

ANVIL

PIPE FITTERS HANDBOOK



**ANVIL**<sup>®</sup>  
INTERNATIONAL, INC.

[www.anvilintl.com](http://www.anvilintl.com)

# PIPE FITTERS HANDBOOK

Building Connections That Last

NOT FOR RESALE  
06.05

# TRUSTED FOR 150 YEARS

We built our reputation from the ground up.

Anvil's history stretches back to the mid-1800s, when a company named Grinnell® began providing its customers with the finest quality pipe products. Since 2000, those quality products and services—and the people who provide them—have been known as Anvil® International. Anvil customers receive the quality and integrity that have been building strong connections in both products and business relationships for over 150 years.



## Focused Product Line:

Anvil® Malleable and Cast Iron Fittings

Anvil® Hangers, Supports and Struts

Anvil® Seamless Pipe Nipples

Anvil® Steel Pipe Couplings and Small Steel Fittings

Beck Welded Pipe Nipples

Merit® Tee-Lets and Drop Nipples

Gruvlok® Couplings, Fittings and Valves

SPF™ Cast Iron and Ductile Iron Fittings

SPF™ Malleable Iron Fittings

SPF™ Grooved Fittings and O'Lets

J.B. Smith Swage Nipples and Bull Plugs

Catawissa® Wing Unions and Check Valves

Anvil® International is the largest and most complete fitting and hanger manufacturer in the world.

**TODAY**

Anvil® International acquires Star Pipe Products, Building and Construction Divisions (SPF) and forms AnvilStar™ Fire Products Division.

**2004**

Anvil® International acquires Merit® Manufacturing and Beck Manufacturing.

**2001**

The industry's trusted manufacturer of pipe products is renamed Anvil International, Inc.

**2000**

Tyco sells the distribution and manufacturing operations known as "Grinnell Supply Sales", but keeps the Grinnell® trademark.

**1999**

Grinnell Co. acquired by International Telephone and Telegraph.

**1969**

Frederick Grinnell opens a piping products foundry in Cranston, RI, and eventually develops the Grinnell Supply Sales Division.

**1909**

General Fire Extinguisher Co. becomes Grinnell Co.

**1919**

Providence Steam & Gas Pipe Co. is formed. Frederick Grinnell purchases a controlling interest.

**1850**

Gruvlok® line of grooved fittings is introduced.

**1960**

J.B. Smith™ and Catawissa™ join the Grinnell Supply Sales and Manufacturing division.

**1994**

Grinnell® is a registered trademark of Grinnell Corporation, a Tyco International Ltd. company.

**BUILDING CONNECTIONS THAT LAST**



ANVIL  
BRANDS:



### Anvil's focused product line consists of:

- Anvil® Malleable & Cast Iron Fittings
- SPF™ Malleable, Cast & Ductile Iron Fittings
- Anvil® Hangers, Supports
- Anvil-Strut™ Strut and Strut Fittings
- Beck Welded Pipe Nipples
- Anvil® Seamless Pipe Nipples
- SPF™ Steel Pipe Nipples
- Anvil® Steel Pipe Couplings & Small Steel Fittings
- Merit® Tee-Lets & Drop Nipples
- Gruvlok® Couplings, Fittings & Valves
- SPF™ Grooved Fittings & O'Lets
- J.B. Smith™ Swage Nipples & Bull Plugs
- Catawissa™ Wing Unions & Check Valves

### CONNECTING WITH CORE MARKETS:

From plumbing, mechanical, and fire protection, to mining, oil & gas, and

### ANVIL PIPE FITTERS HANDBOOK

OEMs, Anvil's focus has always been on providing real solutions for your applications. Our representatives are experts in the markets they serve, and understand the needs of your business. Anvil will work with you to find innovative products that meet your demands and exceed your expectations.

### CONNECTING WITH QUALITY:

Many things have changed during the 150 years in the industry - including the name above our door - but our quality and commitment remains the best in the business. Our ISO 9001:2000 manufacturing facilities produce a range of products unmatched by any other single manufacturer. Our responsive service sets an industry standard for dependability and effectiveness recognized around the world. Whatever the word "quality" means to your business, Anvil guarantees it in everything we do.

### CONNECTING WITH WHOLESALERS:

Wholesale distribution has always been a vital aspect of Anvil's business. Our dedication to the wholesale channel - and our customers there- is a driving force for our services. These relationships remain a primary focus of Anvil's innovation.

### CONNECTING WITH CUSTOMERS:

The most important connection that Anvil makes are the ones we make with our customers. In the field, over the phone, or on the web, we strive to provide our customers with the products, assistance, and service they need - when they need it. Responsive and accessible customer support is what makes the difference between simply delivering products, and delivering solutions.

**ANVIL—  
BUILDING CONNECTIONS THAT LAST.**

VISIT US ON THE WEB AT: [www.anvilintl.com](http://www.anvilintl.com)

## ANVIL—BUILDING CONNECTIONS THAT LAST



**ANVIL**  
INTERNATIONAL, INC.

ANVIL® INTERNATIONAL'S history stretches back to the mid 1800's when a company named Grinnell® began providing its customers with the finest quality pipe products. Since 2000, those quality products and services—and the people

who provide them—have been known as Anvil® International. Anvil customers receive the quality and integrity that have been building strong connections in both products and business relationships for over 150 years.

**GRUVLOK**

**ANVILStar**  
Pipe Products Division



**CANVIL**



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### THE GRUVLOK PIPING METHOD

Gruvlok couplings and grooved-end fittings range in sizes through 30" nominal pipe size and are offered in a variety of styles. These products are used for joining pipe in a wide variety of piping systems. Gruvlok couplings for grooved-end pipe are designed to provide a self-centering joint which accommodates the application of pressure, vacuum and other external forces, while limiting the burdensome need for special supports, expansion joints, etc.

The Gruvlok piping method offers many mechanical design features which benefit the design engineer, the contractor, and the end user. Utilization of the functional characteristics of the Gruvlok coupling will aid in pipe system design and must be considered for proper installation, assembly and performance.



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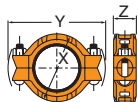
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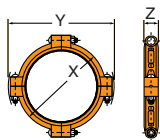
# Couplings

## FIG. 7001

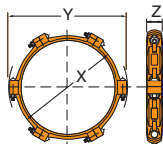
STANDARD COUPLING



SIZES 1" - 14"



SIZES 16" - 24"



SIZES 28" - 30"

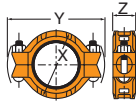
### FIGURE 7001 STANDARD COUPLING DIMENSIONS (CONTINUED ON NEXT PAGE)

Nom. Size	O.D.	Max. Work. Pressure	Max. End Load	Range of Pipe End Separation	Deflection from		Coupling Dimensions			Bolt Dimensions*		Specified Torque S		Approx. Wt. Ea.
					Per Coupling	of Pipe	X	Y	Z	Qty.	Size	Min.	Max.	
1	1.315	1000	1,358	0-1/8	5° 26'	1.14	2 1/2	4 1/2	1 7/8	2	3/8 x 2 1/4	30	45	1.3
25	33.4	68.9	6.04	0-.32		94.7	64	114	48		M10 x 57	40	60	0.6
1 1/4	1.660	1000	2,164	0-1/8	4° 19'	0.90	2 3/4	4 1/2	1 7/8	2	3/8 x 2 1/4	30	45	1.4
32	42.2	68.9	9.63	0-.32		75.3	70	114	48		M10 x 57	40	60	0.6
1 1/2	1.900	1000	2,835	0-1/8	3° 46'	0.79	3	4 5/8	1 7/8	2	3/8 x 2 1/4	30	45	1.5
40	48.3	68.9	12.61	0-.32		65.7	76	117	48		M10 x 57	40	60	0.7
2	2.375	1000	4,430	0-1/8	3° 1'	0.63	3 5/8	6 1/8	1 7/8	2	1/2 x 3	80	100	3.1
50	60.3	68.9	19.71	0-.32		52.6	92	156	48		M12 x 76	110	150	1.4
2 1/2	2.875	1000	6,492	0-1/8	2° 29'	0.52	4 1/4	6 1/2	1 7/8	2	1/2 x 3	80	100	3.7
65	73.0	68.9	28.88	0-.32		43.3	108	165	48		M12 x 76	110	150	1.7
3 O.D.	2.996	1000	7,050	0-1/8	2° 23'	0.50	4 1/4	6 3/4	1 7/8	2	1/2 x 3	80	100	4.3
76.1	76.1	68.9	31.36	0-.32		41.6	108	171	48		M12 x 76	110	150	2.0
3	3.500	1000	9,621	0-1/8	2° 3'	0.43	4 7/8	7 1/8	1 7/8	2	1/2 x 3	80	100	4.3
80	88.9	68.9	42.80	0-.32		35.8	124	181	48		M12 x 76	110	150	2.0
3 1/2	4.000	1000	12,566	0-1/8	1° 48'	0.38	5 1/4	8 1/4	1 7/8	2	5/8 x 3 1/2	100	130	5.1
65	101.6	68.9	55.90	0-.32		31.4	133	210	48		M16 x 89	135	175	2.3
4	4.500	1000	15,904	0-1/4	3° 11'	0.67	6 1/4	8 3/4	2	2	5/8 x 3 1/2	100	130	6.8
100	114.3	68.9	70.75	0-6.4		55.5	159	222	51		M16 x 89	135	175	3.1

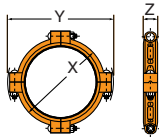


FIG. 7001, CONT'D.

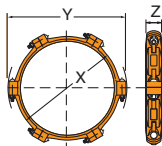
STANDARD COUPLING



SIZES 1" - 14"



SIZES 16" - 24"



SIZES 28" - 30"

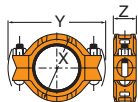
FIGURE 7001 STANDARD COUPLING DIMENSIONS (CONTINUED ON NEXT PAGE)

Nom. Size	O.D.	Max. Work. Pressure	Max. End Load	Range of Pipe End Separation	Deflection from		Coupling Dimensions			Bolt Dimensions*		Specified Torque †		Approx. Wt. Ea.
					Per Coupling	of Pipe	X	Y	Z	Qty.	Size	Min.	Max.	
5 125	5.563 141.3	1000 68.9	24,306 108.12	0-¼ 0-6.4	2° 35'	0.54 45.1	7¼ 184	11¼ 286	2 51	2	¾ x 4½ M20 x 110	130 175	180 245	9.6 4.4
6½ O.D. 165.1	6.500 165.1	1000 68.9	33,183 147.61	0-¼ 0-6.4	2° 12'	0.46 38.4	8¼ 210	11¾ 298	2 51	2	¾ x 4½ M20 x 110	130 175	180 245	11.8 5.4
6 150	6.625 168.3	1000 68.9	34,472 153.34	0-¼ 0-6.4	2° 10'	0.45 37.8	8½ 219	11¾ 298	2 51	2	¾ x 4½ M20 x 110	130 175	180 245	11.8 5.4
8 200	8.625 219.1	800 55.2	46,741 207.91	0-¼ 0-6.4	1° 40'	0.35 29.1	11 279	14¾ 365	2¾ 60	2	7/8 x 5½ M22 x 140	180 245	220 300	21.7 9.8
10 250	10.750 273.0	800 55.2	72,610 322.99	0-¼ 0-6.4	1° 20'	0.28 23.3	13¾ 333	16½ 422	2½ 67	2	7/8 x 5½ M22 x 140	180 245	220 300	27.0 12.2
12 300	12.750 323.9	800 55.2	102,141 454.35	0-¼ 0-6.4	1° 7'	0.23 19.5	15½ 394	18½ 473	2½ 67	2	7/8 x 6 M22 x 150	180 245	220 300	35.0 15.9
14 350	14.000 355.6	300 20.7	46,181 205.43	0-¼ 0-6.4	1° 2'	0.22 18.0	16½ 410	20½ 521	3 76	2	7/8 x 5½ M22 x 140	180 245	220 300	37.0 16.8
16 400	16.000 406.4	300 20.7	60,319 268.31	0-¼ 0-6.4	0° 54'	0.19 15.7	18½ 460	22¾ 581	3 76	4	1 x 4 *	200 -	250 -	50.0 22.7
18 450	18.000 457.2	300 20.7	76,341 339.58	0-¼ 0-6.4	0° 48'	0.17 14.0	21½ 537	25¾ 645	3¾ 79	4	1 x 4 *	200 -	250 -	72.0 32.7

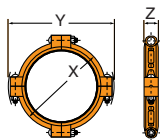
# Couplings

FIG. 7001, CONT'D.

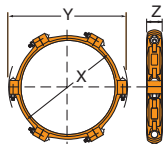
STANDARD COUPLING



SIZES 1" - 14"



SIZES 16" - 24"



SIZES 28" - 30"

FIGURE 7001 STANDARD COUPLING DIMENSIONS (CONTINUED FROM PREVIOUS PAGE)

Nom. Size	O.D.	Max. Work. Pressure	Max. End Load	Range of Pipe End Separation	Deflection from $\xi$		Coupling Dimensions			Bolt Dimensions*		Specified Torque §		Approx. Wt. Ea.
					Per Coupling	Per. In./Ft.	X	Y	Z	Qty.	Size	Min.	Max.	
20 500	20.000 508.0	300 20.7	94,248 419.23	0-1/4 0-6.4	0° 43'	0.15 12.5	23 584	28 1/4 718	3 1/8 79	4	1 1/2 x 4 1/2 *	225 -	275 -	82.0 37.2
24 600	24.000 609.6	300 20.7	135,717 603.70	0-1/4 0-6.4	0° 36'	0.13 10.5	27 686	32 3/8 822	3 1/8 79	4	1 1/2 x 4 1/2 *	225 -	275 -	90.0 40.8
28" O.D. 733.4	28.875 733.4	150 10.3	98,226 436.93	0-1/4 0-6.4	0° 33'	0.12 9.6	33 1/2 851	35 1/2 902	3 1/8 79	6	1 x 5 1/2 *	200 -	250 -	105.0 47.6
30" O.D. 787.4	31.00 787.4	150 10.3	113,215 503.61	0-1/4 0-6.4	0° 28'	0.10 8.1	33 3/4 857	38 1/4 972	3 5/8 92	6	1 x 5 1/2 *	200 -	250 -	137.0 62.1

\* Available in ANSI or metric bolt sizes only as indicated.

For additional details see "Coupling Data Chart Notes" on page 262.

§ - For additional Bolt Torque information on page 200.

See Installation & Assembly directions on pages 148-149.

Not for use in copper systems.

FIG. 7011

STANDARD COUPLING

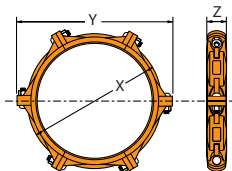


FIGURE 7011 STANDARD COUPLING

Nominal Size	O.D.	Max. Working Pressure	Max. End Load	Range of Pipe End Separation	Deflection from $\xi$		Coupling Dimensions			Coupling Bolts*		Specified Torque $\S$		Approx. Wt. Ea.
					Per Coupling	Per in./ft.	X	Y	Z	Qty.	Size	Min.	Max.	
In./DN(mm)	In./mm	PSI/bar	Lbs./kN	In./mm	Degrees	mm/m	In./mm	In./mm	In./mm		In./mm	Ft.-Lbs./M-M	Lbs./Kg	
30 O.D. 750	30.000 762.0	300 20.7	212,058 943.2	0 - $\frac{3}{16}$ 0 - 4.8	0° 40'	0.14 11.5	34 864	39½ 1003	5 127	6	1¼ x 4¾ -	600 -	800 -	200 90.9

Working pressure and end load values are for standard wall pipe.

Roll and Cut Grooving Specifications can be found in the technical data section.

See technical data section for design factors.

For additional details see "Coupling Data Chart Notes" on page 262.

$\S$  - For additional Bolt Torque information on page 200.

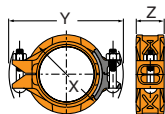
\* Available in ANSI bolt sizes only as indicated.

See Installation & Assembly directions on pages 150-151.

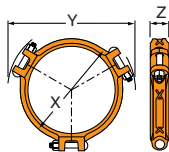
# Couplings

**FIG. 7401**

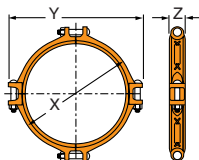
RIGIDLOK® COUPLING



1 1/2" - 14"



16"



18" - 24"

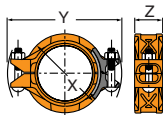
**FIGURE 7401 RIGIDLOK COUPLING (CONTINUED ON NEXT PAGE)**

Nominal Size	O.D.	Max. Working Pressure	Max. End Load	Range of Pipe End Separation	Coupling Dimensions			Coupling Bolts*		Specified Torque †		Approx. Wt. Ea.
					X	Y	Z	Qty.	Size	Min.	Max.	
In./DN(mm)	In./mm	PSI/bar	Lbs./kN	In./mm	In./mm	In./mm	In./mm		In./mm	Fl.-Lbs./N-M	Lbs./Kg	
1 1/2 40	1.900 48.3	750 51.7	2,126 9.46	0 - 1/8 0 - 3.2	3 76	5 1/8 130	1 1/8 48	2	3/8 x 2 1/4 M10 x 57	30 40	45 60	1.8 0.8
2 50	2.375 60.3	750 51.7	3,323 14.78	0 - 1/8 0 - 3.2	3 1/2 89	5 5/8 143	1 1/8 48	2	3/8 x 2 1/2 M10 x 63	30 40	45 60	2.4 1.1
2 1/2 65	2.875 73.0	750 51.7	4,869 21.66	0 - 1/8 0 - 3.2	4 102	6 1/8 156	1 1/8 48	2	3/8 x 2 1/2 M10 x 63	30 40	45 60	2.9 1.3
3 O.D. 76.1	2.996 76.1	750 51.7	5,207 23.52	0 - 1/8 0 - 3.2	4 1/8 105	6 1/8 156	1 1/8 48	2	1/2 x 3 M12 x 76	80 110	100 150	3.4 1.5
3 80	3.500 88.9	750 51.7	7,216 32.10	0 - 1/8 0 - 3.2	4 3/4 121	7 1/4 184	1 1/8 48	2	1/2 x 3 M12 x 76	80 110	100 150	3.6 1.6
4 100	4.500 114.3	750 51.7	11,928 53.06	0 - 1/4 0 - 6.4	5 7/8 149	8 3/8 213	2 1/8 54	2	1/2 x 3 M12 x 76	80 110	100 150	5.0 2.3
5 1/2 O.D. 139.7	5.500 139.7	750 51.7	17,819 79.26	0 - 1/4 0 - 6.4	7 178	9 1/4 248	2 1/8 54	2	5/8 x 3 1/2 M16 x 85	100 135	130 175	6.9 3.1
5 125	5.563 141.3	750 51.7	18,229 81.09	0 - 1/4 0 - 6.4	7 178	10 254	2 1/8 54	2	5/8 x 3 1/2 M16 x 85	100 135	130 175	6.9 3.1
6 1/2 O.D. 165.1	6.500 165.1	750 51.7	24,887 110.70	0 - 1/4 0 - 6.4	8 203	11 279	2 1/8 54	2	5/8 x 3 1/2 M16 x 85	100 135	130 175	7.6 3.4
6 150	6.625 168.3	750 51.7	25,854 115.00	0 - 1/4 0 - 6.4	8 1/8 206	11 1/8 283	2 1/8 54	2	5/8 x 3 1/2 M16 x 85	100 135	130 175	7.9 3.6

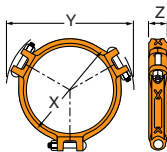
GRUVLOK®

FIG. 7401, CONT'D.

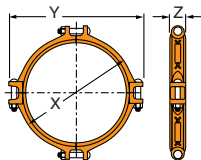
RIGIDLOK® COUPLING



1 1/2" - 14"



16"



18" - 24"

FIGURE 7401 RIGIDLOK COUPLING (CONTINUED FROM NEXT PAGE)

Nominal Size	O.D.	Max. Working Pressure	Max. End Load	Range of Pipe End Separation	Coupling Dimensions			Coupling Bolts*		Specified Torque §		Approx. Wt. Ea.
					X	Y	Z	Qty.	Size	Min.	Max.	
In./DN(mm)	In./mm	PSI/bar	Lbs./kN	In./mm	In./mm	In./mm	In./mm		In./mm	Ft.-Lbs./N-M	Lbs./Kg	
8 200	8.625 219.1	600 51.7	35,056 155.94	0 - 1/4 0 - 6.4	10 1/2 267	14 1/8 359	2 5/8 67	2	3/4 x 4 1/2 M20 x 110	130 175	180 245	15.9 7.2
10 250	10.750 273.1	500 51.7	45,381 201.87	0 - 1/4 0 - 6.4	12 1/8 327	17 1/2 445	2 5/8 67	2	1 x 6 M24 x 150	200 270	250 340	25.6 11.6
12 300	12.750 323.9	400 51.7	51,070 227.17	0 - 1/4 0 - 6.4	15 381	19 1/2 495	2 5/8 67	2	7/8 x 6 M22 x 150	180 245	220 300	30.5 13.8
14 350	14.000 355.6	300 20.7	46,181 205.43	0 - 1/4 0 - 6.4	16 1/4 413	19 3/4 502	3 76	2	1/8 x 5 1/2	180 245	220 300	36.1 16.4
16 400	16.000 406.4	300 20.7	60,319 268.31	0 - 1/4 0 - 6.4	18 1/8 460	22 1/4 565	3 76	3	1/8 x 5 1/2	180 245	220 300	42.0 19.1
18 450	18.000 457.2	300 20.7	76,341 339.58	0 - 1/4 0 - 6.4	20 1/2 521	24 3/8 619	3 1/8 79	4	1 x 4	200 270	250 340	51.6 23.4
20 500	20.000 508.0	300 20.7	94,248 419.23	0 - 1/4 0 - 6.4	23 581	26 1/8 683	3 1/8 79	4	1 x 4	200 270	250 340	68.3 31.0
24 600	24.000 609.6	250 17.2	113,097 503.08	0 - 1/4 0 - 6.4	27 1/8 689	30 7/8 784	3 1/8 79	4	1 x 4	200 270	250 340	89.3 40.5

\* Available in ANSI or metric bolt sizes only as indicated.

Not for use in copper systems.

For additional details see "Coupling Data Chart Notes" on page 262.

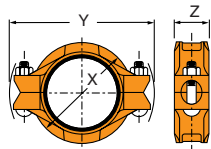
§ - For additional Bolt Torque information on page 200.

See Installation &amp; Assembly directions on pages 152-153.

# Couplings

**FIG. 7000**

LIGHTWEIGHT FLEXIBLE COUPLING



**FIGURE 7000 COUPLING (CONTINUED ON NEXT PAGE)**

Nom. Size	O.D.	Max. Working Pressure	Max. End Load	Range of Pipe End Separation	Deflection from $\zeta$		Coupling Dimensions			Coupling Bolts		Specified Torque \$		Approx. Wt. Ea.
					Per Coupling	Per in./ft.	X	Y	Z	Qty.	Size	Min.	Max.	
1 25	1.315 33.4	600 41.4	815 3.62	0 - 1/8 0 - 3.2	5° 26'	1.14 94.7	2 3/8 60	4 1/4 108	1 3/4 44	2	3/8 x 2 1/4 M10 x 57	30 40	45 60	1.3 0.6
1 1/4 32	1.660 42.2	600 41.4	1,299 5.78	0 - 1/8 0 - 3.2	4° 19'	0.90 75.3	2 3/4 70	4 3/8 111	1 3/4 44	2	3/8 x 2 1/4 M10 x 57	30 40	45 60	1.4 0.6
1 1/2 40	1.900 48.3	600 41.4	1,701 7.57	0 - 1/8 0 - 3.2	3° 46'	0.79 65.7	3 76	4 7/8 117	1 3/4 44	2	3/8 x 2 1/4 M10 x 57	30 40	45 60	1.5 0.7
2 50	2.375 60.3	600 41.4	2,658 11.82	0 - 1/8 0 - 3.2	3° 1'	0.63 52.6	3 1/2 89	5 1/2 140	1 3/4 44	2	3/8 x 2 1/4 M10 x 57	30 40	45 60	1.7 0.8
2 1/2 65	2.875 73.0	600 41.4	3,895 17.33	0 - 1/8 0 - 3.2	2° 29'	0.52 43.3	4 102	5 3/4 146	1 3/4 44	2	3/8 x 2 1/4 M10 x 57	30 40	45 60	1.9 0.9
3 O.D. 76.1	2.996 76.1	600 41.4	4,230 18.82	0 - 1/8 0 - 3.2	2° 23'	0.50 41.6	4 102	6 1/8 156	1 3/4 44	2	3/8 x 2 1/4 M10 x 57	80 110	100 150	2.3 1.0
3 80	3.500 88.9	600 41.4	5,773 25.68	0 - 1/8 0 - 3.2	2° 3'	0.43 35.8	4 7/8 117	6 3/4 171	1 3/4 44	2	1/2 x 2 3/4 M12 x 70	80 110	100 150	2.9 1.3
3 1/2 90	4.000 101.6	600 41.4	7,540 33.54	0 - 1/8 0 - 3.2	1° 48'	0.38 31.4	5 1/8 130	7 5/8 194	1 3/4 44	2	1/2 x 3 M12 x 76	80 110	100 150	3.1 1.4
4 1/4 O.D. 108.0	4.250 108.0	600 41.4	8,512 37.86	0 - 1/4 0 - 6.4	3° 22'	0.70 58.7	5 1/2 140	7 3/4 197	2 51	2	1/2 x 3 M12 x 76	80 110	100 150	4.0 1.8
4 100	4.500 114.3	600 41.4	9,543 42.45	0 - 1/4 0 - 6.4	3° 11'	0.67 55.5	5 7/8 149	8 1/8 206	2 51	2	1/2 x 3 M12 x 76	80 110	100 150	4.6 2.1

FIG. 7000, CONT'D.

LIGHTWEIGHT FLEXIBLE COUPLING

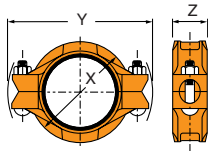


FIGURE 7000 COUPLING (CONTINUED FROM PREVIOUS PAGE)

Nom. Size	O.D.	Max. Working Pressure	Max. End Load	Range of Pipe End Separation	Deflection from $\xi$		Coupling Dimensions			Coupling Bolts		Specified Torque $\S$		Approx. Wt. Ea.
					Per Coupling	Per in./ft.	X	Y	Z	Qty.	Size	Min.	Max.	
In./DN(mm)	In./mm	PSI/bar	Lbs./kN	In./mm	Degrees	mm/m	In./mm	In./mm	In./mm		In./mm	Ft.-Lbs./N-M	Lbs./Kg	
5 1/4 O.D. 133.0	5.236 133.0	500 34.5	10,766 47.89	0 - 1/4 0 - 6.4	2° 44'	0.57 47.7	6 1/2 165	9 1/8 232	2 51	2	5/8 x 3 1/2 M16 x 85	100 135	130 175	5.7 2.6
5 1/2 O.D. 139.7	5.500 139.7	500 34.5	11,879 52.84	0 - 1/4 0 - 6.4	2° 36'	0.54 45.4	6 3/4 171	9 3/8 238	2 51	2	5/8 x 3 1/2 M16 x 85	100 135	130 175	6 2.7
5 125	5.563 141.3	500 34.5	12,153 54.06	0 - 1/4 0 - 6.4	2° 35'	0.54 45.1	7 178	9 5/8 244	2 51	2	5/8 x 3 1/2 M16 x 85	100 135	130 175	6.1 2.8
6 1/4 O.D. 159.0	6.259 159.0	500 34.5	15,384 68.43	0 - 1/4 0 - 6.4	2° 17'	0.48 39.8	7 1/2 191	10 3/8 264	2 51	2	5/8 x 3 1/2 M16 x 85	100 135	130 175	6.7 3.0
6 1/2 O.D. 165.1	6.500 165.1	500 34.5	16,592 73.80	0 - 1/4 0 - 6.4	2° 12'	0.46 34.8	7 3/4 197	10 3/4 273	2 51	2	5/8 x 3 1/2 M16 x 85	100 135	130 175	7.0 3.2
6 150	6.625 168.3	500 34.5	17,236 76.67	0 - 1/4 0 - 6.4	2° 10'	0.45 37.8	8 203	11 279	2 51	2	5/8 x 3 1/2 M16 x 85	100 135	130 175	8.1 3.7
8 200	8.625 219.1	500 34.5	29,213 129.95	0 - 1/4 0 - 6.4	1° 40'	0.35 29.1	10 264	13 1/4 337	2 3/8 60	2	3/4 x 4 1/2 M20 x 110	130 175	180 245	14.2 6.4

For additional details see "Coupling Data Chart Notes" on page 262.

§ - For additional Bolt Torque information on page 200.

Not for use in copper systems.

See Installation & Assembly directions on page 154-155.

## Couplings

FIG. 7400

RIGIDLITE® COUPLING

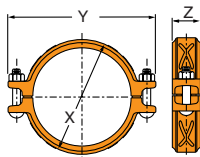


FIGURE 7400 RIGIDLITE® COUPLING (CONTINUED ON NEXT PAGE)

Nominal Size	O.D.	Max. Wk. Pressure	Max. End Load	Range of Pipe End Separation	Coupling Dimensions			Coupling Bolts		Specified Torque §		Approx. Wt. Ea.
					X	Y	Z	Qty.	Size	Min.	Max.	
In./DN(mm)	In./mm	PSI/bar	Lbs./kN	In./mm	In./mm	In./mm	In./mm		In./mm	Ft.-Lbs./N-M	Lbs./Kg	
1	1.315	300	407	0 - 1/8	2 1/4	4 1/2	1 3/4	2	3/8 x 2 1/4	30	45	1.2
25	33.4	20.7	1.81	0 - 3.2	57	114	44		M10 x 57	40	60	0.5
1 1/4	1.660	300	649	0 - 1/8	2 5/8	4 3/4	1 3/4	2	3/8 x 2 1/4	30	45	1.3
32	42.2	20.7	2.89	0 - 3.2	67	121	44		M10 x 57	40	60	0.6
1 1/2	1.900	300	851	0 - 1/8	2 7/8	4 7/8	1 3/4	2	3/8 x 2 1/4	30	45	1.4
40	48.3	20.7	3.78	0 - 3.2	73	124	44		M10 x 57	40	60	0.6
2	2.375	300	1,329	0 - 1/8	3 1/4	5 1/2	1 3/4	2	3/8 x 2 1/4	30	45	1.6
50	60.3	20.7	5.91	0 - 3.2	83	140	44		M10 x 57	40	60	0.7
2 1/2	2.875	300	1,948	0 - 1/8	3 7/8	6	1 3/4	2	3/8 x 2 1/4	30	45	1.9
65	73.0	20.7	8.66	0 - 3.2	98	152	44		M10 x 57	40	60	0.9
3 O.D.	2.996	300	2,115	0 - 1/8	4	5 5/8	1 3/4	2	3/8 x 2 1/4	30	45	1.9
76.1	76.1	20.7	9.41	0 - 3.2	102	149	44		M10 x 57	40	60	0.9
3	3.500	300	2,886	0 - 1/8	4 1/2	6 3/4	1 3/4	2	3/8 x 2 3/4	30	45	2.1
80	88.9	20.7	12.84	0 - 3.2	114	171	44		M10 x 70	40	60	1.0
4	4.500	300	4,771	0 - 1/4	5 5/8	7 3/4	1 7/8	2	3/8 x 2 3/4	30	45	3.1
100	114.3	20.7	21.22	0 - 6.4	143	197	48		M10 x 70	40	60	1.4



FIG. 7400, CONT'D.

RIGIDLITE® COUPLING

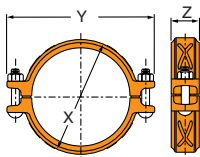


FIGURE 7400 RIGIDLITE® COUPLING (CONTINUED FROM PREVIOUS PAGE).

Nominal Size	O.D.	Max. Wk. Pressure	Max. End Load	Range of Pipe End Separation	Coupling Dimensions			Coupling Bolts		Specified Torque §		Approx. Wt. Ea.
					X	Y	Z	Qty.	Size	Min.	Max.	
In./DN(mm)	In./mm	PSI/bar	Lbs./kN	In./mm	In./mm	In./mm	In./mm		In./mm	Ft.-Lbs./N-M	Lbs./Kg	
5½ O.D. 139.7	5.500 139.7	300 20.7	7,127 31.70	0 -¼ 0 - 6.4	6¾ 171	9¼ 235	2 51	2	½ x 3 M12 x 76	80 110	100 150	4.5 2.0
5 125	5.563 141.3	300 20.7	7,292 32.44	0 -¼ 0 - 6.4	6⅞ 175	9¼ 235	2 51	2	½ x 3 M12 x 76	80 110	100 150	4.6 2.1
6½ O.D. 165.1	6.500 165.1	300 20.7	9,955 44.28	0 -¼ 0 - 6.4	7¾ 200	10⅜ 264	2 51	2	½ x 3 M12 x 76	80 110	100 150	5.5 2.5
6 150	6.625 168.3	300 20.7	10,341 46.00	0 -¼ 0 - 6.4	7⅞ 200	10⅜ 264	2 51	2	½ x 3 M12 x 76	80 110	100 150	5.5 2.5
8 200	8.625 219.1	300 20.7	17,528 77.97	0 -⅝ 0 - 3.2	10¼ 260	12¾ 324	2⅜ 60	2	½ x 3 M12 x 76	80 110	100 150	8.4 3.8

For additional details see "Coupling Data Chart Notes" on page 262.

§ – For additional Bolt Torque information on page 200.

Not for use in copper systems.

See Installation & Assembly directions on pages 156-157

Other sizes available, contact a Gruvlok Representative for more information.

## Couplings

FIG. 7003

HINGELOK® COUPLING

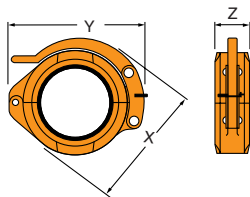


FIGURE 7003 HINGELOK COUPLING

Nominal Size	O.D.	Max. Wk. Pressure	Max. End Load	Range of Pipe End Separation	Deflection from $\zeta$		Coupling Dimensions			Approx. Wt. Ea.
					Per Coupling	Per in./ft.	X	Y	Z	
In./DN(mm)	In./mm	PSI/bar	Lbs./kN	In./mm	Degrees	mm/m	In./mm	In./mm	In./mm	Lbs./Kg
1½ 40	1.900 48.3	300 20.7	851 3.78	0 - 1/8 0 - 3.2	3° 46'	0.79 65.7	3 5/8 92	4 1/4 108	1 7/8 48	1.7 0.8
2 50	2.375 60.3	300 20.7	1,329 5.91	0 - 1/8 0 - 3.2	3° 1'	0.63 52.6	4 1/4 108	4 7/8 124	1 7/8 48	2.2 1.0
2½ 65	2.875 73.0	300 20.7	1,948 8.66	0 - 1/8 0 - 3.2	2° 29'	0.52 43.3	5 1/4 133	5 7/8 149	1 7/8 48	3.2 1.5
3 80	3.500 88.9	300 20.7	2,886 12.84	0 - 1/8 0 - 3.2	2° 3'	0.43 35.8	5 5/8 143	6 1/2 165	1 7/8 48	3.6 1.6
4 100	4.500 114.3	300 20.7	4,771 21.22	0 - 1/4 0 - 6.4	3° 11'	0.67 55.5	7 178	7 3/4 197	2 51	5.1 2.3
5 125	5.563 141.3	300 20.7	7,292 32.44	0 - 1/4 0 - 6.4	2° 35'	0.54 45.1	8 5/8 219	9 1/2 241	2 1/8 54	9.5 4.3
6 150	6.625 168.3	300 20.7	10,341 46.00	0 - 1/4 0 - 6.4	2° 10'	0.45 37.8	9 7/8 251	10 7/8 276	2 1/8 54	11.2 5.1
8 200	8.625 219.1	300 20.7	17,528 77.97	0 - 1/4 0 - 6.4	1° 40'	0.35 29.1	12 305	13 1/8 333	2 1/2 64	18.1 8.2

### SPECIAL NOTE:

Fig. 7003 Hingelok Couplings are not designed for eccentric loading and therefore are not recommended for use at the end of concrete pumping booms or vertical risers above 30 feet (9.1 meters). Shockload must be considered and is to be included in the maximum working pressure listed above. Coupling keys, gasket cavity, and pipe grooves must be kept free of all foreign matter. Proper anchoring practice must always be exercised.

For additional details see "Coupling Data Chart Notes" on page 262.

Not for use in copper systems.

See Installation & Assembly directions on pages 158-159

**CAUTION:** Hammering or banging on the handle or coupling housing could cause serious damage to the locking device and coupling assembly. The result may be an unsuitable pipe joint and unusable coupling assembly. When re-using, always check for gasket damage, housing hinge and handle for looseness, distortion bent or any other damage.

FIG. 7010

REDUCING COUPLING

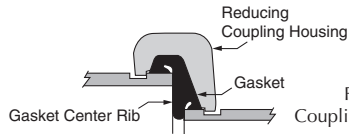
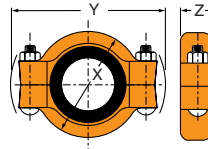
Fig. 7010  
Coupling with Gasket

FIGURE 7010 REDUCING COUPLING (CONTINUED ON NEXT PAGE)

Nominal Size	Larger O.D.	Smaller O.D.	Max. Working Pressure	Max. End Load	Range of Pipe End Separation	Deflection from $\zeta$		Coupling Dimensions			Coupling Bolts		Specified Torque S		Approx. Wt. Ea.
						Per Coupling	Per in./ft.	X	Y	Z	Qty.	Size	Min.	Max.	
In./DN(mm)	In./mm	In./mm	PSI/bar	Lbs./kN	In./mm	Degrees	mm/m	In./mm	In./mm	In./mm		In./mm	Ft.-Lbs./N-M	Lbs./Kg	
2 x 1½	2.375	1.900	500	2,215	0 - ½	1° 53'	0.39	3⅞	5⅞	1⅞	2	1½ x 2¾	80	100	2.0
50 x 40	60.3	48.3	34.5	9.85	0 - 3.2		32.9	92	149	48		M12 x 70	110	150	0.9
2½ x 2	2.875	2.375	500	3,246	0 - ½	1° 33'	0.32	4¼	6⅜	1⅞	2	1½ x 2¾	80	100	3.5
65 x 50	73.0	60.3	34.5	14.44	0 - 3.2		27.0	108	162	48		M12 x 70	110	150	1.6
3 x 2	3.500	2.375	500	4,811	0 - ½	1° 17'	0.27	4⅞	7⅞	1⅞	2	1½ x 2¾	80	100	4.4
80 x 50	88.9	60.3	34.5	21.40	0 - 3.2		22.4	124	181	48		M12 x 70	110	150	2.0
3 x 2½	3.500	2.875	500	4,811	0 - ½	1° 17'	0.27	4⅞	7⅞	1⅞	2	1½ x 2¾	80	100	4.1
80 x 65	88.9	73.0	34.5	21.40	0 - 3.2		22.4	124	181	48		M12 x 70	110	150	1.9
4 x 2	4.500	2.375	500	7,952	0 - ¾	2° 38'	0.55	6¼	8⅞	2	2	5⁄8 x 3½	100	130	8.9
100 x 50	114.3	60.3	34.5	35.37	0 - 4.8		45.9	159	225	51		M16 x 85	135	175	4.0
4 x 2½	4.500	2.875	500	7,952	0 - ¾	2° 38'	0.55	6¼	8⅞	2	2	5⁄8 x 3½	100	130	7.9
100 x 65	114.3	73.0	34.5	35.37	0 - 4.8		45.9	159	225	51		M16 x 85	135	175	3.6
4 x 3	4.500	3.500	500	7,952	0 - ¾	2° 38'	0.55	6¼	8⅞	2	2	5⁄8 x 3½	100	130	6.7
100 x 80	114.3	88.9	34.5	35.37	0 - 4.8		45.9	159	225	51		M16 x 85	135	175	3.0

## Couplings

**FIG. 7010, CONT'D.**

REDUCING COUPLING

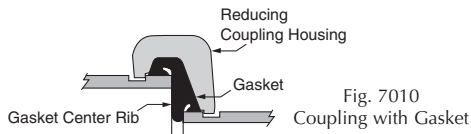
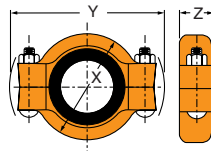


Fig. 7010



**FIGURE 7010 REDUCING COUPLING (CONTINUED FROM PREVIOUS PAGE)**

Nominal Size	Larger O.D.	Smaller O.D.	Max. Working Pressure	Max. End Load	Range of Pipe End Separation	Deflection from $\xi$		Coupling Dimensions			Coupling Bolts		Specified Torque §		Approx. Wt. Ea.
						Per Coupling	Per in./ft.	X	Y	Z	Qty.	Size	Min.	Max.	
In./DN(mm)	In./mm	In./mm	PSI/bar	Lbs./kN	In./mm	Degrees	mm/m	In./mm	In./mm	In./mm		In./mm	Ft.-Lbs./N-M	Lbs./Kg	
5 x 4 125 x 100	5.563 141.3	4.500 114.3	500 34.5	12,153 54.06	0 - 1/4 0 - 6.4	2° 5'	0.44 36.4	7 1/4 184	10 5/8 270	2 1/8 54	2	3/4 x 4 1/2 M20 x 110	130 175	180 245	11.4 5.2
6 x 4 150 x 100	6.625 168.3	4.500 114.3	500 34.5	17,236 76.67	0 - 1/4 0 - 6.4	1° 44'	0.36 30.2	8 1/4 210	11 1/8 295	2 1/8 54	2	3/4 x 4 1/2 M20 x 110	130 175	180 245	13.4 6.1
6 x 5 150 x 125	6.625 168.3	5.562 141.3	500 34.5	17,236 76.67	0 - 1/4 0 - 6.4	1° 44'	0.36 30.2	8 1/2 216	11 1/8 295	2 1/8 54	2	3/4 x 4 1/2 M20 x 110	130 175	180 245	13.5 6.1
8 x 6 200 x 150	8.625 219.1	6.625 168.3	500 34.5	29,213 129.95	0 - 1/4 0 - 6.4	1° 15'	0.26 21.8	10 1/2 267	14 356	2 1/4 57	2	3/4 x 4 1/2 M20 x 110	130 175	180 245	17.7 8.0

For additional details see "Coupling Data Chart Notes" on page 262.

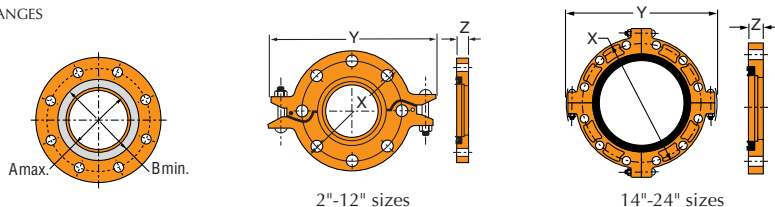
§ - For additional Bolt Torque information on page 200.

Not for use in copper systems.

See Installation & Assembly directions on pages 160-161.

FIG. 7012

GRUVLOK FLANGES



2"-12" sizes

14"-24" sizes

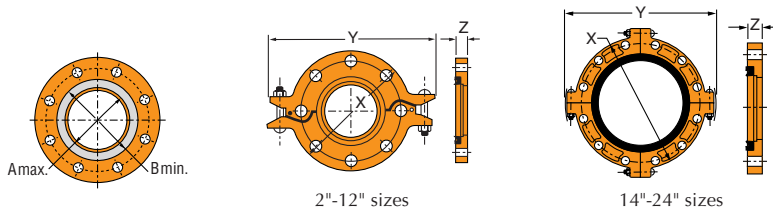
GRUVLOK FIGURE 7012 FLANGE: (CONTINUED ON NEXT PAGE)

Nominal Size	O.D.	Max. Working Pressure▼	Max. End Load▼	Latch Bolt			Dimensions			Sealing Surface		Mating Flange Bolts				Approx. Wt. Ea.
				Latch* Bolt Size	Specified Torque §		X	Y	Z	A Max.	B Min.	Mating Flange Bolts		Specified Torque §		
					Min.	Max.						Qty. ANSI	Size (ANSI)	Min.	Max.	
2	2.375	300	1,329	3/8 x 2 3/4	30	45	6 1/4	8 3/8	3/4	2 3/8	3 1/16	4	5/8 x 2 3/4	110	140	4.2
50	60.3	20.7	5.91	M10 x 70	40	60	159	213	19	60	87	4	M16 x 70	149	190	1.9
2 1/2	2.875	300	1,948	3/8 x 2 3/4	30	45	7	9 1/2	3/4	2 7/8	4	4	5/8 x 2 3/4	110	140	4.6
65	73.0	20.7	8.66	M10 x 70	40	60	178	241	19	73	102	-	M16 x 70	149	190	2.1
3 O.D.	2.996	300	2,115	-	30	45	7 1/4	9 3/4	3/4	3	4 1/8	-	-	110	140	4.8
76.1	76.1	20.7	9.41	M10 x 70	40	60	184	248	19	76	105	4	M16 x 70	149	190	2.2
3	3.500	300	2,886	3/8 x 2 3/4	30	45	7 7/8	10 1/2	3/4	3 1/2	4 9/16	4	5/8 x 2 3/4	110	140	6.0
88.9	88.9	20.7	12.84	M10 x 70	40	60	200	267	19	89	116	8	M16 x 70	149	190	2.7
4	4.500	300	4,771	3/8 x 2 3/4	30	45	9	11 1/2	3/4	4 1/2	5 9/16	8	5/8 x 2 3/4	110	140	6.3
100	114.3	20.7	21.22	M10 x 70	40	60	229	292	19	114	141	8	M16 x 70	149	190	2.9
5 1/2 O.D.	5.500	300	7,127	-	30	45	9 7/8	12 7/8	1/8	5 5/16	6 3/4	-	-	220	250	15.6
139.7	139.7	20.7	31.70	M10 x 70	40	60	251	327	22	141	171	8	M16 x 75	298	339	7.1

# Couplings

FIG. 7012, CONT'D

GRUVLOK FLANGES



2"-12" sizes

14"-24" sizes

GRUVLOK FIGURE 7012 FLANGE: (CONTINUED FROM PREVIOUS PAGE)

Nominal Size	O.D.	Max. Working Pressure▼	Max. End Load▼	Latch Bolt		Dimensions			Sealing Surface		Mating Flange Bolts			Approx. Wt. Ea.		
				Latch* Bolt Size	Specified Torque §		X	Y	Z	A Max.	B Min.	Mating Flange Bolts			Specified Torque §	
					Min.	Max.						Qty. ANSI	Size (ANSI)		Min.	Max.
5	5.563	300	7,292	3/8 x 2 3/4	30	45	10	12 1/2	7/8	5 9/16	6 3/4	8	3/4 x 2 1/8	220	250	8.8
125	141.3	20.7	32.44	M10 x 70	40	60	254	318	22	141	171	-	-	298	339	4.0
6 1/2 O.D.	6.500	300	9,955	-	30	45	11 1/4	14	7/8	6 5/8	7 13/16	-	-	220	250	9.7
165.1	165.1	20.7	44.28	M10 x 70	40	60	286	356	22	168	198	8	M20 x 80	298	339	4.4
6	6.625	300	10,341	3/8 x 2 3/4	30	45	11	14	7/8	6 5/8	7 13/16	8	3/4 x 3 1/8	220	250	9.6
150	168.3	20.7	46.00	M10 x 70	40	60	279	356	22	168	198	8	M20 x 80	298	339	4.4
8	8.625	300	17,528	3/8 x 2 3/4	30	45	13 1/2	16 1/2	1	8 5/8	10	8	3/4 x 3 1/4	220	250	15.6
200	219.1	20.7	77.97	M10 x 70	40	60	343	419	25	219	254	8 (12)	M20 x 80	298	339	7.1
10	10.750	300	27,229	3/8 x 2 3/4	30	45	16	19	1	10 3/4	12 1/8	12	7/8 x 3 1/2	320	400	18.2
250	273.1	20.7	121.12	M10 x 70	40	60	406	483	25	273	308	12	M20 x 90	439	542	8.3
12	12.750	300	38,303	3/8 x 2 3/4	30	45	19	21 3/4	1 1/4	12 3/4	14 1/8	12	7/8 x 3 3/4	320	400	29.9
300	323.9	20.7	170.38	M10 x 70	40	60	483	552	32	324	359	12	-	439	542	13.6

FIG. 7012, CONT'D.

GRUVLOK FLANGES

GRUVLOK FIGURE 7012 FLANGE: (CONTINUED FROM PREVIOUS PAGE).																
Nominal Size	O.D.	Max. Working Pressure▼	Max. End Load▼	Latch Bolt			Dimensions			Sealing Surface		Mating Flange Bolts				Approx. Wt. Ea.
				Latch* Bolt Size	Specified Torque §							Mating Flange Bolts		Specified Torque §		
					Min.	Max.	X	Y	Z	A Max.	B Min.	Qty. ANSI	Size (ANSI)	Min.	Max.	
12 (PN) 300	12.750 323.9	300 20.7	38,303 170.38	- M10 x 70	40 30	60 45	18 <sup>1</sup> / <sub>8</sub> 460	21 <sup>1</sup> / <sub>4</sub> 540	1 25	12 <sup>3</sup> / <sub>4</sub> 324	14 <sup>1</sup> / <sub>8</sub> 359	12 12	- M20 x 90 †	320 439	400 542	20.9 9.5
14 350	14.000 355.6	300 20.7	46,181 205.43	5/8 x 4 <sup>1</sup> / <sub>4</sub> -	100 136	130 176	21 533	24 610	1 <sup>1</sup> / <sub>2</sub> 38	14 356	16 406	12 -	1 x 4 <sup>1</sup> / <sub>4</sub> -	360 488	520 705	52.5 23.8
16 400	16.000 406.4	300 20.7	60,319 268.31	5/8 x 4 <sup>1</sup> / <sub>4</sub> -	100 136	130 176	23 <sup>1</sup> / <sub>2</sub> 597	26 <sup>1</sup> / <sub>2</sub> 673	1 <sup>1</sup> / <sub>2</sub> 38	16 406	18 457	16 -	1 x 4 <sup>1</sup> / <sub>4</sub> -	360 488	520 705	67.0 30.4
18 450	18.000 457.2	300 20.7	76,341 339.58	3/4 x 5 -	130 176	180 244	25 635	29 737	1 <sup>5</sup> / <sub>8</sub> 41	18 457	20 508	16 -	1 <sup>1</sup> / <sub>8</sub> x 4 <sup>3</sup> / <sub>4</sub> -	450 610	725 983	82.5 37.4
20 500	20.000 508.0	300 20.7	94,248 419.23	3/4 x 5 -	130 176	180 244	27 <sup>1</sup> / <sub>2</sub> 699	31 <sup>1</sup> / <sub>2</sub> 800	1 <sup>3</sup> / <sub>4</sub> 44	20 508	22 559	20 -	1 <sup>1</sup> / <sub>8</sub> x 4 <sup>3</sup> / <sub>4</sub> -	450 610	725 983	106.5 48.3
24 600	24.000 609.6	250 17.2	113,097 503.08	7/8 x 5 <sup>1</sup> / <sub>2</sub> -	180 244	220 298	32 813	36 <sup>1</sup> / <sub>2</sub> 927	1 <sup>7</sup> / <sub>8</sub> 48	24 610	26 660	20 -	1 <sup>1</sup> / <sub>4</sub> x 5 <sup>1</sup> / <sub>2</sub> -	620 841	1,000 1,356	138.5 62.8

† PN 16 uses M24 x 90 (PN) Dimensions for bolt circle PN 10 & 16 Flange.

\* Available in ANSI or metric bolt sizes only as indicated.

▼ Based on use with standard wall pipe.

§ – For additional Bolt Torque information, see page 200

The Gruvlok Flange bolt hole pattern conforms to ANSI Class 150 & Class 125 flanges.

To avoid interference issues, flanges cannot be assembled directly to Series 7700

butterfly valve. Flange can be assembled to one side of series 7500 and 7600 valve only.

Mating flange bolts must be at least Intermediate Strength Bolting per ASME B16.5.

Bolts with material properties equal or greater than SAE J429 Grade 5 are acceptable.

Refer to Gruvlok Products Catalog or Anvil's web site for more information on installing this flange.

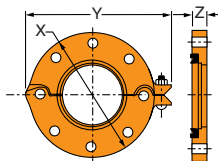
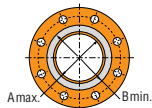
See Installation & Assembly directions on pages 162-167.

For additional details see "Coupling Data Chart notes" on page 262.

## Couplings

FIG. 7013

GRUVLOK FLANGES  
(#300 FLANGE)



GRUVLOK FIGURE 7013 FLANGE

Nominal Size	O.D.	Max. Wk. Pressure	Max. End Load	Latch* Bolt Size	Specified Torque S		Dimensions			Sealing Surface		Mating Flange Bolts		Approx. Wt. Ea.
					Min.	Max.	X	Y	Z	A Max.	B Min.	Qty. ANSI	Size (ANSI) in.	
					In.	Ft.-Lbs/N-M	In./mm	In./mm	In./mm	In./mm	In./mm		(ISO) mm	
2	2.375	750	3,323	3/8 x 2 1/2	30	45	6 1/2	8	1	2 3/8	3 1/16	8	5/8 x 3	5.0
50	60.3	51.7	14.78	-	-	-	165	203	25	60	87	-	-	2.3
2 1/2	2.875	750	4,869	3/8 x 2 1/2	30	45	7 1/2	9 1/8	1	2 7/8	4	8	3/4 x 3 1/4	6.9
65	73.0	51.7	21.66	-	-	-	191	232	25	73	102	-	-	3.1
3	3.500	750	7,216	3/8 x 2 1/2	30	45	8 1/4	9 1/8	1 1/8	3 1/2	4 9/16	8	3/4 x 3 1/2	9.4
80	88.9	51.7	32.10	-	-	-	210	251	29	89	116	-	-	4.3
4	4.500	750	11,928	3/8 x 2 1/2	30	45	10	11 3/8	1 1/4	4 1/2	5 5/8	8	3/4 x 3 3/4	14.4
100	114.3	51.7	53.06	-	-	-	254	289	32	114	143	-	-	6.5
5	5.563	750	18,229	3/8 x 2 1/2	30	45	11	12 5/8	1 3/8	5 9/16	6 3/4	8	3/4 x 4 1/2	18.3
125	141.3	51.7	81.09	-	-	-	279	321	35	141	171	-	-	8.3
6	6.625	750	25,854	3/8 x 2 1/2	30	45	12 1/2	14 1/8	1 1/2	6 5/8	7 13/16	12	3/4 x 4 1/2	24.9
150	168.3	51.7	115.00	-	-	-	318	359	38	168	198	-	-	11.3
8	8.625	750	43,820	1/2 x 3 1/2	80	100	15	16 1/8	1 5/8	8 5/8	10	12	1/8 x 4 3/4	35.4
200	219.1	51.7	194.92	-	-	-	381	429	41	219	254	-	-	16.1
10	10.750	750	68,072	1/2 x 3 1/2	80	100	17 1/2	19 3/8	1 7/8	10 3/4	12 1/8	16	1 x 5	54.0
250	273.1	51.7	302.80	-	-	-	445	492	48	273	308	-	-	24.5
12	12.750	750	95,757	1/2 x 3 1/2	80	100	20 1/2	22 1/2	2	12 3/4	14 3/16	16	1 1/8 x 5 3/4	74.8
300	323.9	51.7	425.95	-	-	-	521	572	51	324	360	-	-	33.9

\* Available in ANSI or metric bolt sizes only as indicated.  
Effective sealing area of mating flange must be free from gouges, undulations or deformities of any type to ensure proper sealing of the gasket.

Not for use with copper systems.

▼ Based on use with standard wall pipe.

Flange cannot be assembled directly to Series 7700 butterfly valve. Flange can be assembled to one side of series 7500 & 7600 valve.

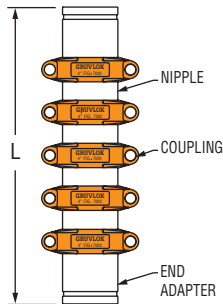
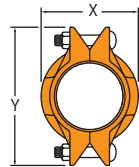
For Bolt Torque information, see page 200

For additional details see "Coupling Data Chart notes" on page 262.



