges Classes 300, 400, and 600 are identical.

(1) The depth of groove is added to the minimum flange thickness.

Ring Joint Grooves in flanges are suitable for either octagonal or oval rings.

(2) For calculating the "laying length" of fittings with ring joints the space dimensions given in this table must be added.

Groove radius and corner radius "r" is 0.03" when "A" is 7/16 or less; 0.06" when "A" is over 7/16 but under 1 inch.

* For ring joints with lapped flanges, the pitch diameter of the ring should be 4.625 in. instead of 4.875 in. and the ring number should be R30 instead of R31.

For Dimensional Tolerances, see page 176.

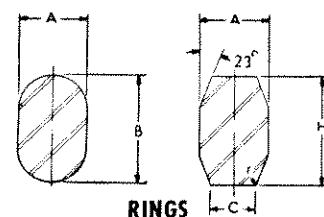
For welding neck flange bevel details see page 177.

For ordering instructions see page 178.

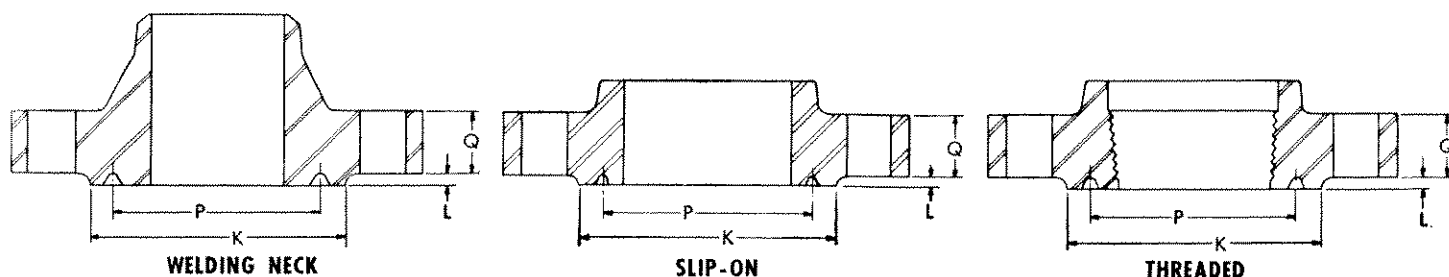
FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.

Facing Dimensions For Tube Turns® CLASS 900 RING JOINT FLANGES

ANSI B16.5 ASTM A105▲



Octagonal Groove
(per ANSI B16.5)
furnished unless
otherwise ordered



NOMINAL PIPE SIZE	PITCH DIAMETER OF RING AND GROOVE P	WIDTH OF RING A	HEIGHT OF RING		WIDTH OF FLAT ON OCTAGONAL RINGS C	WIDTH OF GROOVE D	DEPTH OF GROOVE ¹ L	DIAMETER OF RAISED FACE FOR RING JOINT OR LAPPED K	RING NUMBER	APPROXIMATE DISTANCE BETWEEN FLANGES OF RING JOINTS WHEN RING IS COMPRESSED ²
			OVAL B	OCTAG- ONAL H						
For sizes 2½" and smaller, use class 1500 Ring Joint Flanges.										
3	4.875	7/16	11/16	5/8	0.305	0.469	0.312	6.12	R 31	0.16
4	5.875	7/16	11/16	5/8	0.305	0.469	0.312	7.12	R 37	0.16
5	7.125	7/16	11/16	5/8	0.305	0.469	0.312	8.50	R 41	0.16
6	8.312	7/16	11/16	5/8	0.305	0.469	0.312	9.50	R 45	0.16
8	10.625	7/16	11/16	5/8	0.305	0.469	0.312	12.12	R 49	0.16
10	12.750	7/16	11/16	5/8	0.305	0.469	0.312	14.25	R 53	0.16
12	15.000	7/16	11/16	5/8	0.305	0.469	0.312	16.50	R 57	0.16
14	16.500	5/8	7/8	13/16	0.413	0.656	0.438	18.38	R 62	0.16
16	18.500	5/8	7/8	13/16	0.413	0.656	0.438	20.62	R 66	0.16
18	21.000	3/4	1	15/16	0.485	0.781	0.500	23.38	R 70	0.19
20	23.000	3/4	1	15/16	0.485	0.781	0.500	25.50	R 74	0.19
24	27.250	1	1-5/16	1-1/4	0.681	1.062	0.625	30.38	R 78	0.22

▲ Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA105). For stainless steel and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced. For standard flanges facings see pages 112 & 113.

All dimensions are in inches.

Dimension "Q" is given on pages showing flanges and does not include facing height "L".

- (1) The depth of groove is added to the minimum flange thickness.
- (2) For calculating the "laying length" of fittings with ring joints the space dimensions given in this table must be added.

Ring Joint Grooves in flanges are suitable for either octagonal or oval rings.

Groove radius and corner radius "r" is 0.03" when "A" is 7/16 or less; 0.06" when "A" is over 7/16 but under 1 inch; 0.09" when "A" is 1 inch or over.

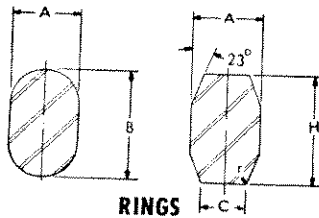
For Dimensional Tolerances, see page 176.

For welding neck flange bevel details see page 177.

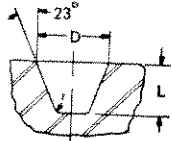
For ordering instructions see page 178.

Facing Dimensions For Tube Turns® CLASS 1500 RING JOINT FLANGES

ANSI B16.5 ASTM A105▲

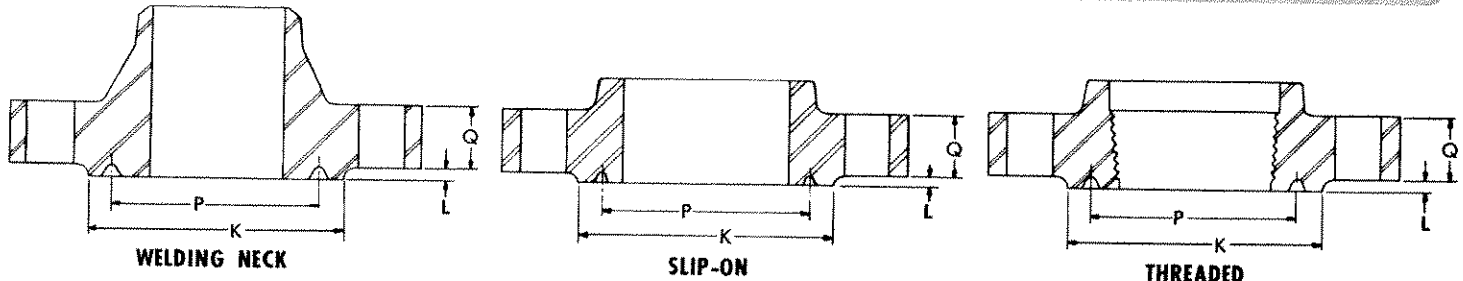


RINGS



GROOVE

Octagonal Groove
(per ANSI B16.5)
furnished unless
otherwise ordered



NOMINAL PIPE SIZE	PITCH DIAMETER OF RING AND GROOVE P	WIDTH OF RING A	HEIGHT OF RING		WIDTH OF FLAT ON OCTAGONAL RINGS C	WIDTH OF GROOVE D	DEPTH OF GROOVE ¹ L	DIAMETER OF RAISED FACE FOR RING JOINT OR LAPPED K	RING NUMBER	APPROXIMATE DISTANCE BETWEEN FLANGES OF RING JOINTS WHEN RING IS COMPRESSED ²
			OVAL B	OCTAG- ONAL H						
1/2	1.562	5/16	9/16	1/2	0.206	0.344	0.250	2.38	R 12	0.16
3/4	1.750	5/16	9/16	1/2	0.206	0.344	0.250	2.62	R 14	0.16
1	2.000	5/16	9/16	1/2	0.206	0.344	0.250	2.81	R 16	0.16
1-1/4	2.375	5/16	9/16	1/2	0.206	0.344	0.250	3.19	R 18	0.16
1-1/2	2.688	5/16	9/16	1/2	0.206	0.344	0.250	3.62	R 20	0.16
2	3.750	7/16	11/16	5/8	0.305	0.469	0.312	4.88	R 24	0.12
2-1/2	4.250	7/16	11/16	5/8	0.305	0.469	0.312	5.38	R 27	0.12
3	5.375	7/16	11/16	5/8	0.305	0.469	0.312	6.62	R 35	0.12
4	6.375	7/16	11/16	5/8	0.305	0.469	0.312	7.62	R 39	0.12
5	7.625	7/16	11/16	5/8	0.305	0.469	0.312	9.00	R 44	0.12
6	8.312	1/2	3/4	11/16	0.341	0.531	0.375	9.75	R 46	0.12
8	10.625	5/8	7/8	13/16	0.413	0.656	0.438	12.50	R 50	0.16
10	12.750	5/8	7/8	13/16	0.413	0.656	0.438	14.62	R 54	0.16
12	15.000	7/8	1-1/8	1-1/16	0.583	0.906	0.562	17.25	R 58	0.19
14	16.500	1	1-5/16	1-1/4	0.681	1.062	0.625	19.25	R 63	0.22
16	18.500	1-1/8	1-7/16	1-3/8	0.780	1.188	0.688	21.50	R 67	0.31
18	21.000	1-1/8	1-7/16	1-3/8	0.780	1.188	0.688	24.12	R 71	0.31
20	23.00	1-1/4	1-9/16	1-1/2	0.879	1.312	0.688	26.50	R 75	0.30
24	27.250	1-3/8	1-3/4	1-5/8	0.977	1.438	0.812	31.25	R 79	0.44

▲ Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA105). For stainless steel and other alloys see page 180. Flanges are furnished faced, drilled and spot faced or back faced. For standard flanges see pages 112 & 113. All dimensions given in inches. Dimension "Q" is given on pages showing flanges and does not include facing height "L".

(1) The depth of groove is added to the minimum flange thickness. Ring Joint Grooves in flanges are suitable for either octagonal or oval rings.

(2) For Calculating the "laying length" of fittings with ring joints the space dimensions given in this table must be added.

Groove radius and corner radius "r" is 0.03" when "A" is 7/16 or less; 0.06" when "A" is over 7/16 but under 1 inch; 0.09" when "A" is 1 inch or over.

For Dimensional Tolerances, see page 176.

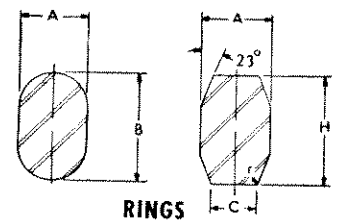
For welding neck flange bevel details see page 177.

For ordering instructions see page 178.

FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.

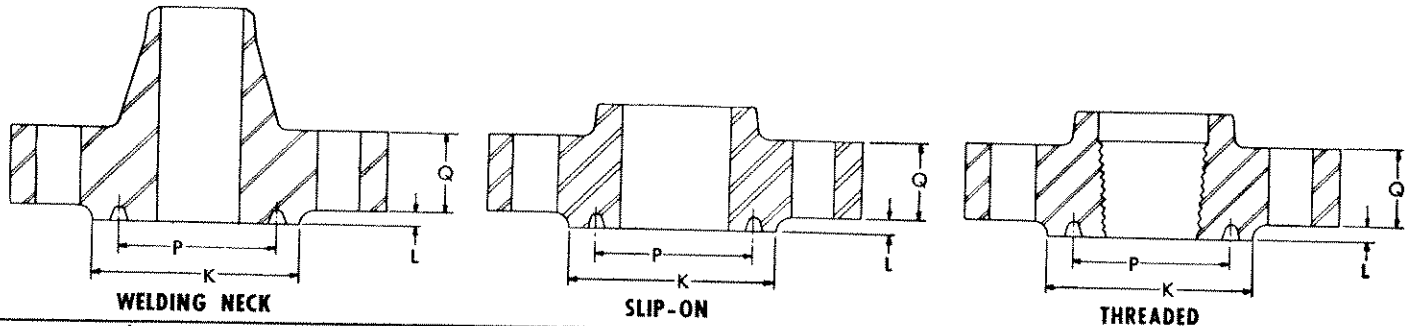
Facing Dimensions For Tube Turns® CLASS 2500 RING JOINT FLANGES

ANSI B16.5 ASTM A105[▲]



Octagonal Groove
(per ANSI B16.5)
furnished unless
otherwise ordered

GROOVE



NOMINAL PIPE SIZE	PITCH DIAMETER OF RING AND GROOVE P	WIDTH OF RING A	HEIGHT OF RING		WIDTH OF FLAT ON OCTAGONAL RINGS C	WIDTH OF GROOVE D	DEPTH OF GROOVE ¹ L	DIAMETER OF RAISED FACE FOR RING JOINT OR LAPPED K	RING NUMBER	APPROXIMATE DISTANCE BETWEEN FLANGES OF RING JOINTS WHEN RING IS COMPRESSED ²
			OV AL B	OCTAG- ONAL H						
1/2	1.688	5/16	9/16	1/2	0.206	0.344	0.250	2.56	R 13	0.16
3/4	2.000	5/16	9/16	1/2	0.206	0.344	0.250	2.88	R 16	0.16
1	2.375	5/16	9/16	1/2	0.206	0.344	0.250	3.25	R 18	0.16
1-1/4	2.844	7/16	11/16	5/8	0.305	0.469	0.312	4.00	R 21	0.12
1-1/2	3.250	7/16	11/16	5/8	0.305	0.469	0.312	4.50	R 23	0.12
2	4.000	7/16	11/16	5/8	0.305	0.469	0.312	5.25	R 26	0.12
2-1/2	4.375	1/2	3/4	11/16	0.341	0.531	0.375	5.88	R 28	0.12
3	5.000	1/2	3/4	11/16	0.341	0.531	0.375	6.62	R 32	0.12
4	6.188	5/8	7/8	13/16	0.413	0.656	0.438	8.00	R 38	0.16
5	7.500	3/4	1	15/16	0.485	0.781	0.500	9.50	R 42	0.16
6	9.000	3/4	1	15/16	0.485	0.781	0.500	11.00	R 47	0.16
8	11.000	7/8	1-1/8	1-1/16	0.583	0.906	0.562	13.38	R 51	0.19
10	13.500	1-1/8	1-7/16	1-3/8	0.780	1.188	0.688	16.75	R 55	0.25
12	16.000	1-1/4	1-9/16	1-1/2	0.879	1.312	0.688	19.50	R 60	0.31

▲ Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA105). For stainless steel and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced. For standard flanges see pages 112 & 113.

All dimensions given in inches.

Dimension "Q" is given on pages showing flanges and does not include facing height "L".

(1) The depth of groove is added to the minimum flange thickness. Ring Joint Grooves in flanges are suitable for either octagonal or oval rings.

(2) For Calculating the "laying length" of fittings with ring joints the space dimensions given in this table must be added.

Groove radius and corner radius "r" is: 0.03" when "r" is 7/16 or less; 0.06" when "A" is over 7/16 but under 1 inch; 0.09" when "A" is 1 inch or over.

For Dimensional Tolerances, see page 176.

For welding neck flange bevel details see page 177.

For ordering instructions see page 178.

FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGES 110 & 111.

NUMBERS for Ring Joint Gaskets and Grooves

AMERICAN NATIONAL STANDARD ANSI B16.20†

NUMBER	PITCH DIAMETER	WIDTH OF RING	
	P	A	
R 11	1 ¹¹ / ₃₂	×	1/4
R 12	1 ⁹ / ₁₆	×	5/16
R 13	1 ¹¹ / ₁₆	×	5/16
R 14	1 ³ / ₄	×	5/16
R 15	1 ⁷ / ₈	×	5/16
R 16	2	×	5/16
R 17	2 ¹ / ₄	×	5/16
R 18	2 ³ / ₈	×	5/16
R 19	2 ⁹ / ₁₆	×	5/16
R 20	2 ¹¹ / ₁₆	×	5/16
R 21	2 ²⁷ / ₃₂	×	7/16
R 22	3 ¹ / ₄	×	5/16
R 23	3 ¹ / ₄	×	7/16
R 24	3 ³ / ₄	×	7/16
R 25	4	×	5/16
R 26	4	×	7/16
R 27	4 ¹ / ₄	×	7/16
R 28*	4 ³ / ₈	×	1/2
R 29	4 ¹ / ₂	×	5/16
R 30	4 ⁵ / ₈	×	7/16
R 31	4 ⁷ / ₈	×	7/16
R 32*	5	×	1/2
R 33	5 ³ / ₁₆	×	5/16
R 34	5 ³ / ₁₆	×	7/16
R 35	5 ³ / ₈	×	7/16
R 36	5 ⁷ / ₈	×	5/16
R 37	5 ⁷ / ₈	×	7/16
R 38*	6 ³ / ₁₆	×	5/8
R 39	6 ³ / ₈	×	7/16
R 40	6 ³ / ₄	×	5/16
R 41	7 ¹ / ₈	×	7/16
R 42*	7 ¹ / ₂	×	3/4
R 43	7 ⁵ / ₈	×	5/16
R 44	7 ⁵ / ₈	×	7/16
R 45	8 ⁵ / ₁₆	×	7/16
R 46*	8 ⁵ / ₁₆	×	1/2
R 47*	9	×	3/4
R 48	9 ³ / ₄	×	5/16
R 49	10 ⁵ / ₈	×	7/16
R 50*	10 ⁵ / ₈	×	5/8

NUMBER	PITCH DIAMETER	WIDTH OF RING	
	P	A	
R 51*	11	×	7/8
R 52	12	×	5/16
R 53	12 ³ / ₄	×	7/16
R 54*	12 ³ / ₄	×	5/8
R 55*	13 ¹ / ₂	×	1 1/8
R 56	15	×	5/16
R 57	15	×	7/16
R 58*	15	×	7/8
R 59	15 ⁵ / ₈	×	5/16
R 60*	16	×	1 1/4
R 61	16 ¹ / ₂	×	7/16
R 62*	16 ¹ / ₂	×	5/8
R 63*	16 ¹ / ₂	×	1
R 64	17 ⁷ / ₈	×	5/16
R 65	18 ¹ / ₂	×	7/16
R 66*	18 ¹ / ₂	×	5/8
R 67*	18 ¹ / ₂	×	1 1/8
R 68	20 ³ / ₈	×	5/16
R 69	21	×	7/16
R 70*	21	×	3/4
R 71*	21	×	1 1/8
R 72	22	×	5/16
R 73*	23	×	1/2
R 74*	23	×	3/4
R 75*	23	×	1 1/4
R 76	26 ¹ / ₂	×	5/16
R 77*	27 ¹ / ₄	×	5/8
R 78*	27 ¹ / ₄	×	1
R 79*	27 ¹ / ₄	×	1 3/8
R 80	24 ¹ / ₄	×	5/16
R 81	25	×	9/16
R 93	29 ¹ / ₂	×	3/4
R 94	31 ¹ / ₂	×	3/4
R 95	33 ³ / ₄	×	3/4
R 96	36	×	7/8
R 97	38	×	7/8
R 98	40 ¹ / ₄	×	7/8
R 100	29 ¹ / ₂	×	1 1/8
R 102	33 ³ / ₄	×	1 1/4
R 104	38	×	1 3/8
R 105	40 ¹ / ₄	×	1 3/8

All dimensions given in inches.

The edge of each flange and the outside circumference of each ring shall carry corresponding identification marks: i.e., R 11, R 45, etc.

† Ring joint gasket and grooves for ANSI B16.5 and MSS SP.44 flanges.

* When ordering rings for nominal pipe sizes which may have either oval or octagonal shaped rings, purchasers must specify oval or octagonal shaped rings as desired.

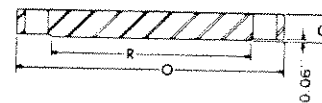
Tube Turns does not furnish ring joint gaskets.

CLASS 150 FLANGES

WELDING NECK



BLIND



CLASS 150, 285 PSI

AT ATMOSPHERIC TEMPERATURE, RAISED FACE

ASTM A105[▲] MSS SP 44

PIPE SIZE	FLANGE DIMENSIONS			HUB DIMENSIONS	DRILLING			
	OD of Flange O	Thick. of Flange C ²	Length Thru Hub Y ²	OD Large End Hub X	NO. of Bolt Holes	Dia. of Bolt Holes	Dia. of Bolt Circle	Face Dia. R
12	19.00	1.25	4.50	14.38	12	1.00	17.00	15.00
14	21.00	1.38	5.00	15.75	12	1.12	18.75	16.25
16	23.50	1.44	5.00	18.00	16	1.12	21.25	18.50
18	25.00	1.56	5.50	19.88	16	1.25	22.75	21.00
20	27.50	1.69	5.69	22.00	20	1.25	25.00	23.00
22	29.50	1.81	5.88	24.00	20	1.38	27.25	25.25
24	32.00	1.88	6.00	26.12	20	1.38	29.50	27.25
26	34.25	2.69	4.75	26.62	24	1.38	31.75	29.50
28	36.50	2.81	4.94	28.62	28	1.38	34.00	31.50
30	38.75	2.94	5.38	30.75	28	1.38	36.00	33.75
32	41.75	3.18	5.69	32.75	28	1.62	38.50	36.00
34	43.75	3.25	5.88	34.75	32	1.62	40.50	38.00
36	46.00	3.56	6.18	36.75	32	1.62	42.75	40.25
38	48.75	3.44	6.19	39.00	32	1.62	45.25	42.25
40	50.75	3.56	6.44	41.00	36	1.62	47.25	44.25
42	53.00	3.81	6.75	43.00	36	1.62	49.50	47.00
44	55.25	4.00	7.00	45.00	40	1.62	51.75	49.00
46	57.25	4.06	7.31	47.12	40	1.62	53.75	51.00
48	59.50	4.25	7.56	49.12	44	1.62	56.00	53.50
50	61.75	4.38	8.00	51.25	44	1.88	58.25	55.50
52	64.00	4.56	8.25	53.25	44	1.88	60.50	57.50
54	66.25	4.75	8.50	55.25	44	1.88	62.75	59.50
56	68.75	4.88	9.00	57.38	48	1.88	65.00	62.00
58	71.00	5.06	9.25	59.38	48	1.88	67.25	64.00
60	73.00	5.19	9.44	61.38	52	1.88	69.25	66.00

All dimensions are in inches. Prices on application.

[▲]Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Pipe line flanges are specifically designed for attachment to thin wall, high strength pipe. All inquiries and orders should specify the grade and; wall thickness of matching pipe or bore of welding neck flange.

Flanges are furnished faced, drilled and spot faced or back faced.

For standard facings see pages 112 & 113.

- (1) Dimension to be specified by the customer.
- (2) The 0.06" raised face is included in thickness "C" and length thru hub "Y".

For bevel details see page 177.

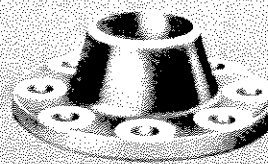
For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

For ordering instructions see page 178.

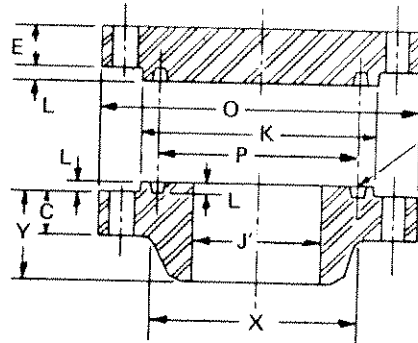


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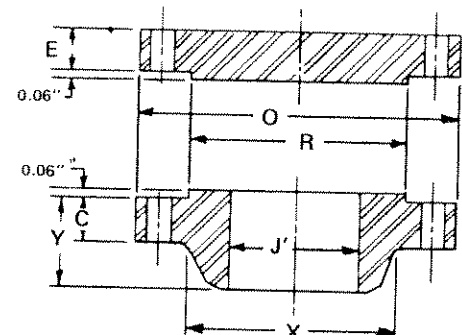


WELDING NECK

CLASS 300 FLANGES



RING TYPE JOINT



RAISED FACE

ASTM A105[▲] MSS SP 44

CLASS 300, 740 PSI AT ATMOSPHERIC TEMPERATURE, RAISED FACE AND RING-TYPE JOINTS

Pipe Size	FLANGE DIMENSIONS				HUB DIM.	DRILLING			FACING DIMENSIONS							Groove Fillet Radius
	OD of Flange O	Thick of Flange		Length Thru Hub Y	OD Large End Hub X	No. of Bolt Holes	Dia. of Bolt Holes	Dia. of Bolt Circle	Raised Face Dia. R	Ring-Type Joint					Ring No.	
		Weld- Neck C	Bld. Fig. E							Facing Dia. K	Depth of Groove L	Pitch Dia. P	Width of Groove D			
12	20.50	2.00	2.00	5.12	14.75	16	1.25	17.75	15.00	16.50	0.312	15.000	0.469	R57	0.03	
14	23.00	2.12	2.12	5.62	16.75	20	1.25	20.25	16.25	18.00	0.312	16.500	0.469	R61	0.03	
16	25.50	2.25	2.25	5.75	19.00	20	1.38	22.50	18.50	20.00	0.312	18.500	0.469	R65	0.03	
18	28.00	2.38	2.38	6.25	21.00	24	1.38	24.75	21.00	22.62	0.312	21.000	0.469	R69	0.03	
20	30.50	2.50	2.50	6.38	23.12	24	1.38	27.00	23.00	25.00	0.375	23.000	0.531	R73	0.06	
22	33.00	2.62	2.62	6.50	25.25	24	1.62	29.25	25.25	27.00	0.438	25.000	0.594	R81	0.06	
24	36.00	2.75	2.75	6.62	27.62	24	1.62	32.00	27.25	29.50	0.438	27.250	0.656	R77	0.06	
26	38.25	3.12	3.31	7.25	28.38	28	1.75	34.50	29.50	31.88	0.500	29.500	0.781	R93	0.06	
28	40.75	3.38	3.56	7.75	30.50	28	1.75	37.00	31.50	33.88	0.500	31.500	0.781	R94	0.06	
30	43.00	3.62	3.75	8.25	32.56	28	1.88	39.25	33.75	36.12	0.500	33.750	0.781	R95	0.06	
32	45.25	3.88	3.94	8.75	34.69	28	2.00	41.50	36.00	38.75	0.562	36.000	0.906	R96	0.06	
34	47.50	4.00	4.12	9.12	36.88	28	2.00	43.50	38.00	40.75	0.562	38.000	0.906	R97	0.06	
36	50.00	4.12	4.38	9.50	39.00	32	2.12	46.00	40.25	43.00	0.562	40.250	0.906	R98	0.06	
38	46.00	4.25	4.25	7.12	39.12	32	1.62	43.00	40.50	.....	.....	.....	.....	.....	.....	
40	48.75	4.50	4.50	7.62	41.25	32	1.75	45.50	42.75	.....	.....	.....	.....	.....	.....	
42	50.75	4.69	4.69	7.88	43.25	32	1.75	47.50	44.75	.....	.....	.....	.....	.....	.....	
44	53.25	4.88	4.88	8.12	45.25	32	1.88	49.75	47.00	.....	.....	.....	.....	.....	.....	
46	55.75	5.06	5.06	8.50	47.38	28	2.00	52.00	49.00	.....	.....	.....	.....	.....	.....	
48	57.75	5.25	5.25	8.81	49.38	32	2.00	54.00	51.25	.....	.....	.....	.....	.....	.....	
50	60.25	5.50	5.50	9.12	51.38	32	2.12	56.25	53.50	.....	.....	.....	.....	.....	.....	
52	62.25	5.69	5.69	9.38	53.38	32	2.12	58.25	55.50	.....	.....	.....	.....	.....	.....	
54	65.25	6.00	6.00	9.94	55.50	28	2.38	61.00	57.75	.....	.....	.....	.....	.....	.....	
56	67.25	6.06	6.06	10.25	57.62	28	2.38	63.00	59.75	.....	.....	.....	.....	.....	.....	
58	69.25	6.25	6.25	10.50	59.62	32	2.38	65.00	62.00	.....	.....	.....	.....	.....	.....	
60	71.25	6.44	6.44	10.75	61.62	32	2.38	67.00	64.00	.....	.....	.....	.....	.....	.....	

All dimensions are in inches. Prices on application.

Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Pipe Line flanges designed to mate with valves. Hubs of pipe line flanges are specifically designed for attachment to thin wall, high strength pipe, but are equally suitable for use with heavier pipe. All inquiries and orders should specify the grade and wall thickness of matching pipe or bore of welding neck flange.

Flanges are furnished faced, drilled and spot faced or back faced.

For standard facings see pages 112 & 113.

(1) Dimensions to be specified by the customer.

(2) The 0.06" raised face is included in thickness "C & E" and length thru hub "Y". For raised faced flanges.

For bevel details see page 177.

For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

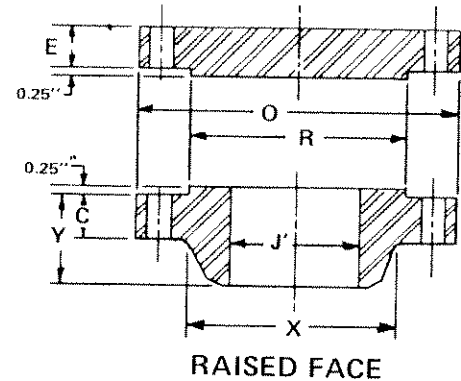
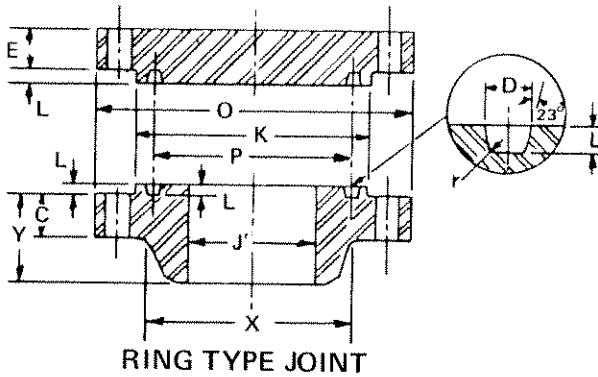
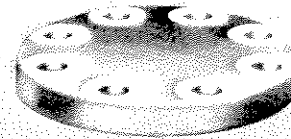
For ordering instructions see page 178.

CLASS 400 FLANGES

WELDING NECK



BLIND



CLASS 400, 985 PSI AT ATMOSPHERIC TEMPERATURE, RAISED FACE AND RING-TYPE JOINTS ASTM A105[▲] MSS SP 44

Pipe Size	FLANGE DIMENSIONS				HUB DIM. OD Large End Hub ⁷	DRILLING			FACING DIMENSIONS						Groove Fillet Radius
	OD of Flange O	THICK OF FLANGE		Length Thru Hub Y		No. of Bolt Holes	Dia. of Bolt Holes	Dia. of Bolt Circle	Raised Face Dia. R	RING-TYPE JOINT				Ring No.	
		Weld-Neck C	Blind Flg. ⁶ I							Facing Dia. K	Depth of Groove L	Pitch Dia. P	Width of Groove D		
12	20.50	2.25	2.25	5.38	14.75	16	1.38	17.75	15.00	16.25	0.312	15.000	0.469	R57	0.03
14	23.00	2.38	2.38	5.88	16.75	20	1.38	20.25	16.25	18.00	0.312	16.500	0.469	R61	0.03
16	25.50	2.50	2.50	6.00	19.00	20	1.50	22.50	18.12	20.00	0.312	18.500	0.469	R65	0.03
18	28.00	2.62	2.62	6.50	21.00	24	1.50	24.75	21.00	22.62	0.312	21.000	0.469	R69	0.03
20	30.50	2.75	2.75	6.62	23.12	24	1.62	27.00	23.00	25.00	0.375	23.000	0.531	R73	0.06
22	33.00	2.88	2.88	6.75	25.25	24	1.75	29.25	25.25	27.00	0.438	25.000	0.594	R81	0.06
24	36.00	3.00	3.00	6.88	27.62	24	1.88	32.00	27.25	29.50	0.438	27.250	0.656	R77	0.06
26	38.25	3.50	3.88	7.62	28.62	28	1.88	34.50	29.50	31.88	0.500	29.500	0.781	R93	0.06
28	40.75	3.75	4.12	8.12	30.81	28	2.00	37.00	31.50	33.88	0.500	31.500	0.781	R94	0.06
30	43.00	4.00	4.38	8.62	32.94	28	2.12	39.25	33.75	36.12	0.500	33.750	0.781	R95	0.06
32	45.25	4.25	4.56	9.12	35.00	28	2.12	41.50	36.00	38.75	0.562	36.000	0.906	R96	0.06
34	47.50	4.38	4.81	9.50	37.19	28	2.12	43.50	38.00	40.75	0.562	38.000	0.906	R97	0.06
36	50.00	4.50	5.06	9.88	39.38	32	2.12	46.00	40.25	43.00	0.562	40.250	0.906	R98	0.06
38	47.50	4.88	4.88	8.12	39.50	32	1.88	44.00	40.75	.....	.....	.....	.....	.....	.....
40	50.00	5.12	5.12	8.50	41.50	32	2.00	46.25	43.00	.....	.....	.....	.....	.....	.....
42	52.00	5.25	5.25	8.81	43.62	32	2.00	48.25	45.00	.....	.....	.....	.....	.....	.....
44	54.50	5.50	5.50	9.18	45.62	32	2.12	50.50	47.25	.....	.....	.....	.....	.....	.....
46	56.75	5.75	5.75	9.62	47.75	36	2.12	52.75	49.50	.....	.....	.....	.....	.....	.....
48	59.50	6.00	6.00	10.12	49.88	28	2.38	55.25	51.50	.....	.....	.....	.....	.....	.....
50	61.75	6.19	6.25	10.56	52.00	32	2.38	57.50	53.62	.....	.....	.....	.....	.....	.....
52	63.75	6.38	6.44	10.88	54.00	32	2.38	59.50	55.62	.....	.....	.....	.....	.....	.....
54	67.00	6.69	6.75	11.38	56.12	28	2.62	62.25	57.88	.....	.....	.....	.....	.....	.....
56	69.00	6.88	6.94	11.75	58.25	32	2.62	64.25	60.12	.....	.....	.....	.....	.....	.....
58	71.00	7.00	7.12	12.06	60.25	32	2.62	66.25	62.12	.....	.....	.....	.....	.....	.....
60	74.25	7.31	7.44	12.56	62.38	32	2.88	69.00	64.38	.....	.....	.....	.....	.....	.....