FIG. 7240

EXPANSION JOINTS

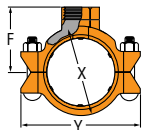


7240 PERFORMANCE DATA									
Nominal Size	O.D.	Coupling Figure	X	Y	Compressed Length L	Expanded Length L	Coupling Movement Capability	Number of Couplings	Total Movement Capability
In./DN(mm)	In./mm		In./mm	In./mm	In./mm	In./mm	In./mm		In./mm
2 50	2.375 60.3	7000	3½ 89	5½ 125	30 450	31¼ 794	⅛ 3.2	10	1¼ 31.8
2½ 65	2.875 73.0	7000	4 100	5¾ 146	30 450	31¼ 794	⅛ 3.2	10	1¼ 31.8
3 80	3.500 88.9	7000	4⅝ 117	6¾ 171	30 450	31¼ 794	⅛ 3.2	10	1¼ 31.8
4 100	4.500 114.3	7000	5⅝ 149	8⅛ 206	17½ 445	18¾ 476	¼ 6.4	5	1¼ 31.8
5 125	5.562 141.3	7000	7 178	9⅝ 244	19 483	20¼ 514	¼ 6.4	5	1¼ 31.8
6 150	6.625 168.3	7000	8 200	11 279	19 483	20¼ 514	¼ 6.4	5	1¼ 31.8
8 200	8.625 219.0	7000	10¾ 264	13¼ 337	22½ 572	23¾ 603	¼ 6.4	5	1¼ 31.8
10 250	10.750 273.1	7001	12⅝ 327	17½ 445	23½ 597	24¾ 629	¼ 6.4	5	1¼ 31.8
12 300	12.750 323.9	7001	15 381	19½ 495	23½ 597	24¾ 629	¼ 6.4	5	1¼ 31.8

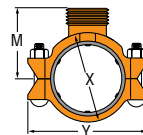
## Branch Outlets

### FIG. 7042

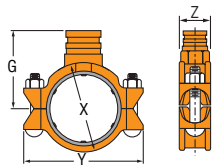
OUTLET COUPLING



Female IPS Outlet- 7042F



Male IPS Outlet - 7042M



Grooved Outlet - 7042G

### FIGURE 7042 - OUTLET COUPLING (CONTINUED ON NEXT PAGE)

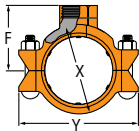
Run	Nominal Pipe Size		Working Pressure	Max. Run End Load	Range of Pipe End Separation	Coupling Dimensions						Bolt Size	Approx. Wt. Each
	Outlet					X	Y	Z	FPT F	MPT M	Grv. G		
	FPT F	MPT/Grv. M/G											
In./DN(mm)	In./mm	In./mm	psi/bar	Lbs./kN	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
1 1/2 40	1/2	—	500	1418	3/4-1 1/16	2 15/16	4 3/4	2 3/4	2 1/16	2 1/2	—	3/8 x 2 1/8	2.6
	15	—	34.5	6.31	19-27	75	121	70	52	64	—	—	1.2
	3/4	—	500	1418	3/4-1 1/16	2 15/16	4 3/4	2 3/4	2 1/16	2 1/2	—	3/8 x 2 1/8	2.6
	20	—	34.5	6.31	19-27	75	121	70	52	64	—	—	1.2
	1	—	500	1418	3/4-1 1/16	2 15/16	4 3/4	2 3/4	1 15/16	2 1/2	—	3/8 x 2 1/8	2.6
	25	—	34.5	6.31	19-27	75	121	70	49	64	—	—	1.2
2 50	1/2	—	500	2215	1 1/16-1	3 1/16	5 1/4	2 3/4	2 5/16	2 7/8	—	3/8 x 2 1/8	3.3
	15	—	34.5	9.85	17-25	87	133	70	59	73	—	—	1.5
	3/4	—	500	2215	1 1/16-1	3 1/16	5 1/4	2 3/4	2 5/16	2 7/8	—	3/8 x 2 1/8	3.3
	20	—	34.5	9.85	17-25	87	133	70	59	73	—	—	1.5
	1	1	500	2215	1 1/16-1	3 7/16	5 1/4	2 3/4	2 5/16	2 7/8	3 1/2	3/8 x 2 1/8	3.3
	25	25	34.5	9.85	17-25	87	133	70	56	73	89	—	1.5
2 1/2 65	1/2	—	500	3246	1 3/16-1 1/2	4 3/16	6 1/2	3 1/4	2 5/16	3 1/8	—	1/2 x 2 3/8	4.8
	15	—	34.5	14.44	30-38	106	165	83	65	79	—	—	2.2
	3/4	—	500	3246	1 3/16-1 1/2	4 3/16	6 1/2	3 1/4	2 5/16	3 1/8	—	1/2 x 2 3/8	4.8
	20	—	34.5	14.44	30-38	106	165	83	65	79	—	—	2.2
	1	—	500	3246	1 3/16-1 1/2	4 3/16	6 1/2	3 1/4	2 1/16	3 1/8	—	1/2 x 2 3/8	4.8
	25	—	34.5	14.44	30-38	106	165	83	62	79	—	—	2.2
	—	1 1/4	500	3246	1 3/16-1 1/2	4 3/16	6 1/2	3 1/4	—	—	3 5/8	1/2 x 2 3/8	5.5
	—	32	34.5	14.44	30-38	106	165	83	—	—	92	—	2.5

See Installation & Assembly directions on pages 168-169.

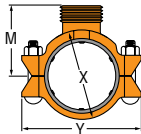
For additional details see "Coupling Data Chart notes" on page 262.

FIG. 7042, CONT'D.

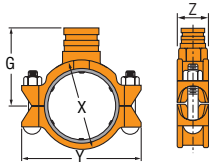
OUTLET COUPLING



Female IPS Outlet- 7042F



Male IPS Outlet - 7042M



Grooved Outlet - 7042G

FIGURE 7042 - OUTLET COUPLING (CONTINUED FROM PREVIOUS PAGE).

Run	Nominal Pipe Size		Working Pressure	Max. Run End Load	Range of Pipe End Separation	Coupling Dimensions						Bolt Size	Approx. Wt. Each
	Outlet					X	Y	Z	FPT F	MPT M	Grv. G		
	FPT F	MPT/Grv. M/G											
In./DN(mm)	In./mm	In./mm	psi/bar	Lbs./kN	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
3 80	3/4	—	500	4811	1 3/16-1 1/2	4 3/4	7 1/4	3 1/4	2 13/16	3 3/8	—	1/2 x 3	7.9
	20	—	34.5	21.40	30-38	121	184	83	72	86	—	—	3.6
	1	1	500	4811	1 3/16-1 1/2	4 3/4	7 1/4	3 1/4	2 3/4	3 3/8	4	1/2 x 3	7.9
	25	25	34.5	21.40	30-38	121	184	83	70	86	102	—	3.6
4 100	—	1 1/2	500	4811	1 3/16-1 1/2	4 3/4	7 1/4	3 1/4	—	—	4	1/2 x 3	8.6
	—	40	34.5	21.40	30-38	121	184	83	—	—	102	—	3.9
	3/4	—	500	7952	1 9/16-1 7/8	6 3/16	8 7/8	3 3/8	3 11/16	4 1/4	—	5/8 x 3 1/2	9.9
	20	—	34.5	35.37	40-48	157	225	92	94	108	—	—	4.5
6 150	1	—	500	7952	1 9/16-1 7/8	6 3/16	8 7/8	3 3/8	3 9/16	4 1/4	—	5/8 x 3 1/2	9.9
	25	—	34.5	35.37	40-48	157	225	92	91	108	—	—	4.5
	—	1 1/2	500	7952	1 9/16-1 7/8	6 3/16	8 7/8	3 3/8	—	—	4 7/8	5/8 x 3 1/2	11.0
	—	25	34.5	35.37	40-48	157	225	92	—	—	124	—	5.0
6 150	—	2	500	7952	1 9/16-1 7/8	6 3/16	8 7/8	3 3/8	—	—	4 7/8	5/8 x 3 1/2	11.0
	—	50	34.5	35.37	40-48	157	225	92	—	—	124	—	5.0
	1	—	500	17236	1 5/8-1 15/16	8 1/8	11 1/4	3 3/4	4 3/4	5 3/8	—	5/8 x 3 1/2	18.0
	25	—	34.5	76.66	41-51	206	286	95	121	137	—	—	8.2
6 150	1 1/2	1 1/2	500	17236	1 5/8-1 15/16	8 1/8	11 1/4	3 3/4	4 3/4	5 3/8	6	5/8 x 3 1/2	18.0
	40	40	34.5	76.66	41-51	206	286	95	121	137	152	—	8.2
	—	2	500	17236	1 5/8-1 15/16	8 1/8	11 1/4	3 3/4	—	—	6	5/8 x 3 1/2	18.7
—	50	34.5	76.66	41-51	206	286	95	—	—	152	—	8.5	

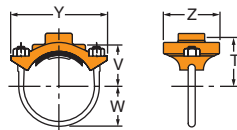
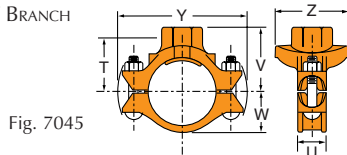
Pipe ends must be prepared in accordance with Gruvlok "Roll or Cut Groove Specifications for Steel & Other IPS or ISO size Pipe".  
 Pressure & end load ratings are for use with standard wall steel pipe.

For a one-time field test only, the maximum working pressure may be increased 1 1/2 times the figure shown.  
 Not for use in copper systems.

## Branch Outlets

**FIG. 7045**

CLAMP-T, FPT BRANCH



**FIGURE 7045-FPT BRANCH (CONTINUED ON NEXT PAGE)**

Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure ▼	Clamp-T Dimensions						Bolt Size	Specified Torque S		Approx. Wt. Each
		Min. Dia.	Max. Dia.		T	U	V Threaded	W	Y	Z		Min.	Max.	
In./DN(mm)	In./mm	In./mm	In./mm	psi/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Fl.-Lbs./N-M	Lbs./Kg	
2 x 1½ 50 x 15	2.375 x 0.840 60.3 x 21.3	1½ 38	1½ 41	500 34.5	2¾ 56	9/16 14	2½ 67	1½ 12	5½ 140	3 76	½ U-Bolt -	30 40	2.3 1.0	
2 x ¾ 50 x 20	2.375 x 1.050 60.3 x 26.7	1½ 38	1½ 41	500 34.5	2¼ 52	9/16 14	2½ 67	1½ 38	5½ 140	3 76	½ U-Bolt -	30 40	2.3 1.0	
2 x 1 50 x 25	2.375 x 1.315 60.3 x 33.7	1½ 38	1½ 41	500 34.5	1½ 51	9/16 14	2½ 67	1½ 38	5½ 140	3 76	½ U-Bolt -	30 40	2.6 1.2	
2 x 1¼ 50 x 32	2.375 x 1.660 60.3 x 42.4	2 51	2½ 54	500 34.5	2¾ 55	9/16 14	2½ 73	1½ 38	5½ 140	3½ 89	½ U-Bolt -	30 40	2.7 1.2	
2 x 1½ 50 x 40	2.375 x 1.900 60.3 x 48.3	2 51	2½ 54	500 34.5	2¾ 55	9/16 14	2½ 73	1½ 38	7 178	3½ 89	½ U-Bolt -	30 40	2.5 1.1	
2½ x ½ 65 x 15	2.875 x 0.840 73.0 x 21.3	1½ 38	1½ 41	500 34.5	2¼ 62	9/16 14	2½ 73	1¾ 44	5½ 140	3 76	½ U-Bolt -	30 40	3.0 1.4	
2½ x ¾ 65 x 20	2.875 x 1.050 73.0 x 26.7	1½ 38	1½ 41	500 34.5	2¾ 59	9/16 14	2½ 73	1¾ 44	5½ 140	3 76	½ U-Bolt -	30 40	2.9 1.3	
2½ x 1 65 x 25	2.875 x 1.315 73.0 x 33.7	1½ 38	1½ 41	500 34.5	2¾ 55	9/16 14	2½ 73	1¾ 44	6½ 156	3 76	½ U-Bolt -	30 40	2.9 1.3	
2½ x 1¼ 65 x 32	2.875 x 1.660 73.0 x 42.4	2 51	2½ 54	500 34.5	2¼ 62	9/16 14	3½ 79	1¾ 44	6½ 156	3½ 86	½ U-Bolt -	30 40	3.4 1.5	

FIG. 7045, CONT'D.

CLAMP-T, FPT BRANCH

FIGURE 7045-FPT BRANCH (CONTINUED FROM PREVIOUS PAGE)														
Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure ▼	Clamp-T Dimensions						Bolt Size	Specified Torque S		Approx. Wt. Each
		Min. Dia.	Max. Dia.		T	U	V Threaded	W	Y	Z		Min.	Max.	
In./DN(mm)	In./mm	In./mm	In./mm	psi/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Ft.-Lbs./N-M	Lbs./Kg
2½ x 1½ 65 x 40	2.875 x 1.900 73.0 x 48.3	2 51	2½ 54	500 34.5	2½/16 62	¾/16 14	3½ 79	1¾ 44	6½ 156	3¾ 86	½ U-Bolt -	30	40	3.4 1.5
3 x ½ 80 x 15	3.500 x 0.840 88.9 x 21.3	1½ 38	1½ 41	500 34.5	2¾/16 65	¾/16 14	3 76	2½ 54	7 178	3¾ 95	½ U-Bolt -	30	40	2.8 1.2
3 x ¾ 80 x 20	3.500 x 1.050 88.9 x 26.7	1½ 38	1½ 41	500 34.5	2½/16 62	¾/16 14	3 76	2½ 54	7 178	3¾ 95	½ U-Bolt -	30	40	2.7 1.2
3 x 1 80 x 25	3.500 x 1.315 88.9 x 33.7	1½ 38	1½ 41	500 34.5	2¾/16 59	¾/16 14	3 76	2½ 54	7 178	3¾ 95	½ U-Bolt -	30	40	2.7 1.2
3 x 1¼ 80 x 32	3.500 x 1.660 88.9 x 42.4	2 51	2½ 54	500 34.5	2½/16 68	1½ 38	3¾ 86	2½ 54	6½ 175	3¾ 95	½ x 2¾ -	80	100	3.4 1.5
3 x 1½ 80 x 40	3.500 x 1.900 88.9 x 48.3	2 51	2½ 54	500 34.5	2½/16 68	1½ 38	3¾ 86	2½ 54	6½ 175	3¾ 95	½ x 2¾ -	80	100	4.4 2.0
3 x 2 80 x 50	3.500 x 2.375 88.9 x 60.3	2½ 64	2½ 67	500 34.5	2½/16 68	1½ 38	3¾ 86	2½ 54	6½ 175	4½ 105	½ x 2¾ -	80	100	4.6 2.1
4 x ½ 100 x 15	4.500 x 0.840 114.3 x 21.3	1½ 38	1½ 41	500 34.5	3½/16 76	¾/16 14	3½ 89	2½ 67	7¾ 197	3¾ 95	½ U-Bolt -	30	40	2.9 1.3
4 x ¾ 100 x 20	4.500 x 1.050 114.3 x 26.7	1½ 38	1½ 41	500 34.5	3½/16 78	¾/16 14	3½ 89	2½ 67	7¾ 197	3¾ 95	½ U-Bolt -	30	40	2.8 1.3
4 x 1 100 x 25	4.500 x 1.315 114.3 x 33.7	1½ 38	1½ 41	500 34.5	2¾/16 73	¾/16 14	3½ 89	2½ 67	7¾ 197	3¾ 95	½ U-Bolt -	30	40	2.7 1.2

**NOTE:** 2½", 5" and 6" Nom. size run pipe may be used on 3" O.D., 5½" O.D. and 6½" O.D. pipe

▼ Based on use with standard wall pipe.

Not for use in copper systems.

## Branch Outlets

FIG. 7045, CONT'D.

CLAMP-T, FPT BRANCH

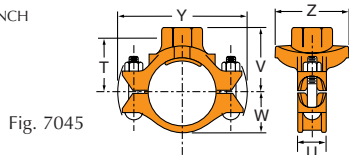


Fig. 7045

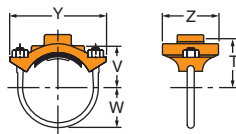


Fig. 7045 (U-Bolt)

FIGURE 7045-FPT BRANCH (CONTINUED ON NEXT PAGE)

Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure ▼	Clamp-T Dimensions						Bolt Size	Specified Torque S		Approx. Wt. Each
		Min. Dia.	Max. Dia.		T	U	V Threaded	W	Y	Z		Min.	Max.	
In./DN(mm)	In./mm	In./mm	In./mm	psi/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Ft.-Lbs./N-M	Lbs./Kg
4 x 1¼ 100 x 32	4.500 x 1.660 114.3 x 42.4	2 51	2½ 54	500 34.5	3¾ 81	1⅞ 48	3⅞ 98	2⅞ 67	7½ 191	3¾ 95	½ x 2¾ -	80	100	4.5 2.0
4 x 1½ 100 x 40	4.500 x 1.900 114.3 x 48.3	2 51	2½ 54	500 34.5	3¾ 81	1⅞ 48	3⅞ 98	2⅞ 67	7½ 191	3¾ 95	½ x 2¾ -	80	100	4.6 2.1
4 x 2 100 x 50	4.500 x 2.375 114.3 x 60.3	2½ 64	2⅞ 67	500 34.5	3⅞ 84	1⅞ 48	4 102	2⅞ 67	7½ 191	4⅞ 105	½ x 2¾ -	80	100	7.7 3.5
4 x 2½ 100 x 65	4.500 x 2.875 114.3 x 73.0	2¾ 70	2⅞ 73	500 34.5	3⅞ 78	1⅞ 48	4 102	2⅞ 67	7½ 191	4⅞ 111	½ x 2¾ -	80	100	5.2 2.4
4 x 3 O.D. 114.3 x 76.1	4.500 x 2.996 114.3 x 76.1	2¾ 70	2⅞ 73	500 34.5	3 76	1⅞ 48	4 102	2⅞ 67	7½ 191	4⅞ 111	½ x 2¾ -	80	100	5.2 2.4
4 x 3 100 x 80	4.500 x 3.500 114.3 x 88.9	3½ 89	3⅞ 92	500 34.5	3¼ 83	1⅞ 48	4¼ 108	2⅞ 67	7½ 191	5¼ 133	½ x 3½ -	80	100	6.5 2.9
5 x 1¼ 125 x 32	5.563 x 1.660 141.3 x 42.4	2 51	2½ 54	500 34.5	3⅞ 94	1⅞ 48	4⅞ 111	3¼ 83	9⅞ 232	3¾ 95	⅝ x 3¼ -	100	130	5.4 2.4
5 x 1½ 125 x 40	5.563 x 1.900 141.3 x 48.3	2 51	2½ 54	500 34.5	3⅞ 94	1⅞ 48	4⅞ 111	3¼ 83	9⅞ 232	3¾ 95	⅝ x 3¼ -	100	130	5.5 2.5
5 x 2 125 x 50	5.563 x 2.375 141.3 x 60.3	2½ 64	2⅞ 67	500 34.5	3⅞ 97	1⅞ 48	4½ 114	3¼ 83	9⅞ 232	4⅞ 105	⅝ x 3¼ -	100	130	5.7 2.6

FIG. 7045, CONT'D.

CLAMP-T, FPT BRANCH

FIGURE 7045-FPT BRANCH (CONTINUED FROM PREVIOUS PAGE)

Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure ▼	Clamp-T Dimensions						Bolt Size	Specified Torque S		Approx. Wt. Each
		Min. Dia.	Max. Dia.		T	U	V Threaded	W	Y	Z		Min.	Max.	
<i>ln./DN(mm)</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>psi/bar</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>Ft.-Lbs./N-M</i>	<i>Lbs./Kg</i>
5 x 2½ <i>125 x 65</i>	5.563 x 2.875 <i>141.3 x 73.0</i>	2¾ <i>70</i>	2⅝ <i>73</i>	500 <i>34.5</i>	3⅜ <i>97</i>	1⅝ <i>48</i>	4¾ <i>121</i>	3¼ <i>83</i>	9⅝ <i>232</i>	4⅝ <i>111</i>	5⅝ x 3¼ <i>-</i>	100 <i>130</i>	130 <i>180</i>	7.0 <i>3.2</i>
5 x 3 O.D. <i>141.3 x 76.1</i>	5.563 x 2.996 <i>141.3 x 76.1</i>	2¾ <i>70</i>	2⅝ <i>73</i>	500 <i>34.5</i>	3¾ <i>95</i>	1⅝ <i>48</i>	4¾ <i>121</i>	3¼ <i>83</i>	9⅝ <i>232</i>	4⅝ <i>111</i>	¾ x 4½ <i>-</i>	130 <i>180</i>	180 <i>3.2</i>	7.0 <i>3.2</i>
5 x 3 <i>125 x 80</i>	5.563 x 3.500 <i>141.3 x 88.9</i>	3½ <i>89</i>	3⅝ <i>92</i>	500 <i>34.5</i>	4 <i>102</i>	1⅝ <i>48</i>	5 <i>127</i>	3¼ <i>83</i>	9⅝ <i>232</i>	5¼ <i>133</i>	5⅝ x 3¼ <i>-</i>	100 <i>130</i>	130 <i>180</i>	8.7 <i>3.9</i>
6 x 1¼ <i>150 x 32</i>	6.625 x 1.660 <i>168.3 x 42.4</i>	2 <i>51</i>	2⅝ <i>54</i>	500 <i>34.5</i>	4⅜ <i>106</i>	2 <i>51</i>	4⅝ <i>124</i>	3⅝ <i>98</i>	10⅝ <i>257</i>	3¾ <i>95</i>	5⅝ x 4¼ <i>-</i>	100 <i>130</i>	130 <i>180</i>	7.8 <i>3.5</i>
6 x 1½ <i>150 x 40</i>	6.625 x 1.900 <i>168.3 x 48.3</i>	2 <i>51</i>	2⅝ <i>54</i>	500 <i>34.5</i>	4⅜ <i>106</i>	2 <i>51</i>	4⅝ <i>124</i>	3⅝ <i>98</i>	10⅝ <i>257</i>	3¾ <i>95</i>	5⅝ x 4¼ <i>-</i>	100 <i>130</i>	130 <i>180</i>	7.8 <i>3.5</i>
6 x 2 <i>150 x 50</i>	6.625 x 2.375 <i>168.3 x 60.3</i>	2½ <i>64</i>	2⅝ <i>67</i>	500 <i>34.5</i>	4⅜ <i>106</i>	2 <i>51</i>	4⅝ <i>124</i>	3⅝ <i>98</i>	10⅝ <i>257</i>	4⅝ <i>105</i>	5⅝ x 4¼ <i>-</i>	100 <i>130</i>	130 <i>180</i>	7.8 <i>3.5</i>
6 x 2½ <i>150 x 65</i>	6.625 x 2.875 <i>168.3 x 73.0</i>	2¾ <i>70</i>	2⅝ <i>73</i>	500 <i>34.5</i>	4⅜ <i>106</i>	2 <i>51</i>	5⅝ <i>130</i>	3⅝ <i>98</i>	10⅝ <i>257</i>	4⅝ <i>111</i>	5⅝ x 4¼ <i>-</i>	100 <i>130</i>	130 <i>180</i>	8.4 <i>3.8</i>
6 x 3 O.D. <i>168.3 x 76.1</i>	6.625 x 2.996 <i>168.3 x 76.1</i>	2¾ <i>70</i>	2⅝ <i>73</i>	500 <i>34.5</i>	4⅝ <i>105</i>	2 <i>51</i>	5⅝ <i>130</i>	3⅝ <i>98</i>	10⅝ <i>257</i>	4⅝ <i>111</i>	5⅝ x 4¼ <i>-</i>	100 <i>130</i>	130 <i>180</i>	8.4 <i>3.8</i>
6 x 3 <i>150 x 80</i>	6.625 x 3.500 <i>168.3 x 88.9</i>	3½ <i>89</i>	3⅝ <i>92</i>	500 <i>34.5</i>	4⅝ <i>111</i>	2 <i>51</i>	5⅝ <i>137</i>	3⅝ <i>98</i>	10⅝ <i>257</i>	5¼ <i>133</i>	5⅝ x 4¼ <i>-</i>	100 <i>130</i>	130 <i>180</i>	9.6 <i>4.4</i>
6 x 4 <i>150 x 100</i>	6.625 x 4.500 <i>168.3 x 114.3</i>	4½ <i>114</i>	4⅝ <i>117</i>	500 <i>34.5</i>	4⅝ <i>111</i>	2 <i>51</i>	5½ <i>140</i>	3⅝ <i>98</i>	10⅝ <i>257</i>	6½ <i>165</i>	5⅝ x 4¼ <i>-</i>	100 <i>130</i>	130 <i>180</i>	10.5 <i>4.8</i>

**NOTE:** 2½", 5" and 6" Nom. size run pipe may be used on 3" O.D., 5½" O.D. and 6½" O.D. pipe

▼ Based on use with standard wall pipe.

Not for use in copper systems.

## Branch Outlets

FIG. 7045, CONT'D.

CLAMP-T, FPT BRANCH

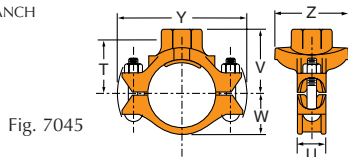


Fig. 7045

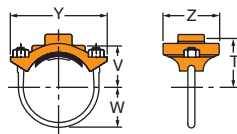


Fig. 7045 (U-Bolt)

FIGURE 7045-FPT BRANCH (CONTINUED FROM PREVIOUS PAGE)

Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure ▼	Clamp-T Dimensions						Bolt Size	Specified Torque S		Approx. Wt. Each
		Min. Dia.	Max. Dia.		T	U	V Threaded	W	Y	Z		Min.	Max.	
In./DN(mm)	In./mm	In./mm	In./mm	psi/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Ft.-Lbs./N-M	Lbs./Kg	
8 x 2 200 x 50	8.625 x 2.750 219.1 x 70.0	2½ 64	2⅝ 67	500 34.5	5⅞ 132	2¼ 57	5⅝ 149	5 127	12¾ 324	4⅞ 105	⅝ x 4¼ -	100	130	11.2 5.1
8 x 2½ 200 x 65	8.625 x 2.875 219.1 x 73.0	2¾ 70	2⅞ 73	500 34.5	5⅞ 134	2¼ 57	6¼ 159	5 127	12¾ 324	4⅞ 111	⅝ x 4¼ -	100	130	11.1 5.0
8 x 3 O.D. 219.1 x 76.1	8.625 x 2.996 219.1 x 76.1	2¾ 70	2⅞ 73	500 34.5	5¼ 133	2¼ 57	6¼ 159	5 127	12¾ 324	4⅞ 111	⅝ x 4¼ -	100	130	11.1 5.0
8 x 3 200 x 80	8.625 x 3.500 219.1 x 88.9	3½ 89	3⅝ 92	500 34.5	5⅝ 137	2¼ 57	6⅝ 162	5 127	12¾ 324	5¼ 133	⅝ x 4¼ -	100	130	13.0 5.9
8 x 4 200 x 100	8.625 x 4.500 219.1 x 114.3	4½ 114	4⅞ 117	500 34.5	5⅝ 137	2¼ 57	6½ 165	5 127	12¾ 324	6½ 165	⅝ x 4¼ -	100	130	16.2 7.3

**NOTE:** 2½", 5" and 6" Nom. size run pipe may be used on 3" O.D., 5½" O.D. and 6½" O.D. pipe

▼ Based on use with standard wall pipe.

Not for use in copper systems.

§ – For additional Bolt Torque information, see page 200.

See Installation & Assembly directions on pages 170-171.



FIG. 7046

CLAMP-T, GROOVED BRANCH

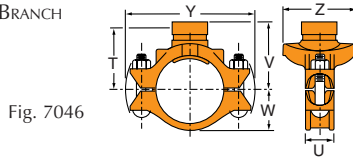


Fig. 7046

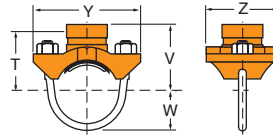


Fig. 7046 (U-BOLT)

FIGURE 7046-GR BRANCH (CONTINUED ON NEXT PAGE)

Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure ▼	Clamp-T Dimensions					Bolt Size	Specified Torque §		Approx. Wt. Each
		Min. Dia.	Max. Dia.		U	V Grooved	W	Y	Z		Min.	Max.	
In./DN(mm)	In./mm	In./mm	In./mm	psi/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Ft.-Lbs./N-M	Lbs./Kg	
2½ x 1¼•	2.875 x 1.660	2	2½	500	9/16	3½	1¾	6½	3½	½ U-Bolt	30	40	3.4
65 x 32	73.0 x 42.4	51	54	34.5	14	79	44	156	89	-			1.5
2½ x 1½	2.875 x 1.900	2	2½	500	9/16	3½	1¾	6½	3½	½ U-Bolt	30	40	3.4
65 x 40	73.0 x 48.3	51	54	34.5	14	79	44	156	89	-			1.5
3 x 1¼	3.500 x 1.660	2	2½	500	1½	3½	2½	6½	3¾	½ x 2¾	80	100	3.4
80 x 32	88.9 x 42.4	51	54	34.5	38	89	54	175	95	-			1.5
3 x 1½	3.500 x 1.900	2	2½	500	1½	3½	2½	6½	3¾	½ x 2¾	80	100	4.4
80 x 40	88.9 x 48.3	51	54	34.5	38	89	54	175	95	-			2.0
3 x 2	3.500 x 2.375	2½	2¾	500	1½	3½	2½	6½	4½	½ x 2¾	80	100	4.6
80 x 50	88.9 x 60.3	64	67	34.5	38	89	54	175	105	-			2.1
4 x 1¼	4.500 x 1.660	2	2½	500	1½	4	2¾	7½	3¾	½ x 2¾	80	100	4.2
100 x 32	114.3 x 42.4	51	54	34.5	48	102	67	191	95	-			1.9
4 x 1½	4.500 x 1.900	2	2½	500	1½	4	2¾	7½	3¾	½ x 2¾	80	100	4.3
100 x 40	114.3 x 48.3	51	54	34.5	48	102	67	191	95	-			2.0
4 x 2	4.500 x 2.375	2½	2¾	500	1½	4	2¾	7½	4½	½ x 2¾	80	100	4.6
100 x 50	114.3 x 60.3	64	67	34.5	48	102	67	191	105	-			2.1

## Branch Outlets

FIG. 7046, CONT'D.

CLAMP-T, GROOVED BRANCH

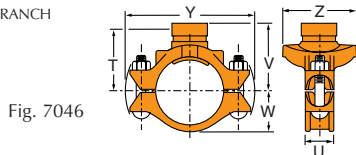


Fig. 7046

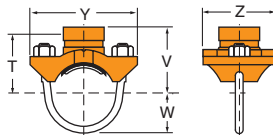


Fig. 7046 (U-BOLT)

FIGURE 7046-GR BRANCH (CONTINUED ON NEXT PAGE)

Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure ▼	Clamp-T Dimensions					Bolt Size	Specified Torque §		Approx. Wt. Each
		Min. Dia.	Max. Dia.		U	V Grooved	W	Y	Z		Min.	Max.	
In./DN(mm)	In./mm	In./mm	In./mm	psi/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Ft.-Lbs./N-M	Lbs./Kg	
4 x 2½ 100 x 65	4.500 x 2.875 114.3 x 73.0	2¾ 70	2⅞ 73	500 34.5	1⅞ 48	4 102	2⅞ 67	7½ 191	4⅞ 111	½ x 2¾ -	80 100	5.0 2.3	
4 x 3 O.D. 114.3 x 76.1	4.500 x 2.996 114.3 x 76.1	2¾ 70	2⅞ 73	500 34.5	1⅞ 48	4 102	2⅞ 67	7½ 191	4⅞ 111	½ x 2¾ -	80 100	5.0 2.3	
4 x 3 100 x 80	4.500 x 3.500 114.3 x 88.9	3½ 89	3⅝ 92	500 34.5	1⅞ 48	4 102	2⅞ 67	7½ 191	5¼ 133	½ x 3½ -	80 100	5.6 2.5	
5 x 1¼ 125 x 32	5.563 x 1.660 141.3 x 42.4	2 51	2⅞ 54	500 34.5	1⅞ 48	4¼ 108	3¼ 83	9⅞ 232	3¾ 95	½ x 2¾ -	80 100	5.6 2.5	
5 x 1½ 125 x 40	5.563 x 1.900 141.3 x 48.3	2 51	2⅞ 54	500 34.5	1⅞ 48	4¼ 108	3¼ 83	9⅞ 232	3¾ 95	⅝ x 3¼ -	100 130	5.6 2.5	
5 x 2 125 x 50	5.563 x 2.375 141.3 x 60.3	2½ 64	2⅝ 67	500 34.5	1⅞ 48	4¼ 108	3¼ 83	9⅞ 232	4⅞ 105	⅝ x 3¼ -	100 130	5.5 2.5	
5 x 2½ 125 x 65	5.563 x 2.875 141.3 x 73.0	2¾ 70	2⅞ 73	500 34.5	1⅞ 48	4¼ 108	3¼ 83	9⅞ 232	4⅞ 111	⅝ x 3¼ -	100 130	5.8 2.6	
5 x 3 125 x 80	5.563 x 3.500 141.3 x 88.9	3½ 89	3⅝ 92	500 34.5	1⅞ 48	4⅞ 117	3¼ 83	9⅞ 232	5¼ 133	⅝ x 3¼ -	100 130	7.1 3.2	

FIG. 7046, CONT'D.

CLAMP-T, GROOVED BRANCH

FIGURE 7046-GR BRANCH (CONTINUED ON NEXT PAGE)

Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure ▼	Clamp-T Dimensions					Bolt Size	Specified Torque §		Approx. Wt. Each
		Min. Dia.	Max. Dia.		U	V Grooved	W	Y	Z		Min.	Max.	
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>psi/bar</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Ft.-Lbs./N-M</i>	<i>Lbs./Kg</i>	
6 x 1½ <i>150 x 40</i>	6.625 x 1.900 <i>168.3 x 48.3</i>	2 <i>51</i>	2½ <i>54</i>	500 <i>34.5</i>	2 <i>51</i>	5 <i>127</i>	3/8 <i>98</i>	10½ <i>257</i>	3¾ <i>95</i>	¾ x 4¼ <i>*</i>	100	130	7.2 <i>3.3</i>
6 x 2 <i>150 x 50</i>	6.625 x 2.375 <i>168.3 x 60.3</i>	2½ <i>64</i>	2¾ <i>67</i>	500 <i>34.5</i>	2 <i>51</i>	5 <i>127</i>	3/8 <i>98</i>	10½ <i>257</i>	4½ <i>105</i>	¾ x 4¼ <i>*</i>	100	130	7.8 <i>3.5</i>
6 x 2½ <i>150 x 65</i>	6.625 x 2.875 <i>168.3 x 73.0</i>	2¾ <i>70</i>	2½ <i>73</i>	500 <i>34.5</i>	2 <i>51</i>	5½ <i>130</i>	3/8 <i>98</i>	10½ <i>257</i>	4½ <i>111</i>	¾ x 4¼ <i>*</i>	100	130	7.6 <i>3.4</i>
6 x 3 O.D. <i>168.3 x 76.1</i>	6.625 x 2.996 <i>168.3 x 76.1</i>	2¾ <i>70</i>	2½ <i>73</i>	500 <i>34.5</i>	2 <i>51</i>	5½ <i>130</i>	3/8 <i>98</i>	10½ <i>257</i>	4½ <i>111</i>	¾ x 4¼ <i>*</i>	100	130	7.6 <i>3.4</i>
6 x 3 <i>150 x 80</i>	6.625 x 3.500 <i>168.3 x 88.9</i>	3½ <i>89</i>	3¾ <i>92</i>	500 <i>34.5</i>	2 <i>51</i>	5½ <i>130</i>	3/8 <i>98</i>	10½ <i>257</i>	5¼ <i>133</i>	¾ x 4¼ <i>*</i>	100	130	8.0 <i>3.6</i>
6 x 4 <i>150 x 100</i>	6.625 x 4.500 <i>168.3 x 114.3</i>	4½ <i>114</i>	4¾ <i>117</i>	500 <i>34.5</i>	2 <i>51</i>	5¼ <i>133</i>	3/8 <i>98</i>	10½ <i>257</i>	6½ <i>165</i>	¾ x 4¼ <i>*</i>	100	130	10.4 <i>4.7</i>
8 x 2 <i>200 x 50</i>	8.625 x 2.375 <i>219.1 x 60.3</i>	2½ <i>64</i>	2¾ <i>67</i>	500 <i>34.5</i>	2¼ <i>57</i>	6½ <i>156</i>	5 <i>127</i>	12¾ <i>324</i>	4¼ <i>108</i>	¾ x 4½ <i>-</i>	130	180	10.4 <i>4.7</i>
8 x 2½ <i>200 x 65</i>	8.625 x 2.875 <i>219.1 x 73.0</i>	2¾ <i>70</i>	2½ <i>73</i>	500 <i>34.5</i>	2¼ <i>57</i>	6½ <i>156</i>	5 <i>127</i>	12¾ <i>324</i>	4¾ <i>111</i>	¾ x 4½ <i>M20 x 110</i>	130	180	10.6 <i>4.8</i>
8 x 3 <i>200 x 80</i>	8.625 x 3.500 <i>219.1 x 88.9</i>	3½ <i>89</i>	3¾ <i>92</i>	500 <i>34.5</i>	2¼ <i>57</i>	6½ <i>156</i>	5 <i>127</i>	12¾ <i>324</i>	5¼ <i>133</i>	¾ x 4½ <i>M20 x 110</i>	130	180	11.5 <i>5.2</i>
8 x 4 <i>200 x 100</i>	8.625 x 4.500 <i>219.1 x 114.3</i>	4½ <i>114</i>	4¾ <i>117</i>	500 <i>34.5</i>	2¼ <i>57</i>	6¼ <i>159</i>	5 <i>127</i>	12¾ <i>324</i>	6½ <i>165</i>	¾ x 4½ <i>M20 x 110</i>	130	180	16.2 <i>7.3</i>

NOTE: 2½", 5" &amp; 6" Nom. size run pipe may be used on 3" O.D., 5½" O.D. &amp; 6½" O.D. pipe.

▼ Based on use with standard wall pipe.

Not for use in copper systems.

• Cannot be used in cross configuration.

§ – For additional Bolt Torque information, see page 200.

See Installation &amp; Assembly directions on pages 170-171.

## Branch Outlets

### FIG. 7047, FIG. 7048 & FIG. 7049

CLAMP-T, CROSS

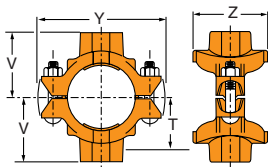


Fig. 7047 – Thread x Thread

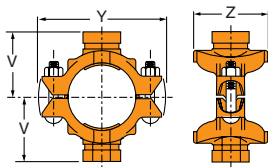


Fig. 7048 – Groove x Groove

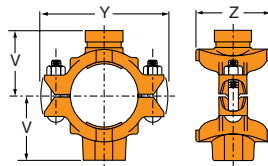


Fig. 7049 – Groove x Thread

The Gruvlok Clamp-T provides for a branch or cross connection in light wall or standard wall steel pipe.

The Fig. 7045 Clamp-T female pipe thread branch is available with NPT or ISO 7/1 connection and the Fig. 7046 Clamp-T has grooved-end branch connection.

Clamp-T cross connections are available allowing greater versatility in piping design.

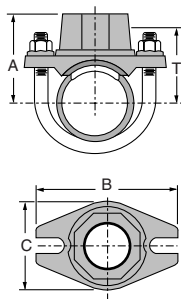
#### NOTES:

2<sup>1</sup>/<sub>2</sub>" x 1<sup>1</sup>/<sub>4</sub>" Figure 7046 cannot be used in cross configuration.

In addition, 2 x 1<sup>1</sup>/<sub>2</sub>" through 2 x 1<sup>1</sup>/<sub>2</sub>" can now be made into crosses from the new design.

FIG. 7044

BRANCH OUTLET



Maximum Working Pressure for all sizes is 175 PSI (12.1 bar)

Not for use in copper systems.

§ – For additional Bolt Torque information on page 200

For additional details see "Coupling Data Chart notes" from page 262.

See Installation & Assembly directions on pages 172-173.

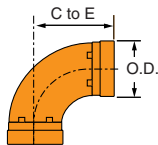
FIGURE 7044 BRANCH OUTLET

Nominal Size	O.D.	Hole Diameter		Dimensions				Specified Torque §		Approx. Wt. Each
		Min. Dia.	Max. Dia.	A	B	C	Take-out T	Min.	Max.	
In./DN(mm)	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Ft.-Lbs./N-M		Lbs./Kg
1¼ x ½ 32 x 15	1.660 x 0.840 42.4 x 21.3	1¾/16 30	1¼ 32	2¼/16 53	3½ 89	2¼/32 56	1¾/8 35	27	33	0.8 0.4
1¼ x ¾ 32 x 20	1.660 x 1.050 42.4 x 26.7	1¾/16 30	1¼ 32	2¼/16 53	3½ 89	2¼/32 56	1¾/8 35	27	33	0.8 0.4
1¼ x 1 32 x 25	1.660 x 1.315 42.4 x 33.7	1¾/16 30	1¼ 32	2¾/16 56	3½ 89	2¼/32 56	1½ 38	27	33	0.9 0.4
1½ x ½ 40 x 15	1.900 x 0.840 48.3 x 21.3	1¾/16 30	1¼ 32	2¾/32 55	3½ 89	2¼/32 56	1¾/8 35	27	33	0.8 0.4
1½ x ¾ 40 x 20	1.900 x 1.050 48.3 x 26.7	1¾/16 30	1¼ 32	2¾/32 55	3½ 89	2¼/32 56	1¾/8 35	27	33	0.8 0.4
1½ x 1 40 x 25	1.900 x 1.315 48.3 x 33.7	1¾/16 30	1¼ 32	2¾/32 58	3½ 89	2¼/32 56	1½ 38	27	33	0.9 0.4
2 x ½ 50 x 15	2.375 x 0.840 60.3 x 21.3	1¾/16 30	1¼ 32	2½ 64	3¾ 98	2¼/32 56	1¾/8 42	27	33	0.8 0.4
2 x ¾ 50 x 20	2.375 x 1.050 60.3 x 26.7	1¾/16 30	1¼ 32	2½ 64	3¾ 98	2¼/32 56	1¾/8 42	27	33	0.8 0.4
2 x 1 50 x 25	2.375 x 1.315 60.3 x 33.7	1¾/16 30	1¼ 32	2½ 67	3¾ 98	2¼/32 56	1¾/8 45	27	33	0.9 0.4
2½ x ½ 65 x 15	2.875 x 0.840 73.0 x 21.3	1¾/16 30	1¼ 32	2¼/16 69	4¾ 111	2¼/32 56	2 51	27	33	0.8 0.4
2½ x ¾ 65 x 20	2.875 x 1.050 73.0 x 26.7	1¾/16 30	1¼ 32	2¼/16 69	4¾ 111	2¼/32 56	2 51	27	33	0.9 0.4
2½ x 1 65 x 25	2.875 x 1.315 73.0 x 33.7	1¾/16 30	1¼ 32	2¼/16 72	4¾ 111	2¼/32 56	2¼/8 54	27	33	1.0 0.5

## Grooved Fittings

**FIG. 7050**

90° ELBOW\*



C - Cast malleable or ductile iron, all others are fabricated steel.

\* 14"-24" Standard Radius 90° Elbows are 1½".

Center to end dimensions and weights may differ from those shown in chart, contact a Gruvlok Representative for more information.

**FIGURE 7050 90° ELBOW\***

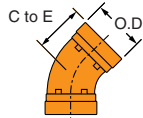
Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
1	1.315	2¼ C	0.6
25	33.4	57	0.3
1¼	1.660	2¾ C	1.0
32	42.2	70	0.5
1½	1.900	2¾ C	1.2
40	48.3	70	0.5
2	2.375	3¼ C	1.7
50	60.3	83	0.8
2½	2.875	3¾ C	2.6
65	73.0	95	1.2
3 O.D.	2.996	4 C	3.6
76.1	76.1	102	1.6
3	3.500	4¼ C	4.0
80	88.9	108	1.8
3½	4.000	4½ C	5.5
90	101.6	114	2.5

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
4¼ O.D.	4.250	4¾ C	7.7
108.0	108.0	121	3.5
4	4.500	5 C	7.7
100	114.3	127	3.5
5¼ O.D.	5.236	5¼ C	10.4
133.0	133.0	133	4.7
5½ O.D.	5.500	5¼ C	10.9
139.7	139.7	133	4.9
5	5.563	5½ C	11.1
125	141.3	140	5.0
6¼ O.D.	6.259	6 C	15.2
159.0	159.0	152	6.9
6½ O.D.	6.500	6½ C	17.4
165.1	165.1	165	7.9
6	6.625	6½ C	16.5
150	168.3	165	7.5

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
8	8.625	7¾ C	30.6
200	219.1	197	13.9
10	10.750	9 C	53.5
250	273.1	229	24.3
12	12.750	10 C	82
300	323.9	254	37.2
14	14.000	21	169.0
350	355.6	533	76.7
16	16.000	24	222.0
400	406.4	610	100.7
18	18.000	27	280.0
450	457.2	686	127.0
20	20.000	30	344.0
500	508.0	762	156.0
24	24.000	36	490.0
600	609.6	914	222.3

## FIG. 7051

45° ELBOW\*



C - Cast malleable or ductile iron, all others are fabricated steel.

\* 14"-24" Standard Radius 45° Elbows are 1½".

Center to end dimensions and weights may differ from those shown in chart, contact a Gruvlok Representative for more information.

FIGURE 7051 45° ELBOW\*

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	1¾ C	0.5
25	33.4	44	0.2
1¼	1.660	1¾ C	0.7
32	42.2	44	0.3
1½	1.900	1¾ C	0.9
40	48.3	44	0.4
2	2.375	2 C	1.5
50	60.3	51	0.7
2½	2.875	2¼ C	1.9
65	73.0	57	0.9
3 O.D.	2.996	2½ C	2.2
76.1	76.1	64	1.0
3	3.500	2½ C	3.3
80	88.9	64	1.5
3½	4.000	2¾ C	4.3
90	101.6	70	2.0

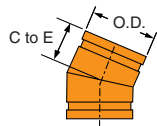
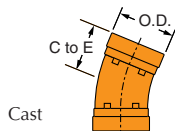
Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
4¼ O.D.	4.250	2⅞ C	4.4
108.0	108.0	83	2.0
4	4.500	3 C	5.4
100	114.3	76	2.4
5¼ O.D.	5.236	3¼ C	7.3
133.0	133.0	83	3.3
5½ O.D.	5.500	3¼ C	7.8
139.7	139.7	83	3.5
5	5.563	3¼ C	9.0
125	141.3	83	4.1
6¼ O.D.	6.259	3½ C	10.1
159.0	159.0	89	4.6
6½ O.D.	6.500	3½ C	11.1
165.1	165.1	89	5.0
6	6.625	3½ C	11.2
150	168.3	89	5.1

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
8	8.625	4¼ C	19.8
200	219.1	108	9.0
10	10.750	4¾ C	34.3
250	273.1	121	15.6
12	12.750	5¼ C	50.0
300	323.9	133	22.7
14	14.000	8¾	92.0
350	355.6	222	41.7
16	16.000	10	117.0
400	406.4	254	53.1
18	18.000	11¼	146.0
450	457.2	286	66.2
20	20.000	12½	179.0
500	508.0	317	81.2
24	24.000	15	255.0
600	609.6	381	115.7

## Grooved Fittings

**FIG. 7052**

22½° ELBOW



**FIGURE 7052 22½° ELBOW**

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	3¼	0.5
25	33.4	83	0.2
1¼	1.660	1¾	0.7
32	42.2	44	0.3
1½	1.900	1¾	0.8
40	48.3	44	0.4
2	2.375	1¾ C	1.5
50	60.3	48	0.7
2½	2.875	2	1.9
65	73.0	51	0.9
3	3.500	2¼ C	3.2
80	88.9	57	1.5
3½	4.000	2½	4.0
90	101.6	64	1.8
4	4.500	2¾ C	5.3
100	114.3	67	2.4

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
5	5.563	2½	7.2
125	141.3	73	3.3
6	6.625	3½ C	8.2
150	168.3	79	3.7
8	8.625	3½ C	17.8
200	219.1	98	8.1
10	10.750	4¾	30.0
250	273.1	111	13.6
12	12.750	4¾	40.4
300	323.9	124	18.3
14	14.000	5	46.0
350	355.6	127	20.9
16	16.000	5	52.2
400	406.4	127	23.7
18	18.000	5½	65.0
450	457.2	140	29.5

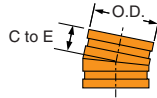
Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
20	20.000	6	80.0
500	508.0	152	36.3
24	24.000	7	112.0
600	609.6	178	50.8

C - Cast malleable or ductile iron, all others are fabricated steel.

Center to end dimensions and weights may differ from those shown in chart, contact a Gruvlok Representative for more information.



## FIG. 7053

11<sup>1</sup>/<sub>4</sub>° ELBOWFIGURE 7053 11<sup>1</sup>/<sub>4</sub>° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	1 <sup>3</sup> / <sub>8</sub>	0.3
25	33.4	35	0.1
1 <sup>1</sup> / <sub>4</sub>	1.660	1 <sup>3</sup> / <sub>8</sub>	0.5
32	42.2	35	0.2
1 <sup>1</sup> / <sub>2</sub>	1.900	1 <sup>3</sup> / <sub>8</sub>	0.7
40	48.3	35	0.3
2	2.375	1 <sup>3</sup> / <sub>8</sub>	0.9
50	60.3	35	0.4
2 <sup>1</sup> / <sub>2</sub>	2.875	1 <sup>1</sup> / <sub>2</sub>	1.5
65	73.0	38	0.7
3	3.500	1 <sup>1</sup> / <sub>2</sub>	2.0
80	88.9	38	0.9
3 <sup>1</sup> / <sub>2</sub>	4.000	1 <sup>3</sup> / <sub>4</sub>	2.8
90	101.6	44	1.3
4	4.500	1 <sup>3</sup> / <sub>4</sub>	3.3
100	114.3	44	1.5

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
5	5.563	2	5.0
125	141.3	51	2.3
6	6.625	2	6.5
150	168.3	51	2.9
8	8.625	2	10.0
200	219.1	51	4.5
10	10.750	2 <sup>1</sup> / <sub>8</sub>	14.5
250	273.1	54	6.6
12	12.750	2 <sup>1</sup> / <sub>4</sub>	18.7
300	323.9	57	8.5
14	14.000	3 <sup>1</sup> / <sub>2</sub>	32.1
350	355.6	89	14.6
16	16.000	4	42.0
400	406.4	102	19.1
18	18.000	4 <sup>1</sup> / <sub>2</sub>	53.2
450	457.2	114	24.1

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
20	20.000	5	65.7
500	508.0	127	29.8
24	24.000	6	96.0
600	609.6	152	43.5

C - Cast malleable or ductile iron, all others are fabricated steel.

Center to end dimensions and weights may differ from those shown in chart, contact a Gruvlok Representative for more information.

## Grooved Fittings

### FIG. 7050 LR

90° LONG RADIUS ELBOW\*

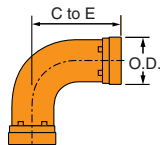


FIGURE 7050 LR 90° LONG RADIUS ELBOW\*

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	3½	0.9
25	33.4	89	0.4
1¼	1.660	3⅞	1.3
32	42.2	98	0.6
1½	1.900	4¼	1.7
40	48.3	108	0.8
2	2.375	4¾ C	2.5
50	60.3	136	1.1
2½	2.875	5¾	4.9
65	73.0	146	2.2
3	3.500	5⅞ C	6.5
80	88.9	181	2.9
3½	4.000	7¼	9.7
90	101.6	184	4.4
4	4.500	7½ C	11.5
100	114.3	191	5.2

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
5	5.563	9½	20.9
125	141.3	241	9.5
6	6.625	10¾	29.1
150	168.3	273	13.2
8	8.625	15	59.2
200	219.1	381	26.9
10	10.750	18	104.0
250	273.1	457	47.2
12	12.750	21	147.0
300	323.9	533	66.7
14	14.000	21	169.0
350	355.6	533	76.7
16	16.000	24	222.0
400	406.4	610	100.7
18	18.000	27	280.0
450	457.2	686	127.0

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
20	20.000	30	344.0
500	508.0	762	156.0
24	24.000	36	490.0
600	609.6	914	222.3

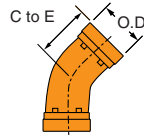
C - Cast malleable or ductile iron, all others are fabricated steel.

\* 14"-24" Standard Radius 90° Elbows are 1½.

Center to end dimensions and weights may differ from those shown in chart, Contact a Gruvlok Representative for more information.

**FIG. 7051LR**

45° LONG RADIUS ELBOW\*

**FIG. 7051LR 45° LONG RADIUS ELBOW\***

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	2½	0.7
25	33.4	64	0.3
1¼	1.660	2½	1.0
32	42.2	64	0.5
1½	1.900	2½	1.2
40	48.3	64	0.5
2	2.375	2¾	1.7
50	60.3	70	0.8
2½	2.875	3	2.9
65	73.0	76	1.3
3	3.500	3¾	4.3
80	88.9	86	2.0
3½	4.000	3½	5.3
90	101.6	89	2.4
4	4.500	4	7.2
100	114.3	102	3.3

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
5	5.563	5	12.2
125	141.3	127	5.5
6	6.625	5½	17.4
150	168.3	140	7.9
8	8.625	7¼	34.0
200	219.1	184	15.4
10	10.750	8½	57.4
250	273.1	216	26.0
12	12.750	10	82.6
300	323.9	254	37.5
14	14.000	21	169.0
350	355.6	222	41.7
16	16.000	10	117.0
400	406.4	254	53.1
18	18.000	11¼	146.0
450	457.2	286	66.2

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
20	20.000	12½	179.0
500	508.0	317	81.2
24	24.000	15	255.0
600	609.6	381	115.7

C - Cast malleable or ductile iron, all others are fabricated steel.

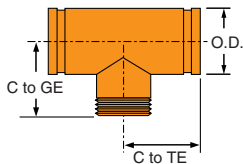
\* 14"-24" Standard Radius 45° Elbows are 1½".

Center to end dimensions and weights may differ from those shown in chart. Contact a Gruvlok Representative for more information.

## Grooved Fittings

**FIG. 7063**

TEE W/ THREADED BRANCH



**FIGURE 7063 TEE WITH THREADED BRANCH**

Nominal Size	O.D.	C to GE	C to TE	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
1	1.315	2¼	2¼	0.9
25	33.4	57	57	0.4
1¼	1.660	2¾	2¾	1.4
32	42.2	70	70	0.6
1½	1.900	2¾	2¾	1.7
40	48.3	70	70	0.8
2	2.375	3¼	4¼	2.9
50	60.3	83	108	1.3
2½	2.875	3¾	3¾	4.7
65	73.0	95	95	2.1
3	3.500	4¼	6	8.1
80	88.9	108	152	3.7
3½	4.000	4½	4½	8.8
90	101.6	114	114	4.0

Nominal Size	O.D.	C to GE	C to TE	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
4	4.500	5	7¼	13.5
100	114.3	127	184	6.1
5	5.563	5½	5½	16.7
125	140	140	7.6	7.6
6	6.625	6½	6½	25.6
150	168.3	165	165	11.6
8	8.625	7¾	7¾	45.0
200	219.1	197	197	20.4
10	10.750	9	9	73.0
250	273.1	229	229	33.1
12	12.750	10	10	98.0
300	323.9	254	254	44.5

C - Cast malleable or ductile iron, all others are fabricated steel.

FIG. 7061

REDUCING TEE STANDARD

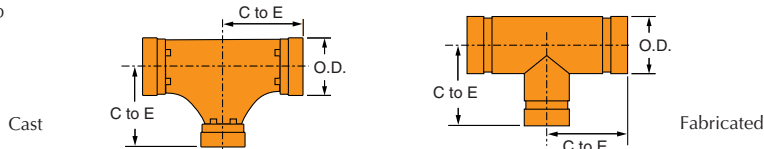


FIG. 7061 REDUCING TEE STANDARD (CONTINUED ON NEXT PAGE)

Nominal Size <i>In./DN(mm)</i>	Center to End <i>In./mm</i>	Approx. Wt. Ea. <i>Lbs./Kg</i>
1¼ x 1¼ x 1	2¾	1.5
32 x 32 x 25	70	0.7
1½ x 1½ x 1	2¾	1.8
40 x 40 x 25	70	0.8
1½ x 1½ x 1¼	2¾	1.8
40 x 40 x 32	70	0.8
2 x 2 x 1	3¼ C	2.6
50 x 50 x 25	83	1.2
2 x 2 x 1¼	3¼	1.7
50 x 50 x 32	83	0.8
2 x 2 x 1½	3¼ C	2.7
50 x 50 x 40	83	1.2
2½ x 2½ x 1	3¾	4.1
65 x 65 x 25	95	1.9
2½ x 2½ x 1¼	3¾	4.2
65 x 65 x 32	95	1.9

Nominal Size <i>In./DN(mm)</i>	Center to End <i>In./mm</i>	Approx. Wt. Ea. <i>Lbs./Kg</i>
2½ x 2½ x 1½	3¾	4.3
65 x 65 x 40	95	2.0
2½ x 2½ x 2	3¾	4.4
65 x 65 x 50	95	2.0
3 x 3 x 1	4¼ C	7.0
80 x 80 x 25	108	3.2
3 x 3 x 1¼	4¼	5.8
80 x 80 x 32	108	2.6
3 x 3 x 1½	4¼	5.9
80 x 80 x 40	108	2.7
3 x 3 x 2	4¼ C	5.5
80 x 80 x 50	108	2.5
3 x 3 x 2½	4¼	6.3
80 x 80 x 65	108	2.9
4 x 4 x 1	3¾	7.0
100 x 100 x 25	95	3.2

Nominal Size <i>In./DN(mm)</i>	Center to End <i>In./mm</i>	Approx. Wt. Ea. <i>Lbs./Kg</i>
4 x 4 x 1¼	5	9.6
100 x 100 x 32	127	4.4
4 x 4 x 1½	5	10.2
100 x 100 x 40	127	4.6
4 x 4 x 2	5 C	10.2
100 x 100 x 50	127	4.6
4 x 4 x 2½	5 C	11.2
100 x 100 x 65	127	5.1
4 x 4 x 3	5 C	11.4
100 x 100 x 80	127	5.2
5 x 5 x 1	5½	13.6
125 x 125 x 25	140	6.2
5 x 5 x 1½	5½	13.8
125 x 125 x 40	140	6.3
5 x 5 x 2	5½	14
125 x 125 x 50	140	6.4

Nominal Size <i>In./DN(mm)</i>	Center to End <i>In./mm</i>	Approx. Wt. Ea. <i>Lbs./Kg</i>
5 x 5 x 2½	5½	14.3
125 x 125 x 65	140	6.5
5 x 5 x 3	5½	14.6
125 x 125 x 80	140	6.6
5 x 5 x 4	5½ C	17.9
125 x 125 x 100	140	8.1
6 x 6 x 1	6½	20.5
150 x 150 x 25	165	9.3
6 x 6 x 1½	6½	21.0
150 x 150 x 40	165	9.5
6 x 6 x 2	6½ C	26.4
150 x 150 x 50	165	12.0
6 x 6 x 2½	6½ C	26.5
150 x 150 x 65	165	12.0
6 x 6 x 3	6½ C	26.5
150 x 150 x 80	165	12.0

C - Cast malleable or ductile iron, all others are fabricated steel.

See Fitting Size Chart on page 146 for O.D. sizes

## Grooved Fittings

FIG. 7061, CONT'D.

REDUCING TEE STANDARD

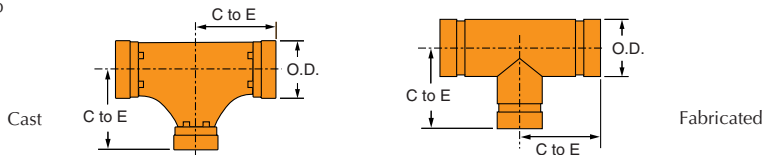


FIG. 7061 REDUCING TEE STANDARD (CONTINUED ON NEXT PAGE)

Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
6 x 6 x 4	6½ C	26.5
150 x 150 x 100	165	12.0
6 x 6 x 5	6½ C	28.0
150 x 150 x 125	165	12.7
8 x 8 x 1½	7¾	33.0
200 x 200 x 40	197	15.0
8 x 8 x 2	7¾	32.7
200 x 200 x 50	197	14.8
8 x 8 x 2½	7¾	33.0
200 x 200 x 65	197	15.0
8 x 8 x 3	7¾	33.5
200 x 200 x 80	197	15.2
8 x 8 x 4	7¾ C	50.0
200 x 200 x 100	197	22.7
8 x 8 x 5	7¾	34.7
200 x 200 x 125	197	15.7
8 x 8 x 6	7¾ C	54.0
200 x 200 x 150	197	24.5

Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
10 x 10 x 1½	9	52.0
250 x 250 x 40	229	23.6
10 x 10 x 2	9	52.2
250 x 250 x 50	229	23.7
10 x 10 x 2½	9	52.6
250 x 250 x 65	229	23.9
10 x 10 x 3	9	53.0
250 x 250 x 80	229	24.0
10 x 10 x 4	9	53.6
250 x 250 x 100	229	24.3
10 x 10 x 5	9	54.2
250 x 250 x 125	229	24.6
10 x 10 x 6	9 C	55.0
250 x 250 x 150	229	24.9
10 x 10 x 8	9 C	64.7
250 x 250 x 200	229	29.3
12 x 12 x 1	10	77.0
300 x 300 x 25	254	34.9

Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
12 x 12 x 2	10	80.0
300 x 300 x 50	254	36.3
12 x 12 x 2½	10	78.0
300 x 300 x 65	254	35.4
12 x 12 x 3	10	74.6
300 x 300 x 80	254	33.8
12 x 12 x 4	10	75.1
300 x 300 x 100	254	34.1
12 x 12 x 5	10	75.6
300 x 300 x 125	254	34.3
12 x 12 x 6	10	76.2
300 x 300 x 150	254	34.6
12 x 12 x 8	10	76.3
300 x 300 x 200	254	34.6
12 x 12 x 10	10	77.6
300 x 300 x 250	254	35.2
14 x 14 x 4	11	100.0
350 x 350 x 100	279	45.4

Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
14 x 14 x 6	11	101
350 x 350 x 150	279	45.8
14 x 14 x 8	11	103
350 x 350 x 200	279	46.7
14 x 14 x 10	11	104
350 x 350 x 250	279	47.2
14 x 14 x 12	11	105
350 x 350 x 300	279	47.6
16 x 16 x 4	12	126
400 x 400 x 100	305	57.2
16 x 16 x 6	12	127
400 x 400 x 150	305	57.6
16 x 16 x 8	12	128
400 x 400 x 200	305	58.1
16 x 16 x 10	12	129
400 x 400 x 250	305	58.5
16 x 16 x 12	12	130
400 x 400 x 300	305	59.0

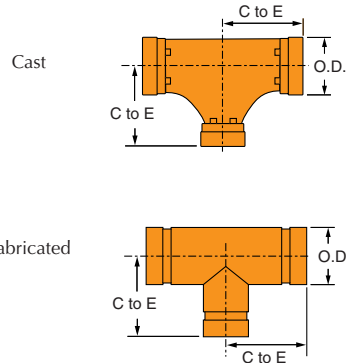
## FIG. 7061, CONT'D.

REDUCING TEE STANDARD

## FIG. 7061 REDUCING TEE STANDARD (CONT'D. FROM PREVIOUS PAGE)

Nominal Size	Center to End	Approx. Wt. Ea.	Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg	In./DN(mm)	In./mm	Lbs./Kg
16 x 16 x 14	12	132	20 x 20 x 12	17¼	246
400 x 400 x 350	305	59.9	500 x 500 x 300	438	111.6
18 x 18 x 4	15½	188	20 x 20 x 14	17¼	248
450 x 450 x 100	394	85.3	500 x 500 x 350	438	112.5
18 x 18 x 6	15½	190	20 x 20 x 16	17¼	250
450 x 450 x 150	394	86.2	500 x 500 x 400	438	113.4
18 x 18 x 8	15½	192	20 x 20 x 18	17¾	252
450 x 450 x 200	394	87.1	500 x 500 x 450	451	114.3
18 x 18 x 10	15½	194	24 x 24 x 8	20	327
450 x 450 x 250	394	88.0	600 x 600 x 200	508	148.3
18 x 18 x 12	15½	196	24 x 24 x 10	20	330
450 x 450 x 300	394	88.9	600 x 600 x 250	508	149.7
18 x 18 x 14	15½	201	24 x 24 x 12	20	334
450 x 450 x 350	394	91.2	600 x 600 x 300	508	151.5
18 x 18 x 16	15½	203	24 x 24 x 14	20	340
450 x 450 x 400	394	92.1	600 x 600 x 350	508	154.2
20 x 20 x 6	17¼	240	24 x 24 x 16	20	342
500 x 500 x 150	438	108.9	600 x 600 x 400	508	155.1
20 x 20 x 8	17¼	242	24 x 24 x 18	20	345
500 x 500 x 200	438	109.8	600 x 600 x 450	508	156.5
20 x 20 x 10	17¼	244	24 x 24 x 20	20	347
500 x 500 x 250	438	110.7	600 x 600 x 500	508	157.4

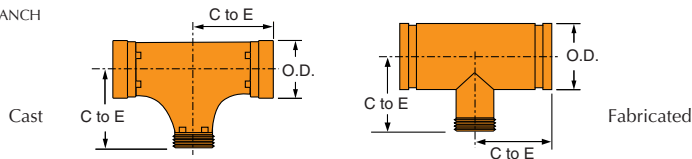
C - Cast malleable or ductile iron, all others are fabricated steel.

See Fitting Size Chart on page 146  
for O.D. sizes

## Grooved Fittings

**FIG. 7064**

REDUCING TEE W/ THREADED BRANCH



**FIGURE 7064 REDUCING TEE W/THREADED BRANCH (CONTINUED ON NEXT PAGE)**

Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs/Kg
2 x 2 x 3/4	3/4	1.6
50 x 50 x 20	83	0.7
2 x 2 x 1	3/4 C	2.6
50 x 50 x 25	83	1.2
2 x 2 x 1 1/4	3/4	1.7
50 x 50 x 32	83	0.8
2 x 2 x 1 1/2	3/4 C	2.7
50 x 50 x 40	83	1.2
2 1/2 x 2 1/2 x 1	3/4	4.1
65 x 65 x 25	95	1.9
2 1/2 x 2 1/2 x 1 1/2	3/4	4.3
65 x 65 x 40	95	2
2 1/2 x 2 1/2 x 2	3/4	4.4
65 x 65 x 50	95	2
3 x 3 x 3/4	4/4	5.7
80 x 80 x 20	108	2.6

Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs/Kg
3 x 3 x 1	4/4 C	7.0
80 x 80 x 25	108	3.2
3 x 3 x 1 1/2	4/4	5.3
80 x 80 x 40	108	2.4
3 x 3 x 2	4/4	5.5
80 x 80 x 50	108	2.5
3 x 3 x 2 1/2	4/4	5.8
80 x 80 x 65	108	2.6
4 x 4 x 3/4	3/4	7.2
100 x 100 x 20	95	3.3
4 x 4 x 1	3/4	7.0
100 x 100 x 25	95	3.2
4 x 4 x 1 1/2	5	9.2
100 x 100 x 40	127	4.2
4 x 4 x 2	5	10.2
100 x 100 x 50	127	4.6

Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs/Kg
4 x 4 x 2 1/2	5	11.2
100 x 100 x 65	127	5.1
4 x 4 x 3	5	11.4
100 x 100 x 80	127	5.2
5 x 5 x 2	5 1/2	14.5
125 x 125 x 50	140	6.6
5 x 5 x 3	5 1/2	16.1
125 x 125 x 80	140	7.3
5 x 5 x 4	5 1/2 C	17.9
125 x 125 x 100	140	8.1
6 x 6 x 2	6 1/2	26.4
150 x 150 x 50	165	12
6 x 6 x 2 1/2	6 1/2	26.5
150 x 150 x 65	165	12
6 x 6 x 3	6 1/2	26.5
150 x 150 x 80	165	12

Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs/Kg
6 x 6 x 4	6 1/2	26.5
150 x 150 x 100	165	12
6 x 6 x 5	6 1/2 C	28.0
150 x 150 x 125	165	12.7
8 x 8 x 2	7 3/4	37.5
200 x 200 x 50	197	17
8 x 8 x 3	7 3/4	38.7
200 x 200 x 80	197	17.6
8 x 8 x 4	7 3/4	50.0
200 x 200 x 100	197	22.7
8 x 8 x 5	7 3/4	41.0
200 x 200 x 125	197	18.6
8 x 8 x 6	7 3/4	54.0
200 x 200 x 150	197	24.5
10 x 10 x 2	9	61.8
250 x 250 x 50	229	28.0



FIG. 7064, CONT'D.

REDUCING TEE W/ THREADED BRANCH

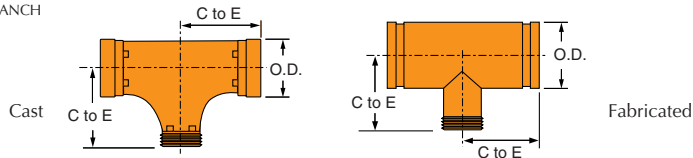


FIGURE 7064 REDUCING TEE W/THREADED BRANCH (CONTINUED FROM PREVIOUS PAGE)

Nominal Size	Center to End	Approx. Wt. Ea.	Nominal Size	Center to End	Approx. Wt. Ea.	Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs/Kg	In./DN(mm)	In./mm	Lbs/Kg	In./DN(mm)	In./mm	Lbs/Kg
10 x 10 x 3	9	63.0	12 x 12 x 6	10	88.3	16 x 16 x 12	12	142.0
250 x 250 x 80	229	28.6	300 x 300 x 150	254	40.1	400 x 400 x 300	305	64.4
10 x 10 x 4	9	64.0	12 x 12 x 8	10	91.2	18 x 18 x 10	15½	204.0
250 x 250 x 100	229	29.0	300 x 300 x 200	254	41.4	450 x 450 x 250	394	92.5
10 x 10 x 5	9	65.1	12 x 12 x 10	10	94.8	18 x 18 x 12	15½	209.0
250 x 250 x 125	229	29.5	300 x 300 x 250	254	43.0	450 x 450 x 300	394	94.8
10 x 10 x 6	9	55.0	14 x 14 x 8	11	110.0	18 x 18 x 14	15½	211.0
250 x 250 x 150	229	24.9	350 x 350 x 200	279	49.7	450 x 450 x 350	394	95.7
10 x 10 x 8	9	64.7	14 x 14 x 10	11	114.0	18 x 18 x 16	15½	216.0
250 x 250 x 200	229	29.3	350 x 350 x 250	279	51.5	450 x 450 x 400	394	98.0
12 x 12 x 3	10	84.9	14 x 14 x 12	11	117.0	24 x 24 x 8	20	334.0
300 x 300 x 80	254	38.5	350 x 350 x 300	279	52.8	600 x 600 x 200	508	152
12 x 12 x 4	10	85.8	16 x 16 x 8	12	135.0	24 x 24 x 10	20	342.0
300 x 300 x 100	254	38.9	400 x 400 x 200	305	61.2	600 x 600 x 250	508	155
12 x 12 x 5	10	87.0	16 x 16 x 10	12	139.0	24 x 24 x 12	20	349.0
300 x 300 x 125	254	39.5	400 x 400 x 250	305	63.0	600 x 600 x 300	508	158

See Fitting Size Chart on page 146 for O.D. sizes

C - Cast malleable or ductile iron, all others are fabricated steel.

## Grooved Fittings

FIG. 7060

TEE

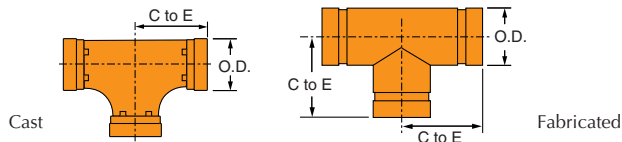


FIG. 7060 TEE

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	2¼ C	0.9
25	33.4	57	0.4
1¼	1.660	2¾ C	1.5
32	42.2	70	0.7
1½	1.900	2¾ C	1.8
40	48.3	70	0.8
2	2.375	3¼ C	2.4
50	60.3	83	1.1
2½	2.875	3¾ C	4.0
65	73.0	95	1.8
3 O.D.	2.996	4 C	4.6
76.1	76.1	101	2.1
3	3.500	4¼ C	5.8
80	88.9	108	2.6
3½	4.000	4½ C	9.8
90	101.6	114	4.4

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
4¼ O.D.	4.250	4¾ C	9.3
108.0	108.0	121	4.2
4	4.500	5 C	10.3
100	114.3	127	4.7
5¼ O.D.	5.236	5¼ C	14.1
133.0	133.0	133	6.4
5½ O.D.	5.500	5½ C	16.1
139.7	139.7	140	7.3
5	5.563	5½ C	16.2
125	141.3	140	7.3
6¼ O.D.	6.259	6 C	20.8
159.0	159.0	152	9.4
6½ O.D.	6.500	6½ C	24.4
165.1	165.1	165	11.1
6	6.625	6½ C	25.7
150	168.3	165	11.7

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
8	8.625	7¾ C	41.1
200	219.1	197	18.6
10	10.750	9 C	74.5
250	273.1	229	33.8
12	12.750	10 C	94.7
300	323.9	254	43.0
14	14.000	11	118.0
350	355.6	279	53.5
16	16.000	12	146.0
400	406.4	305	66.2
18	18.000	15½	218.0
450	457.2	394	98.9
20	20.000	17¼	275.0
500	508.0	438	125
24	24.000	20	379.0
600	609.6	508	172

C - Cast malleable or ductile iron, all others are fabricated steel.

For Gruvlok Technical Detail Refer to the Gruvlok Catalog or contact your local sales representative.

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## FIG. 7076

GR X THD CONCENTRIC REDUCERS

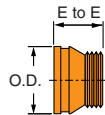


FIG. 7076 GR X THD CONCENTRIC REDUCERS

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
1½ x 1	2½	0.6
40 x 25	64	0.3
2 x ¾	2½	1.0
50 x 80	64	0.5
2 x 1	2½	0.8
50 x 25	64	0.4
2 x 1¼	2½	1.3
50 x 32	64	0.6
2 x 1½	2½	1.3
50 x 40	64	0.6
2½ x 1	2½	1.0
65 x 25	64	0.5
2½ x 1¼	2½	1.0
65 x 32	64	0.5

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
2½ x 1½	2½	1.3
65 x 40	64	0.6
2½ x 2	2½	1.2
65 x 50	64	0.5
3 x ¾	2½	1.2
80 x 80	64	0.5
3 x 1	2½	1.2
80 x 25	64	0.5
3 x 1½	2½	1.3
80 x 40	64	0.6
3 x 2	2½	1.3
80 x 50	64	0.6
3 x 2½	2½	1.5
80 x 65	64	0.7

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
3½ x 3	3	1.8
90 x 80	76	0.8
4 x 1	3	2.2
100 x 25	76	1.0
4 x 1½	3	2.3
100 x 40	76	1.0
4 x 2	3	2.3
100 x 50	76	1.0
4 x 2½	3	2.3
100 x 65	76	1.0
4 x 3	3	2.6
100 x 80	76	1.2
4 x 3½	3	2.5
100 x 90	76	1.1

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
5 x 4	3½	4.5
125 x 100	89	2.0
6 x 1	4	6.0
150 x 25	102	2.7
6 x 2	4	6.0
150 x 50	102	2.7
6 x 3	4	6.0
150 x 80	102	2.7
6 x 4	4	5.9
150 x 100	102	2.7
6 x 5	4	5.8
150 x 125	102	2.6

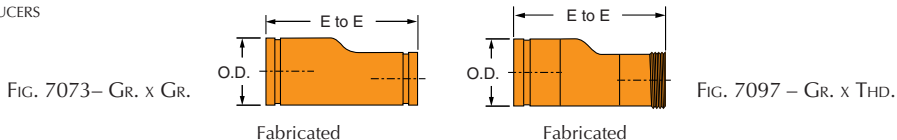
All are Fabricated Steel.

See Fitting Size Chart on page 146 for O.D. sizes

## Grooved Fittings

**FIG. 7073 & FIG. 7097**

ECCENTRIC REDUCERS



**FIGURE 7073 & 7097 ECCENTRIC REDUCERS (CONTINUED ON NEXT PAGE)**

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
1¼ x 1	8½	1.5
32 x 25	216	0.7
1½ x ¾	8½	1.6
40 x 20	216	0.7
1½ x 1	8½	1.7
40 x 25	216	0.8
1½ x 1¼	8½	4.5
40 x 32	216	2.0
2 x ¾	9	2.1
50 x 80	229	1.0
2 x 1	9	2.2
50 x 25	229	1.0
2 x 1¼	9	2.4
50 x 32	229	1.1
2 x 1½	9	2.5
50 x 40	229	1.1

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
2½ x 1	9½	3.2
65 x 25	241	1.5
2½ x 1¼	9½	3.4
65 x 32	241	1.5
2½ x 1½	9½	3.6
65 x 40	241	1.6
2½ x 2	9½	4.0
65 x 50	241	1.8
3 x 1	9½	4.0
80 x 25	241	1.8
3 x 1¼	9½	4.3
80 x 32	241	2.0
3 x 1½	9½	4.5
80 x 40	241	2.0
3 x 2	9½	4.8
80 x 50	241	2.2

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
3 x 2½	9½	5.6
80 x 65	241	2.5
3½ x 3	9½	6.6
90 x 80	241	3.0
4 x 1	10	5.9
100 x 25	254	2.7
4 x 1¼	10	6.3
100 x 32	254	2.9
4 x 1½	10	6.4
100 x 40	254	2.9
4 x 2	10	6.7
100 x 50	254	3.0
4 x 2½	10	7.3
100 x 65	254	3.3
4 x 3	10	7.9
100 x 80	254	3.6

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
4 x 3½	10	8.5
100 x 90	254	3.9
5 x 2	11	9.3
125 x 50	279	4.2
5 x 2½	11	9.9
125 x 65	279	4.5
5 x 3	11	10.7
125 x 80	279	4.9
5 x 4	11	11.9
125 x 100	279	5.4
6 x 1	11½	12.0
150 x 25	292	5.4
6 x 1½	11½	12.1
150 x 40	292	5.5
6 x 2	11½	12.2
150 x 50	292	5.5

See Fitting Size Chart on page 146 for O.D. sizes

For Gruvlok Technical Detail Refer to the Gruvlok Catalog or contact your local sales representative.

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## FIG. 7073 &amp; FIG. 7097, CONT'D.

ECCENTRIC REDUCERS

FIGURE 7073 &amp; 7097 ECCENTRIC REDUCERS (CONTINUED FROM PREVIOUS PAGE)

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
6 x 2½ 150 x 65	11½ 292	12.8 5.8
6 x 3 150 x 80	11½ 292	13.6 6.2
6 x 4 150 x 100	11½ 292	14.9 6.8
6 x 5 150 x 125	11½ 292	16.2 7.3
8 x 3 200 x 80	12 305	17.9 8.1
8 x 4 200 x 100	12 305	19.7 8.9
8 x 5 200 x 125	12 305	21.4 9.7
8 x 6 200 x 150	12 305	23.2 10.5
10 x 4 250 x 100	13 330	29.7 13.5
10 x 5 250 x 125	13 330	31.7 14.4

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
10 x 6 250 x 150	13 330	34.0 15.4
10 x 8 250 x 200	13 330	34.4 15.6
12 x 4 300 x 100	14 356	44.8 20.3
12 x 6 300 x 150	14 356	45.2 20.5
12 x 8 300 x 200	14 356	47.7 21.6
12 x 10 300 x 250	14 356	52.0 23.6
14 x 6 350 x 150	13 330	78 35.4
14 x 8 350 x 200	13 330	80 36.3
14 x 10 350 x 250	13 330	84 38.1
14 x 12 350 x 300	13 330	88 39.9

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
16 x 8 400 x 200	14 356	91 41.3
16 x 10 400 x 250	14 356	96 43.5
16 x 12 400 x 300	14 356	99 44.9
16 x 14 400 x 350	14 356	104 47.2
18 x 10 450 x 250	15 381	110 49.9
18 x 12 450 x 300	15 381	113 51.3
18 x 14 450 x 350	15 381	117 53.1
18 x 16 450 x 400	15 381	121 54.9
20 x 10 500 x 250	20 508	145 65.8
20 x 12 500 x 300	20 508	149 67.6

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
20 x 14 500 x 350	20 508	152 68.9
20 x 16 500 x 400	20 508	156 70.8
20 x 18 500 x 450	20 508	160 72.6
24 x 10 600 x 250	20 508	174 78.9
24 x 12 600 x 300	20 508	179 81.2
24 x 14 600 x 350	20 508	184 83.5
24 x 16 600 x 400	20 508	189 85.7
24 x 18 600 x 450	20 508	194 88
24 x 20 600 x 500	20 508	199 90.3

See Fitting Size Chart on page 146 for O.D. sizes

Fabricated Steel \*Figure 7097 is available in sizes 1¼ x 1 through 12 x 10.

Center to end dimensions may differ from those shown above. Contact a Gruvlok Representative for more information.

## Grooved Fittings

FIG. 7077, FIG. 7078 & FIG. 7079

SWAGED NIPPLES

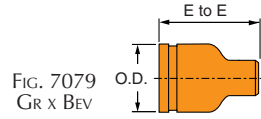
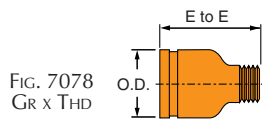
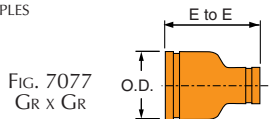


FIGURE 7077, 7078 & 7079 SWAGED NIPPLES

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
2 x 1	6½	2.0
50 x 25	165	0.9
2 x 1¼	6½	2.0
50 x 32	165	0.9
2 x 1½	6½	2.0
50 x 40	165	0.9
2½ x 1	7	3.5
65 x 25	178	1.6
2½ x 1¼	7	3.5
65 x 32	178	1.6
2½ x 1½	7	3.5
65 x 40	178	1.6
2½ x 2	7	3.5
65 x 50	178	1.6
3 x 1	8	5.0
80 x 25	203	2.3
3 x 1¼	8	5.0
80 x 32	203	2.3

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
3 x 1½	8	5.0
80 x 40	203	2.3
3 x 2	8	5.0
80 x 50	203	2.3
3 x 2½	8	5.0
80 x 65	203	2.3
3½ x 3	8	7.0
90 x 80	203	3.2
4 x 1	9	8.0
100 x 25	229	3.6
4 x 1¼	9	8.0
100 x 32	229	3.6
4 x 1½	9	8.0
100 x 40	229	3.6
4 x 2	9	8.0
100 x 50	229	3.6
4 x 2½	9	8.0
100 x 65	229	3.6

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
4 x 3	9	8.0
100 x 80	229	3.6
4 x 3½	9	8.0
100 x 90	229	3.6
5 x 2	11	12.0
125 x 50	279	5.4
5 x 2½	11	12.0
125 x 65	279	5.4
5 x 3	11	12.0
125 x 80	279	5.4
5 x 4	11	12.0
125 x 100	279	5.4
6 x 1	12	19.0
150 x 25	305	8.6
6 x 1¼	12	19.0
150 x 32	305	8.6
6 x 1½	12	19.0
150 x 40	305	8.6

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
6 x 2	12	19.0
150 x 50	305	8.6
6 x 2½	12	19.0
150 x 65	305	8.6
6 x 3	12	19.0
150 x 80	305	8.6
6 x 3½	12	17.0
150 x 90	305	7.7
6 x 4	12	19.0
150 x 100	305	8.6
6 x 5	12	19.0
150 x 125	305	8.6

See Fitting Size Chart on page 146 for O.D. sizes

FIG. 7072

GR X GR CONCENTRIC REDUCERS

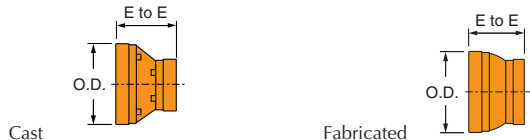


FIGURE 7072 CONCENTRIC REDUCER (CONTINUED ON NEXT PAGE)

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
1¼ x 1	2½	0.6
32 x 25	64	0.3
1½ x 1	2½	0.6
40 x 25	64	0.3
1½ x 1¼	2½	0.6
40 x 32	64	0.3
2 x 1	2½	0.8
50 x 25	64	0.4
2 x 1¼	2½ C	1.3
50 x 32	64	0.6
2 x 1½	2½ C	1.3
50 x 40	64	0.6
2½ x 1	2½	1.0
65 x 25	64	0.5
2½ x 1¼	2½	1.0
65 x 32	64	0.5
2½ x 1½	2½	1.3
65 x 40	64	0.6

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
2½ x 2	2½ C	1.6
65 x 50	64	0.7
3 x 1	2½	1.2
80 x 25	64	0.5
3 x 1¼	2½	1.3
80 x 32	64	0.6
3 x 1½	2½	1.3
80 x 40	64	0.6
3 x 2	2½ C	1.4
80 x 50	64	0.6
3 x 2½	2½ C	1.5
80 x 65	64	0.7
3½ x 3	3	1.8
90 x 80	76	0.8
4 x 1	3 C	2.2
100 x 25	76	1.0
4 x 1¼	3	2.2
100 x 32	76	1.0

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
4 x 1½	3	2.3
100 x 40	76	1.0
4 x 2	3 C	2.4
100 x 50	76	1.1
4 x 2½	3 C	2.6
100 x 65	76	1.2
4 x 3	3 C	3.2
100 x 80	76	1.5
4 x 3½	3 C	3.6
100 x 90	76	1.6
5 x 2	3½	4.6
125 x 50	89	2.1
5 x 2½	3½	4.5
125 x 65	89	2.0
5 x 3	3½	4.4
125 x 80	89	2.0
5 x 4	3½ C	4.5
125 x 100	89	2.0

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
6 x 1	4	6.8
150 x 25	102	3.1
6 x 1½	4	6.9
150 x 40	102	3.1
6 x 2	4 C	6.0
150 x 50	102	2.7
6 x 2½	4	6.0
150 x 65	102	2.7
6 x 3	4 C	5.4
150 x 80	102	2.4
6 x 4	4 C	5.6
150 x 100	102	2.5
6 x 5	4 C	6.0
150 x 125	102	2.7
8 x 3	5	12.0
200 x 80	127	5.5
8 x 4	5 C	9.0
200 x 100	127	4.1

## Grooved Fittings

FIG. 7072, CONT'D.

GR X GR CONCENTRIC REDUCERS



FIGURE 7072 CONCENTRIC REDUCER (CONTINUED FROM PREVIOUS PAGE)

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
8 x 5	5	11.5
200 x 125	127	5.2
8 x 6	5 C	10.6
200 x 150	127	4.8
10 x 4	6	20
250 x 100	152	9.1
10 x 5	6	20
250 x 125	152	9.1
10 x 6	6 C	20
250 x 150	152	9.1
10 x 8	6	23.9
250 x 200	152	10.8
12 x 4	7	25
300 x 100	178	11.3
12 x 6	7	29
300 x 150	178	13.2
12 x 8	7	29
300 x 200	178	13.2

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
12 x 10	7	32.4
300 x 250	178	14.7
14 x 6	13	54.3
350 x 150	330	24.6
14 x 8	13	54.5
350 x 200	330	24.7
14 x 10	13	55.7
350 x 250	330	25.3
14 x 12	13	57.3
350 x 300	330	26.0
16 x 8	14	65.4
400 x 200	356	29.7
16 x 10	14	66.7
400 x 250	356	30.3
16 x 12	14	68.1
400 x 300	356	30.9
16 x 14	14	71.0
400 x 350	356	32.2

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
18 x 10	15	82.3
450 x 250	381	37.3
18 x 12	15	83.6
450 x 300	381	37.9
18 x 14	15	86.2
450 x 350	381	39.1
18 x 16	15	87.2
450 x 400	381	39.6
20 x 10	20	123.0
500 x 250	508	55.8
20 x 12	20	125.0
500 x 300	508	56.7
20 x 14	20	129.0
500 x 350	508	58.5
20 x 16	20	131.0
500 x 400	508	59.4
20 x 18	20	133.0
500 x 450	508	60.3

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
24 x 10	20	147.0
600 x 250	508	66.7
24 x 12	20	149.0
600 x 300	508	67.6
24 x 14	20	152.0
600 x 350	508	68.9
24 x 16	20	153.0
600 x 400	508	69.4
24 x 18	20	154.0
600 x 450	508	69.9
24 x 20	20	155.0
600 x 500	508	70.3

See Fitting Size Chart on page 146 for O.D. sizes



FIG. 7069

45° LATERAL

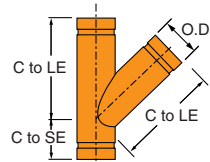


FIGURE 7069 45° LATERALS

Nominal Size	O.D.	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
1	1.315	5	2¼	1.5
25	33.4	127	57	0.7
1¼	1.660	5¾	2½	2.5
32	42.2	146	64	1.1
1½	1.900	6¼	2¾	3.5
40	48.3	159	70	1.6
2	2.375	7	2¾	4.5
50	60.3	178	70	2.0
2½	2.875	7¾	3	10.0
65	73.0	197	76	4.5
3	3.500	8½	3¼	11.0
80	88.9	216	83	5.0
3½	4.000	10	3½	14.0
90	101.6	254	89	6.4

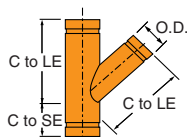
Nominal Size	O.D.	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
4	4.500	10½	3¾	18.3
100	114.3	267	95	8.3
5	5.563	12½	4	30.0
125	141.3	318	102	13.6
6	6.625	14	4½	46.6
150	168.3	356	114	21.1
8	8.625	18	6	82.8
200	219.1	457	152	37.6
10	10.750	20½	6½	127
250	273.1	521	165	57.4
12	12.750	23	7	165
300	323.9	584	178	74.8
14	14.000	26½	7½	215
350	355.6	673	191	97.5

Nominal Size	O.D.	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
16	16.000	29	8	345
400	406.4	737	203	157
18	18.000	32	8½	425
450	457.2	813	216	193
20	20.000	35	9	517
500	508.0	889	229	235
24	24.000	40	10	940
600	609.6	1016	254	426

## Grooved Fittings

### FIG. 7070

45° REDUCING LATERAL



### FIGURE 7070 45° REDUCING LATERAL

Nominal Size	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
3 x 3 x 2	8½	3¼	9.8
80 x 80 x 50	216	83	4.4
3 x 3 x 2½	8½	3¼	11.5
80 x 80 x 65	216	83	5.2
4 x 4 x 2	10½	3¾	15.5
100 x 100 x 50	267	95	7.0
4 x 4 x 2½	10½	3¾	17.0
100 x 100 x 65	267	95	7.7
4 x 4 x 3	10½	3¾	18.5
100 x 100 x 80	267	95	8.4
5 x 5 x 2	12½	4	22.5
125 x 125 x 50	318	102	10.2
5 x 5 x 3	12½	4	26.5
125 x 125 x 80	318	102	12.0
5 x 5 x 4	12½	4	30.5
125 x 125 x 100	318	102	13.8

Nominal Size	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
6 x 6 x 2	14	4½	33.0
150 x 150 x 50	356	114	15.0
6 x 6 x 3	14	4½	37.0
150 x 150 x 80	356	114	16.8
6 x 6 x 4	14	4½	40.0
150 x 150 x 100	356	114	18.1
6 x 6 x 5	14	4½	45.0
150 x 150 x 125	356	114	20.4
8 x 8 x 4	18	6	59.6
200 x 200 x 100	457	152	27.0
8 x 8 x 5	18	6	68.0
200 x 200 x 125	457	152	30.8
8 x 8 x 6	18	6	75.0
200 x 200 x 150	457	152	34.0
10 x 10 x 4	20½	6½	83.0
250 x 250 x 100	521	165	37.6

Nominal Size	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10 x 10 x 5	20½	6½	100.0
250 x 250 x 125	521	165	45.4
10 x 10 x 6	20½	6½	105.0
250 x 250 x 150	521	165	47.6
10 x 10 x 8	20½	6½	116.0
250 x 250 x 200	521	165	52.6
12 x 12 x 4	23	7	137.0
300 x 300 x 100	584	178	62.1
12 x 12 x 6	23	7	140.0
300 x 300 x 150	584	178	63.5
12 x 12 x 8	23	7	147.0
300 x 300 x 200	584	178	66.7
12 x 12 x 10	23	7	168
300 x 300 x 250	584	178	76.2
14 x 14 x 4	26½	7½	173
350 x 350 x 100	673	191	78.5

FIG. 7070, CONT'D.

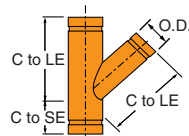
45° REDUCING LATERAL

FIGURE 7070 45° REDUCING LATERAL

Nominal Size	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
14 x 14 x 6 350 x 350 x 150	26½ 673	7½ 191	185 83.9
14 x 14 x 8 350 x 350 x 200	26½ 673	7½ 191	195 88.5
14 x 14 x 10 350 x 350 x 250	26½ 673	7½ 191	223 101
14 x 14 x 12 350 x 350 x 300	26½ 673	7½ 191	240 109
16 x 16 x 6 400 x 400 x 150	29 737	8 203	235 107
16 x 16 x 8 400 x 400 x 200	29 737	8 203	250 113
16 x 16 x 10 400 x 400 x 250	29 737	8 203	263 119
16 x 16 x 12 400 x 400 x 300	29 737	8 203	283 128
16 x 16 x 14 400 x 400 x 350	29 737	8 203	307 139
18 x 18 x 6 450 x 450 x 150	32 813	8½ 216	275 125

Nominal Size	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
18 x 18 x 8 450 x 450 x 200	32 813	8½ 216	306 139
18 x 18 x 10 450 x 450 x 250	32 813	8½ 216	321 146
18 x 18 x 12 450 x 450 x 300	32 813	8½ 216	333 151
18 x 18 x 14 450 x 450 x 350	32 813	8½ 216	358 162
18 x 18 x 16 450 x 450 x 400	32 813	8½ 216	382 173
20 x 20 x 12 500 x 500 x 300	35 889	9 229	390 177
20 x 20 x 14 500 x 500 x 350	35 889	9 229	410 186
20 x 20 x 16 500 x 500 x 400	35 889	9 229	440 200
24 x 24 x 16 600 x 600 x 400	40 1016	10 254	725 329
24 x 24 x 20 600 x 600 x 500	40 1016	10 254	785 356

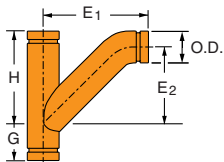
See Fitting Size Chart on page 146 for O.D. sizes



## Grooved Fittings

**FIG. 7066**

TEE WYE



**FIGURE 7066 TEE WYE (CONTINUED ON NEXT PAGE)**

Nominal Size	G	H	E1	E2	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
2 x 2 x 2	2 <sup>3</sup> / <sub>4</sub>	7	9	4 <sup>3</sup> / <sub>8</sub>	6.4
50 x 50 x 50	70	178	229	117	2.9
2 <sup>1</sup> / <sub>2</sub> x 2 <sup>1</sup> / <sub>2</sub> x 2 <sup>1</sup> / <sub>2</sub>	3	7 <sup>3</sup> / <sub>4</sub>	10 <sup>1</sup> / <sub>2</sub>	5 <sup>3</sup> / <sub>4</sub>	11.5
65 x 65 x 65	76	197	267	146	5.2
3 x 3 x 3	3 <sup>1</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	11 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>2</sub>	16.5
80 x 80 x 80	83	216	292	165	7.5
3 <sup>1</sup> / <sub>2</sub> x 3 <sup>1</sup> / <sub>2</sub> x 3 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>	10	13	7 <sup>3</sup> / <sub>4</sub>	22
90 x 90 x 90	89	254	330	197	10.0
4 x 4 x 3	3 <sup>3</sup> / <sub>4</sub>	10 <sup>1</sup> / <sub>2</sub>	12 <sup>3</sup> / <sub>8</sub>	7 <sup>7</sup> / <sub>8</sub>	23
100 x 100 x 80	95	267	327	200	10.4
4 x 4 x 4	3 <sup>3</sup> / <sub>4</sub>	10 <sup>1</sup> / <sub>2</sub>	13 <sup>3</sup> / <sub>8</sub>	8 <sup>1</sup> / <sub>8</sub>	26
100 x 100 x 100	95	267	346	206	11.8
5 x 5 x 3	4	12 <sup>1</sup> / <sub>2</sub>	14 <sup>1</sup> / <sub>4</sub>	9 <sup>1</sup> / <sub>4</sub>	32
125 x 125 x 80	102	318	362	235	14.5
5 x 5 x 4	4	12 <sup>1</sup> / <sub>2</sub>	15 <sup>3</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>	35
125 x 125 x 100	102	318	384	244	15.9

Nominal Size	G	H	E1	E2	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
5 x 5 x 5	4	12 <sup>1</sup> / <sub>2</sub>	16 <sup>1</sup> / <sub>8</sub>	10	40
125 x 125 x 125	102	318	410	254	18.1
6 x 6 x 3	4 <sup>1</sup> / <sub>2</sub>	14	15 <sup>5</sup> / <sub>16</sub>	10 <sup>9</sup> / <sub>16</sub>	50
150 x 150 x 80	114	356	389	262	22.7
6 x 6 x 4	4 <sup>1</sup> / <sub>2</sub>	14	16 <sup>1</sup> / <sub>4</sub>	10 <sup>3</sup> / <sub>4</sub>	55
150 x 150 x 100	114	356	413	273	24.9
6 x 6 x 5	4 <sup>1</sup> / <sub>2</sub>	14	17 <sup>1</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>8</sub>	58
150 x 150 x 125	114	356	438	283	26.3
6 x 6 x 6	4 <sup>1</sup> / <sub>2</sub>	14	18 <sup>1</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>2</sub>	60.5
150 x 150 x 150	114	356	464	292	27.4
8 x 8 x 3	6	18	18 <sup>3</sup> / <sub>16</sub>	13 <sup>3</sup> / <sub>16</sub>	100
200 x 200 x 80	152	457	462	338	45.4
8 x 8 x 4	6	18	19	13 <sup>1</sup> / <sub>2</sub>	110
200 x 200 x 100	152	457	483	343	49.9
8 x 8 x 5	6	18	20	13 <sup>3</sup> / <sub>8</sub>	111
200 x 200 x 125	152	457	508	352	50.3

FIG. 7066, CONT'D.

TEE WYE

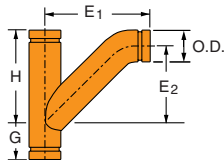


FIGURE 7066 TEE WYE (CONTINUED FROM PREVIOUS PAGE)

Nominal Size	G	H	E1	E2	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
8 x 8 x 6 <i>200 x 200 x 150</i>	6 <i>152</i>	18 <i>457</i>	21 <sup>1</sup> / <sub>8</sub> <i>537</i>	14 <sup>3</sup> / <sub>8</sub> <i>365</i>	112 <i>50.8</i>
8 x 8 x 8 <i>200 x 200 x 200</i>	6 <i>152</i>	18 <i>457</i>	23 <sup>1</sup> / <sub>4</sub> <i>591</i>	15 <sup>1</sup> / <sub>4</sub> <i>387</i>	120 <i>54.4</i>
10 x 10 x 3 <i>250 x 250 x 80</i>	6 <sup>1</sup> / <sub>2</sub> <i>165</i>	20 <sup>1</sup> / <sub>2</sub> <i>521</i>	19 <sup>1</sup> / <sub>8</sub> <i>505</i>	14 <sup>1</sup> / <sub>8</sub> <i>378</i>	130 <i>59.0</i>
10 x 10 x 4 <i>250 x 250 x 100</i>	6 <sup>1</sup> / <sub>2</sub> <i>165</i>	20 <sup>1</sup> / <sub>2</sub> <i>521</i>	20 <sup>3</sup> / <sub>4</sub> <i>527</i>	15 <sup>1</sup> / <sub>4</sub> <i>387</i>	135 <i>61.2</i>
10 x 10 x 5 <i>250 x 250 x 125</i>	6 <sup>1</sup> / <sub>2</sub> <i>165</i>	20 <sup>1</sup> / <sub>2</sub> <i>521</i>	21 <sup>1</sup> / <sub>8</sub> <i>556</i>	15 <sup>3</sup> / <sub>4</sub> <i>400</i>	140 <i>63.5</i>
10 x 10 x 6 <i>250 x 250 x 150</i>	6 <sup>1</sup> / <sub>2</sub> <i>165</i>	20 <sup>1</sup> / <sub>2</sub> <i>521</i>	22 <sup>1</sup> / <sub>8</sub> <i>581</i>	16 <sup>1</sup> / <sub>8</sub> <i>410</i>	145 <i>65.8</i>
10 x 10 x 8 <i>250 x 250 x 200</i>	6 <sup>1</sup> / <sub>2</sub> <i>165</i>	20 <sup>1</sup> / <sub>2</sub> <i>521</i>	27 <sup>1</sup> / <sub>4</sub> <i>692</i>	19 <sup>1</sup> / <sub>4</sub> <i>489</i>	150 <i>68.0</i>
10 x 10 x 10 <i>250 x 250 x 250</i>	6 <sup>1</sup> / <sub>2</sub> <i>165</i>	20 <sup>1</sup> / <sub>2</sub> <i>521</i>	27 <sup>1</sup> / <sub>4</sub> <i>692</i>	18 <i>457</i>	190 <i>86.2</i>

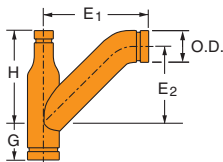
Nominal Size	G	H	E1	E2	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
12 x 12 x 3 <i>300 x 300 x 80</i>	7 <i>178</i>	23 <i>584</i>	20 <sup>3</sup> / <sub>4</sub> <i>527</i>	15 <sup>3</sup> / <sub>4</sub> <i>400</i>	140 <i>63.5</i>
12 x 12 x 4 <i>300 x 300 x 100</i>	7 <i>178</i>	23 <i>584</i>	21 <sup>1</sup> / <sub>2</sub> <i>546</i>	16 <i>406</i>	145 <i>65.8</i>
12 x 12 x 6 <i>300 x 300 x 150</i>	7 <i>178</i>	23 <i>584</i>	23 <sup>3</sup> / <sub>4</sub> <i>603</i>	17 <i>432</i>	165 <i>74.8</i>
12 x 12 x 8 <i>300 x 300 x 200</i>	7 <i>178</i>	23 <i>584</i>	26 <i>660</i>	18 <i>457</i>	175 <i>79.4</i>
12 x 12 x 10 <i>300 x 300 x 250</i>	7 <i>178</i>	23 <i>584</i>	28 <i>711</i>	18 <sup>3</sup> / <sub>4</sub> <i>476</i>	200 <i>90.7</i>
12 x 12 x 12 <i>300 x 300 x 300</i>	7 <i>178</i>	23 <i>584</i>	31 <i>787</i>	20 <sup>1</sup> / <sub>2</sub> <i>521</i>	240 <i>109</i>

See Fitting Size Chart on page 146 for O.D. sizes

## Grooved Fittings

**FIG. 7067**

REDUCING TEE WYE



**FIGURE 7067 REDUCING TEE WYE**

Nominal Size	G	H	E1	E2	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
4 x 3 x 3	1 <sup>5</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>4</sub>	5 <sup>5</sup> / <sub>8</sub>	16.0
12 x 12 x 10	41	187	273	143	7.3
4 x 3 x 4	3 <sup>3</sup> / <sub>4</sub>	10 <sup>1</sup> / <sub>2</sub>	13 <sup>5</sup> / <sub>8</sub>	8 <sup>1</sup> / <sub>8</sub>	27.0
12 x 12 x 10	267	346	346	206	
5 x 3 x 3	1 <sup>1</sup> / <sub>4</sub>	9 <sup>3</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>2</sub>	25.0
12 x 12 x 10	32	248	292	165	11.3
5 x 3 x 5	4	12 <sup>1</sup> / <sub>2</sub>	16 <sup>1</sup> / <sub>8</sub>	10	44.0
12 x 12 x 10	102	318	410	254	20.0
5 x 4 x 3	1 <sup>7</sup> / <sub>8</sub>	9 <sup>1</sup> / <sub>8</sub>	11 <sup>7</sup> / <sub>8</sub>	6 <sup>7</sup> / <sub>8</sub>	21.0
12 x 12 x 10	48	232	302	175	9.5
5 x 4 x 4	1 <sup>7</sup> / <sub>8</sub>	9 <sup>1</sup> / <sub>8</sub>	12 <sup>3</sup> / <sub>4</sub>	7 <sup>1</sup> / <sub>4</sub>	25.0
12 x 12 x 10	48	232	324	184	11.3

Nominal Size	G	H	E1	E2	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
6 x 4 x 6	4 <sup>1</sup> / <sub>2</sub>	14	18 <sup>1</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>2</sub>	61.0
12 x 12 x 10	114	356	464	292	27.7
6 x 5 x 3	1 <sup>1</sup> / <sub>4</sub>	10 <sup>3</sup> / <sub>4</sub>	13	8	27.0
12 x 12 x 10	32	273	330	203	12.2
6 x 5 x 4	1 <sup>1</sup> / <sub>4</sub>	10 <sup>3</sup> / <sub>4</sub>	13 <sup>7</sup> / <sub>8</sub>	8 <sup>3</sup> / <sub>8</sub>	31.0
12 x 12 x 10	32	273	352	213	14.1
8 x 6 x 4	1	12	14 <sup>3</sup> / <sub>4</sub>	9 <sup>1</sup> / <sub>4</sub>	45.0
12 x 12 x 10	25	305	375	235	20.4
8 x 6 x 8	6	18	23 <sup>1</sup> / <sub>4</sub>	15 <sup>1</sup> / <sub>4</sub>	95.0
12 x 12 x 10	152	457	591	387	43.1

See Fitting Size Chart on page 146 for O.D. sizes

FIG. 7071

TRUE WYE

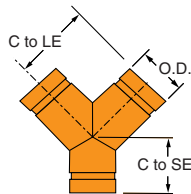


FIGURE 7071 TRUE WYE

Nominal Size	O.D.	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
1	1.315	2¼	2¼	1.1
25	33.4	57	57	0.5
1¼	1.660	2¾	2½	1.5
32	42.2	70	64	0.7
1½	1.900	2¾	2¾	1.8
40	48.3	70	70	0.8
2	2.375	3¼	2¾	2.3
50	60.3	83	70	1.0
2½	2.875	3¾	3	5.0
65	73.0	95	76	2.3
3	3.500	4¼	3¼	6.1
80	88.9	108	83	2.8

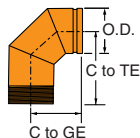
Nominal Size	O.D.	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
3½	4.000	4½	3½	8.3
90	101.6	114	89	3.8
4	4.500	5	3¾	10.5
100	114.3	127	95	4.8
5	5.563	5½	4	15
125	141.3	140	102	6.8
6	6.625	6½	4½	21.6
150	168.3	165	114	9.8
8	8.625	7¾	6	36.0
200	219.1	197	152	16.3
10	10.750	9	6½	51.0
250	273.1	229	165	23.1

Nominal Size	O.D.	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
12	12.750	10	7	160.0
300	323.9	254	178	72.6
14	14.000	11	7½	136.0
350	355.6	279	191	61.7
16	16.000	12	8	166.0
400	406.4	305	203	75.3
18	18.000	15½	8½	234
450	457.2	394	216	106
20	20.000	17¼	9	281
500	508.0	438	229	128
24	24.000	20	10	523
600	609.6	508	254	237

## Grooved Fittings

### FIG. 7055 GR x MPT

90° ADAPTER ELBOW

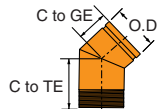


#### FIGURE 7055 90° ADAPTER ELBOWS

Nominal Size	O.D.	Center to Grooved End	Center to Threaded End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
1	1.315	2¼	2¼	0.6
25	33.4	57	57	0.3
1¼	1.660	2¾	2¾	1.0
32	42.2	70	70	0.5
1½	1.900	2¾	2¾	1.2
40	48.3	70	70	0.5
2	2.375	3¼	4¼	2.3
50	60.3	83	108	1.0
2½	2.875	3¾	3¾	3.7
65	73.0	95	95	1.7
3	3.500	4¼	6	6.5
80	88.9	108	152	2.9
3½	4.000	4½	6¼	8.2
90	101.6	114	159	3.7
4	4.500	5	7¼	11
100	114.3	127	184	5.0
6	6.625	6½	6½	19.8
150	168.3	165	165	9.0

### FIG. 7056 GR x MPT

45° ADAPTER ELBOW



#### FIGURE 7056 45° ADAPTER ELBOWS

Nominal Size	O.D.	Center to Grooved End	Center to Threaded End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
1	1.315	1¾	1¾	0.6
25	33.4	44	44	0.3
1¼	1.660	1¾	1¾	0.7
32	42.2	44	44	0.3
1½	1.900	1¾	1¾	0.8
40	48.3	44	44	0.4
2	2.375	2	3	1.6
50	60.3	51	76	0.7
2½	2.875	2¼	2¼	2.2
65	73.0	57	57	1.0
3	3.500	2½	4¼	4.3
80	88.9	64	108	2.0
3½	4.000	2¾	2¾	4.2
90	101.6	70	70	1.9
4	4.500	3	5¼	7.5
100	114.3	76	133	3.4
6	6.625	3½	3½	11.1
150	168.3	89	89	5.0



FIG. 7087 GR x FPT

FEMALE THREAD ADAPTER

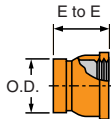


FIGURE 7087 FEMALE THREAD ADAPTER			
Nominal Size	Grooved End O.D.	End to End	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
1	1.315	2 <sup>1</sup> / <sub>16</sub>	0.7
25	33.4	52	0.3
1 <sup>1</sup> / <sub>4</sub>	1.660	2 <sup>9</sup> / <sub>16</sub>	1.4
32	42.2	59	0.6
1 <sup>1</sup> / <sub>2</sub>	1.900	2 <sup>9</sup> / <sub>16</sub>	1.5
40	48.3	59	0.7
2	2.375	2 <sup>1</sup> / <sub>2</sub>	1.6
50	60.3	64	0.7
3	3.500	2 <sup>3</sup> / <sub>4</sub>	2.5
80	88.9	70	1.1
4	4.500	3 <sup>1</sup> / <sub>4</sub>	4.5
100	114.3	83	2.0

FIG. 7050RF

GROOVED X 150# FLANGED (GxF)

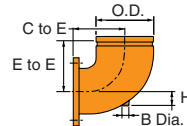
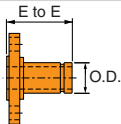


FIGURE 7050 RF REDUCING BASE SUPPORT ELBOWS					
Nominal Size	Grooved End O.D.	Center to End	H	B Dia. Threaded	Approx. Wt. Ea. GxF
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>NPSC</i>	<i>Lbs./Kg</i>
6 x 4	6.625	12	2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	38.5
150 x 100	168.3	305	64	38	17.5
6 x 5	6.625	12 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	45.4
150 x 125	168.3	318	64	38	20.6
8 x 5	8.625	16	3	1 <sup>1</sup> / <sub>2</sub>	65.5
200 x 125	219.1	406	76	38	29.7
8 x 6	8.625	16	3	1 <sup>1</sup> / <sub>2</sub>	73
200 x 150	219.1	406	76	38	33.1
10 x 6	10.750	19	3 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	100
250 x 150	273.1	483	89	38	45.4
10 x 8	10.750	19	3 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	127
250 x 200	273.1	483	89	38	57.6
12 x 8	12.750	22	4	1 <sup>1</sup> / <sub>2</sub>	155
300 x 200	323.9	559	102	38	70.3
12 x 10	12.750	22	4	1 <sup>1</sup> / <sub>2</sub>	186
300 x 250	323.9	559	102	38	84.4

## Grooved Fittings

### FIG. 7084

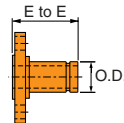
GROOVE X CLASS 150  
FLANGE NIPPLES



\* Contact a Gruvlok Representative  
for dimensions & weights.

### FIG. 7085

GROOVE X CLASS 300  
FLANGE NIPPLES



#### FIGURE 7084 GROOVE X CLASS 150 FLANGE NIPPLES

Nominal Size	O.D.	End to End	Approx. Wt. Ea.	Nominal Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg	In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	3	2.5	6	6.625	6	29.5
25	33.4	76	1.1	150	168.3	152	13.4
1¼	1.660	4	3.8	8	8.625	6	43.5
32	42.2	102	1.7	200	219.1	152	19.7
1½	1.900	4	4.1	10	10.750	8	68.2
40	48.3	102	1.9	250	273.1	203	30.9
2	2.375	4	6.0	12	12.750	8	96.1
50	60.3	102	2.7	300	323.9	203	43.6
2½	2.875	4	9.2	14	14.000	*	*
65	73.0	102	4.2	350	355.6	*	*
3	3.500	4	10.4	16	16.000	*	*
80	88.9	102	4.7	400	406.4	*	*
3½	4.000	4	14.0	18	18.000	*	*
90	101.6	102	6.4	450	457.2	*	*
4	4.500	6	19.1	20	20.000	*	*
100	114.3	152	8.7	500	508.0	*	*
5	5.563	6	23.0	24	24.000	*	*
125	141.3	152	10.4	600	609.6	*	*

#### FIGURE 7085 GROOVE X CLASS 300 FLANGE NIPPLES

Nominal Size	O.D.	End to End	Approx. Wt. Ea.	Nominal Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg	In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	3	3.6	6	6.625	6	35.0
25	33.4	76	1.6	150	168.3	152	15.9
1¼	1.660	4	4.6	8	8.625	6	50.0
32	42.2	102	2.1	200	219.1	152	22.7
1½	1.900	4	7.1	10	10.750	6	72.0
40	48.3	102	3.2	250	273.1	152	32.7
2	2.375	4	8.2	12	12.750	8	*
50	60.3	102	3.7	300	323.9	203	*
2½	2.875	4	11.9	14	14.000	8	*
65	73.0	102	5.4	350	355.6	203	*
3	3.500	4	15.5	16	16.000	*	*
80	88.9	102	7.0	400	406.4	*	*
3½	4.000	4	21.0	18	18.000	*	*
90	101.6	102	9.5	450	457.2	*	*
4	4.500	6	28.0	20	20.000	*	*
100	114.3	152	12.7	500	508.0	*	*
5	5.563	6	35.0	24	24.000	*	*
125	141.3	152	15.9	600	609.6	*	*

FIG. 7074

CAP

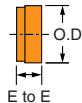


FIGURE 7074 CAP

Nominal Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
1¼ C	1.660	1¼	0.4
32	42.2	32	0.2
1½ C	1.900	1¼	0.5
40	48.3	32	0.2
2 C	2.375	1	0.5
50	60.3	25	0.2
2½ C	2.875	1	0.7
65	73.0	25	0.3
3 O.D. C	2.996	1	0.8
76.1	76.1	25	0.4
3 C	3.500	1	1.1
80	88.9	25	0.5
3½ C	4.000	1	1.4
90	101.6	25	0.6
4¼ O.D. C	4.250	1½	2.0
108.0	108.0	29	0.9

Nominal Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
4 C	4.500	1½	2.8
100	114.3	29	1.3
5¼ O.D. C	5.236	1½	3.2
133.0	133.0	29	1.5
5½ O.D. C	5.500	1½	4.0
139.7	139.7	29	1.8
5 C	5.563	1½	4.0
125	141.3	29	1.8
6¼ O.D. C	6.259	1½	5.1
159.0	159.0	29	2.3
6½ O.D. C	6.500	1½	6.0
165.1	165.1	29	2.7
6 C	6.625	1¾	6.0
150	168.3	33	2.7
8 C	8.625	1½	12.5
200	219.1	38	5.7

Nominal Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10 C	10.750	1½	21.9
250	273.1	38	9.9
12 C	12.750	1½	33.8
300	323.9	38	15.3
14*	14.000	8½	40
350	355.6	216	18.1
16*	16.000	9	45
400	406.4	229	20.4
18*	18.000	10	58
450	457.2	254	26.3
20*	20.000	11	79
500	508.0	279	35.8
24*	24.000	12½	100
600	609.6	318	45.4

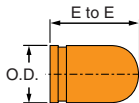
\* Machined Cap

C - Cast Malleable or Ductile Iron

## Grooved Fittings

### FIG. 7075

BULL PLUG



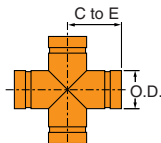
#### FIGURE 7075 BULL PLUG

Nominal Size	Fitting O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	4	2.5
50	60.3	102	1.1
2½	2.875	5	3.1
65	73.0	127	1.4
3	3.500	6	4.4
80	88.9	152	2.0
4	4.500	7	7.4
100	114.3	178	3.4
5	5.563	*	*
125	141.3	*	*
6	6.625	10	18.5
150	168.3	254	8.4

\* Contact a Gruvlok Representative for dimensions & weights.