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Pipe line flanges designed to mate with valves. Hubs of Pipe Line Flanges are specifically designed for attachment to thin wall, high strength pipe, but are equally suitable for use with heavier pipe.

All inquiries and orders should specify the grade and wall thickness of matching pipe or bore of welding neck flange.

Flanges are furnished faced, drilled and spot faced or back faced. For standard flange facings see pages 112 & 113.

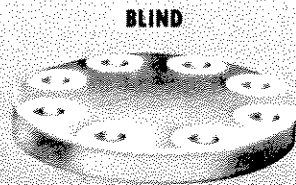
(1) Dimension to be specified by the customer.

For bevel details see page 177.

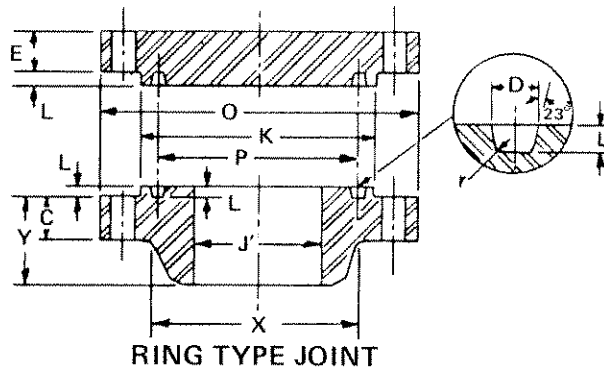
For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

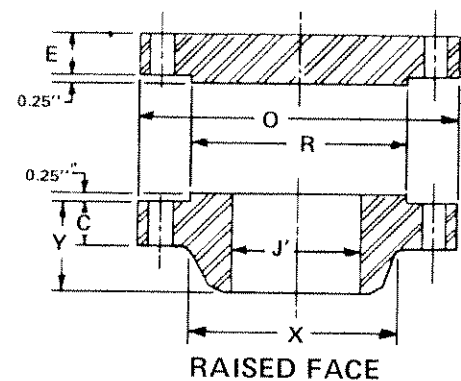
For ordering instructions see page 178.



CLASS 600 FLANGES



RING TYPE JOINT



RAISED FACE

ASTM A105[▲] MSS SP 44

CLASS 600, 1480 PSI AT ATMOSPHERIC TEMPERATURE, RAISED FACE AND RING-TYPE JOINTS

Pipe Size	FLANGE DIMENSIONS				HUB DIM. OD Large End Hub	DRILLING				FACING DIMENSIONS						Groove Fillet Radius
	OD of Flange	THICK. OF FLANG.		Length Thru Hub		No. of Bolt Holes	Dia. of Bolt Holes	Dia. of Bolt Circle	Raised Face Dia.	RING TYPE JOINT						
		Weld- Neck	Blk. Flg.							Facing Dia.	Depth of Groove	Pitch Dia.	Width of Groove	Ring No.		
	O	C	E	Y	X				R	K	L	P	D		r	
12	22.00	2.62	2.62	6.12	15.75	20	1.38	19.25	15.00	16.25	0.312	15.000	0.469	R57	0.03	
14	23.75	2.75	2.75	6.50	17.00	20	1.50	20.75	16.25	18.00	0.312	16.500	0.469	R61	0.03	
16	27.00	3.00	3.00	7.00	19.50	20	1.62	23.75	18.50	20.00	0.312	18.500	0.469	R65	0.03	
18	29.25	3.25	3.25	7.35	21.50	20	1.75	25.75	21.00	22.62	0.312	21.000	0.469	R69	0.03	
20	32.00	3.50	3.50	7.50	24.00	24	1.75	28.50	23.00	25.00	0.375	23.000	0.531	R73	0.06	
22	34.25	3.75	3.75	7.75	26.25	24	1.88	30.62	25.25	27.00	0.438	25.000	0.594	R81	0.06	
24	37.00	4.00	4.00	8.00	28.25	24	2.00	33.00	27.25	29.50	0.438	27.250	0.656	R77	0.06	
26	40.00	4.25	4.94	8.75	29.44	28	2.00	36.00	29.50	31.88	0.500	29.500	0.781	R93	0.06	
28	42.25	4.38	5.19	9.25	31.62	28	2.12	38.00	31.50	33.88	0.500	31.500	0.781	R94	0.06	
30	44.50	4.50	5.50	9.75	33.94	28	2.12	40.25	33.75	36.12	0.500	33.750	0.781	R95	0.06	
32	47.00	4.62	5.81	10.25	36.12	28	2.38	42.50	36.00	38.75	0.562	36.000	0.906	R96	0.06	
34	49.00	4.75	6.06	10.62	38.19	28	2.38	44.50	38.00	40.75	0.562	38.000	0.906	R97	0.06	
36	51.75	4.88	6.38	11.12	40.62	28	2.62	47.00	40.25	43.00	0.562	40.250	0.906	R98	0.06	
38	50.00	6.00	6.12	10.00	40.25	28	2.38	45.75	41.50	-----	-----	-----	-----	-----	-----	
40	52.00	6.25	6.38	10.38	42.25	32	2.38	47.75	43.75	-----	-----	-----	-----	-----	-----	
42	55.25	6.62	6.75	11.00	44.38	28	2.62	50.50	46.00	-----	-----	-----	-----	-----	-----	
44	57.25	6.81	7.00	11.38	46.50	32	2.62	52.50	48.25	-----	-----	-----	-----	-----	-----	
46	59.50	7.06	7.31	11.81	48.62	32	2.62	54.75	50.25	-----	-----	-----	-----	-----	-----	
48	62.75	7.44	7.69	12.44	50.75	32	2.88	57.50	52.50	-----	-----	-----	-----	-----	-----	
50	65.75	7.75	8.00	12.94	52.88	28	3.12	60.00	54.50	-----	-----	-----	-----	-----	-----	
52	67.75	8.00	8.25	13.25	54.88	32	3.12	62.00	56.50	-----	-----	-----	-----	-----	-----	
54	70.00	8.25	8.56	13.75	57.00	32	3.12	64.25	58.75	-----	-----	-----	-----	-----	-----	
56	73.00	8.56	8.88	14.25	59.12	32	3.38	66.75	60.75	-----	-----	-----	-----	-----	-----	
58	75.00	8.75	9.12	14.56	61.12	32	3.38	68.75	63.00	-----	-----	-----	-----	-----	-----	
60	78.50	9.19	9.56	15.31	63.38	28	3.62	71.75	65.25	-----	-----	-----	-----	-----	-----	

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Pipe line flanges designed to mate with valves. Hubs of Pipe Line Flanges are specifically designed for attachment to thin wall, high strength pipe, but are equally suitable for use with heavier pipe.

All inquiries and orders should specify the grade and wall thickness of matching pipe or bore of welding neck flange.

Flanges are furnished faced, drilled and spot faced or back faced. For standard flange facings see pages 112 & 113.

(1) Dimension to be specified by the customer.

For bevel details see page 177.

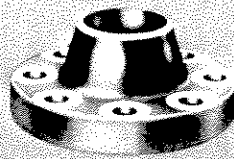
For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

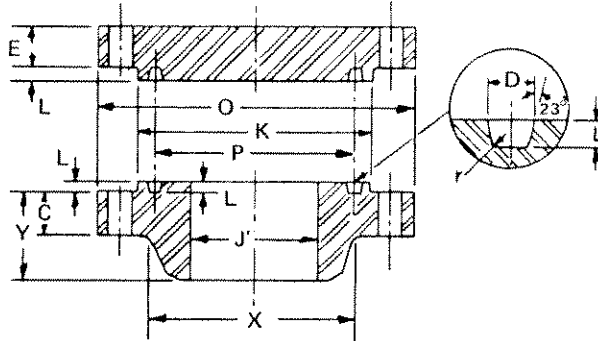
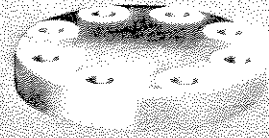
For ordering instructions see page 178.

CLASS 900 FLANGES

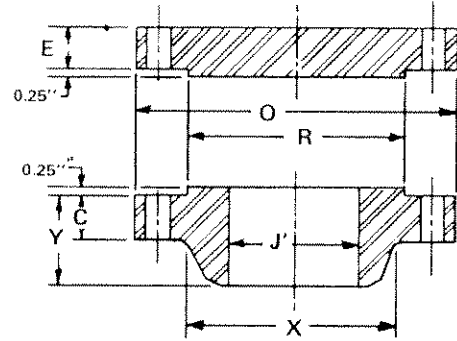
WELDING NECK



BLIND



RING TYPE JOINT



RAISED FACE

ASTM A105[▲] MSS SP 44

CLASS 900, 2220 PSI AT ATMOSPHERIC TEMPERATURE, RAISED FACE AND RING-TYPE JOINTS

Pipe Size	FLANGE DIMENSIONS				HUB DIM.	DRILLING			FACING DIMENSIONS						Groove Fillet Radius r
	OD of Flange O	THICK OF FLANGE		Length Thru Hub Y	OD Large End Hub X	No. of Bolt Holes	Dia. of Bolt Holes	Dia. of Bolt Circle	Raised Face Dia. R	RING-TYPE JOINT					
		Weld-Neck C	Bld. Flg. E							Facing Dia. K	Depth of Groove L	Pitch Dia. P	Width of Groove D	Ring No.	
12	24.00	3.12	3.12	7.88	16.50	20	1.50	21.00	15.00	16.50	0.312	15.000	0.469	R57	0.03
14	25.25	3.38	3.38	8.38	17.75	20	1.62	22.00	16.25	18.38	0.438	16.500	0.656	R62	0.06
16	27.75	3.50	3.50	8.50	20.00	20	1.75	24.25	18.50	20.62	0.438	18.500	0.656	R66	0.06
18	31.00	4.00	4.00	9.00	22.25	20	2.00	27.00	21.00	23.38	0.500	21.000	0.781	R70	0.06
20	33.75	4.25	4.25	9.75	24.50	20	2.12	29.50	23.00	25.50	0.500	23.000	0.781	R74	0.06
24	41.00	5.50	5.50	11.50	29.50	20	2.62	35.50	27.25	30.38	0.625	27.750	1.062	R78	0.09
26	42.75	5.50	6.31	11.25	30.50	20	2.88	37.50	29.50	32.75	0.688	29.500	1.188	R100	0.06
28	46.00	5.62	6.75	11.75	32.75	20	3.12	40.25	31.50	35.00	0.688	31.500	1.312	R101	0.06
30	48.50	5.88	7.18	12.25	35.00	20	3.12	42.75	33.75	37.75	0.688	33.750	1.312	R102	0.06
32	51.75	6.25	7.62	13.00	37.25	20	3.38	45.50	36.00	39.50	0.688	36.000	1.312	R103	0.06
34	55.00	6.50	8.06	13.75	39.62	20	3.62	48.25	38.00	42.00	0.812	38.000	1.438	R104	0.06
36	57.50	6.75	8.44	14.25	41.88	20	3.62	50.75	40.25	44.25	0.812	40.250	1.438	R105	0.06
38	57.50	7.50	8.50	13.88	42.25	20	3.62	50.75	43.25						
40	59.50	7.75	8.81	14.31	44.38	24	3.62	52.75	45.75						
42	61.50	8.12	9.12	14.62	46.31	24	3.62	54.75	47.75						
44	64.88	8.44	9.56	15.38	48.62	24	3.88	57.62	50.00						
46	68.25	8.88	10.06	16.18	50.88	24	4.12	60.50	52.50						
48	70.25	9.19	10.38	16.50	52.88	24	4.12	62.50	54.50						

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Pipe line flanges designed to mate with valves. Hubs of Pipe Line Flanges are specifically designed for attachment to thin wall, high strength pipe, but are equally suitable for use with heavier pipe.

All inquiries and orders should specify the grade and wall thickness of matching pipe or bore of welding neck flange.

Flanges are furnished faced, drilled and spot faced or back faced. For standard flange facings see pages 112 & 113.

(1) Dimension to be specified by the customer.

For bevel details see page 177.

For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

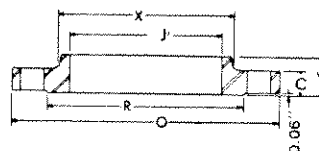
For ordering instructions see page 178.

CLASS 150

BOLTING MATCHES MSS SP 44

These Slip-On Flanges Are Not Covered by MSS-SP-44. The Flanges listed here have been added for completeness.

SLIP-ON



CLASS 150. 285 PSI AT ATMOSPHERIC TEMPERATURE, RAISED FACE

PIPE SIZE	FLANGE O. D. O	FLANGE THICKNESS C	FLANGE LENGTH Y	HUB DIA. X	NO. BOLT HOLES	DIA. BOLT HOLES	DIA. BOLT CIRCLE	DIA. FACE R	FILLET RAD. MIN. A	FLANGE BORE J
26	34.25	2.69	3.69	28.25	24	1.38	31.75	29.50	.38	26.25
28	36.50	3.06	3.81	30.50	28	1.38	34.00	31.50	.44	28.25
30	38.75	3.31	3.94	32.50	28	1.38	36.00	33.75	.44	30.25
32	41.75	3.41	4.18	34.50	28	1.62	38.50	36.00	.44	32.25
34	43.75	3.68	4.25	36.50	32	1.62	40.50	38.00	.50	34.25
36	46.00	3.96	4.56	38.75	32	1.62	42.75	40.25	.50	36.25
38	48.75	4.06	4.56	41.25	32	1.62	45.25	42.25	.50	38.25
40	50.75	4.18	4.81	43.25	36	1.62	47.25	44.25	.50	40.25
42	53.00	4.43	5.06	45.50	36	1.62	49.50	47.00	.50	42.25
44	55.25	4.68	5.18	47.75	40	1.62	51.75	49.00	.50	44.25
46	57.25	4.86	5.31	49.75	40	1.62	53.75	51.00	.50	46.25
48	59.50	5.06	5.56	52.00	44	1.62	56.00	53.50	.50	48.25

FACING AND DRILLING MATCHES MSS-SP-44 CLASS 150 FLANGES.

THE DESIGN CRITERIA IS PER MSS-SP-44 (1975) ANNEX B.

STRESS CALCULATIONS ARE PER ASME VIII DIVISION I.

All dimensions are in inches. Prices on application.

Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

For standard facings see pages 112 & 113

(1) The 0.06" raised face is included in thickness "C" and length thru hub "Y".

For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

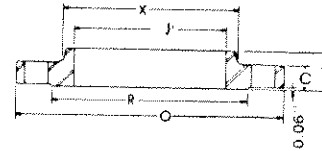
For ordering instructions see page 178.

CLASS 300

BOLTING MATCHES MSS SP 44

These Slip-On Flanges Are Not Covered by MSS-SP-44. The Flanges listed here have been added for completeness.

SLIP-ON



CLASS 300, 740 PSI AT ATMOSPHERIC TEMPERATURE, RAISED FACE ⁽¹⁾

PIPE SIZE	FLANGE O.D. O	FLANGE THICKNESS C	FLANGE LENGTH Y	HUB DIA. X	NO. BOLT HOLES	DIA. BOLT HOLES	DIA. BOLT CIRCLE	DIA. FACE R	FILLET RAD. MIN. A	FLANGE BORE J
26	38.25	3.12	5.37	30.25	28	1.75	34.50	29.50	.38	26.25
28	40.75	3.38	5.68	32.75	28	1.75	37.00	31.50	.44	28.25
30	43.00	3.62	6.12	34.75	28	1.88	39.25	33.75	.44	30.25
32	45.25	3.88	6.56	36.75	28	2.00	41.50	36.00	.44	32.25
34	47.50	4.00	6.81	38.75	28	2.00	43.50	38.00	.50	34.25
36	50.00	4.12	7.06	41.00	32	2.12	46.00	40.25	.50	36.25
38	46.00	5.31	6.06	39.00	32	1.62	43.00	40.50	.50	38.25
40	48.75	5.56	6.56	41.25	32	1.75	45.50	42.75	.50	40.25
42	50.75	5.81	6.81	43.25	32	1.75	47.50	44.75	.50	42.25
44	53.25	6.06	6.86	45.25	32	1.88	49.75	47.00	.50	44.25
46	55.75	6.31	7.06	47.25	28	2.00	52.00	49.00	.50	46.25
48	57.75	6.56	7.18	49.25	32	2.00	54.00	51.25	.50	48.25

STRESS CALCULATIONS ARE PER ASME VIII DIVISION I.

All dimensions are in inches. Prices on application.

Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

For standard facings see pages 112 & 113.

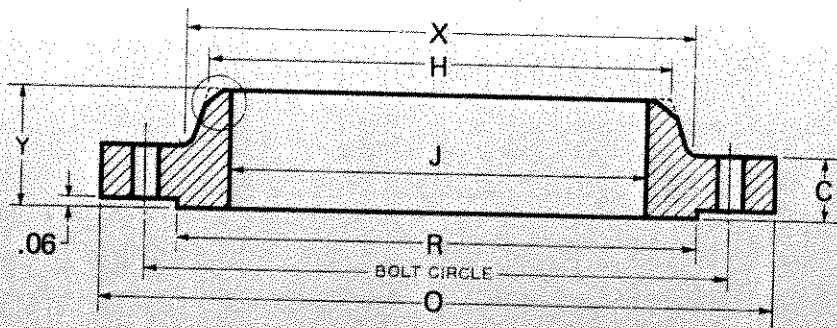
(1) The 0.06" raised face is included in thickness "C" and length thru hub "Y".

For gasket surface finishes see page 94.

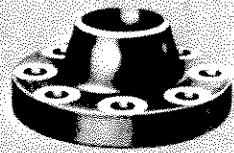
For dimensional tolerances see page 176.

For ordering instructions see page 178.

75, 150, 300 lb. Weld Neck Flanges



WELDING NECK FLANGE



ASTM A105[▲] API 605

Nominal Size	Welding Neck								Welding Neck Flanges			
	Flange Outside Diameter	Flange Thickness	Raised-Face Diameter	Drilling				Bolt Length	Diameter at Large End of Hub	Diameter at Small End of Hub	Overall Length	
				Bolt-Circle Diameter	Number of Bolts	Bolt Diameter	Bolt-Hole Diameter					
								Stud Bolt	L	X	H	Y ²
75 Lb Nominal Rating												
26	30	1 ¹ / ₁₆	27 ³ / ₄	28 ¹ / ₂	36	⁵ / ₈	³ / ₄	4 ¹ / ₄	26 ³ / ₈	26 ¹ / ₁₆	2 ⁵ / ₁₆	
28	32	1 ³ / ₁₆	29 ³ / ₄	30 ¹ / ₂	40	⁵ / ₈	³ / ₄	4 ¹ / ₄	28 ³ / ₈	28 ¹ / ₁₆	2 ⁷ / ₁₆	
30	34	1 ³ / ₁₆	31 ³ / ₄	32 ¹ / ₂	44	⁵ / ₈	³ / ₄	4 ¹ / ₄	30 ³ / ₈	30 ¹ / ₁₆	2 ⁹ / ₁₆	
32	36	1 ³ / ₈	33 ³ / ₄	34 ¹ / ₂	48	⁵ / ₈	³ / ₄	4 ¹ / ₂	32 ³ / ₈	32 ¹ / ₁₆	2 ³ / ₄	
34	38	1 ³ / ₈	35 ³ / ₄	36 ¹ / ₂	52	⁵ / ₈	³ / ₄	4 ¹ / ₂	34 ³ / ₈	34 ¹ / ₁₆	2 ⁷ / ₈	
36	40 ¹¹ / ₁₆	1 ⁷ / ₁₆	38	39 ¹ / ₁₆	40	³ / ₄	⁷ / ₈	4 ³ / ₄	36 ¹ / ₁₆	36 ¹ / ₁₆	3 ³ / ₈	
42	46 ¹¹ / ₁₆	1 ⁹ / ₁₆	44	45 ¹ / ₁₆	48	³ / ₄	⁷ / ₈	5	42 ¹ / ₁₆	42 ¹ / ₁₆	3 ³ / ₄	
48	53 ³ / ₄	1 ¹¹ / ₁₆	50 ¹ / ₄	51 ³ / ₈	44	⁷ / ₈	1	5 ³ / ₄	48 ⁷ / ₈	48 ¹ / ₁₆	4 ³ / ₈	
54	59 ³ / ₈	1 ¹³ / ₁₆	56 ¹ / ₄	57 ¹ / ₂	48	⁷ / ₈	1	6	55	54 ¹ / ₁₆	4 ¹⁵ / ₁₆	
60	66	2 ¹ / ₁₆	62 ¹ / ₂	63 ³ / ₈	44	1	1 ¹ / ₈	6 ³ / ₄	61 ¹ / ₈	60 ¹ / ₁₆	5 ¹¹ / ₁₆	
150 Lb Nominal Rating												
26	30 ¹⁵ / ₁₆	1 ⁵ / ₈	28	29 ⁹ / ₁₆	36	³ / ₄	⁷ / ₈	5 ¹ / ₄	26 ¹⁵ / ₁₆	26 ¹ / ₁₆	3 ¹ / ₂	
28	32 ¹⁵ / ₁₆	1 ³ / ₄	30	31 ⁹ / ₁₆	40	³ / ₄	⁷ / ₈	5 ¹ / ₂	28 ¹⁵ / ₁₆	28 ¹ / ₁₆	3 ³ / ₄	
30	34 ¹⁵ / ₁₆	1 ³ / ₄	32	33 ⁹ / ₁₆	44	³ / ₄	⁷ / ₈	5 ¹ / ₂	31	30 ¹ / ₁₆	3 ¹⁵ / ₁₆	
32	37 ¹ / ₁₆	1 ¹³ / ₁₆	34	35 ¹ / ₁₆	48	³ / ₄	⁷ / ₈	5 ¹ / ₂	33 ¹ / ₁₆	32 ¹ / ₁₆	4 ¹ / ₄	
34	39 ⁹ / ₁₆	1 ¹¹ / ₁₆	36 ¹ / ₄	37 ¹ / ₁₆	40	⁷ / ₈	1	6	35 ³ / ₈	34 ¹ / ₁₆	4 ¹¹ / ₃₂	
36	41 ⁵ / ₈	2 ¹ / ₁₆	38 ¹ / ₄	39 ³ / ₄	44	⁷ / ₈	1	6 ³ / ₄	37 ³ / ₈	36 ¹ / ₁₆	4 ⁵ / ₈	
42	48 ¹ / ₄	2 ⁵ / ₁₆	44 ¹ / ₂	46 ¹ / ₈	48	1	1 ¹ / ₈	7	43 ³ / ₈	42 ¹ / ₁₆	5 ¹ / ₄	
54	61	2 ¹³ / ₁₆	56 ³ / ₄	58 ³ / ₄	56	1 ¹ / ₈	1 ¹ / ₄	8 ¹ / ₄	55 ⁵ / ₈	54 ¹ / ₁₆	6 ³ / ₈	
60	67 ¹⁵ / ₁₆	3	63	65 ¹ / ₁₆	52	1 ¹ / ₄	1 ³ / ₄	8 ³ / ₄	61 ¹⁵ / ₁₆	60 ¹ / ₁₆	7 ¹ / ₁₆	
300 Lb Nominal Rating												
26	34 ¹ / ₈	3 ¹ / ₂	29	31 ⁵ / ₈	32	1 ³ / ₄	1 ³ / ₈	10	27 ³ / ₈	26 ³ / ₁₆	5 ¹¹ / ₁₆	
28	36 ¹ / ₄	3 ¹ / ₂	31	33 ³ / ₄	36	1 ³ / ₄	1 ³ / ₈	10	29 ³ / ₈	28 ³ / ₁₆	5 ⁷ / ₈	
30	39	3 ¹¹ / ₁₆	33 ¹ / ₄	36 ¹ / ₄	36	1 ³ / ₈	1 ¹ / ₂	10 ¹ / ₂	32	30 ³ / ₁₆	6 ⁷ / ₃₂	
32	41 ¹ / ₂	4 ¹ / ₁₆	35 ¹ / ₂	38 ¹ / ₂	32	1 ¹ / ₂	1 ⁵ / ₈	11 ¹ / ₂	34	32 ¹ / ₁₆	6 ³ / ₈	
34	43 ³ / ₈	4 ¹ / ₁₆	37 ¹ / ₂	40 ⁵ / ₈	36	1 ¹ / ₂	1 ⁵ / ₈	11 ¹ / ₂	36 ³ / ₈	34 ¹ / ₁₆	6 ¹ / ₁₆	
36	46 ¹ / ₈	4 ¹ / ₁₆	39 ³ / ₄	42 ⁷ / ₈	32	1 ⁵ / ₈	1 ³ / ₄	11 ³ / ₄	38	36 ¹ / ₄	7 ¹ / ₄	
42	52 ¹ / ₂	4 ¹¹ / ₁₆	46	49	36	1 ³ / ₄	1 ⁷ / ₈	13 ¹ / ₄	44	42 ³ / ₁₆	8 ¹ / ₁₆	
48	59 ¹ / ₂	5 ¹ / ₁₆	52 ¹ / ₄	55 ³ / ₄	40	1 ⁷ / ₈	2	14 ¹ / ₄	50 ¹ / ₁₆	48 ¹ / ₁₆	8 ¹³ / ₁₆	
54	65 ³ / ₈	5 ³ / ₈	58 ¹ / ₄	62 ¹ / ₈	48	1 ⁷ / ₈	2	15	56 ¹ / ₂	54 ¹ / ₁₆	9 ⁷ / ₁₆	
60	73 ¹ / ₁₆	5 ¹¹ / ₁₆	65	69 ¹ / ₁₆	40	2 ¹ / ₄	2 ³ / ₈	16 ³ / ₄	62 ¹ / ₁₆	60 ¹ / ₁₆	10 ¹¹ / ₁₆	

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA105). For stainless steel and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

For standard flange facings see pages 112 & 113.

(1) Dimension to be specified by the customer.

(2) The 0.06" raised face is included in thickness "C" and length thru hub "Y".

For bevel details see page 177.

For gasket surface finishes see page 94.

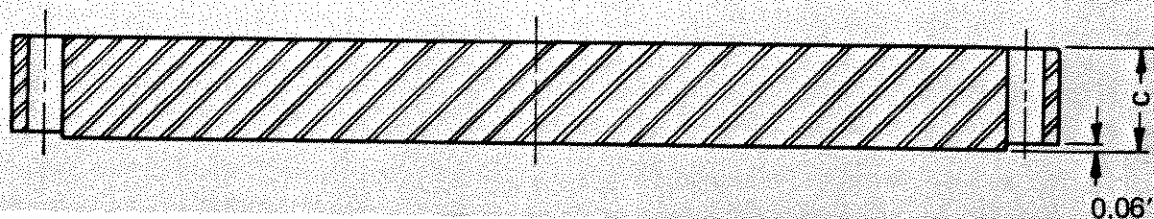
For dimensional tolerances see pages 129 & 176.

For ordering instructions see page 178.

FOR APPROPRIATE CODE PRESSURE-TEMPERATURE RATINGS SEE PAGE 129

BLIND¹ Part No.

TO MATCH API 605
WELD NECK FLANGES



ASTM A105⁽²⁾

NOMINAL SIZE	THICKNESS C
Class 75	
26	1.31
28	1.31
30	1.38
32	1.48
34	1.50
36	1.62
42	1.88
48	2.12
54	2.38
60	2.62
Class 150	
26	1.75
28	1.81
30	1.94
32	1.81
34	2.19
36	2.31
42	2.69
48	3.06
54	3.38
60	3.75
Class 300	
26	3.50
28	3.50
30	3.69
32	4.06
34	4.06
36	4.06
42	4.69
48	5.25
54	5.81
60	6.50

(1) These flanges are specially designed using formulas taken from the ASME Boiler Construction Code.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105.)

Raised face is normally furnished.

Facing and gasket dimensions are the same as given for the weld neck flanges.

For ordering instructions see page 178.

Pressure Ratings *

API 605

Temperature (Degrees Fahrenheit)	Pressure Rating (Pounds per Square Inch Gage)		
	Nominal Pressure Rating		
	75 Lb	150 Lb	300 Lb
100	140	275	720
150	135	271	710
200	134	267	700
250	132	264	690
300	130	260	680
350	129	258	675
400	127	254	665
450	124	248	650
500	120	239	625
550	113	226	590
600	106	212	555
650	98	196	515
700	90	180	470
750	81	162	425
775	<u>75</u>	<u>150</u>	395
800	70	139	365
825	63	126	332
850	57	114	<u>300</u>
875	50	99	<u>260</u>
900	43	86	225
925	37	73	190
950	30	59	155
975	23	46	120
1,000	16	32	85

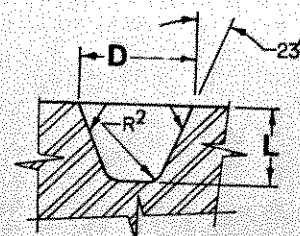
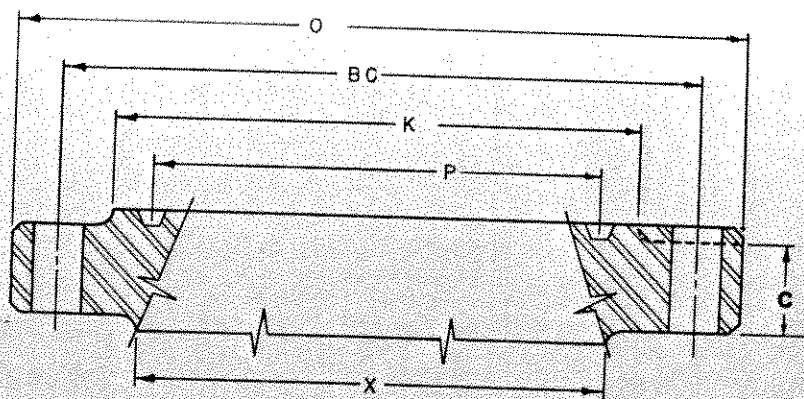
*Ratings shown above are based on flanges made from ASTM A105 carbon steel material.

Tolerances **

API 605

Dimension	Tolerance (Inch)
Outside diameter of raised face, <i>R</i>	$\pm \frac{1}{32}$
Flange thickness, <i>C</i>	$+\frac{3}{16}, -0$
Hub length, overall, <i>Y</i>	$\pm \frac{1}{8}$
Inside diameter, welding neck flange, <i>B</i>	$+\frac{1}{8}, -\frac{1}{16}$
Parallelism, back-to-face of flange	0.03

**FOR TOLERANCES NOT GIVEN IN THE TABLE ABOVE, SEE PAGE 176



GROOVE DETAIL

API SPEC. 6A TYPE 6B 2000* PSI

API TYPE 6B FLANGES FOR 2000*-PSI MAXIMUM WORKING PRESSURE

Basic Flange Dimensions				Bolting Dimensions				Ring-Joint Groove and Flange Facing Dimensions				
Nominal Size of Flange	Outside Diameter of Flange	Basic Thickness of Flange	Diameter of Hub	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Length of Stud Bolts	Ring Number R or RX	Pitch Diameter of Type R Ring & Groove	Width of Groove	Depth of Groove	Diameter of Raised Face
O	C	X	BC					P	D	L	K	
1½**	6½	¾	2¾	4½	4	¾	4¼	20	2½	½	¼	3½
2	6½	1	3½	5	8	¾	4½	23	3¼	½	½	4¼
2½	7½	1½	3½	5½	8	¾	5	26	4	½	½	5
3	8¼	1¼	4½	6½	8	¾	5¼	31	4¾	½	½	5½
4	10¼	1½	6	8½	8	¾	6	37	5¾	½	½	6½
6	14	1¾	8¾	11½	12	1	7	45	8½	½	½	9½
8	16½	2½	10¾	13¾	12	1½	8	49	10½	½	½	11½
10	20	2½	13½	17	16	1¼	8¾	53	12¾	½	½	14
12	22	2¾	15¾	19¼	20	1¼	9	57	15	½	½	16¼
16	27	3	19½	23¾	20	1½	10¼	65	18½	½	½	20
20	32	3½	24	28¾	24	1¾	11¾	73	23	½	¾	25

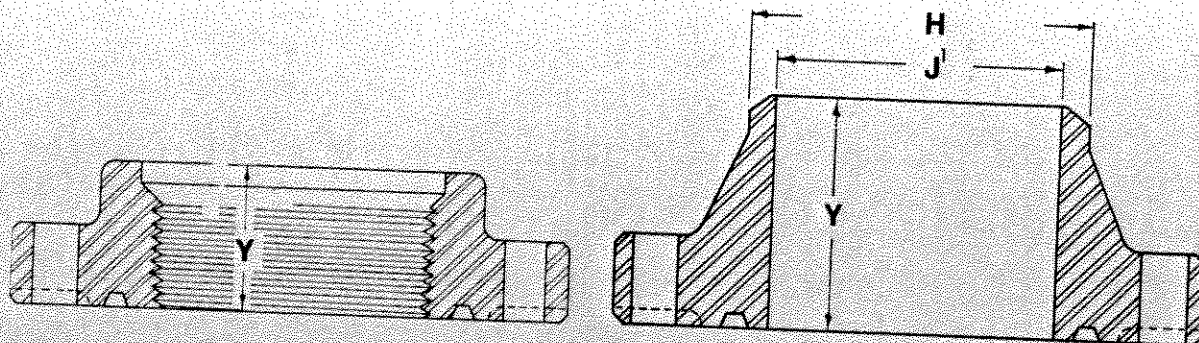
All dimensions are in inches. Prices on application

Flanges are made from 45,000 psi minimum yield strength material unless specified otherwise.