### FIG. 7068

CROSS



#### FIGURE 7068 CROSS

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	2¼	1.3
25	33.4	57	0.6
1¼	1.660	2¾	2.1
32	42.2	70	1.0
1½	1.900	2¾	2.5
40	48.3	70	1.1
2	2.375	3¼	2.9
50	60.3	83	1.3
2½	2.875	3¾	5.2
65	73.0	95	2.4
3	3.500	4¼	7.5
80	88.9	108	3.4
3½	4.000	4½	9.8
90	101.6	114	4.4
4	4.500	5	12.2
100	114.3	127	5.5
5	5.563	5½	17.6
125	141.3	140	8.0

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
6	6.625	6½	28.3
150	168.3	165	12.8
8	8.625	7¾	48.0
200	219.1	197	21.8
10	10.750	9	70.0
250	273.1	229	31.8
12	12.750	10	110
300	323.9	254	49.9
14	14.000	11	140
350	355.6	279	63.5
16	16.000	12	170
400	406.4	305	77.1
18	18.000	15½	260
450	457.2	394	118
20	20.000	17¼	320
500	508.0	438	145
24	24.000	20	585
600	609.6	508	265

FIG. 7086

GR x HOSE NIPPLES

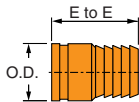


FIGURE 7086 HOSE NIPPLES

Nom. Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	3¼	0.4
25	33.4	83	0.2
1¼	1.660	3⅝	0.7
32	42.2	92	0.3
1½	1.900	4	0.8
40	48.3	102	0.4
2	2.375	4⅝	1.3
50	60.3	117	0.6
2½	2.875	5½	2.1
65	73.0	140	1.0
3	3.500	6	3.3
80	88.9	152	1.5

Nom. Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
4	4.500	7¼	5.5
100	114.3	184	2.5
5	5.563	9¾	8.1
125	141.3	248	3.7
6	6.625	11	13.2
150	168.3	279	6.0
8	8.625	12½	24.0
200	219.1	318	10.9
10	10.750	14	29.0
250	273.1	356	13.2
12	12.750	16	46.0
300	323.9	406	20.9

FIG. 7080

GR x GR

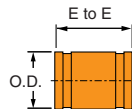


FIG. 7081

GR x MPT

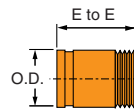
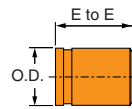


FIG. 7082

GR x BEV



FIGURES 7080, 7081 &amp; 7082 ADAPTER NIPPLES

Nom. Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
1	1.315	3	0.4
25	33.4	76	0.2
1¼	1.660	4	0.8
32	42.2	102	0.4
1½	1.900	4	0.9
40	48.3	102	0.4
2	2.375	4	1.2
50	60.3	102	0.5
2½	2.875	4	1.9
65	73.0	102	0.9
3	3.500	4	2.5
80	88.9	102	1.1
3½	4.000	4	3.1
90	101.6	102	1.4

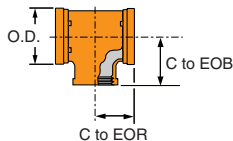
Nom. Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
4	4.500	6	5.5
100	114.3	152	2.5
5	5.563	6	7.4
125	141.3	152	3.4
6	6.625	6	9.5
150	168.3	152	4.3
8	8.625	6	14.2
200	219.1	152	6.4
10	10.750	8	27.0
250	273.1	203	12.2
12	12.750	8	33.0
300	323.9	203	15.0

This product is not UL/ULC Listed or FM Approved.

## Grooved Fittings

### FIG. 7065

STANDPIPE TEE (GR x GR x FPT)



### FIGURE 7065 STANDPIPE TEE (GR x GR x FPT)

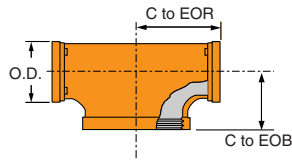
Nominal Size	O.D.	Center to End of Run	Center to End of Branch	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
4 x 4 x 2½	4.500	3¼	4	7.6
100 x 100 x 65	114.3	83	102	3.4
6 x 6 x 2½	6.625	3¼	5½	11.2
150 x 150 x 65	168.3	83	130	5.1

See Fitting Size Chart on page 146 for O.D. sizes.

These fittings are designed to provide minimal pressure drop and uniform strength. Pressure ratings of Gruvlok Fittings conforms to those of Fig. 7001 Gruvlok Standard Coupling.

### FIG. 7062

BULLHEAD TEE SPECIALTY TEES (GR x GR x FPT)



### FIGURE 7062 BULLHEAD TEE SPECIALTY TEES (GR x GR x FPT)

Nominal Size	O.D.	Center to End of Run	Center to End of Branch	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
5 x 5 x 8	7¾	5½	31.0	7.6
125 x 125 x 200	197	140	14.1	3.4
6 x 6 x 8	7¾	6½	37.6	11.2
150 x 150 x 200	197	165	17.1	5.1

See Fitting Size Chart on page 146 for O.D. sizes

These fittings are designed to provide minimal pressure drop and uniform strength. Pressure ratings of Gruvlok Fittings conforms to those of Fig. 7001 Gruvlok Standard Coupling.

## FIG. 7050DR

STANDPIPE TEE (GR X GR X FPT)

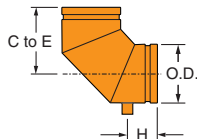


FIGURE 7050DR 90° DRAIN ELBOW

Nominal Size	O.D.	Max Working Pressure	Dimensions		Approx. Wt. Ea.
			C to E	H	
In./DN(mm)	In./mm	psi/bar	In./mm	In./mm	Lbs./Kg
1¼ 32	1.660 42.2	300 20.7	2¾ 69	1¾ 44	0.70 0.30
1½ 40	1.900 48.3	300 20.7	2¾ 69	1¾ 44	1.70 0.8
2 50	2.375 60.3	300 20.7	3¼ 83	1¾ 44	2.00 0.90
2½ 65	2.875 73.0	300 20.7	3¾ 95	1⅞ 48	2.50 1.10
3 80	3.500 88.9	300 20.7	4¼ 108	2 51	3.20 1.50
4 100	4.500 114.3	300 20.7	5 127	2¼ 57	4.60 2.10

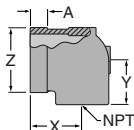
Nominal Size	O.D.	Max Working Pressure	Dimensions		Approx. Wt. Ea.
			C to E	H	
In./DN(mm)	In./mm	psi/bar	In./mm	In./mm	Lbs./Kg
5 125	5.583 141.3	300 20.7	5½ 140	2¾ 60	11.5 5.2
6 150	6.625 168.3	300 20.7	6½ 165	2¾ 60	9.60 4.40
8 200	8.625 219.1	300 20.7	7¾ 197	2½ 64	15.8 7.20
10 250	10.750 273.1	300 20.7	9 229	2¾ 69	48.5 22.0
12 300	12.750 323.9	300 20.7	10 254	2¾ 69	66.0 29.0

Available fabricated Schedule 10 only.  
 Drain elbow has a standard 1" female NPT outlet

## Grooved Fittings

### FIG. 7091

END-OF-LINE FITTING



### FIGURE 7091 END-OF-LINE FITTING

Nominal Size Run x Branch	O.D.	Max. Wk. Pressure	Coupling Dimensions			Approx. Wt. Ea.
			A	X	Y	
In./DN(mm)	In./mm	PSI/bar	In./mm	In./mm	In./mm	Lbs./kg
1½ x ½	1.900	300	⅝	1¾	1⅝	0.8
40 x 15	48	20.7	16	44	33	0.3
1½ x ¾	1.900	300	⅝	1¾	1⅝	0.8
40 x 20	48	20.7	16	44	33	0.3
1½ x 1	1.900	300	⅝	1⅞	1⅝	0.8
40 x 25	48	20.7	16	48	35	0.3
2 x ½	2.375	300	⅝	1¾	1⅞	1.0
50 x 15	60	20.7	16	44	40	0.4
2 x ¾	2.375	300	⅝	1¾	1⅞	1.0
50 x 20	60	20.7	16	44	40	0.4

Nominal Size Run x Branch	O.D.	Max. Wk. Pressure	Coupling Dimensions			Approx. Wt. Ea.
			A	X	Y	
In./DN(mm)	In./mm	PSI/bar	In./mm	In./mm	In./mm	Lbs./kg
2 x 1	2.375	300	⅝	1⅞	1⅝	1.0
50 x 25	60	20.7	16	48	41	0.4
2½ x ½	2.875	300	⅝	1¾	1¾	1.4
65 x 15	73	20.7	16	44	44	0.6
2½ x ¾	2.875	300	⅝	1¾	1¾	1.4
65 x 20	73	20.7	16	44	44	0.6
2½ x 1	2.875	300	⅝	1⅞	1⅞	1.4
65 x 25	73	20.7	16	48	46	0.6



FIG. 7450

90° SHORT PATTERN ELBOW

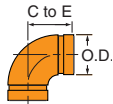


FIGURE 7450 90° ELBOW

Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	2 <sup>3</sup> / <sub>4</sub>	1.7
50	60.3	70	0.8
2½	2.875	3	2.6
65	73.0	76	1.2
3	3.500	3 <sup>3</sup> / <sub>8</sub>	3.5
80	88.9	86	1.6
4	4.500	4	6.5
100	114.3	102	3.0
6	6.625	5½	14.8
150	168.3	140	6.7
8	8.625	6 <sup>7</sup> / <sub>8</sub>	25.6
200	219.1	175	11.6

See the Gruvlok Catalog for additional information

FIG. 7460

SHORT PATTERN TEE

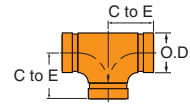


FIGURE 7460 TEE

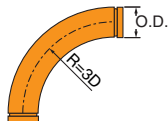
Nominal Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	2 <sup>3</sup> / <sub>4</sub>	2.5
50	60.3	70	1.1
2½	2.875	3	3.5
65	73.0	76	1.6
3	3.500	3 <sup>3</sup> / <sub>8</sub>	4.8
80	88.9	86	2.2
4	4.500	4	8.1
100	114.3	102	3.7
6	6.625	5½	19.1
150	168.3	140	8.7
8	8.625	6 <sup>7</sup> / <sub>8</sub>	35.2
200	219.1	175	16.0

See the Gruvlok Catalog for additional information

## Grooved Fittings

### FIG. 7050 3D

LONG RADIUS 90° ELBOW



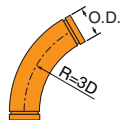
#### FIGURE 7050-3D 90° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	10	5.3
50	60.3	254	2.4
2½	2.875	11½	9.5
65	73	292	4.3
3	3.500	13	14.0
80	88.9	330	6.4
3½	4.000	14½	18.6
90	101.6	368	8.4
4	4.500	16	24.1
100	114.3	406	10.9
5	5.563	20	40.9
125	141.3	508	18.6
6	6.625	24	63.7
150	168.3	610	28.9
8	8.625	32	127.8
200	219.1	813	58.0

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	40	226.4
250	273.1	1016	102.7
12	12.750	48	332.7
300	323.9	1219	150.9
14	14.000	56	427.3
350	355.6	1422	193.8
16	16.000	64	560.1
400	406.4	1626	254.1
18	18.000	72	710.7
450	457.2	1829	322.4
20	20.000	80	879.3
500	508	2032	398.8
24	24.000	96	1270.3
600	609.6	2438	576.2

### FIG. 7057 3D

LONG RADIUS 60° ELBOW



#### FIGURE 7057-3D 60° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	7½	4.3
50	60.3	191	2.0
2½	2.875	8¼	7.7
65	73	210	3.5
3	3.500	9¼	11.0
80	88.9	235	5.0
3½	4.000	10	14.4
90	101.6	254	6.5
4	4.500	11	18.5
100	114.3	279	8.4
5	5.563	13¾	31.3
125	141.3	349	14.2
6	6.625	16½	48.8
150	168.3	419	22.1
8	8.625	22	97.9
200	219.1	559	44.4

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	27¼	173.4
250	273.1	692	78.7
12	12.750	32¾	254.8
300	323.9	832	115.6
14	14.000	38¼	327.3
350	355.6	972	148.5
16	16.000	43¾	429.0
400	406.4	1111	194.6
18	18.000	49¼	544.4
450	457.2	1251	246.9
20	20.000	54¾	673.5
500	508	1391	305.5
24	24.000	65½	973.0
600	609.6	1664	441.3

FIG. 7051 3D

LONG RADIUS 45° ELBOW



FIGURE 7051-3D 45° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	6½	3.9
50	60.3	165	1.8
2½	2.875	7¼	6.7
65	73	184	3.0
3	3.500	7¾	9.5
80	88.9	197	4.3
3½	4.000	8½	12.3
90	101.6	216	5.6
4	4.500	9	15.7
100	114.3	229	7.1
5	5.563	11¼	26.5
125	141.3	286	12.0
6	6.625	13½	41.3
150	168.3	343	18.7
8	8.625	18	82.9
200	219.1	457	37.6

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	22½	146.9
250	273.1	572	66.6
12	12.750	27	215.9
300	323.9	686	97.9
14	14.000	31½	227.3
350	355.6	800	103.1
16	16.000	36	363.5
400	406.4	914	164.9
18	18.000	40½	461.3
450	457.2	1029	209.2
20	20.000	45	540.7
500	508	1143	245.3
24	24.000	53¾	824.4
600	609.6	1365	373.9

FIG. 7058 3D

LONG RADIUS 30° ELBOW



FIGURE 7058-3D 30° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	5¾	3.4
50	60.3	146	1.5
2½	2.875	6	5.8
65	73	152	2.6
3	3.500	6½	8.0
80	88.9	165	3.6
3½	4.000	6¾	10.2
90	101.6	171	4.6
4	4.500	7¼	12.8
100	114.3	184	5.8
5	5.563	9	21.8
125	141.3	229	9.9
6	6.625	10¾	33.9
150	168.3	273	15.4
8	8.625	14½	68.0
200	219.1	368	30.8

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	18	120.5
250	273.1	457	54.7
12	12.750	21¾	177.0
300	323.9	552	80.3
14	14.000	25¼	227.3
350	355.6	641	103.1
16	16.000	29	297.9
400	406.4	737	135.1
18	18.000	32½	378.1
450	457.2	826	171.5
20	20.000	36	467.8
500	508	914	212.2
24	24.000	43¾	675.7
600	609.6	1099	304.1

## Grooved Fittings

### FIG. 7052 3D

LONG RADIUS 22<sup>1</sup>/<sub>2</sub>° ELBOW



#### FIGURE 7052-3D 22<sup>1</sup>/<sub>2</sub>° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	5 <sup>1</sup> / <sub>4</sub>	3.2
50	60.3	133	1.5
2 <sup>1</sup> / <sub>2</sub>	2.875	5 <sup>1</sup> / <sub>2</sub>	5.3
65	73	140	2.4
3	3.500	5 <sup>3</sup> / <sub>4</sub>	7.3
80	88.9	146	3.3
3 <sup>1</sup> / <sub>2</sub>	4.000	6	9.2
90	101.6	152	4.2
4	4.500	6 <sup>1</sup> / <sub>2</sub>	11.4
100	114.3	165	5.2
5	5.563	8	19.4
125	141.3	203	8.8
6	6.625	9 <sup>1</sup> / <sub>2</sub>	30.1
150	168.3	241	13.7
8	8.625	12 <sup>3</sup> / <sub>4</sub>	60.5
200	219.1	324	27.4

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	16	107.2
250	273.1	406	48.6
12	12.750	19 <sup>1</sup> / <sub>4</sub>	157.5
300	323.9	489	71.4
14	14.000	22 <sup>1</sup> / <sub>2</sub>	202.3
350	355.6	572	91.8
16	16.000	25 <sup>1</sup> / <sub>2</sub>	265.2
400	406.4	648	120.3
18	18.000	28 <sup>3</sup> / <sub>4</sub>	336.5
450	457.2	730	152.6
20	20.000	32	416.3
500	508	813	188.8
24	24.000	38 <sup>1</sup> / <sub>4</sub>	601.4
600	609.6	972	272.8

### FIG. 7053 3D

LONG RADIUS 11<sup>1</sup>/<sub>4</sub>° ELBOW



#### FIGURE 7053-3D 11<sup>1</sup>/<sub>4</sub>° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	4 <sup>1</sup> / <sub>2</sub>	2.8
50	60.3	114	1.3
2 <sup>1</sup> / <sub>2</sub>	2.875	4 <sup>3</sup> / <sub>4</sub>	4.6
65	73	121	2.1
3	3.500	5	6.2
80	88.9	127	2.8
3 <sup>1</sup> / <sub>2</sub>	4.000	5	7.6
90	101.6	127	3.4
4	4.500	5 <sup>1</sup> / <sub>4</sub>	9.3
100	114.3	133	4.2
5	5.563	6 <sup>1</sup> / <sub>2</sub>	15.8
125	141.3	165	7.2
6	6.625	7 <sup>3</sup> / <sub>4</sub>	24.6
150	168.3	197	11.2
8	8.625	10 <sup>1</sup> / <sub>2</sub>	49.3
200	219.1	267	22.4

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	13	87.3
250	273.1	330	39.6
12	12.750	15 <sup>1</sup> / <sub>2</sub>	128.3
300	323.9	394	58.2
14	14.000	18 <sup>1</sup> / <sub>4</sub>	164.8
350	355.6	464	74.8
16	16.000	20 <sup>3</sup> / <sub>4</sub>	216.0
400	406.4	527	98.0
18	18.000	23.35	274.1
450	457.2	593	124.3
20	20.000	26	339.2
500	508	660	153.9
24	24.000	31	490.0
600	609.6	787	222.3

FIG. 7050 5D

LONG RADIUS 90° ELBOW

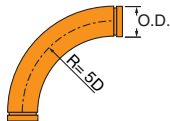


FIGURE 7050-5D 90° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	14	7.2
50	60.3	356	3.3
2½	2.875	16½	13.3
65	73	419	6.0
3	3.500	19	19.9
80	88.9	483	9.0
3½	4.000	21½	26.9
90	101.6	546	12.2
4	4.500	24	35.4
100	114.3	610	16.1
5	5.563	30	60.0
125	141.3	762	27.2
6	6.625	36	93.5
150	168.3	914	42.4
8	8.625	48	187.6
200	219.1	1219	85.1

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	60	332.4
250	273.1	1524	150.8
12	12.750	72	488.4
300	323.9	1829	221.5
14	14.000	84	627.4
350	355.6	2134	284.6
16	16.000	96	822.2
400	406.4	2438	372.9
18	18.000	108	1,043.4
450	457.2	2743	473.3
20	20.000	120	1,290.9
500	508	3048	585.5
24	24.000	144	1,864.8
600	609.6	3658	845.9

FIG. 7057 5D

LONG RADIUS 60° ELBOW

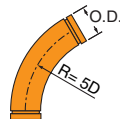


FIGURE 7057-5D 60° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	9¾	5.6
50	60.3	248	2.5
2½	2.875	11¼	10.2
65	73	286	4.6
3	3.500	12¾	15.0
80	88.9	324	6.8
3½	4.000	12¼	20.0
90	101.6	311	9.1
4	4.500	15½	26.0
100	114.3	394	11.8
5	5.563	19½	44.1
125	141.3	495	20.0
6	6.625	23¼	68.6
150	168.3	591	31.1
8	8.625	31	137.7
200	219.1	787	62.5

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	39	244.1
250	273.1	991	110.7
12	12.750	46¾	358.6
300	323.9	1187	162.7
14	14.000	54½	460.7
350	355.6	1384	209.0
16	16.000	62¼	603.8
400	406.4	1581	273.9
18	18.000	70	766.2
450	457.2	1778	347.5
20	20.000	77¾	947.9
500	508	1975	430.0
24	24.000	93¼	1,369.3
600	609.6	2369	621.1

## Grooved Fittings

### FIG. 7051 5D

LONG RADIUS 45° ELBOW



#### FIGURE 7051-5D 45° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	8¼	4.8
50	60.3	210	2.2
2½	2.875	9¼	8.6
65	73	235	3.9
3	3.500	10¼	12.5
80	88.9	260	5.7
3½	4.000	11¼	16.5
90	101.6	286	7.5
4	4.500	12½	21.3
100	114.3	318	9.7
5	5.563	15½	36.1
125	141.3	394	16.4
6	6.625	18½	56.2
150	168.3	470	25.5
8	8.625	24½	112.8
200	219.1	622	51.2

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	30¾	199.9
250	273.1	781	90.7
12	12.750	37	293.7
300	323.9	940	133.2
14	14.000	43	377.3
350	355.6	1092	171.1
16	16.000	49¼	494.5
400	406.4	1251	224.3
18	18.000	55¼	627.6
450	457.2	1403	284.7
20	20.000	61½	776.4
500	508	1562	352.2
24	24.000	73¾	1,121.6
600	609.6	1873	508.7

### FIG. 7058 5D

LONG RADIUS 30° ELBOW



#### FIGURE 7058-5D 30° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	6¾	4.0
50	60.3	171	1.8
2½	2.875	7½	7.0
65	73	191	3.2
3	3.500	8	10.0
80	88.9	203	4.5
3½	4.000	8¾	13.0
90	101.6	222	5.9
4	4.500	9½	16.6
100	114.3	241	7.5
5	5.563	11¾	28.1
125	141.3	298	12.7
6	6.625	14	43.8
150	168.3	356	19.9
8	8.625	18¾	87.9
200	219.1	476	39.9

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	23½	155.8
250	273.1	597	70.7
12	12.750	28	228.9
300	323.9	711	103.8
14	14.000	32¾	294.0
350	355.6	832	133.4
16	16.000	37½	385.3
400	406.4	953	174.8
18	18.000	42¼	489.0
450	457.2	1073	221.8
20	20.000	46¾	605.0
500	508	1187	274.4
24	24.000	56¼	873.9
600	609.6	1429	396.4

FIG. 7052 5D

LONG RADIUS 22<sup>1</sup>/<sub>2</sub>° ELBOWFIGURE 7052-5D 22<sup>1</sup>/<sub>2</sub>° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.	Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg	In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	6	3.6	10	10.750	20	133.7
50	60.3	152	1.6	250	273.1	508	60.6
2½	2.875	6½	6.2	12	12.750	24	196.4
65	73	165	2.8	300	323.9	610	89.1
3	3.500	7	8.8	14	14.000	28	252.3
80	88.9	178	4.0	350	355.6	711	114.4
3½	4.000	7½	11.3	16	16.000	32	330.7
90	101.6	191	5.1	400	406.4	813	150.0
4	4.500	8	14.3	18	18.000	36	419.7
100	114.3	203	6.5	450	457.2	914	190.4
5	5.563	10	24.1	20	20.000	40	519.2
125	141.3	254	10.9	500	508	1016	235.5
6	6.625	12	37.6	24	24.000	48	750.1
150	168.3	305	17.1	600	609.6	1219	340.2
8	8.625	16	75.4				
200	219.1	406	34.2				

FIG. 7053 5D

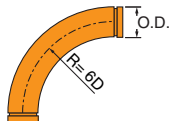
LONG RADIUS 11<sup>1</sup>/<sub>4</sub>° ELBOWFIGURE 7053-5D 11<sup>1</sup>/<sub>4</sub>° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.	Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg	In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	5	3.0	10	10.750	15	100.6
50	60.3	127	1.4	250	273.1	381	45.6
2½	2.875	5¼	5.0	12	12.750	18	147.8
65	73	133	2.3	300	323.9	457	67.0
3	3.500	5½	6.9	14	14.000	21	189.8
80	88.9	140	3.1	350	355.6	533	86.1
3½	4.000	5¾	8.7	16	16.000	24	248.8
90	101.6	146	3.9	400	406.4	610	112.9
4	4.500	6	10.7	18	18.000	27	315.7
100	114.3	152	4.9	450	457.2	686	143.2
5	5.563	7½	18.2	20	20.000	30	390.6
125	141.3	191	8.3	500	508	762	177.2
6	6.625	9	28.3	24	24.000	35¾	564.3
150	168.3	229	12.8	600	609.6	908	256.0
8	8.625	12	56.8				
200	219.1	305	25.8				

## Grooved Fittings

### FIG. 7050 6D

LONG RADIUS 90° ELBOW



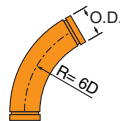
#### FIGURE 7050-6D 90° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	16	8.2
50	60.3	406	3.7
2½	2.875	19	15.2
65	73	483	6.9
3	3.500	22	22.9
80	88.9	559	10.4
3½	4.000	25	31.1
90	101.6	635	14.1
4	4.500	28	41.1
100	114.3	711	18.6
5	5.563	35	69.6
125	141.3	889	31.6
6	6.625	42	108.4
150	168.3	1067	49.2
8	8.625	56	217.5
200	219.1	1422	98.7

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	70	385.4
250	273.1	1778	174.8
12	12.750	84	566.2
300	323.9	2134	256.8
14	14.000	98	727.4
350	355.6	2489	329.9
16	16.000	112	953.3
400	406.4	2845	432.4
18	18.000	126	1,209.7
450	457.2	3200	548.7
20	20.000	140	1,496.6
500	508	3556	678.8
24	24.000	168	2,162.0
600	609.6	4267	980.7

### FIG. 7057 6D

LONG RADIUS 60° ELBOW



#### FIGURE 7057-6D 60° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	11	6.3
50	60.3	279	2.9
2½	2.875	12¾	11.4
65	73	324	5.2
3	3.500	14½	17.0
80	88.9	368	7.7
3½	4.000	16¼	22.8
90	101.6	413	10.3
4	4.500	18	29.8
100	114.3	457	13.5
5	5.563	22¼	50.5
125	141.3	565	22.9
6	6.625	26¾	78.6
150	168.3	679	35.7
8	8.625	35¾	157.7
200	219.1	908	71.5

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	44¾	279.4
250	273.1	1137	126.7
12	12.750	53½	410.5
300	323.9	1359	186.2
14	14.000	62½	527.3
350	355.6	1588	239.2
16	16.000	71½	691.1
400	406.4	1816	313.5
18	18.000	80½	877.1
450	457.2	2045	397.8
20	20.000	89¼	1,085.1
500	508	2267	492.2
24	24.000	107¼	1,567.5
600	609.6	2724	711.0



FIG. 7051 6D

LONG RADIUS 45° ELBOW

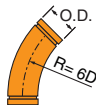


FIGURE 7051-6D 45° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	9	5.3
50	60.3	229	2.4
2½	2.875	10¼	9.5
65	73	260	4.3
3	3.500	1½	14.0
80	88.9	38	6.4
3½	4.000	12¾	18.6
90	101.6	324	8.4
4	4.500	14	24.1
100	114.3	356	10.9
5	5.563	17½	40.9
125	141.3	445	18.6
6	6.625	21	63.7
150	168.3	533	28.9
8	8.625	28	127.8
200	219.1	711	58.0

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	35	226.4
250	273.1	889	102.7
12	12.750	41¾	332.7
300	323.9	1060	150.9
14	14.000	48¾	427.3
350	355.6	1238	193.8
16	16.000	55¾	560.1
400	406.4	1416	254.1
18	18.000	62¾	710.7
450	457.2	1594	322.4
20	20.000	69¾	879.3
500	508	1772	398.8
24	24.000	83¾	1,270.3
600	609.6	2127	576.2

FIG. 7058 6D

LONG RADIUS 30° ELBOW



FIGURE 7058-6D 30° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	7¼	4.3
50	60.3	184	2.0
2½	2.875	8	7.7
65	73	203	3.5
3	3.500	8¾	11.0
80	88.9	222	5.0
3½	4.000	9¾	14.4
90	101.6	248	6.5
4	4.500	10½	18.5
100	114.3	267	8.4
5	5.563	13	31.3
125	141.3	330	14.2
6	6.625	15¾	48.8
150	168.3	400	22.1
8	8.625	21	97.9
200	219.1	533	44.4

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	26	173.4
250	273.1	660	78.7
12	12.750	31¼	254.8
300	323.9	794	115.6
14	14.000	36½	327.3
350	355.6	927	148.5
16	16.000	41¾	429.0
400	406.4	1060	194.6
18	18.000	47	544.4
450	457.2	1194	246.9
20	20.000	52¼	673.5
500	508	1327	305.5
24	24.000	62½	973.0
600	609.6	1588	441.3

## Grooved Fittings

### FIG. 7052 6D

LONG RADIUS 22<sup>1</sup>/<sub>2</sub>° ELBOW



#### FIGURE 7052-6D 22<sup>1</sup>/<sub>2</sub>° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	6 <sup>1</sup> / <sub>2</sub>	3.9
50	60.3	165	1.8
2 <sup>1</sup> / <sub>2</sub>	2.875	7	6.7
65	73	178	3.0
3	3.500	7 <sup>1</sup> / <sub>2</sub>	9.5
80	88.9	191	4.3
3 <sup>1</sup> / <sub>2</sub>	4.000	8 <sup>1</sup> / <sub>4</sub>	12.3
90	101.6	210	5.6
4	4.500	8 <sup>3</sup> / <sub>4</sub>	15.7
100	114.3	222	7.1
5	5.563	11	26.5
125	141.3	279	12.0
6	6.625	13 <sup>1</sup> / <sub>4</sub>	41.3
150	168.3	337	18.7
8	8.625	17 <sup>1</sup> / <sub>2</sub>	82.9
200	219.1	445	37.6

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	22	146.9
250	273.1	559	66.6
12	12.750	26 <sup>1</sup> / <sub>4</sub>	215.9
300	323.9	667	97.9
14	14.000	30 <sup>3</sup> / <sub>4</sub>	277.3
350	355.6	781	125.8
16	16.000	35 <sup>1</sup> / <sub>4</sub>	363.5
400	406.4	895	164.9
18	18.000	39 <sup>1</sup> / <sub>2</sub>	461.3
450	457.2	1003	209.2
20	20.000	44	570.7
500	508	1118	258.9
24	24.000	52.34	824.4
600	609.6	1329	373.9

### FIG. 7053 6D

LONG RADIUS 11<sup>1</sup>/<sub>4</sub>° ELBOW



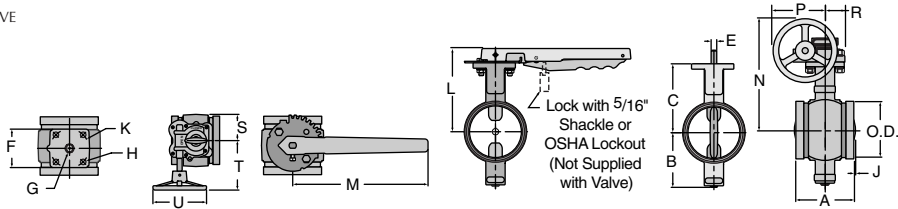
#### FIGURE 7053-6D 11<sup>1</sup>/<sub>4</sub>° ELBOW

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	5 <sup>1</sup> / <sub>4</sub>	3.2
50	60.3	133	1.5
2 <sup>1</sup> / <sub>2</sub>	2.875	5 <sup>1</sup> / <sub>2</sub>	5.3
65	73	140	2.4
3	3.500	5 <sup>3</sup> / <sub>4</sub>	7.3
80	88.9	146	3.3
3 <sup>1</sup> / <sub>2</sub>	4.000	6	9.2
90	101.6	152	4.2
4	4.500	6 <sup>1</sup> / <sub>2</sub>	11.4
100	114.3	165	5.2
5	5.563	8	19.4
125	141.3	203	8.8
6	6.625	9 <sup>1</sup> / <sub>2</sub>	30.1
150	168.3	241	13.7
8	8.625	12 <sup>3</sup> / <sub>4</sub>	60.5
200	219.1	324	27.4

Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
10	10.750	16	107.2
250	273.1	406	48.6
12	12.750	19	157.5
300	323.9	483	71.4
14	14.000	22 <sup>1</sup> / <sub>4</sub>	202.3
350	355.6	565	91.8
16	16.000	25 <sup>1</sup> / <sub>2</sub>	265.2
400	406.4	648	120.3
18	18.000	28 <sup>3</sup> / <sub>4</sub>	336.5
450	457.2	730	152.6
20	20.000	31 <sup>3</sup> / <sub>4</sub>	416.3
500	508	806	188.8
24	24.000	38 <sup>1</sup> / <sub>4</sub>	601.4
600	609.6	972	272.8

**SERIES 7700**

BUTTERFLY VALVE



**SERIES 7700 - BUTTERFLY VALVE DIMENSIONS**

Dimensions	Valve Size (ANSI/DN)								
	2	2½	3	4	5	6	8	10	12
<i>In./mm</i>	<b>50</b>	<b>65</b>	<b>80</b>	<b>100</b>	<b>125</b>	<b>150</b>	<b>200</b>	<b>250</b>	<b>300</b>
O.D.	2¾	2⅞	3½	4½	5⅞	6⅝	8⅞	10¾	12¾
<i>In./mm</i>	60.3	73.0	88.9	114.3	141.3	168.3	219.1	273.1	323.9
A	3⅜	3⅜	3⅜	4⅞	5⅜	5⅜	5¼	6¼	6½
	81.0	96.8	96.8	117.3	147.6	147.6	133.4	158.8	165.1
B	3	3⅜	3⅜	4¼	5	5½	6⅜	8	9
	75.4	80.8	96.5	108.5	126.5	138.9	175.8	202.9	229.4
C	4⅜	4⅞	5⅜	5⅞	5⅞	6⅞	7¾	9½	10½
	105.9	111.3	129.0	136.7	149.4	161.8	196.9	240.3	266.7
D	1⅜	1⅜	1⅜	1⅜	1⅜	1⅜	1⅞	1⅞	1⅞
	26.9	26.9	26.9	26.9	26.9	26.9	41.1	41.1	41.1
E	⅞	⅞	⅞	⅞	⅞	⅞	¾	¾	¾
	11.1	11.1	11.1	11.1	11.1	11.1	19.1	19.1	19.1
F	3	3	3	3	3	3	5	5	5
	76.2	76.2	76.2	76.2	76.2	76.2	127.0	127.0	127.0

## Valves & Accessories

GRUVLOK®

SERIES 7700 - BUTTERFLY VALVE DIMENSIONS									
Dimensions	Valve Size (ANSI/DN)								
	2	2½	3	4	5	6	8	10	12
In./mm	50	65	80	100	125	150	200	250	300
G	<sup>9</sup> / <sub>16</sub> 14.3	<sup>9</sup> / <sub>16</sub> 14.3	<sup>9</sup> / <sub>16</sub> 14.3	<sup>9</sup> / <sub>16</sub> 14.3	<sup>7</sup> / <sub>8</sub> 22.2	<sup>7</sup> / <sub>8</sub> 22.2	1 25.4	1¼ 31.8	1¼ 31.8
H	<sup>7</sup> / <sub>16</sub> 11.1	<sup>7</sup> / <sub>16</sub> 11.1	<sup>7</sup> / <sub>16</sub> 11.1	<sup>7</sup> / <sub>16</sub> 11.1	<sup>7</sup> / <sub>16</sub> 11.1	<sup>7</sup> / <sub>16</sub> 11.1	½ 13.5	½ 13.5	½ 13.5
J	-	-	-	-	-	⅛ 3.3	⅜ 34.8	⅜ 47.0	2¾ 70.1
K	3 76.2	3 76.2	3 76.2	3 76.2	3 76.2	3 76.2	5 127.0	5 127.0	5 127.0
L	<sup>5</sup> / <sub>16</sub> 135.1	5½ 140.5	6¼ 158.2	6½ 165.9	7 178.6	7½ 191.0	<sup>9</sup> / <sub>16</sub> 240.3	-	-
M	10½ 266.7	10½ 266.7	10½ 266.7	10½ 266.7	10½ 266.7	10½ 266.7	15 381.0	-	-
N	<sup>7</sup> / <sub>16</sub> <sup>13</sup> / <sub>16</sub> 198.0	8 203.3	8 <sup>1</sup> / <sub>16</sub> 221.1	9 228.7	9½ 241.4	10 253.9	14 <sup>15</sup> / <sub>16</sub> 379.2	16 <sup>5</sup> / <sub>8</sub> 422.7	20 <sup>11</sup> / <sub>16</sub> 525.3
P	4 102.1	4 102.1	4 102.1	4 102.1	4 102.1	4 102.1	8 <sup>1</sup> / <sub>16</sub> 204.5	8 <sup>1</sup> / <sub>16</sub> 204.5	11 <sup>5</sup> / <sub>8</sub> 295.4
R	1½ 38.2	1½ 38.2	1½ 38.2	1½ 38.2	1½ 38.2	1½ 38.2	2 <sup>5</sup> / <sub>16</sub> 58.5	2 <sup>5</sup> / <sub>16</sub> 58.5	2 <sup>9</sup> / <sub>16</sub> 65.5
S	2 51.0	2 51.0	2 51.0	2 51.0	2 51.0	2 51.0	2 <sup>5</sup> / <sub>8</sub> 66.0	2 <sup>5</sup> / <sub>8</sub> 66.0	3¼ 83.0
T	<sup>6</sup> / <sub>16</sub> 160.3	<sup>6</sup> / <sub>16</sub> 160.3	<sup>6</sup> / <sub>16</sub> 160.3	<sup>6</sup> / <sub>16</sub> 160.3	<sup>6</sup> / <sub>16</sub> 160.3	<sup>6</sup> / <sub>16</sub> 160.3	10 <sup>13</sup> / <sub>16</sub> 275.3	10 <sup>13</sup> / <sub>16</sub> 275.3	13 <sup>13</sup> / <sub>16</sub> 350.3
U	5 127.0	5 127.0	5 127.0	5 127.0	5 127.0	5 127.0	12 304.8	12 304.8	18 457.2

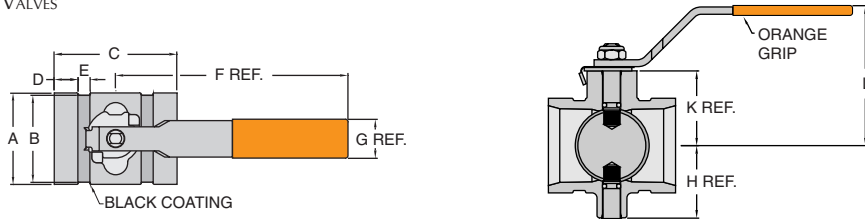
3" or 5" handwheels may be included on valves sizes 2" - 4". Contact your Anvil Rep. for additional information.

For Gruvlok Technical Detail Refer to the Gruvlok Catalog or contact your local sales representative.

www.anvilintl.com

## SERIES 7600

### BUTTERFLY VALVES



### SERIES 7600 - BUTTERFLY VALVE DIMENSIONS

Nom. Size	Dimensions									
	A	B	C	D	E	F	G	H	K	L
<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>
2	2 <sup>3</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	3 <sup>7</sup> / <sub>16</sub>	5 <sup>5</sup> / <sub>8</sub>	5 <sup>5</sup> / <sub>16</sub>	6	1	1 <sup>13</sup> / <sub>16</sub>	2	3 <sup>3</sup> / <sub>16</sub>
50	60.3	57.2	87.4	15.9	8.7	152.4	25.4	46.0	50.8	81.0
2 <sup>1</sup> / <sub>2</sub>	2 <sup>15</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>4</sub>	3 <sup>13</sup> / <sub>16</sub>	5 <sup>5</sup> / <sub>8</sub>	3 <sup>3</sup> / <sub>8</sub>	6	1	2 <sup>1</sup> / <sub>16</sub>	2 <sup>7</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>8</sub>
65	74.2	70.2	96.8	15.9	8.9	152.4	25.4	52.3	62.0	91.9
3	3 <sup>9</sup> / <sub>16</sub>	3 <sup>3</sup> / <sub>8</sub>	3 <sup>13</sup> / <sub>16</sub>	5 <sup>5</sup> / <sub>8</sub>	3 <sup>3</sup> / <sub>8</sub>	8 <sup>7</sup> / <sub>16</sub>	1	2 <sup>5</sup> / <sub>8</sub>	2 <sup>11</sup> / <sub>16</sub>	4 <sup>1</sup> / <sub>4</sub>
80	90.3	86.4	96.8	15.9	8.9	214.4	25.4	66.5	68.1	108.0
4	4 <sup>9</sup> / <sub>16</sub>	4 <sup>3</sup> / <sub>8</sub>	4 <sup>5</sup> / <sub>8</sub>	5 <sup>5</sup> / <sub>8</sub>	3 <sup>3</sup> / <sub>8</sub>	8 <sup>7</sup> / <sub>16</sub>	1	3 <sup>5</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>16</sub>	4 <sup>15</sup> / <sub>16</sub>
100	116.1	111.8	117.3	15.9	8.9	214.4	25.4	84.1	84.1	125.5
6	6 <sup>3</sup> / <sub>4</sub>	6 <sup>9</sup> / <sub>16</sub>	5 <sup>1</sup> / <sub>4</sub>	5 <sup>5</sup> / <sub>8</sub>	3 <sup>3</sup> / <sub>8</sub>	12 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>8</sub>	4 <sup>3</sup> / <sub>8</sub>	7
150	171.0	166.6	133.4	15.9	8.9	311.2	31.8	111.3	111.3	177.8

## SERIES 8000GR

BUTTERFLY VALVE

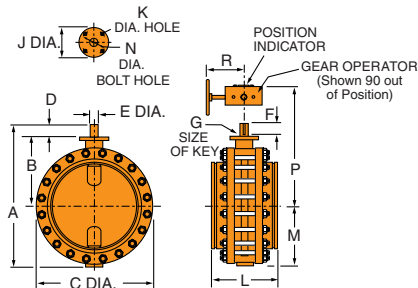
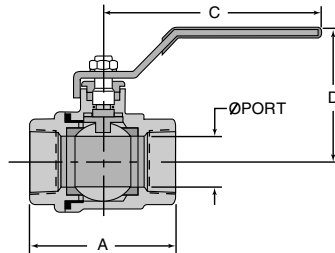


FIGURE 8000GR - BUTTERFLY VALVE DIMENSIONS

Nominal Size	O.D.	A	B	C	D	E	F	G	J	K	L	M	N	P	R
In./DN(mm)	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm
14 350	14.000 356	26.25 667	13.25 337	21.00 533	2.25 57	1.50 38	2.00 51	$\frac{3}{8} \times \frac{3}{8}$ 87	6.00 152	0.53 13	13.06 332	10.75 273	5.00 127	17.94 456	10.00 254
16 400	16.000 406	29.50 749	14.75 375	23.50 597	2.25 57	1.50 38	2.00 51	$\frac{3}{8} \times \frac{3}{8}$ 87	6.00 152	0.53 13	14.33 364	12.5 318	5.00 127	19.44 494	10.00 254
18 450	18.000 457	32.75 832	15.75 400	25.00 635	3.00 76	1.75 44	2.38 60	$\frac{3}{8} \times \frac{3}{8}$ 87	6.75 171	0.53 13	15.40 391	14.00 356	5.00 127	20.44 519	10.00 254
20 500	20.000 508	34.00 864	16.25 413	27.50 699	3.00 76	1.75 44	2.60 66	$\frac{3}{8} \times \frac{3}{8}$ 87	6.75 171	0.53 13	16.38 416	15.00 381	5.00 127	20.94 532	10.00 254
24 600	24.000 610	39.37 1000	19.12 486	32.00 813	3.00 76	2.25 57	3.25 83	$\frac{1}{2} \times \frac{1}{2}$ 116	9.50 241	0.81 21	18.26 464	16.75 425	6.50 165	24.38 619	10.25 260

FIG. 141S, FIG. 171N & FIG. 171S

INTERNATIONAL BRASS BALL VALVES



**NOTES**

1. Dimensions of solder joint ends conform to ANSI B16.22. Solder end valves are designed to be used with solders not exceeding a melting point of 470°F/250°C. Higher temperatures may damage the seal material.
2. For solder joint valves, the pressure/temperature rating is dependent on the solder material used. Please refer to the limitations listed in ANSI B16.18.

3. Rate of Flow Calculations for liquids:

To determine the flow rate of a liquid passing through a valve, use the following formula:

$$Q_L = C_v \left( \sqrt{\frac{\Delta P}{S_L}} \right)$$

Where:  $Q_L$  = flow of liquid in gallons per minute (GPM)

- $C_v$  = flow coefficient
- $\Delta P$  = pressure drop (PSI)
- $S_L$  = specific gravity of liquid

**DIMENSIONS**

Valve Code	Size	Port Dia.	A	C	D	Cv	Approx. Wt. Ea.
	In./mm	In./mm	In./mm	In./mm	In./mm		Lbs./Kg
141S Standard Port	1/2	1/2	2 1/16	3 7/8	1 13/16	6.3	0.7 0.3
	3/4	9/16	2 11/16	3 7/8	1 15/16	9.5	0.8 0.4
	1	3/4	3 3/16	4 13/16	2 5/16	22.2	1.1 0.5
Soldered End	1 1/4	1	3 9/16	4 13/16	2 1/2	30.8	1.5 0.7
	1 1/2	1 1/4	4	6	3 1/16	60.9	2.2 1.0
	2	1 9/16	5 1/16	6	3 5/16	92.9	3.1 1.4

## Valves & Accessories

FIG. 141S, FIG. 171N & FIG. 171S

INTERNATIONAL BRASS BALL VALVES

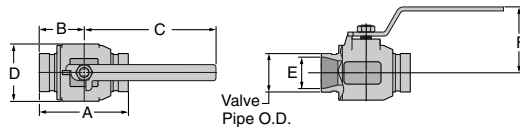
DIMENSIONS							
Valve Code	Size	Port Dia.	A	C	D	Cv	Approx. Wt. Ea.
							Lbs./Kg
171N Full Port Threaded End	1/4	3/8	2	3 3/8	1 3/4	6	0.3
	8	10	51	98	45		0.1
	3/8	3/8	2	3 3/8	1 3/4	7	0.3
	10	10	51	98	45		0.1
	1/2	9/16	2 7/16	3 3/8	1 7/8	19	0.4
	15	14	62	98	48		0.2
	3/4	3/4	2 11/16	4 13/16	2 1/4	35	0.7
	20	19	68	122	57		0.3
	1	15/16	3 1/16	4 13/16	2 7/16	50	1.0
	25	24	78	122	62		0.5
	1 1/4	1 1/4	3 7/16	6	3 1/16	104	2.0
	32	32	87	152	78		0.9
1 1/2	1 9/16	3 7/8	6	3 5/16	268	3.1	
40	40	98	152	84		1.4	
2	1 15/16	4 5/16	6 3/8	3 13/16	309	4.2	
50	49	110	162	97		1.9	
2 1/2	2 9/16	5 9/16	8 1/16	5	629	8.0	
65	65	141	205	127		3.7	
3	3 1/8	6 7/16	8 5/16	5 7/16	1018	12.0	
75	79	164	205	138		5.9	
4	3 15/16	7 9/8	10 1/4	6 5/16	1622	22.0	
100	100	194	260	160		10.0	

DIMENSIONS							
Valve Code	Size	Port Dia.	A	C	D	Cv	Approx. Wt. Ea.
							Lbs./Kg
171S Full Port Soldered End	1/2	9/16	2 1/2	3 3/8	1 7/8	19	0.5
	15	14	64	98	48		0.2
	3/4	3/4	3	4 13/16	2 5/16	35	0.7
	20	19	76	122	59		0.3
	1	1	3 9/16	4 13/16	2 1/2	50	1.1
	25	25	91	122	64		0.5
	1 1/4	1 1/4	4 9/16	6	3 1/8	104	2.0
	32	32	103	152	79		0.9
	1 1/2	1 9/16	4 9/16	6	3 3/8	268	2.7
	40	40	116	152	86		1.2
	2	1 15/16	5 7/16	6 7/16	3 11/16	309	3.9
	50	49	138	164	94		1.8
2 1/2	2 9/16	6 7/8	8 1/16	5	629	9.4	
65	65	175	205	127		4.3	
3	3 1/8	8 9/16	8 1/16	5 7/16	1018	14.5	
75	79	208	205	138		6.6	
4	3 15/16	10 5/16	10 1/4	6 5/16	1622	24.7	
100	100	262	260	160		11.2	



FIG. 7500

BALL VALVES



## SERIES 7500 - BALL VALVE

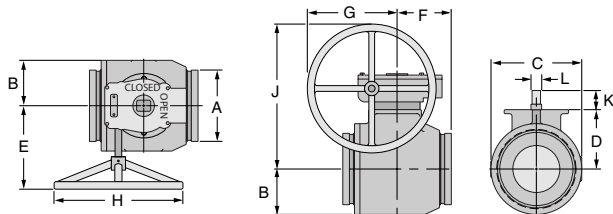
Size ANSI	O.D.	Dimensions						Cv	Approx. Wt. Ea.
		A	B	C	D	E	F		
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>		<i>Lbs./Kg</i>
2	2.375	5½	2¾	8¼	3 <sup>13</sup> / <sub>16</sub>	1 <sup>15</sup> / <sub>16</sub>	4½	165	8
50	60.3	140	70	209	81	49	105		3.6
3	3.500	6¾	3¾	10	4 <sup>13</sup> / <sub>16</sub>	2 <sup>7</sup> / <sub>8</sub>	4 <sup>13</sup> / <sub>16</sub>	310	18
80	88.9	171	85	254	122	74	121		8.2
4	4.500	8¼	4½	16	6 <sup>5</sup> / <sub>16</sub>	3 <sup>13</sup> / <sub>16</sub>	6	815	38
100	114.3	210	105	406	176	97	152		17.2
6 *	6.625	10½	5½	28	8 <sup>7</sup> / <sub>16</sub>	5 <sup>11</sup> / <sub>16</sub>	7 <sup>5</sup> / <sub>8</sub>	1500	106
150	168.3	257	128	711	215	144	194		48.1

\* Bare Stem

## Valves &amp; Accessories

## SERIES 7500

BALL VALVES



SERIES 7500 - BALL VALVE WITH GEAR ACTUATOR

Size ANSI	O.D.	Dimensions											Approx. Wt. Ea.
		A	B	C	D	E	F	G	H	J	K	L	
<i>ln./DN(mm)</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>ln./mm</i>	<i>Lbs./Kg</i>
6	6.625	6 <sup>5</sup> / <sub>8</sub>	4 <sup>1</sup> / <sub>4</sub>	8 <sup>7</sup> / <sub>16</sub>	5 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>4</sub>	5 <sup>1</sup> / <sub>16</sub>	8 <sup>1</sup> / <sub>8</sub>	12	13 <sup>1</sup> / <sub>2</sub>	1 <sup>13</sup> / <sub>16</sub>	1	9.6
150	168.3	168.7	107.4	214.6	140.5	260.4	128.0	206.4	304.8	342.9	45.2	25.4	4.4

FIG. 400G

GROOVED-END SILENT CHECK VALVE

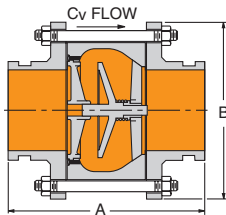


FIGURE 400G - GROOVED-END SILENT CHECK VALVE

Nom. Size	O.D.	Model	A	B	Cv Flow	Approx. Wt. Each
<i>In./mm</i>	<i>In./mm</i>	<i>Number</i>	<i>In./mm</i>	<i>In./mm</i>		<i>Lbs./Kg</i>
2	2.375	402G	6	6	66	12
<i>50</i>	<i>60.3</i>		<i>152</i>	<i>152</i>	<i>1,676</i>	<i>5.4</i>
2½	2.875	4025G	6¼	7	88	15
<i>65</i>	<i>73.0</i>		<i>159</i>	<i>178</i>	<i>2,235</i>	<i>6.8</i>
3	3.500	403G	6⅞	7½	130	20
<i>80</i>	<i>88.9</i>		<i>164</i>	<i>191</i>	<i>3,302</i>	<i>9.1</i>
4	4.500	404G	8⅞	9	228	36
<i>100</i>	<i>114.3</i>		<i>206</i>	<i>229</i>	<i>5,791</i>	<i>16.3</i>
5	5.563	405G	11¼	10	350	50
<i>125</i>	<i>141.3</i>		<i>286</i>	<i>254</i>	<i>8,890</i>	<i>22.7</i>
6	6.625	406G	12¼	11	520	68
<i>150</i>	<i>168.3</i>		<i>311</i>	<i>279</i>	<i>13,208</i>	<i>30.8</i>
8	8.625	408G	13¾	13½	900	140
<i>200</i>	<i>219.1</i>		<i>349</i>	<i>343</i>	<i>22,860</i>	<i>63.5</i>
10	10.750	410G	16	16	1,450	198
<i>250</i>	<i>273.1</i>		<i>406</i>	<i>406</i>	<i>36,830</i>	<i>89.8</i>

# Valves & Accessories

## SERIES 7800

CHECK VALVES

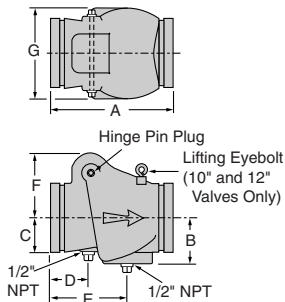


FIGURE 7800 - CHECK VALVE

Nom. Size	O.D.	Nominal Dimensions							Approx. Wt. Ea.
		A	B	C	D	E	F	G	
In./DN(mm)	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs./Kg.
2	2.375	6 <sup>3</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>8</sub>	1 <sup>7</sup> / <sub>16</sub>	1 <sup>3</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>16</sub>	4 <sup>3</sup> / <sub>8</sub>	7.5
50	60.3	171	60	36	44	114	81	111	3.4
2½	2.875	7¼	2 <sup>7</sup> / <sub>16</sub>	1 <sup>9</sup> / <sub>16</sub>	1¾	3 <sup>13</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>8</sub>	4½	10.5
65	73.0	184	61	39	44	96	92	114	4.8
3	3.500	7¾	2 <sup>5</sup> / <sub>8</sub>	2	1 <sup>13</sup> / <sub>16</sub>	4 <sup>1</sup> / <sub>16</sub>	3 <sup>11</sup> / <sub>16</sub>	4 <sup>15</sup> / <sub>16</sub>	11.5
80	88.9	197	67	51	46	103	93	125	5.2
4	4.500	8 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	2¼	2½	5 <sup>1</sup> / <sub>16</sub>	4¼	6	13.5
100	114.3	206	79	57	64	128	108	152	6.1
5	5.563	9¾	3½	2¾	2 <sup>7</sup> / <sub>16</sub>	5 <sup>13</sup> / <sub>16</sub>	4 <sup>5</sup> / <sub>8</sub>	6¾	19.0
125	141.3	248	89	70	61	147	117	171	8.6
6	6.625	12¾	4¼	3 <sup>5</sup> / <sub>16</sub>	3 <sup>1</sup> / <sub>8</sub>	6¼	6¾	8½	33.5
150	168.3	324	108	84	79	159	171	216	15.2
8	8.625	14¾	5 <sup>1</sup> / <sub>16</sub>	3 <sup>15</sup> / <sub>16</sub>	4	5 <sup>15</sup> / <sub>16</sub>	8	10¼	59.0
200	219.1	365	128	100	102	150	203	260	26.8
10	10.750	18	6 <sup>9</sup> / <sub>16</sub>	4 <sup>15</sup> / <sub>16</sub>	4 <sup>9</sup> / <sub>16</sub>	6 <sup>7</sup> / <sub>8</sub>	9 <sup>9</sup> / <sub>16</sub>	12 <sup>11</sup> / <sub>16</sub>	130.0
250	273.1	457	160	125	115	175	233	322	59.0
12	12.750	21	7 <sup>5</sup> / <sub>16</sub>	6	5 <sup>1</sup> / <sub>16</sub>	7¼	10 <sup>3</sup> / <sub>8</sub>	14¾	183.0
300	323.9	533	185	152	128	184	264	375	83.0

GRUVLOK®

## GBV-G

## BALANCING VALVES

2½" TO 12" DUCTILE IRON, GROOVED-END STRAIGHT

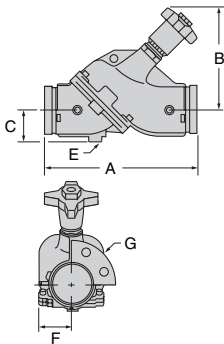


FIGURE GBV-G - GROOVED-END STRAIGHT BALANCING VALVES

Nom. Size	O.D.	A	B Open	C	E	F	Flange Diameter		Approx. Wt. Each
							G Flange 125#	G Flange 250#	
In./DN(mm)	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
2½	2.875	12	9 <sup>5</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>4</sub>	1	2 <sup>9</sup> / <sub>16</sub>	7	7½	25
65	73.0	305	244	70	25	65	178	191	11.3
3	3.500	12	10½	2 <sup>7</sup> / <sub>16</sub>	1	3	7½	8¼	28
80	88.9	305	267	61	25	76	191	210	12.7
4	4.500	14	10 <sup>9</sup> / <sub>16</sub>	3	1¼	3 <sup>7</sup> / <sub>16</sub>	9¼	10	41
100	114.3	356	268	76	32	87	235	254	18.6
5	5.563	17½	13 <sup>1</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>8</sub>	1¼	4 <sup>15</sup> / <sub>16</sub>	10	11	90
125	141.3	445	331	92	32	125	254	279	40.8
6	6.625	20 <sup>11</sup> / <sub>16</sub>	13 <sup>3</sup> / <sub>4</sub>	4 <sup>7</sup> / <sub>16</sub>	2	5 <sup>7</sup> / <sub>8</sub>	11	12½	130
150	168.3	525	349	112	51	149	279	318	59.0
8	8.625	28 <sup>3</sup> / <sub>16</sub>	24 <sup>5</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>16</sub>	2¼	7 <sup>7</sup> / <sub>8</sub>	13½	15	310
200	219.1	716	625	144	57	200	343	381	140.6
10	10.750	30	26½	6 <sup>9</sup> / <sub>16</sub>	2¼	9 <sup>15</sup> / <sub>32</sub>	16	17½	460
250	273.1	762	673	166	57	240	406	445	208.7
12	12.750	38 <sup>1</sup> / <sub>16</sub>	28 <sup>7</sup> / <sub>16</sub>	7 <sup>5</sup> / <sub>8</sub>	2¼	12 <sup>5</sup> / <sub>8</sub>	19	20½	870
300	323.9	966	722	194	57	321	483	521	394.6

**NOTE:** Grooved-Ends are for connection of components with dimensions conforming to Gruvlok® standard grooved specifications for IPS pipe.