For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

* This is maximum working pressure according to API 6A-1973 for temperatures -20°F to 250°F.



**WELDING-NECK
LINE-PIPE FLANGE**

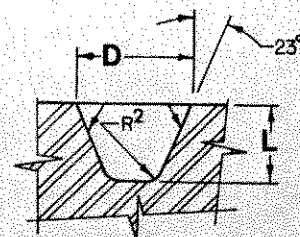
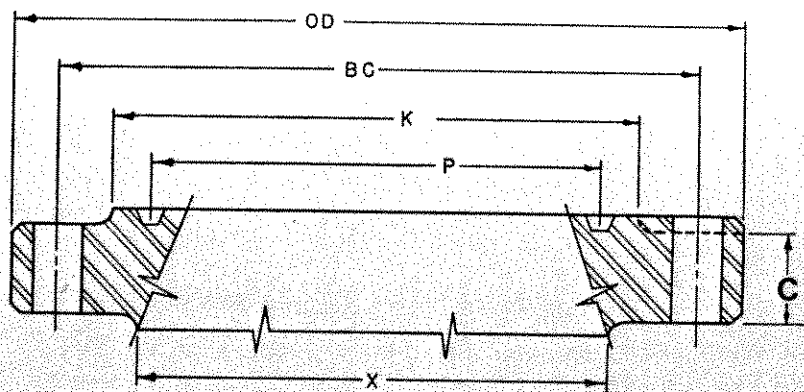
API SPEC. 6A

HUB AND BORE DIMENSIONS

Nominal Size of Flange	Hub Length Threaded Line- Pipe Flange Y	Hub Length Threaded Casting Flange Y	Hub Length Welding-Neck Line-Pipe Flange Y	Neck Diameter Welding-Neck Line-Pipe Flange H	Maximum Bore of Welding Neck Flange J ¹
2	1 $\frac{1}{4}$	.....	3 $\frac{1}{8}$	2.38	2.067
2 $\frac{1}{2}$	1 $\frac{1}{2}$	.....	3 $\frac{1}{4}$	2.88	2.469
3	2 $\frac{1}{8}$	.....	3 $\frac{3}{4}$	3.50	3.068
4	2 $\frac{7}{8}$	3 $\frac{1}{2}$	4 $\frac{1}{8}$	4.50	4.026
6	2 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	6.63	5.761
8	3 $\frac{1}{8}$	5	5 $\frac{1}{8}$	8.63	7.813
10	3 $\frac{1}{2}$	5 $\frac{1}{4}$	6 $\frac{1}{8}$	10.75	9.750
12	3 $\frac{3}{4}$	3 $\frac{1}{2}$	.....	.....	.....
16	4 $\frac{1}{2}$	4 $\frac{1}{2}$	.....	.....	.....
20	5 $\frac{3}{8}$	5 $\frac{3}{8}$	.....	.....	.....

- (1) Dimension to be specified by customer, but shall not exceed the value of J.
- (2) Ring-groove radius R shall be 1/32 in. for groove widths 11/32 and 15/32; 1/16 in. for width 17/32.

For welding neck flange bevel details see page 177.
 For gasket surface finishes see page 94.
 For dimensional tolerances see page 176.
 For ordering instructions see page 178.



GROOVE DETAIL

API SPEC. 6A TYPE 6B 3000* PSI

API TYPE 6B FLANGES FOR 3000*-PSI MAXIMUM WORKING PRESSURE

Basic Flange Dimensions				Bolting Dimensions				Ring-Joint Groove and Flange Facing Dimensions				
Nominal Size of Flange	Outside Diameter of Flange O	Basic Thickness of Flange C	Diameter of Hub X	Diameter of Bolt Circle BC	Number of Bolts	Diameter of Bolts	Length of Stud Bolts	Ring Number R or RX	Pitch Diameter of Type R Ring & Groove P	Width of Groove D	Depth of Groove L	Diameter of Raised Face K
2	8½	1½	4⅞	6½	8	⅞	6	24	3¾	⅜	⅝	4⅞
2½	9⅝	1⅝	4⅞	7½	8	1	6½	27	4¼	⅜	⅝	5⅝
3	9½	1½	5	7½	8	⅞	6	31	4⅞	⅜	⅝	6⅞
4	11½	1¾	6¼	9¼	8	1⅞	7	37	5⅞	⅜	⅝	7⅞
6	15	2⅞	9¼	12½	12	1⅞	8	45	8⅞	⅜	⅝	9½
8	18½	2½	11¾	15½	12	1⅞	9	49	10⅝	⅜	⅝	12⅞
10	21½	2¾	14½	18½	16	1⅞	9½	53	12¾	⅜	⅝	14¼
12	24	3⅞	16½	21	20	1⅞	10¼	57	15	⅜	⅝	16½
16	27¾	3½	20	24¼	20	1⅞	11¾	66	18½	⅜	⅝	20⅝
20	33¾	4¼	24½	29½	20	2	14½	74	23	⅜	½	25½

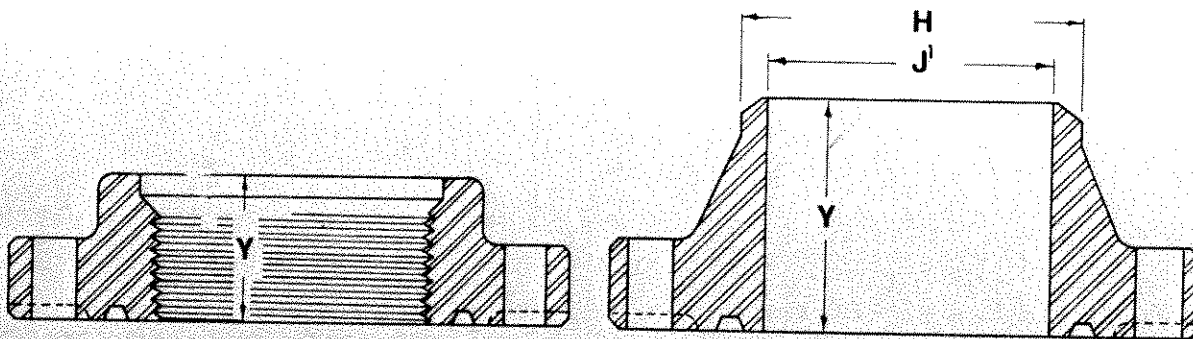
All dimensions are in inches. Prices on application.

Flanges are made from 45,000 psi minimum yield strength material unless specified otherwise.

For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

* This is maximum working pressure according to API 6A-1973 for temperatures -20°F to 250°F.



THREADED FLANGE

**WELDING-NECK
LINE-PIPE FLANGE**

API SPEC. 6A

HUB AND BORE DIMENSIONS

Nominal Size of Flange	Hub Length Threaded Line- Pipe Flange Y	Hub Length Threaded Casing Flange Y	Hub Length Tubing Flange Y	Hub Length Welding-Neck Line-Pipe Flange Y	Neck Diameter Welding-Neck Line-Pipe Flange H	Maximum Bore of Welding Neck Flange J'
2	2 1/8	2 1/8	2 1/8	4 1/8	2.38	1.939
2 1/2	2 1/8	2 1/8	2 1/8	4 1/8	2.88	2.323
3	2 1/8	2 1/8	2 1/8	4 1/8	3.50	2.900
4	3 1/8	3 1/2	3 1/2	4 1/8	4.50	3.826
6	3 1/8	4 1/2		5 1/8	6.63	5.761
8	4 1/8	5		6 1/8	8.63	7.439
10	4 1/8	5 1/4		7 1/8	10.75	9.314
12	4 1/8	4 1/8				
16	5 1/8	5 1/8				
20	6 3/4	6 3/4				

(1) Dimension to be specified by customer, but shall not exceed the value of J.

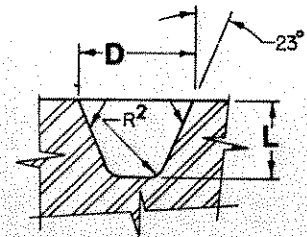
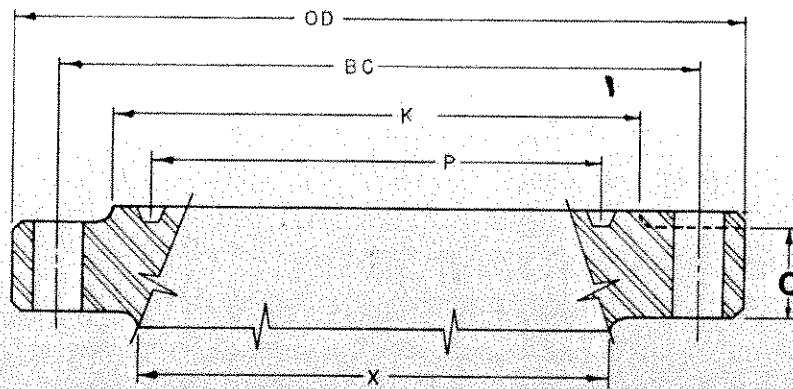
(2) Ring-groove radius R shall be 1/32 in. for groove widths 11/32 and 15/32; 1/16 in. for width 17/32.

For welding neck flange bevel details see page 177.

For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

For ordering instructions see page 178.



GROOVE DETAIL

API SPEC. 6A TYPE 6B 5000* PSI

API TYPE 6B FLANGES FOR 5000*-PSI MAXIMUM WORKING PRESSURE

Nominal Size of Flange	Basic Flange Dimensions				Bolting Dimensions				Ring-Joint Groove and Flange Facing Dimensions				
	Outside Diameter of Flange O	Total Thickness of Flange C	Basic Thickness of Flange X	Diameter of Hub BC	Diameter of Bolt Circle BC	Number of Bolts	Diameter of Bolts	Length of Stud Bolts	Ring Number R or RX	Pitch Diameter of Type R Ring & Groove P	Width of Groove D	Depth of Groove L	Diameter of Raised Face K
2	8½	1½	1½	4½	6½	8	¾	6	24	3¾	1½	1½	4¾
2½	9¾	1½	1½	4¾	7½	8	1	6½	27	4¼	1½	1½	5¾
3	10½	2¼	1¾	5¼	8	8	1½	7¼	35	5¾	1½	1½	6¾
4	12¼	2½	2½	6¾	9½	8	1¼	8	39	6¾	1½	1½	7¾
6	15½	3¾	3¼	9	12½	12	1¾	10¾	46	8¾	1½	¾	9¾
8	19	4½	3¾	11½	15½	12	1¾	12	50	10¾	1½	1½	12½
10	23	4½	4¼	14½	19	12	1¾	13¾	54	12¾	1½	1½	14¾

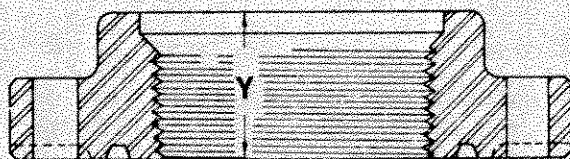
All dimensions are in inches. Prices on application.

Flanges are made from 45,000 psi minimum yield strength material unless specified otherwise.

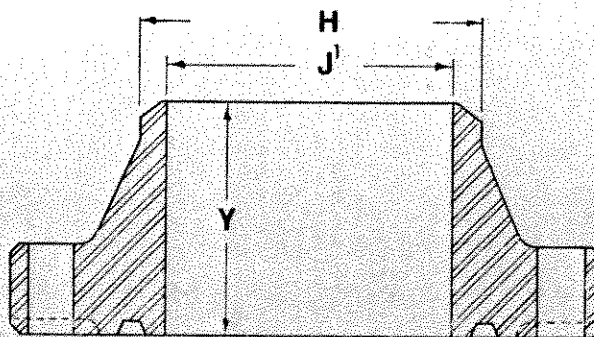
For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

* This is maximum working pressure according to API 6A-1973 for temperatures -20°F to 250°F.



THREADED FLANGE



WELDING-NECK
LINE-PIPE FLANGE

API SPEC. 6A

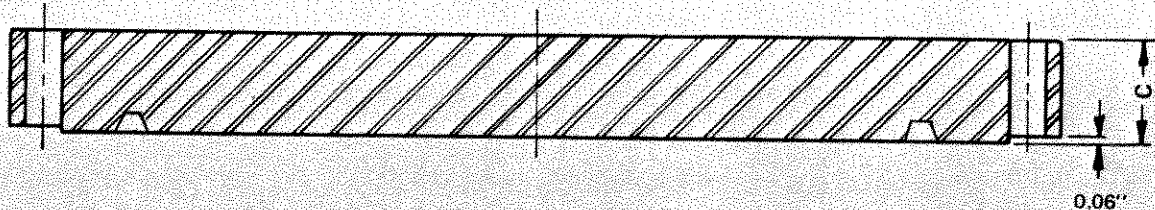
HUB AND BORE DIMENSIONS

Nominal Size of Flange	Hub Length Threaded Line- Pipe Flange Y	Hub Length Threaded Casing Flange Y	Hub Length Tubing Flange Y	Hub Length Welding-Neck Line-Pipe Flange Y	Neck Diameter Welding-Neck Line-Pipe Flange H	Maximum Bore of Welding Neck Flange J ¹
2	2 ¹ / ₈	.....	2 ¹ / ₈	4 ¹ / ₈	2.38	1.689
2 1/2	2 1/4	.....	2 1/4	4 1/4	2.88	2.125
3	3 ¹ / ₈	.....	3 ¹ / ₈	4 1/2	3.50	2.624
4	3 3/8	3 3/8	3 3/8	5 ¹ / ₈	4.50	3.438
6	5 ¹ / ₈	5 ¹ / ₈	.....	7 1/4	6.63	5.189
8	6 ¹ / ₈	6 ¹ / ₈	.....	8 1/2	8.63	6.813
10	6 1/4	6 1/4	.....	10 ¹ / ₈	10.75	8.500

- (1) Dimension to be specified by customer, but shall not exceed the value of J.
- (2) Ring-groove radius R shall be 1/32 in. for groove widths 11/32 and 15/32; 1/16 in. for width 17/32.

For welding neck flange bevel details see page 177.
 For gasket surface finishes see page 94.
 For dimensional tolerances see page 176.
 For ordering instructions see page 178.

BLIND¹



DESIGNED TO MATCH API SPEC. 6A TYPE 6B FLANGES

2000* PSI MAX. WORKING PRESSURE

NOMINAL SIZE	THICKNESS C	Ring # R or Rx
2	1.31	23
2½	1.75	26
3	1.56	31
4	1.81	37
6	2.19	45
8	2.50	49
10	2.81	53
12	3.06	57
16	3.75	65
20	4.44	73
3000* PSI MAX. WORKING PRESSURE		
2	1.81	24
2½	1.94	27
3	1.81	31
4	2.06	37
6	2.50	45
8	3.06	49
10	3.56	53
12	4.06	57
16	4.69	66
20	5.69	74
5000* PSI MAX. WORKING PRESSURE		
2	1.88	24
2½	2.06	27
3	2.19	35
4	2.50	39
6	3.62	46
8	4.06	50
10	4.81	54

(1) These flanges are specially designed using formulas taken from the ASME Boiler Construction Code. Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). When ordering blind flanges, the purchaser should specify the nominal size and class of the blind flange, and the type of mating flange.

* This is maximum working pressure according to API 6A-1973 for temperatures -20°F to 250°F. Facing and gasket dimensions are the same as given for the mating flanges. For ordering instructions see page 178.

Tolerances

API SPEC 6A - 1973

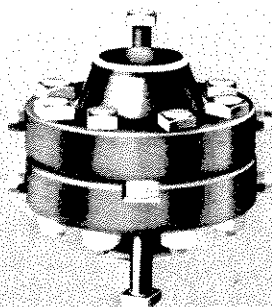
Weld Neck

BORE $\pm 1/32$

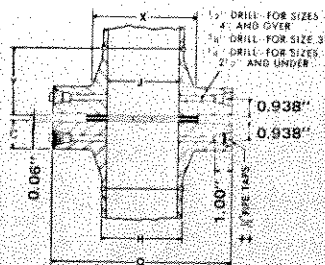
HUB LENGTH $\pm 1/16$

FOR OTHER TOLERANCES SEE PAGE 176.

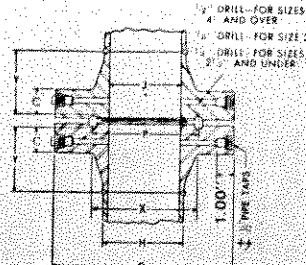
WELDING NECK



Raised Face⁴ – Part No. 159
Ring Joint¹ – Part No. 160

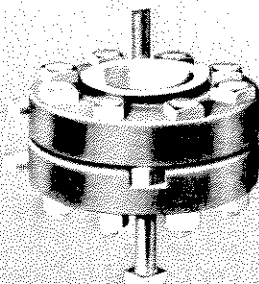


Raised Face



Ring Joint

SLIP-ON*



Raised Face⁴ – Part No. 153
Ring Joint¹ – Part No. 1533 RJ

ASTM A105[▲]

ANSI B16.3

ANSI B16.3

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICKNESS OF FLANGE C ²		DIAM. OF HUB AT BASE X	DIAM. OF RAISED FACE	DIAM. OF HUB AT BEVEL H	LENGTH THRU HUB Y ²				BORE		PITCH DIAM OF RIN & GROO P
		RAISED FACE	RING JOINT				WELDING NECK		SLIP-ON & THREADED		WELDING NECK ³ J	SLIP-ON J	
							RAISED FACE	RING JOINT	RAISED FACE	RING JOINT			
1	4.88	1.50	1.25	2.12	2.00	1.32	3.25	3.00	1.88	1.62	1.05	1.36	2.00
1-1/4	5.25	1.50	1.25	2.50	2.50	1.66	3.31	3.06	1.81	1.56	1.38	1.70	2.37
1-1/2	6.12	1.50	1.25	2.75	2.88	1.90	3.38	3.12	1.88	1.62	1.61	1.95	2.68
2	6.50	1.50	1.25	3.31	3.62	2.38	3.38	3.12	1.94	1.69	2.07	2.44	3.25
2-1/2	7.50	1.50	1.25	3.94	4.12	2.88	3.50	3.25	2.00	1.75	2.47	2.94	4.00
3	8.25	1.50	1.25	4.62	5.00	3.50	3.50	3.25	2.06	1.81	3.07	3.57	4.87
4	10.00	1.50	1.25	5.75	6.19	4.50	3.62	3.38	2.12	1.88	4.03	4.57	5.87
5	11.00	1.50	1.38	7.00	7.31	5.56	4.00	3.88	2.12	2.00	5.05	5.66	7.12
6	12.50	1.50	1.44	8.12	8.50	6.63	3.94	3.88	2.12	2.06	6.07	6.72	8.31
8	15.00	1.62	1.62	10.25	10.62	8.63	4.38	4.38	2.44	2.44	7.98	8.72	10.62
10	17.50	1.88	1.88	12.62	12.75	10.75	4.62	4.62	2.62	2.62	10.02	10.88	12.75
12	20.50	2.00	2.00	14.75	15.00	12.75	5.12	5.12	2.88	2.88	12.00	12.88	15.00
14	23.00	2.12	2.12	16.75	16.25	14.00	5.62	5.62	3.00	3.00	13.25	14.14	16.50
16	25.50	2.25	2.25	19.00	18.50	16.00	5.75	5.75	3.25	3.25	15.25	16.16	18.50
18	28.00	2.38	2.38	21.00	21.00	18.00	6.25	6.25	3.50	3.50	17.25	18.18	21.00
20	30.50	2.50	2.50	23.12	23.00	20.00	6.38	6.38	3.75	3.75	19.25	20.20	23.00
24	36.00	2.75	2.75	27.62	27.25	24.00	6.62	6.62	4.19	4.19	23.25	24.25	27.25

THE FOLLOWING FLANGES ARE NOT INCLUDED IN ANSI B16.36. THE DIMENSIONS ARE THE SAME AS MSS :

22	33.00	2.62	2.62	25.25	25.25	22.00	6.50	6.50			21.25		25.00
26	38.25	3.12	3.12	28.38	29.50	26.25	7.25	7.25			25.25		29.50
30	43.00	3.62	3.62	32.56	33.75	30.25	8.25	8.25			29.25		33.75
34	47.50	4.00	4.00	36.88	38.00	34.31	9.12	9.12			33.25		38.00
36	50.00	4.12	4.12	39.00	40.25	36.31	9.50	9.50			35.25		40.25
42	50.75	4.69		43.25	44.75	42.31	7.88				41.25		

All dimensions are in inches. Prices on application.

Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

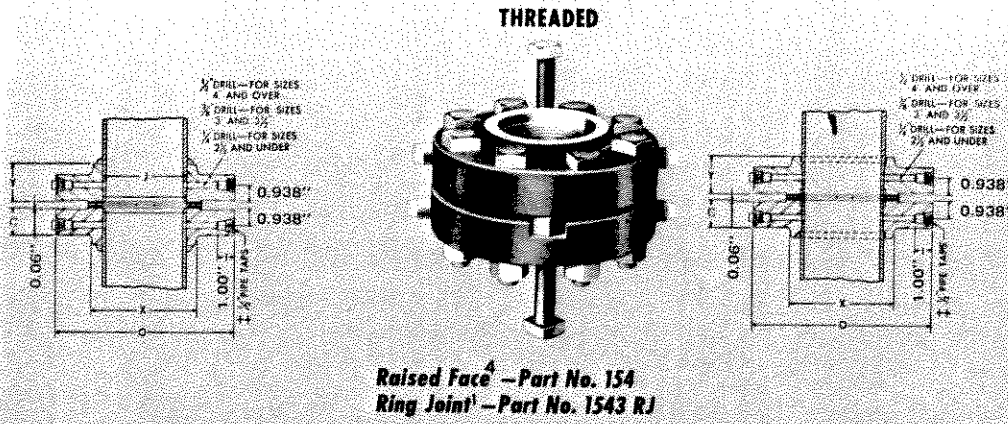
Orifice flanges are normally furnished in pairs with carbon steel Jack Screws and carbon steel pipe plugs in the tapped openings.

Complete unions can also be furnished at additional cost; Unless specified otherwise, unions 24" and smaller are furnished with carbon steel

regular square headed bolts with semi-finished American Standard heavy series hex nuts and two compressed asbestos gaskets; 26" and larger are furnished with alloy bolt studs per ASTM A193 Grade B7 with American Standard heavy series hex nuts ASTM A194 Class 2H and two compressed asbestos gaskets. Orifice plates are not furnished.

For Threaded Orifice Flanges, the A.G.A. requires pipe to be threaded so that the end is not more than 3/16" from face of flange.

* Class 300 Orifice Flanges can also be furnished in Socket Welding Type.



CLASS 300 ORIFICE FLANGES

**RAISED FACE
RING JOINT**

Orifice Flanges in the shaded areas are not included in ANSI B16.36.

DEPTH OF JACK SCREW SLOT		JACK SCREW SIZE ¹		DRILLING TEMPLATE						APPROX. WEIGHT PER UNION LBS.				NOMI- NAL PIPE SIZE
FACE	RING JOINT	RAISED FACE	RING JOINT	DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF STUD BOLTS	DIAM. OF BOLT HOLES	LENGTH OF STUD BOLTS ⁴		WELDING NECK		SLIP-ON & THREADED		
								RAISED FACE	RING JOINT	RAISED FACE	RING JOINT	RAISED FACE	RING JOINT	
0.38	0.25	JACK SCREW SIZES FOR 1" THRU 24" ARE THOSE AS SHOWN FOR LENGTH AND DIAMETER OF BOLTS		3.50	4	5/8	0.69	4.00	4.75	18	15	15	17	1
0.38	0.25			3.88	4	5/8	0.69	4.00	4.75	20	17	17	20	1-1/4
0.50	0.25			4.50	4	3/4	0.81	4.25	5.00	25	25	19	28	1-1/2
0.38	0.25			5.00	8	5/8	0.69	4.00	4.75	27	30	23	31	2
0.50	0.25			5.88	8	3/4	0.81	4.25	5.00	35	46	31	42	2-1/2
0.50	0.25			6.62	8	3/4	0.81	4.25	5.00	43	56	39	48	3
0.50	0.25			7.88	8	3/4	0.81	4.25	5.00	66	65	60	66	4
0.50	0.25			9.25	8	3/4	0.88	4.25	5.50	78	101	70	80	5
0.50	0.25			10.62	12	3/4	0.88	4.25	5.50	106	107	100	110	6
0.62	0.38			13.00	12	7/8	1.00	4.50	6.00	152	169	134	160	8
0.75	0.50			15.25	16	1	1.12	5.50	6.50	216	250	196	230	10
0.88	0.62			17.75	16	1-1/8	1.25	5.50	7.00	327	365	281	325	12
0.88	0.62			20.25	20	1-1/8	1.25	6.00	7.00	448	490	380	450	14
1.00	0.75			22.50	20	1-1/4	1.38	6.50	8.00	596	640	530	535	16
1.00	0.75			24.75	24	1-1/4	1.38	6.50	8.00	741	785	691	690	18
1.00	0.75			27.00	24	1-1/4	1.38	7.00	8.00	887	960	781	840	20
1.25	1.00			32.00	24	1-1/2	1.62	7.50	9.00	1311	1410	1201	1300	24

JACK SCREW SIZES FOR
1" THRU 24" ARE THOSE AS SHOWN
FOR LENGTH AND DIAMETER OF BOLTS

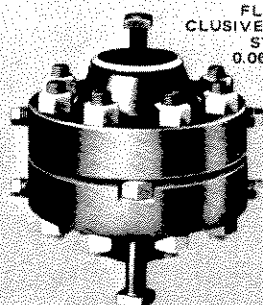
FLANGES TO PROVIDE JACK SCREWS AND METERING TAP HOLES.

0.25	1.25	1 1/2x7.50	1 1/2x9.00	29.25	24	1-1/2	1.62	7.50	9.00	1040	1155			22
0.88	0.75	1x4.78	1x6.25	34.50	28	1-5/8	1.75	10.50	11.50	1505	1670			26†
0.88	0.75	1x5.25	1x6.75	39.25	28	1-3/4	1.88	11.75	12.75	2065	2270			30†
0.88	0.75	1x5.50	1x7.25	43.50	28	1-7/8	2.00	12.75	14.00	2655	2915			34†
0.88	0.75	1x5.75	1x7.25	46.00	32	2	2.12	13.25	14.50	3055	3340			36†
0.88		1x6.25		47.50	32	1-5/8	1.75	13.75		4170				42†

- (1) Flanges are furnished with octagonal groove. For ring joint details see page 115.
- (2) The 0.06" raised face is included in flange thickness "C" and length thru hub "Y".
- (3) Bore corresponds to I.D. of standard weight pipe unless otherwise specified.
- (4) In conformance with ANSI B16.5, stud lengths do not include point height.

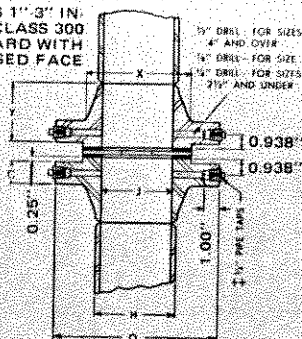
‡ 1/2" pipe taps regularly furnished. 3/4" pipe taps can be furnished as alternate.
For bevel detail see page 177.
For gasket surface finishes see page 94.
For dimensional tolerances see page 176.
For ordering instructions see page 178.

WELDING NECK

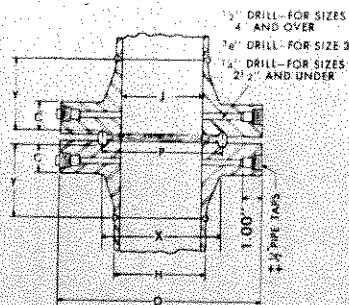


Raised Face — Part No. 165
Ring Joint — Part No. 161

FLANGES 1"–3" INCLUSIVE ARE CLASS 300 STANDARD WITH 0.06" RAISED FACE

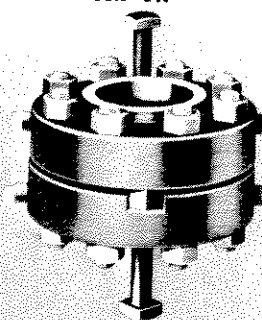


Raised Face



Ring Joint

SLIP-ON



Raised Face — Part No. 1534
Ring Joint — Part No. 1534 RJ

ASTM A105[▲]

CLASS 400 ORIFICE FLANGES ARE NOT INCLUDED IN ANSI

CLASS 400 ORIFICE FLANGES ARE NOT INCLUDED IN ANSI B16.36. THE DIMENSIONS ARE THE SAME AS ANSI B16.36.													
NOMINAL PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICKNESS OF FLANGE C ²		DIAM. OF HUB AT BASE X	DIAM. OF RAISED FACE	DIAM. OF HUB AT BEVEL H	LENGTH THRU HUB Y ²				BORE		PI DI OF & GF
		RAISED FACE	RING JOINT				WELDING NECK		SLIP-ON & THREADED		WELDING NECK ³ J	SLIP-ON J	
							RAISED FACE	RING JOINT	RAISED FACE	RING JOINT			
1	4.88	1.50	1.25	2.12	2.00	1.32	3.25	3.00	1.88	1.62	1.05	1.36	2.0
1-1/4	5.25	1.50	1.25	2.50	2.50	1.66	3.31	3.06	1.81	1.56	1.38	1.70	2.3
1-1/2	6.12	1.50	1.25	2.75	2.88	1.90	3.38	3.12	1.88	1.62	1.61	1.95	2.6
2	6.50	1.50	1.25	3.31	3.62	2.38	3.38	3.12	1.94	1.69	2.07	2.44	3.2
2-1/2	7.50	1.50	1.25	3.94	4.12	2.88	3.50	3.25	2.00	1.75	2.47	2.94	4.0
3	8.25	1.50	1.25	4.62	5.00	3.50	3.50	3.25	2.06	1.81	3.07	3.57	4.8
4	10.00	1.38	1.38	5.75	6.19	4.50	3.50	3.50	2.00	2.00		4.57	5.8
5	11.00	1.50	1.50	7.00	7.31	5.56	4.00	4.00	2.12	2.12		5.66	7.1
6	12.50	1.62	1.62	8.12	8.50	6.63	4.06	4.06	2.25	2.25		6.72	8.3
8	15.00	1.88	1.88	10.25	10.62	8.63	4.62	4.62	2.69	2.69		8.72	10.6
10	17.50	2.12	2.12	12.62	12.75	10.75	4.88	4.88	2.88	2.88		10.88	12.7
12	20.50	2.25	2.25	14.75	15.00	12.75	5.38	5.38	3.12	3.12		12.88	15.0
14	23.00	2.38	2.38	16.75	16.25	14.00	5.88	5.88					16.5
16	25.50	2.50	2.50	19.00	18.50	16.00	6.00	6.00					18.5
18	28.00	2.62	2.62	21.00	21.00	18.00	6.50	6.50					21.0
20	30.50	2.75	2.75	23.12	23.00	20.00	6.62	6.62					23.0
24	36.00	3.00	3.00	27.62	27.25	24.00	6.88	6.88					27.2

To be Specified by Purchaser

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). For stainless steels, aluminum and other alloys see page 180.

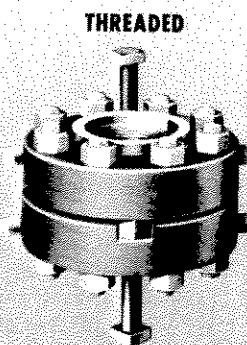
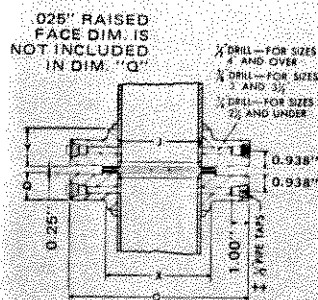
Orifice flanges are normally furnished in pairs with carbon steel Jack screws and carbon steel pipe plugs in the tapped openings.

Complete unions can also be furnished at additional cost; raised face unions are furnished with Standard heavy gaskets per ASTM A104

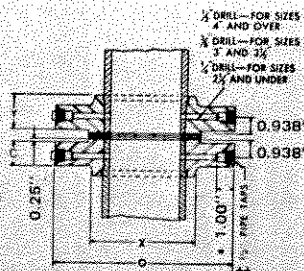
Class 2H and two compressed asbestos gaskets. Orifice plates are not furnished.

Ring Joint faced unions are similarly furnished, except that no gaskets or rings are furnished. A combination ring joint gasket and orifice plate is used with this type joint (Tube Turns does not supply). For Threaded Orifice Flanges, the A.G.A. requires pipe to be threaded so that the end is not more than 3/16" from face of flange.