## Valves & Accessories

### GBV-A

BALANCING VALVE

2½" TO 12" DUCTILE IRON, GROOVED-END ANGLE

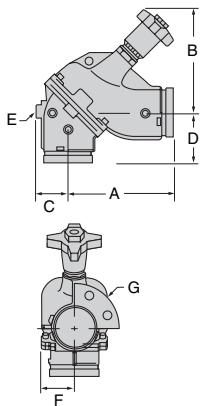


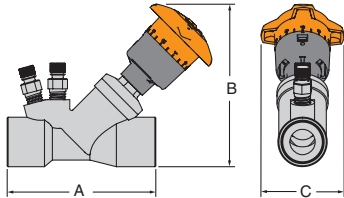
FIGURE GBV-A - GROOVED-END ANGLE BALANCING VALVES

Nom. Size	O.D.	A	B Open	C	D	E	F	Flange Diameter		Approx. Wt. Each
								G Flange 125#	G Flange 250#	
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
2½	2.875	7¾	9⅝	2¾	4⅝	1	2⅞	7	7½	25
65	73.0	187	244	70	117	25	65	178	191	11.3
3	3.500	8⅞	10½	2⅞	3⅞	1	3	7½	8¼	28
80	88.9	213	267	61	98	25	76	191	210	12.7
4	4.500	9⅞	10⅞	3	4⅞	1¼	3⅞	9¼	10	41
100	114.3	244	268	76	111	32	87	235	254	18.6
5	5.563	12	13⅞	3⅞	5½	1¼	4⅞	10	11	90
125	141.3	305	331	92	140	32	125	254	279	40.8
6	6.625	14⅞	13¾	4⅞	6⅞	2	5⅞	11	12½	130
150	168.3	359	349	112	168	51	149	279	318	59.0
8	8.625	18⅞	24⅞	5⅞	9⅞	2¼	7⅞	13½	15	310
200	219.1	481	625	144	233	57	200	343	381	140.6
10	10.750	20⅞	26½	6⅞	9¼	2¼	9⅞	16	17½	460
250	273.1	515	673	166	248	57	240	406	445	208.7
12	12.750	24⅞	28⅞	7⅞	14	2¼	12⅞	19	20½	870
300	323.9	611	722	194	356	57	321	483	521	394.6

**NOTE:** Grooved-Ends are for connection of components with dimensions conforming to Gruvlok® standard grooved specifications for IPS pipe.

**GBV-S (SOLDER)**

FIVE TURN CIRCUIT BALANCING VALVES



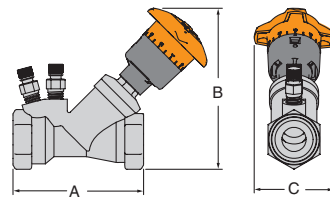
**MODEL: GBV-S - 1/2" - 2"**

Model	Nominal Size	A	B	C	Approx. Wt. Ea.
	In./DN(mm)				
GBV050VS	1/2"	3 <sup>3</sup> / <sub>16</sub>	4 <sup>9</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>4</sub>	1.1
	15	81	116	70	0.5
GBV075VS	3/4"	3 <sup>9</sup> / <sub>16</sub>	4 <sup>9</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>4</sub>	1.1
	20	93	118	70	0.5
GBV100VS	1"	4 <sup>1</sup> / <sub>4</sub>	4 <sup>15</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>4</sub>	1.7
	25	108	126	70	0.8
GBV125VS	1 <sup>1</sup> / <sub>4</sub> "	4 <sup>15</sup> / <sub>16</sub>	5 <sup>3</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>4</sub>	2.3
	32	125	137	70	1.0
GBV150VS	1 <sup>1</sup> / <sub>2</sub> "	5 <sup>11</sup> / <sub>16</sub>	5 <sup>5</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>4</sub>	3.2
	40	144	142	70	1.5
GBV200VS	2"	7	6 <sup>3</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>4</sub>	5.4
	50	179	162	70	2.5

See Installation & Assembly directions on pages 184-189.

**GBV-T (NPT-THREADED)**

FIVE TURN CIRCUIT BALANCING VALVES



**MODEL: GBV-T - 1/2" - 2"**

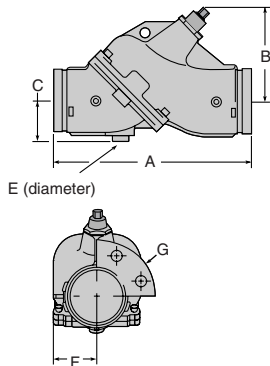
Model	Nominal Size	A	B	C	Approx. Wt. Ea.
	In./DN(mm)				
GBV050VT	1/2"	3	4 <sup>5</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>4</sub>	1.1
	15	76	117	70	0.5
GBV075VT	3/4"	3 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>4</sub>	1.2
	20	83	125	70	0.6
GBV100VT	1"	3 <sup>13</sup> / <sub>16</sub>	5 <sup>1</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>4</sub>	1.9
	25	97	135	70	0.8
GBV125VT	1 <sup>1</sup> / <sub>4</sub> "	4 <sup>9</sup> / <sub>16</sub>	5 <sup>5</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>4</sub>	2.3
	32	110	143	70	1.1
GBV150VT	1 <sup>1</sup> / <sub>2</sub> "	5 <sup>1</sup> / <sub>16</sub>	5 <sup>7</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>4</sub>	3.5
	40	129	150	70	1.6
GBV200VT	2"	6	6 <sup>11</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>4</sub>	6.0
	50	153	170	70	2.5

See Installation & Assembly directions on pages 184-189.

## Valves & Accessories

### FTV-S (STRAIGHT)

TRI-SERVICE VALVE



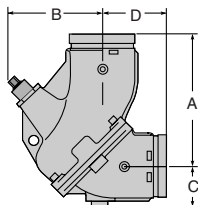
MODEL FTV-S - (STRAIGHT)

Connection Size	A	B (fully open)	C	E	F	Flange 125/150 PSI G	Flange 250/300 PSI G	Approx. Wt. Each
In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	lbs/kg
2 <sup>1</sup> / <sub>2</sub>	12	7	2 <sup>3</sup> / <sub>4</sub>	1	2 <sup>9</sup> / <sub>16</sub>	7	7 <sup>1</sup> / <sub>2</sub>	19
65	305	178	70	25	65	178	191	9
3	12	7 <sup>13</sup> / <sub>16</sub>	2 <sup>7</sup> / <sub>16</sub>	1	3	7 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>4</sub>	24
880	305	198	62	25	76	191	210	11
4	14	8	3	1 <sup>1</sup> / <sub>4</sub>	3 <sup>7</sup> / <sub>16</sub>	9 <sup>1</sup> / <sub>4</sub>	10	42
100	356	203	76	32	87	235	254	19
5	17 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>8</sub>	3 <sup>5</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	4 <sup>15</sup> / <sub>16</sub>	10	11	81
125	445	257	92	32	125	254	279	37
6	20 <sup>11</sup> / <sub>16</sub>	10 <sup>3</sup> / <sub>8</sub>	4 <sup>7</sup> / <sub>16</sub>	2	5 <sup>7</sup> / <sub>8</sub>	11	12 <sup>1</sup> / <sub>2</sub>	120
150	525	264	113	51	149	279	318	54
8	28 <sup>3</sup> / <sub>16</sub>	22 <sup>13</sup> / <sub>16</sub>	5 <sup>1</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	13 <sup>1</sup> / <sub>2</sub>	15	300
200	716	579	144	57	200	343	381	136
10	30	28 <sup>5</sup> / <sub>8</sub>	6 <sup>9</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>4</sub>	9 <sup>15</sup> / <sub>32</sub>	16	17 <sup>1</sup> / <sub>2</sub>	450
250	762	727	167	57	241	409	445	204
12	38 <sup>1</sup> / <sub>16</sub>	32 <sup>5</sup> / <sub>8</sub>	7 <sup>5</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	12 <sup>9</sup> / <sub>8</sub>	19	20 <sup>1</sup> / <sub>2</sub>	850
300	967	829	194	57	321	483	521	390

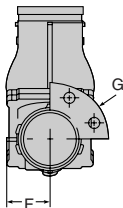


## FTV-A (ANGLE BODY)

TRI-SERVICE VALVE



E (diameter)



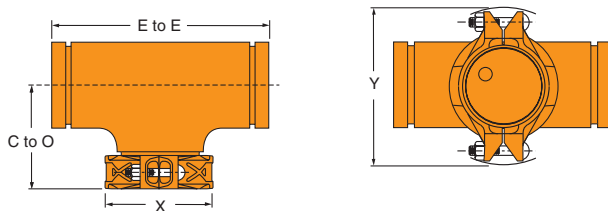
MODEL FTV-A - (ANGLE)

Connection Size	A	B (fully open)	C	D	E	F	Flange 125/150 PSI G	Flange 250/300 PSI G	Approx. Wt. Each
In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs/kg
2 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>8</sub>	7	2 <sup>3</sup> / <sub>4</sub>	4 <sup>5</sup> / <sub>8</sub>	1	2 <sup>9</sup> / <sub>16</sub>	7	7 <sup>1</sup> / <sub>2</sub>	19
65	187	178	70	117	25	65	178	191	9
3	8 <sup>3</sup> / <sub>16</sub>	7 <sup>13</sup> / <sub>16</sub>	2 <sup>7</sup> / <sub>16</sub>	3 <sup>7</sup> / <sub>8</sub>	1	3	7 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>4</sub>	24
880	208	198	62	98	25	76	191	210	11
4	9 <sup>5</sup> / <sub>8</sub>	8	3	4 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>16</sub>	9 <sup>1</sup> / <sub>4</sub>	10	42
100	244	203	76	111	32	87	235	254	19
5	12	10 <sup>1</sup> / <sub>8</sub>	3 <sup>5</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	4 <sup>15</sup> / <sub>16</sub>	10	11	81
125	305	257	92	140	32	125	254	279	37
6	14 <sup>1</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>8</sub>	4 <sup>7</sup> / <sub>16</sub>	6 <sup>5</sup> / <sub>8</sub>	2	5 <sup>7</sup> / <sub>8</sub>	11	12 <sup>1</sup> / <sub>2</sub>	120
150	359	264	113	168	51	149	279	318	54
8	18 <sup>15</sup> / <sub>16</sub>	18 <sup>3</sup> / <sub>4</sub>	5 <sup>11</sup> / <sub>16</sub>	9 <sup>3</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	13 <sup>1</sup> / <sub>2</sub>	15	300
200	481	476	144	233	57	200	343	381	136
10	20 <sup>9</sup> / <sub>16</sub>	24	6 <sup>9</sup> / <sub>16</sub>	9 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	9 <sup>15</sup> / <sub>32</sub>	16	17 <sup>1</sup> / <sub>2</sub>	450
250	516	610	167	248	57	241	409	445	204
12	24 <sup>1</sup> / <sub>16</sub>	26 <sup>1</sup> / <sub>4</sub>	7 <sup>5</sup> / <sub>8</sub>	14	2 <sup>1</sup> / <sub>4</sub>	12 <sup>5</sup> / <sub>8</sub>	19	20 <sup>1</sup> / <sub>2</sub>	860
300	611	667	194	356	57	321	483	521	390

## Valves & Accessories

**FIG. 7260**

GRUVLOK TEE STRAINER



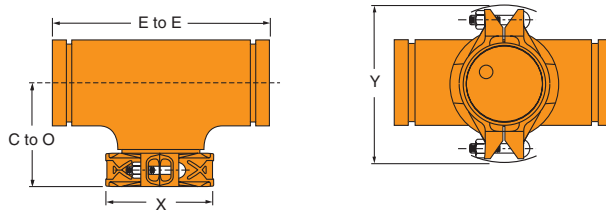
**NOTE:** This illustration shows the required orientation of the Rigidlok access coupling for assembly with a grooved-end flange.

**FIGURE 7260 - TEE STRAINER (CONTINUES ON NEXT PAGE)**

Nom. Size	O.D.	Max.* Working Pressure	E to E	C to O	X	Y	Basket Removal	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>PSI/bar</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Clearance</i>	<i>Lbs./Kg</i>
2 50	2.375 60.3	750 51.7	6½ 165	4¼ 108	3½ 89	5⅞ 149	4⅜ 111	6.0 2.7
2½ 65	2.875 73.0	750 51.7	7½ 191	4¾ 121	4 102	6½ 165	5⅞ 130	8.0 3.6
3 80	3.500 88.9	750 51.7	8½ 216	5¼ 133	4¾ 121	7 178	6 152	13.0 5.9
4 100	4.500 114.3	750 51.7	10 254	6⅞ 156	5⅞ 149	8⅜ 213	7¼ 184	19.0 8.6
5 125	5.563 141.3	750 51.7	11 279	6⅝ 168	7 178	10⅞ 257	8¼ 210	30.0 13.6
6 150	6.625 168.3	750 51.7	13 330	7⅞ 194	8⅞ 206	11⅞ 283	9¾ 248	45.0 20.4
8 200	8.625 219.1	600 41.4	15½ 394	9⅞ 232	10½ 267	14⅞ 359	12 305	79.0 35.8

FIG. 7260 (CONT'D.)

GRUVLOK TEE STRAINER



**NOTE:** This illustration shows the required orientation of the Rigidlok access coupling for assembly with a grooved-end flange.

FIGURE 7260 - TEE STRAINER (CONTINUES FROM PREVIOUS PAGE)

Nom. Size	O.D.	Max.* Working Pressure	E to E	C to O	X	Y	Basket Removal	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>PSI/bar</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Clearance</i>	<i>Lbs./Kg</i>
10 250	10.750 273.1	500 34.5	18 457	10 <sup>3</sup> / <sub>8</sub> 264	12 <sup>7</sup> / <sub>8</sub> 327	17 <sup>1</sup> / <sub>8</sub> 435	14 <sup>1</sup> / <sub>4</sub> 362	133 60.3
12 300	12.750 323.9	400 27.6	20 508	11 <sup>3</sup> / <sub>8</sub> 289	15 381	19 <sup>1</sup> / <sub>8</sub> 486	16 <sup>1</sup> / <sub>4</sub> 413	187 84.8
14 350	14.000 355.6	300 20.7	22 559	12 <sup>3</sup> / <sub>4</sub> 324	16 <sup>1</sup> / <sub>8</sub> 410	20 <sup>1</sup> / <sub>2</sub> 521	17 <sup>1</sup> / <sub>4</sub> 438	272 123.4
16 400	16.000 406.4	300 20.7	24 610	12 305	18 <sup>1</sup> / <sub>8</sub> 460	22 <sup>1</sup> / <sub>4</sub> 565	20 508	350 158.8
18 450	18.000 457.2	300 20.7	31 787	15 <sup>1</sup> / <sub>2</sub> 394	20 <sup>1</sup> / <sub>2</sub> 521	24 <sup>3</sup> / <sub>8</sub> 619	24 <sup>1</sup> / <sub>2</sub> 622	400 181.4

\*Maximum working pressure is based upon the performance capability of the Gruvlok Strainer. Maximum system working pressure is dependent upon the couplings used for installation and the pressure capability of other system components.

14" - 18" Fabricated

Not for use with copper systems.

## Valves & Accessories

### MODEL 758G

GROOVED-END "WYE" STRAINER

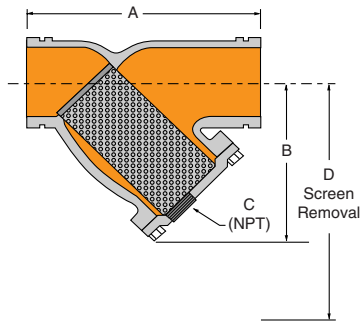


FIGURE 758 G - GROOVED-END "WYE" STRAINER

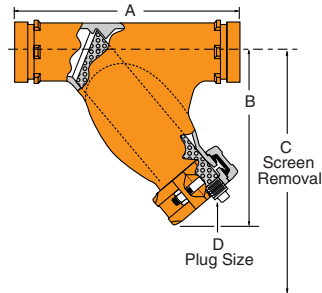
Nominal Size	O.D.	Dimensions				Approx. Wt. Each
		A	B	C Plug Size	D	
2 <i>In./DN(mm)</i>	2.375 <i>In./mm</i>	7 <sup>1</sup> / <sub>8</sub> <i>In./mm</i>	5 <sup>1</sup> / <sub>4</sub> <i>In./mm</i>	1/2 <i>In./mm</i>	7 <i>In./mm</i>	12.0 <i>Lbs./Kg</i>
50	60.3	200	133	25	178	5.4
2 <sup>1</sup> / <sub>2</sub>	2.875	10	6 <sup>1</sup> / <sub>2</sub>	1	9 <sup>3</sup> / <sub>4</sub>	18.0
65	73.0	254	165	25	248	8.2
3	3.500	10 <sup>1</sup> / <sub>8</sub>	7	1	10	23.0
80	88.9	257	178	25	254	10.4
4	4.500	12 <sup>1</sup> / <sub>8</sub>	8 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	12	42.0
100	114.3	308	210	38	305	19.1
5	5.563	15 <sup>5</sup> / <sub>8</sub>	11 <sup>1</sup> / <sub>4</sub>	2	17	80.0
125	141.3	396	286	51	432	36.3
6	6.625	18 <sup>1</sup> / <sub>2</sub>	13 <sup>1</sup> / <sub>2</sub>	2	20	112.0
150	168.3	470	343	51	508	50.8
8	8.625	21 <sup>5</sup> / <sub>8</sub>	15 <sup>1</sup> / <sub>2</sub>	2	22 <sup>3</sup> / <sub>4</sub>	205.0
200	219.1	549	394	51	577	93.0
10	10.750	25 <sup>3</sup> / <sub>4</sub>	18 <sup>1</sup> / <sub>2</sub>	2	28	277.0
250	273.1	654	470	51	711	125.6
12	12.750	30	21 <sup>3</sup> / <sub>4</sub>	2	30	470.0
300	323.9	762	552	51	762	213.2

\*Maximum working pressure is based upon the performance capability of the Gruvlok® Strainer. Maximum system working pressure is dependant upon the couplings used for installation and the pressure capacity of other system components.

Not for use with copper systems.

## MODEL 768G

## GROOVED-END "WYE" STRAINER



Not for use in copper systems.

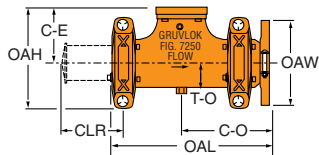
- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by UL, ULC, and/or FM as testing conditions and test pipes differ.
- Maximum working pressure and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI C606-97 specifications.
- For one time field test only the maximum joint working pressure may be increased 1½ times the figures shown.
- Warning: Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.

FIGURE 768 G - GROOVED-END "WYE" STRAINER

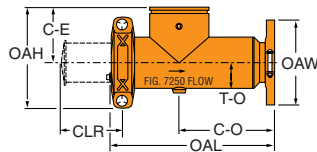
Nominal Size	O.D.	Working Pressure	Dimensions				Cv Values	Approx. Wt. Each
			A	B	C	D Plug Size		
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>PSI/bar</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>		<i>Lbs./Kg</i>
2	2.375	300	9¾	7⅞	4⅞/16	½	59	9.3
50	60.3	20.7	248	192	116	12		4.2
2½	2.875	300	10¾	7⅞/16	4⅞/16	½	92	13.2
65	73.0	20.7	273	211	122	12		6.0
3	3.500	300	11¾	8⅞/16	5⅞/16	1	162	18.0
80	88.9	20.7	298	231	129	25		8.2
4	4.500	300	14¼	10⅞	6⅞	1	284	26.4
100	114.3	20.7	362	281	168	25		12.0
5	5.563	300	16½	13	10¾/16	1	410	46.4
125	141.3	20.7	419	330	258	25		22.0
6	6.625	300	18½	14⅞/16	8⅞	1½	770	70.4
150	168.3	20.7	470	357	219	38		32.0
8	8.625	300	24	17⅞	11¾/16	1½	1010	121.0
200	219.1	20.7	610	454	284	38		55.0
10	10.750	300	27	20⅞/16	12⅞	1½	1800	182.6
250	273.1	20.7	686	522	320	38		83.0
12	12.750	300	30	24	14¾	1½	2800	277.2
300	323.9	20.7	762	609	366	38		126.0
14	14.000	300	40	29⅞/16	18⅞	1½	4600	418.0
350	355.6	20.7	1016	760	480	38		190.0
16	16.000	300	42	30⅞/16	19	1½	5800	495.0
400	406.4	20.7	1067	777	483	38		225.0

## FIG. 7250

SUCTION DIFFUSER



2 1/2" x 2 1/2" thru 10" x 8"



10" x 10" thru 16" x 14"

### FIGURE 7250 - SUCTION DIFFUSER

Nominal Size	O.D.	System Side (Grooved)	Pump Side (Flanged)	C-E	C-O	OAL	OAH	OAW	CLR	T-O	Orifice Cylinder Open Area	Max. Working Pressure	Approx. Wt. Each
In./DN(mm)	In./mm	In./DN(mm)	In./DN(mm)	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In. Sq./cm. Sq.	PSI/bar	Lbs./Kg
2 1/2 x 2 1/2 65 x 65	2.875 x 2.875 73.0 x 73.0	2 1/2 65	2 1/2 65	5 127	8 1/4 210	13 1/2 343	9 229	9 1/2 241	12 1/2 318	2 3/16 56	47.0 303	300 20.7	36 16.3
3 x 2 80 x 65	3.500 x 2.375 88.9 x 60.3	3 80	2 50	5 127	8 203	14 356	9 229	8 3/8 213	13 1/2 343	2 3/16 56	47.0 303	300 20.7	36 16.3
3 x 2 1/2 80 x 65	3.500 x 2.875 88.9 x 73.0	3 80	2 1/2 65	5 127	8 1/4 210	13 1/2 343	9 229	9 1/2 241	12 1/2 318	2 3/16 56	47.0 303	300 20.7	36 16.3
3 x 3 80 x 80	3.500 x 3.500 88.9 x 88.9	3 80	3 80	5 127	8 1/4 210	13 1/2 343	9 229	9 1/2 241	12 1/2 318	2 3/16 56	51.0 329	300 20.7	37 16.8
4 x 2 1/2 100 x 65	4.500 x 2.875 114.3 x 2.875	4 100	2 1/2 65	5 127	8 1/4 210	13 1/2 343	9 229	9 1/2 241	12 1/2 318	2 3/16 56	51.0 329	300 20.7	38 17.2
4 x 3 100 x 80	4.500 x 3.500 114.3 x 88.9	4 100	3 80	5 127	8 1/4 210	13 1/2 343	9 229	10 254	12 1/2 318	2 3/16 56	51.0 329	300 20.7	38 17.2
4 x 4 100 x 100	4.500 x 4.500 114.3 x 114.3	4 100	4 100	6 1/2 165	10 1/2 267	17 1/2 445	11 3/4 298	11 1/2 292	16 1/2 419	3 1/4 83	95.0 613	300 20.7	72 32.7

FIG. 7250 (CONT'D.)

SUCTION DIFFUSER

FIGURE 7250 - SUCTION DIFFUSER

Nominal Size	O.D.	System Side (Grooved)	Pump Side (Flanged)	C-E	C-O	OAL	OAH	OAW	CLR	T-O	Orifice Cylinder Open Area	Max. Working Pressure	Approx. Wt. Each
In./DN(mm)	In./mm	In./DN(mm)	In./DN(mm)	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In. Sq./cm. Sq.	PSI/bar	Lbs./Kg
5 x 4 125 x 100	5.563 x 4.500 141.3 x 114.3	5 125	4 100	6½ 165	10½ 267	17½ 445	11¾ 298	11½ 292	16½ 419	3¼ 83	95.0 613	300 20.7	74 33.6
5 x 5 125 x 125	5.563 x 5.563 141.3 x 141.3	5 125	5 125	6½ 165	10½ 267	17½ 445	11¾ 298	12½ 318	16½ 419	3¼ 83	124.0 800	300 20.7	75 34.0
6 x 3 150 x 80	6.625 x 3.500 168.3 x 88.9	6 150	3 80	6½ 165	10½ 267	18 457	11¾ 298	10½ 268	17½ 445	3¼ 83	94.0 607	300 20.7	72 34.0
6 x 4 150 x 100	6.625 x 4.500 168.3 x 114.3	6 150	4 100	6½ 165	10½ 267	17½ 445	11¾ 298	11½ 292	16½ 419	3¼ 83	95.0 613	300 20.7	72 32.7
6 x 5 150 x 125	6.625 x 5.563 168.3 x 141.3	6 150	5 125	6½ 165	10½ 267	17½ 445	11¾ 298	12½ 318	16½ 419	3¼ 83	124.0 800	300 20.7	74 33.6
6 x 6 150 x 150	6.625 x 6.625 168.3 x 168.3	6 150	6 150	7¾ 197	13¼ 337	21½ 546	14¾ 375	13½ 343	20½ 521	4⅞ 124	182.0 1,174	300 20.7	133 60.3
8 x 5* 200 x 125	8.625 x 5.563 219.1 x 141.3	8 200	5 125	7¾ 197	13¼ 337	21½ 546	10 <sup>15/16</sup> 278	10 254	19½ 495	4⅞ 124	182.0 1,174	300 20.7	118 53.5
8 x 6 200 x 150	8.625 x 6.625 219.1 x 168.3	8 200	6 150	7¾ 197	13¼ 337	21½ 546	14¾ 375	13½ 343	20½ 521	4⅞ 124	182.0 1,174	300 20.7	118 53.5
8 x 8 200 x 200	8.625 x 8.625 219.1 x 219.1	8 200	8 200	9 229	15¼ 387	24½ 622	17½ 445	19 483	23½ 597	5⅞ 149	283.5 1,829	300 20.7	190 86.2
10 x 8 250 x 200	10.750 x 8.625 273.1 x 219.1	10 250	8 200	9 229	15¼ 387	24½ 622	17½ 445	19 483	23½ 597	5⅞ 149	283.5 1,829	300 20.7	203 92.1
10 x 10* 250 x 250	10.750 x 10.750 273.1 x 273.1	10 250	10 250	10 254	17¼ 438	28 711	19⅞ 498	22 559	26 660	7⅞ 187	397.0 2,561	300 20.7	192 87.1

## FIG. 7250 (CONT'D.)

SUCTION DIFFUSER

### FIGURE 7250 - SUCTION DIFFUSER

Nominal Size	O.D.	System Side (Grooved)	Pump Side (Flanged)	C-E	C-O	OAL	OAH	OAW	CLR	T-O	Orifice Cylinder Open Area	Max. Working Pressure	Approx. Wt. Each
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./DN(mm)</i>	<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In. Sq./cm. Sq.</i>	<i>PSI/bar</i>	<i>Lbs./Kg</i>
12 x 10*	12.750 x 10.750	12	10	10	17¼	28	19⅝	22	26	7¾	397.0	300	196
300 x 250	323.9 x 273.1	300	250	254	438	711	498	559	660	187	2.561	20.7	88.9
12 x 12*	12.750 x 12.750	12	12	11	24¼	36	20½	24	34	8	571.0	300	382
300 x 300	323.9 x 323.9	300	300	279	616	914	521	610	864	203	3.684	20.7	173.3
14 x 10*	14.000 x 10.750	14	10	11	24¼	36	20½	24	34	8	571.0	300	382
350 x 250	355.6 x 273.1	350	250	279	616	914	521	610	864	203	3.684	20.7	173.3
14 x 12*	14.000 x 12.750	14	12	11	24¼	36	20½	24	34	8	571.0	300	382
350 x 300	355.6 x 323.9	350	300	279	616	914	521	610	864	203	3.684	20.7	173.3
14 x 14*	14.000 x 14.000	14	14	12	26¼	39	23	26¼	37	9	993.0	300	467
350 x 350	355.6 x 355.6	350	350	305	667	991	584	667	940	229	6.406	20.7	211.8
16 x 14*	16.000 x 14.000	16	14	12	26¼	39	23	26¼	37	9	993.0	300	467
400 x 350	406.4 x 355.6	400	350	305	667	991	584	667	940	229	6.406	20.7	211.8

\* Fabricated

Other sizes available on special request. Contact Gruvlok Rep. for ordering information.

Dimensions may vary Contact Gruvlok Rep. for certified values.

Not for use in copper systems.

Product must be supported by pipe supports (supports not included).

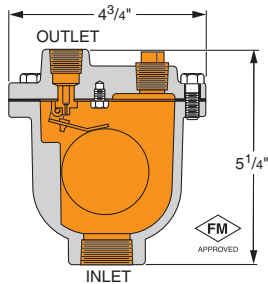
#### NOTES:

1. "CLR" Dimension indicates clearance needed for diffuser basket removal.
2. Drain Holes: (End Cap)—¾" NPT for sizes 2½ x 2½ thru 6 x 5, -1" NPT for sizes 6 x 6 thru 16 x 14.
3. Pipe Support - Use 1¼" SCH. 40 Pipe for 2½" thru 10" pipe & 2" SCH. 40 Pipe for 12" & larger diffusers.
4. "Orifice Cylinder Open Area" is the total area of the opening in the diffuser basket after the pre-filter screen has been removed.



**MODELS GAV-15**

AUTOMATIC AIR VENTS FOR ULTIMATE PERFORMANCE



MODEL GAV-15 - AUTOMATIC AIR VENT					
Valve Size	Maximum Temp.	Inlet Size NPT	Outlet Size NPT	Orifice Size	Approx. Wt. Ea.
In./DN(mm)	°F/°C	In./DN(mm)	In./DN(mm)	In./DN(mm)	Lbs/Kg
1/2	250	1/2	1/2	1/16	5 1/2
15	120	15	15	2	3
3/4	250	3/4	1/2	1/16	5 1/2
20	120	20	15	2	3
1	250	1	1/2	1/16	5 1/2
25	120	25	15	2	3

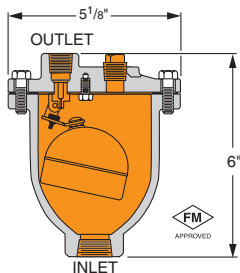
MODEL GAV-15 - AUTOMATIC AIR VENT									
Type	Max. Water Pressure	Max. Temp.	Inlet Size	Outlet Size NPT	Valve Orifice	Overall			Approx. Wt. Ea.
						Height	Width	Length	
	psi/bar	°F/°C	In./DN(mm)	In./DN(mm)	In./mm	In./mm	In./mm	In./mm	Lbs/Kg
GAV-15	150	250	1/2, 3/4 & 1	3/8	1/16	5 1/4	4 3/4	4 3/4	5 1/2
	10	120	15, 20 & 25	10	2	130	100	100	2.5

GRUVLOK®

## Valves & Accessories

### MODELS GAV-30

AUTOMATIC AIR VENTS FOR ULTIMATE PERFORMANCE

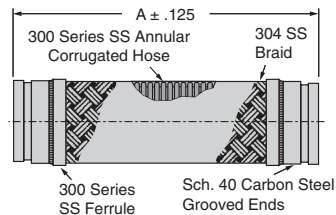


MODEL GAV-30 - AUTOMATIC AIR VENT					
Valve Size	Maximum Temp.	Inlet Size NPT	Outlet Size NPT	Orifice Size	Approx. Wt. Ea.
In./DN(mm)	°F/°C	In./DN(mm)	In./DN(mm)	In./DN(mm)	Lbs/Kg
1/2	250	1/2	1/2	1/16	8
15	120	15	15	2	3
3/4	250	3/4	1/2	1/16	8
20	120	20	15	2	3

MODEL GAV-30 - AUTOMATIC AIR VENT									
Type	Max. Water Pressure	Max. Temp.	Inlet Size	Outlet Size NPT	Valve Orifice	Overall			Approx. Wt. Ea
						Height	Width	Length	
	psi/bar	°F/°C	In./DN(mm)	In./DN(mm)	In./mm	In./mm	In./mm	In./mm	Lbs/Kg
GAV-30	300	250	1/2, 3/4 & 1	1/2	1/16	6	5 1/8	5 1/8	7 1/2
	20.7	120	15, 20 & 25	15	2	150	125	125	3.4

FIG. AF21-GG

GROOVED ENDS FLEX CONNECTOR



See Installation & Assembly directions on pages 190-191.

ANVIL PIPE FITTERS HANDBOOK

AF21-GG - GRxGR FLEX CONNECTORS

Nominal Size	O.D.	Model or 10 dig. #	A	Pressure 70°F	Parallel Offset *		Approx. Wt. Ea.
					Permanent	Intermittent	
In./DN(mm)	In./mm		In./mm	psi/bar	In./mm	In./mm	Lbs./kN
2 50	2.375 60.3	AF0390232007	12 304.8	450 31.0	1¼ 31.8	¾ 9.5	2.5 1.1
2½ 65	2.875 73.0	AF0390232106	12 304.8	300 20.7	1¼ 31.8	¾ 9.5	3.5 1.6
3 80	3.500 88.9	AF0390232031	12 304.8	275 19.0	¾ 19.1	¼ 6.4	4.5 2.0
4 100	4.500 114.3	AF0390232114	14 355.6	270 18.6	½ 12.7	¼ 6.4	8.0 3.6
5 125	5.563 141.3	AF0390232122	16 406.4	225 15.5	⅞ 22.2	¾ 9.5	12.0 5.4
6 150	6.625 168.3	AF0390232130	16 406.4	165 11.4	⅝ 15.9	¼ 6.4	14.0 6.4
8 200	8.625 219.1	AF0390232148	16 406.4	155 10.7	½ 12.7	¼ 6.4	20.0 9.1
10 250	10.750 273.1	AF0390232155	20 508.0	150 10.3	⅝ 15.9	¼ 6.4	38.0 17.2
12 300	12.750 323.9	AF0390232163	20 508.0	145 10.0	½ 12.7	¼ 6.4	46.0 20.9

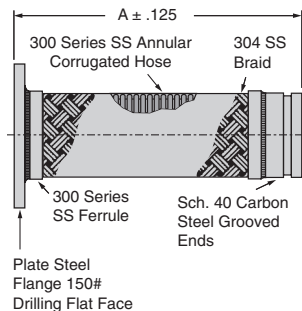
\* See Motion Classification to the left for additional information.

For Gruvlok Technical Detail Refer to the Gruvlok Catalog or contact your local sales representative.

## Valves & Accessories

### FIG. AF21-GF

CLASS 150 FLANGED X GROOVED FLEX CONNECTOR



#### AF21-GF - GRxFL FLEX CONNECTORS

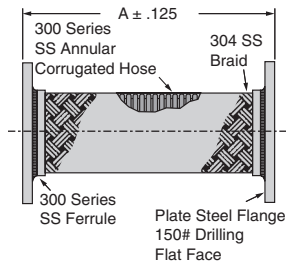
Nominal Size	O.D.	Model or 10 dig. #	A	Pressure 70°F	Parallel Offset		Approx. Wt. Ea.
					Permanent	Intermittent	
In./DN(mm)	In./mm		In./mm	psi/bar	In./mm	In./mm	Lbs./kN
2	2.375	AF0390232197	12	450	1 <sup>7</sup> / <sub>8</sub>	5 <sup>5</sup> / <sub>8</sub>	7.2
50	60.3		304.8	31.0	47.6	15.9	3.3
2½	2.875	AF0390232213	12	300	1 <sup>5</sup> / <sub>8</sub>	5 <sup>5</sup> / <sub>8</sub>	8.5
65	73.0		304.8	20.7	41.3	15.9	3.9
3	3.500	AF0390232171	12	275	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	10.4
80	88.9		304.8	19.0	28.6	12.7	4.7
4	4.500	AF0390232189	12	270	5 <sup>5</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	14.0
100	114.3		304.8	18.6	15.9	6.4	6.4
5	5.563	AF0390232247	14	225	7 <sup>7</sup> / <sub>8</sub>	3 <sup>3</sup> / <sub>8</sub>	18.4
125	141.3		355.6	15.5	22.2	9.5	8.3
6	6.625	AF0390232254	14	165	3 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>8</sub>	23.7
150	168.3		355.6	11.4	19.1	9.5	10.8
8	8.625	AF0390232262	15	155	5 <sup>5</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	39.6
200	219.1		381.0	10.7	15.9	6.4	18.0
10	10.750	AF0390232270	16	150	5 <sup>5</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	40
250	273.1		406.4	10.3	15.9	6.4	18.1
12	12.750	AF0390232288	17	145	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>	50
300	323.9		431.8	10.0	12.7	6.4	22.7

See Installation & Assembly directions on pages 190-191.

\* See Motion Classification on previous page for additional information.

FIG. AF21-FF

CLASS 150 FLANGED X CLASS 150  
FLANGED FLEX CONNECTOR



See Installation & Assembly directions on pages 190-191.

Anvil also provides AnvilFlex™ Increases contact your Gruvlok Rep. for additional information

AF21-FF - FLxFL FLEX CONNECTORS

Nominal Size	O.D.	Model or 10 dig. #	A	Pressure 70°F	Parallel Offset		Approx. Wt. Ea.
					Permanent	Intermittent	
In./DN(mm)	In./mm		In./mm	psi/bar	In./mm	In./mm	Lbs./kN
2 50	2.375 60.3	AF0390232387	9 228.6	450 31.0	1½ 28.6	¾ 9.5	10.0 4.5
2½ 65	2.875 73.0	AF0390232395	9 228.6	300 20.7	1 25.4	¾ 9.5	12.0 5.4
3 80	3.500 88.9	AF0390232403	9 228.6	275 19.0	⅝ 15.9	¼ 6.4	14.0 6.4
4 100	4.500 114.3	AF0390232429	9 228.6	270 18.6	½ 12.7	¼ 6.4	19.0 8.6
5 125	5.563 141.3	AF0390232437	11 279.4	225 15.5	¾ 19.1	¾ 9.5	25.0 11.3
6 150	6.625 168.3	AF0390232445	11 279.4	165 11.4	⅝ 15.9	¼ 6.4	30.0 13.6
8 200	8.625 219.1	AF0390232452	12 304.8	155 10.7	½ 12.7	¼ 6.4	54.0 24.5
10 250	10.750 273.1	AF0390232460	13 330.2	150 10.3	½ 12.7	¼ 6.4	75.0 34.0
12 300	12.750 323.9	AF0390232478	14 355.6	145 10.0	½ 12.7	¼ 6.4	105.0 47.6

\* See Motion Classification on previous page for additional information.

# High Pressure System

**FIG. 7004 HPR®**

COUPLING

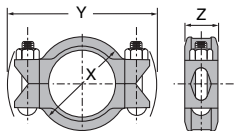


Fig. 7004 HPR®  
with standard gasket.

**FIGURE 7004 - HPR COUPLING**

Nom. Size	O.D.	Max. Wk. Pressure	Max. End Load	Range of Pipe End Separation	Coupling Dimensions			Coupling Bolts		Approx. Wt. Ea.
					X	Y	Z	Qty.	Size	
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>PSI/bar</i>	<i>Lbs./kN</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>		<i>In./mm</i>	<i>Lbs./Kg</i>
2	2.375	1200	5,316	0 - 1/8	3 3/8	6 1/4	1 1/8	2	5/8 x 2 3/4	3.9
50	60.3	82.8	23.65	0 - 3.2	92	159	48		-	1.8
2 1/2	2.875	1200	7,790	0 - 1/8	4 1/4	6 3/8	1 1/8	2	5/8 x 3 1/2	4.6
65	73.0	82.8	34.65	0 - 3.2	108	175	48		M16 x 85	2.1
3	3.500	1200	11,545	0 - 1/8	4 3/8	7 1/2	1 1/8	2	5/8 x 3 1/2	5.2
80	88.9	82.8	51.36	0 - 3.2	124	191	48		M16 x 85	2.4
4	4.500	1200	19,085	0 - 1/4	6 1/4	9 1/2	2 1/4	2	3/4 x 4 1/2	8.6
100	114.3	82.8	84.90	0 - 6.4	159	241	57		M20 x 110	3.9
5	5.563	1200	29,167	0 - 1/4	7 1/2	11	2 1/4	2	1/2 x 5 1/2	14.0
125	141.3	82.8	129.74	0 - 6.4	191	279	57		M22 x 150	6.4
6	6.625	1200	41,366	0 - 1/4	8 3/4	12 1/8	2 1/4	2	1/2 x 5 1/2	15.5
150	168.3	82.8	184.00	0 - 6.4	222	308	57		M22 x 150	7.0
8	8.625	1000	58,426	0 - 1/4	11 1/8	14 3/8	2 3/8	2	1 x 5 1/2	25.6
200	219.1	68.9	259.89	0 - 6.4	283	378	67		-	11.6
10	10.750	800	72,610	0 - 1/4	13 1/2	17	2 3/8	2	1 x 6 1/2	32.3
250	273.1	55.2	322.99	0 - 6.4	343	432	67		-	14.7
12	12.750	800	102,141	0 - 1/4	15 1/8	19 1/4	2 3/8	2	1 x 6 1/2	43.9
300	323.9	55.2	454.35	0 - 6.4	403	489	67		-	19.9

For additional details, see coupling data chart notes on page 262.

Not for use in copper systems.

## FIG. 7004 EG®

END GUARD® COUPLING

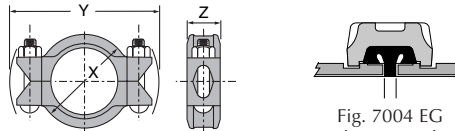


Fig. 7004 EG  
with "EG" gasket.

### FIGURE 7004 - END GUARD (EG) COUPLING

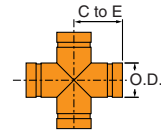
Nominal Size	O.D.	Max. Wk. Pressure	Max. End Load	Range of Pipe End Separation	Coupling Dimensions			Coupling Bolts		Approx. Wt. Ea.
					X	Y	Z	Qty.	Size	
In./DN(mm)	In./mm	PSI/bar	Lbs./kN	In./mm	In./mm	In./mm	In./mm		In./mm	Lbs./Kg
2	2.375	2500	11,075	0 - 1/8	3 5/8	6 1/4	1 1/8	2	5/8 x 2 3/4	4.1
50	60.3	172.4	49.27	0 - 3.2	92	159	48		-	1.9
2 1/2	2.875	2500	16,230	0 - 1/8	4 1/4	6 5/8	1 1/8	2	5/8 x 3 1/2	5.1
65	73.0	172.4	72.19	0 - 3.2	108	175	48		M16 x 85	2.3
3	3.500	2500	24,053	0 - 1/8	4 7/8	7 1/2	1 1/8	2	5/8 x 3 1/2	5.5
80	88.9	172.4	106.99	0 - 3.2	124	191	48		M16 x 85	2.5
4	4.500	2500	39,761	0 - 1/4	6 1/4	9 1/2	2 1/4	2	3/4 x 4 1/2	9.0
100	114.3	172.4	176.86	0 - 6.4	159	241	57		M16 x 85	4.1
6	6.625	2000	68,943	0 - 1/4	8 3/4	12 1/8	2 1/4	2	1/2 x 5 1/2	15.5
150	168.3	137.9	306.67	0 - 6.4	222	308	57		M22 x 150	7.0
8	8.625	1500	87,639	0 - 1/4	11 1/8	14 7/8	2 3/8	2	1 x 5 1/2	25.6
200	219.1	103.4	389.84	0 - 6.4	283	378	67		-	11.6
10	10.750	1250	113,453	0 - 1/4	13 1/2	17	2 3/8	2	1 x 6 1/2	32.3
250	273.1	86.2	504.66	0 - 6.4	343	432	67		-	14.7
12	12.750	1250	159,595	0 - 1/4	15 1/8	19 1/4	2 3/8	2	1 x 6 1/2	43.9
300	323.9	86.2	709.92	0 - 6.4	403	489	67		-	19.9

For additional details, see coupling data chart notes on page 262.

Not for use in copper systems.

## FIG. 7068 EG

HIGH PRESSURE CROSS



### Fig. 7068 EG

HIGH PRESSURE CROSS

Nom. Size	O.D.	Center To-End	Approx. Wt. Ea.
2	2.375	3 1/4	3.9
50	60.3	83	1.8
2 1/2	2.875	3 3/4	6.8
65	73.0	95	3.1
3	3.500	4 1/4	11.5
80	88.9	108	5.2
4	4.500	5	19.3
100	114.3	127	8.8
6	6.625	6 1/2	46.0
150	168.3	165	20.9

# High Pressure System

**FIG. 7050 EG**

HIGH PRESSURE 90° LR ELBOW

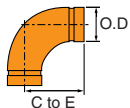


FIGURE 7050 EG, HIGH PRESSURE 90° LR ELBOW			
Nom. Size	O.D.	Center To-End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	3¼	2.5
50	60.3	83	1.1
2½	2.875	3¾	4.2
65	73.0	95	1.9
3	3.500	4¼	6.0
80	88.9	108	2.7
4	4.500	5	11.0
100	114.3	127	5.0
6	6.625	6½	27.2
150	168.3	165	12.4
8	8.625	*	*
200	219.1	*	*
10	10.750	*	*
250	273.0	*	*
12	12.750	*	*
300	323.9	*	*

\*Contact a Gruvlok Representative for more information.

**FIG. 7051 EG**

HIGH PRESSURE 45° LR ELBOW



FIGURE 7051 EG, HIGH PRESSURE 45° LR ELBOW			
Nom. Size	O.D.	Center To-End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	2	1.8
50	60.3	51	0.8
2½	2.875	2¼	2.9
65	73.0	57	1.3
3	3.500	2½	4.3
80	88.9	64	2.0
4	4.500	3	7.5
100	114.3	76	3.4
6	6.625	3½	16.5
150	168.3	89	7.5

**FIG. 7022 EG**

HIGH PRESSURE HEADER TEE

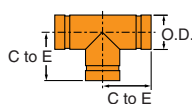


FIG. 7022 EG HIGH PRESSURE HEADER TEE			
Nom. Size	O.D.	Center To-End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	6½	4.9
50	60.3	165	2.2
2	2.375	5	3.6
50	60.3	127	1.6

**FIG. 7060 EG**

HIGH PRESSURE TEE

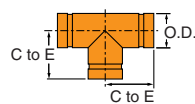


FIGURE 7060 EG HIGH PRESSURE TEE			
Nom. Size	OD	Center To-End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	3¼	3.3
50	60.3	83	1.5
2½	2.875	3¾	5.1
65	73.0	95	2.3
3	3.500	4¼	9.3
80	88.9	108	4.2
4	4.500	5	15.9
100	114.3	127	7.2
6	6.625	6½	38.5
150	168.3	165	17.5



FIG. 7400

RIGIDLITE® COUPLING

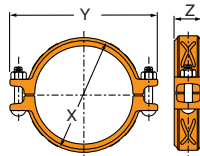


FIGURE 7400 - RIGIDLITE COUPLING

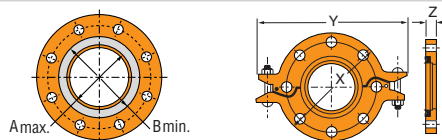
Nominal Size	O.D.	Range of Pipe End Separation	Coupling Dimensions			Coupling Bolts.		Specified Torque §		Approx Wt. Ea.
			X	Y	Z	Qty.	Size	Min.	Max.	
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>		<i>In./mm</i>	<i>Ft. -Lbs./N-M</i>	<i>Lbs./Kg</i>	
2	2.375	0 - 1/8	3 1/4	5 1/2	1 3/4	2	3/8 x 2 1/4	30	45	1.6
50	60.3	0 - 3.2	83	140	44		M10 x 57	40	60	0.7
2 1/2	2.875	0 - 1/8	3 1/8	5	1 3/4	2	3/8 x 2 1/4	30	45	1.9
65	73.0	0 - 3.2	98	127	44		M10 x 57	40	60	0.9
3	3.500	0 - 1/8	4 1/2	6 3/4	1 3/4	2	3/8 x 2 3/4	30	45	2.1
80	88.9	0 - 3.2	114	171	44		M10 x 70	40	60	1.0
4	4.500	0 - 1/4	5 3/8	7 3/4	1 1/8	2	3/8 x 2 3/4	30	45	3.1
100	114.3	0 - 6.4	143	197	48		M10 x 70	40	60	1.4
5	5.563	0 - 1/4	6 1/8	9 1/4	2	2	1/2 x 3	80	100	4.6
125	141.3	0 - 6.4	175	235	51		M12 x 76	110	150	2.1
6	6.625	0 - 1/4	7 1/8	10 3/8	2	2	1/2 x 3	80	100	5.5
150	168.3	0 - 6.4	200	264	51		M12 x 76	110	150	2.5
8	8.625	0 - 1/8	10 1/4	12 3/4	2 3/8	2	1/2 x 3	80	100	8.4
200	219.1	0 - 3.2	260	324	60		M12 x 76	110	150	3.8

§ - For additional Bolt Torque information on page 200.  
 see "Coupling Data Chart Notes" on page 262.  
 See Installation & Assembly directions on pages 156-157.

## Advanced Copper Method

FIG. 7012 (NOTES CONTINUED ON NEXT PAGE)

GRUVLOK FLANGES FOR GRUVLOK ADVANCED COPPER METHOD



GRUVLOK FIGURE 7012 - FLANGE: ANSI CLASS 150 OR ISO PN10 OR PN16 BOLT PATTERNS

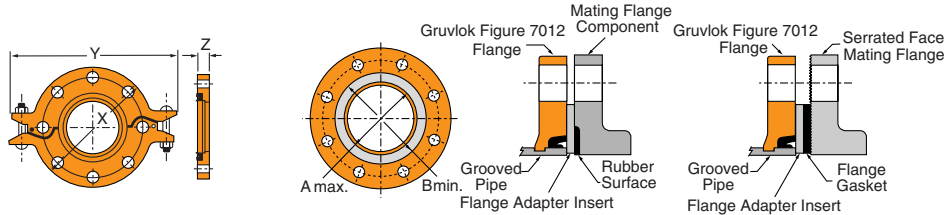
Nom. Size	O.D.	Max. Working Pressure▼	Max. End Load▼	Latch Bolt		Range Dimensions			Sealing Surface		Mating Flange Bolts				Approx. Wt. Ea.	
				Latch* Bolt Size	Specified Torque §		X	Y	Z	A Max.	B Min.	Mating Flange Bolts		Specified Torque §		
					Min.	Max.						Qty. ANSI	Size (ANSI)	Min.		Max.
In./DN(mm)	In./mm	PSI/bar	Lbs./kN	In./mm	Ft.-Lbs/N-M	In./mm	In./mm	In./mm	In./mm	In./mm	PN10 (16)	In. (ISO) mm	Ft.-Lbs/N-M	Lbs./Kg		
2	2.375	300	1,329	3/8 x 2 3/4	30	45	6 1/4	8 3/8	3/4	2 3/8	3/16	4	5/8 x 2 3/4	110	140	4.2
50	60.3	20.7	5.91	M10 x 70	40	60	159	213	19	60	87	4	M16 x 70	149	190	1.9
2 1/2	2.875	300	1,948	3/8 x 2 3/4	30	45	7	9 1/2	3/4	2 7/8	4	4	5/8 x 2 3/4	110	140	4.6
65	73.0	20.7	8.66	M10 x 70	40	60	178	241	19	73	102	-	M16 x 70-	149	190	2.1
3	3.500	300	2,886	3/8 x 2 3/4	30	45	7 7/8	10 1/2	3/4	3 1/2	4 9/16	4	5/8 x 2 3/4	110	140	6.0
80	88.9	20.7	12.84	M10 x 70	40	60	200	267	19	89	116	8	M16 x 70	149	190	2.7
4	4.500	300	4,771	3/8 x 2 3/4	30	45	9	11 1/2	3/4	4 1/2	5 9/16	8	5/8 x 2 3/4	110	140	6.3
100	114.3	20.7	21.22	M10 x 70	40	60	229	292	19	114	141	8	M16 x 70	149	190	2.9
5	5.563	300	7,292	3/8 x 2 3/4	30	45	10	12 1/2	7/8	5 9/16	6 3/4	8	3/4 x 2 7/8	220	250	8.8
125	141.3	20.7	32.44	M10 x 70	40	60	254	318	22	141	171	-	-	298	339	4.0
6	6.625	300	10,341	3/8 x 2 3/4	30	45	11	14	7/8	6 5/8	7 13/16	8	3/4 x 3 1/8	220	250	9.6
150	168.3	20.7	46.00	M10 x 70	40	60	279	356	22	168	198	8	M20 x 80	298	339	4.4
8	8.625	300	17,528	3/8 x 2 3/4	30	45	13 1/2	16 1/2	1	8 5/8	10	8	3/4 x 3 1/4	220	250	15.6
200	219.1	20.7	77.97	M10 x 70	40	60	343	419	25	219	254	8 (12)	M20 x 80	298	339	7.1

For Gruklok Technical Detail Refer to the Gruklok Catalog or contact your local sales representative.

www.anvilintl.com

**FIG. 7012** (NOTES CONTINUED FROM PREVIOUS PAGE)

GRUVLOK FLANGES FOR GRUVLOK ADVANCED COPPER METHOD



+ PN 16 uses M24 x 90 (PN) Dimensions for bolt circle PN 10 & 16 Flange

\* Available in ANSI or metric bolt sizes only as indicated.

▼ Based on use with standard wall pipe.

§ – For additional Bolt Torque information see page 200.

See “Coupling Data Chart Notes” on page 262.

See Installation & Assembly directions on pages 162-165.

The Gruvlok Flange bolt hole pattern conforms to ANSI Class 150 and Class 125 flanges.

Effective sealing area of mating flange must be free from gouges, undulations or deformities of any type to ensure proper sealing of the gasket.

To avoid interference issues, flanges cannot be assembled directly to Series 7700 butterfly valve. Flange can be assembled to one side of series 7500 and 7600 valve only.

Gruvlok Flange adapter insert required when mating to rubber surfaces or serrated faced mating flanges.

Mating flange bolts must be at least Intermediate Strength Bolting per ASME B16.5. Bolts with material properties equal or greater than SAE J429 Grade 5 are acceptable.

Refer to Gruvlok Products Catalog or Anvil's web site for more information on installing this flange

## Advanced Copper Method

### FIG. 7550

90° ELBOW

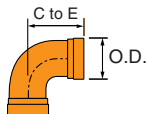


FIGURE 7550 - 90° ELBOW			
Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	3¼	0.9
50	60.3	83	0.4
2½	2.875	3¾	1.5
65	73.0	95	0.7
3	3.500	4¼	2.4
80	88.9	108	1.1
4	4.500	5	5.5
100	114.3	127	2.5
5	5.563	5½	9.3
125	141.3	140	4.2
6	6.625	6½	17.6
150	168.3	165	8.0
8	8.625	12	29.4
200	219.1	305	13.3

8" fittings are copper coated stainless steel.

### FIG. 7551

45° ELBOW

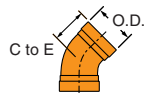


FIGURE 7551 - 45° ELBOW			
Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	2½	0.6
50	60.3	54	0.3
2½	2.875	2¾	1.1
65	73.0	60	0.5
3	3.500	2¾	1.6
80	88.9	67	0.7
4	4.500	3¾	3.5
100	114.3	86	1.6
5	5.563	3¼	6.1
125	141.3	83	2.8
6	6.625	3½	11.7
150	168.3	89	5.3
8	8.625	7½	19.4
200	219.1	191	8.8

8" fittings are copper coated stainless steel.