(1) Flanges are furnished with octagonal groove. For ring joint details see



Raised Face —Part No. 155
Ring Joint —Part No. 1544 RJ



CLASS 400 ORIFICE FLANGES

RAISED FACE
RING JOINT

THEY ARE PRESENTED HERE FOR COMPLETENESS.

DEPTH OF JACK SCREW SLOT		JACK SCREW SIZE ⁴		DRILLING TEMPLATE						APPROX. WEIGHT PER UNION LBS.				NOMI- NAL PIPE SIZE
RAISED FACE	RING JOINT	RAISED FACE	RING JOINT	DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF STUD BOLTS	DIAM. OF BOLT HOLES	LENGTH OF STUD BOLTS ³		WELDING NECK		SLIP-ON & THREADED		
								RAISED FACE	RING JOINT	RAISED FACE	RING JOINT	RAISED FACE	RING JOINT	

MODIFIED TO PROVIDE JACK SCREWS AND METERING TAP HOLES.

0.38	0.25	5/8x4.00	5/8x4.75	3.50	4	5/8	0.69	4.00	4.75	18	15	15	17	1
0.38	0.25	5/8x4.00	5/8x4.75	3.88	4	5/8	0.69	4.00	4.75	20	17	17	20	1-1/4
0.50	0.25	3/4x4.25	3/4x5.00	4.50	4	3/4	0.81	4.24	5.00	25	25	19	28	1-1/2
0.38	0.25	5/8x4.00	5/8x4.75	5.00	8	5/8	0.69	4.00	4.75	27	30	23	31	2
0.50	0.25	3/4x4.25	3/4x5.00	5.88	8	3/4	0.81	4.25	5.00	35	46	31	42	2-1/2
0.50	0.25	3/4x4.25	3/4x5.00	6.62	8	3/4	0.81	4.25	5.00	43	56	39	48	3
0.25	0.62	3/4x3.00	3/4x4.00	7.88	8	7/8	1.00	5.50	6.00	82	90	64	74	4
0.25	0.62	3/4x3.00	3/4x4.00	9.25	8	7/8	1.00	5.75	6.25	101	105	77	85	5
0.50	0.88	1x3.50	1x4.00	10.62	12	7/8	1.00	6.25	6.50	136	145	110	120	6
0.50	0.88	1x3.50	1x4.50	13.00	12	1	1.12	6.75	7.25	213	220	169	180	8
0.50	0.88	1x4.00	1x4.50	15.25	16	1-1/8	1.25	7.50	8.00	309	325	239	255	10
0.50	0.88	1x4.00	1x5.00	17.75	16	1-1/4	1.38	8.00	8.50	429	450	333	355	12
0.50	0.88	1x4.25	1x5.00	20.25	20	1-1/4	1.38	8.25	9.00	554	590			14
0.50	0.88	1x4.25	1x5.00	22.50	20	1-3/8	1.50	8.75	9.25	705	745			16
0.50	0.88	1x4.50	1x5.00	24.75	24	1-3/8	1.50	9.25	9.50	863	910			18
0.50	0.88	1x4.75	1x5.50	27.00	24	1-1/2	1.62	9.75	10.25	1066	1160			20
0.50	0.88	1x5.00	1x6.00	32.00	24	1-3/4	1.88	11.00	11.25	1555	1665			24

MODIFIED TO PROVIDE JACK SCREWS AND METERING TAP HOLES.

0.50	0.88	1x4.75	1x5.75	29.25	24	1-5/8	1.75	10.50	10.75	1160	1250			22
0.50	0.88	1x5.50	1x6.50	34.50	28	1-3/4	1.88	12.00	12.50	1705	1845			26
0.50	0.88	1x6.00	1x7.00	39.25	28	2	2.12	13.50	14.00	2385	2550			30
0.50	0.88	1x6.25	1x7.50	43.50	28	2	2.12	14.25	15.00	2960	3170			34
0.50	0.88	1x6.50	1x7.75	46.00	32	2	2.12	14.50	15.25	3350	3585			36
0.50		1x7.00		48.25	32	1-7/8	2.00	15.75		4865				42

(2) The 0.06" raised face for sizes 3" and smaller is included in flange thickness "C" and length through hub "Y". The 0.25" raised face for sizes 4" and larger is not included in "C" and "Y" dimensions.

(3) In conformance with ANSI B16.5, stud lengths do not include point height.

‡ 1/2" pipe taps regularly furnished. 3/4" pipe taps can be furnished as alternate.

tance from the center line of the tap hole to the flange face is 0.750". When the depth of groove is 0.438" or greater, changes in drill size or method of drilling are necessary.

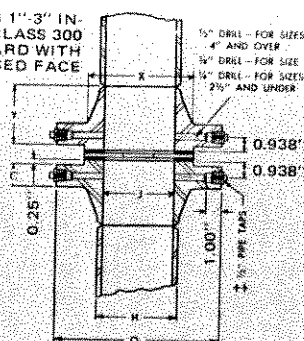
For bevel detail see page 177.

For gasket surface finished see page 94.

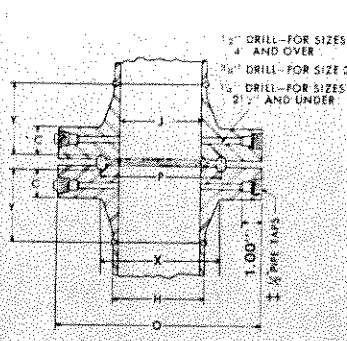
For dimensional tolerances see page 176.

For ordering instructions see page 178.

FLANGES 1"-3" IN-
CLUSIVE ARE CLASS 300
STANDARD WITH
0.06" RAISED FACE



Raised Face



Ring Joint

Raised Face —Part No. 1536
Ring Joint¹ —Part No. 1536 RJ

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICKNESS OF FLANGE C ²		DIAM. OF HUB AT BASE X	DIAM. OF RAISED FACE	DIAM. OF HUB AT BEVEL H	LENGTH THRU HUB Y ²				BORE		PIT DIA. OF R & GR
		RAISED FACE	RING JOINT				WELDING NECK		SLIP-ON & THREADED		WELDING NECK ³ J	SLIP-ON J	
							RAISED FACE	RING JOINT	RAISED FACE	RING JOINT			
1	4.88	1.50	1.25	2.12	2.00	1.32	3.25	3.00	1.88	1.62	1.05	1.36	2.0
1-1/4	5.25	1.50	1.25	2.50	2.50	1.66	3.31	3.06	1.81	1.56	1.38	1.70	2.3
1-1/2	6.12	1.50	1.25	2.75	2.88	1.90	3.38	3.12	1.88	1.62	1.61	1.95	2.6
2	6.50	1.50	1.25	3.31	3.62	2.38	3.38	3.12	1.94	1.69	2.07	2.44	3.2
2-1/2	7.50	1.50	1.25	3.94	4.12	2.88	3.50	3.25	2.00	1.75	2.47	2.94	4.0
3	8.25	1.50	1.25	4.62	5.00	3.50	3.50	3.25	2.06	1.81	3.07	3.57	4.8
4	10.75	1.50	1.50	6.00	6.19	4.50	4.00	4.00	2.12	2.12		4.57	5.8
5	13.00	1.75	1.75	7.44	7.31	5.56	4.50	4.50	2.38	2.38		5.66	7.1
6	14.00	1.88	1.88	8.75	8.50	6.63	4.62	4.62	2.62	2.62		6.72	8.3
8	16.50	2.19	2.19	10.75	10.62	8.63	5.25	5.25	3.00	3.00		8.72	10.6
10	20.00	2.50	2.50	13.50	12.75	10.75	6.00	6.00	3.38	3.38		10.88	12.7
12	22.00	2.62	2.62	15.75	15.00	12.75	6.12	6.12	3.38	3.62		12.88	15.0
14	23.75	2.75	2.75	17.00	16.25	14.00	6.50	6.50					16.5
16	27.00	3.00	3.00	19.50	18.50	16.00	7.00	7.00					18.5
18	29.25	3.25	3.25	21.50	21.00	18.00	7.25	7.25					21.0
20	32.00	3.50	3.50	24.00	23.00	20.00	7.50	7.50					23.0
24	37.00	4.00	4.00	28.25	27.25	24.00	8.00	8.00					27.2

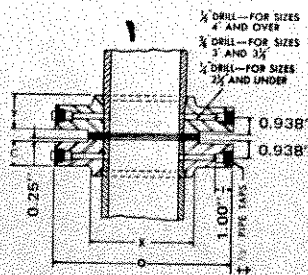
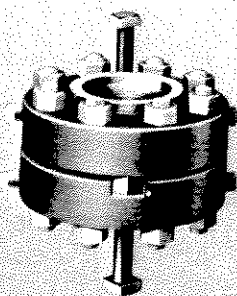
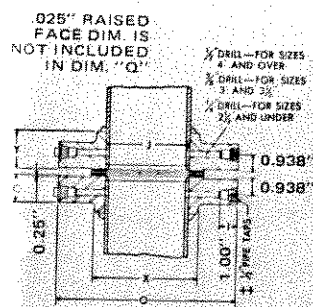
To be Specified by Purchaser

THE FOLLOWING FLANGES ARE NOT INCLUDED IN ANSI B16.36. THE DIMENSIONS ARE THE SAME AS MSS SP

22	34.25	3.75	3.75	26.25	25.25	22.00	7.75	7.75	25.00
26	40.00	4.25	4.25	29.44	29.50	26.44	8.75	8.75	29.50
30	44.50	4.50	4.50	33.94	33.75	30.50	9.75	9.75	33.75
34	49.00	4.75	4.75	38.31	38.00	34.56	10.62	10.62	38.00
36	51.75	4.88	4.88	40.62	40.25	36.56	11.12	11.12	40.25
42	55.25	6.62		44.38	46.00	42.63	11.00		

(1) Flanges are furnished with octagonal groove. For ring joint details see

THREADED



Raised Face⁴ - Part No. 156
Ring Joint¹ - Part No. 1546 RJ

CLASS 600 ORIFICE FLANGES

RAISED FACE
RING JOINT

Orifice flanges in the shaded areas are not included in ANSI B16.36.

ASTM A105⁴

PTH OF JACK CREW SLOT		JACK SCREW SIZE ¹		DRILLING TEMPLATE						APPROX. WEIGHT PER UNION LBS.				NOMI- NAL PIPE SIZE
D	RING JOINT	RAISED FACE	RING JOINT	DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF STUD BOLTS	DIAM. OF BOLT HOLES	LENGTH OF STUD BOLTS ³		WELDING NECK		SLIP-ON & THREADED		
								RAISED FACE	RING JOINT	RAISED FACE	RING JOINT	RAISED FACE	RING JOINT	
38	0.25	5/8x4.00	5/8x4.75	3.50	4	5/8	0.69	4.00	4.75	18	15	15	17	1
38	0.25	5/8x4.00	5/8x4.75	3.88	4	5/8	0.69	4.00	4.75	20	17	17	20	1-1/4
50	0.25	3/4x4.25	3/4x5.00	4.50	4	3/4	0.81	4.25	5.00	25	25	19	28	1-1/2
38	0.25	5/8x4.00	5/8x4.75	5.00	8	5/8	0.69	4.00	4.75	27	30	23	31	2
50	0.25	3/4x4.25	3/4x5.00	5.88	8	3/4	0.81	4.25	5.00	35	46	31	42	2-1/2
50	0.25	3/4x4.25	3/4x5.00	6.62	8	3/4	0.81	4.25	5.00	43	56	39	48	3
25	0.62	3/4x3.00	3/4x4.00	8.50	8	7/8	1.00	6.00	6.50	103	99	89	98	4
25	0.62	3/4x3.50	3/4x4.50	10.50	8	1	1.12	5.50	7.00	157	158	147	160	5
50	0.88	1x3.50	1x4.50	11.50	12	1	1.12	7.00	7.50	195	197	193	205	6
50	0.88	1x4.00	1x4.75	13.75	12	1-1/8	1.25	7.75	8.25	278	284	274	295	8
50	0.88	1x4.00	1x5.00	17.00	16	1-1/4	1.38	8.75	9.25	454	472	430	445	10
50	0.88	1x4.50	1x5.00	19.25	20	1-1/4	1.38	9.00	9.50	553	571	531	530	12
50	0.88	1x5.00	1x5.50	20.75	20	1-3/8	1.50	9.50	10.00	815	830			14
50	0.88	1x5.00	1x5.50	23.75	20	1-1/2	1.62	10.25	10.75	1113	1135			16
50	0.88	1x5.00	1x5.75	25.75	20	1-5/8	1.75	11.00	11.50	1306	1330			18
50	0.88	1x6.00	1x6.25	28.50	24	1-5/8	1.75	11.75	12.50	1622	1660			20
50	0.88	1x6.00	1x7.00	33.00	24	1-7/8	2.00	13.25	13.50	2320	2375			24

MODIFIED TO PROVIDE JACK SCREWS AND METERING TAP HOLES.

50	0.88	1x6.00	1x6.50	30.62	24	1-3/4	1.88	12.50	13.00	1545	1590			22
50	0.88	1x7.00	1x7.50	36.00	28	1-7/8	2.00	13.75	14.25	2365	2445			26†
50	0.88	1x7.00	1x7.50	40.25	28	2	2.12	14.50	15.00	2995	3085			30†
50	0.88	1x7.00	1x8.00	44.50	28	2-1/4	2.38	15.50	16.25	3760	3880			34†
50	0.88	1x7.00	1x8.00	47.00	28	2-1/2	2.62	16.25	17.00	4390	4525			36†
50		1x8.00		50.50	28	2-1/2	2.62	19.75		6090				42†

page 115.

- (2) The 0.06" raised face for sizes 3" and smaller is included in flange thickness "C" and length through hub "Y". The 0.25" raised face for sizes 4" and larger is not included in "C" and "Y" dimensions.

- (3) In conformance with ANSI B16.5, stud lengths do not include point height.

‡ 1/2" pipe taps regularly furnished. 3/4" pipe taps can be furnished as alternate.

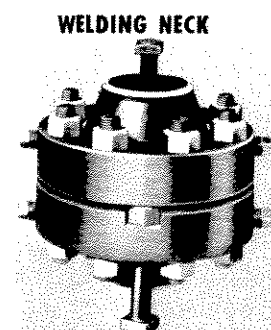
On ring joint flanges having a groove depth 0.375" and less, the distance from the center line of the tap hole to the flange face is 0.750". When the depth of groove is 0.438" or greater, changes in drill size or method of drilling are necessary.

For bevel detail see page 177.

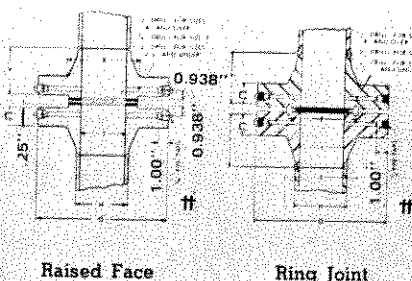
For gasket surface finished see page 94.

For dimensional tolerances see page 176.

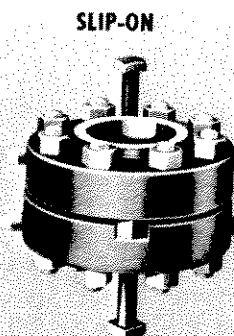
For ordering instructions see page 178.



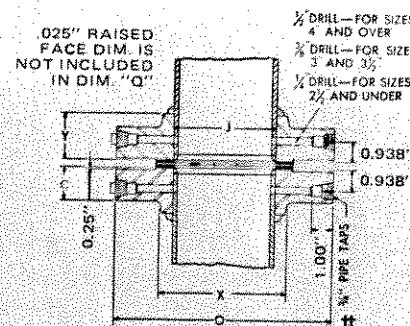
CLASS 900
Raised Face —Part No. 167
Ring Joint¹ —Part No. 163



CLASS 1500
Raised Face —Part No. 168
Ring Joint¹ —Part No. 164



CLASS 900
Raised Face —Part No. 1539
Ring Joint¹ —Part No. 1539 RJ



CLASS 1500
Raised Face —Part No. 1531
Ring Joint¹ —Part No. 1531 RJ

ANSI B16.36

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	THICKNESS OF FLANGE C ²		DIAM. OF HUB AT BASE X	DIAM. OF RAISED FACE	DIAM. OF HUB AT BEVEL H	LENGTH THRU HUB Y ²				BORE		PITC DIAM OF RII & GROU P
		RAISED FACE	RING JOINT				WELDING NECK		SLIP-ON & THREADED		WELDING NECK ³ J	SLIP-ON J	
							RAISED FACE	RING JOINT	RAISED FACE	RING JOINT			
CLASS 900													
3	9.50	1.50	1.50	5.00	5.00	3.50	4.00	4.00	2.12	2.12	TO BE SPECIFIED BY PURCHASER	3.57	4.8
4	11.50	1.75	1.75	6.25	6.19	4.50	4.50	4.50	2.75	2.75		4.57	5.8
5	13.75	2.00	2.00	7.50	7.31	5.56	5.00	5.00	3.12	3.12		5.66	7.1
6	15.00	2.19	2.19	9.25	8.50	6.63	5.50	5.50	3.38	3.38		6.72	8.3
8	18.50	2.50	2.50	11.75	10.62	8.63	6.38	6.38	4.00	4.00		8.72	10.6
10	21.50	2.75	2.75	14.50	12.75	10.75	7.25	7.25	4.25	4.25		10.88	12.7
12	24.00	3.12	3.12	16.50	15.00	12.75	7.88	7.88	4.62	4.62		12.88	15.00
14	25.25	3.38		17.75	16.25	14.00	8.38						
16	17.75	3.50		20.00	18.50	16.00	8.50						
18	31.00	4.00		22.25	21.00	18.00	9.00						
20	33.75	4.25		24.50	23.00	20.00	9.75						
24	41.00	5.50		29.50	27.25	24.00	11.50						
CLASS 1500													
1	5.88	1.50	1.50	2.06	2.00	1.32	3.25	3.25	1.88	1.75	TO BE SPECIFIED BY PURCHASER	1.36	2.00
1-1/4	6.25	1.38	1.38	2.50	2.50	1.66	2.88	2.88	1.88	1.75		1.70	2.3
1-1/2	7.00	1.50	1.50	2.75	2.88	1.90	3.50	3.50	1.88	1.75		1.95	2.6
2	8.50	1.50	1.50	4.12	3.62	2.38	4.00	4.00	2.25	2.25		2.44	3.7
2-1/2	9.62	1.62	1.62	4.88	4.12	2.88	4.12	4.12	2.50	2.50		2.94	4.2
3	10.50	1.88	1.88	5.25	5.00	3.50	4.62	4.62	2.88	2.88		3.57	5.3
4	12.25	2.12	2.12	6.38	6.19	4.50	4.88	4.88	3.56	3.56		4.57	6.3
5	14.75	2.88	2.88	7.75	7.31	5.56	6.12	6.12	4.12	4.12		5.66	7.6
6	15.50	3.25	3.25	9.00	8.50	6.63	6.75	6.75	4.69	4.69		6.72	8.3
8	19.00	3.62	3.62	11.50	10.62	8.63	8.38	8.38	5.62	5.62	8.72	10.6	
10	23.00	4.25	4.25	14.50	12.75	10.75	10.00	10.00	6.25	6.25	10.88	12.7	
12	26.50	4.88	4.88	17.75	15.00	12.75	11.12	11.12	7.12	7.12	12.88	15.0	
14	29.50	5.25		19.50	16.25	14.00	11.75						
16	32.50	5.75		21.75	18.50	16.00	12.25						
18	36.00	6.38		23.50	21.00	18.00	12.88						
20	38.75	7.00		25.25	23.00	20.00	14.00						
24	46.00	8.00		30.00	27.25	24.00	16.00						

All dimensions are in inches. Prices on application.

* Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA105). Also available in stainless steels and other materials see page 180.

Orifice flanges are normally furnished in pairs with carbon steel Jack Screws and carbon steel pipe plugs in the tapped openings.

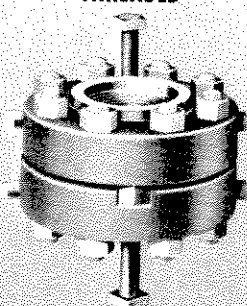
Complete unions can also be furnished at additional cost; raised face

Class 2H and two compressed asbestos gaskets. Orifice plates are furnished.

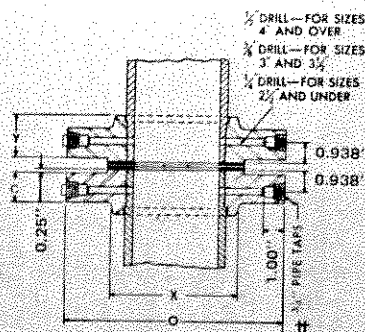
Ring Joint faced unions are similarly furnished, except that no gasket or rings are furnished. A combination ring joint gasket and orifice plate is used with this type joint (Tube Turns does not supply).

For Threaded Orifice Flanges, the A.G.A. requires pipe to be threaded so that the end is not more than 3/16" from face of flange.

THREADED



CLASS 900
Raised Face --Part No. 157
Ring Joint¹ --Part No. 1549 RJ



CLASS 1500
Raised Face --Part No. 158
Ring Joint¹ --Part No. 1541 RJ

CLASS 900 & CLASS 1500^{*}

ORIFICE FLANGES

RAISED FACE
RING JOINT

ORIFICE FLANGES IN THE SHADED AREAS ARE NOT INCLUDED IN ANSI B16.36.

ASTM A105^Δ

ASTM A105

DEPTH OF JACK SCREW SLOT		JACK SCREW SIZE ¹		DRILLING TEMPLATE						APPROX. WEIGHT PER UNION LBS.				NOMI- NAL PIPE SIZE
USED FACE	RING JOINT	RAISED FACE	RING JOINT	DIAM. OF BOLT CIRCLE	NUMBER OF BOLTS	DIAM. OF STUD BOLTS	DIAM. OF BOLT HOLES	LENGTH OF STUD BOLTS ³		WELDING NECK		SLIP-ON & THREADED		
								RAISED FACE	RING JOINT	RAISED FACE	RING JOINT	RAISED FACE	RING JOINT	
CLASS 900														
0.38	0.62	3/4x3.50	3/4x4.00	7.50	8	7/8	1.00	6.00	6.50	79	85	77	74	3
0.38	0.62	3/4x3.50	3/4x4.50	9.25	8	1-1/8	1.25	7.00	7.50	129	140	133	145	4
0.38	0.62	3/4x3.50	3/4x4.50	11.00	8	1-1/4	1.38	7.50	8.00	207	225	201	215	5
0.62	0.88	1x4.50	1x4.75	12.50	12	1-1/8	1.25	7.75	8.25	263	280	259	285	6
0.62	0.88	1x4.50	1x5.00	15.50	12	1-3/8	1.50	9.00	9.50	445	475	415	435	8
0.62	0.88	1x4.50	1x5.25	18.50	16	1-3/8	1.50	9.50	10.00	634	675	588	620	10
0.62	0.88	1x4.50	1x5.50	21.00	20	1-3/8	1.50	10.25	10.75	872	930	780	820	12
				22.00	20	1-1/2	1.62	11.00						14
				24.25	20	1-5/8	1.75	11.50						16
				27.00	20	1-7/8	2.00	13.00						18
				29.50	20	2	2.12	14.00						20
				35.50	20	2-1/2	2.62	17.50						24
CLASS 1500														
0.25	0.50	5/8x3.00	5/8x3.50	4.00	4	7/8	1.00	6.00	6.25	26	27	26	26	1
0.25	0.50	5/8x3.00	5/8x3.50	4.38	4	7/8	1.00	5.50	5.75	30	30	30	29	1-1/4
0.25	0.50	5/8x3.00	5/8x3.50	4.88	4	1	1.12	6.25	6.50	45	41	45	38	1-1/2
0.25	0.50	5/8x3.00	5/8x4.00	6.50	8	7/8	1.00	6.00	6.50	65	71	65	71	2
0.25	0.50	5/8x3.00	5/8x4.00	7.50	8	1	1.12	6.50	7.00	98	100	98	100	2-1/2
0.38	0.62	5/8x3.50	3/4x4.50	8.00	8	1-1/8	1.25	7.25	7.75	123	131	123	135	3
0.38	0.62	3/4x3.50	3/4x4.50	9.50	8	1-1/4	1.38	8.00	8.50	182	200	182	195	4
0.38	0.62	3/4x3.50	3/4x4.50	11.50	8	1-1/2	1.62	9.75	10.25	326	345	326	340	5
0.62	0.88	1x6.00	1x6.50	12.50	12	1-3/8	1.50	10.50	11.00	407	435	407	435	6
0.62	0.88	1x6.50	1x6.50	15.50	12	1-5/8	1.75	11.75	12.50	675	715	645	680	8
0.62	0.88	1x6.50	1x7.00	19.00	12	1-7/8	2.00	13.50	14.25	1099	1165	1063	1125	10
0.62	0.88	1x6.50	1x8.00	22.50	16	2	2.12	15.00	16.00	1706	1790	1660	1550	12
				25.00	16	2-1/4	2.38	16.25						14
				27.75	16	2-1/2	2.62	17.75						16
				30.50	16	2-3/4	2.88	19.75						18
				32.75	16	3	3.12	21.50						20
				39.00	16	3-1/2	3.62	24.50						24

Flanges are furnished with octagonal groove. For ring joint details see pages 116 and 117.

The 0.025" raised face is not included in flange thickness "C" or length thru hub "Y".

In conformance with ANSI B16.5, stud lengths do not include point height.

On ring joint flanges having a groove depth 0.375" and less, the dis-

tance from the Center line of the tap hole to the flange face is 0.750". When the depth of groove is 0.438" are greater, changes in drill size or method of drilling are necessary.

For bevel detail see page 177.

For gasket surface finishes see page 94.

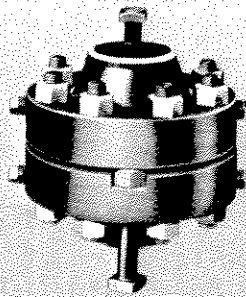
For dimensional tolerances see page 176.

For ordering instructions see page 178.

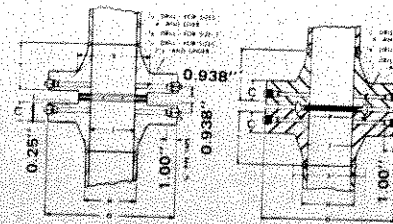
CLASS 2500 ORIFICE FLANGES

RAISED FACE
RING JOINT

WELDING NECK



Raised Face — Part No. 167
Ring Joint¹ — Part No. 163



Raised Face

Ring Joint

ANSI B16.36

CLASS 2500 ORIFICE FLANGES, WELDING NECK

ASTM A105[▲]

SEWER 2000 ORifice FLANGES, WELDING NECK														ASTM A105▲	
Nom. Pipe Size	O.D. of Raised Face	O. D. of Flange O	Thk's. of Flange Min. C	Length thru Hub Y	Ring Type Joint	Dia. of Hub X	Hub Dia. Begin- ning of Chamfer H	Bore J	Drilling Template				Length of Stud Bolts ³		
					Pitch Dia. P				Dia. of Bolt Circle	Number of Holes	Dia. of Holes	Dia. of Bolts	Raised Face	Ring Joint	
1	2.00	6.25	1.50	3.62	2.375	2.25	1.32	TO BE SPEC- IFIED BY PUR- CHAS- ER	4.25	4	1.00	7/8	6.00	6.25	
1½	2.88	8.00	1.75	4.38	3.250	3.12	1.90		5.75		1.25	1-1/8	7.00	7.50	
2	3.62	9.25	2.00	5.00	4.000	3.75	2.38	SPEC- IFIED BY PUR- CHAS- ER	6.75	8	1.12	1	7.25	7.75	
2½	4.12	10.50	2.25	5.62	4.375	4.50	2.88		7.75		1.25	1-1/8	8.00	8.50	
3	5.00	12.00	2.62	6.62	5.000	5.25	3.50	PUR- CHAS- ER	9.00	12	1.38	1-1/4	9.00	9.50	
4	6.19	14.00	3.00	7.50		6.50	4.50		10.75		1.62	1-1/2	10.25		
6	8.50	19.00	4.25	10.75		9.25	6.63	PUR- CHAS- ER	14.50	12	2.12	2	13.75		
8	10.62	21.75	5.00	12.50		12.00	8.63		17.25				15.25		
10	12.75	26.50	6.50	16.50		14.75	10.75	PUR- CHAS- ER	21.25	12	2.62	2-1/2	19.25		
12	15.00	30.00	7.25	18.25		17.38	12.75		24.38		2.88	2-3/4	21.25		

All dimensions are in inches. Prices on application.

Flanges are carbon steel A105 (same as ASME Boiler Construction Code SA105). Also available in stainless steels and other materials see page 180.

Orifice flanges are normally furnished in pairs with carbon steel Jack Screws and carbon steel pipe plugs in the tapped openings.

Complete unions can also be furnished at additional cost; raised face unions are furnished with Standard heavy series hex nuts ASTM A194 Class 2H and two compressed asbestos gaskets. Orifice plates are not furnished.

Ring Joint faced unions are similarly furnished, except that no gaskets or rings are furnished. A combination ring joint gasket and orifice plate is used with this type joint (Tube Turns does not supply).

For Threaded Orifice Flanges, the A.G.A. requires pipe to be threaded so that the end is not more than 3/16" from face of flange.

- (1) Flanges are furnished with octagonal groove. For ring joint details see page 118.
- (2) The 0.025" raised face is not included in flange thickness "C" or length thru hub "Y".
- (3) In conformance with ANSI B16.5, stud lengths do not include point height.

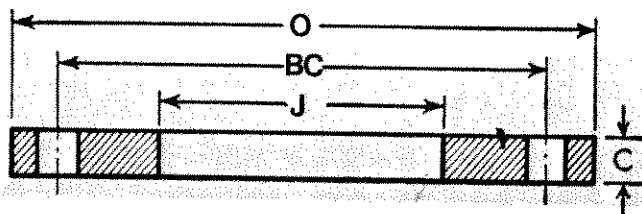
On ring joint flanges having a groove depth 0.375" and less, the distance from the Center line of the tap hole to the flange face is 0.750". When the depth of groove is 0.438" or greater, changes in drill size or method of drilling are necessary.

For bevel detail see page 177.

For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

For ordering instructions see page 178.



AWWA C207-55 RING FLANGES

ASTM A105[▲]

AWWA STANDARD STEEL RING FLANGES, * CLASS B† (86 psi) AND CLASS D ‡ (175-150 psi)

Nominal Pipe Size <i>in.</i>	OD of Flange O	Number of Bolts BC	Diam. of Bolt Circle	Diam. of Bolts		Thickness of Flange	
				Class B	Class D	Class B C	Class D C
6	11	8	9½	5/8	3/4	11/16	11/16
8	13½	8	11¾	5/8	3/4	11/16	11/16
10	16	12	14¼	5/8	7/8	11/16	11/16
12	19	12	17	5/8	7/8	11/16	13/16
14	21	12	18¾	¾	1	11/16	1½
16	23½	16	21¼	¾	1	11/16	1
18	25	16	22¾	¾	1½	11/16	1 1/16
20	27½	20	25	¾	1½	11/16	1 1/8
22	29½	20	27¼	¾	1¾	¾	1 3/16
24	32	20	29½	¾	1¾	¾	1½
26	34¼	24	31¾	¾	1¾	13/16	1 5/16
28	36½	28	34	¾	1¾	7/8	1 5/16
30	38¾	28	36	7/8	1½	7/8	1 3/8
32	41¼	28	38½	7/8	1½	15/16	1½
34	43¾	32	40½	7/8	1½	15/16	1½
36	46	32	42¾	7/8	1½	1	1 5/8
38	48¾	32	45¼	7/8	1½	1	1 5/8
40	50¾	36	47¼	7/8	1½	1	1 5/8
42	53	36	49½	1	1½	1 1/8	1¾
44	55¼	40	51¾	1	1½	1 1/8	1¾
46	57¼	40	53¾	1	1½	1 1/8	1¾
48	59½	44	56	1	1½	1¼	1¾
50	61¾	44	58½	1 1/8	1 5/4	1¼	2
52	64	44	60½	1 1/8	1 3/4	1¼	2
54	66¼	44	62¾	1¼	1¾	1 3/8	2½
60	73	52	69¼	1¼	1¾	1½	2¼
66	80	52	76	1¼	1¾	1 5/8	2½
72	86½	60	82½	1¼	1¾	1¾	2½
84	99¾	64	95½	1½	2	2	2¾
96	113¼	68	108½	1¾	2¼	2¼	3

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise. For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

(1) Dimension to be specified by the customer.

† Water service rating at atmospheric temperature is 86 psi. These flanges have the same outside diameter, bolt circle, and number of bolts as ANSI B16.1 (25-psi cast iron pipe flanges and flanged fittings). In sizes 48 in. and under they have the same size bolts, and in sizes over 48 in. they use larger bolts than specified by this 25-psi cast iron pipe flanges and flanged fittings, but use smaller bolts.

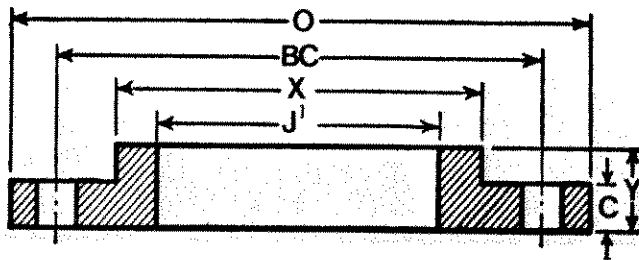
‡ Water service rating at atmospheric temperature: sizes 6 to 12 in., inclusive, 175 psi; sizes larger than 12 in., 150 psi. These flanges have the same diameter and drilling as Class 125 cast-iron flanges (ANSI B16.1). In sizes 24 in. and smaller they also match the ANSI B16.5 150-psi standard for steel flanges.