### FIG. 7560

TEES

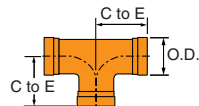
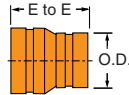


FIGURE 7560 - TEES			
Nom. Size	O.D.	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	3¼	1.7
50	60.3	83	0.8
2½	2.875	3¾	2.5
65	73.0	95	1.1
3	3.500	4¼	3.5
80	88.9	108	1.6
4	4.500	5	7.3
100	114.3	127	3.3
5	5.563	5½	7.9
125	141.3	140	3.6
6	6.625	6½	13.4
150	168.3	165	6.1
8	8.625	7¾	41.7
200	219.1	197	18.9

8" fittings are copper coated stainless steel.

## FIG. 7572

(GR X GR) CONCENTRIC REDUCER



### FIGURE 7572 - (GR X GR) CONCENTRIC REDUCER

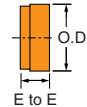
Nom. Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
2½ x 2	¾	0.6
65 x 50	83	0.3
3 x 2	¾	1.0
80 x 50	98	0.5
3 x 2½	¾	0.9
80 x 65	92	0.4
4 x 2	5	2.2
100 x 50	127	1.0
4 x 2½	¾	2.0
100 x 65	121	0.9
4 x 3	¾	2.0
100 x 80	121	0.9

8" fittings fabricated upon request.

Contact your Gruvlok Representative for more information.  
See Fitting Size Chart on page 146 for O.D. sizes

## FIG. 7574

END CAP



### FIGURE 7574 - END CAPS

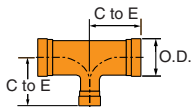
Nominal Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	¼	0.3
50	60.3	32	0.1
2½	2.875	¼	0.4
65	73.0	32	0.2
3	3.500	¼	0.6
80	88.9	32	0.3
4	4.500	¼	1.0
100	114.3	32	0.5
5	5.563	¼	2.2
125	141.3	32	1.0
6	6.625	¼	2.8
150	168.3	32	1.3
8	8.625	4	11.0
200	219.1	203	5.0

8" fittings are copper coated stainless steel.

## Advanced Copper Method

**FIG. 7561A**

(GR X GR X GR) REDUCING TEE



**FIGURE 7561A - (GR X GR X GR) REDUCING TEE**

Nominal Size	Center to End	Cup	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2½ x 2½ x 2 65 x 65 x 50	7½ 191	3¾ 95	1.8 0.8
3 x 3 x 2 80 x 80 x 50	8½ 216	4¼ 108	2.7 1.2
3 x 3 x 2½ 80 x 80 x 65	8½ 216	4¼ 108	2.1 1.0
4 x 4 x 2 100 x 100 x 50	10 254	5 127	4.8 2.2
4 x 4 x 2½ 100 x 100 x 65	10 254	5 127	4.9 2.2
4 x 4 x 3 100 x 100 x 80	10 254	5 127	5.1 2.3

Nominal Size	Center to End	Cup	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
5 x 5 x 3 125 x 125 x 80	11 279	5½ 140	7.5 3.4
5 x 5 x 4 125 x 125 x 100	11 279	5½ 140	7.8 3.5
6 x 6 x 2½ 150 x 150 x 65	13 330	6½ 165	11.5 5.2
6 x 6 x 3 150 x 150 x 80	13 330	6½ 165	11.7 5.3
6 x 6 x 4 150 x 150 x 100	13 330	6½ 165	12.1 5.5
6 x 6 x 5 150 x 150 x 125	13 330	6½ 165	12.4 5.6

Nominal Size	Center to End	Cup	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
8 x 8 x 2½ 200 x 200 x 65	15 381	7¾ 197	18 8.2
8 x 8 x 3 200 x 200 x 80	15 381	7¾ 197	18.2 8.3
8 x 8 x 4 200 x 200 x 100	15 381	7¾ 197	18.4 8.3
8 x 8 x 5 200 x 200 x 125	15 381	7¾ 197	18.8 8.5
8 x 8 x 6 200 x 200 x 150	15 381	7¾ 197	19 8.6

8" fittings are copper coated stainless steel.

See Fitting Size Chart on page 146 for O.D. sizes

For Gruvlok Technical Detail Refer to the Gruvlok Catalog or contact your local sales representative.

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## FIG. 7564A

(GR X GR X CUP) REDUCING TEE

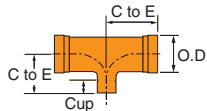


FIGURE 7564A - (GR X GR X CUP) REDUCING TEE

Nom. Size	Center to End	Cup	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2 x 2 x 3/4	6 1/2	3/4	1.0
50 x 50 x 20	165	83	0.5
2 x 2 x 1	6 1/2	3/4	1.0
50 x 50 x 25	165	83	0.5
2 x 2 x 1 1/4	6 1/2	3/4	1.1
50 x 50 x 32	165	83	0.5
2 x 2 x 1 1/2	6 1/2	3/4	1.1
50 x 50 x 40	165	83	0.5
2 1/2 x 2 1/2 x 3/4	7 1/2	3/4	1.6
65 x 65 x 80	191	95	0.7
2 1/2 x 2 1/2 x 1	7 1/2	3/4	1.7
65 x 65 x 25	191	95	0.8
2 1/2 x 2 1/2 x 1 1/4	7 1/2	3/4	1.7
65 x 65 x 32	191	95	0.8

Nom. Size	Center to End	Cup	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2 1/2 x 2 1/2 x 1 1/2	7 1/2	3/4	1.7
65 x 65 x 40	191	95	0.8
2 1/2 x 2 1/2 x 2	7 1/2	3/4	1.8
65 x 65 x 50	191	95	0.8
3 x 3 x 3/4	8 1/2	4/4	2.5
80 x 80 x 20	216	108	1.1
3 x 3 x 1	8 1/2	4/4	2.5
80 x 80 x 25	216	108	1.1
3 x 3 x 1 1/4	8 1/2	4/4	2.5
80 x 80 x 32	216	108	1.1
3 x 3 x 1 1/2	8 1/2	4/4	2.6
80 x 80 x 40	216	108	1.2
3 x 3 x 2	8 1/2	4/4	2.7
80 x 80 x 50	216	108	1.2

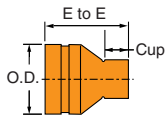
Nom. Size	Center to End	Cup	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
4 x 4 x 3/4	10	5	4.5
100 x 100 x 20	254	127	2.0
4 x 4 x 1	10	5	4.6
100 x 100 x 25	254	127	2.1
4 x 4 x 1 1/4	10	5	4.7
100 x 100 x 32	254	127	2.1
4 x 4 x 1 1/2	10	5	4.7
100 x 100 x 40	254	127	2.1
4 x 4 x 2	10	5	4.8
100 x 100 x 50	254	127	2.2

See Fitting Size Chart on page 146 for O.D. sizes

## Advanced Copper Method

### FIG. 7575

(GR X CUP) REDUCING ADAPTER

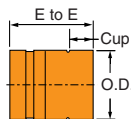


#### FIGURE 7575 - (GR X CUP) REDUCING ADAPTER

Nom. Size	End to End	Cup	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2 x 1	3	7/8	0.4
50 x 25	76	23	0.2
2 x 1 1/4	3	15/16	0.4
50 x 32	76	25	0.2
2 x 1 1/2	2 7/8	1 1/16	0.4
50 x 40	73	28	0.2
2 1/2 x 1	3 1/2	7/8	0.6
65 x 25	89	23	0.3
2 1/2 x 1 1/4	3 1/2	15/16	0.6
65 x 32	89	25	0.3
2 1/2 x 1 1/2	3 1/2	1 1/16	0.7
65 x 40	89	28	0.3
2 1/2 x 2	3 1/4	1 5/16	0.7
65 x 50	83	34	0.3
3 x 1 1/2	3 3/8	1 1/16	1.1
80 x 40	98	28	0.5
3 x 2	3 3/8	1 5/16	1.0
80 x 50	98	34	0.5
4 x 2	5	1 5/16	2.2
100 x 50	127	34	1.0

### FIG. 7582

TRANSITION FITTING



#### FIGURE 7582 - TRANSITION FITTING

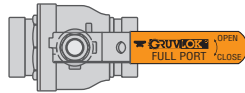
Nominal Size	O.D.	End to End	Cup	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
2	2.375	2 3/4	1 3/8	0.4
50	60.3	70	35	0.2
2 1/2	2.875	3	1 1/2	0.6
65	73.0	76	38	0.3
3	3.500	3 1/16	1 11/16	1.0
80	88.9	87	42	0.5
4	4.500	4 1/16	2 3/16	2.0
100	114.3	112	55	0.9
5	5.563	5 1/16	2 5/8	3.3
125	141.3	138	67	1.5
6	6.625	6 3/8	3 1/8	5.3
150	168.3	162	79	2.4

See Fitting Size Chart on page 146 for O.D. sizes

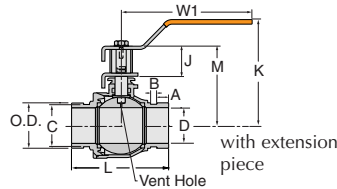


## SERIES 7500B

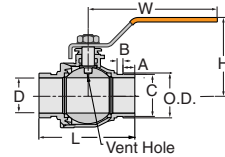
GROOVED-END BRONZE BALL VALVE - FULL PORT



FULL PORT



with extension piece



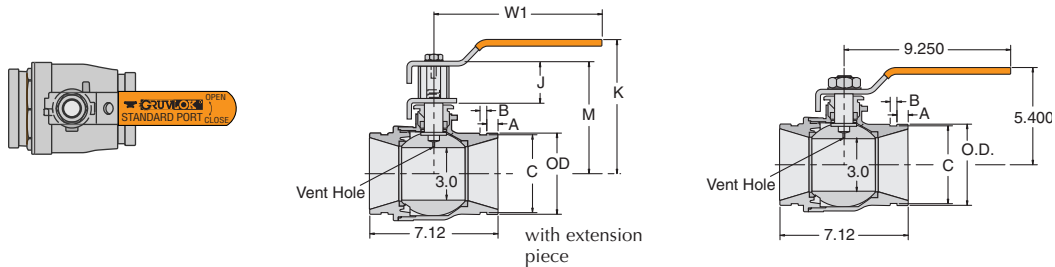
### SERIES 7500B - FULL PORT - DIMENSIONS

Nominal Size	O.D.	A	B	C	D	H	J	K	L	M	W	W1
In./DN(mm)	In./mm	In./mm										
1½ 40	1.910 48.5	5/8 16.0	5/16 7.9	1¾ 45.1	1½ 38.1	2 1/16 67.8	2¼ 57.1	4¾ 120.9	4¼ 108.0	3 5/8 91.4	5½ 129.8	6 5/16 159.8
	1.888 48.0											
2 50	2.375 60.3	5/8 16.0	5/16 7.9	2¼ 57.2	2 50.8	3 9/16 90.9	2¼ 57.1	5 1/16 144.0	5 1/16 128.5	4½ 114.6	6.29 159.8	6 5/16 159.8
	2.365 60.1											
2½ 65	2.876 73.1	5/8 16.0	5/16 7.9	2 1/16 69.1	2½ 63.5	4 15/16 126.0	2¼ 57.1	7 1/16 179.1	6 1/8 155.4	5¾ 146.6	9¼ 235.0	9¼ 235.0
	2.870 72.9											
3 80	3.500 88.9	5/8 16.0	5/16 7.9	3 5/16 84.9	3 76.2	5 7/16 137.2	2¼ 57.1	7½ 190.5	6 5/8 168.1	6¼ 159.5	9¼ 235.0	9¼ 235.0
	3.490 88.6											

# Advanced Copper Method

## SERIES 7500B

GROOVED-END BRONZE BALL VALVE - STANDARD PORT 4"



SERIES 7500B - STANDARD PORT 4" - DIMENSIONS

Nominal Size	O.D.	A	B	C	J	K	L	M	W1
In./DN(mm)	In./mm	In./mm							
4 100	4.545	5/8 16.0	3/8 9.5	45/16 109.5	2 1/4 57.1	7 1/2 190.5	7 1/8 180.8	6 1/4 159.5	9 1/4 235.0
	115.4								
	4.469 113.5								

## FIG. 7088, FIG. 7089 &amp; FIG. 7090

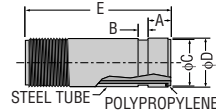
GRUVLOK DI-LOK® NIPPLE  
DI-ELECTRIC PIPE CONNECTION

FIG. 7088

GROOVE BY THREAD

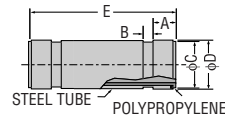


FIG. 7089

GROOVE BY GROOVE

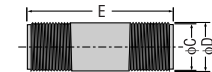


FIG. 7090

THREAD BY THREAD

FIGURE 7088, 7089 &amp; 7090 - DI-LOK® NIPPLES

Nom. IPS Pipe Size	O.D.	A +/- .030 +/- .76	B +/- .030 +/- .76	C Actual	Tolerance +0.000	D Actual	Tolerance	E +/- .090 +/- 2.29
NIPS/DN	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm
3/4	1.050	n/a	n/a	0.881	n/a	1.050	+0.005/-0.000	3.000
19	26.7			22		26.7	+13/-0.00	76
1	1.315	n/a	n/a	1.114	n/a	1.315	+0.005/-0.000	4.000
25	33.7			28		33.7	+13/-0.00	102
1 1/4	1.660	n/a	n/a	1.458	n/a	1.660	+0.006/-0.000	4.000
32	42.4			37		42.4	+15/-0.00	102
1 1/2	1.900	n/a	n/a	1.697	n/a	1.900	+0.006/-0.000	4.000
40	48.3			43		48.3	+15/-0.00	102
2	2.375	0.625	0.312	2.250	-0.015	2.375	+0.007/-0.000	4.000
50	60.3	15.88	7.92	57	-0.37	60.3	+18/-0.00	102
2 1/2	2.875	0.625	0.312	2.720	-0.018	2.875	+0.008/-0.000	6.000
65	73.0	15.88	7.92	69	-0.45	73.0	+20/-0.00	152
3	3.500	0.625	0.312	3.344	-0.018	3.500	+0.010/-0.000	6.000
80	88.9	15.88	7.92	85	-0.45	88.9	+25/-0.00	152
4	4.500	0.625	0.375	4.334	-0.020	4.500	+0.013/-0.000	6.000
100	114.3	15.88	9.53	110	-0.50	114.3	+33/-0.00	152
5	5.563	0.625	0.375	5.395	-0.022	5.563	±0.010	6.000
125	141.3	15.88	9.53	137	-0.55	141.3	±25	152
6	6.625	0.625	0.375	6.455	-0.022	6.625	±0.015	6.000
150	168.3	15.88	9.53	164	-0.55	168.3	±38	152

Figure 7088 available in Nominal Pipe Sizes 2" through 4" only.

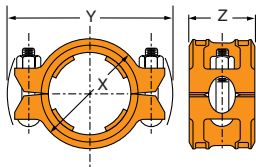
Figure 7089 available in Nominal Pipe Sizes 2" through 6" only.

Figure 7090 available in Nominal Pipe Sizes 3/4" through 2" only.

## Plain-End Fittings

**FIG. 7005**

ROUGHNECK® COUPLING



**FIGURE 7005 - ROUGHNECK® COUPLING**

Nominal Size	O.D.	Max. Wk. Pressure	Max. End Load	No. of Grippers	Coupling Dimensions			Coupling Bolts		Specified Torque §		Approx. Wt. Ea.
					X	Y	Z	Qty.	Size	Min.	Max.	
In./DN(mm)	In./mm	PSI/bar	Lbs./kN		In./mm	In./mm	In./mm		In./mm	LbFt/ N-m	LbFt/ N-m	Lbs./Kg
2 50	2.375 60.3	750 51.7	3,323 1,507	8	3 <sup>3</sup> / <sub>4</sub> 95	6 <sup>3</sup> / <sub>8</sub> 162	3 <sup>1</sup> / <sub>2</sub> 89	2	5/8 x 3/4 -	150 203	190 257	6.6 3.0
2 <sup>1</sup> / <sub>2</sub> 65	2.875 73.0	600 41.4	3,895 1,766	8	4 <sup>1</sup> / <sub>4</sub> 108	7 <sup>1</sup> / <sub>8</sub> 181	3 <sup>1</sup> / <sub>2</sub> 89	2	5/8 x 3/4 -	150 203	190 257	7.4 3.4
3 80	3.500 88.9	600 41.4	5,773 2,618	8	4 <sup>7</sup> / <sub>8</sub> 124	8 <sup>1</sup> / <sub>2</sub> 206	3 <sup>1</sup> / <sub>2</sub> 89	2	3/4 x 4 <sup>1</sup> / <sub>2</sub> -	200 271	250 339	10.5 4.8
4 100	4.500 114.3	450 31.0	7,157 3,246	8	6 <sup>3</sup> / <sub>8</sub> 162	9 <sup>3</sup> / <sub>8</sub> 238	4 <sup>1</sup> / <sub>8</sub> 105	2	3/4 x 4 <sup>1</sup> / <sub>2</sub> -	200 271	250 339	16.4 7.4
5 125	5.563 141.3	350 24.1	8,507 3,858	8	7 <sup>1</sup> / <sub>2</sub> 191	11 <sup>1</sup> / <sub>8</sub> 283	4 <sup>3</sup> / <sub>8</sub> 111	2	7/8 x 5 -	250 339	300 406	23.8 10.8
6 150	6.625 168.3	300 20.7	10,341 4,690	12	8 <sup>3</sup> / <sub>4</sub> 222	12 <sup>7</sup> / <sub>8</sub> 327	4 <sup>3</sup> / <sub>8</sub> 111	2	1 x 6 -	250 339	300 406	31.7 14.4
8 200	8.625 219.1	300 20.7	17,528 7,950	12	10 <sup>7</sup> / <sub>8</sub> 276	14 <sup>1</sup> / <sub>2</sub> 368	4 <sup>1</sup> / <sub>2</sub> 114	4	7/8 x 5 -	250 339	300 406	38.6 17.5
10 250	10.750 273.1	300 20.7	27,229 12,377	8	12 <sup>5</sup> / <sub>8</sub> 321	18 457	5 <sup>3</sup> / <sub>8</sub> 137	4	1 x 6 <sup>1</sup> / <sub>2</sub> -	500 678	600 814	40 18.1
12 300	12.750 323.9	300 20.7	31,919 14,509	12	14 <sup>7</sup> / <sub>8</sub> 378	20 <sup>1</sup> / <sub>4</sub> 514	5 <sup>3</sup> / <sub>8</sub> 137	4	1 x 6 <sup>1</sup> / <sub>2</sub> -	550 746	700 949	56 25.4
14 350	14.000 355.6	300 20.7	30,788 13,995	12	16 <sup>3</sup> / <sub>4</sub> 425	22 <sup>1</sup> / <sub>8</sub> 562	6 <sup>1</sup> / <sub>4</sub> 159	4	1 x 6 <sup>1</sup> / <sub>2</sub> -	550 746	700 949	88 39.9
16 400	16.000 406.4	300 20.7	30,159 13,709	12	18 <sup>3</sup> / <sub>4</sub> 476	24 610	6 <sup>1</sup> / <sub>4</sub> 159	4	1 x 6 <sup>1</sup> / <sub>2</sub> -	550 746	700 949	95 43.1

**NOTES:**

See Coupling data chart notes in technical data section for additional information.

§ – For additional Bolt Torque information see page 200

see “Coupling Data Chart Notes” on page 262.

Not for use in copper or PVC systems.

See Installation & Assembly directions on pages 174-175.

FIG. 7050P

90° ELBOW

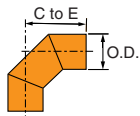


FIGURE 7050P - 90° ELBOW			
Nominal Size	O.D.	Center To End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	4 <sup>3</sup> / <sub>4</sub>	2.7
50	60.3	121	1.2
2½	2.875	5½	4.8
65	73.0	140	2.2
3	3.500	6¼	7.2
80	88.9	159	3.3
3½	4.000	7	9.4
90	101.6	178	4.3
4	4.500	7¾	12.3
100	114.3	197	5.6
5	5.563	9½	13.4
125	141.3	241	6.1
6	6.625	11	31
150	168.3	279	14.1
8	8.625	11	38.7
200	219.1	279	17.6

FIG. 7051P

45° ELBOW

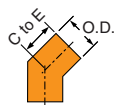


FIGURE 7051P - 45° ELBOW			
Nominal Size	O.D.	Center To End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	3½	2.0
50	60.3	79	0.9
2½	2.875	3½	3.5
65	73.0	89	1.6
3	3.500	3¾	4.8
80	88.9	95	2.2
3½	4.000	4	6.2
90	101.6	102	2.8
4	4.500	4¼	8.0
100	114.3	108	3.6
5	5.563	5½	9.2
125	141.3	130	4.2
6	6.625	5¾	18.5
150	168.3	146	8.4
8	8.625	6	24.9
200	219.1	152	11.3

FIG. 7060P

TEE

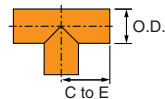
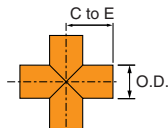


FIGURE 7060P - TEE			
Nominal Size	O.D.	Center To End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	4¼	3.5
50	60.3	108	1.6
2½	2.875	4¾	6.2
65	73.0	121	2.8
3	3.500	5½	8.6
80	88.9	130	3.9
3½	4.000	5½	11
90	101.6	140	5.0
4	4.500	5½	13.8
100	114.3	149	6.3
5	5.563	6½	21.7
125	141.3	175	9.8
6	6.625	7¾	30.9
150	168.3	194	14.0
8	8.625	10	61.1
200	219.1	254	27.7

## Plain-End Fittings

### FIG. 7068P

CROSS

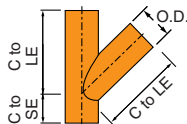


#### FIGURE 7068P - CROSS

Nominal Size	O.D.	Center To End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	4 $\frac{1}{4}$	4.4
50	60.3	108	2.0
2 $\frac{1}{2}$	2.875	4 $\frac{3}{4}$	7.8
65	73.0	121	3.5
3	3.500	5 $\frac{1}{8}$	10.7
80	88.9	130	4.9
3 $\frac{1}{2}$	4.000	5 $\frac{1}{2}$	13.7
90	101.6	140	6.2
4	4.500	5 $\frac{7}{8}$	17
100	114.3	149	7.7
5	5.563	6 $\frac{1}{8}$	26.7
125	141.3	175	12.1
6	6.625	7 $\frac{5}{8}$	37.7
150	168.3	194	17.1
8	8.625	10	74.6
200	219.1	254	33.8

### FIG. 7069P

45° LATERAL

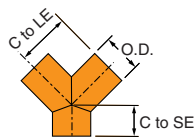


#### FIGURE 7069P - 45° LATERAL

Nominal Size	O.D.	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
2	2.375	7 $\frac{1}{4}$	2 $\frac{3}{4}$	5.1
50	60.3	184	70	2.3
2 $\frac{1}{2}$	2.875	7 $\frac{3}{4}$	3	9.5
65	73.0	197	76	4.3
3	3.500	8 $\frac{3}{4}$	3 $\frac{1}{4}$	12.8
80	88.9	222	83	5.8
3 $\frac{1}{2}$	4.000	10	3 $\frac{1}{2}$	20.0
90	101.6	254	89	9.1
4	4.500	10 $\frac{3}{4}$	3 $\frac{3}{4}$	22.2
100	114.3	273	95	10.1
5	5.563	12 $\frac{3}{4}$	4	38.0
125	141.3	324	102	17.2
6	6.625	14	4 $\frac{1}{2}$	54.0
150	168.3	356	114	24.5
8	8.625	18	6	92.0
200	219.1	457	152	41.7

### FIG. 7071P

90° TRUE WYE



#### FIGURE 7071P - 90° TRUE WYE

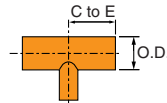
Nominal Size	O.D.	Center to Long End	Center to Short End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	In./mm	Lbs./Kg
2	2.375	4 $\frac{1}{4}$	2 $\frac{3}{4}$	3.5
50	60.3	108	70	1.6
2 $\frac{1}{2}$	2.875	4 $\frac{3}{4}$	3	6.2
65	73.0	121	76	2.8
3	3.500	5 $\frac{1}{8}$	3 $\frac{1}{4}$	8.5
80	88.9	130	83	3.9
3 $\frac{1}{2}$	4.000	5 $\frac{1}{2}$	3 $\frac{1}{2}$	10.0
90	101.6	140	89	4.5
4	4.500	5 $\frac{7}{8}$	3 $\frac{3}{4}$	14.0
100	114.3	149	95	6.4
5	5.563	6 $\frac{1}{8}$	4	21.6
125	141.3	175	102	9.8
6	6.625	7 $\frac{5}{8}$	4 $\frac{1}{2}$	31.2
150	168.3	194	114	14.2
8	8.625	10	6	53.6
200	219.1	254	152	24.3

## FIG. 7061P

REDUCING TEE

FIGURE 7061P - REDUCING TEE

Nominal Size	Center To End	Approx. Wt. Ea.	Nominal Size	Center To End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg	In./DN(mm)	In./mm	Lbs./Kg
3 x 3 x 2	5½	7.1	8 x 8 x 4	10	46.0
80 x 80 x 50	140	3.2	200 x 200 x 100	254	20.9
4 x 4 x 2	5⅞	11.3	8 x 8 x 5	10	48.0
100 x 100 x 50	149	5.1	200 x 200 x 125	2254	21.8
4 x 4 x 2½	5⅞	11.6	8 x 8 x 6	10	50.0
100 x 100 x 65	149	5.3	200 x 200 x 150	254	22.7
4 x 4 x 3	5⅞	11.9	10 x 10 x 4	11½	74.0
100 x 100 x 80	149	5.4	250 x 250 x 100	292	33.6
6 x 6 x 2	7⅞	24.6	10 x 10 x 6	11½	78.0
150 x 150 x 50	194	11.2	250 x 250 x 150	292	35.4
6 x 6 x 3	7⅞	25.4	10 x 10 x 8	11½	86.0
150 x 150 x 80	194	11.5	250 x 250 x 200	292	39.0
6 x 6 x 4	7⅞	26.2	12 x 12 x 6	13½	112.0
150 x 150 x 100	194	11.9	300 x 300 x 150	343	50.8
8 x 8 x 2	10	42.0	12 x 12 x 8	13½	118.0
200 x 200 x 50	254	19.1	300 x 300 x 200	343	53.5
8 x 8 x 3	10	44.0	12 x 12 x 10	13½	130.0
200 x 200 x 80	254	20.0	300 x 300 x 250	343	59.0

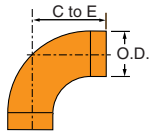


See Fitting Size Chart on page 146 for O.D. sizes

## Plain-End Fittings

### FIG. 7050LRP

90° LR ELBOW



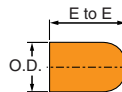
### FIG. 7051LRP

45° LR ELBOW



### FIG. 7075P

BULL PLUG



#### FIGURE 7050 LRP - 90° LR ELBOW

Nominal Size	O.D.	Center To End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	5	2.5
50	60.3	127	1.1
2½	2.875	5¾	4.9
65	73.0	146	2.2
3	3.500	6½	6.5
80	88.9	165	2.9
3½	4.000	7¼	9.8
90	101.6	184	4.4
4	4.500	8	11.5
100	114.3	203	5.2
5	5.563	9¾	21.5
125	141.3	248	9.8
6	6.625	11¼	28.5
150	168.3	286	12.9
8	8.625	15	56.7
200	219.1	381	25.7

#### FIGURE 7051 LRP - 45° LR ELBOW

Nominal Size	O.D.	Center To End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	3¾	1.8
50	60.3	86	0.8
2½	2.875	3¾	3.6
65	73.0	95	1.6
3	3.500	4	4.5
80	88.9	102	2.0
3½	4.000	4¼	6.7
90	101.6	108	3.0
4	4.500	4½	7.5
100	114.3	114	3.4
5	5.563	5¾	13.8
125	141.3	137	6.3
6	6.625	6	17.3
150	168.3	152	7.8
8	8.625	8	34.0
200	219.1	203	15.4

#### FIGURE 7075P - BULL PLUG

Nominal Size	O.D.	Center To End	Approx. Wt. Ea.
In./DN(mm)	In./mm	In./mm	Lbs./Kg
2	2.375	4	2.3
50	60.3	102	1.0
2½	2.875	5	3.0
65	73.0	127	1.4
3	3.500	6	4.5
80	88.9	152	2.0
3½	4.000	6½	5.5
90	101.6	165	2.5
4	4.500	7	7.5
100	114.3	178	3.4
5	5.563	8½	12.5
125	141.3	216	5.7
6	6.625	10	17.0
150	168.3	254	7.7
8	8.625	11	29.0
200	219.1	279	13.2



## FIG. 7084P & FIG. 7085P

FLANGE NIPPLES  
(Plain-End x Class 150 or 300)

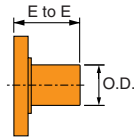


FIGURE 7084P - PLAIN-END X CLASS 150 FLANGE NIPPLES			
Nominal Size	O.D.	End To End	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
2	2.375	4	6.0
50	60.3	102	2.7
2½	2.875	4	9.2
65	73.0	102	4.2
3	3.500	4	10.4
80	88.9	102	4.7
3½	4.000	4	14.0
90	101.6	102	6.4
4	4.500	6	19.1
100	114.3	152	8.7
5	5.563	6	23.0
125	141.3	152	10.4
6	6.625	6	29.5
150	168.3	152	13.4
8	8.625	6	43.5
200	219.1	152	19.7

FIGURE 7085P - PLAIN-END X CLASS 300 FLANGE NIPPLES	
End To End	Approx. Wt. Ea.
<i>In./mm</i>	<i>Lbs./Kg</i>
4	8.2
102	3.7
4	11.9
102	5.4
4	15.5
102	7.0
4	21.0
102	9.5
6	28.0
152	12.7
6	35.0
152	15.9
6	50.0
152	22.7
6	72.0
152	32.7

## FIG. 7080P, FIG. 7081P & FIG. 7082P

ADAPTER NIPPLES

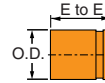


FIG. 7080P  
Plain x Grooved

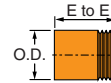


FIG. 7081P  
Plain x Thread

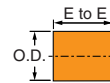


FIG. 7082P  
Plain x Bevel

FIGURE 7080P, 7081P, 7082P - ADAPTER NIPPLES			
Nominal Size	O.D.	End To End	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
2	2.375	4	1.2
50	60.3	102	0.5
2½	2.875	4	1.9
65	73.0	102	0.9
3	3.500	4	2.5
80	88.9	102	1.1
3½	4.000	4	3.1
90	101.6	102	1.4
4	4.500	6	5.5
100	114.3	152	2.5
5	5.563	6	7.4
125	141.3	152	3.4
6	6.625	6	9.5
150	168.3	152	4.3
8	8.625	6	14.2
200	219.1	152	6.4

## Plain-End Fittings

### FIG. 7077P

SWAGED NIPPLES

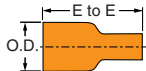


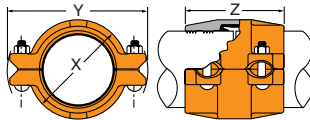
FIGURE 7077P - SWAGED NIPPLES

Nominal Size	End Center To End	Approx. Wt. Ea.	Nominal Size	End Center To End	Approx. Wt. Ea.
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>Lbs./Kg</i>	<i>In./DN(mm)</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
2½ x 2 <i>65 x 50</i>	7 <i>178</i>	3.0 <i>1.4</i>	6 x 2 <i>150 x 50</i>	12 <i>305</i>	17.0 <i>7.7</i>
3 x 2 <i>80 x 50</i>	8 <i>203</i>	4.5 <i>2.0</i>	6 x 2½ <i>150 x 65</i>	12 <i>305</i>	17.0 <i>7.7</i>
3 x 2½ <i>80 x 65</i>	8 <i>203</i>	4.5 <i>2.0</i>	6 x 3 <i>150 x 80</i>	12 <i>305</i>	17.0 <i>7.7</i>
4 x 2 <i>100 x 50</i>	9 <i>229</i>	7.5 <i>3.4</i>	6 x 4 <i>150 x 100</i>	12 <i>305</i>	17.0 <i>7.7</i>
4 x 2½ <i>100 x 65</i>	9 <i>229</i>	7.5 <i>3.4</i>	6 x 5 <i>150 x 125</i>	12 <i>305</i>	17.0 <i>7.7</i>
4 x 3 <i>100 x 80</i>	9 <i>229</i>	7.5 <i>3.4</i>	8 x 3 <i>200 x 80</i>	13 <i>330</i>	29.0 <i>13.2</i>
5 x 2 <i>125 x 50</i>	11 <i>279</i>	11.5 <i>5.2</i>	8 x 4 <i>200 x 100</i>	13 <i>330</i>	29.0 <i>13.2</i>
5 x 3 <i>125 x 80</i>	11 <i>279</i>	11.5 <i>5.2</i>	8 x 5 <i>200 x 125</i>	13 <i>330</i>	29.0 <i>13.2</i>
5 x 4 <i>125 x 100</i>	11 <i>279</i>	11.5 <i>5.2</i>	8 x 6 <i>200 x 150</i>	13 <i>330</i>	29.0 <i>13.2</i>

See Fitting Size Chart on page 146 for O.D. sizes

## FIG. 7305

HDPE COUPLING



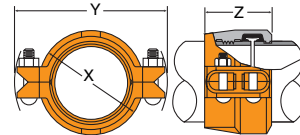
### FIGURE 7305 - HDPE COUPLING

Nominal Size	O.D.	Coupling Dimensions			Coupling Bolts		Approx. Wt. Ea.
		X	Y	Z	Qty.	Size	
In./DN(mm)	In./mm	In./mm	In./mm	In./mm		In.	Lbs./Kg
2	2.375	3 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	4 <sup>5</sup> / <sub>8</sub>	4	1/2 x 2 <sup>3</sup> / <sub>8</sub>	4.5
50	60.3	86	140	117		-	2.0
3	3.500	4 <sup>5</sup> / <sub>8</sub>	6 <sup>3</sup> / <sub>4</sub>	4 <sup>5</sup> / <sub>8</sub>	4	1/2 x 3	8.5
80	88.9	117	171	117		-	3.9
4	4.500	5 <sup>1</sup> / <sub>4</sub>	8	5 <sup>3</sup> / <sub>4</sub>	4	1/2 x 3	12
100	114.3	133	203	146		-	5.4
6	6.625	7 <sup>1</sup> / <sub>2</sub>	11	5 <sup>7</sup> / <sub>8</sub>	4	5/8 x 3 <sup>1</sup> / <sub>2</sub>	18
150	168.3	191	279	149		-	8.2
8	8.625	10	13 <sup>1</sup> / <sub>4</sub>	6	4	5/8 x 3 <sup>1</sup> / <sub>2</sub>	30
200	219.1	254	337	152		-	13.6
10	10.750	12	15 <sup>3</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>2</sub>	4	3/4 x 4 <sup>3</sup> / <sub>4</sub>	43
250	273.1	305	400	165		-	19.5
12	12.750	14 <sup>3</sup> / <sub>8</sub>	17 <sup>7</sup> / <sub>8</sub>	7 <sup>1</sup> / <sub>4</sub>	4	3/4 x 4 <sup>3</sup> / <sub>4</sub>	58
300	323.9	365	454	184		-	26.3

See Installation & Assembly directions on pages 176-177.

## FIG. 7307

HDPE TRANSITION COUPLING



### FIGURE 7307 - HDPE TRANSITION COUPLING

Nominal Size	O.D.	Coupling Dimensions			Coupling Bolts		Approx. Wt. Ea.
		X	Y	Z	Qty.	Size	
In./DN(mm)	In./mm	In./mm	In./mm	In./mm		In.	Lbs./Kg
2	2.375	3 <sup>3</sup> / <sub>8</sub>	6	3 <sup>1</sup> / <sub>8</sub>	4	1/2 x 2 <sup>3</sup> / <sub>8</sub>	4.5
50	60.3	86	152	79		-	2.0
3	3.500	4 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	4	1/2 x 3	6
80	88.9	114	181	79		-	2.7
4	4.500	5 <sup>3</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>4</sub>	4	1/2 x 3	8.5
100	114.3	146	216	95		-	3.9
6	6.625	8	11 <sup>1</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4	5/8 x 3 <sup>1</sup> / <sub>2</sub>	12.5
150	168.3	203	286	95		-	5.7
8	8.625	10 <sup>1</sup> / <sub>2</sub>	13 <sup>5</sup> / <sub>8</sub>	4 <sup>1</sup> / <sub>4</sub>	4	5/8 x 3 <sup>1</sup> / <sub>2</sub>	20.5
200	219.1	267	346	108		-	9.3
10	10.750	12 <sup>5</sup> / <sub>8</sub>	17	5	4	7/8 x 5 <sup>1</sup> / <sub>2</sub>	34.5
250	273.1	321	432	127		-	15.6
12	12.750	14 <sup>3</sup> / <sub>4</sub>	19 <sup>1</sup> / <sub>2</sub>	5	4	7/8 x 5 <sup>1</sup> / <sub>2</sub>	42.5
300	323.9	375	495	127		-	19.3

See Installation & Assembly directions on pages 178-179.

## HDPE Couplings

FIG. 7312

HDPE FLANGE ADAPTER

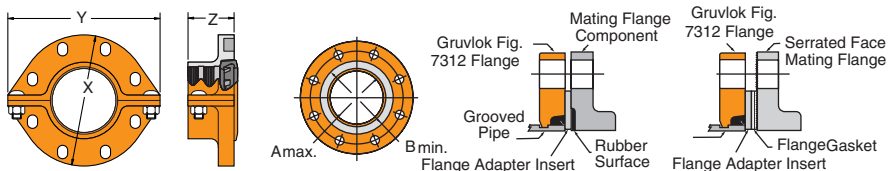


FIGURE 7312 - HDPE FLANGE ADAPTER

Nominal Size	O.D.	Flange Dimensions			Sealing Surface		Latch Bolt		Mating Flange Bolts		Approx. Wt. Ea.
		X	Y	Z	A Max	B Min.	Qty.	Size	Qty.	Size	
In./DN(mm)	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm		In./mm		In./mm	Lbs./Kg
4	4.500	9	10 <sup>3</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>	4 <sup>1</sup> / <sub>2</sub>	5 <sup>3</sup> / <sub>4</sub>	2	5/8 x 1 <sup>5</sup> / <sub>8</sub>	8	5/8 x 3	15
100	114.3	229	264	79	114	146					6.8
6	6.625	11 <sup>1</sup> / <sub>4</sub>	12 <sup>3</sup> / <sub>8</sub>	3 <sup>7</sup> / <sub>8</sub>	6 <sup>5</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>4</sub>	2	5/8 x 1 <sup>5</sup> / <sub>8</sub>	8	3/4 x 3 <sup>1</sup> / <sub>2</sub>	22
150	168.3	286	314	98	168	197					10.0
8	8.625	13 <sup>1</sup> / <sub>2</sub>	14 <sup>7</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>2</sub>	8 <sup>5</sup> / <sub>8</sub>	10 <sup>1</sup> / <sub>4</sub>	2	3/4 x 2	8	3/4 x 3 <sup>1</sup> / <sub>2</sub>	26
200	219.1	343	378	89	219	260					12.7

- A. The sealing surfaces A Max. to B Min. of the mating flange must be free from gouges, undulations and deformities of any type to ensure proper sealing of gasket.
- B. Gruvlok Flanges are to be assembled on butterfly valves so as not to interfere with actuator or handle operation.
- C. Do not use Gruvlok Flanges within 90 degrees of one another on standard fittings because the outside dimensions may cause interference.
- D. Gruvlok Flanges should not be used as anchor points for tierods across non-restrained joints.

- E. Fig. 7012 Gruvlok Flange sealing gaskets require a hard flat surface for adequate sealing. The use of a Gruvlok Flange Adapter Insert is required for applications against rubber faced valves or other equipment. The Gruvlok Flange Adapter Insert is installed between the Gruvlok Flange sealing gasket and the mating flange or surface to provide a good sealing surface area.

- F. Gruvlok Flanges are not recommended for use against formed rubber flanges.

See Installation & Assembly directions on pages 180-181.

FIG. 7100

90° ELBOW (SOCK-IT® x SOCK-IT®)

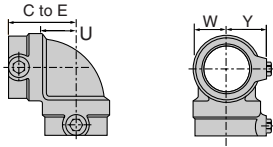


FIGURE 7100 - SOCK-IT® ELBOW (S x S)							
Nominal Size	O.D.	Max. Working Pressure	Dimensions				Approx. Wt. Ea.
			Center To End	U*	W	Y	
In./DN(mm)	In./mm	PSI/bar	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
1	1.315	300	2 <sup>5</sup> / <sub>16</sub>	7/8	1 <sup>1</sup> / <sub>16</sub>	1 <sup>3</sup> / <sub>4</sub>	1.9
25	33.7	20.7	59	22	17	44	0.9
1 <sup>1</sup> / <sub>4</sub>	1.660	300	2 <sup>7</sup> / <sub>16</sub>	1	1 <sup>1</sup> / <sub>4</sub>	1 <sup>13</sup> / <sub>16</sub>	2.3
32	42.4	20.7	62	25	32	46	1.0
1 <sup>1</sup> / <sub>2</sub>	1.900	300	2 <sup>5</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>15</sup> / <sub>16</sub>	2.7
40	48.3	20.7	67	29	35	49	1.2
2	2.375	250	3 <sup>1</sup> / <sub>4</sub>	1 <sup>9</sup> / <sub>16</sub>	1 <sup>5</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>16</sub>	4.0
50	60.3	17.2	83	40	41	56	1.8

\* "U" - Run take-out dimension.

See Installation & Assembly directions on pages 182-183.

FIG. 7103

STRAIGHT TEE (SOCK-IT® x SOCK-IT® x SOCK-IT®)

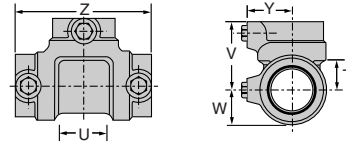


FIGURE 7103 - SOCK-IT® STRAIGHT TEE (S x S x S)										
Nominal Size	O.D.	Max. Working Pressure	Dimensions					Approx. Wt. Ea.		
			**T	U*	V	W	Y		Z	
In./DN(mm)	In./mm	PSI/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
1	1.315	300	1 <sup>3</sup> / <sub>16</sub>	1 <sup>5</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>11</sup> / <sub>16</sub>	1 <sup>11</sup> / <sub>16</sub>	4 <sup>1</sup> / <sub>2</sub>	2.3	
25	33.7	20.7	21	41	57	17	43	114	1.0	
1 <sup>1</sup> / <sub>4</sub>	1.660	300	1	2	2 <sup>1</sup> / <sub>16</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>13</sup> / <sub>16</sub>	4 <sup>1</sup> / <sub>8</sub>	2.9	
32	42.4	20.7	25	51	62	32	46	124	1.3	
1 <sup>1</sup> / <sub>2</sub>	1.900	300	1 <sup>11</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>8</sub>	2 <sup>9</sup> / <sub>16</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>15</sup> / <sub>16</sub>	5 <sup>1</sup> / <sub>8</sub>	3.4	
40	48.3	20.7	17	54	65	35	49	130	1.5	
2	2.375	250	1 <sup>15</sup> / <sub>16</sub>	2 <sup>5</sup> / <sub>8</sub>	3	1 <sup>11</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>16</sub>	6	5.6	
50	60.3	17.2	23	67	76	43	56	152	2.5	

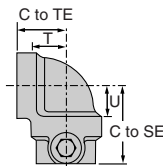
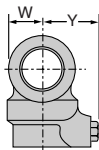
\* "U" - Run take-out dimension.

\*\*"T" - Outlet take-out dimension.

See Installation & Assembly directions on pages 182-183.

## FIG. 7101

90° REDUCING ELBOW (SOCK-IT® x NPT)



### FIGURE 7101 - SOCK-IT® REDUCING ELBOW (S x NPT)

Nominal Size	Max. Working Pressure	Dimensions						Approx. Wt. Ea.
		Center to TE	Center To SE	U*	T**	W	Y	
In./DN(mm)	PSI/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
1 x 1/2 25 x 15	300 20.7	1 1/16 37	2 5/16 59	7/8 22	1 25	1 1/16 17	1 11/16 43	1.7 0.8
1 x 3/4 25 x 20	300 20.7	1 1/16 37	2 5/16 59	7/8 22	7/8 22	1 1/16 17	1 11/16 43	1.6 0.7
1 x 1 25 x 25	300 20.7	1 1/16 37	2 5/16 59	7/8 22	7/8 22	1 1/16 17	1 11/16 43	1.5 0.7
1 1/4 x 1/2 32 x 15	300 20.7	1 9/16 40	2 1/2 64	1 1/16 17	1 1/8 29	1 1/4 32	1 13/16 46	2.2 1.0
1 1/4 x 3/4 32 x 20	300 20.7	1 9/16 40	2 1/2 64	1 1/16 17	1 25	1 1/4 32	1 13/16 46	2.1 1.0
1 1/4 x 1 32 x 25	300 20.7	1 9/16 40	2 1/2 64	1 1/16 17	1 25	1 1/4 32	1 13/16 46	2 0.9
1 1/2 x 1/2 40 x 15	300 20.7	1 11/16 43	2 1/2 64	1 25	1 1/4 32	1 3/8 35	1 15/16 49	2.5 1.1
1 1/2 x 3/4 40 x 20	300 20.7	1 11/16 43	2 1/2 64	1 25	1 1/8 29	1 3/8 35	1 15/16 49	2.4 1.1
1 1/2 x 1 40 x 25	300 20.7	1 11/16 43	2 1/2 64	1 25	1 1/8 29	1 3/8 35	1 15/16 49	2.3 1.0

See Installation & Assembly directions on pages 182-183.

See Fitting Size Chart on page 146 for O.D. sizes

C to SE - Center to Sock-It® End

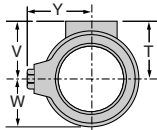
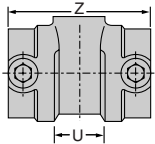
C to TE - Center to Thread End

\* "U" - Take-out dimension, Sock-It® End.

\*\* "T" - Take-out dimension, Thread End.

FIG. 7105

REDUCING OUTLET TEE  
(SOCK-IT® x SOCK-IT® x NPT)



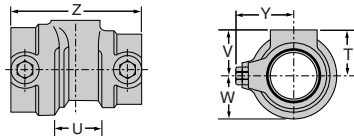
Note: Anvil® is the only manufacturer to offer a 2½" Sock-It Fitting

\* "U" - Run take-out dimension.  
 \*\* "T" - Outlet take-out dimension.  
 See Installation & Assembly directions on pages 182-183.  
 See Fitting Size Chart on page 146 for O.D. sizes

Nominal Size	Max. Working Pressure	Dimensions						Approx. Wt. Ea.
		**T	U*	V	W	Y	Z	
In./DN(mm)	PSI/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
1 x 1 x ½	300	1	1¾	1¼	1¼	1¼	4¼	2.0
25 x 25 x 15	20.7	25	35	37	17	43	108	0.9
1 x 1 x ¾	300	¾	1¾	1¼	1¼	1¼	4¼	1.9
25 x 25 x 20	20.7	22	35	37	17	43	108	0.9
1 x 1 x 1	300	¾	1¾	1¼	1¼	1¼	4¼	1.9
25 x 25 x 25	20.7	22	35	37	17	43	108	0.9
1¼ x 1¼ x ½	300	1½	1¾	1¾	1¼	1¾	4¼	2.2
32 x 32 x 15	20.7	29	35	41	32	46	108	1.0
1¼ x 1¼ x ¾	300	1	1¾	1¾	1¼	1¾	4¼	2.2
32 x 32 x 20	20.7	25	35	41	32	46	108	1.0
1¼ x 1¼ x 1	300	1	1¾	1½	1¼	1¾	4¼	2.0
32 x 32 x 25	20.7	25	35	41	32	46	108	0.9
1½ x 1½ x ½	300	1¼	1¾	1¾	1¾	1½	4¾	2.7
40 x 40 x 15	20.7	32	35	44	35	49	111	1.2
1½ x 1½ x ¾	300	1½	1¾	1¾	1¾	1½	4¾	2.6
40 x 40 x 20	20.7	29	35	44	35	49	111	1.2
1½ x 1½ x 1	300	1½	1¾	1¾	1¾	1½	4¾	2.5
40 x 40 x 25	20.7	29	35	44	35	49	111	1.1
2 x 2 x ½	250	1½	1¾	1¾	1¾	2¾	4¾	3.5
50 x 50 x 15	17.2	38	35	49	41	56	121	1.6
2 x 2 x ¾	250	1¾	1¾	1¾	1¾	2¾	4¾	3.4
50 x 50 x 20	17.2	35	35	49	41	56	121	1.5
2 x 2 x 1	250	1¾	1¾	1¾	1¾	2¾	4¾	3.3
50 x 50 x 25	17.2	35	35	49	41	56	121	1.5
2½ x 2½ x ¾	175	1½	1¾	2½	1½	2½	4¾	5.2
65 x 65 x 20	12.1	38	35	54	49	62	121	2.4
2½ x 2½ x 1	175	1½	1¾	2½	1½	2½	4¾	5.2
65 x 65 x 25	12.1	38	35	54	49	62	121	2.4

## FIG. 7106

REDUCING TEE  
(SOCK-IT® x SOCK-IT® x NPT)



### FIGURE 7106 - SOCK-IT® REDUCING TEE (S x S x NPT)

Nominal Size	Max. Working Pressure	Dimensions						Approx. Wt. Ea.
		**T	U*	V	W	Y	Z	
In./DN(mm)	PSI/bar	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs./Kg
1¼ x 1 x ½	300	1	1⅜	1⅛	1¼	1⅜	4¼	2.1
32 x 25 x 15	2.1	25	35	37	32	46	108	1.0
1¼ x 1 x ¾	300	⅞	1⅜	1⅛	1¼	1⅜	4¼	2.1
32 x 25 x 20	20.7	22	35	37	32	46	108	1.0
1¼ x 1 x 1	300	⅞	1⅜	1⅛	1¼	1⅜	4¼	2.0
32 x 25 x 25	20.7	22	35	37	32	46	108	0.9
1½ x 1¼ x ½	300	1⅛	1⅜	9⁄16	1⅜	1⅝	4⅜	2.5
40 x 32 x 15	20.7	29	35	40	35	49	111	1.1
1½ x 1¼ x ¾	300	1	1⅜	9⁄16	1⅜	1⅝	4⅜	2.4
40 x 32 x 20	20.7	25	35	40	35	49	111	1.1
1½ x 1¼ x 1	300	1	1⅜	1⅛	1⅜	1⅝	4⅜	2.2
40 x 32 x 25	20.7	25	35	40	35	49	111	1.0
2 x 1½ x ½	250	1¼	1⅜	1¼	1⅝	2⅜	4⅞	3.2
50 x 40 x 15	17.2	32	35	44	41	56	116	1.5
2 x 1½ x ¾	250	1⅛	1⅜	1¼	1⅝	2⅜	4⅞	3.1
50 x 40 x 20	17.2	29	35	44	41	56	116	1.4
2 x 1½ x 1	250	1⅛	1⅜	1¼	1⅝	2⅜	4⅞	3.0
50 x 40 x 25	17.2	29	35	44	41	56	116	1.4

\* "U" - Run take-out dimension.

\*\* "T" - Outlet take-out dimension.

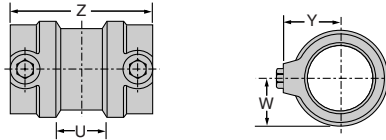
See Installation & Assembly directions on pages 182-183.

See Fitting Size Chart on page 146 for O.D. sizes



**FIG. 7107**

COUPLING  
(SOCK-IT® x SOCK-IT®)



**FIGURE 7107 - SOCK-IT® COUPLING (S X S)**

Nominal Size	O.D.	Max. Working Pressure	Dimensions				Approx. Wt. Ea.
			U*	W	Y	Z	
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>PSI/bar</i>	<i>n./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>
1	1.315	300	¼	1 <sup>1</sup> / <sub>16</sub>	1 <sup>11</sup> / <sub>16</sub>	3 <sup>1</sup> / <sub>8</sub>	1.7
25	33.7	20.7	6	17	43	79	0.8
1¼	1.660	300	¼	1¼	1 <sup>13</sup> / <sub>16</sub>	3 <sup>1</sup> / <sub>8</sub>	1.9
32	42.4	20.7	6	32	46	79	0.9
1½	1.900	300	¼	1 <sup>3</sup> / <sub>8</sub>	1 <sup>15</sup> / <sub>16</sub>	3¼	2.1
40	48.3	20.7	6	35	49	83	1.0
2	2.375	250	¼	1 <sup>5</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>8</sub>	2.9
50	60.3	17.2	6	41	56	92	1.3

\* "U" - Run take-out dimension.

See Installation & Assembly directions on pages 182-183.

FIG. 7400SS

RIGIDLITE® COUPLING

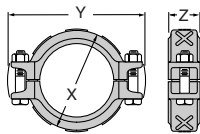


FIGURE 7400SS - RIGIDLITE STAINLESS STEEL COUPLING

Nominal Size	O.D.	Max. Wk. Pressure†	Max. End Load†	Range of Pipe End Separation	Coupling Dimensions			Coupling Bolts* Size	Approx. Wt. Ea.
					X	Y	Z		
1¼	1.66	275	595	0-½	2⅞	4⅞	1¾	¾ x 2¼	1.6
32	42.4	19.0	2.65	0-3.2	73	105	44	M10 x 57	0.7
1½	1.900	275	780	0-½	3⅞	4⅞	1¾	¾ x 2¼	1.7
40	48.3	19.0	3.47	0-3.2	79	117	44	M10 x 57	0.8
2	2.375	275	1,218	0-½	3⅝	5⅜	1¾	¾ x 2¼	2.1
50	60.3	19.0	5.42	0-3.2	92	137	45	M10 x 57	1.0
2½	2.875	275	1,785	0-½	4⅞	5⅞	1¾	¾ x 2¼	2.3
65	73.0	19.0	7.44	0-3.2	105	149	44	M10 x 57	1.0
3	3.500	275	2,646	0-½	4⅝	6⅝	1¾	½ x 2¾	3.1
80	88.9	19.0	11.77	0-3.2	117	168	44	M12 x 76	1.4
4	4.500	275	4,374	0-¼	6	7¾	1⅞	½ x 2¾	4.4
100	114.3	19.0	19.46	0-6.4	152	197	48	M12 x 76	2.0
6	6.625	275	9,480	0-¼	8⅞	11⅞	2	½ x 3	7.8
150	168.3	19.0	42.17	0-6.4	206	283	51	M12 x 76	3.5
8	8.625	275	16,067	0-¼	10⅞	13⅞	2⅞	½ x 3	13.2
200	219.1	19.0	71.47	0-6.4	264	346	60	M12 x 76	6.0

\* All bolts are hex head design Type 316 Grade B8M Class 2 stainless steel to ASTM A193, with Type 316 Grade 8M stainless steel heavy hex nuts conforming to ASTM A194.

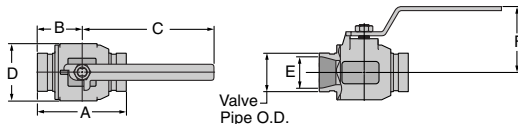
† Ratings apply when used with Schedule 40 ASTM A312 Type 304 stainless steel pipe for all sizes. Refer to ratings chart for additional data.

**CAUTION:** Contact your local Gruvlok representative for corrosive application environments.

No Coatings or zinc options.