For bevel details see page 177.

For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

For ordering instructions see page 178.



AWWA C207-55 HUB FLANGES

ASTM A105[▲]

AWWA STANDARD STEEL HUB FLANGES, CLASS B† (86 psi) AND CLASS D† (175-150 psi)

Nominal Pipe Size <i>in.</i>	OD of Flange O	Number of Bolts	Diam. of Bolt Circle BC	Diam. of Bolts		Flange Dimensions for Class B and D		
				Class B	Class D	Thickness C	Length Through Hub Y	Diam. of Hub X
6 8	11 13½	8 8	9½ 11½	5/8 5/8	1/4 1/4	9/16 9/16	1¼ 1¼	7 5/16 9 11/16
10 12	16 19	12 12	14¼ 17	5/8 5/8	7/8 7/8	11/16 11/16	1¼ 1¼	12 14 3/8
14 16	21 23½	12 16	18¼ 21¼	3/4 3/4	1 1	1¼ 1¼	1¼ 1¼	15¼ 18
18 20	25 27½	16 20	22¼ 25	3/4 3/4	1 1/8 1 1/8	1¼ 1¼	1¼ 1¼	19 3/8 22
22 24	29½ 32	20 20	27¼ 29½	7/8 7/8	1¼ 1¼	1 1	1¼ 1¼	24¼ 26 3/8
26 28	34¼ 36½	24 28	31¼ 34	3/4 3/4	1¼ 1¼	1 1	1¼ 1¼	28½ 30½
30 32	38¼ 41¼	28 28	36 38½	7/8 7/8	1¼ 1½	1 1 1/8	1¼ 1¼	32½ 34¼
34 36	43¼ 46	32 32	40½ 42¼	7/8 7/8	1½ 1½	1 1/8 1 1/8	1¼ 1¼	36¼ 38¼
38 40	48¼ 50¼	32 36	45¼ 47¼	7/8 7/8	1½ 1½	1 1/8 1 1/8	1¼ 1¼	40¼ 43
42 44	53 55¼	36 40	49½ 51¼	1 1	1½ 1½	1¼ 1¼	1¼ 2¼	45 47
46 48	57¼ 59½	40 44	53¼ 56	1 1	1½ 1½	1¼ 1 1/8	2¼ 2½	49 51
50 52	61¼ 64	44 44	58¼ 60½	1 1/8 1 1/8	1¾ 1¾	1 3/8 1 3/8	2½ 2½	53 55
54 60	66¼ 73	44 52	62¼ 69¼	1¼ 1¼	1¾ 1¾	1 3/8 1 3/8	2½ 2¾	57 63
66 72	80 86½	52 60	76 82½	1¾ 1¾	1¾ 1¾	1½ 1½	2¾ 2¾	69 75
84 96	99¼ 113¼	64 68	95½ 108½	1½ 1¾	2 2¼	1¼ 2	3 3¼	87½ 100

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise. For stainless steels, aluminum and other alloys see page 180.

Flanges are furnished faced, drilled and spot faced or back faced.

(1) Dimension to be specified by the customer.

† Water service rating at atmospheric temperature is 86 psi. These flanges have the same outside diameter, bolt circle, and number of bolts as ANSI B16.1 (25-psi cast-iron pipe flanges and flanged fittings). In sizes 48 in. and under they have the same size bolts, and in sizes over 48 in. they use larger bolts than specified by this 25 psi cast iron pipe flanges and flanged fittings, but use smaller bolts.

† Water service rating at atmospheric temperature: sizes 6 to 12 in., inclusive, 175 psi; sizes larger than 12 in., 150 psi. These flanges have the same diameter and drilling as Class 125 cast iron flanges (ANSI B16.1). In sizes 24 in. and smaller they also match the ANSI B16.5 150-psi standard for steel flanges.

For bevel details see page 177.

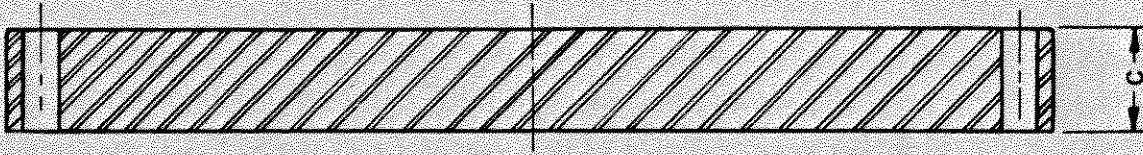
For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

For ordering instructions see page 178.

BLIND¹

To Match AWWA C207-55 Class B & D
Ring and Hub Flanges on pages 147 & 148.



ASTM A105⁽²⁾

TO MATCH AWWA C-207-55
CLASS B RING & HUB FLANGES

NOMINAL SIZE 3	THICKNESS C	
	RING FLANGE	HUB FLANGE
6	0.69	0.56
8	0.69	0.56
10	0.69	0.69
12	0.69	0.69
14	0.69	0.75
16	0.69	0.75
18	0.69	0.75
20	0.75	0.75
22	0.81	1.00
24	0.88	1.00
26	0.94	1.00
28	1.00	1.00
30	1.06	1.06
32	1.12	1.12
34	1.19	1.19
36	1.25	1.25
38	1.31	1.31
40	1.38	1.38
42	1.44	1.44
44	1.50	1.50
46	1.56	1.56
48	1.62	1.62
50	1.69	1.69
52	1.75	1.75
54	1.81	1.81
60	2.00	2.00
66	2.19	2.19
72	2.38	2.38
84	2.75	2.75
96	3.12	3.12

TO MATCH AWWA C-207-55
CLASS D RING & HUB FLANGES

THICKNESS C	
RING FLANGE	HUB FLANGE
0.69	0.56
0.69	0.56
0.69	0.69
0.81	0.75
0.94	0.75
1.00	0.81
1.06	0.88
1.12	1.00
1.19	1.06
1.25	1.12
1.31	1.25
1.31	1.31
1.38	1.38
1.50	1.50
1.56	1.56
1.62	1.62
1.75	1.75
1.81	1.81
1.88	1.88
2.00	2.00
2.06	2.06
2.12	2.12
2.25	2.25
2.31	2.31
2.38	2.38
2.62	2.69
2.88	2.88
3.12	3.12
3.62	3.62
4.12	4.12

(1) These flanges are specially designed using formulas taken from the ASME Boiler Construction Code.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

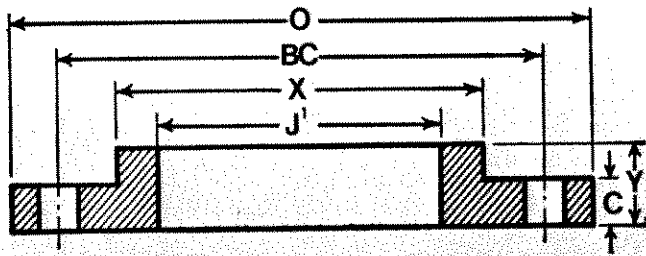
(3) Intermediate and larger sizes are also available. All dimensions may be modified without die cost.

Facing and gasket dimensions are the same as given for the ring and hub flanges.

(4) Pressure ratings of these flanges are identical to those flanges to which they are to match.

For ordering instructions see page 178.

AWWA C207-55 HUB FLANGES



ASTM A105[▲]

AWWA STANDARD STEEL HUB FLANGES, CLASS E* (275 psi)

Nominal Pipe Size <i>in.</i>	OD of Flange O	ID of Flange J	Drilling			Flange Dimensions— <i>in.</i>		
			No. of Bolts	Diam. of Bolts <i>in.</i>	Diam. of Bolt Circle BC	Thickness C	Length Through Hub Y	Diam. of Hub X
$\frac{1}{2}$	$3\frac{1}{2}$	0.88	4	$\frac{1}{2}$	$2\frac{1}{2}$	$\frac{7}{16}$	$\frac{3}{8}$	$1\frac{3}{4}$
$\frac{3}{4}$	$3\frac{3}{4}$	1.09	4	$\frac{1}{2}$	$2\frac{1}{2}$	$\frac{7}{16}$	$\frac{3}{8}$	$1\frac{1}{2}$
1	$4\frac{1}{4}$	1.38	4	$\frac{1}{2}$	$3\frac{1}{8}$	$\frac{9}{16}$	$\frac{1}{2}$	$1\frac{1}{2}$
$1\frac{1}{2}$	$4\frac{3}{4}$	1.72	4	$\frac{1}{2}$	$3\frac{1}{2}$	$\frac{5}{8}$	$\frac{1}{2}$	$2\frac{1}{8}$
$1\frac{1}{2}$	5	1.97	4	$\frac{3}{8}$	$3\frac{7}{8}$	$\frac{11}{16}$	$\frac{7}{8}$	$2\frac{1}{8}$
2	6	2.44	4	$\frac{3}{8}$	$4\frac{1}{2}$	$\frac{3}{4}$	1	$3\frac{1}{8}$
$2\frac{1}{2}$	7	2.94	4	$\frac{3}{8}$	5	$\frac{7}{8}$	$1\frac{1}{8}$	$3\frac{1}{8}$
3	$7\frac{1}{2}$	3.56	4	$\frac{3}{8}$	6	$\frac{15}{16}$	$1\frac{3}{16}$	$4\frac{1}{2}$
$3\frac{1}{2}$	$8\frac{1}{2}$	4.06	8	$\frac{5}{8}$	7	$\frac{15}{16}$	$1\frac{1}{2}$	$4\frac{1}{2}$
4	9	4.56	8	$\frac{5}{8}$	$7\frac{1}{2}$	$\frac{15}{16}$	$1\frac{1}{8}$	$5\frac{1}{8}$
5	10	5.66	8	$\frac{5}{8}$	8	$\frac{15}{16}$	$1\frac{1}{8}$	$6\frac{1}{8}$
6	11	6.72	8	$\frac{5}{8}$	$9\frac{1}{2}$	1	$1\frac{1}{8}$	$7\frac{1}{8}$
8	$13\frac{1}{2}$	8.72	8	$\frac{3}{4}$	$11\frac{1}{2}$	$1\frac{1}{8}$	$1\frac{1}{2}$	$9\frac{1}{2}$
10	16	10.88	12	$\frac{7}{8}$	$14\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{3}{4}$	12
12	19	12.88	12	$\frac{7}{8}$	17	$1\frac{1}{2}$	$2\frac{3}{16}$	$14\frac{1}{2}$
14	21	14.19	12	1	$18\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{4}$	$15\frac{1}{2}$
16	$23\frac{1}{2}$	16.19	16	1	$21\frac{1}{2}$	$1\frac{7}{8}$	$2\frac{1}{2}$	18
18	25	18.19	16	$1\frac{1}{8}$	$22\frac{1}{2}$	$1\frac{9}{8}$	$2\frac{1}{2}$	$19\frac{1}{2}$
20	$27\frac{1}{2}$	20.19	20	$1\frac{1}{8}$	25	$1\frac{1}{2}$	$2\frac{1}{4}$	22
24	32	24.19	20	$1\frac{1}{2}$	$29\frac{1}{2}$	$1\frac{3}{8}$	3	$26\frac{1}{2}$
26	$34\frac{1}{2}$		24	$1\frac{1}{2}$	$31\frac{1}{2}$	2	$3\frac{1}{8}$	$28\frac{1}{2}$
28	$36\frac{1}{2}$		28	$1\frac{1}{2}$	34	$2\frac{1}{8}$	$3\frac{1}{8}$	$30\frac{1}{2}$
30	$38\frac{1}{2}$		28	$1\frac{1}{2}$	36	$2\frac{1}{8}$	$3\frac{1}{8}$	$32\frac{1}{2}$
32	$41\frac{1}{2}$		28	$1\frac{1}{2}$	$38\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{1}{8}$	35
34	$43\frac{1}{2}$		32	$1\frac{1}{2}$	$40\frac{1}{2}$	$2\frac{3}{8}$	$3\frac{1}{4}$	37
36	46		32	$1\frac{1}{2}$	$42\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{4}$	$39\frac{1}{2}$
38	$48\frac{1}{2}$		32	$1\frac{1}{2}$	$45\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{1}{4}$	$41\frac{1}{2}$
40	$50\frac{1}{2}$		36	$1\frac{1}{2}$	$47\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{1}{4}$	$43\frac{1}{2}$
42	53		36	$1\frac{1}{2}$	$49\frac{1}{2}$	$2\frac{1}{2}$	4	46
44	$55\frac{1}{2}$		40	$1\frac{1}{2}$	$51\frac{1}{2}$	$2\frac{1}{2}$	4	48
46	$57\frac{1}{2}$		40	$1\frac{1}{2}$	$53\frac{1}{2}$	$2\frac{1}{2}$	$4\frac{1}{8}$	50
48	$59\frac{1}{2}$		44	$1\frac{1}{2}$	56	$2\frac{1}{4}$	$4\frac{1}{8}$	$52\frac{1}{2}$
50	$61\frac{1}{2}$		44	$1\frac{1}{2}$	$58\frac{1}{2}$	$2\frac{1}{4}$	$4\frac{1}{8}$	$54\frac{1}{2}$
52	64		44	$1\frac{1}{2}$	60	$2\frac{1}{4}$	$4\frac{1}{8}$	$56\frac{1}{2}$
54	$66\frac{1}{2}$		44	$1\frac{1}{2}$	$62\frac{1}{2}$	3	$4\frac{1}{8}$	$58\frac{1}{2}$
60	73		52	$1\frac{1}{2}$	$69\frac{1}{2}$	$3\frac{1}{8}$	$4\frac{1}{8}$	$65\frac{1}{2}$
66	80		52	$1\frac{1}{2}$	76	$3\frac{1}{8}$	$4\frac{1}{8}$	$71\frac{1}{2}$
72	$86\frac{1}{2}$		60	$1\frac{1}{2}$	$82\frac{1}{2}$	$3\frac{1}{8}$	5	$78\frac{1}{2}$
84	$99\frac{1}{2}$		64	2	$95\frac{1}{2}$	$3\frac{1}{4}$	$5\frac{1}{8}$	$90\frac{1}{2}$
96	$113\frac{1}{2}$		68	$2\frac{1}{2}$	$108\frac{1}{2}$	$4\frac{1}{4}$	$5\frac{1}{8}$	$102\frac{1}{2}$

All dimensions are in inches. Prices on application.

▲ Flanges are carbon steel A105 unless specified otherwise. For stainless steels, aluminum and other alloys see page 180.
Flanges are furnished faced, drilled and spot faced or back faced.

* Water rating at atmospheric temperature is 275 psi. These flanges have the same diameter and drilling as Class 125 cast iron flanges (ANSI B16.1). In sizes 24 in. and smaller they also match the ANSI B16.5 150-psi. standard for steel flanges.

(1) The purchaser should specify the inside diameter of the flange for nominal pipe sizes 26 to 96 in.

For bevel details see page 177.

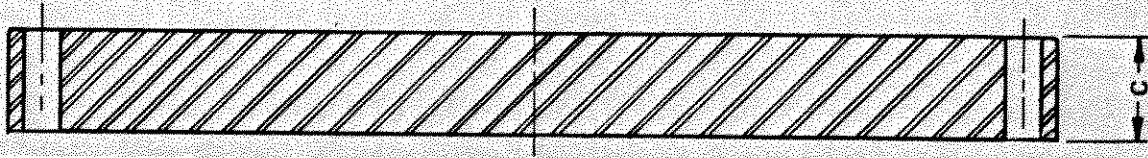
For gasket surface finishes see page 94.

For dimensional tolerances see page 176.

For ordering instructions see page 178.

BLIND¹

To Match AWWA C207-55 Class E
Hub Flanges on page 150.



ASTM A105▲

TO MATCH AWWA C-207-55 CLASS E, HUB FLANGES

NOMINAL SIZE 3	THICKNESS C
½	0.44
¾	0.50
1	0.56
1¼	0.62
1½	0.69
2	0.75
2½	0.88
3	0.94
3½	0.94
4	0.94
5	0.94
6	1.00
8	1.12
10	1.19
12	1.25
14	1.38
16	1.44
18	1.56
20	1.69
24	1.88
26	2.00
28	2.06
30	2.12
32	2.25
34	2.31
36	2.38
38	2.38
40	2.50
42	2.62
44	2.69
46	2.81
48	2.88
50	3.00
52	3.12
54	3.25
60	3.56
66	3.94
72	4.25
84	4.94
96	5.56

(1) These flanges are specially designed using formulas taken from the ASME Boiler Construction Code.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

(3) Intermediate and larger sizes are also available. All dimensions may be

modified without die cost.

Facing and gasket dimensions are the same as given for the ring and hub flanges.

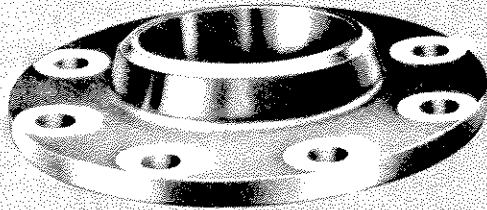
(4) Pressure ratings of these flanges are identical to those flanges to which they are to match.

For ordering instructions see page 178.

WELDING NECK FLANGES¹

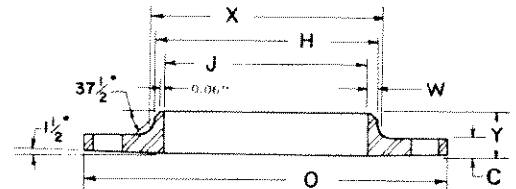
BOLTING MATCHES B16.1 CLASS 125
VALVES AND FITTINGS

**Light
Weight**



**Taper
Face**

Part No. 718



NOM. PIPE SIZE	PIPE WALL THICKNESS* W			OUTSIDE DIAM. OF FLANGE O	FLANGE THICK- NESS C	DIAM. OF HUB AT BEVEL H	DIAMETER OF BORE J			LENGTH THRU HUB Y	DIAM. OF HUB AT BASE X	DRILLING TEMPLATE			APPROX. WEIGHT (LBS.)
	SCH 10S	API 5L†	STD WT				SCH 10S	API 5L	STD WT			DIAM. OF BOLT CIRCLE	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES	
1	.109		.133	4.25	0.38	1.32	1.10		1.05	0.88	1.62	3.12	4	0.62	1.3
1¼	.109		.140	4.62	0.38	1.66	1.44		1.38	0.88	2.00	3.50	4	0.62	1.6
1½	.109		.145	5.00	0.38	1.90	1.68		1.61	0.88	2.25	3.88	4	0.62	1.8
2	.109		.154	6.00	0.44	2.38	2.16		2.07	1.00	2.75	4.75	4	0.75	3.0
2½	.120		.203	7.00	0.44	2.88	2.64		2.47	1.00	3.25	5.50	4	0.75	4.1
3	.120	.125	.216	7.50	0.50	3.50	3.26		3.07	1.12	3.94	6.00	4	0.75	5.3
3½	.120		.226	8.50	0.50	4.00	3.76		3.55	1.12	4.44	7.00	8	0.75	6.4
4	.120	.188	.237	9.00	0.50	4.50	4.26	4.12	4.03	1.12	4.94	7.50	8	0.75	6.9
6	.134	.219	.280	11.00	0.56	6.63	6.36	6.19	6.07	1.25	7.06	9.50	8	0.88	10.3
8	.148	.219	.322	13.50	0.56	8.63	8.33	8.19	7.98	1.25	9.06	11.75	8	0.88	14.4
10	.165	.219	.365	16.00	0.69	10.75	10.42	10.31	10.02	1.50	11.31	14.25	12	1.00	22.6
12	.180	.250	.375	19.00	0.88	12.75	12.39	12.25	12.00	1.88	13.44	17.00	12	1.00	43.0

All dimensions are in inches. Prices on application.

Sizes 1" thru 3½" are furnished bored for either Schedule 10S or Standard Weight pipe.

Sizes 4" thru 12" are bored for Schedule 10S, API 5L or Standard Weight pipe.

Approximate weights based on Standard Weight bore for sizes 3½" and smaller, API 5L bore for sizes 4" and larger.

† Wall thicknesses are from API 5L pipe specification and are those thicknesses most commonly used for gas distribution and similar services. Flanges are carbon steel A 105.

(1) Drilling and outside diameter of flanges match ANSI B16.5 Class 150 steel flange standard (same drilling and outside diameter as ANSI B16.1 Class 125 cast iron flange standard).

(2) Flanges have a maximum service pressure rating of 175 psi liquid or gas at -20 to 150° F and 125 psi saturated steam (353° F).

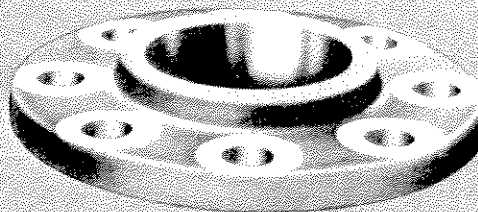
For large diameter flanges, see page 154.

For ordering instructions see page 178.

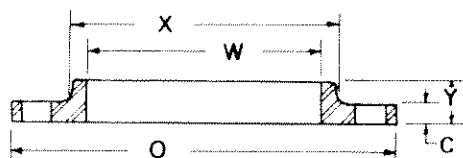
SLIP-ON FLANGES*

BOLTING MATCHES B16.1 CLASS 125
VALVES AND FITTINGS

**Light
Weight**



**Flat
Face**



Part No. 717

NOMINAL PIPE SIZE	OUTSIDE DIAM. OF FLANGE O	FLANGE THICKNESS C	DIAM. OF BORE W	MINIMUM BORE	LENGTH THRU HUB Y	DIAM. OF HUB AT BASE X	DIAM. OF BOLT CIRCLE	NUMBER OF BOLT HOLES	DIAMETER OF BOLT HOLES	APPROX. WEIGHT (LBS.)
3	7.50	0.50	3.57	3.13	0.88	4.25	6.00	4	3/4	6.0
4	9.00	0.50	4.57	4.13	0.88	5.31	7.50	8	3/4	8.0
5	10.00	0.56	5.66	5.13	0.88	6.44	8.50	8	7/8	9.5
6	11.00	0.56	6.72	6.25	1.25	7.56	9.50	8	7/8	13
8	13.50	0.56	8.72	8.25	1.25	9.69	11.75	8	7/8	18
10	16.00	0.69	10.88	10.25	1.25	12.00	14.25	12	1	26
12	19.00	0.69	12.88	12.25	1.25	14.38	17.00	12	1	42
14	21.00	0.75	14.14	13.75	1.25	15.75	18.75	12	1-1/8	44
16	23.50	0.75	16.16	15.75	1.25	18.00	21.25	16	1-1/8	58
18	25.00	0.75	18.18	17.75	1.25	19.88	22.75	16	1-1/4	59
20	27.50	0.75	20.20	19.75	1.25	22.00	25.00	20	1-1/4	69
24	32.00	1.00	24.25	23.75	1.75	26.12	29.50	20	1-3/8	113

All dimensions are in inches.

Flanges are carbon steel A105.

These flanges are used for welding to light weight pipe to connect with fittings and valves having Class 125 cast iron flanges, using full face gaskets.

* Drilling and outside diameter of flanges match ANSI B16.1 Class 125 cast iron flange standard (same drilling and outside diameters as ANSI B16.5 Class 150 steel flange standard).

(1) Suggested maximum non-shock service pressure rating for use ONLY with plain facing and full face non-metallic gasket: 100 psi at or near air temperature.

For large diameter flanges, see page 154.

Light weight lap joint flanges are also available.

For pressure rating, see page 155.

For ordering instructions see page 178.

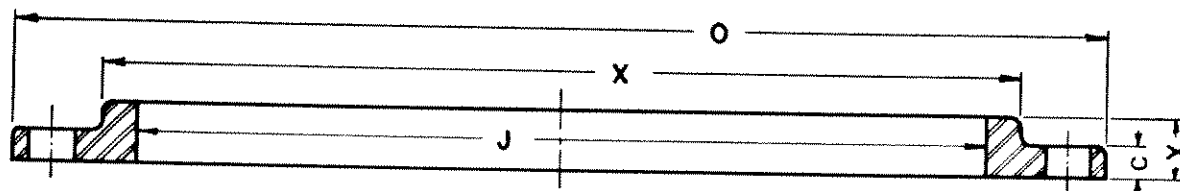
Large Diameter ANSI-Type Flanges¹

LIGHT WEIGHT SLIP-ON¹

Flat
Face

Part No. 717-LD

BOLTING MATCHES B16.1 CLASS 125² VALVES AND FITTINGS



ASTM A105

NOMINAL SIZE	DIAMETRAL DIMENSIONS			AXIAL DIMENSIONS		DRILLING TEMPLATE			APPROX. WEIGHT PER FLANGE (LB)
	DIAM. OF FLANGE O	DIAM. OF HUB X	DIAM. OF BORE J	THICKNESS OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES	BOLT CIRCLE DIAM.	
26	34.25	28.50	Inside Diameter to be Specified by Purchaser (The bore is normally 1/4" larger than pipe O.D.)	1.00	1.75	24	1.38	31.75	126
28	36.50	30.50		1.00	1.75	28	1.38	34.00	138
30	38.75	32.50		1.00	1.75	28	1.38	36.00	155
32	41.75	34.75		1.12	1.75	28	1.62	38.50	192
34	43.75	36.75		1.12	1.75	32	1.62	40.50	200
36	46.00	38.75		1.12	1.75	32	1.62	42.75	218
38	48.75	40.75		1.12	1.75	32	1.62	45.25	250
40	50.75	43.00		1.12	1.75	36	1.62	47.25	262
42	53.00	45.00		1.25	1.75	36	1.62	49.50	301
44	55.25	47.00		1.25	2.25	40	1.62	51.75	348
46	57.25	49.00		1.25	2.25	40	1.62	53.75	364
48	59.50	51.00		1.38	2.50	44	1.62	56.00	423
50	61.75	53.00		1.38	2.50	44	1.88	58.25	438
52	64.00	55.00		1.38	2.50	44	1.88	60.50	466
54	66.25	57.00		1.38	2.50	44	1.88	62.75	495
60	73.00	63.00		1.50	2.75	52	1.88	69.25	629
66	80.00	69.00		1.50	2.75	52	1.88	76.00	748
72	86.50	75.00		1.50	2.75	60	1.88	82.50	836

Light Weight Flanges are also available in smaller sizes. See page 153.

Flanges are intended for use only with full face non-metallic gaskets. Bolting should preferably be alloy steel (ASTM A193). Bolt diameter is normally 1/8" smaller than bolt hole diameter.

Sizes 26"-36" incl., 42" and 48" conform to Class D flanges in AWWA (American Water Works Association) Standard C207-55. Class D water service rating at atmospheric temperature for these sizes is 150 psi.

The same size flanges, with smaller bolting (see Table 2 in C 207-55 for number and diameter of bolts required) can also be furnished for

Class B service in the AWWA Standard. Class B water service rating at atmospheric temperatures is 86 psi.

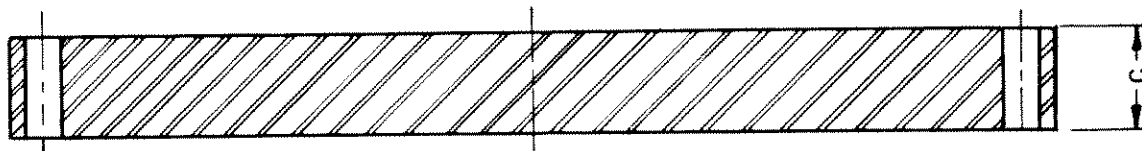
- (1) Drilling and flange diameter conform to the American Standard for covered therein, except bolt holes are 1/8" larger than bolts for all sizes.
- (2) Suggested maximum non-shock service pressure rating, for use ONLY with plain facing and full face non-metallic gasket: 100 psi at or near air temperature.

For ordering instructions see page 178.

FOR MATCHING BLIND FLANGES SEE PAGE 155.

Light Weight BLIND¹

To match slip-on flanges on pages 153 & 154.



ASTM A105⁽²⁾

NOMINAL SIZE ³	THICKNESS C
3	0.50
4	0.50
5	0.56
6	0.56
8	0.56
10	0.69
12	0.75
14	0.75
16	0.81
18	0.88
20	1.00
24	1.12
26	1.25
28	1.31
30	1.38
32	1.50
34	1.56
36	1.62
38	1.75
40	1.81
42	1.88
44	2.00
46	2.06
48	2.12
50	2.25
52	2.31
54	2.38
60	2.62
66	2.88
72	3.12

(1) These flanges are specially designed using formulas taken from the ASME Boiler Construction Code.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

(3) Intermediate and larger sizes are also available. All dimensions may be modified without die cost.

(4) Pressure ratings are identical to those specified for the flanges to which they are designed to match.

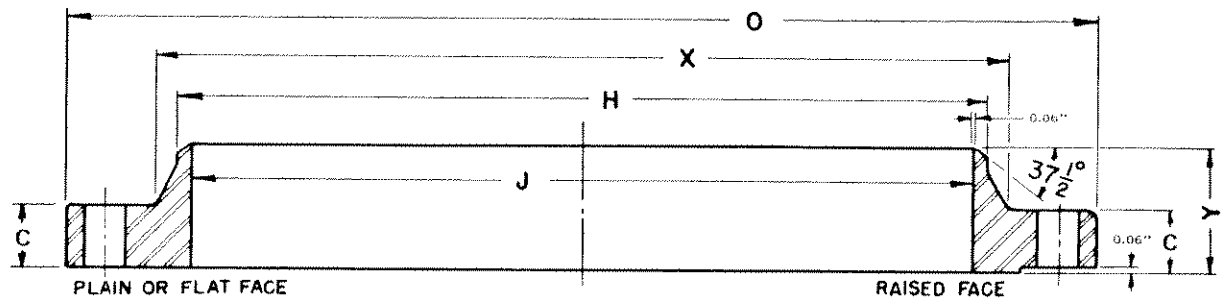
For ordering instructions see page 178.

Large Diameter ANSI-Type Flanges¹

WELDING NECK¹

Part No. 701

BOLTING MATCHES B16.1 CLASS 125³
VALVES AND FITTINGS



ASTM A105⁽²⁾

NOMINAL SIZE ⁵	DIAMETRAL DIMENSIONS			AXIAL DIMENSIONS		DRILLING TEMPLATE			FACING	APPROX. WEIGHT PER FLANGE (LB)
	DIAM. OF FLANGE O	LARGE DIAM. OF HUB X	DIAM. OF BORE J ⁵	THICKNESS OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES	BOLT CIRCLE DIAM.	DIAM. OF RAISED FACE ⁴	
H										
26	34.25	28.50		2.00	5.00	24	1.38	31.75	29.50	260
28	36.50	30.75		2.06	5.06	28	1.38	34.00	31.50	296
30	38.75	32.75		2.12	5.12	28	1.38	36.00	33.75	338
32	41.75	35.00		2.25	5.25	28	1.62	38.50	36.00	412
34	43.75	37.00		2.31	5.31	32	1.62	40.50	38.00	440
36	46.00	39.25		2.38	5.38	32	1.62	42.75	40.25	495
38	48.75	41.75		2.38	5.38	32	1.62	45.25	42.25	573
40	50.75	43.75		2.50	5.50	36	1.62	47.25	44.25	620
42	53.00	46.00		2.62	5.62	36	1.62	49.50	47.00	707
44	55.25	48.00		2.62	5.62	40	1.62	51.75	49.00	752
46	57.25	50.00		2.69	5.69	40	1.62	53.75	51.00	799
48	59.50	52.25		2.75	5.75	44	1.62	56.00	53.50	868
50	61.75	54.25		2.75	5.75	44	1.88	58.25	55.50	900
52	64.00	56.50		2.88	5.88	44	1.88	60.50	57.50	998
54	66.25	58.75		3.00	6.00	44	1.88	62.75	59.75	1104
60	73.00	65.25		3.12	6.12	52	1.88	69.25	66.00	1346

Diameter of Bore to be Specified by Purchaser.

Where intended for bolting to cast iron valves or fittings, these flanges should be used with a plain or flat facing, as shown in the left-hand portion of the illustration. Gaskets should be of a soft non-metallic material. When a ring gasket (which should extend to the inner edge of the bolts) is used, the bolting should be carbon steel equivalent to ASTM A307 Gr. B. When a full face gasket is used, the bolting should be alloy steel (ASTM A193).

Other types of facings can also be furnished.

Lap joint and blind flanges can be furnished with matching O.D. and drilling.

(1) Dimensions and drilling conform to the American Standard for Cast Iron Pipe Flanges and Flanged Fittings, ANSI B16.1, to the extent covered therein, except bolt holes are 1/8" larger than bolts for all sizes.

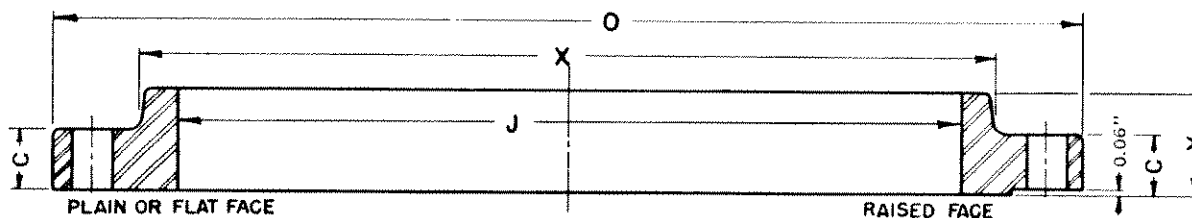
(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

(3) For Pressure Rating see page 162.

(4) When these flanges are to be used as companion flanges (not mated to cast iron valves or fittings), a raised face as shown in the right hand illustration is recommended. Higher service pressure ratings may be assignable.

(5) Intermediate and larger sizes are also available. All dimensions may be modified without die cost. Small hub diameter and bore machining can be varied to suit purchaser's specification.

For ordering instructions see page 178.


ASTM A105⁽²⁾

NOMINAL SIZE ⁵ PIPE O.D.	DIAMETRAL DIMENSIONS			AXIAL DIMENSIONS		DRILLING TEMPLATE			FACING	APPROX. WEIGHT PER FLANGE (LB)
	DIAM. OF FLANGE O	DIAM. OF HUB X	DIAM. OF BORE J	THICKNESS OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES	BOLT CIRCLE DIAM.	DIAM. OF RAISED FACE ⁴	
26	34.25	28.50	26.25	2.00	3.38	24	1.38	31.75	29.50	236
28	36.50	30.75	28.25	2.06	3.44	28	1.38	34.00	31.50	269
30	38.75	32.75	30.25	2.12	3.50	28	1.38	36.00	33.75	304
32	41.75	35.00	32.25	2.25	3.62	28	1.62	38.50	36.00	375
34	43.75	37.00	34.25	2.31	3.69	32	1.62	40.50	38.00	400
36	46.00	39.25	36.25	2.38	3.75	32	1.62	42.75	40.25	452
38	48.75	41.75	38.25	2.38	3.75	32	1.62	45.25	42.25	527
40	50.75	43.75	40.25	2.50	3.88	36	1.62	47.25	44.25	573
42	53.00	46.00	42.25	2.62	4.00	36	1.62	49.50	47.00	648
44	55.25	48.00	44.25	2.62	4.00	40	1.62	51.75	49.00	694
46	57.25	50.00	46.25	2.69	4.06	40	1.62	53.75	51.00	733
48	59.50	52.25	48.25	2.75	4.12	44	1.62	56.00	53.50	799
50	61.75	54.25	50.25	2.75	4.12	44	1.88	58.25	55.50	828
52	64.00	56.50	52.25	2.88	4.25	44	1.88	60.50	57.50	923
54	66.25	58.75	54.25	3.00	4.38	44	1.88	62.75	59.75	1024
60	73.00	65.25	60.25	3.12	4.50	52	1.88	69.25	66.00	1254
66	80.00	71.50	66.25	3.38	4.88	52	1.88	76.00	73.00	1623
72	86.50	78.50	72.25	3.50	5.00	60	1.88	82.50	79.50	1922
84	99.75	90.50	84.25	3.88	5.38	64	2.12	95.50	92.50	2588
96	113.25	102.75	96.25	4.25	5.75	68	2.38	108.50	105.50	3284

Where intended for bolting to cast iron valves or fittings, these flanges should be used with a plain or flat facing, as shown in the left-hand portion of the illustration. Gaskets should be of a soft non-metallic material. When a ring gasket (which should extend to the inner edge of the bolts) is used, the bolting should be carbon steel equivalent to ASTM A307 Gr. B. When a full face gasket is used, the bolting should be alloy steel (ASTM A193).

Other types of facings can also be furnished.

All sizes with plain or flat facing conform to Class E flanges in AWWA (American Water Works Association) Standard C207-55. Class E flanges water service rating at atmospheric temperature is 275 psi.

(1) Dimensions and drilling conform to the American Standard for Cast Iron Pipe Flanges and Flanged Fittings, ANSI B16.1, to the extent covered therein, except bolt holes are 1/8" larger than bolts for all sizes.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

(3) For Pressure Rating See Page 162.

(4) When these flanges are to be used as companion flanges (not mated to cast iron valves or fittings), A raised face as shown in the right hand illustration is recommended. Higher service pressure ratings may be assignable.

(5) Intermediate and larger sizes are also available. All dimensions may be modified without die cost. Small hub diameter and bore machining can be varied to suit purchaser's specification.

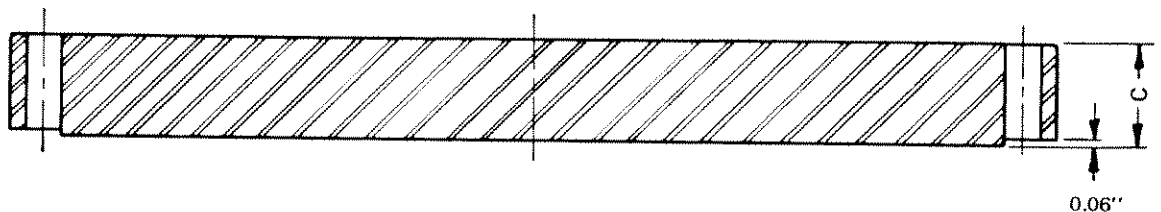
For ordering instructions see page 178.

FOR MATCHING BLIND FLANGES SEE PAGE 158.

Large Diameter

BLIND¹

To match welding neck and slip-on flanges on pages 156 & 157.



ASTM A105⁽²⁾

NOMINAL SIZE 3	THICKNESS C
26	2.00
28	2.12
30	2.12
32	2.25
34	2.31
36	2.38
38	2.38
40	2.50
42	2.62
44	2.62
46	2.69
48	2.75
50	2.75
52	2.88
54	3.00
60	3.12
66	3.38
72	3.50
84	4.06
96	4.56

(1) These flanges are specially designed using formulas taken from the ASME Boiler Construction Code SA105).

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

Raised face is normally furnished.

(3) Intermediate and larger sizes are also available. All dimensions may be modified without die cost.

Facing and gasket dimensions are the same as given for the welding neck and slip-on larger diameter flanges.

For pressure rating see page 162.

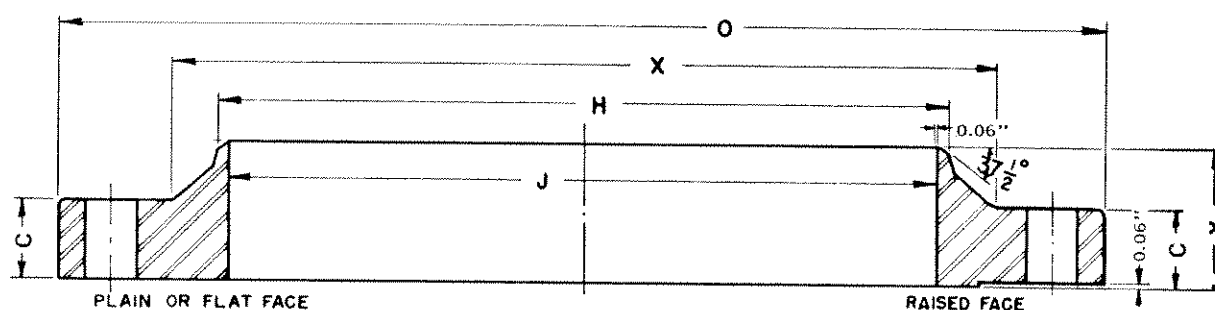
For ordering instructions see page 178.

Large Diameter ANSI-Type Flanges¹

WELDING NECK

Part No. 702

BOLTING MATCHES B16.1 CLASS 250³
VALVES AND FITTINGS



ASTM A105⁽²⁾

NOMINAL SIZE ⁵ H	DIAMETRAL DIMENSIONS			AXIAL DIMENSIONS		DRILLING TEMPLATE			FACING DIMENSIONS ⁴		APPROX. WEIGHT PER FLANGE (LB)
	DIAM. OF FLANGE O	LARGE DIAM. OF HUB X	DIAM. OF BORE J ⁵	THICK. OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES	BOLT CIRCLE DIAM.	DIAM. OF STD. RAISED FACE PER ANSI B16.1	DIAM. OF SPECIAL SMALL RAISED FACE	
26	38.25	30.50	Diameter of Bore to be Specified by Purchaser.	2.81	5.81	28	1.88	34.50	32.44	29.50	534
28	40.75	33.00		2.94	5.94	28	1.88	37.00	34.94	31.50	629
30	43.00	35.25		3.00	6.00	28	1.88	39.25	37.19	33.75	702
32	45.25	37.50		3.12	6.12	28	1.88	41.50	39.44	36.00	793
34	47.50	39.50		3.25	6.25	28	1.88	43.50	41.44	38.00	882
36	50.00	41.50		3.38	6.38	32	2.12	46.00	43.69	40.25	969
38	52.25	43.50		3.44	6.44	32	2.12	48.00	45.69	42.25	1057
40	54.50	45.75		3.56	6.56	36	2.12	50.25	47.94	44.25	1158
42	57.00	47.75		3.69	6.94	36	2.12	52.75	50.44	47.00	1318
44	59.25	49.75		3.75	7.00	36	2.12	55.00	52.69	49.00	1423
46	61.50	51.75		3.88	7.12	40	2.12	57.25	54.94	51.00	1536
48	65.00	54.00		4.00	7.25	40	2.12	60.75	58.44	53.50	1824

Where intended for bolting to cast iron valves or fittings, these flanges should be used with a plain or flat facing, as shown in the left-hand portion of the illustration. Gaskets should be of a soft non-metallic material. When a ring gasket (which should extend to the inner edge of the bolts) is used, the bolting should be carbon steel equivalent to ASTM A307 Gr. B. When a full face gasket is used, the bolting should be alloy steel (ASTM A193).

Other types of facings can also be furnished.

All sizes with plain or flat facing conform to Class E flanges in AWWA (American Water Works Association) Standard C207.55. Class E flanges water service rating at atmospheric temperature is 275 psi.

(1) Dimensions and drilling conform to the American Standard for Cast Iron Pipe Flanges and Flanged Fittings, ANSI B16.1, to the extent covered therein, except bolt holes are 1/8" larger than bolts for all sizes.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

(3) For Pressure Rating See Page 162.

(4) When these flanges are to be used as companion flanges (not mated to cast iron valves or fittings), A raised face as shown in the right hand illustration is recommended. Higher service pressure ratings may be assignable.

(5) Intermediate and larger sizes are also available. All dimensions may be modified without die cost. Small hub diameter and bore machining can be varied to suit purchaser's specification.

For ordering instructions see page 178.

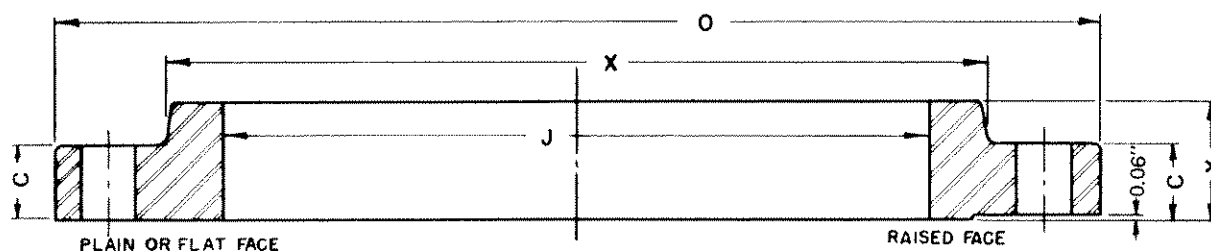
FOR MATCHING BLIND FLANGES SEE PAGE 161.

Large Diameter ANSI-Type Flanges¹

SLIP-ON

Part No. 712

BOLTING MATCHES B16.1 CLASS 250³
VALVES AND FITTINGS



ASTM A105⁽²⁾

NOMINAL SIZE ⁵ PIPE O.D.	DIAMETRAL DIMENSIONS			AXIAL DIMENSIONS		DRILLING TEMPLATE			FACING DIMENSIONS ⁴		APPROX. WEIGHT PER FLANGE (LB)
	DIAM. OF FLANGE O	DIAM. OF HUB X	DIAM. OF BORE J	THICKNESS OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES	BOLT CIRCLE DIAM.	DIAM. OF STD. RAISED FACE PER ANSI B16.1	DIAM. OF SPECIAL SMALL RAISED FACE	
26	38.25	30.50	26.25	2.81	4.75	28	1.88	34.50	32.44	29.50	531
28	40.75	33.00	28.25	2.94	5.00	28	1.88	37.00	34.94	31.50	637
30	43.00	35.25	30.25	3.00	5.00	28	1.88	39.25	37.19	33.75	707
32	45.25	37.50	32.25	3.12	5.12	28	1.88	41.50	39.44	36.00	801
34	47.50	39.50	34.25	3.25	5.25	28	1.88	43.50	41.44	38.00	889
36	50.00	41.50	36.25	3.38	5.38	32	2.12	46.00	43.69	40.25	970
38	52.25	43.50	38.25	3.44	5.50	32	2.12	48.00	45.69	42.25	1062
40	54.50	45.75	40.25	3.56	5.50	36	2.12	50.25	47.94	44.25	1172
42	57.00	47.75	42.25	3.69	5.62	36	2.12	52.75	50.44	47.00	1288
44	59.25	49.75	44.25	3.75	5.75	36	2.12	55.00	52.69	49.00	1397
46	61.50	51.75	46.25	3.88	5.88	40	2.12	57.25	54.94	51.00	1510
48	65.00	54.00	48.25	4.00	6.00	40	2.12	60.75	58.44	53.50	1797

Where intended for bolting to cast iron valves or fittings having 0.06" raised face, these flanges may be used with the raised face dimension per ANSI B16.1 given in the Table and as shown in the right-hand portion of the illustration, or a plain or flat face may be used as shown in the left-hand portion of the illustration. In either case, the bolting should be of carbon steel equivalent to ASTM A307 Grade B, without heat treatment other than stress relief.

Other types of facings can also be furnished.

(1) Dimensions and drilling conform to the American Standard for cast iron Pipe Flanges and Flanged Fittings, Class 250 ANSI B16.1, to the extent covered therein, except bolt holes are 1/8" larger than bolts for all sizes.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

(3) For Pressure Rating See Page 162.

(4) When these flanges are to be used as companion flanges (not mated to cast iron valves or fittings), the small raised face diameters are recommended. Higher service pressure ratings may be assignable.

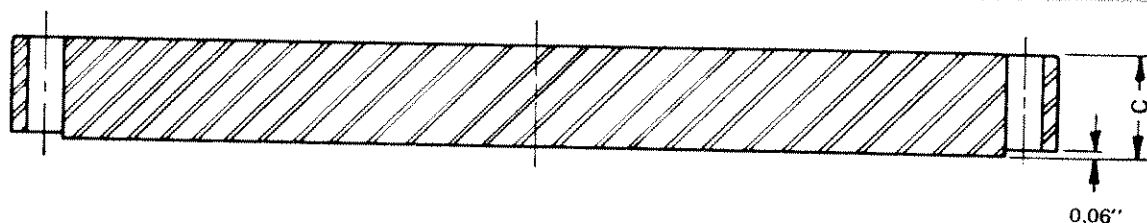
(5) Intermediate and larger sizes are also available. All dimensions may be modified without die cost. Small hub diameter and bore machining can be varied to suit purchaser's specifications.

For ordering instructions see page 178.

FOR MATCHING BLIND FLANGES SEE PAGE 161.

Large Diameter BLIND¹

To match welding neck and slip-on flanges on pages 159 & 160.



ASTM A105⁽²⁾

NOMINAL SIZE 3	THICKNESS C
26	2.81
28	2.94
30	3.00
32	3.12
34	3.25
36	3.38
38	3.44
40	3.56
42	3.69
44	3.75
46	3.88
48	4.00

(1) These flanges are specially designed using formulas taken from the ASME Boiler Construction Code.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

Raised face is normally furnished.

(3) Intermediate and larger sizes are also available. All dimensions may be modified without die cost.

Facing and gasket dimensions are the same as given for the welding neck and slip-on larger diameter flanges.

For pressure rating see page 162.

For ordering instructions see page 178.

CLASS 125 LIGHT WEIGHT ANSI TYPE FLANGES

Class 125 Light Weight ANSI-Type Flanges are identical with regular Class 125 ANSI-Type Slip-On Flanges except the flange thickness and hub length are reduced. The suggested rating of 100 psi at or near the ordinary range of air temperature is conditioned on the use of a full-face gasket and plain facing. The resistance of that part of the contact surface situated outside the bolt circle in such designs produces a countermoment which effects a substantial reduction in the total moment causing rotation of the flange, and hence justifies a marked reduction in flange thickness; by the same token, however, the bolt load required for tightness is increased, for which reason it is recommended that bolts superior in physical properties to those of ordinary carbon steel without heat treatment be employed.

CLASS 125 AND CLASS 250 ANSI TYPE FLANGES

The classes of flanges designated herein as *Class 125* and *Class 250 ANSI-Type Flanges* represent an extension of the size range of the Class 150 and Class 300 series of steel pipe flanges covered in ANSI B16.5. This extension is effected by paralleling the Class 125 and Class 250 series of cast iron flanges covered in ANSI B16.1 - 1975.

These ANSI-Type flanges should be used where the flanges are required to bolt to standard valves, fittings, or to existing flanges whose bolting is in accordance with the above mentioned cast iron standards. (Where flanges are not required to bolt to standard valves, fittings, or existing flanges, or where line stresses are not anticipated, consideration should be given to the "Pressure Vessel" type flanges.)

ANSI B16.1 1975 gives flange diameter, thickness and bolt hole drilling dimensions but do not establish hub dimensions beyond the 24" size. For the *Class 125 and Class 250 ANSI-Type Flanges*, hub proportions have been made as massive as compatible with the dimensions taken over from the standards. These steel flanges accordingly can at least be rated as equal to cast iron flanges of the same pressure class, as is recommended for ordinary uses. Where detailed flange calculations are made following the Rules for Bolted Flanged Connections in Section VIII (Unfired Pressure Vessels Code) of the ASME Boiler Construction Code, higher ratings may be justified.

Where intended for bolting to cast iron valves or fittings having a 0.06" raised face (per ANSI B16.1) the *Class 250 ANSI-Type Flanges* may be used with the raised face dimension per ANSI B16.1 given in the dimension tables, or preferably, the flange may be ordered with a plain or flat facing. In either case, the bolting should be carbon steel equivalent to ASTM A307 Gr. B, without heat treatment other than stress relief. Gaskets should be ring gaskets (which should extend at least to the outside diameter of the raised face) of soft non-metallic material.

The above bolting and gasket suggestions are intended to limit the maximum possible stress that may be placed on the cast iron flanges. Where these flanges are used as companion flanges (not matched up to cast iron valves or fittings), the use of the small raised face dimensions given in the dimension tables is recommended. Possible higher service ratings assignable for such applications will be furnished upon request. Inquiry should state the diameter and thickness of the mating pipe, the type of service and code (if any) controlling the design, the service pressure, the temperature and corrosion allowance desired (if any).

ANSI B16.1-1975

Pressure—Pounds per square inch Gage

NONSHOCK GAGE PRESSURE—TEMPERATURE RATINGS

TEMP. IN ° F	CLASS 125				CLASS 250			
	ASTM A126				ASTM A126			
	CLASS A	CLASS B			CLASS A	CLASS B		
	NPS 1-12	NPS 1-12	NPS 14-24	NPS 30-48	NPS 1-12	NPS 1-12	NPS 14-24	NPS 30-48
-20 to 150	175	200	150	150	400	500	300	300
200	165	190	135	115	370	460	280	250
225	155	180	130	100	355	440	270	225
250	150	175	125	85	340	415	260	200
275	145	170	120	65	325	395	250	175
300	140	165	110	50	310	375	240	150
325	130	155	105	—	295	355	230	125
353 ¹	125	150	100	—	280	335	220	100
375	—	145	—	—	265	315	210	—
406 ²	—	140	—	—	250	290	200	—
425	—	130	—	—	—	270	—	—
450	—	125	—	—	—	250	—	—

¹ 353° F (Max) to reflect the temperature of saturated steam at 125 psig.

² 406° F (Max) to reflect the temperature of saturated steam at 250 psig.

CLASS 75—MAXIMUM PRESSURE RATING
FOR THESE FLANGES IS 100 PSI

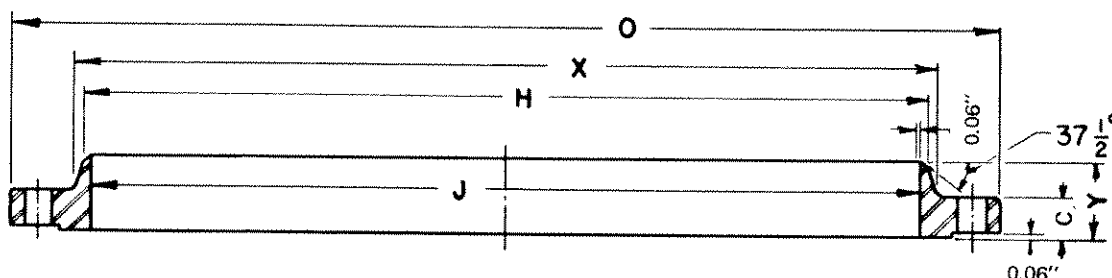
CLASS 75³

Pressure Vessel Flanges¹

WELDING NECK

For Nominal I. D. Vessels²

Part No. 705



ASTM A105⁽²⁾

Nominal I.D. Flange	I.D. J	DIAMETRAL DIMENSIONS			AXIAL DIMENSIONS		DRILLING TEMPLATE			FACING AND GASKET DIMENSIONS		APPROX. WEIGHT PER FLANGE (LB)
		DIAM. OF FLANGE O	LARGE DIAM. OF HUB X	SMALL DIAM. OF HUB H ⁶	THICKNESS OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES ⁷	BOLT CIRCLE DIAM.	DIAM. OF RAISED FACE ⁴	DIMENSIONS OF ASBESTOS COMPOSITION GASKET ³	
16		31.50	27.12		1.25	3.00	32	1.00	29.62	28.62	27.75x28.62	98
18		33.50	29.12		1.25	3.00	36	1.00	31.62	30.62	29.75x30.62	105
20		35.50	31.12		1.25	3.00	36	1.00	33.62	32.62	31.75x32.62	112
22		38.25	33.38		1.25	3.25	36	1.12	36.12	35.00	33.88x35.00	140
24	Dimension To Be Specified By Customer	40.25	35.38		1.25	3.25	40	1.12	38.12	37.00	35.88x37.00	149
26		42.25	37.38		1.25	3.25	40	1.12	40.12	39.00	37.88x39.00	157
28		49.00	43.75		1.25	3.50	48	1.25	46.75	45.50	44.12x45.50	209
30		55.00	49.75		1.25	3.75	52	1.25	52.75	51.50	50.12x51.50	241
34		61.25	56.00		1.38	4.00	64	1.25	59.00	57.75	56.25x57.75	312
40		67.25	62.00		1.62	4.38	72	1.25	65.00	63.75	62.25x63.75	398
46		74.00	68.00		1.88	4.88	72	1.38	71.50	70.12	68.38x70.12	556
52		80.00	74.00		2.25	5.25	80	1.38	77.50	76.12	74.38x76.12	705

Computer precalculated dimensions for most economical Pressure Vessel Flange designs are immediately available in a wide range of sizes for many service conditions.

- (1) These flanges are specially designed by the Rules for Bolted Flanged Connections of the ASME Boiler Construction Code.
- (2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.
- (3) Gaskets other than those shown in the Table may be used provided they are so proportioned as to require no increase in bolt load over that using the specified gasket.
- (4) Other types of facings and lap joint and blind flanges can be furnished but

dimensions shown in the Table may be modified to meet Code rules.

- (5) Intermediate and larger sizes for nominal I.D. shells are also available. All dimensions may be modified without die cost.
- (6) Welding-neck flanges suitable for nominal O.D. shells are also available. When ordering, purchaser should specify the outside diameter and wall thickness of pipe or shell with which flange is to be used.
- (7) Bolting should be carbon steel equivalent to ASTM A307 Gr. B. Bolt diameter is normally 1/8" smaller than bolt hole diameter.

For pressure rating see page 171.

For ordering instructions see page 178.

FOR MATCHING BLIND FLANGES SEE PAGE 165.

CLASS 75³

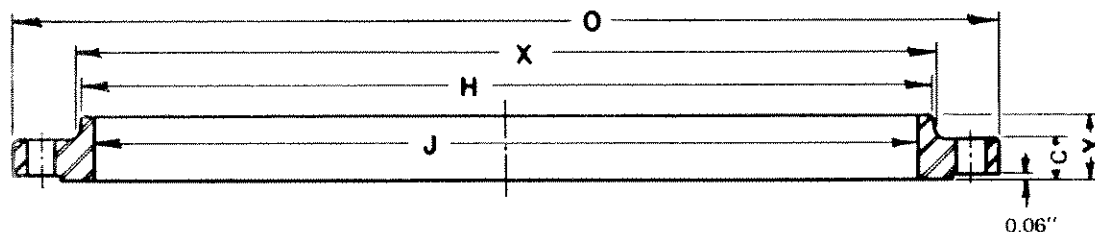
Pressure Vessel Flanges¹

SLIP-ON

For Nominal I. D. Vessels⁶

Part No. 715

CLASS 75—MAXIMUM PRESSURE RATING
FOR THESE FLANGES IS 100 PSI



ASTM A105⁽²⁾

NOMINAL SHELL ⁵ I.D.	DIAMETRAL DIMENSIONS				AXIAL DIMENSIONS		DRILLING TEMPLATE			FACING AND GASKET DIMS.		APPROX. WEIGHT PER FLANGE (LB)
	DIAM. OF FLANGE O	LARGE DIAM. OF HUB X	SMALL DIAM. OF HUB H	DIAM. OF BORE J	THICKNESS OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES ⁷	BOLT CIRCLE DIAM.	DIAM. OF RAISED FACE ⁴	DIMENSIONS OF ASBESTOS COMPOSITION GASKET ³	
26	33.00	28.50			1.25	2.25	32	1.00	31.00	30.00	29.12x30.00	122
28	35.00	30.50			1.25	2.25	36	1.00	33.00	32.00	31.12x32.00	140
30	37.00	32.50			1.25	2.25	36	1.00	35.00	34.00	33.12x34.00	148
32	39.50	34.62			1.25	2.50	40	1.12	37.38	36.25	35.12x36.25	171
34	41.50	36.62	Dimension To Be Specified By Customer	Dimension To Be Specified By Customer	1.25	2.50	40	1.12	39.38	38.25	37.12x38.25	181
36	43.50	38.62			1.25	2.50	44	1.12	41.38	40.25	39.12x40.25	191
42	50.00	44.75			1.25	2.75	48	1.25	47.75	46.50	45.12x46.50	234
48	56.00	50.75			1.25	2.88	56	1.25	53.75	52.50	51.12x52.50	269
54	62.50	57.25			1.38	3.12	68	1.25	60.25	59.00	57.50x59.00	335
60	68.50	63.25			1.62	3.62	72	1.25	66.25	65.00	63.50x65.00	451
66	75.50	69.50			1.75	4.00	72	1.38	73.00	71.62	69.88x71.62	591
72	81.50	75.50			2.00	4.50	80	1.38	79.00	77.62	75.88x77.62	728

(1) These flanges are specifically designed by the Rules for Bolted Flanged Connections of the ASME Boiler Construction Code.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

(3) Gaskets other than those shown in the Table may be used provided they are so proportioned as to require no increase in bolt load over that using the specified gasket.

(4) Other types of facings and lap joint and blind flanges can be furnished but dimensions shown in the Table may be modified to meet Code rules.

(5) Intermediate and larger sizes for nominal I.D. shells are also available. All dimensions may be modified without die cost.

(6) Slip-on flanges suitable for nominal O.D. shells are also available. When ordering, purchaser should specify the outside diameter of pipe or shell with which flange is to be used.

(7) Bolting should be carbon steel equivalent to ASTM A307 Gr. B. Bolt diameter is normally 1/8" smaller bolt hole diameter. Computer precalculated dimensions for most economical Pressure Vessel Flange Designs are immediately available in a wide range of sizes for many service conditions.

For pressure rating see page 171.

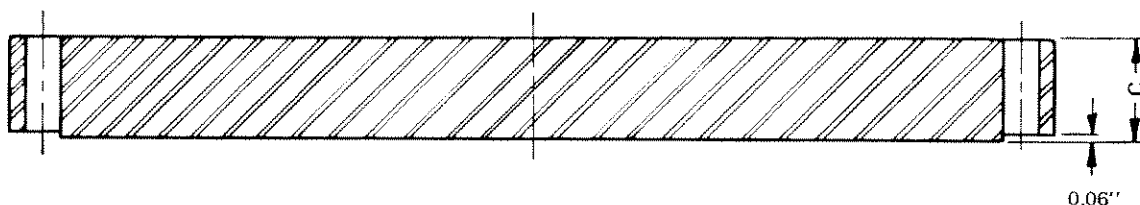
For ordering instructions see page 178.

FOR MATCHING BLIND FLANGES SEE PAGE 165.

Pressure Vessel Flanges¹

BLIND¹

To match welding neck and slip-on flanges on pages 163 & 164.



ASTM A105⁽²⁾

NOMINAL SIZE ^{3,5}	THICKNESS C
26	1.25
28	1.25
30	1.38
32	1.44
34	1.50
36	1.62
42	1.88
48	2.06
54	2.31
60	2.56
66	2.81
72	3.06

(1) These flanges are specially designed using formulas taken from the ASME Boiler Construction Code.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

Raised face is normally furnished.

(3) Intermediate and larger sizes are also available. All dimensions may be modified without die cost.

Facing and gasket dimensions are the same as given for the welding neck and slip-on pressure vessel flanges.

For pressure rating see page 171.

For ordering instructions see page 178.

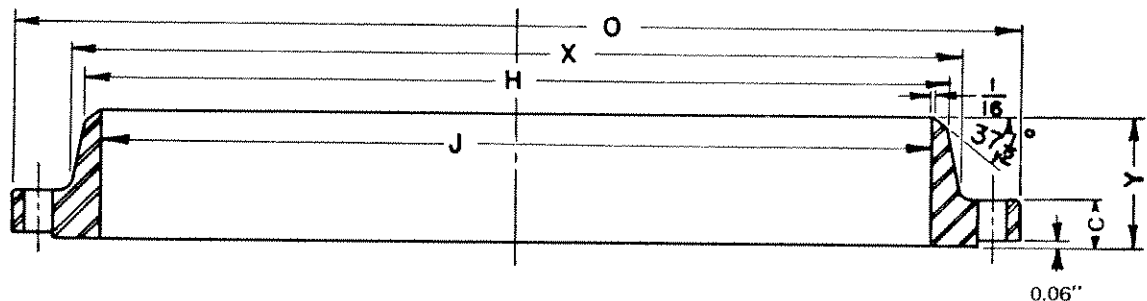
CLASS 175³

Pressure Vessel Flanges¹

WELDING NECK

For Nominal I. D. Vessels⁶

Part No. 703



ASTM A105⁽²⁾

NOMINAL SHELL ⁵	I.D. J	DIAMETRAL DIMENSIONS			AXIAL DIMENSIONS		DRILLING TEMPLATE			FACING AND GASKET DIMS.		APPROX. WEIGHT PER FLANGE (LB)
		DIAM. OF FLANGE O	LARGE DIAM. OF HUB X	SMALL DIAM. OF HUB H ⁶	THICKNESS OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES ⁸	BOLT CIRCLE DIAM.	DIAM. OF RAISED FACE ⁴	DIMENSIONS OF ASBESTOS COMPOSITION GASKET ³	
26	Dimension To Be Specified By Customer	31.50	27.62	Dimension To Be Specified By Customer	1.38	3.38	28	0.88	29.88	29.00	28.00x29.00	119
28		33.50	29.62		1.38	3.38	28	0.88	31.88	31.00	30.00x31.00	128
30		35.75	31.88		1.38	3.62	36	0.88	34.12	33.25	32.00x33.25	152
32		37.75	33.88		1.38	3.62	36	0.88	36.12	35.25	34.00x35.25	162
34		40.25	35.88		1.50	3.75	36	1.00	38.38	37.38	35.88x37.38	193
36		42.25	37.88		1.50	3.75	36	1.00	40.38	39.38	37.88x39.38	204
38		44.25	39.88		1.75	4.12	36	1.00	42.38	41.38	39.88x41.38	245
40		46.25	41.88		1.75	4.12	40	1.00	44.38	43.38	41.88x43.38	257
42		49.00	44.12		2.00	4.50	40	1.12	46.88	45.75	44.00x45.75	342
44		51.00	46.12		2.00	4.50	40	1.12	48.88	47.75	46.00x47.75	359
46		53.00	48.12		2.00	4.50	40	1.12	50.88	49.75	48.00x49.75	375
48		55.00	50.12		2.25	4.88	44	1.12	52.88	51.75	50.00x51.75	430
50		57.00	52.12		2.25	4.88	44	1.12	54.88	53.75	52.00x53.75	448
52		59.50	54.25		2.62	5.38	44	1.25	57.25	56.00	54.00x56.00	562
54		61.50	56.25		2.62	5.38	44	1.25	59.25	58.00	56.00x58.00	584
60		67.50	62.25		2.75	5.75	48	1.25	65.25	64.00	62.00x64.00	682
66		73.50	68.50		3.12	6.12	56	1.25	71.25	70.00	68.00x70.00	830
72		80.00	74.50		3.62	6.62	64	1.25	77.75	76.50	74.00x76.50	1075

(1) These flanges are specially designed by the Rules for Bolted Flanged Connections of the ASME Boiler Construction Code.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

(3) Gaskets other than those shown in the Table may be used provided they are so proportioned as to require no increase in bolt load over that using the specified gasket.