## SERIES 7500 SS

## GROOVED-END BALL VALVE



## SERIES 7500 SS - BALL VALVE

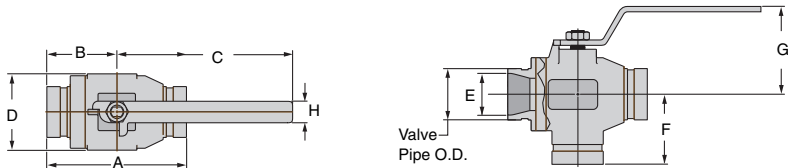
Size ANSI	O.D.	Dimensions							Approx. Wt. Ea.
		A	B	C	D	E	F	Cv	
<i>In./DN(mm)</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>		<i>Lbs./Kg</i>
2	2.375	5½	2¾	8¼	3 <sup>13</sup> / <sub>16</sub>	1 <sup>15</sup> / <sub>16</sub>	4½	165	8
50	60.3	140	70	209	81	49	105		3.6
3	3.500	6¾	3¾	10	4 <sup>13</sup> / <sub>16</sub>	2 <sup>7</sup> / <sub>8</sub>	4 <sup>13</sup> / <sub>16</sub>	310	18
80	88.9	171	85	254	122	74	121		8.2
4	4.500	8¼	4½	16	6 <sup>5</sup> / <sub>16</sub>	3 <sup>13</sup> / <sub>16</sub>	6	815	38
100	114.3	210	105	406	176	97	152		17.2
6 *	6.625	10½	5½	28	8 <sup>7</sup> / <sub>16</sub>	5 <sup>11</sup> / <sub>16</sub>	7 <sup>5</sup> / <sub>8</sub>	1500	106
150	168.3	257	128	711	215	144	194		48.1

\* Bare Stem

## Stainless Steel

## SERIES 7500 SS

GROOVED-END BALL VALVE



## SERIES 7500 SS - THREE-WAY DIVERTER VALVES

Size ANSI	O.D.	Dimensions								Approx. Wt. Ea. Lb./Kg
		A	B	C	D	E	F	G	Cv	
In./DN	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm		
2 FP	2.375 FP	6½	3¼	10¾ <sub>16</sub>	4¾ <sub>16</sub>	2	¾	5¾	135	14.2
50	60.3	165	83	258	106	51	83	137		31.2

**NOTE:** Contact your Gruvlok representative for actuator mounting details.  
Full port only.

## FIG. 7050SS

90° STAINLESS STEEL ELBOW

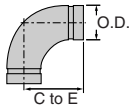


FIG. 7050SS 90° STAINLESS STEEL ELBOW		
Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
1¼	3⅞	1.2
32	98	0.5
1½	4¼	1.4
40	108	0.6
2	4¾	2.3
50	111	1.0
2½	5¾	3.3
65	146	1.5
3	5⅞	4.6
80	149	2.1
4	7½	7.9
100	191	3.6
6	10¾	17.0
150	273	7.7
8	15	29.4
200	381	13.4

**NOTE:** Fabricated fittings weights are based on Schedule 10 pipe.

## FIG. 7051SS

45° STAINLESS STEEL ELBOW



FIG. 7051SS 45° STAINLESS STEEL ELBOW		
Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
1¼	2½	0.7
32	64	0.3
1½	2½	0.9
40	64	0.4
2	2½	1.5
50	64	0.7
2½	3	1.9
65	76	0.9
3	3¾	3.3
80	86	1.5
4	4	5.4
100	102	2.4
6	5½	11.2
150	140	5.1
8	7¼	19.8
200	184	9.0

**NOTE:** Fabricated fittings weights are based on Schedule 10 pipe.

## FIG. 7060SS

STAINLESS STEEL TEES

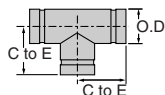


FIG. 7060SS STAINLESS STEEL TEE		
Nominal Size	Center to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
1¼	2¾	1.5
32	70	0.7
1½	2¾	1.8
40	70	0.8
2	3¼	2.4
50	83	1.1
2½	3¾	4.0
65	95	1.8
3	4¼	5.8
80	108	2.6
4	5	10.3
100	127	4.7
6	6½	25.7
150	165	11.7
8	7¾	41.1
200	197	18.6

**NOTE:** Fabricated fittings weights are based on Schedule 10 pipe.

## FIG. 7074SS

STAINLESS STEEL CAPS

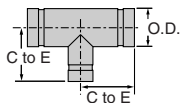


FIG. 7074SS STAINLESS STEEL CAPS		
Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
1¼	1⅝	0.4
32	41	0.2
1½	1⅝	0.5
40	41	0.2
2	1⅝	0.8
50	41	0.4
2½	1¾	1.1
65	45	0.5
3	1¾	1.6
80	45	0.7
4	1¾	2.8
100	45	1.3
6	1⅞	7.1
150	48	3.2
8	2¼	14.9
200	57	6.8

**NOTE:** Pressure and load ratings equal to or greater than Schedule 10S as listed above. Caps are all cast fittings.

## FIG. 7061SS

STAINLESS STEEL REDUCING TEES



### FIG. 7061SS - STAINLESS STEEL REDUCING TEE

Nominal Size In./DN(mm)	Center to End In./mm	Approx. Wt. Ea. Lbs./Kg
1½ x 1½ x ¾ 40 x 40 x 20	2¾ 70	1.3 0.6
1½ x 1½ x 1 40 x 40 x 25	2¾ 70	1.4 0.6
1½ x 1½ x 1¼ 40 x 40 x 32	2¾ 70	1.5 0.7
2 x 2 x ¾ 50 x 50 x 20	3¼ 83	2.0 0.9
2 x 2 x 1 50 x 50 x 25	3¼ 83	2.1 1.0
2 x 2 x 1¼ 50 x 50 x 32	3¼ 83	2.3 1.0
2 x 2 x 1½ 50 x 50 x 40	3¼ 83	2.5 1.1
2½ x 2½ x ¾ 65 x 65 x 20	3¾ 95	2.8 1.3
2½ x 2½ x 1 65 x 65 x 25	3¾ 95	3.0 1.4

Nominal Size In./DN(mm)	Center to End In./mm	Approx. Wt. Ea. Lbs./Kg
2½ x 2½ x 1½ 65 x 65 x 40	3¾ 95	3.5 1.6
2½ x 2½ x 2 65 x 65 x 50	3¾ 95	3.8 1.7
3 x 3 x ¾ 80 x 80 x 20	4¼ 108	4.0 1.8
3 x 3 x 1 80 x 80 x 25	4¼ 108	4.1 1.9
3 x 3 x 1¼ 80 x 80 x 32	4¼ 108	4.2 1.9
3 x 3 x 1½ 80 x 80 x 40	4¼ 108	4.3 1.9
3 x 3 x 2 80 x 80 x 50	4¼ 108	4.5 2.0
3 x 3 x 2½ 80 x 80 x 65	4¼ 108	4.8 2.2

See Fitting Size Chart on page 146 for O.D. sizes

Nominal Size In./DN(mm)	Center to End In./mm	Approx. Wt. Ea. Lbs./Kg
4 x 4 x 2 100 x 100 x 50	5 127	5.8 2.6
4 x 4 x 2½ 100 x 100 x 65	5 127	5.9 2.7
4 x 4 x 3 100 x 100 x 80	5 127	6.0 2.7
6 x 6 x 3 150 x 150 x 80	6½ 165	14.0 6.4
6 x 6 x 4 150 x 150 x 100	6½ 165	14.5 6.6
8 x 8 x 4 200 x 200 x 100	7¾ 197	29.6 13.5
8 x 8 x 6 200 x 200 x 150	7¾ 197	31.1 14.1

**NOTE:** Fabricated fittings weights are based on Schedule 10 pipe. Additional sizes available. Contact a Gruvlok Representative for more information.

FIG. 7072SS

STAINLESS STEEL  
CONCENTRIC REDUCERS

FIGURE 7072SS - STAINLESS STEEL CONCENTRIC REDUCERS

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
1½ x 1	3½	0.7
40 x 25	79	0.3
1½ x 1¼	3½	0.7
40 x 32	79	0.3
2 x 1	3½	0.9
50 x 25	79	0.4
2 x 1¼	3½	0.9
50 x 32	79	0.4
2 x 1½	2½	1.2
50 x 40	73	0.5
2½ x 1	2½	1.1
65 x 25	73	0.5
2½ x 1½	2¾	1.2
65 x 40	70	0.5
2½ x 2	2½	1.2
65 x 50	73	0.5
3 x 1	3¾	1.8
80 x 25	86	0.8

**NOTE:** Fabricated fittings weights are based on Schedule 10 pipe. Additional sizes available. Contact a Gruvlok Representative for more information.

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
3 x 1¼	3¾	1.8
80 x 32	86	0.8
3 x 1½	3¼	1.9
80 x 40	83	0.9
4 x 2	3¾	2.9
100 x 50	95	1.3
4 x 2½	3¾	3.1
100 x 65	92	1.4
4 x 3	3½	3.1
100 x 80	89	1.4
6 x 2½	4¾	7.1
150 x 65	121	3.2
6 x 3	4¾	7.0
150 x 80	117	3.2
6 x 4	4½	7.0
150 x 100	114	3.2
8 x 4	5½	11.7
200 x 100	130	5.3
8 x 6	5	11.5
200 x 150	127	5.2

FIG. 7073SS

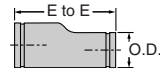
STAINLESS STEEL  
ECCENTRIC REDUCERS

FIGURE 7073SS - STAINLESS STEEL ECCENTRIC REDUCERS

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
1½ x 1	8½	1.7
40 x 25	216	0.8
1½ x 1¼	8½	4.5
40 x 32	216	2.0
2 x 1	9	2.2
50 x 25	229	1.0
2 x 1¼	9	2.4
50 x 32	229	1.1
2 x 1½	9	2.5
50 x 40	229	1.1
2½ x 1	9½	3.2
65 x 25	241	1.5
2½ x 1½	9½	3.6
65 x 40	241	1.6
2½ x 2	9½	4.0
65 x 50	241	1.8
3 x 1	9½	4.0
80 x 25	241	1.8

**NOTE:** Fabricated fittings weights are based on Schedule 10 pipe. Additional sizes available. Contact a Gruvlok Representative for more information.

Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	In./mm	Lbs./Kg
3 x 1¼	9½	4.3
80 x 32	241	2.0
3 x 1½	9½	4.5
80 x 40	241	2.0
4 x 2	10	6.7
100 x 50	254	3.0
4 x 2½	10	7.3
100 x 65	254	3.3
4 x 3	10	7.9
100 x 80	254	3.6
6 x 2½	11½	12.8
150 x 65	292	5.8
6 x 3	11½	13.6
150 x 80	292	6.2
6 x 4	11½	14.9
150 x 100	292	6.8
8 x 4	12	19.7
200 x 100	305	8.9
8 x 6	12	23.2
200 x 150	305	10.5

## Roll Groovers

### MODEL 1007 & 3007

#### ROLL GROOVERS



Model 1007



Model 3007

Gruvlok roll grooving technology is protected by U.S. Patents 5450738, 5570603, 5778715 & others pending.

MODEL 1007 & MODEL 3007 - GROOVER CAPABILITY											
Pipe Material	Pipe Size/Wall Thickness (Schedule In./DN mm)										
	2	2½	3	4	5	6	8	10	12	14	16
	50	65	80	100	125	150	200	250	300	350	400
Steel	Schedule 40									Std.	Std.
Stainless Steel	Schedule 40S									n/a	n/a
Copper								n/a	n/a	n/a	n/a

#### NOTES:

- (1) All wall thickness shown are the maximum wall thickness for the indicated pipe material.
- (2) Minimum wall thickness for each pipe materials & size is:

Steel: 2" - 12" - Sch. 10, 14" & 16" Std. Wall

Stainless Steel: 2" - 12" - Sch. 10S requires optional roller sets

Copper: 2" - 2½" - Type M  
3" - 8" - Type DWV

**NOTE:** Some sizes may require optional equipment.

- (3) Contact a Gruvlok Representative for information on grooving alternate materials

MODEL 1007 & MODEL 3007 - STEEL PIPE GROOVING TIMES (MIN: SEC.)											
Pipe Size (In./DN mm) - Sch. 40 (Std. Wall) Steel Pipe											
2	2½	3	4	5	6	8	10	12	14	16	
50	65	80	100	125	150	200	250	300	350	400	
0:20	0:20	0:25	0:30	1:00	1:20	1:35	1:50	2:20	2:40	3:00	

This chart shows approximate grooving times with the groover setup for the proper size and groove diameter and the pipe properly positioned on the groover. The times shown are average times from the start of rotation of the pipe in the grooving rolls to completed groove.



## MODEL 3006 & 3006C

ROLL GROOVERS



Gruvlok roll grooving technology is protected by U.S. Patents 5450738, 5570603, 5778715 & others pending.

### MODEL 3006 & MODEL 3006C - GROOVER CAPABILITY

Pipe Material	Pipe Size/Wall Thickness (Schedule)								
	2	2½	3	4	5	6	8	10	12
	50	65	80	100	125	150	200	250	300
Steel	Schedule 40							.188"	.219"
Stainless Steel	Schedule 40S						n/a	n/a	n/a
Copper	K, L, M & DWV						n/a	n/a	n/a

#### NOTES:

- (1) All wall thickness shown are the maximum wall thickness for the indicated pipe material.
- (2) Minimum wall thickness for each pipe materials & size is:

Steel: All sizes – Sch. 10

Stainless Steel: All sizes – Sch. 40S

Copper: 2", 2½" – Type M  
3" - 6" – Type DWV

Note: The universal diameter gauge is part of the copper option or is available as a stand alone option

- (3) Please contact a Gruvlok Representative for more information on grooving alternate materials & wall thickness.

### MODEL 3006 & MODEL 3006C - STEEL PIPE GROOVING TIMES (MIN: SEC.)

Pipe Size (Inches)/Max Steel Pipe Wall Thickness							
2	2½	3	4	6	8	10	12
50	65	80	100	150	200	250	300
0:20	0:20	0:25	0:30	1:20	1:55	0:40	1:20

**GROOVING TIMES:** This chart shows approximate grooving times with the groover set-up for the proper size and groove diameter and the pipe properly positioned on the groover. The times shown are average times from the start of rotation of the pipe in the grooving rolls to completed groove.

## Fitting Size O.D. Chart & Flow Data Frictional Resistance

### FITTING SIZE O.D. & FLOW DATA FRICTIONAL RESISTANCE (EXPRESSED AS EQUIVALENT STRAIGHT PIPE)

Nominal Size	O.D.	Pipe Wall Thickness	Elbow		Tee	
			90°	45°	Branch	Run
In./DN(mm)	In./mm	In./mm	Ft./m	Ft./m	Ft./m	Ft./m
1	1.315	0.133	1.7	0.9	4.4	1.7
25	33.4	3.4	0.5	0.3	1.3	0.5
1¼	1.660	0.14	2.3	1.2	5.8	2.3
32	42.2	3.6	0.7	0.4	1.8	0.7
1½	1.900	0.145	2.7	1.3	6.7	2.7
40	48.3	3.7	0.8	0.4	2.0	0.8
2	2.375	0.154	3.4	1.7	8.6	3.4
50	60.3	3.9	1.0	0.5	2.6	1.0
2½	2.875	0.203	4.1	2.1	10.3	4.1
65	73.0	5.2	1.2	0.6	3.1	1.2
3 O.D.	2.996	0.197	4.3	2.2	10.8	4.3
76.1	76.1	5.0	1.3	0.7	3.3	1.3
3	3.500	0.216	5.1	2.6	12.8	5.1
80	88.9	5.5	1.6	0.8	3.9	1.6
4¼ O.D.	4.250	0.220	6.4	3.2	16.1	6.4
108.0	108.0	5.6	2.0	1.0	4.9	2.0
4	4.500	0.237	6.7	3.4	16.8	6.7
100	114.3	6.0	2.0	1.0	5.1	2.0
5¼ O.D.	5.236	0.248	8.0	4.0	20.1	8.0
133.0	133.0	6.3	2.4	1.2	6.1	2.4
5½ O.D.	5.500	0.248	8.3	4.2	20.9	8.3
139.7	139.7	6.3	2.5	1.3	6.4	2.5
5	5.563	0.258	8.4	4.2	21.0	8.4
125	141.3	6.6	2.6	1.3	6.4	2.6
6¼ O.D.	6.259	0.280	9.7	4.9	24.3	9.7
159.0	159.0	7.1	3.0	1.5	7.4	3.0

Nominal Size	O.D.	Pipe Wall Thickness	Elbow		Tee	
			90°	45°	Branch	Run
In./DN(mm)	In./mm	In./mm	Ft./m	Ft./m	Ft./m	Ft./m
6½ O.D.	6.500	0.280	10.0	5.0	24.9	10.0
165.1	165.1	7.1	3.0	1.5	7.6	3.0
6	6.625	0.280	10.1	5.1	25.3	10.1
150	168.3	7.1	3.1	1.6	7.7	3.1
8	8.625	0.322	13.3	6.7	33.3	13.3
200	219.1	8.2	4.1	2.0	10.1	4.1
10	10.750	0.365	16.7	8.4	41.8	16.7
250	273.1	9.3	5.1	2.6	12.7	5.1
12	12.750	0.375	20.0	10.0	50.0	20.0
300	323.9	9.5	6.1	3.0	15.2	6.1
14	14.000	0.375	22.2	11.7	64.2	22.9
350	355.6	9.5	6.8	3.4	19.6	7.0
16	16.000	0.375	25.5	12.4	73.9	26.4
400	406.4	9.5	7.8	3.9	22.5	8.0
18	18.000	0.375	28.9	14.1	87.2	31.1
450	457.2	9.5	8.8	4.4	26.6	9.5
20	20.000	0.375	32.2	15.7	97.3	34.8
500	508.0	9.5	9.8	4.9	29.7	10.6
24	24.000	0.375	38.9	19.1	113.0	40.4
600	609.6	9.5	11.9	5.9	34.4	12.3

For the reducing tee and branches, use the value that is corresponding to the branch size. For example: for 6" x 6" x 3" tee, the branch value of 3" is 12.8 ft (3.9).

The Fitting Size Chart is used to determine the O.D. of the pipe that the fittings are to be used with. Gruvlok Fittings are identified by either the Nominal size in inches or the Pipe O.D. in/mm.

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### INSTALLATION AND ASSEMBLY



The instructions are based on pipe grooved in accordance with Gruvlok® grooving specifications. Check pipe ends for proper groove dimensions and to assure that the pipe ends are free of indentations and projections which would prevent proper sealing.

**ALWAYS USE A GRUVLOK® LUBRICANT FOR PROPER COUPLING ASSEMBLY.** Thorough lubrication of the external surface of the gasket is essential to prevent pinching and possible damage to the gasket. For temperatures above 150°F (65.6° C) use Gruvlok Xtreme™ Lubricant and lubricate all gasket surfaces, internal and external. See Gruvlok Lubricants in the Technical Data section of the Gruvlok catalog for additional important information.

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**FIG. 7001**

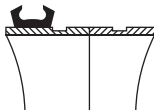
STANDARD COUPLING



**1 Check & lubricate gasket—** Check gasket to be sure it is compatible for the intended service. Apply a thin coating of Gruvlok lubricant to outside and sealing lips of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.



**2 Gasket Installation—** Slip the gasket over the pipe end making sure the gasket lip does not overhang the pipe end. On couplings 10" and larger it may be easier to turn the gasket inside out-then lubricate and slide the gasket over the pipe end as shown.



**3 Alignment—** After aligning the two pipe ends, pull the gasket into position centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe.

On couplings 10" and larger, flip or roll the gasket into centered position.

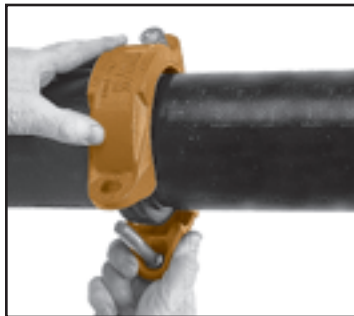


**NOTE:** The housings for sizes 16" and larger are cast in four or more segments.

**TO INSTALL:** loosely pre-assemble the segments into two "Housing Halves" making sure that the alignment tang(s) and slot(s) on the bolt pad(s) are properly mated. Install the "Housing Halves" as shown in steps 4 & 5. The coupling is properly installed when all bolt pads are firmly together - Metal-to-Metal.

## FIG. 7001

### STANDARD COUPLING



**4 Housings**— Place the coupling housing halves over the gasket making sure the housing keys engage the grooves. Insert bolts and turn nuts finger tight.



**5 Tighten Nuts**— Tighten the nuts alternately and equally to the specified bolt torque. The housing bolt pads must make metal-to-metal contact.

Uneven tightening may cause the gasket to pinch.



**6 Assembly is completed**— Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves and the bolt pads are in firm even metal-to-metal contact on both sides of the coupling.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

**FIG. 7011**

## STANDARD COUPLING

**1** Inspect the pipe ends making sure the criteria, in the Gruvlok Large Diameter Pipe Roll and Cut Groove Specifications, are met.



**2** Turn the gasket inside out and slide the gasket completely over one of the pipe ends. Turning the gasket inside out will reduce the stretching necessary to put the gasket into position. Ideally, approximately 75% of the pipe's gasket-sealing surface, (Dimension A) should be visible when the gasket is in proper position. This will aid in step 4.



**3** Lubricate the gasket sealing lips. The use of Gruvlok lubricants ensures compatibility between the lubricant and the gasket.



**4** Pull the two pipes into contact aligning the pipe ends.

**CAUTION:** Be careful not to pinch fingers during this step. Working your way around the circumference of the pipe, flip the gasket toward the pipe end so that the proper side is facing out. The end of this procedure will result in the gasket snapping into place. Position the gasket centrally between the grooves of the two pipe ends.

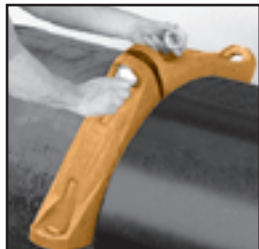
## FIG. 7011, CONT'D.

### STANDARD COUPLING



**5** Lubricate the exterior surface of the gasket. This helps prevent pinching of the gasket during assembly.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.



**6** Secure the housings about the pipes making sure the coupling keys are engaged in the pipe end grooves. Hint: For horizontal assembly, place housing segment on top of the pipe to support the weight of the housing segment. Secure the adjacent housing with an oval neck track bolt and heavy hex nut and then rotate the secured housings, again balancing the weight of the housings on the top of the pipe. Continue this procedure for all segments.



**7** Firmly torque each bolt. The specified minimum torque for each nut is 600 ft.-lbs. The specified maximum torque for each nut is 800 ft.-lbs.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.



**8** Installation of the Figure 7011 Standard Coupling is completed.

**FIG. 7401**

RIGIDLOK® COUPLING



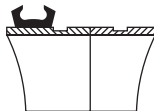
**1 Check & lubricate gasket—** Check gasket to be sure it is compatible for the intended service. Apply a thin coating of Gruklok lubricant to outside and sealing lips of the gasket. Some applications require lubrication of the entire gasket surface. Be careful that foreign particles do not adhere to lubricated surfaces.

**NOTE:** VdS - Roll Grooving Approval Specifications, see the Technical Data/ Install Instructions section on Anvil's web site - [www.anvilintl.com](http://www.anvilintl.com)



**2 Gasket Installation—** Slip the gasket over the pipe end making sure the gasket lip does not overhang the pipe end.

On couplings 10" and larger it may be easier to turn the gasket inside out-then lubricate and slide the gasket over the pipe end as shown.

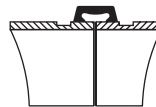


**NOTE:** Sizes 14" and larger are cast in multiple segments. To install the larger sizes align the tongue and pocket of the couplings appropriately and tighten the nuts alternately to the specified bolt torque. When properly assembled there will be a small equal gap between the adjacent bolt pads.



**3 Alignment—** After aligning the two pipe ends, pull the gasket into position centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe.

On couplings 10" and larger, flip or roll the gasket into centered position.





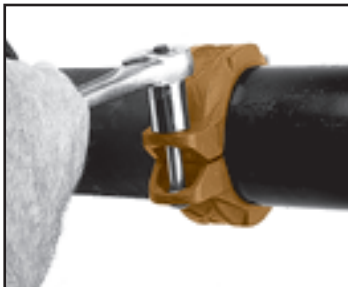
## FIG. 7401, CONT'D.

### RIGIDLOK® COUPLING



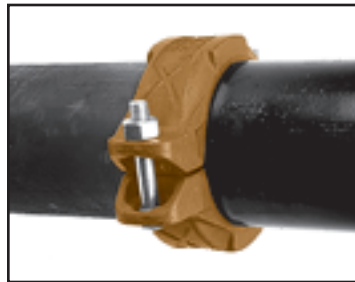
**4 Housings**— Remove one nut and bolt and loosen the other nut. Place one housing over the gasket, making sure the housing keys fit into the tube grooves. Swing the other housing over the gasket and into the grooves on both tubes, making sure the tongue and recess of each housing is properly mated. Re-insert the bolt and run-up both nuts finger tight.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.



**5 Tighten Nuts**— Securely tighten nuts alternately and equally to the specified bolt torque, keeping the gaps at the bolt pads evenly spaced.

**CAUTION:** Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.



**6 Assembly is completed**— Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have equal gaps on each side of the coupling.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

**FIG. 7000**

## STANDARD COUPLING



**1 Check & lubricate gasket—** Check gasket to be sure it is compatible for the intended service. Apply a thin coating of Gruvlok lubricant to outside and sealing lips of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.



**2 Gasket Installation—** Slip the gasket over the pipe end, making sure the gasket lip does not overhang the pipe end.



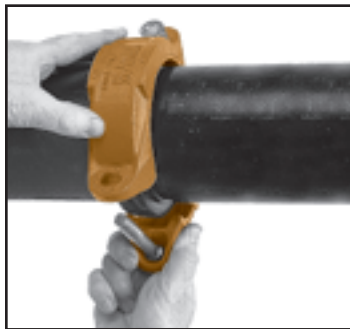
**3 Alignment—** After aligning the two pipe ends together, pull the gasket into position, centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe.

**NOTE:** VdS - Roll Grooving Approval Specifications, see the Technical Data/ Install Instructions section on Anvil's web site - [www.anvilintl.com](http://www.anvilintl.com)

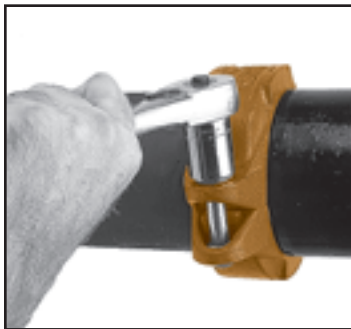
**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

## FIG. 7000, CONT'D.

### STANDARD COUPLING

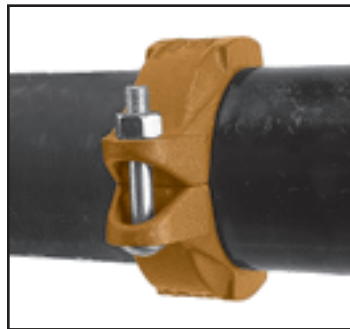


**4 Housings**— With one nut unthreaded to the end of the bolt, unthread the other nut completely and swing the coupling housing halves over the gasket, making sure the housing keys engage the grooves. Insert the bolt and turn the nuts finger tight.



**5 Tighten Nuts**— Tighten the nuts alternately and equally to the specified coupling bolt torque. The housing bolt pads must make metal-to-metal contact.

**CAUTION:** Uneven tightening may cause the gasket to pinch.



**6 Assembly is completed**— Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves and the bolt pads are in firm even metal-to-metal contact on both sides of the coupling.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

**FIG. 7400****RIGIDLITE® COUPLING**

**1 Check & lubricate gasket—** Check the gasket to be sure it is compatible for the intended service. Apply a thin coating of Gruvlok Xtreme Lubricant to the entire surface, both internal and external, of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.



**2 Gasket Installation—** Slip the gasket over the one tube, making sure the gasket lip does not overhang the tube end.



**3 Alignment—** After aligning the two tube ends together, pull the gasket into position, centering it between the grooves on each tube. The gasket should not extend into the groove on either tube.

**NOTE:** VdS - Roll Grooving Approval Specifications, see the Technical Data/ Install Instructions section on Anvil's web site - [www.anvilintl.com](http://www.anvilintl.com)

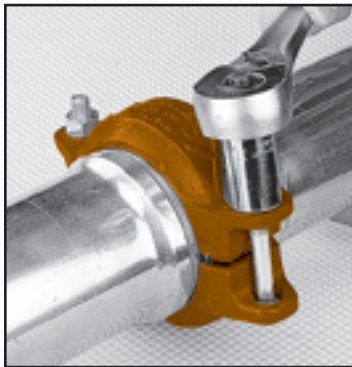
**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

## FIG. 7400, CONT'D.

### RIGIDLITE® COUPLING



**4 Housings**— Remove one nut and bolt and loosen the other nut. Place one housing over the gasket, making sure the housing keys fit into the tube grooves. Swing the other housing over the gasket and into the grooves on both tubes, making sure the tongue and recess of each housing is properly mated. Re-insert the bolt and run-up both nuts finger tight.



**5 Tighten Nuts**— Securely tighten nuts alternately and equally to the specified bolt torque, keeping the gaps at the bolt pads evenly spaced.

**CAUTION:** Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.

**6 Assembly is completed**— Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have equal gaps on each side of the coupling.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

**FIG. 7003**

HINGELOK™ COUPLING



**1 Check & lubricate gasket—** Check gasket to be sure it is compatible for the intended service. Apply a thin coating of Gruvlok lubricant to outside and sealing lips of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.



**2 Gasket Installation—** Slip the gasket over the pipe end making sure the gasket lip does not overhang the pipe end.



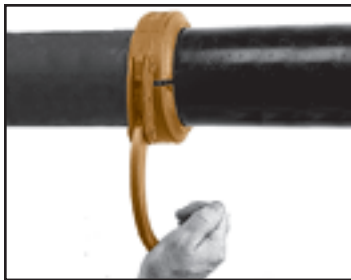
**3 Alignment—** After aligning the two pipe ends, pull the gasket into position centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe.

## FIG. 7003, CONT'D.

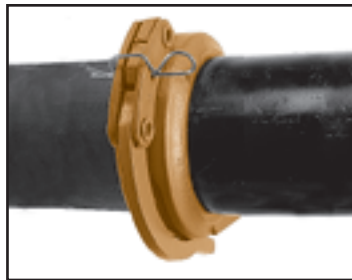
### HINGELOK™ COUPLING



**4 Housings**— Put one half of the open coupling over the gasket as the coupling keys fit firmly into the grooves on each pipe end. Swing the other half of the coupling into position around the gasket and into the grooves.



**5 Lock coupling**— Fit the nose of the locking handle in the notch of the opposite housing. Press firmly down on the handle until it makes contact with the coupling housing. Insert locking pin into handle linkage to secure handle in closed position. (See Caution.)



**6 Assembly is completed**— Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves and the bolt pads are in firm even metal-to-metal contact on both sides of the coupling.

#### CAUTION:

- 1) Hammering or banging on the handle or coupling housing could cause serious damage to the locking device and coupling assembly. The result may be an unsuitable pipe joint and unusable coupling assembly.
- 2) Care needs to be taken so that fingers do not get caught or pinched when handle is placed in locked position as a result of cam action of handle assembly.
- 3) When re-using coupling and gasket, always inspect gasket for damage and hinge/handle assembly for looseness, distortion or any other damage.

**FIG. 7010**

## REDUCING COUPLING



**1 Check & lubricate gasket—** Check gasket to be sure it is compatible for the intended service. Apply a thin coating of Gruvlok lubricant to outside and sealing lips of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.



**2 Gasket Installation—** Place the smaller opening of the gasket over the smaller pipe. Angle the gasket over the pipe end and pull the gasket lip open around the circumference of the pipe. The center leg of the gasket should make flush contact with the pipe end and will prevent telescoping of the smaller pipe inside the larger.



**3 Alignment—** Align the adjoining pipe center lines, and insert the larger pipe end into the gasket. Angle the pipe end slightly to the face of the gasket and tilt the pipe into the gasket and tilt the pipe into the gasket to ease assembly.

**NOTE:** VdS - Roll Grooving Approval Specifications, see the Technical Data/ Install Instructions section on Anvil's web site - [www.anvilintl.com](http://www.anvilintl.com)

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

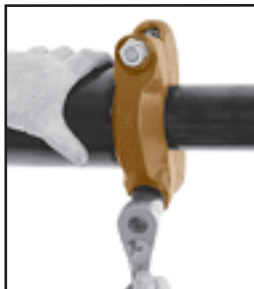


## FIG. 7010, CONT'D.

### REDUCING COUPLING

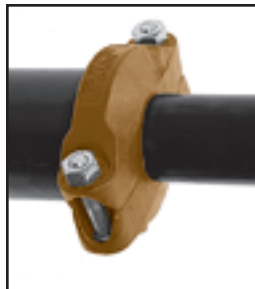


**4 Housings**— Place the coupling housing halves over the gasket making sure the housing keys engage the grooves. Insert bolts and turn nuts finger tight.



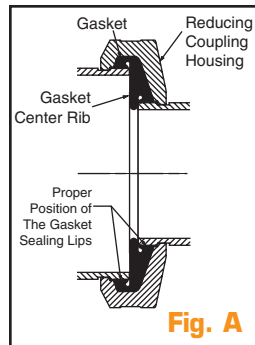
**5 Tighten Nuts**— Tighten the nuts alternately and equally to the specified bolt torque. The housing bolt pads must make metal-to-metal contact.

**CAUTION:** Uneven tightening may cause the gasket to pinch.



**6 Assembly Complete**— Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves and the bolt pads are in firm even metal-to-metal contact on both sides of the coupling.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.



**NOTE:** Fig. A illustrates the correct position of the Fig. 7010 Reducing Coupling gasket and housing properly assembled onto adjacent pipe ends.

**CAUTION:** In vertical installations the pipes must be supported to prevent telescoping during installation.

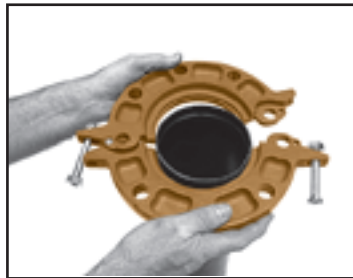
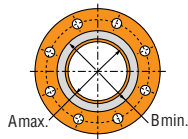
**FIG. 7012**

GRUVLOK FLANGE (2"-12")

**APPLICATIONS WHICH REQUIRE A GRUVLOK® FLANGE ADAPTER INSERT:**

1. When mating to a wafer valve (lug valve), if the valve is rubber faced in the area designated by the sealing surface dimensions (A Max. to B Min.), place the Gruvlok Flange Adapter Insert between the valve and the Gruvlok Flange.
2. When mating to a rubber-faced metal flange, the Gruvlok Flange Adapter Insert is placed between the Gruvlok Flange and the rubber-faced flange.
3. When mating to a serrated flange surface, a standard full-faced flange gasket is installed against the serrated flange face, and the Gruvlok Flange Adapter Insert is placed between the Gruvlok Flange and the standard flange gasket.
4. When mating to valves or other component equipment where the flange face has an insert, use procedure described in note 3.

Check pipe end for proper grooved dimensions and to assure that the pipe end is free of indentations and projections that would prevent proper sealing of the Gruvlok flange gasket.



**1** On the side without the hinge pin, loosen the latch bolt nut to the end of the bolt thread. (It is not necessary to remove the nut from the latch bolt.) Swing the latch bolt out of the slot. Open the Gruvlok Flange and place around the grooved pipe end with the key section fitting into the groove. The flange gasket cavity must face the pipe end.

**NOTE:** VdS - Roll Grooving Approval Specifications, see the Technical Data/ Install Instructions section on Anvil's web site - [www.anvilintl.com](http://www.anvilintl.com)

## FIG. 7012, CONT'D.

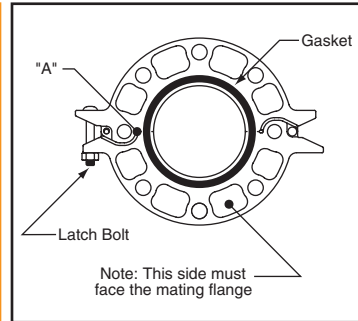
GRUVLOK FLANGE (2"-12")



**2** Place the latch bolt back into the slotted hole. Tighten the nut until there is a  $\frac{1}{16}$ " gap between the flange halves at location "A". (See Figure below)



**3** Check the gasket to assure that it is properly suited for the intended service. Lubricate the entire exterior surface of the gasket, including the sealing lips, using the proper Gruvlok lubricant.



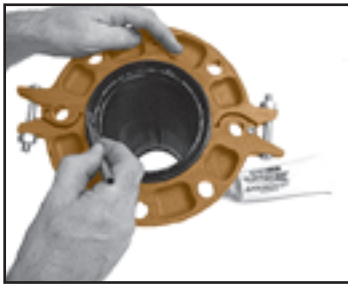
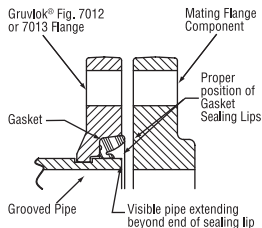
The Gruvlok Flange gasket must be inserted so that the sealing lips face toward the pipe end and the mating flange. The lip of the gasket, sealing on the pipe, should not extend beyond the pipe end. The pipe should extend out beyond the end of the sealing lip by approximately  $\frac{1}{8}$ " on the 2"-6" sizes and  $\frac{3}{16}$ " on the 8"-12" sizes.

FIG. 7012, CONT'D.

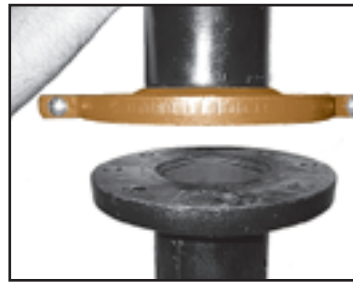
GRUVLOK FLANGE (2"-12")



**4** Stretch the Gruklok gasket around the pipe end and then press the gasket into the cavity between the pipe O.D. and the flange. The gasket must be properly positioned as shown in the figure below.



**5** With the gasket in place apply lubricant to the exposed gasket tip, which will seal on the mating flange. **Tighten the nuts on the latch bolts alternately to the specified latch bolt torque. The flange housings must be in firm metal-to-metal contact.**



**6** Verify that the mating flange face is hard, flat and smooth, free of indentations, which would prevent proper sealing of the Gruklok Flange gasket. Assure the gasket is still in the proper position and align Gruklok Flange bolt holes with the mating flange, pump, tank, etc., bolt holes.

**WARNING**

It is important to line up the bolt holes before bringing the two flanges together. Sliding the flanges into place will dislodge the gasket and cause leakage to occur. When using a flange insert, it is important that the insert is properly aligned with the gasket prior to tightening the bolts.

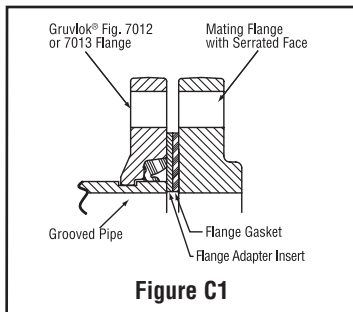
## FIG. 7012, CONT'D.

GRUVLOK FLANGE (2"-12")



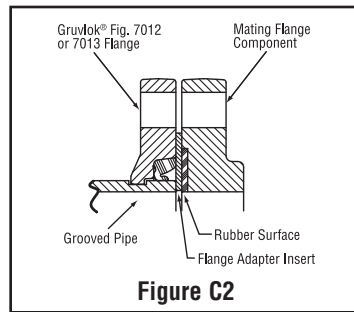
**7** Insert a flange bolt or stud with material properties of SAE J429 Grade 5 or higher through the bolt holes and thread a nut on hand tight. Continue this procedure until all bolt holes have been fitted. Tighten the nuts alternately and evenly so the flange faces remain parallel. All the bolts or studs must be torqued to the mating flange bolts specified torque. The flange faces should have metal-to-metal contact.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.



**NOTE:** The Gruvlok Fig. 7012 Flange requires the use of an Flange Adapter Insert when used against rubber surfaces (Figure C1), serrated flange surfaces or mating flanges with inserts (Figure C2). The Flange Adapter Insert will be exposed to the fluids in the system. Ensure that the Insert is compatible with the fluids in the systems and with adjacent piping components.

**CAUTION:** Proper torquing of flange bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.



### WARNING

Do not use a steel Flange Adapter Insert in copper systems or in systems where galvanic corrosion is possible.

**FIG. 7012**

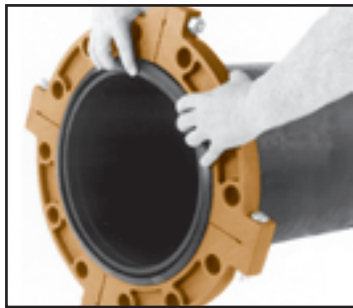
GRUVLOK FLANGE (14"–24")

Gruvlok® Flanges of 14" size and larger are cast in four segments to ease handling during assembly.



**1** Place each Gruvlok Flange segment around the grooved pipe with the key section fitting into the groove and the flange gasket cavity facing the pipe end. Loosely assemble the segments using the four segment-bolts-and-nuts. Alternately and equally tighten the latch bolts and nuts to the specified latch bolt torque bring the four flange segments into full, firm metal-to-metal contact.

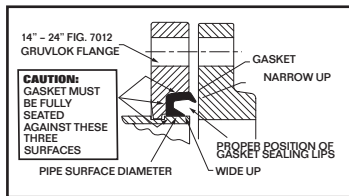
**NOTE:** An alternative method of assembly is to loosely preassemble two segments into two equal halves of the flange leaving a small gap (approximately 1/8") between the two segments of each flange-half. Place the flange halves around the pipe and complete the assembly as described in Step 1, above.



**2** Check the gasket grade to verify that it is properly suited for the intended service. Lubricate the entire surface of the gasket and the flange cavity using the appropriate Gruvlok Lubricant. The gasket may be shipped with the sealing lips facing outward. If so, it will be necessary to rotate the gasket so the narrow gasket lip (marked, "This face towards mating flange" on the 16"-24" sizes) is facing out as shown in figure Step 3. Place the Gruvlok Flange Gasket around the pipe end by pressing the gasket into the cavity between the pipe O.D. and flange recess. Move around the gasket in both directions until the gasket is fully seated in the flange gasket cavity.

## FIG. 7012, CONT'D.

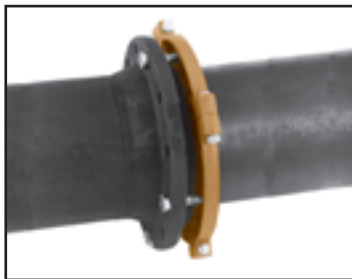
### GRUVLOK FLANGE (14"-24")



**3** The correct position and relationship of the components of the Gruklok Flange assembly is shown in the Figure above. The wide gasket lip must seal on the pipe surface diameter and the narrow gasket lip must face the mating flange. Be careful that foreign particles do not adhere to lubricated surfaces.

**NOTE:** Design of the Gruklok Flange provides sealing only with the special Gruklok Flange gasket. Only Gruklok Flange gaskets may be used with Fig. 7012 flanges.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.



**4** Align the Gruklok Flange bolt holes with mating flange bolt holes. Insert a flange bolt or stud with material properties of SAE J429 Grade 5 or higher through the bolt holes and thread a nut on hand tight. Insert the next bolt or stud opposite the first and again thread the nut on hand tight. Continue this procedure until all bolt holes have been fitted. Insertion of the flange bolts prior to contact of the flanges will help in the alignment of the flanges. Pull the two flanges into contact using care to assure that the gasket remains fully seated within the gasket cavity during assembly.

**NOTE:** Take care to assure that the gasket lip is not bent backwards and pinched between the two flanges.



**5** Tighten the nuts evenly to the specified mating face bolt torque so that the flange faces remain parallel and make firm even contact around the entire flange.

**CAUTION:** Proper torquing of flange bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

**FIGURE 7042**

## OUTLET COUPLING

These instructions are based on pipe grooved in accordance with Gruvlok® grooving specifications. Check pipe ends for proper groove dimensions and to assure that the pipe ends are free of indentations and projections which would prevent proper sealing.

ALWAYS USE A GRUVLOK LUBRICANT FOR PROPER COUPLING ASSEMBLY. Thorough lubrication of the gasket is essential to prevent pinching and possible damage to the gasket.



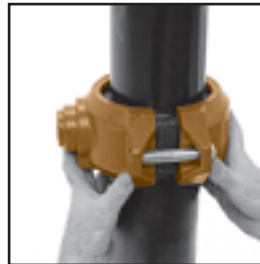
**1 Check & lubricate gasket**—Check gasket to be sure it is compatible for the intended service. Apply a thin coating of Gruvlok lubricant to outside and sealing lips of the gasket. Be careful that foreign particles do not adhere to lubricated surfaces.



**2 Gasket Installation**—Slip the gasket over one pipe end making sure the pipe abuts the gasket's center ribs.



**3 Alignment**—Align the pipe ends and pull the pipe into the gasket until the center ribs are in contact with the pipe ends. The gasket should not extend into the groove on either pipe. Rotate the gasket to align the outlet of the gasket to the same direction as the branch outlet.

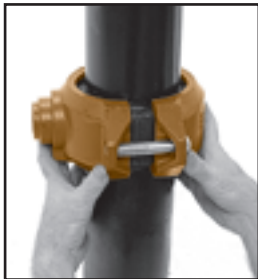


**4 Housing Assembly**—With one nut and bolt removed and the other loosened, place one side of the housing over the gasket. Make sure the ribs on the outside of the gasket align with the recesses in the housing and the keys in the housing are in the grooves on both pipes. Swing the other housing over the gasket and into the grooves on both sides of the pipe. Make sure the recess in the outlet of the housing is properly aligned with gasket outlet.



## FIGURE 7042, CONT'D

### OUTLET COUPLING



**5 Tighten Nuts**—Reinsert the bolt and run-up both nuts finger tight. Securely tighten the nuts alternately and equally until they are completely tightened and there is no gap between the bolt pads. Continue tightening the nuts alternately and equally until the specified bolt torque is reached.

**CAUTION:** Make sure the ribs on the exterior of the gasket are enclosed in the housing recesses.



**6 Assembly is complete**

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

### FIG. 7042 – SPECIFIED BOLT TORQUE

Specified bolt torque is for the oval neck track bolts used on Gruvlok® couplings and flanges. The nuts must be tightened alternately and evenly until fully tightened.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

**FIGURE 7045 & 7046**

CLAMP-T® BRANCH OUTLETS

ALWAYS USE A GRUVLOK LUBRICANT FOR PROPER COUPLING ASSEMBLY.

Thorough lubrication of the gasket is essential to assist the gasket into the proper sealing position.

**1 Pipe Preparation**—Cut the appropriate size hole in the pipe and remove any burrs. Be sure to remove the slug from inside the pipe. Clean the gasket sealing surface within 5/8" of the hole and visually inspect the sealing surface for defects that may prevent proper sealing of the gasket.

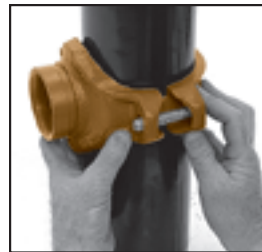


PIPE PREPARATION	
Branch Size (Inches)	Hole Saw Size (Inches) (+1/8, -0)
1/2, 3/4, 1	1 1/2
1 1/4, 1 1/2	2
2	2 1/2
2 1/2	2 3/4
3	3 1/2
4	4 1/2

**2 Check & lubricate gasket**—Check the gasket to be sure it is compatible for the intended service. Apply a thin layer of Gruvlok lubricant to the back surface of the gasket. Be careful that foreign particles do not adhere to the lubricated surfaces. Insert the gasket back into the outlet housing making sure the tabs in the gasket line up with the tab recesses in the housing.



**3 Gasket Installation**—Lubricate the exposed surface of the gasket. Align the outlet housing over the pipe hole making sure that the locating collar is in the pipe hole.



**4 Alignment**—Align the strap around the pipe, insert the bolts and tighten the nuts finger tight. Some sizes use a U-bolt design.

## FIGURE 7045 & 7046, CONT'D.

### CLAMP-T<sup>®</sup> BRANCH OUTLETS



**5 Tighten nuts**—Alternately and evenly tighten the nuts to the specified bolt torque.



**6 Assembly is complete**

### FIGS. 7045 & 7046—SPECIFIED BOLT TORQUE

Specified bolt torque is for the oval neck track bolts and U-bolts used on the Gruvlok<sup>®</sup> Clamp-T's. The nuts must be tightened alternately and evenly until fully tightened.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

**FIGURE 7044**

BRANCH OUTLET



**1 Pipe Preparation and Gasket Lubrication**— Cut a  $\frac{13}{16}$ " hole in the pipe and remove any burrs. Be sure to remove the slug from inside the pipe. Clean the gasket sealing surface within  $\frac{5}{8}$ " of the hole and visually inspect the sealing surface for defects that may prevent proper sealing of the gasket. Remove the gasket from the housing and apply a thin layer of Gruvlok<sup>®</sup> lubricant to the back surface of the gasket. Be careful that foreign particles do not adhere to the lubricated surfaces. Insert the gasket back into the outlet housing making sure the tabs in the gasket line up with the tab recesses in the housing.



**2 Gasket Installation**— Lubricate the exposed surface of the gasket with Gruvlok<sup>®</sup> lubricant.



**3 Alignment**— Align the outlet housing over the pipe hole making sure that the locating collar is in the pipe hole.

## FIGURE 7044, CONT'D.

### BRANCH OUTLET



**4 Housing Assembly—** Attach the U-bolt from the other side and fasten the nuts finger tight.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.



**5 Tighten Nuts —** Making sure the fitting is properly located over the pipe hole, tighten the nuts alternately and evenly to the specified torque of 27 to 33 Lbs.-Ft. (37 to 45 N-M).



**6 Assembly is Complete** — Visually inspect the assembly, the gasket will extrude out from under the housing.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

ALWAYS USE A GRUVLOK LUBRICANT FOR PROPER BRANCH OUTLET ASSEMBLY. Thorough lubrication of the gasket is essential to assist the gasket into the proper sealing position.

**FIGURE 7005**

ROUGHNECK® COUPLING

**1** Make certain the pipe ends are free of indentations, projections, weld splatter, or other imperfections which could prevent proper sealing of the gasket.



**2** Mark each pipe at a distance from the pipe end according to the pipe run size. See the chart.



**3** Check the gasket color code to verify that the gasket grade is properly suited for the intended service. Apply a thin coating of Gruvlok Lubricant to the gasket lips and outside of the gasket and slip the gasket over one pipe. Make sure the gasket does not overhang the pipe end.

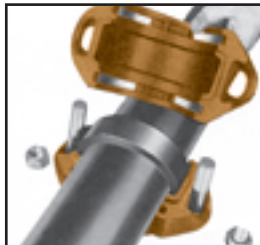
**4** Align the second pipe and while holding the pipe in the butted position slide the gasket back over the second pipe end. The gasket should be equally spaced between the lines scribed on each pipe.

Pipe Size	Distance from pipe end for mark	Bolt Torque	
		Min.	Max.
In.	In.	(Ft.-lbs.)	(Ft.-lbs.)
2-2½	1	150	190
3-4	1	200	250
5-8	1¼	250	300
10	1¾	500	600
12	1¾	550	700
14-16	1¾	550	700

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

## FIGURE 7005

### ROUGHNECK® COUPLING



**5** Place each half of the Roughneck coupling over the gasket, making sure that the tongue on one housing half is aligned with the recess on the other housing half.



**6** Tighten the nuts alternately and uniformly until the required bolt torque is reached. See chart on previous page for bolt torque.

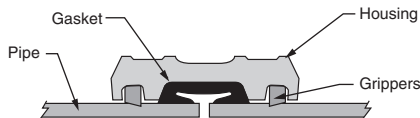
**7** Reinstallation after a disassembly will require that the threads on the bolt and in the nut are clean and lubricated with a light oil.

**NOTE:** Torque requirements must be met and housing halves must be assembled with equal gaps between bolt pads.

Working pressure and end load are based on a properly assembled Roughneck coupling with bolts fully torqued to the above specifications, on plain-end or beveled standard wall steel pipe and Gruvlok Plain-End Fittings. Roughneck Couplings are designed to be used on plain-end pipe and Gruvlok Plain-End Fittings only. For externally coated pipe applications, contact Gruvlok.

Not recommended for use on steel pipe with a hardness greater than 150 Brinell, plastic, HDPE, cast iron or other brittle pipe.

\*Bolt torque ratings shown must be applied at installation.



**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

FIGURE 7305

## HDPE COUPLING



**1** Make certain the pipe ends are free of indentations, projections or other imperfections, which could prevent proper sealing of the gasket. Mark each pipe at a distance from the end of the pipe according to the pipe size:

Size Inches	Distance to Mark
2-4" (51 - 102 mm)	1" (25.4 mm)
5-8" (127 - 203 mm)	1 <sup>1</sup> / <sub>4</sub> " (31.8 mm)
10&12" (254 - 305 mm)	1 <sup>3</sup> / <sub>4</sub> " (44.5 mm)

**NOTE:** Make certain the HDPE pipe end is square cut to 1/8" maximum for the 2" to 4" and 5/32" maximum for the 6" and larger sizes.



**2** Check to assure the gasket material is acceptable for the intended service. The Gasket color code is green for EPDM and orange for Nitrile (Buna-N).

**CAUTION:** Use only Gruvlok Xtreme™ Lubricant with HDPE pipe products. Gruvlok Xtreme™ Lubricant contains silicone. If silicone is unacceptable for the application contact Gruvlok for the lubrication recommendation. Apply a thin coating of Gruvlok Xtreme™ Lubricant to the gasket lip and outside surface of the gasket.



**3** Slip the gasket over one of the pipe ends. Make sure the gasket does not overhang the pipe end. Align the second pipe and while keeping the pipes in the butted position slide the gasket back over the second pipe end. The gasket must be positioned centrally between the lines on the pipe ends.

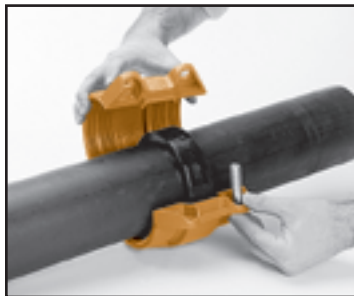
**WARNING**

- The gasket temperature rating may exceed the manufacturer's temperature rating for the HDPE pipe. Consult the HDPE pipe manufacturer for the temperature and pressure ratings.



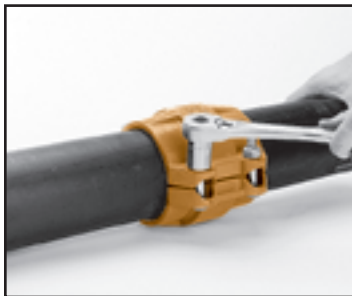
## FIGURE 7305, CONT'D

### HDPE COUPLING



**4** Place the Figure 7305 housing casting over the gasket, making sure the tongue on one casting is aligned with the recess of the other casting.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.



**5** Insert the bolts and secure the nuts alternately and uniformly until the bolt pads are in contact. Torque all bolts to the required bolt torque levels. Refer to the Specified Bolt Torque Table. There is no gap between the bolt pads and the bolt torque should be within the range given when the coupling is properly assembled. Alternate and even tightening of the bolts will significantly reduce the torque needed to close the gap at the pipe joint.

### SPECIFIED BOLT TORQUE

Specified bolt torque is for the oval neck track bolts used on Gruvlok® couplings. The nuts must be tightened alternately and evenly until fully tightened.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

## FIGURE 7307

## HDPE TRANSITION COUPLING



**1** Make certain the HDPE pipe end is square cut to  $\frac{1}{8}$ " maximum for the 2" to 4" and  $\frac{5}{32}$ " maximum for the 6" and larger sizes. The steel pipe must be grooved in accordance with Gruvlok® Grooving Specifications for Steel Pipe. The pipe ends must be free of scratches, indentations, projections or other imperfections, which could prevent proper sealing of the gasket.



**2** Check to assure the gasket material is acceptable for the intended service. The Gasket color code is green for EPDM and orange for Nitrile (Buna-N).

**CAUTION:** Use only Gruvlok Xtreme™ Lubricant. Gruvlok Xtreme™ Lubricant contains silicone. If silicone is unacceptable for the application contact Gruvlok for the lubrication recommendation. Apply a thin coating of Gruvlok Xtreme™ Lubricant to the gasket lips and outside surface of the gasket.



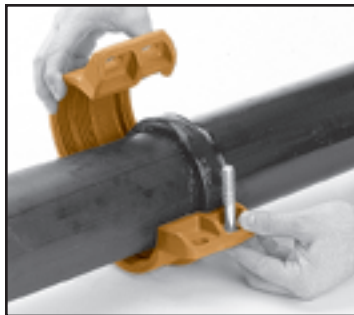
**3** Slip the gasket over one of the pipe ends. Make sure the gasket does not overhang the pipe end. Align the second pipe and while holding it in the butted position, slide the gasket back over the second pipe end. The gasket must be positioned on the gasket seat surface of the grooved steel pipe. Make sure the gasket does not overhang into the pipe groove.

 **WARNING**

- The gasket temperature rating may exceed the manufacturer's temperature rating for the HDPE pipe. Consult the HDPE pipe manufacturer for the temperature and pressure ratings.

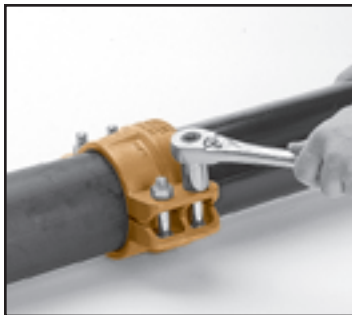
## FIGURE 7307, CONT'D

### HDPE TRANSITION COUPLING



**4** Place each half of the coupling housing over the gasket, making sure the housing grooved end is directed into the pipe groove.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.



**5** Insert the bolts and secure the nuts alternately and uniformly until the bolt pads are in contact. Torque all bolts to the required bolt torque levels. Refer to the Specified Bolt Torque Table. There is no gap between the bolt pads and the bolt torque should be within the range given when the coupling is properly assembled. Alternate and even tightening of the bolts will significantly reduce the torque needed to close the gap at the pipe joint.

### SPECIFIED BOLT TORQUE

Specified bolt torque is for the oval neck track bolts used on Gruvlok® couplings. The nuts must be tightened alternately and evenly until fully tightened.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

**FIGURE 7312****HDPE FLANGE ADAPTER**

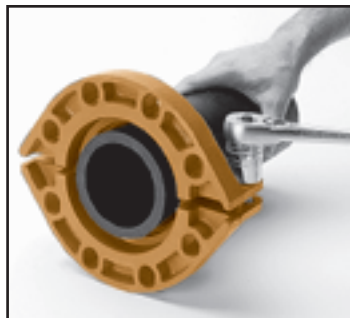
**1** Make certain the pipe end is square cut to  $\frac{1}{8}$ " maximum for the 4" and  $\frac{5}{32}$ " maximum for the 6" and 8" sizes. Inspect the surface of the mating flange to be assured the surface is free of dimensions of the mating flange to be assured that the scratches, indentations, projections, or other imperfections, which could prevent proper sealing of the gasket.

**2** Check to assure the gasket material is acceptable for the intended service. The gasket color code is green for EPDM and orange for Nitrile (Buna-N).

**CAUTION:** Use only Gruvlok Xtreme™ Lubricant with HDPE pipe Products. Gruvlok Xtreme™ Lubricant contains silicone. If Silicone is unacceptable for the application contact Gruvlok for the lubrication recommendation. Apply a thin coating of Gruvlok Xtreme™ Lubricant to the gasket lips and outside surface of the gasket.