(4) Other types of facings and lap joint flanges can be furnished but dimensions shown in the Table may be modified to meet Code rules.

(5) Intermediate and larger sizes are also available. All dimensions may be modified without die cost.

(6) Welding neck flanges suitable for nominal O.D. shells are also available.

When ordering, purchaser should specify the outside diameter and wall thickness of pipe or shell with which flange is to be used.

(7) Bolting should be alloy steel, ASTM A193 Grade B7 or equal. Bolt diameter is normally 1/8" smaller than bolt hole diameter.

(8) The O.D. of mating nominal I.D. shell provides sufficient wall thickness to withstand the Pressure/Temperature rating of Class 175 Slip-on flanges. If an increased shell thickness is needed for corrosion allowance or shell reinforcement, the increase should be placed at the I.D. of the shell, not at the O.D. The flange bore provides 0.25" for clearance over the nominal O.D. shown. Increasing the bore would result in a reduction in the pressure rating of the flange.

Computer precalculated dimension for most economical Pressure Vessel Flange Designs are immediately available in a wide range of sizes for many service conditions.

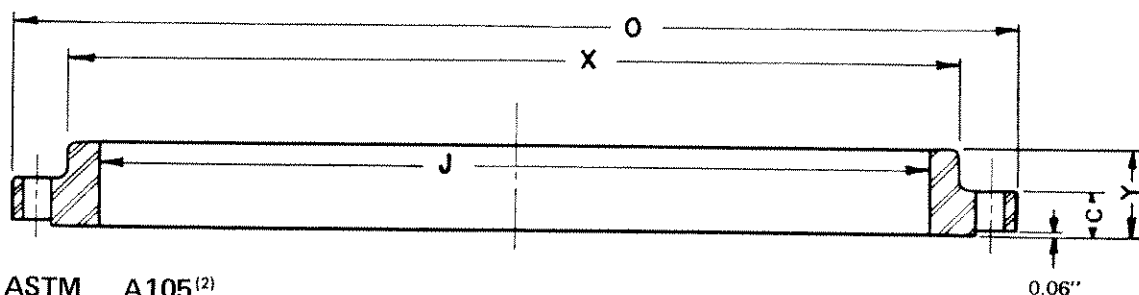
For pressure rating see page 171.

For ordering instructions see page 178.

CLASS 175³ Pressure Vessel Flanges¹

SLIP-ON

For Nominal I.D. and Nominal O.D. Vessels⁶
Part No. 713



ASTM A105⁽²⁾

NOMINAL SHELL ⁵ DIAM.	DIAMETRAL DIMENSIONS			DIAM. OF BORE J	AXIAL DIMENSIONS		DRILLING TEMPLATE			FACING AND GASKET DIMS.		APPROX. WEIGHT PER FLANGE (LB)
	DIAM. OF FLANGE O	LARGE DIAM. OF HUB X	O.D. OF SHELL ⁸		THICKNESS OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES ⁷	BOLT CIRCLE DIAM.	DIAM. OF RAISED FACE ⁴	DIMENSIONS OF ASBESTOS COMPOSITION GASKET ³	
I.D. FLANGES FOR NOMINAL I.D. VESSELS												
26	32.00	28.25	26.75	Dimension To Be Specified By Customer	1.38	2.75	28	0.88	30.50	29.00	28.00x29.00	110
28	34.00	30.25	28.75		1.38	2.75	28	0.88	32.50	31.00	30.00x31.00	125
30	36.50	32.75	31.00		1.38	2.75	36	0.88	35.00	33.25	32.00x33.25	140
32	38.50	34.75	33.00		1.38	2.75	36	0.88	37.00	35.25	34.00x35.25	150
34	41.00	36.75	35.00		1.75	3.38	36	1.00	39.25	37.38	35.88x37.38	200
36	43.00	38.75	37.00		1.75	3.38	36	1.00	41.25	39.38	37.88x39.38	225
38	45.25	41.00	39.00		2.00	3.75	36	1.00	43.50	41.38	39.88x41.38	275
40	47.25	43.00	41.00		2.00	4.00	40	1.00	45.50	43.38	41.88x43.38	300
42	49.75	45.00	43.00		2.38	4.38	40	1.12	47.75	45.75	44.00x45.75	380
44	51.75	47.00	45.00		2.38	4.38	40	1.12	49.75	47.75	46.00x47.75	400
46	54.00	49.25	47.00		2.38	4.62	40	1.12	52.00	49.75	48.00x49.75	450
48	56.00	51.25	49.00		2.62	4.88	44	1.12	54.00	51.75	50.00x51.75	500
50	58.25	53.50	51.25		2.62	4.88	44	1.12	56.50	53.75	52.00x53.75	525
52	60.75	55.50	53.25		3.00	5.38	44	1.25	58.50	56.00	54.00x56.00	640
54	63.00	57.75	55.25		3.00	5.38	44	1.25	60.75	58.00	56.00x58.00	700
60	69.00	63.75	61.25		3.12	5.88	48	1.25	66.75	64.00	62.00x64.00	825
66	75.00	69.75	67.25		4.00	6.88	56	1.25	72.75	70.00	68.00x70.00	1100
72	81.00	75.75	73.25		5.00	8.00	64	1.25	78.75	76.50	74.00x76.50	1425
O.D. FLANGES FOR NOMINAL O.D. VESSELS												
26	31.50	27.62	26.00	Dimension To Be Specified By Customer	1.38	2.75	28	0.88	29.88	29.00	28.00x29.00	109
28	33.50	29.62	28.00		1.38	2.75	28	0.88	31.88	31.00	30.00x31.00	117
30	35.75	31.88	30.00		1.38	2.75	36	0.88	34.12	33.25	32.00x33.25	134
32	37.75	33.88	32.00		1.38	2.75	36	0.88	36.12	35.25	34.00x35.25	143
34	40.25	35.88	34.00		1.75	3.38	36	1.00	38.38	37.38	35.88x37.38	201
36	42.25	37.88	36.00		1.75	3.38	36	1.00	40.38	39.38	37.88x39.38	212
38	44.25	39.88	38.00		2.00	3.75	36	1.00	42.38	41.38	39.88x41.38	253
40	46.25	41.88	40.00		2.00	4.00	40	1.00	44.38	43.38	41.88x43.38	269
42	49.00	44.12	42.00		2.38	4.38	40	1.12	46.88	45.75	44.00x45.75	369
44	51.00	46.12	44.00		2.38	4.38	40	1.12	48.88	47.75	46.00x47.75	386
46	53.00	48.12	46.00		2.38	4.62	40	1.12	50.88	49.75	48.00x49.75	412
48	55.00	50.12	48.00		2.62	4.88	44	1.12	52.88	51.75	50.00x51.75	464
50	57.00	52.12	50.00		2.62	4.88	44	1.12	54.88	53.75	52.00x53.75	484
52	59.50	54.25	52.00		3.00	5.38	44	1.25	57.25	56.00	54.00x56.00	602
54	61.50	56.25	54.00		3.00	5.38	44	1.25	59.25	58.00	56.00x58.00	625
60	67.50	62.25	60.00		3.12	5.88	48	1.25	65.25	64.00	62.00x64.00	751
66	73.50	68.50	66.00		4.00	6.88	56	1.25	71.25	70.00	68.00x70.00	987
72	80.00	74.50	72.00		5.00	8.00	64	1.25	77.75	76.50	74.00x76.50	1382

See page 166 for notes.

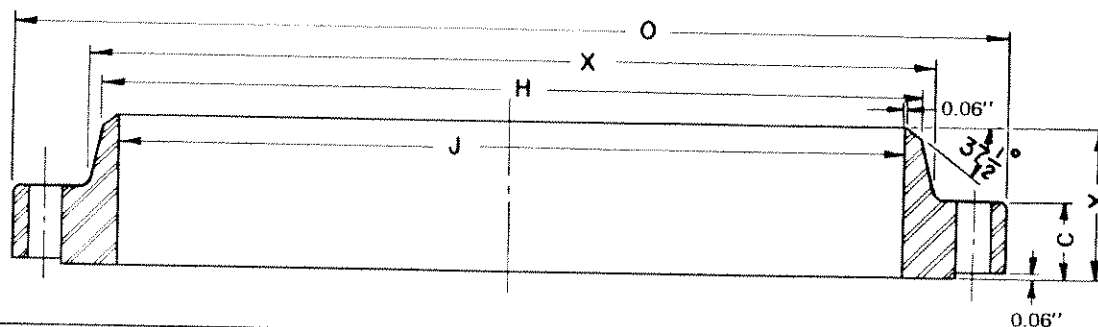
CLASS 350³

Pressure Vessel Flanges¹

WELDING NECK

For Nominal I. D. Vessels⁶

Part No. 704



ASTM A105⁽²⁾

NOMINAL SHELL ⁵	I.D. J	DIAMETRAL DIMENSIONS			AXIAL DIMENSIONS		DRILLING TEMPLATE			FACING AND GASKET DIMS.		APPROX. WEIGHT PER FLANGE (LB)
		DIAM. OF FLANGE O	LARGE DIAM. OF HUB X	SMALL DIAM. OF HUB H ⁶	THICKNESS OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES ⁷	BOLT CIRCLE DIAM.	DIAM. OF RAISED FACE ⁴	DIMENSIONS OF ASBESTOS COMPOSITION GASKET ³	
26		32.75	27.88		2.50	5.00	28	1.12	30.62	29.50	28.50x29.50	244
28		34.75	29.88		2.50	5.00	28	1.12	32.62	31.50	30.50x31.50	262
30		37.00	32.12		2.62	5.25	32	1.12	34.88	33.75	32.50x33.75	307
32		39.00	34.12		2.75	5.50	36	1.12	36.88	35.75	34.50x35.75	338
34	Dimension To Be Specified By Customer	41.00	36.12	Dimension To Be Specified By Customer	2.88	5.75	40	1.12	38.88	37.75	36.50x37.75	373
36		43.75	38.50		3.12	6.12	40	1.25	41.50	40.25	38.75x40.25	479
38		45.75	40.50		3.12	6.12	40	1.25	43.50	42.25	40.75x42.25	506
40		47.75	42.50		3.25	6.25	44	1.25	45.50	44.25	42.50x44.25	545
42		50.00	44.75		3.50	6.50	48	1.25	47.75	46.50	44.50x46.50	637
44		52.75	46.75		3.75	6.75	44	1.38	50.25	48.88	46.88x48.88	764
46		54.75	48.75		4.25	7.25	48	1.38	52.25	50.88	48.88x50.88	884
48		56.75	50.75		4.25	7.25	48	1.38	54.25	52.88	50.88x52.88	920

(1) These flanges are specially designed by the Rules for Bolted Flanges Connections of the ASME Boiler Construction Code.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.

(3) Gaskets other than those shown in the Table may be used provided they are so proportioned as to require no increase in bolt load over that using the specified gasket.

(4) Other types of facings and lap joint flanges can be furnished but dimensions shown in the Table may be modified to meet Code rules.

(5) Intermediate and larger sizes for nominal I.D. shells are also available. All dimensions may be modified without die cost.

(6) Welding neck flanges suitable for nominal O.D. shells are also available. When ordering, purchaser should specify the outside diameter and wall thickness of pipe or shell with which flange is to be used.

(7) Bolting should be alloy steel, ASTM A193 Grade B7 or equal. Bolt diameter is normally 1/8" smaller than bolt hole diameter. Computer precalculated dimensions for most economical Pressure Vessel Flange Designs are immediately available in a wide range of sizes for many service conditions.

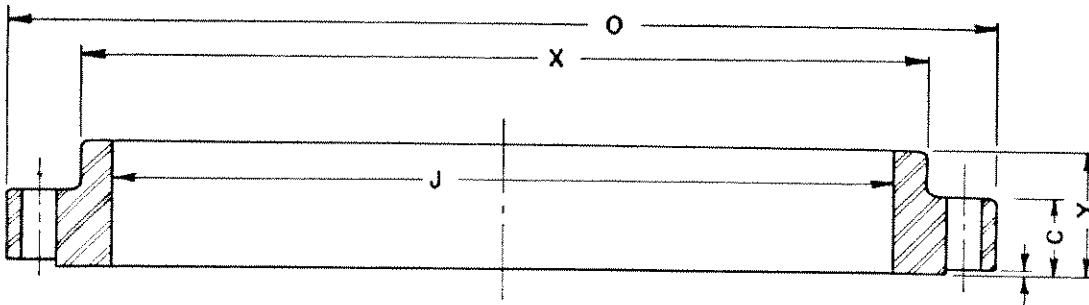
For pressure rating see page 171.

For ordering instructions see page 178.

FOR MATCHING BLIND FLANGES SEE PAGE 170.

CLASS 350³ Pressure Vessel Flanges¹ SLIP-ON

For Nominal I. D. and Nominal O. D. Vessels⁶
Part No. 714



ASTM A105⁽²⁾

0.06"

NOMINAL SHELL ⁵ DIAM.	DIAMETRAL DIMENSIONS			DIAM. OF BORE J	AXIAL DIMENSIONS		DRILLING TEMPLATE			FACING AND GASKET DIMS.		APPROX. WEIGHT PER FLANGE (LB)
	DIAM. OF FLANGE O	LARGE DIAM. OF HUB X	O.D. OF SHELL ⁸		THICKNESS OF FLANGE C	OVERALL LENGTH Y	NO. OF BOLT HOLES	DIAM. OF BOLT HOLES ⁷	BOLT CIRCLE DIAM.	DIAM. OF RAISED FACE ⁴	DIMENSIONS OF ASBESTOS COMPOSITION GASKET ³	
26	33.50	28.75	27.00	Dimension To Be Specified By Customer	2.50	4.50	28	1.12	31.50	29.50	28.50x29.50	230
28	35.50	30.75	29.00		2.50	4.50	28	1.12	33.50	31.50	30.50x31.50	250
30	37.75	33.00	31.00		2.62	4.75	32	1.12	35.75	33.75	32.50x33.75	310
32	39.75	35.00	33.00		2.75	5.00	36	1.12	37.75	35.75	34.50x35.75	340
34	42.25	37.50	35.25		2.88	5.12	40	1.12	40.25	37.75	36.50x37.75	375
36	44.75	39.50	37.25		3.12	5.62	40	1.25	42.50	40.25	38.75x40.25	470
38	46.75	41.50	39.25		3.12	5.62	40	1.25	44.50	42.25	40.75x42.25	490
40	48.75	43.50	41.25		3.25	5.88	44	1.25	46.50	44.25	42.50x44.25	530
42	51.25	46.00	43.50		3.50	6.12	48	1.25	49.00	46.50	44.50x46.50	630
44	54.00	48.00	45.50		3.75	6.75	44	1.38	51.50	48.88	46.88x48.88	765
46	56.00	50.00	47.50		4.25	7.25	48	1.38	53.50	50.88	48.88x50.88	830
48	58.25	52.25	49.75		4.25	7.25	48	1.38	55.75	52.88	50.88x52.88	925

O.D.

FLANGES FOR NOMINAL O.D. VESSELS

26	32.75	27.88	26.00	Dimension To Be Specified By Customer	2.50	4.50	28	1.12	30.62	29.50	28.50x29.50	231
28	34.75	29.88	28.00		2.50	4.50	28	1.12	32.62	31.50	30.50x31.50	249
30	37.00	32.12	30.00		2.62	4.75	32	1.12	34.88	33.75	32.50x33.75	298
32	39.00	34.12	32.00		2.75	5.00	36	1.12	36.88	35.75	34.50x35.75	327
34	41.00	36.12	34.00		2.88	5.12	40	1.12	38.88	37.75	36.50x37.75	357
36	43.75	38.50	36.00		3.12	5.62	40	1.25	41.50	40.25	38.75x40.25	464
38	45.75	40.50	38.00		3.12	5.62	40	1.25	43.50	42.25	40.75x42.25	488
40	47.75	42.50	40.00		3.25	5.88	44	1.25	45.50	44.25	42.50x44.25	533
42	50.00	44.75	42.00		3.50	6.12	48	1.25	47.75	46.50	44.50x46.50	622
44	52.75	46.75	44.00		3.75	6.75	44	1.38	50.25	48.88	46.88x48.88	763
46	54.75	48.75	46.00		4.25	7.25	48	1.38	52.25	50.88	48.88x50.88	878
48	56.75	50.75	48.00		4.25	7.25	48	1.38	54.25	52.88	50.88x52.88	915

(1) These flanges are specially designed by the Rules for Bolted Flanged Connections of the ASME Boiler Construction Code.

(2) Flanges are carbon steel A 105 unless specified otherwise (same as ASME Boiler Construction Code SA 105). Flanges can also be furnished in any other material that can be forged or rolled.

(3) Gaskets other than those shown in the Table may be used provided they are so proportioned as to require no increase in bolt load over that using the specified gasket.

(4) Other types of facings and lap joint flanges can be furnished but dimensions shown in the Table may be modified to meet Code rules.

(5) Intermediate and larger sizes are also available. All dimensions may be modified without die cost.

(6) When ordering, purchaser should specify the outside diameter of pipe or shell with which flange is to be used.

(7) Bolting should be alloy steel, ASTM A193 Grade B7 or equal. Bolt diameter is normally 1/8" smaller than bolt hole diameter.

(8) The O.D. of mating nominal I.D. shell provides sufficient wall thickness to withstand the Pressure/Temperature rating of Class 350 Slip-on flanges. If an increased shell thickness is needed for corrosion allowance or shell reinforcement, the increase should be placed at the I.D. of the shell, not at the O.D. The flange bore provides 0.25" for clearance over the nominal O.D. shown. Increasing the bore would result in a reduction in the pressure rating of the flange.

Computer precalculated dimensions for most economical Pressure Vessel Flange Designs are immediately available in a wide range of sizes for many service conditions.

For pressure rating see page 171.

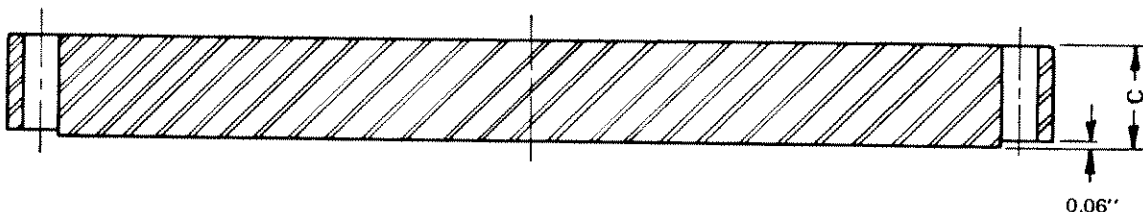
For ordering instructions see page 178.

FOR MATCHING BLIND FLANGES SEE PAGE 170.

Pressure Vessel Flanges¹

Part No. 723 **BLIND** **Part No. 724**
TO MATCH CLASS 175 TO MATCH CLASS 350

To match welding neck and slip-on flanges on pages 166 thru 169.



ASTM A105⁽²⁾

NOMINAL SIZE ³	PRESSURE VESSEL BLIND FLANGES						PRESSURE VESSEL BLIND FLANGES					
	WELDING NECK TO MATCH O.D. AND DRILLING OF FLANGES ON PAGE 166		SLIP-ON TO MATCH O.D. AND DRILLING OF FLANGES ON PAGE 167				WELDING NECK TO MATCH O.D. AND DRILLING OF FLANGES ON PAGE 168		SLIP-ON TO MATCH O.D. AND DRILLING OF FLANGES ON PAGE 169			
	THICKNESS OF FLANGE C	APPROX. WT. PER FLANGE (LB)	NOMINAL I.D.		NOMINAL O.D.		THICKNESS OF FLANGE C	APPROX. WT. PER FLANGE (LB)	NOMINAL I.D.		NOMINAL O.D.	
			THICKNESS C	APPROX. WT. (LB)	THICKNESS C	APPROX. WT. (LB)			THICKNESS C	APPROX. WT. (LB)	THICKNESS C	APPROX. WT. (LB)
26	1.81	410	1.81	425	1.88	407	2.50	600	2.50	610	2.75	636
28	1.88	480	1.94	510	2.00	492	2.62	705	2.62	735	2.88	752
30	2.00	580	2.12	640	2.12	596	2.88	835	2.88	870	3.00	892
32	2.12	690	2.25	755	2.25	705	3.00	1010	3.00	1050	3.25	1091
34	2.25	825	2.38	900	2.38	844	3.12	1185	3.12	1260	3.38	1230
36	2.38	955	2.50	1045	2.50	981	3.38	1425	3.38	1490	3.62	1500
38	2.50	1100	2.62	1210	2.62	1130	3.50	1620	3.50	1690	3.75	1702
40	2.62	1260	2.75	1375	2.75	1294	3.69	1855	3.69	1935	4.00	1981
42	2.75	1515	2.88	1600	2.88	1514	3.88	2135	3.88	2250	4.12	2237
44	2.88	1680	3.00	1765	3.00	1714	4.00	2490	4.00	2600	4.38	2639
46	3.00	1890	3.12	2045	3.12	1931	4.25	2800	4.25	2935	4.75	3082
48	3.12	2115	3.25	2285	3.38	2244	4.38	3100	4.38	3275	4.75	3318
50	3.25	2370	3.38	2565	3.38	2412						
52	3.38	2675	3.50	2890	3.62	2815						
54	3.50	2960	3.62	3220	3.62	3011						
60	3.88	3950	4.00	4260	4.00	4050						
66	4.25	5135	4.38	5495	4.38	5250						
72	4.50	6515	5.00	6770	5.00	6730						

(1) These flanges are specially designed using formulas taken from the ASME Boiler Construction Code.

(2) Flanges are carbon steel A105 unless specified otherwise (same as ASME Boiler Construction Code SA105). Flanges can also be furnished in any other material that can be forged or rolled.
Raised face is normally furnished.

(3) Intermediate and larger sizes are also available. All dimensions may be modified without die cost.

Facing and gasket dimensions are the same as given for the welding neck and slip-on pressure vessel flanges.

Computer precalculated dimensions for most economical Pressure Vessel Flange Designs are immediately available in a wide range of sizes for many service conditions.

For pressure ratings see page 171.

For ordering instructions see page 178.

PRESSURE VESSEL FLANGES

The classes of flanges designated herein as *Pressure Vessel Flanges* have been individually engineered to comply in all respects with the ASME Code. Welding neck and slip-on flanges were engineered in accordance with the Rules of Bolted Flanged Connections, Section VIII (Unfired Pressure Vessels Code) of the ASME Boiler Construction Code. Blind flanges were engineered in accordance with formulas taken from the ASME Code.

Pressure Vessel Flanges derive their designation from the circumstance that they were designed by a procedure well established for pressure vessel work and find their principal field of application on pressure vessels. These flanges are often adaptable, however, to piping applications. They may be used in place of ANSI type flanges where the drilling is not required to match that of valves or fittings and where bending moments and line stresses are not an important consideration. They offer a more economical product with the weight being reduced in some cases to as little as one-half that of comparable ANSI type flanges.

Ratings for the Pressure Vessel Flanges made of carbon steel (ASTM A105) have been recalculated taking advantage of the Unfired Pressure Vessel Code revisions and are tabulated below. Ratings at other temperatures as well as for other ferrous or non-ferrous materials are available upon request.

COMPUTER DESIGNED FLANGES

Tube Turns has conducted an extensive computer program to predetermine the most economical proportions for Pressure Vessel Flanges. This program covered a wide range of sizes for many service conditions. The results enable Tube Turns to provide immediately the most economical product for a given service.

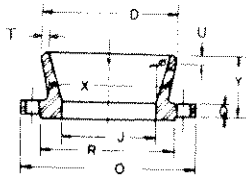
PRESSURE/TEMPERATURE RATINGS FOR PRESSURE VESSEL FLANGES

CLASS	TYPE	MAX. NON-SHOCK PRESSURE RATING	
		TEMP T	A105
Class 75	Welding Neck	-20 to 450*	100 psi
		-20 to 775**	
	Slip-On	-20 to 450* -20 to 775**	100 psi
Class 175	Blind	-20 to 775**	100 psi
	Welding Neck	-20 to 750	200 psi
		-20 to 775	200 psi
	Slip-on	-20 to 700	190 psi
		-20 to 750 -20 to 775	170 psi 150 psi
Class 350	Welding Neck	-20 to 750	375 psi
		-20 to 775	375 psi
	Slip-on	-20 to 650	350 psi
		-20 to 700	350 psi
		-20 to 750 -20 to 775	350 psi 315 psi

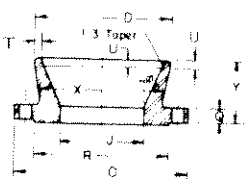
* Service limited to 450°F with un-heat-treated carbon steel bolts.

** Requires A193-B7 bolting or equivalent to be suitable for up to 775°F.

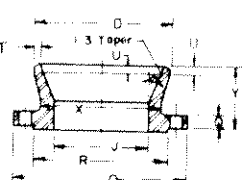
Tube Turns® Carbon Steel Expander Flanges



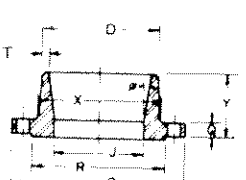
DESIGN A



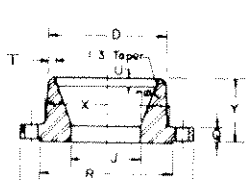
DESIGN B



DESIGN C



DESIGN D



DESIGN E

NOM. PIPE SIZE	DIAM. OF HUB AT BEVEL D	WALL THICKNESS T	OUTSIDE DIAM. OF FLANGE O	DIAM. OF BORE J	DIAM. OF HUB AT BASE X	THICKNESS OF FLANGE Q*	LENGTH THRU HUB Y*	SLOPE AT BEVEL θ	DIAM. OF RAISED FACE R	COMPOUND TAPER U	BOLT CIRCLE DIAM.	NUMBER OF BOLT HOLES	BOLT HOLE DIAM.	DESIGN
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CLASS 150

2x 3	3.50	.216	6.00	2.07	3.06	0.75	2.50	16°	3.62	0.50	4.75	4	0.75	A
2x 4	4.50	.237	6.00	2.07	3.06	0.75	3.62	29°†	3.62	0.50	4.75	4	0.75	C
3x 4	4.50	.237	7.50	3.07	4.25	0.94	2.75	15°	5.00	0.50	6.00	4	0.75	A
4x 6	6.62	.280	9.00	4.03	5.31	0.94	3.25	30°†	6.19	0.50	7.50	8	0.75	C
6x 8	8.62	.322	11.00	6.07	7.56	1.00	4.00	28°†	8.50	0.50	9.50	8	0.88	C
8x10	10.75	.365	13.50	7.98	9.69	1.12	4.00	29°†	10.62	0.50	11.75	8	0.88	C
8x12	12.75	.375	13.50	7.98	9.69	1.12	6.12	28°†	10.62	0.62	11.75	8	0.88	C
10x12	12.75	.375	16.00	10.02	12.00	1.19	4.06	29°†	12.75	0.62	14.25	12	1.00	C
10x14	14.00	.375	16.00	10.02	12.00	1.19	5.44	30°†	12.75	0.62	14.25	12	1.00	C
12x14	14.00	.375	19.00	12.00	14.38	1.25	4.50	11°	15.00		17.00	12	1.00	D
12x16	16.00	.375	19.00	12.00	14.38	1.25	4.81	30°†	15.00	0.62	17.00	12	1.00	C
14x16	16.00	.375	21.00	13.25	15.75	1.38	5.00	15°	16.25	0.62	18.75	12	1.12	A
14x18	18.00	.375	21.00	13.25	15.75	1.38	5.69	30°†	16.25	0.62	18.75	12	1.12	C
18x20	20.00	.375	25.00	17.25	19.88	1.56	5.50	14°	21.00	0.62	22.75	16	1.25	A
18x24	24.00	.375	25.00	17.25	19.88	1.56	8.81	28°†	21.00	0.62	22.75	16	1.25	C
20x24	24.00	.375	27.50	19.25	22.00	1.69	6.44	30°†	23.00	0.62	25.00	20	1.25	C
24x30	30.00	.375	32.00	23.25	26.12	1.88	8.75	30°†	27.25	0.75	29.50	20	1.38	C

CLASS 300

2x 3	3.50	.216	6.50	2.07	3.31	0.88	2.75	15°	3.62	0.50	5.00	8	0.75	A
2x 4	4.50	.237	6.50	2.07	3.31	0.88	3.69	28°†	3.62	0.50	5.00	8	0.75	C
3x 4	4.50	.237	8.25	3.07	4.62	1.12	3.12	13°	5.00		6.62	8	0.88	D
4x 6	6.62	.280	10.00	4.03	5.75	1.25	3.81	30°†	6.19	0.50	7.88	8	0.88	C
6x 8	8.62	.322	12.50	6.07	8.12	1.44	3.88	22°†	8.50	0.50	10.62	12	0.88	B
8x10	10.75	.365	15.00	7.98	10.25	1.62	4.38	20°	10.62	0.50	13.00	12	1.00	A
10x12	12.75	.375	17.50	10.02	12.62	1.88	4.62	20°	12.75	0.62	15.25	16	1.12	A
12x14	14.00	.375	20.50	12.00	14.75	2.00	5.12	11°	15.00		17.75	16	1.25	D
14x16	16.00	.375	23.50	13.25	16.75	2.12	5.62	16°	16.25		20.25	20	1.25	D
16x18	18.00	.375	25.50	15.25	19.00	2.25	5.75	16°	18.50		22.50	20	1.38	D
18x20	20.00	.375	28.00	17.25	21.00	2.38	6.25	14°	21.00		24.75	24	1.38	D
20x24	24.00	.375	30.50	19.25	23.12	2.50	6.38	29°†	23.00	0.62	27.00	24	1.38	B
24x30	30.00	.625	36.00	23.25	27.62	2.75	8.00	30°†	27.25	0.75	32.00	24	1.62	C

CLASS 600

2x 3	3.50	.300	6.50	1.94	3.31	1.00	2.88	14°	3.62	0.50	5.00	8	0.75	A
2x 4	4.50	.337	6.50	1.94	3.31	1.00	3.75	29°†	3.62	0.50	5.00	8	0.75	C
3x 4	4.50	.337	8.25	2.90	4.62	1.25	3.25	13°	5.00		6.62	8	0.88	D
4x 6	6.62	.432	10.75	3.83	6.00	1.50	4.00	21°	6.19	0.62	8.50	8	1.00	A
6x 8	8.62	.500	14.00	5.76	8.75	1.88	4.62	19°	8.50		11.50	12	1.12	D
8x10	10.75	.500	16.50	7.63	10.75	2.19	5.25	19°	10.62		13.75	12	1.25	D
10x12	12.75	.500	20.00	9.75	13.50	2.50	6.00	16°	12.75		17.00	16	1.38	D
12x14	14.00	.500	22.00	11.75	15.75	2.62	6.12	10°	15.00		19.25	20	1.38	D
14x16	16.00	.562	23.75	13.00	17.00	2.75	6.50	14°	16.25		20.75	20	1.50	D
16x18	18.00	.625	27.00	14.88	19.50	3.00	7.00	13°	18.50		23.75	20	1.62	D
18x20	20.00	.687	29.25	16.75	21.50	3.25	7.25	13°	21.00		25.75	20	1.75	D
20x24	24.00	.812	32.00	18.62	24.00	3.50	7.50	27°†	23.00	1.00	28.50	24	1.75	E
24x30	30.00	1.000	37.00	22.38	28.25	4.00	9.94	30°†	27.25	1.00	33.00	24	2.00	C

* Includes 0.06" raised face for Class 150 and Class 300. Does not include 0.25" raised face for Class 600.

† The slope at the welding bevel approximates 1:3 max in sizes marked (†), the flange bore has a compound-angle taper of 18° through dimension "U" and the remaining taper as indicated.

Designs A, B and C require insertion of bolts from face side of expander flanges. Bolts may be inserted from either back or face side of Design D or E. Expander flanges to accept bolts from the face can be furnished in all sizes and pressure on special order.

MATERIAL: CLASSES 150, 300 and 600 are ASTM A105 Carbon Steel.

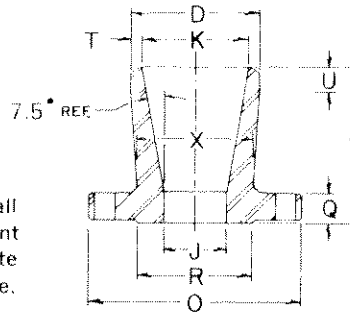
OTHER SIZES AND MATERIALS: Expander flanges are furnished on special order in other sizes to 72", other reductions; and other materials, including high yield strength carbon steel, stainless steels, aluminum and other alloys.

THE OVERALL LENGTHS LISTED HERE ARE FOR STANDARD BORE FLANGES.
THE OVERALL LENGTH MAY VARY FOR BORES OTHER THAN STANDARD.

Tube Turns®

Carbon Steel

NOTE: Tube Turns should be contacted for exact overall lengths if wall thicknesses and/or bores are different from those contained in the table. Please designate bore wall thickness, and yield of the matching pipe.



VENTURI EXPANDER FLANGES

CLASS 150

NOM PIPE SIZE	DIAM OF HUB AT REVEL D	WALL THICK- NESS T	OUTSIDE DIAM OF FLANGE O	DIAM OF BORE J	DIAM OF BORE K	DIAM OF HUB AT BASE X	THICK- NESS OF FLANGE Q*	LENGTH THRU HUB Y*	DIAM OF RAISED FACE R	TAN- GENT LENGTH U	BOLT CIRCLE DIAM	NO. OF BOLT HOLES	BOLT HOLE DIAM
2 x 3	3.50	.216	6.00	2.07	3.068	3.06	0.75	4.56	3.62	0.50	4.75	4	0.75
2 x 4	4.50	.237	6.00	2.07	4.026	3.06	0.75	8.25	3.62	0.50	4.75	4	0.75
3 x 4	4.50	.237	7.50	3.07	4.026	4.25	0.94	4.62	5.00	0.50	6.00	4	0.75
4 x 6	6.62	.280	9.00	4.03	6.065	5.31	0.94	8.69	6.19	0.50	7.50	8	0.75
6 x 8	8.62	.322	11.00	6.07	7.981	7.56	1.00	8.31	8.50	0.50	9.50	8	0.88
8 x 10	10.75	.365	13.50	7.98	10.020	9.69	1.12	8.88	10.62	0.50	11.75	8	0.88
8 x 12	12.75	.375	13.50	7.98	12.00	9.69	1.12	16.44	10.62	0.62	11.75	8	0.88
10 x 12	12.75	.375	16.00	10.02	12.00	12.00	1.19	8.75	12.75	0.62	14.25	12	1.00
10 x 14	14.00	.375	16.00	10.02	13.25	12.00	1.19	13.50	12.75	0.62	14.25	12	1.00
12 x 14	14.00	.375	19.00	12.00	13.25	14.38	1.25	6.00	15.00	0.62	17.00	12	1.00
12 x 16	16.00	.375	19.00	12.00	15.25	14.38	1.25	13.62	15.00	0.62	17.00	12	1.00
14 x 16	16.00	.375	21.00	13.25	15.25	15.75	1.38	9.00	16.25	0.62	18.75	12	1.12
14 x 18	18.00	.375	21.00	13.25	17.25	15.75	1.38	16.62	16.25	0.62	18.75	12	1.12
18 x 20	20.00	.375	25.00	17.25	19.25	19.88	1.56	9.19	21.00	0.62	22.75	16	1.25
18 x 24	24.00	.375	25.00	17.25	23.25	19.88	1.56	24.38	21.00	0.62	22.75	16	1.25
20 x 24	24.00	.375	27.50	19.25	23.25	22.00	1.69	16.94	23.00	0.62	25.00	20	1.25
24 x 30	30.00	.375	32.00	23.25	29.25	26.12	1.88	24.69	27.25	0.75	29.50	20	1.38

CLASS 300

2 x 3	3.50	.216	6.50	2.07	3.068	3.31	0.88	4.69	3.62	0.50	5.00	8	0.75
2 x 4	4.50	.237	6.50	2.07	4.026	3.31	0.88	8.38	3.62	0.50	5.00	8	0.75
3 x 4	4.50	.237	8.25	3.07	4.026	4.62	1.12	4.81	5.00	0.50	6.62	8	0.88
4 x 6	6.62	.280	10.00	4.03	6.065	5.75	1.25	9.00	6.19	0.50	7.88	8	0.88
6 x 8	8.62	.322	12.50	6.07	7.981	8.12	1.44	8.75	8.50	0.50	10.62	12	0.88
8 x 10	10.75	.365	15.00	7.98	10.02	10.25	1.62	9.38	10.62	0.50	13.00	12	1.00
10 x 12	12.75	.375	17.50	10.02	12.00	12.62	1.88	9.44	12.75	0.62	15.25	16	1.12
12 x 14	14.00	.375	20.50	12.00	13.25	14.75	2.00	6.75	15.00	0.62	17.75	16	1.25
14 x 16	16.00	.375	23.00	13.25	15.25	16.75	2.12	9.75	16.25	0.62	20.25	20	1.25
16 x 18	18.00	.375	25.50	15.25	17.25	19.00	2.25	9.88	18.50	0.62	22.50	20	1.38
18 x 20	20.00	.375	28.00	17.25	19.25	21.00	2.38	10.00	21.00	0.62	24.75	24	1.38
20 x 24	24.00	.375	30.50	19.25	23.25	23.12	2.50	17.75	23.00	0.62	27.00	24	1.38
24 x 30	30.00	.625	36.00	23.25	28.75	27.62	2.75	23.69	27.25	0.75	32.00	24	1.62

CLASS 600

2 x 3	3.50	.300	6.50	1.94	2.90	3.31	1.00	4.69	3.62	0.50	5.00	8	0.75
2 x 4	4.50	.337	6.50	1.94	3.826	3.31	1.00	8.19	3.62	0.50	5.00	8	0.75
3 x 4	4.50	.337	8.25	2.90	3.826	4.62	1.25	4.81	5.00	0.50	6.62	8	0.88
4 x 6	6.62	.432	10.75	3.83	5.761	6.00	1.50	8.88	6.19	0.62	8.50	8	1.00
6 x 8	8.62	.500	14.00	5.76	7.625	8.75	1.88	9.00	8.50	0.62	11.50	12	1.12
8 x 10	10.75	.500	16.50	7.63	9.75	10.75	2.19	10.31	10.62	0.62	13.75	12	1.25
10 x 12	12.75	.500	20.00	9.75	11.75	13.50	2.50	10.12	12.75	0.62	17.00	16	1.38
12 x 14	14.00	.500	22.00	11.75	13.00	15.75	2.62	7.38	15.00	0.62	19.25	20	1.38
14 x 16	16.00	.562	23.75	13.00	14.875	17.00	2.75	9.88	16.25	0.75	20.75	20	1.50
16 x 18	18.00	.625	27.00	14.88	16.75	19.50	3.00	10.12	18.50	0.75	23.75	20	1.62
18 x 20	20.00	.688	29.25	16.75	18.625	21.50	3.25	10.38	21.00	0.88	25.75	20	1.75
20 x 24	24.00	.812	32.00	18.62	22.375	24.00	3.50	17.75	23.00	1.00	28.50	24	1.75
24 x 30	30.00	1.000	37.00	22.38	28.00	28.25	4.00	25.38	27.25	1.00	33.00	24	2.00

* Includes 0.06" raised face for Class 150 and Class 300. Does not include 0.25" raised face for Class 600.

MATERIAL: Class 150, Class 300 and Class 600 are ASTM A105 Carbon Steel.

OTHER SIZES AND MATERIALS: Tube Turns Expander Flanges are furnished on special order in other sizes to 72", other reductions and other materials, including high yield strength carbon steel, stainless steels, aluminum and other alloys.

THE OVERALL LENGTHS LISTED HERE ARE FOR STANDARD BORE FLANGES.
THE OVERALL LENGTH MAY VARY FOR BORES OTHER THAN STANDARD.

Tube Turns' engineering skills and production facilities are not limited to the production of the more or less standardized and commonplace flanges described elsewhere in this catalogue. Instead, we regularly design and manufacture flanges that are beyond the scope of all but the most experienced manufacturer. Among these are:

GENERAL PURPOSE FLANGES

Tube Turns is prepared to manufacture flanges of any desired dimension, type or metal on special order. Long experience in helping develop codes and national Standards and in advancing flange forging techniques, permits Tube Turns to approach flange design problems from the user's point of view. Balance in design is achieved and costly refinements are eliminated. This results in improved flanges at the most economical price. Tube Turns' Product Engineering Department is at the disposal of customers desiring assistance in calculating ratings for flanges for which pressure/temperature ratings are not given in this catalogue.

HEAT EXCHANGER FLANGES

In its latest Standards, The Tubular Exchanger Manufacturers Association (TEMA) requires that basic rules of the ASME Boiler Code be applied in the design of flanges and other heat exchanger components. Specific requirements are given as to bolting, wrench clearance, gasketing and other design features which enable flanges to be designed for maximum economy and over-all compactness consistent with safety and service requirements. Standard sizes range from 5" through 60" for pressure classes of 75, 150, 300, 450 and 600 psi. These flanges are available in carbon steel, low and intermediate alloys, non-ferrous metals, and other metals that can be forged or rolled.

PIPE LINE GATE VALVE FLANGES

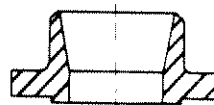
Tube Turns regularly furnished welding neck, slip-on threaded and blind flanges matching non-standard oil pipe line gate valves, such as Ludlow No. 8, Chapman No. 106, Crane No. 2154, Walworth No. 850F and 855F, Darling No. 162 and Wescott 800 lb WOG Pipe Line Standard.

CLASS 150 CORROSION-RESISTANT FLANGES

When service conditions are not extreme and Code compliance is not required, the Tube Turns Class 150 corrosion-resistant stainless steel flange is often recommended. This flange is ideal for attachment to Schedule 5S or 10S pipe, and has a maximum rating of 150 psi at 500°F, and of 225 psi at 150°F when used with a full face gasket. Outside diameter and drilling meet ANSI B16.5 — Class 150 lb flange standard, and MSS SP-42 — 150 lb valve standard. It is available from stock in sizes ½" through 6" and in welding neck, slip-on and blind types.

EXPANDER FLANGES

Economics and good design practice requires that the pipe size be increased at flanged connections to pumps, compressors, valves and similar equipment. The TUBE TURNS Expander Flange provides a less expensive, more compact means of effecting this transition than the conventional welding neck flange and concentric reducer combination. The Expander Flange is a one piece, welding neck forging that is taper bored to match the connecting pipe sizes. It eliminates the need for a concentric reducer, saves one circumferential butt-weld and saves space. Pressure ratings, dimensions and drilling correspond to ANSI B16.5. It is available in sizes 2" x 3" through 24" x 30". See page 172 for dimensions.



TUBE TURNS Venturi Expander Flanges are made from a one-piece forging. The inside is machined to maintain a total included angle of 15°. This assures optimum flow conditions at flanged connections to valves in pressure regulating stations and other flanged connections.

Since only one butt-weld connection is required, installation costs for fit-up, welding and nondestructive examination of the weld are reduced substantially.

TUBE TURNS Venturi Expander Flanges can be made from any forgeable material. Standard material, however, is ASTM A105 Carbon Steel.

Normal reductions are available in Classes 150, 300 and 600. These ratings comply with ANSI B16.5. Other sizes up to 72" and higher pressure rating are available on application.

PHYSICAL and CHEMICAL REQUIREMENTS of Flange, Bolt, and Nut Steels

PHYSICAL AND CHEMICAL REQUIREMENTS	ASTM A193	ASTM A194	
	CARBON STEEL	GRADE 1	GRADE 2
Tensile strength (min)	70,000 lb per sq in.	70,000 lb per sq in.	90,000 lb per sq in.
Yield strength (min)	38,000 lb per sq in.	40,000 lb per sq in.	65,000 lb per sq in.
Elongation in 2 in. (min)	22 per cent	25 per cent	22 per cent
Reduction of area (min)	30 per cent	35 per cent	50 per cent
Phosphorus (max)	0.04 per cent	0.04 per cent	0.04 per cent
Sulphur (max)	0.05 per cent	0.04 per cent	0.03 per cent
Manganese	0.60 to 1.05 per cent	0.60 to 0.90 per cent	0.60 per cent (max)
Carbon	0.22 to 0.35 per cent	0.20 to 0.30 per cent	0.25 per cent (max)
Silicon (max)	0.35 per cent	0.20 to 0.35 per cent	0.50 per cent (max)
Chromium	.....	.....	4.00 to 6.00 per cent
Molybdenum	.....	0.40 to 0.60 per cent	0.45 to 0.65 per cent
Nickel	.....	.....	0.50 per cent (max)

Physical and Chemical Requirements, STEEL MACHINE BOLTS (ASTM A307)

BOLT DIAMETER	PHYSICAL REQUIREMENTS	CHEMICAL REQUIREMENTS
4 in. and smaller	Tensile strength (min) Tensile strength (max) Brinell (min) Brinell (max) Phosphorus (max) Sulphur (max)	55,000 90,000 104 187 0.06 per cent 0.15 per cent

Physical Requirements, ALLOY STEEL BOLTING MATERIAL⁽¹⁾ (ASTM A193)

BOLT DIAMETER	PHYSICAL REQUIREMENTS	GRADE 1 MINIMUM TENSILE YIELD STRENGTH TENSILE STRENGTH	GRADE 2 MINIMUM TENSILE YIELD STRENGTH TENSILE STRENGTH	GRADE 3 MINIMUM TENSILE YIELD STRENGTH TENSILE STRENGTH
2½ in. and smaller	Tempering temp F Tensile strength (min) Yield strength (min) Elongation in 2 in. (min) Reduction of area (min)	1100 125,000 psi 105,000 psi 16 per cent 50 per cent	1200 125,000 psi 105,000 psi 16 per cent 50 per cent	75,000 psi 30,000 psi 35 per cent 50 per cent
Over 2½ in. to 4 in. incl	Tempering temp F Tensile strength (min) Yield strength (min) Elongation in 2 in. (min) Reduction of area (min)	1000 125,000 psi 105,000 psi 15 per cent 50 per cent	Cold Drawn* B8c Stabilized	
			¾ and under	Over ¾-1 incl
			125,000 psi	115,000 psi
			100,000 psi	80,000 psi
			12 per cent	15 per cent
			35 per cent	35 per cent

Chemical Requirements and Brinell Hardness, CARBON- AND ALLOY-STEEL NUT MATERIAL (ASTM A194)

CHEMICAL REQUIREMENTS	GRADE 1	GRADE 2	GRADE 3	GRADE 4
Carbon, per cent	0.15 min	0.40 min	0.10 min	0.08 max
Manganese, per cent			1.00	2.00 max
Phosphorus, max per cent ⁽²⁾			.04	.045
Sulphur, max per cent ⁽²⁾			.03	.03
Silicon			1.00 max	1.00 max
Nickel				9.00 to 13.00
Chromium			4.0 to 6.0	17.0 to 19.0
Molybdenum			0.40 to 0.65	.....
Columbium				
Brinell hardness	120 min	Grade 2, 160 min Grade 2H, 248 to 352	248 to 252	10 x carbon, min 149 min

† Grade B bolts are intended for flanged joints in piping system where one or both flanges are cast iron.

* Cold drawn to Brinell surface hardness of 320 max.

⁽¹⁾ Other alloy steel bolting materials are covered in ASTM A193.

⁽²⁾ Check analysis may be 25% higher than shown for Grades 1, 2, 2H and 3.

Dimensional tolerances for Tube Turns forged pipe flanges

Listed below are the Dimensional Tolerances to which TUBE TURNS flanges are manufactured. These tolerances are a part of ANSI B16.5 except where noted otherwise. The limits given are maximum, and TUBE TURNS products will normally run much

closer to nominal dimensions than to these permitted extremes. Rigid inspection procedure assures the maintenance of high standards of accuracy in regular day to day production.

THREADED, SOCKET-WELDING, SLIP-ON, LAP JOINT AND BLIND			WELDING NECK†		
Outside Diameter	When O.D. is 24" or less	± .06"*(1.6mm)	Outside Diameter	When O.D. is 24" or Less	± .06"*(1.6mm)
	When O.D. is Over 24"	± .12"*(3.2mm)		When O.D. is Over 24"	± .12"*(3.2mm)
Inside Diameter	Threaded	To Standard Gauge Limits	Inside Diameter	10" and Smaller	± .03" (0.8mm)
	Socket-Welding	10" and Smaller		12" thru 18"	± .06" (1.6mm)
	Slip-on and Lap Joint	+ .03" (0.8mm), - 0"		20" thru 42" + .12" (3.2mm), - .06" (1.6mm)	
		12" and Larger	Diameter of Contact Face	0.06" Raised Face	± .03" (0.8mm)
		+ .06" (1.6mm), - 0"		0.25" Raised Face	
Outside Diameter of Hub	12" and Smaller	+ .09"*(2.4mm), - .06"*(1.6mm)		Tongue & Groove Male, Female	± .02" (0.5mm)
	14" thru 42"	± .12"*(3.2mm)	Diameter of Hub at Base	When "X" is 24" or Smaller	± .06"*(1.6mm)
Diameter of Contact Face	0.06" Raised Face	± .03" (0.8mm)		When "X" is Over 24"	± .12"*(3.2mm)
	0.25" Raised Face		Diameter of Hub at Point of Welding	5" and Smaller	+ .09" (2.4mm), - .03" (0.8mm)
	Tongue & Groove Male, Female	± .02" (0.5mm)		6" and Larger	+ .16" (4.0mm), - .03" (0.8mm)
Diameter of Counterbore	10" and Smaller	+ .03" (0.8mm), - 0"	Bolt Circle	½" 24" 26" 42"	± .06"*(1.6mm) ± .06"*(1.6mm) ± .06"*(1.6mm) ± .06"*(1.6mm)
	12" thru 42"	+ .06" (1.6mm), - 0"	Bolt hole spacing		± .03" (0.8mm) ± .03" (0.8mm)
	Bolt Circle	½" 24" 26" 42"			± .03" (0.8mm) ± .03" (0.8mm)
		± .06"*(1.6mm) ± .06"*(1.6mm)	Drilling	Eccentricity of Bolt Circle with Respect to Facing	2½" and Smaller .03" Max. (0.8mm) 3" and Larger .06" Max. (1.6mm)
	Bolt hole spacing	± .03" (0.8mm) ± .03" (0.8mm)			
	Eccentricity of Bolt Circle with Respect to Facing	2½" and Smaller .03" Max. (0.8mm) 3" and Larger .06" Max. (1.6mm)		Eccentricity of Bolt Circle with Respect to Bore	.03" Max. * (0.8mm)
Drilling				Eccentricity of Facing with Respect to Bore	.03" Max. * (0.8mm)
	Eccentricity of Bolt Circle with Respect to Bore	.03" Max. * (0.8mm)			
	Eccentricity of Facing with Respect to Bore	.03" Max. * (0.8mm)	Thickness	18" and Smaller	+ .12" (3.2mm), - 0"
				Over 18"	+ .19" (4.8mm), - 0"
Thickness	18" and Smaller	+ .12" (3.2mm), - 0"	Length Thru Hub	10" and Smaller	± .06" (1.6mm)
	20" thru 42"	+ .19" (4.8mm), - 0"		12" thru 42"	± .12" (3.2mm)
Length Thru Hub	10" and Smaller	± .06" (1.6mm)			
	12" thru 42"	± .12" (3.2mm)			
RING JOINT FACING			RING JOINT GASKET†		
Depth	Dimension L	+0.016" (0.4mm), - 0"	Ring Width	Dimension A	± .008"
Width	Dimension D	± .008"	Ring Depth	Dimension B&H	± .004"
Pitch Dia.	Dimension P	± .005"	Width Octagonal Flat	Dimension C	± .008"
Rad. at Bottom	Dimension r	Max.	Pitch Dia.	Dimension P	± .007"
Angle	23° Angle	± ½°	Radius	Dimension r	± .004"
			Angle	23° Angle	± ½°

† For bevel detail see page 89.

† Tube Turns does not supply ring joint gasket; tolerances conform to ANSI B16.20.

* This tolerance not covered in ANSI B16.5.

▲ This tolerance is + .03" for orifice flanges.

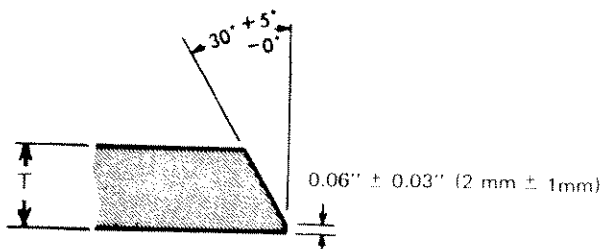
■ This tolerance applies to flat face flanges, sizes ½" thru 42", and sizes 3" and larger flanges with raised face and other machined facings.

For orifice flanges (not covered by ANSI B16.5) the usual tolerance on the dimension .938" from gasket surface to meter connection tap is +.016" for sizes 3" and smaller, +.03" for sizes 4" and larger; regular flange tolerances apply to all other dimensions.

BEVELING STANDARDS*

FOR WELDING END OF FLANGES

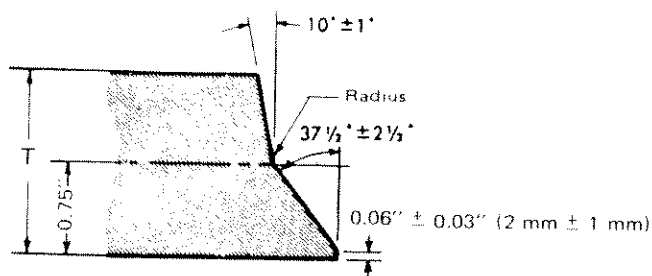
ANSI B16.25



**BEVEL FOR WALL THICKNESS
(T) AT END OF FLANGE, 0.75* IN. OR LESS**

- * or 1 inch at the manufacturer's option
- ** Flanges sizes 24 and smaller may be furnished with $37\frac{1}{2}$ ° bevel at option of manufacturer.

ANSI B16.25



**BEVEL FOR WALL THICKNESSES
AT END OF FLANGE, GREATER THAN 0.75 IN.**

*For information on beveling requirements for flanges intended for use with higher yield strength pipe materials see ANSI B16.5.

ORDERING INSTRUCTIONS

WHEN ORDERING OR INQUIRING ABOUT TUBE TURN FLANGES, PLEASE SPECIFY THE FOLLOWING INFORMATION:

1. Quantity
2. Nominal Pipe Size
3. Pressure/Temperature Class
4. Type of Flange
5. Piping Code Reference
6. Bore (when applicable)
7. Type of Facing
8. Material

IF SPECIAL MODIFICATIONS ARE REQUIRED, THE ADDITIONAL INFORMATION MUST BE SUPPLIED:

1. Matching Pipe Specifications:
 - a) Outside Diameter
 - b) Wall Thickness
 - b) Minimum Yield Strength of Material
2. Bore of Flange (when applicable)
3. Facing Dimensions
4. Length through the Hub
5. Flange Thickness
6. Diameter at the Base of Hub
7. Outside Diameter of the Flange
8. Bolting Dimensions
9. Flange Gasket Material

Tube Turns®

Alloy Fittings and Flanges

Tube Turns alloy welding fittings and forged flanges

Range of materials and sizes regularly furnished

(Other Materials, Sizes and Wall Thicknesses Available on Special Order)

MATERIAL	FITTINGS — NOMINAL PIPE SIZES				FLANGES — NOMINAL PIPE SIZES						
	SCH 5S	SCH 10S	SCH 40S (ST)	SCH 80S (XS)	CLASS 150	CLASS 300	CLASS 400	CLASS 600	CLASS 900	CLASS 1500	CLASS 2500
STAINLESS STEEL											
304	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
304L	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
316	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
316L	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
ALUMINUM											
3003			1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
5052			1/2-24	1/2-24							
6061			1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
LOW & INTERMEDIATE ALLOYS											
Carbon Moly			1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
1 Cr 1/2 Moly			1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
1 1/4 Cr 1/2 Moly			1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
2 1/4 Cr 1 Moly			1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
5 Cr 1/2 Moly			1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
7 Cr 1/2 Moly			1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
3 1/2 Nickel			1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
Cr Cu Ni			1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
NICKEL & NICKEL ALLOYS											
Nickel	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
Monel	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12
Inconel	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-24	1/2-12

* For dimensional information see TT1200 Alloy Catalog.

For layout dimensions of TUBE TURNS Alloy Welding Fittings and Flanges, refer to corresponding pages in the Carbon Steel Section of Catalog 411. For wall thicknesses, refer to pages 182 and 183.

The right alloy is the right answer to many piping problems

For a variety of reasons, industry is employing more and more welded alloy piping to help meet the increasingly-severe service conditions being encountered today.

These materials afford the most practical and economical protection against effects of corrosion and erosion or a combination of both; they have the ability to withstand very high or very low temperatures and pressures over extended periods of time; they avoid change of product due to catalytic action between the fluid being conveyed and the pipe that conveys it, and they prevent contamination and assure purity of product.

Butt-welded construction is the commonly-accepted method of installing most industrial pipe lines, for it provides additional significant economies to piping users; erection time and costs are lower; pipe lines are leakproof and crevice-free and maintenance expense is minimal; piping is stronger, more reliable, and finally, butt-welding permits the use of lighter schedules and pipe wall thicknesses, thereby leading to significant savings in material costs.

Continuing metallurgical and welding research, too, has stimulated the use of alloys in industrial piping applications by making available a host of new piping materials, each peculiarly suited to specific installations: low and intermediate ferrous metals, high alloy (stainless) steels, aluminum, nickel, copper and the reactive metals, and scores of special metals or alloys.

As a result, the engineer has considerable freedom in selecting the piping material that best satisfies the functional needs and the safety requirements of his design. This wide range of available materials, of course, places increased importance on full-line availability of high quality welding fittings and flanges, for optimum economy in design, construction and operation cannot be realized otherwise.

THE TUBE TURNS LINE

The complete line of Tube Turns welding fittings and flanges includes a full range of shapes, sizes and wall thicknesses in more than 40 different metals and alloys, both ferrous and non-ferrous. This unequalled selectivity permits the designer to choose the pipe metal and the factory-made welding fitting and flange most economically suitable for a specific application.

Furthermore, Tube Turns is continually studying all the factors involved in the application of alloys to industrial piping applications. These studies result in an ever-broadening product line so that the piping engineer may confidently look to Tube Turns as a responsible source for welding fittings and flanges that provide solutions to problems involving unusual shapes, thicknesses and materials.

Laboratory
Control Number

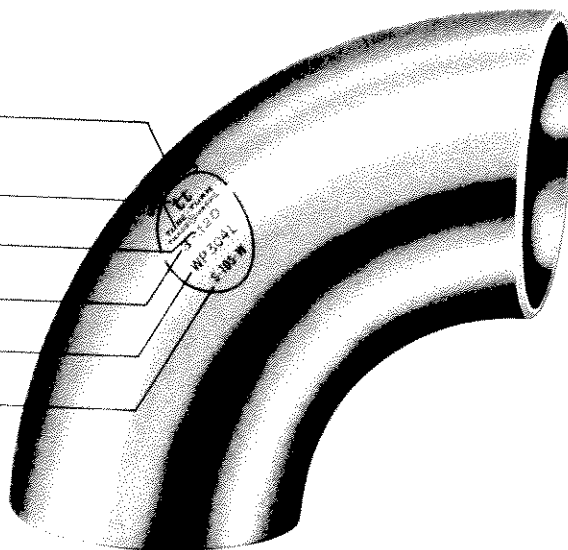
Tube Turns
Identification

Wall Thickness

Nominal Pipe
Size

Material

Wall Schedule
& Construction



Properties of Pipe

Dimensions of Seamless and Welded Steel Pipe ANSI B36.10 and B36.19

Commercial Pipe Sizes and Wall Thicknesses

This table lists the pipe sizes and wall thicknesses currently established as standard, or specifically:

1. The traditional standard weight, extra strong and double extra strong pipe.
2. The pipe wall thickness schedules listed in ANSI B36.10,

which are applicable to carbon steel and alloys other than stainless steels.

3. The pipe wall thickness schedules listed in ANSI B36.19 and ASTM Specification A409, which are applicable only to corrosion resistant materials.

(NOTE: Schedule 10S is also available in carbon steel in sizes 12 NPS [DN 300] and smaller.)

Nom. Pipe Size Dia. Nom.	Out- side Diam.	Nominal Wall Thickness for														
		Sched. 5S*	Sched. 10S*	Sched. 10	Sched. 20	Sched. 30	Std. †	Sched. 40	Sched. 60	Extra Strong§	Sched. 80	Sched. 100	Sched. 120	Sched. 140	Sched. 160	XX Strong
NPS 1/8																
DN 3	10mm		1.24mm				1.73mm	1.73mm		2.41mm	2.41mm					
1/4																
6	14mm		1.65mm				2.24mm	2.24mm		3.02mm	3.02mm					
3/4																
10	17mm		1.65mm				2.31mm	2.31mm		3.20mm	3.20mm					
1 1/8																
15	21mm	1.65mm	2.11mm				2.77mm	2.77mm		3.73mm	3.73mm				4.78mm	7.47mm
1 1/2																
20	27mm	1.65mm	2.11mm				2.87mm	2.87mm		3.91mm	3.91mm				5.56mm	7.82mm
1																
25	34mm	1.65mm	2.77mm				3.38mm	3.38mm		4.55mm	4.55mm				6.35mm	9.08mm
1 3/4																
32	42mm	1.65mm	2.77mm				3.56mm	3.56mm		4.85mm	4.85mm				6.35mm	9.70mm
1 7/8																
40	48mm	1.65mm	2.77mm				3.68mm	3.68mm		5.08mm	5.08mm				7.14mm	10.16mm
2																
50	60mm	1.65mm	2.77mm				3.91mm	3.91mm		5.54mm	5.54mm				8.74mm	11.97mm
2 1/8																
65	73mm	2.11mm	3.05mm				5.16mm	5.16mm		7.01mm	7.01mm				9.52mm	14.02mm
3																
80	89mm	2.11mm	3.05mm				5.49mm	5.49mm		7.62mm	7.62mm				11.13mm	15.24mm
3 1/2																
90	102mm	2.11mm	3.05mm				5.74mm	5.74mm		8.08mm	8.08mm					
4																
100	114mm	2.11mm	3.05mm				6.02mm	6.02mm		8.56mm	8.56mm		11.13mm		13.49mm	17.12mm
5																
125	141mm	2.77mm	3.40mm				6.55mm	6.55mm		9.52mm	9.52mm		12.70mm		15.08mm	19.05mm
6																
150	168mm	2.77mm	3.40mm				7.11mm	7.11mm		10.97mm	10.97mm		14.27mm		18.26mm	21.95mm
8																
200	219mm	2.77mm	3.76mm		6.35mm	7.04mm	8.18mm	8.18mm	10.31mm	12.70mm	12.70mm	15.09mm	18.26mm	20.62mm	23.01mm	22.22mm

All dimensions are given in inches with millimeters shown below. The decimal thickness listed for the respective pipe sizes represent their nominal or average wall dimensions. The actual thicknesses may be as much as 12.5% under the nominal thickness because of mill tolerance. Thicknesses shown in bold face for Schedule 60 and Heavier Pipe are not currently supplied by the mills, unless a certain minimum tonnage is ordered.

*Schedules 5S and 10S are available in corrosion resistant materials and Schedule 10S is also available in carbon steel.

†Thicknesses shown in italics are available also in stainless steel under the designation Schedule 40S.

§Thicknesses shown in italics are available also in stainless steel, under the designation Schedule 80S.

Conversion Factor 25.4 mm = 1.0".

Fittings are stocked in carbon steel and a variety of other metals and alloys.

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NPS DN	Nom. Pipe Size Dia. Nom.	Out- side Diam.	Nominal Wall Thickness for														
			Sched. 5S*	Sched. 10S*	Sched. 10	Sched. 20	Sched. 30	Std. †	Sched. 40	Sched. 60	Extra Strong§	Sched. 80	Sched. 100	Sched. 120	Sched. 140	Sched. 160	XX Strong
10	250	273mm	3.40mm	4.19mm		6.35mm	7.60mm	9.27mm	9.27mm	12.70mm	12.70mm	15.09mm	18.26mm	21.44mm	25.40mm	28.58mm	25.40mm
12	300	324mm	3.96mm	4.57mm		6.35mm	8.38mm	9.52mm	10.31mm	14.27mm	12.70mm	17.48mm	21.44mm	25.40mm	28.58mm	33.32mm	25.40mm
14	350	356mm	3.96mm	4.78mm	6.35mm	7.92mm	9.52mm	9.52mm	11.13mm	15.09mm	12.70mm	19.05mm	23.83mm	27.79mm	31.75mm	35.71mm	
16	400	406mm	4.19mm	4.78mm	6.35mm	7.92mm	9.52mm	9.52mm	12.70mm	16.66mm	12.70mm	21.44mm	26.19mm	30.96mm	36.53mm	40.49mm	
18	450	457mm	4.19mm	4.78mm	6.35mm	7.92mm	11.13mm	9.52mm	14.27mm	19.05mm	12.70mm	23.83mm	29.36mm	34.92mm	39.67mm	45.24mm	
20	500	508mm	4.78mm	5.54mm	6.35mm	9.52mm	12.70mm	9.52mm	15.09mm	20.62mm	12.70mm	26.19mm	32.54mm	38.10mm	44.45mm	50.01mm	
22	550	559mm	4.78mm	5.54mm	6.35mm	9.52mm	12.70mm	9.52mm		22.22mm	12.70mm	28.58mm	34.92mm	41.28mm	47.62mm	53.98mm	
24	600	610mm	5.54mm	6.35mm	6.35mm	9.52mm	14.27mm	9.52mm	17.48mm	24.61mm	12.70mm	30.96mm	38.89mm	46.02mm	52.37mm	59.54mm	
26	650	660mm			7.92mm	12.70mm		9.52mm			12.70mm						
28	700	711mm			7.92mm	12.70mm	15.88mm	9.52mm			12.70mm						
30	750	762mm	6.35mm	7.92mm	7.92mm	12.70mm	15.88mm	9.25mm			12.70mm						
32	800	813mm			7.92mm	12.70mm	15.88mm	9.52mm			12.70mm						
34	850	864mm			7.92mm	12.70mm	15.88mm	9.52mm			12.70mm						
36	900	914mm			7.92mm	12.70mm	15.88mm	9.52mm			12.70mm						
42	1050	1067mm			7.92mm	12.70mm	15.88mm	9.52mm	19.05mm		12.70mm						
48	1200	1219mm						9.52mm			12.70mm						
								9.52mm			12.70mm						

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