**3** Place the housing over the end of the pipe and using a straight edge, align the face and the flange face with the end of the pipe. Do not let the pipe extend beyond the flange face.



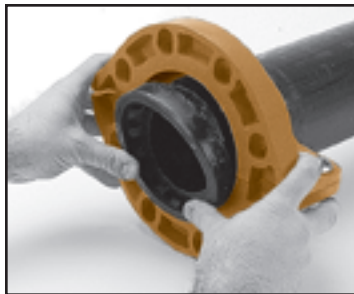
**4** Tighten the housing nut until the housing bolt pads make firm metal to metal contact. Torque all bolts to the required latch bolt torque levels. Refer to the Specified Latch Bolt Torque Table.

**WARNING**

- The gasket temperature rating may exceed the manufacturer's temperature rating for the HDPE pipe. Consult the HDPE pipe manufacturer for the temperature and pressure ratings.

## FIGURE 7312, CONT'D

### HDPE FLANGE ADAPTER



**5** Position the Gruvlok Flange gasket around the pipe end and press the gasket into the flange gasket pocket. Be sure the flange sealing lips are facing out.

**6** Align the Gruvlok Flange bolt holes with the mating flange bolt holes. Insert a standard bolt or stud through one bolt hole and thread the nut on hand tight. Insert the next bolt or stud opposite the first and thread the nut on hand tight. Continue this procedure until all holes have been fitted. Note: Take care to assure the gasket lip is not bent backwards and pinched between the two flanges.



**7** Tighten the flange face nuts alternately and evenly so that the flange faces remain parallel and make firm contact around the entire flange. Torque all bolts to the required mating flange joint torque levels. Refer to the Specified Mating Flange Bolt Torque Table.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

### SPECIFIED BOLT TORQUE FOR LATCH & MATING FLANGE BOLTS

Specified bolt torque is for the latch and mating flange bolts used on Gruvlok® flanges. The nuts must be tightened alternately and evenly until fully tightened.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury. See page 200 for bolt torque information.

GRUVLOK SOCK-IT<sup>®</sup> FITTING

**1** Pipe surface shall be cleaned at least 1" from the end of the pipe to remove any coating, indentations, projections, and sharp edges which could affect proper gasket sealing. As a guide for installation, mark the pipe at a distance of 1<sup>1</sup>/<sub>2</sub>" from the end for 1", 1<sup>1</sup>/<sub>4</sub>", and 1<sup>1</sup>/<sub>2</sub>" size fittings and 1<sup>3</sup>/<sub>4</sub>" for the 2" & 2<sup>1</sup>/<sub>2</sub>" size fittings.

**NOTE:** When Allied XL pipe is used it is necessary only to remove sharp edges and burrs at the end of the pipe. No additional cleaning is required.



**2** Check all lock bolts to be sure they do not extend into the I.D. of the Sock-It Fittings as this would prevent proper insertion of the pipe.



**3** Apply a light coating of GRUVLOK Lubricant to the gaskets located in each end of the Sock-It Fitting. Also apply a light coating of lubricant to the pipe ends to further ease insertion of the pipe into the Sock-It Fitting.

**NOTE:** Use only Gruvlok Lubricants. Other lubricants may affect gasket performance.



**4** Insert the prepped and lubricated pipe end into the Sock-It Fitting until the pipe end makes contact with the internal pipe stop. A slight twist while pushing fitting and pipe together will ease the required insertion force. The end of the Sock-It Fitting should be within  $\frac{1}{16}$ " from the edge of the marking on the pipe. (See Step 1). Rotate the fitting until the desired position is obtained. Tighten the lock bolt until the bolt head bottoms against the threaded boss. (NOTE: The  $2\frac{1}{2}$ " Sock-It fitting has 2 locking bolts for each pipe end.)

Install the other prepped and lubricated pipe end into the Sock-It fitting in the same manner.

**CAUTION:** Do NOT hammer fitting on.



**5** Sock-It Fittings may be removed by loosening the lock bolts. Re-installation may be accomplished as described in Steps 1-4.

**WARNING:** System pressure must be relieved and vented, and the system drained of fluid prior to loosening the lock bolts to remove or reposition the Sock-It Fitting.

Bolt end must be inspected to assure bolts ability to cut into pipe. Replace bolts in cases where bolt end sharpness has been comprised.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

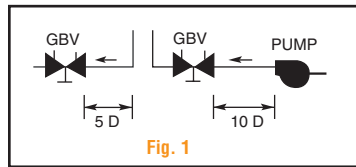
## FIGURE GBV-S & GBV-T

### CIRCUIT BALANCING VALVES

**1** Clean the system piping of debris (pipe scale, rust, welding slag) and other contaminants. As with any water system it is important to make provisions to keep the system clean. For optimum operation, air entrapment in the fluid must be removed.

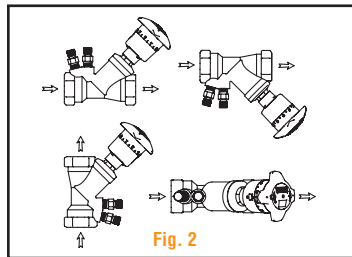
**2** The operation of the valve is dependent on the fluid characteristics such as specific gravity and viscosity, which vary with the fluid temperature. For installations using fluids other than 100% water, flow rates must be corrected for the changes created by the fluid medium. See [www.anvilintl.com](http://www.anvilintl.com) for appropriate correction factors, or call your local Anvil representative.

**3** To ensure accuracy of measurement Circuit Balancing Valves (GBV's) should be located at least five pipe diameters downstream from any fitting and at least ten pipe diameters downstream from a pump (as illustrated in Fig. 1).



**4** All GBV's are marked with an arrow on the valve body to indicate direction of flow. The arrow must point in the direction of flow for proper operation.

**5** GBV's may be installed in horizontal or vertical piping (as illustrated in Fig. 2). Provisions must be made for easy access to the probe metering ports (PMP's), reading scale, and memory stop.



### GBV-S - SWEAT (SOLDER) CONNECTIONS:

**6** GBV-S models are supplied with sweat style connections. Caution should be used when sweat style connection valves are installed to prevent overheating the valve.

**7** Solder the valve body in line using 95/5 (95% tin, 5% antimony) type solder or equal. Always follow local plumbing codes for installation best practices.

**CAUTION:** Before soldering, ensure the valve is opened at least one full turn to avoid damage to the sealing O-ring due to overheating. Anvil recommends that the GBV be protected during installation by wrapping a damp rag around the handle / bonnet assembly prior to soldering the valve into the line.

### GBV-T - NPT THREADED CONNECTIONS

**6** GBV-T models are tapped with NPT threaded connections. All threaded connections should be sealed using an approved pipe sealant per industry standards. Once the GBV installation has been completed and the system has been filled and purged, each valve loop must be adjusted to the correct flow setting. Employ piping best practice when engaging pipe to threaded valves. Overtightening when installing valves may result in fracturing of the valve body at the threads. (Go to Step 8)



## FIGURE GBV-S & GBV-T, CONT'D

### CIRCUIT BALANCING VALVES

**WARNING:** Anvil does NOT recommend leak testing an HVAC system with air due to safety concerns. Testing HVAC systems with pressurized air can be dangerous due to the high compressibility of air, as compared to water.

#### OPERATION:

**8** Valves are circuit balancing valves that are selected to deliver the correct flow in a piping circuit based on line size and design flow rate.

**9** To set the system flow, adjust the handwheel position until the differential pressure reading across the venturi corresponds to the required GPM.

**10** The valve operates from fully open to closed by a clockwise rotation of the orange handwheel using five 360° turns. Two indicators describe the position of the valve: the handwheel turns dial and the micrometer scale.

#### • “Handwheel Turns” Dial:

This dial is printed on the outer surface of a gearing mechanism located inside the lower half of the handle assembly (Fig.

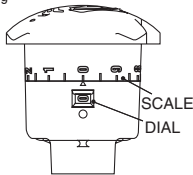
6). Each complete 360° revolution of the handwheel is visible through a display window and is scaled 0 - 5 to indicate the valve position in terms of the number of full turns. (Fig. 3)

#### • Micrometer Scale:

This scale is marked 0 - 9 and is located on the upper half of the handle assembly. Each mark represents  $\frac{1}{10}$ th of a full, 360° turn of opening when lined up with an arrowhead symbol, located above the handwheel turns display window. (Fig. 3)

**Fig. 3:** GBV setting

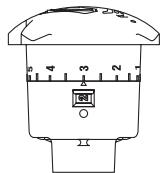
of 0.0 indicates that the valve is closed. Both the handwheel turns dial and the micrometer scale indicate a valve position reading of 0.



**11** The valve is considered “zeroed” when fully closed hand tight. The “0” on the micrometer scale should be within one half of

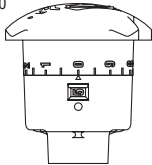
$\frac{1}{10}$ th of a turn of the arrowhead symbol when the valve is closed hand tight. **DO NOT USE A WRENCH ON THESE VALVES – THEY SHOULD BE OPENED AND CLOSED HAND-TIGHT ONLY!**

**Fig. 4:** GBV setting of 2.3 indicates that the valve is partially open (2.3 turns open).



**Fig. 5:** GBV setting of 5.0 indicates that the valve is fully opened.

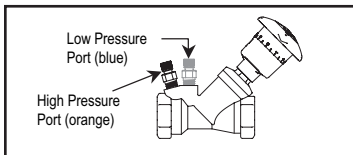
In some cases, the valve may open as much as 5.3 turns, due to the depth of the stem threads. This is not a problem with the valve; however, the performance curves for these GBVs are calibrated only to 5.0 turns.



## FIGURE GBV-S & GBV-T, CONT'D

### CIRCUIT BALANCING VALVES

**CAUTION:** Hot water leakage can occur from metering ports (P.M.P.'s) during probe insertion and hookup of metering device. Wear protective eyewear and clothing to prevent personal injury when measuring pressure.



**12** Connect pressure measuring device to the GBV metering ports as follows:

- Remove protective cap from metering ports ( $1/4$ " NPT connection).

- Insert the meter probe into the metering ports. The hose with orange fitting, up stream; the hose with blue fitting downstream.

**CAUTION:** When inserting probe, do not bend, as this will cause permanent damage to the probe, adversely affecting the pressure measurement. Do not use any lubrication on the probes when inserting them. If necessary, simply wet the probes with clean water.

The probe should not be left inserted into the fitting for prolonged periods of time, overnight, etc., as leakage of the P.M.P. may occur when the probe is removed.

The locking nut on the probe is designed to hold it in the P.M.P. when taking readings. As sealing is accomplished internally on the probe stem, it is only necessary to tighten the locking nut FINGER-TIGHT. Over-tightening may cause damage to the P.M.P. or locking nut threads.

**13** Before taking a measurement reading, set the valve to its fully open position (5.0) or at a preset position. Read the pressure drop across the venturi with a digital meter. Determine flow rate by use of venturi Cv performance curves on page 4 or the Anvil Balancing Slide Rule.

**14** The handle of the GBV is not designed to be removable. Do not try to take it off

the valve, or it may become damaged. If for any reason, the handle is damaged, replace the entire handle / stem assembly with the appropriate replacement part indicated in the table below.

**Table 1**

PART NUMBER	SIZE
871158-010	$1/2$ "
871158-011	$3/4$ "
871158-012	1"
871158-013	$1 1/4$ "
871158-014	$1 1/2$ "
871158-015	2"

### MEMORY SETTING:

**15** After valve has been properly adjusted and without moving the handwheel, the locking memory stop should be set. The memory stop will allow the valve to be fully closed for isolation and then reopened to the preset flow position.

**16** Insert a 2.5 mm (or  $3/32$ " ) Allen key through the hole provided in the valve's handle cap. (Fig. 6)

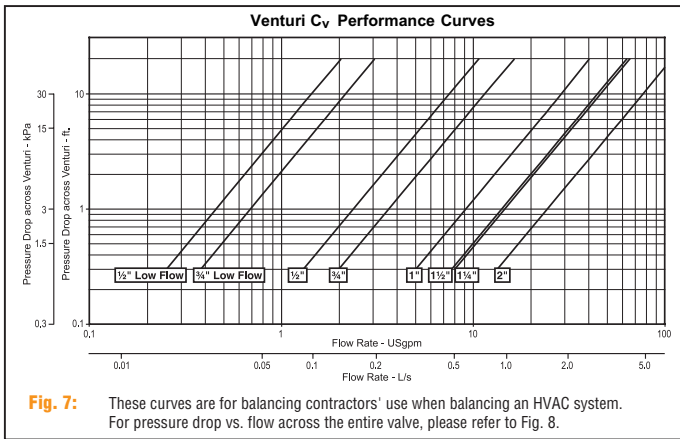
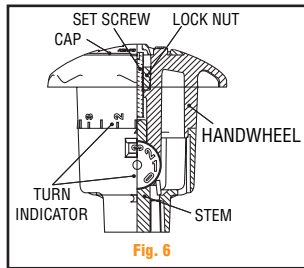
**17** Turn the setscrew in a clockwise direction until it stops. It is not necessary to

## FIGURE GBV-S & GBV-T, CONT'D

### CIRCUIT BALANCING VALVES

tighten. The memory has now been set. This establishes the maximum opening position for this particular valve.

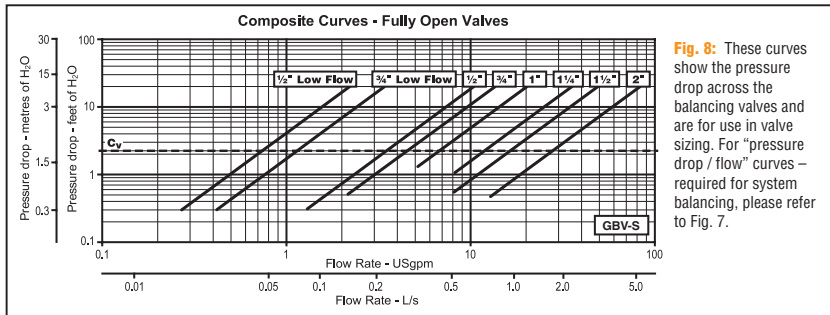
**18** The valve may now be closed tightly, as needed, for isolating the piping during system maintenance. To return the valve to its preset “balanced” position, simply open the valve by turning the handwheel counterclockwise until the handle stops turning (the valve stem inside the handle has hit the memory setscrew). **DO NOT APPLY EXCESSIVE FORCE WHEN REOPENING THE VALVE – OPEN ONLY UNTIL THE VALVE STOPS TURNING UNDER “HAND TIGHT” CONDITIONS. DO NOT USE A WRENCH TO OPEN, CLOSE, OR TIGHTEN VALVES.**



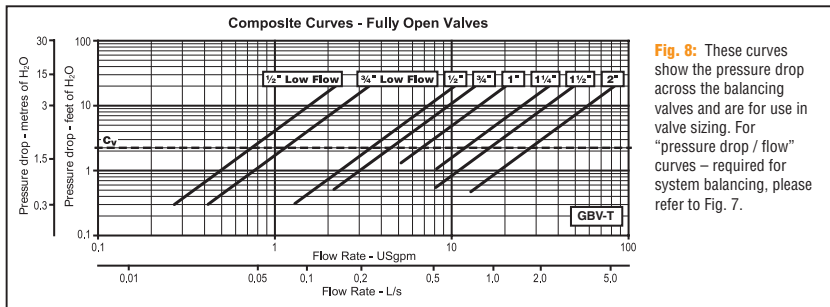
See next two pages for Fig. 8 for both the GBV-S & GBV-T and a troubleshooting chart

FIGURE GBV-S & GBV-T, CONT'D

CIRCUIT BALANCING VALVES



**Fig. 8:** These curves show the pressure drop across the balancing valves and are for use in valve sizing. For “pressure drop / flow” curves – required for system balancing, please refer to Fig. 7.



**Fig. 8:** These curves show the pressure drop across the balancing valves and are for use in valve sizing. For “pressure drop / flow” curves – required for system balancing, please refer to Fig. 7.

## FIGURE GBV-S & GBV-T, CONT'D

CIRCUIT BALANCING VALVES

### TROUBLESHOOTING:

Symptom	Likely Cause	Solution
<b>1. Valve is leaking:</b>		
• At the bonnet / body joint	Bonnet O Ring has been damaged.	Remove the handle / stem assembly and replace with the appropriate replacement part indicated in Table 1.
• At the pipe connection	If solder joint - the joint has failed, or was not soldered properly.	Re-solder the connection and recheck for leakage.
	If threaded - the connection is not sufficiently tight, or	Tighten and recheck for leakage.
	the valve was over-tightened during installation and the valve body has cracked (fractured).	Remove and reinstall a new valve, being careful not to over-tighten.
<b>2. Valve does not shut off completely when closed (hand tight).</b>	The seat O ring has been deformed due to overheating during soldering.	Remove the handle / stem assembly and replace with the appropriate replacement part indicated in Table 1.

**FIGURE AF21-GG, AF21-GF & AF21-FF**

ANVILFLEX™ FLEX CONNECTORS

**Installation**

**1** Avoid torque. Do not twist the hose assembly during installation when aligning the bolt holes in a flange or in making up pipe threads. The utilization of lap joint flanges or pipe unions will minimize this condition.

**2** To install a thread end braided metal hose assembly unions must be used. Do not place wrenches on the braided portion or the collar of the braided metal hose assembly. Use care not to torque the braided metal hose assembly while tightening the union. It is recommended that two wrenches be used in making the union connection; one to prevent the hose from twisting and the other to tighten the coupling.

**3** Install the braided metal hose assembly with neutral face-to-face dimension as shown on the submittal drawing. Do not install a braided metal hose assembly compressed (bagged braid). The corrugated inner hose contains the fluid, the braid is designed to take the stress of system pressurization and contain the core.

**4** If the braided metal hose assembly must be installed with an initial offset then the maximum allowable movement is reduced by the amount of the initial deflection.

**5** Avoid over bending. The repetitive bending of a hose assembly to a radius smaller than the radius specified will result in early hose failure. Always provide sufficient length to prevent over bending and to eliminate strain on the hose assembly. Utilize sound geometric configurations that avoid sharp bends, especially near the end fittings of the assembly.

**6** Verify that the movements of the system are within the design parameters of the braided metal hose assembly being installed.

**7** Prevent out-of-plane flexing in an installation. Always install the hose assembly so that the flexing takes place in only one plane - - this being the plane in which the bending occurs

**8** The maximum system test pressure must not exceed 150% of the maximum rated working pressure as shown

**9** Check system pressure and temperature and do not exceed recommended performance limits. Operation beyond design limits will result in premature failure.

**10** The corrugated metal hose alloy must be chemically compatible with the media in the piping system. If in doubt as to suitability, refer to a Chemical Resistance Data table or contact your Gruvlok rep. for guidance.

**11** The flanges on a concentric increasing braided metal hose assembly have the bolt holes straddling the hose centerline. The mating flanges should also straddle the centerline to avoid torque on the braided metal hose assembly.

**12** When installing weld end, or sweat end, braided metal hose assemblies, or when welding in the area of a braided metal hose assembly, extreme care is necessary in ensure no weld spatter comes in contact with the braided hose sections.

## FIGURE AF21-GG, AF21-GF & AF21-FF, CONT'D

### ANVILFLEX™ FLEX CONNECTORS

**13** A piping system, which utilizes braided metal hose to absorb movement, must be properly anchored and/or guided. Always support the piping to prevent excessive weight from compressing the hose and relaxing the braid tension.

**14** Use care when handling the braided metal hose assembly during transportation, storage, and installation. The braided hose sections must not be allowed to bend, deflect, sag, or otherwise extend beyond their rated capabilities.

**15** The shipping sticks, on flanged units, are to keep the braided metal hose assembly in its neutral end-to-end dimension during shipping and installation. After installation, the shipping sticks should be removed.

### Maintenance

**1** The braided metal hose assembly should be inspected during routine maintenance to ensure there are no signs of external damage. Inspect for frayed or broken braid wires. Also inspect to ensure there is no damage to the hose. In the event that such damage is found, the braided metal hose assembly should be replaced.

**2** During system shutdown braided metal hose assembly should be examined to verify no thermal axial motion has occurred causing compression of the assembly.

**PROPER  
INSTALLATION**



**IMPROPER  
INSTALLATION  
PARALLEL**



**IMPROPER  
INSTALLATION  
COMPRESSED**



## RECOMMENDED INSTALLATION PROCEDURES

Merit Weld-Miser Tee-Let Welding Outlet Fittings are designed and manufactured to reduce the cost of installation from both the standpoint of labor required and energy consumed. In addition, by following the recommended installation procedures, many of the problems associated with installing welding outlet fittings on standard weight or light weight pipe are eliminated, including burn through and excessive shrinkage resulting in pipe distortion.

## RECOMMENDED HOLE SIZES

The hole cut in the branch or header pipe can be cut prior or subsequent to attachment of the Tee-Let. One advantage of cutting the hole after welding is that the pipe is left intact during welding thereby reducing shrinkage and possible distortion. If holes are cut prior to welding, as some codes require, then the following hole sizes are recommended. Note that the same hole diameter for a given outlet size is required for both Type A and Type C Tee-Lets 1-1½" larger.

## RECOMMENDED WELDING PROCEDURES

Merit Weld-Wiser Tee-Lets are designed to be installed on standard weight or light weight pipe with one weld pass on Type A outlet sizes from ½" through 2½" inclusive, and on Type C outlet sizes through 4". Moreover, the wall thickness at the weld end of the fitting approximately matches standard weight pipe. Accordingly, heat setting can be made to optimize penetration on both the fitting and the pipe which it is being welded. Aside from reducing the likelihood of burn through and distortion resulting from excessive heat, the amount of weld required for adequate penetration is significantly reduced.

Merit Tee-Lets are manufactured from continuous cast aluminum killed steel with a carbon range of from 0.05 to 0.25. Merit specifies that residuals, such as chrome, nickel and other metals resident in the scrap used for production of the steel be reported and kept to a minimum. On the other hand, certain grades of carbon steel pipe are manufactured from skelp whose

RECOMMENDED TEE-LET HOLE SIZES		
Tee-Let Size	Type	Recommended Hole Size
<i>In./mm</i>		<i>In./mm</i>
½ 13	Type A	⅝ 16
¾ 19	Type A	⅞ 22
1 25	Type A	1⅞ 28
1¼ 31	Type A	1½ 38
1¼ 31	Type C	1⅝ 35
1½ 38	Type A or C	1⅞ 41
2 50	Type A or C	2 50
2½ 63	Type A or C	2⅞ 61
3 75	Type A or C	3 75
4 100	Type A or C	4 100

Holes may be cut employing mechanical means—including hole sawing, mechanical flame cutting (oxy-acetylene or propane), and air plasma cutting (constricted tungsten arc) machines. Merit offers a simple approach to cutting the hole. Hand-held templates are sized to match your plasma cutter.

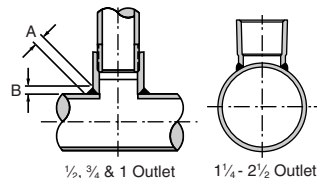


chemical composition is not specified. When the metal inert gas shield (MIG) welding process is employed, certain residuals may cause excessive porosity, spatter or lack of penetration. Specifically, gases released during the welding process do not escape before the molten puddle sets up.

When porosity or lack of penetration occurs, one approach is to slightly increase the heat in order to give the gases time to escape from the puddle. A flux cored wire can also be used. This wire contains scavengers which allow gases in the molten weld puddle to escape before the weld solidifies. The following recommended settings for welding therefore may need to be adjusted slightly higher if any of the above mentioned adverse conditions exist.

As a general rule, the weld should be only as hot as required to allow the weld to

penetrate the materials being welded while concomitantly allowing gases developed in the welding process to escape. Every effort must be made to avoid welding too hot or overheating both the pipe and the Tee-Let. **Excessive heat may cause the wrench tight threads (those in the bottom of the Tee-Let near the weld zone) to distort while also causing the branch pipe to bend.** It should be noted that Merit Tee-Lets have been subjected to exhaustive testing and evaluation, and only negligibly distort when subjected to excessive heat. The threads, on the other hand, may not return to their gauged form after cooling if excessive heat causes them to expand. The following is intended only as a guide, and assumes that the welding equipment is properly calibrated and functioning normally and the operator is qualified.



RECOMMENDED AMOUNT OF WELD		
Outlet Size	A	B
In./mm	In./mm	In./mm
1/2	1/4	3/16
13	7	5
3/4	1/4	3/16
19	7	5
1	1/4	3/16
25	7	5
1 1/4	1/4	3/16
31	7	5
1 1/2	5/16	1/4
38	8	7
2	5/16	1/4
50	8	7
2 1/2	5/16	1/4
63	8	7
3	3/8	5/16
75	10	5
4	3/8	5/16
100	10	5

**RECOMMENDED SETTINGS FOR MICROWIRE WELDING PROCESS, CONTINUED ON NEXT PAGE**

Header Size	Pipe Wall Thickness	Tee-Let Types A, B, C	Electrode Size	Welding Current	Arc. Volts	Wire Feed	Travel Speed
<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>		<i>AMPS-DC</i>	<i>POS.</i>	<i>IPM</i>	<i>IPM</i>
1¼ - 2 31-50	0.065 2	½ - 2	0.035	100-130	16-20	210	25-30
		13-50 2½ - 4 63-100	0.035	115-150	17-21	270	20-25
	0.109 3	½ - 2	0.035	110-140	18-22	220	25-30
		13-50 2½ - 4 63-100	0.035	120-160	19-22	290	20-25
2½ - 4 63-100	0.083 2.5	½ - 2	0.035	110-140	17-20	210	20-25
		13-50 2½ - 4 63-100	0.035	120-150	17-20	270	20-25
	0.120 3	½ - 2	0.035	120-160	19-22	290	20-25
		13-50 2½ - 4 63-100	0.035	130-160	19-22	240	20-25
5-6 125-150	0.109 3	½ - 2	0.035	120-150	17-20	210	20-25
		13-50 2½ - 4 63-100	0.035	130-150	18-20	270	15-20
		½ - 2	0.035	130-160	19-22	290	20-25
	0.134 3.5	13-50 2½ - 4 63-100	0.035	140-160	20-22	270	15-20
		2½ - 4 63-100	0.045	180-205	20-24	245	27-32

RECOMMENDED SETTINGS FOR MICROWIRE WELDING PROCESS, CONTINUED FROM PREVIOUS PAGE							
Header Size	Pipe Wall Thickness	Tee-Let Types A, B, C	Electrode Size	Welding Current	Arc. Volts	Wire Feed	Travel Speed
<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>		<i>AMPS-DC</i>	<i>POS.</i>	<i>IPM</i>	<i>IPM</i>
8 200	0.109 3	1/2 - 2 13-50	0.035	120-150	17-20	240	20-25
		2 1/2 - 4 63-100	0.035	130-150	18-20	260	15-20
		2 1/2 - 4 63-100	0.045	170-220	18-22	290	12-18
	0.148 3.5	1/2 - 2 13-50	0.035	130-160	19-22	240	20-25
		2 1/2 - 4 63-100	0.035	140-160	20-22	260	15-20
		2 1/2 - 4 63-100	0.045	180-225	20-24	290	12-18

### SHIELDING GAS FLOW (FOR ALL SIZES) 20-25 CFH

- 1.) CO<sub>2</sub> - Deeper penetration, faster welding, low cost.
- 2.) 25% - Argon, 75% - CO<sub>2</sub>, Recommended for .134 wall and lighter, high welding speeds without melthrough, minimum distortion and spatter, good penetration.

Merit assumes no liability for any consequential damages resulting from the improper use of its Tee-Let Welding Outlet Fittings, nor for any recommendations made with respect to installation procedures.

## ELIMINATOR ADJUSTABLE DROP NIPPLES

## INSTALLATION

- A) For use in wet and dry pipe automatic sprinkler systems installed in accordance with all applicable standards or codes. (See item 4)
- B) Before starting the job of making sprinklers into steel threads of the above fittings, count the number of fully developed male threads on the brand of sprinkler to be installed into the fittings. If seven (7) perfect threads are counted, the sprinkler should thread into the 1/2" or 3/4" thread from three (3) to four (4) threads hand tight. If five (5) to six (6) threads are counted, the sprinkler should thread into the 1/2" or 3/4" thread from two (2) to three (3) threads hand tight.
- C) Use an anaerobic pipe thread sealant for thread make-up. Apply pipe thread sealant only to male threads on the nipple and sprinkler only.
- D) If either of the above fails to allow the sprinkler to make-up to a minimum of from five (5) to six (6) full threads, do not overtighten the sprinkler. Instead back the sprinkler out of the fitting. Clean any debris and/or pipe sealant from both the male and female threads. Gauge both the male threads of the sprinkler and the female threads of the Adjustable Drop Nipple for compliance with ANSI B1.2.1. Specification for Tapered Pipe Threads. The same procedure would apply if a leak has been detected.

If within tolerance, reapply the anaerobic pipe sealant and make-up to the required length. Refer to the pipe chart on the back of

this card for correct make-up lengths. Allow twenty-four hours for setting.

- E) Connect the Adjustable Drop Nipple assembly to the sprinkler system by wrenching on the make-up area on the Drop Nipple **DO NOT WRENCH ON THE BARREL PORTION OF THE UNIT OR SPRINKLER.** Damage to the Adjustable Drop Nipple or Sprinkler may result.
- F) After the ceiling has been installed adjust the sprinkler to its final position by using the sprinkler wrench and assemble the escutcheon plate to the inner support ring. It is recommended that the system pressure be relieved when adjusting, however it is not necessary to drain the system.

## 1) GENERAL DESCRIPTION

Merit Eliminator Adjustable Drop Nipples Models "M" and "F" are the screw type consisting of an outer case which has one (1) inch N.P.T. or ISO-7 male or female thread on the inlet, and an inner case which has either a one-half inch (1/2") or a three-quarter inch (3/4") N.P.T. sprinkler connection. The inner case employs O-Ring Seals and adjusts either in or out over the range of the adjustment.

Merit Eliminator Adjustable Drop Nipples are designed for use in automatic fire sprinkler systems installed in accordance with all applicable standards or codes. (See item 4).

The purpose of these fittings is to allow for the final adjustment of the drop nipple between a branch line and a pendant sprinkler by eliminating the need to re-cut the existing drop nipple in order to fit-up flush to the ceiling. Merit Eliminator Adjustable Drop Nipples do not require any secondary locking following final adjustment and they will not extend as a result of vibrations or pressure surges in the system.

### 2) APPROVALS AND STANDARDS

Merit Eliminator Adjustable Drop Nipples are listed by the Underwriters Laboratories, Inc. (UL Listing Number 57SO) and approved by the Factory Mutual Research Corporation (FM). In addition, Model "M" and "F" Adjustable Drop Nipples are approved by the New York Board of Materials and Equipment Standard (BSA-886-86-5A) and verband der Schadenversicherer e.V., (Vds).

### 3) TECHNICAL DATA

Merit Adjustable Drop Nipples are rated for use at a maximum temperature of 300° F, and a maximum service pressure of 300 psi.

The approximate friction loss based on the Hazen and Williams Formula expressed in equivalent length of one (1) inch, schedule 40 pipe (where C= 120) is 1' for 1/2" outlet Model 'M', 2.6' for 3/4" outlet Model 'M', 4.2' for F1, 1.3' for F2, 1.5' for F3.150, and 2.9' for F3.175.

Merit Eliminator Drop nipples maximum sprinkler orifice size for Models M3.150, ME3.150, M1.150, and F3.150 is 17/32" and Models F1.150, F2.150, F3.175 and M3.175 is 5/8".

The inlet and outlet threads conform to ANSI B1.20.1 / ISO-7R/RC.

The O-Ring seals used in the manufacture are an ethylene propylene elastomer (EPDM). The outer and inner casings are manufactured from high strength carbon Steel.

All Model "M" and "F" Adjustable Drop Nipples are hydrostatically tested for o-ring integrity prior to shipment.

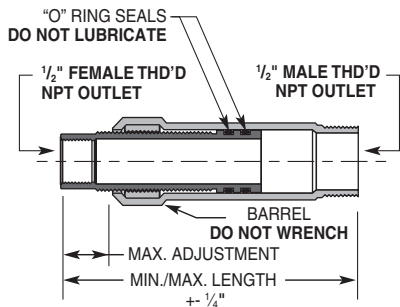
### 4) WARNING

Adjustable Drop Nipples described herein must be installed and maintained in compliance with this document as well as the applicable standards of the National Fire Protection Association in addition to the standards for any other authorities having jurisdiction. DO NOT USE ANY PETROLEUM BASED LUBRICANTS ON THE O-RING SEALS. Petroleum based lubricants are incompatible with EPDM and will impair serviceability of the unit.

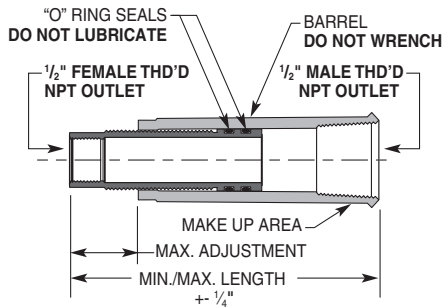
### 5) DIMENSIONAL DATA

See chartson next page.

## ELIMINATOR ADJUSTABLE DROP NIPPLES, CONT'D



Model M



Model F

### MODEL M DIMENSIONAL DATA

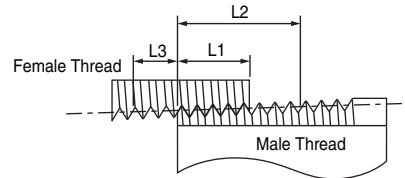
Model #	Inlet	Outlet	Min. Length	Max Length	Max. Adjust
	<i>In./mm</i>	<i>In./mm</i>	<i>in./mm</i>	<i>in./mm</i>	<i>in./mm</i>
M1.150	1 Male 25	1/2 Female 13	4 1/8 105	5 1/8 130	1 25
M3.150	1 Male 25	1/2 Female 13	6 1/8 156	9 1/8 232	3 76
ME3.150	1 Male 25	1/2 Female 13	7 7/8 200	10 7/8 276	3 76
M3.175	1 Male 25	3/4 Female 19	8 1/8 206	11 1/8 283	3 76

### MODEL F DIMENSIONAL DATA

Model #	Inlet NPT or DIN	Outlet NPT	Min. Length	Max Length	Max. Adjust
	<i>In./mm</i>		<i>in./mm</i>	<i>in./mm</i>	<i>in./mm</i>
F1.150	1 Female 25	1/2 Female 13	3 1/2 89	4 1/2 114	1 25
F2.150	1 Female 25	1/2 Female 13	4 1/2 114	6 1/2 165	3 76
F3.150	1 Female 25	1/2 Female 13	5 1/2 14	8 1/2 216	3 76
F3.175	1 Female 25	3/4 Female 19	7 5/16 186	10 5/16 262	3 76

## GENERAL ASSEMBLY OF THREADED FITTINGS

- 1) Inspect both male and female components prior to assembly.
  - Threads should be free from mechanical damage, dirt, chips and excess cutting oil.
  - Clean or replace components as necessary.
  
- 2) Application of pipe dope
  - Use a pipe dope that is fast drying, sets-up to a semi hard condition and is vibration resistant. Alternately, an anaerobic sealant may be utilized.
  - Thoroughly mix the thread sealant prior to application.
  - Apply a thick even coat to the male threads only. Best application is achieved with a brush stiff enough to force sealant down to the root of the threads.
  
- 3) Joint Makeup
  - For sizes up to and including 1½" pipe, wrench tight makeup is considered three full turns past hand tight. Hand tight engagement for ½" through 2" thread varies from 4.48 turns to 5.01 turns.
  - For 2½" through 4" sizes, wrench tight makeup is considered two full turns past hand tight. Hand tight engagement for 2½" through 4" thread varies from 5.46 turns to 6.75 turns.



NPT TAPERED PIPE THREADS—Length of Effective Threads				
Drop Nipple or Tee-Let Outlet Size	L1 Dim. Hand Tight	L3 Dim. Wrench Tight	Total L1 + L3 Length	L2 Dim. Effective Threads
In./mm	In.(mm)/Thrds	In.(mm)/Thrds	In.(mm)/Thrds	In.(mm)/Thrds
½ 13	0.320/4.48 2.6	0.214/3.00 5.4	0.534/7.48 13.6	0.534/7.47 13.6
¾" 19	0.339/4.75 8.6	0.214/3.00 5.4	0.553/7.75 14.0	0.546/7.64 13.9
1 25	0.400/4.60 10.2	0.261/3.00 6.6	0.661/7.60 16.8	0.683/7.85 17.3
1¼ 31	0.420/4.83 10.7	0.261/3.00 6.6	0.681/7.83 17.3	0.707/8.13 18.0
1½ 38	0.420/4.83 10.7	0.261/3.00 6.6	0.697/7.83 17.1	0.724/8.32 18.4
2 50	0.436/5.01 11.1	0.261/3.00 6.6	0.706/8.01 17.9	0.757/8.70 19.2
2½ 63	0.682/5.46 17.3	0.250/2.00 6.4	0.932/7.46 23.7	1.138/9.10 28.9
3 75	0.766/6.13 19.5	0.250/2.00 6.4	1.016/8.13 25.8	1.200/9.50 30.5
4 100	0.844/6.75 21.4	0.250/2.00 6.4	1.094/8.75 27.8	1.300/10.40 33.0

## SPECIFIED BOLT TORQUE

Specified bolt torque is for the oval neck track bolts used on Gruvlok® couplings and flanges. The nuts must be tightened alternately and evenly until fully tightened.

**NOTE:** Specified torques are to be used unless otherwise noted on Product Installation Instructions.

**CAUTION:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

**CAUTION:** Proper torquing of coupling bolts is required to obtain specified performance. Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation. **Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation.** Pipe joint separation may result in significant property damage and serious injury.

ANSI SPECIFIED BOLT TORQUE		
Bolt Size	Wrench Size	Specified Bolt Torque *
<i>In.</i>	<i>In.</i>	<i>Fl.-Lbs</i>
3/8	11/16	30-45
1/2	7/8	80-100
5/8	1 1/16	100-130
3/4	1 1/4	130-180
7/8	1 7/16	180-220
1	1 5/8	200-250
1 1/8	1 13/16	225-275
1 1/4	2	250-300

\* Non-lubricated bolt torques

METRIC SPECIFIED BOLT TORQUE		
Bolt Size	Wrench Size	Specified Bolt Torque *
<i>mm</i>	<i>mm</i>	<i>N-M</i>
M10	16	40-60
M12	22	110-150
M16	24	135-175
M20	30	175-245
M22	34	245-300
M24	36	270-340

\* Non-lubricated bolt torques



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## LIST OF ABBREVIATIONS

Abbreviations conform to the practice of the American Standard  
Abbreviations for Scientific and Engineering Terms, ASA Z10.1

abs ..... Absolute  
AGA ..... American Gas Association  
AISI ..... American Iron and Steel Institute  
Amer Std ..... American Standard  
API ..... American Petroleum Institute  
ASA ..... American Standards Association  
Ashve ..... American Society of Heating and Ventilation Engineers  
ASME ..... American Society of Mechanical Engineers  
ASTM ..... American Society for Testing Materials  
AWWA ..... American Water Works Association  
B & S ..... Bell and Spigot or Brown & Sharpe (gauge)  
bbl ..... Barrel  
Btu ..... British thermal unit(s)  
C ..... Centigrade  
cfm ..... Cubic feet per minute

cfs ..... Cubic feet per second  
CI ..... Cast Iron  
CS ..... Cast Steel  
Comp ..... Companion  
C to F ..... Center to Face  
°C ..... Degrees Centigrade  
°F ..... Degrees Fahrenheit  
diam. .... Diameter  
dwg ..... Drawing  
ex-hy ..... Extra-heavy  
F & D ..... Faced and Drilled  
F ..... Fahrenheit  
F to F ..... Face to Face  
flg. .... Flange or Flanges  
flgd. .... Flanged  
g. .... Gage or Gauge  
hex. .... Hexagonal  
hg. .... Mercury

## LIST OF ABBREVIATIONS

IBBM .....	Iron Body Bronze (or Brass) Mounted	SF.....	Semifinished
ID.....	Inside Diameter	Spec.....	Specification
kw .....	Kilowatt(s)	SSP.....	Steam Service Pressure
MI .....	Malleable Iron	SSU .....	Seconds Saybolt Universal
max .....	Maximum	Std .....	Standard
min .....	Minimum	Trans .....	Transactions
mtd .....	.Mounted	WOG.....	Water, Oil, Gas (see OWG)
MSS .....	Manufacturers Standardization Society (of Valve and Fittings Industry)	WWP.....	Working Water Pressure
NEWWA .....	New England Water Works Association	XS .....	Extra Strong
NPS .....	Nominal pipe size (formerly IPS for iron pipe size)	XXS .....	Double Extra Strong
OD.....	Outside diameter		
OS&Y.....	Outside Screw and Yoke		
OWG.....	Oil, Water, Gas (see WOG)		
psig .....	.Pounds per square inch, gage		
red .....	Reducing		
Sch or Sched .....	.Schedule		
scd .....	Screwed		

## DECIMAL EQUIVALENTS OF FRACTIONS

$1/64$ .....0.015625	$23/64$ .....0.359375	$45/64$ .....0.703125
$1/32$ .....0.03125	$3/8$ ...0.375	$23/32$ .....0.71875
$3/64$ .....0.046875	$25/64$ .....0.390625	$47/64$ .....0.734375
$1/16$ .....0.0625	$13/32$ .....0.40625	$3/4$ .....0.75
$5/64$ .....0.078125	$27/64$ .....0.421875	$49/64$ .....0.765625
$3/32$ .....0.09375	$7/16$ .....0.4375	$25/32$ .....0.78125
$7/64$ .....0.109375	$29/64$ .....0.453125	$51/64$ .....0.796875
$1/8$ ...0.125	$15/32$ .....0.46875	$13/16$ .....0.8125
$9/64$ .....0.140625	$31/64$ .....0.484375	$53/64$ .....0.828125
$5/32$ .....0.15625	$1/2$ .....0.5	$27/32$ .....0.84375
$11/64$ .....0.171875	$33/64$ .....0.515625	$55/64$ .....0.859375
$3/16$ .....0.1875	$17/32$ .....0.53125	$7/8$ ...0.875
$13/64$ .....0.203125	$35/64$ .....0.546875	$57/64$ .....0.890625
$7/32$ .....0.21875	$9/16$ .....0.5625	$29/32$ .....0.90625
$15/64$ .....0.234375	$37/64$ .....0.578125	$59/64$ .....0.921875
$1/4$ .....0.25	$19/32$ .....0.59375	$15/16$ .....0.9375
$17/64$ .....0.265625	$39/64$ .....0.609375	$61/64$ .....0.953125
$9/32$ .....0.28125	$5/8$ ...0.625	$31/32$ .....0.96875
$19/64$ .....0.296875	$41/64$ .....0.640625	$63/64$ .....0.984375
$5/16$ .....0.3125	$21/32$ .....0.65625	1 .....1
$21/64$ .....0.328125	$43/64$ .....0.671875	
$11/32$ .....0.34375	$11/16$ .....0.6875	

## DECIMAL DEGREE EQUIVALENTS OF MINUTES

Min	Degree	Min	Degree	Min	Degree
1	.....0.0167	21	.....0.3500	41	.....0.6833
2	.....0.0333	22	.....0.3667	42	.....0.7000
3	.....0.0500	23	.....0.3833	43	.....0.7167
4	.....0.0667	24	.....0.4000	44	.....0.7333
5	.....0.0833	25	.....0.4167	45	.....0.7500
6	.....0.1000	26	.....0.4333	46	.....0.7667
7	.....0.1167	27	.....0.4500	47	.....0.7833
8	.....0.1333	28	.....0.4667	48	.....0.8000
9	.....0.1500	29	.....0.4833	49	.....0.8167
10	.....0.1667	30	.....0.5000	50	.....0.8333
11	.....0.1833	31	.....0.5167	51	.....0.8500
12	.....0.2000	32	.....0.5333	52	.....0.8667
13	.....0.2167	33	.....0.5500	53	.....0.8833
14	.....0.2333	34	.....0.5667	54	.....0.9000
15	.....0.2500	35	.....0.5833	55	.....0.9167
16	.....0.2667	36	.....0.6000	56	.....0.9333
17	.....0.2833	37	.....0.6167	57	.....0.9500
18	.....0.3000	38	.....0.6333	58	.....0.9667
19	.....0.3167	39	.....0.6500	59	.....0.9833
20	.....0.3333	40	.....0.6667	60	.....1.0000

## COMMERCIAL PIPE SIZES AND WALL THICKNESSES

This table lists standard pipe sizes and wall thicknesses, or specifically:

1. Traditional standard weight, extra strong & durable extra strong pipe.
2. Pipe wall thickness in ASME B36.10 for carbon steel.
3. Pipe wall thickness in ASTM Specification A409 & ASME B36.19 & applicable only to corrosion resistant materials.

**NOTE:** All dimensions in inches & thicknesses are nominal or average wall thickness. Actual thickness may be as much as 12.5% under nominal due to mill tolerance.

Nom. Pipe Size	NOMINAL WALL THICKNESS FOR																	
	Outside Dia. (IN)	Sch 5S	Sch 10	Sch 10S	Sch 20	Sch 30	Sch Std.	Sch 40	Sch 40S	Sch 60	Sch 80	Sch 80S	Sch 100	Sch 120	Sch. 140	Sch. 160	X Strong	XX Strong
1/8	0.405	-	0.049	0.049	-	-	0.068	0.068	0.068	-	0.095	0.095	-	-	-	-	0.095	-
1/4	0.540	-	0.065	0.065	-	-	0.088	0.088	0.088	-	0.119	0.119	-	-	-	-	0.119	-
3/8	0.675	-	0.065	0.065	-	-	0.091	0.091	0.091	-	0.126	0.126	-	-	-	-	0.126	-
1/2	0.840	0.065	0.083	0.083	-	-	0.109	0.109	0.109	-	0.147	0.147	-	-	-	0.187	0.147	0.294
3/4	1.050	0.065	0.083	0.083	-	-	0.113	0.113	0.113	-	0.154	0.154	-	-	-	0.219	0.154	0.308
1	1.315	0.065	0.109	0.109	-	-	0.133	0.133	0.133	-	0.179	0.179	-	-	-	0.250	0.179	0.358
1 1/4	1.660	0.065	0.109	0.109	-	-	0.140	0.140	0.140	-	0.191	0.191	-	-	-	0.250	0.191	0.382
1 1/2	1.900	0.065	0.109	0.109	-	-	0.145	0.145	0.145	-	0.200	0.200	-	-	-	0.281	0.200	0.400
2	2.375	0.065	0.109	0.109	-	-	0.154	0.154	0.154	-	0.218	0.218	-	-	-	0.344	0.218	0.436
2 1/2	2.875	0.083	0.120	0.120	-	-	0.203	0.203	0.203	-	0.276	0.276	-	-	-	0.375	0.276	0.552
3	3.500	0.083	0.120	0.120	-	-	0.216	0.216	0.216	-	0.300	0.300	-	-	-	0.437	0.300	0.600
3 1/2	4.000	0.083	0.120	0.120	-	-	0.226	0.226	0.226	-	0.318	0.318	-	-	-	-	0.318	0.636
4	4.500	0.083	0.120	0.120	-	-	0.237	0.237	0.237	-	0.337	0.337	-	0.438	-	0.531	0.337	0.674
5	5.563	0.109	0.134	0.134	-	-	0.258	0.258	0.258	-	0.375	0.375	-	0.500	-	0.625	0.375	0.750

## COMMERCIAL PIPE SIZES AND WALL THICKNESSES

Nom. Pipe Size	Outside Dia. (IN)	NOMINAL WALL THICKNESS FOR																
		Sch 5S	Sch 10	Sch 10S	Sch 20	Sch 30	Sch Std.	Sch 40	Sch 40S	Sch 60	Sch 80	Sch 80S	Sch 100	Sch 120	Sch. 140	Sch. 160	X Strong	XX Strong
6	6.625	0.109	0.134	0.134	-	-	0.280	0.280	0.280	-	0.432	0.432	-	0.562	-	0.719	0.432	0.864
8	8.625	0.109	0.148	0.148	0.250	0.277	0.322	0.322	0.322	0.406	0.500	0.500	0.594	0.719	0.812	0.906	0.500	0.875
10	10.750	0.134	0.165	0.165	0.250	0.307	0.365	0.365	0.365	0.500	0.594	0.500	0.719	0.844	1.000	1.125	0.500	1.000
12	12.750	0.156	0.180	0.180	0.250	0.330	0.375	0.406	0.375	0.562	0.688	0.500	0.844	1.000	1.125	1.312	0.500	1.000
14	14.000	0.156	0.250	0.188	0.312	0.375	0.375	0.438	-	0.594	0.750	-	0.938	1.094	1.250	1.406	0.500	-
16	16.000	0.165	0.250	0.188	0.312	0.375	0.375	0.500	-	0.656	0.844	-	1.031	1.219	1.438	1.594	0.500	-
18	18.000	0.165	0.250	0.188	0.312	0.438	0.375	0.562	-	0.750	0.938	-	1.156	1.375	1.562	1.781	0.500	-
20	20.000	0.188	0.250	0.218	0.375	0.500	0.375	0.594	-	0.812	1.031	-	1.281	1.500	1.750	1.969	0.500	-
22	22.000	0.188	0.250	0.218	0.375	0.500	0.375	-	-	0.875	1.125	-	1.375	1.625	1.875	2.125	0.500	-
24	24.000	0.218	0.250	-	0.375	0.562	0.375	0.688	-	0.969	1.219	-	1.531	1.812	2.062	2.344	0.500	-
26	26.000	-	0.312	-	0.500	-	0.375	-	-	-	-	-	-	-	-	-	0.500	-
28	28.000	-	0.312	-	0.500	0.625	0.375	-	-	-	-	-	-	-	-	-	0.500	-
30	30.000	0.250	0.312	0.312	0.500	0.625	0.375	-	-	-	-	-	-	-	-	-	0.500	-
32	32.000	-	0.312	-	0.500	0.625	0.375	0.688	-	-	-	-	-	-	-	-	0.500	-
34	34.000	-	0.312	-	0.500	0.625	0.375	0.688	-	-	-	-	-	-	-	-	0.500	-
36	36.000	-	0.312	-	0.500	0.625	0.375	0.750	-	-	-	-	-	-	-	-	0.500	-
42	42.000	-	-	-	0.500	0.625	0.375	0.750	-	-	-	-	-	-	-	-	0.500	-

All dimensions shown are in inches.

STANDARD WEIGHT PIPE DATA

Nom. Pipe Dia. (Inches)	Nom. Inside Dia. (Inches)	Nom. Outside Dia. (Inches)	Nom. Wt./Ft. (Pounds)	Length Containing One Cu. Ft. (Feet)	Gallons per Linear Ft. (Gallons)
1/8	0.269	0.405	0.245	2,526.000	0.0030
1/4	0.364	0.540	0.425	1,383.800	0.0054
3/8	0.493	0.675	0.568	754.360	0.0099
1/2	0.622	0.840	0.851	473.910	0.0158
3/4	0.824	1.050	1.131	270.030	0.0277
1	1.049	1.315	1.679	166.620	0.0449
1 1/4	1.380	1.660	2.273	96.275	0.0777
1 1/2	1.610	1.900	2.718	70.733	0.1058
2	2.067	2.375	3.653	49.913	0.1743
2 1/2	2.469	2.875	5.793	30.077	0.2487
3	3.068	3.500	7.580	19.479	0.3840
3 1/2	3.548	4.000	9.110	14.565	0.5136
4	4.026	4.500	10.790	11.312	0.6613
5	5.047	5.563	14.620	7.198	1.0393
6	6.065	6.625	18.970	4.984	1.5008
8	7.981	8.625	28.550	2.878	2.5988
10	10.020	10.750	40.480	1.826	4.0963

BARLOW'S FORMULA

Barlow's Formula is a safe, easy method for finding the relationship between internal fluid pressure and stress in the pipe wall. The formula predicts bursting pressures that have been found to be safely within the actual test bursting pressures.

It is interesting to note that the formula uses the "outside diameter" of pipe and is sometimes referred to as the "outside diameter formula."

$$P = (2 \cdot t \cdot S) / D$$

Where:

P = internal units pressure, in psi

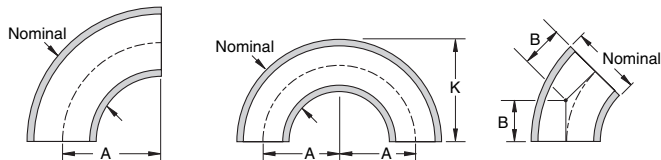
S = unit stress, in psi

D = outside diameter of pipe, in inches

t = wall thickness, in inches



## WELD FITTING—90° ELBOW, 180° RETURN, 45° ELBOW

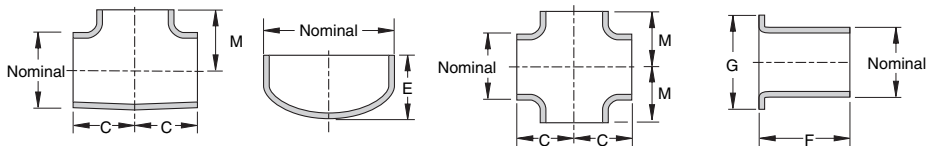


Nom. Pipe Size	90° ELBOWS		180° RETURNS		45° LR Elbow B
	Long R A	Short R A	Long R K	Short R K	
1/2	1 1/2	—	1 7/8	—	5/8
3/4	1 1/8	—	1 11/16	—	7/16
1	1 1/2	1	2 3/16	1 5/8	7/8
1 1/4	1 7/8	1 1/4	2 3/4	2 1/16	1
1 1/2	2 1/4	1 1/2	3 1/4	2 7/16	1 1/8
2	3	2	4 3/16	3 3/16	1 3/8
2 1/2	3 3/4	2 1/2	5 3/16	3 15/16	1 3/4
3	4 1/2	3	6 1/4	4 3/4	2
3 1/2	5 1/4	3 1/2	7 1/4	5 1/2	2 1/4
4	6	4	8 1/4	6 1/4	2 1/2
5	7 1/2	5	10 5/16	7 3/4	3 1/8
6	9	6	12 5/16	9 5/16	3 3/4
8	12	8	16 5/16	12 5/16	5
10	15	10	20 3/8	15 3/8	6 1/4
12	18	12	24 3/8	18 3/8	7 1/2

Nom. Pipe Size	90° ELBOWS		180° RETURNS		45° LR Elbow B
	Long R A	Short R A	Long R K	Short R K	
14	21	14	28	21	8 3/4
16	24	16	32	24	10
18	27	18	36	27	11 1/4
20	30	20	40	30	12 1/2
22	33	22	44	—	13 1/2
24	36	24	48	36	15
26	39	26	52	—	16
30	45	30	60	45	18 1/2
34	51	34	—	—	21
36	54	36	72	54	22 1/4
42	63	48	—	—	26

All dimensions shown are in inches.

## WELD FITTING—TEE, CAP, CROSS, STUB END

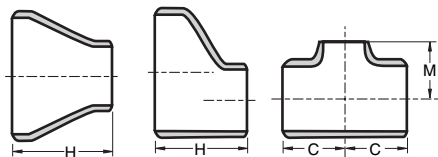


Nom. Pipe Size	Straight Tees		Straight Crosses	Long Pattern Stub Ends	
	C & M	Caps E		C & M	F
1/2	1	1	—	3	1 <sup>3</sup> / <sub>8</sub>
3/4	1 <sup>1</sup> / <sub>8</sub>	1	—	3	1 <sup>11</sup> / <sub>16</sub>
1	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	—	4	2
1 <sup>1</sup> / <sub>4</sub>	1 <sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	1 <sup>7</sup> / <sub>8</sub>	4	2 <sup>1</sup> / <sub>2</sub>
1 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>4</sub>	4	2 <sup>7</sup> / <sub>8</sub>
2	2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub> *	2 <sup>1</sup> / <sub>2</sub>	6	3 <sup>5</sup> / <sub>8</sub>
2 <sup>1</sup> / <sub>2</sub>	3	1 <sup>1</sup> / <sub>2</sub> *	3	6	4 <sup>1</sup> / <sub>8</sub>
3	3 <sup>3</sup> / <sub>8</sub>	2*	3 <sup>3</sup> / <sub>8</sub>	6	5
3 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>2</sub> *	3 <sup>3</sup> / <sub>4</sub>	6	5 <sup>1</sup> / <sub>2</sub>
4	4 <sup>1</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>2</sub> *	4 <sup>1</sup> / <sub>8</sub>	6	6 <sup>3</sup> / <sub>16</sub>
5	4 <sup>7</sup> / <sub>8</sub>	3*	4 <sup>7</sup> / <sub>8</sub>	8	7 <sup>5</sup> / <sub>16</sub>
6	5 <sup>5</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>2</sub> *	5 <sup>5</sup> / <sub>8</sub>	8	8 <sup>1</sup> / <sub>2</sub>
8	7	4*	7	8	10 <sup>5</sup> / <sub>8</sub>
10	8 <sup>1</sup> / <sub>2</sub>	5*	8 <sup>1</sup> / <sub>2</sub>	10	12 <sup>3</sup> / <sub>4</sub>
12	10	6*	10	10	15

Nom. Pipe Size	Straight Tees		Straight Crosses	Long Pattern Stub Ends	
	C & M	Caps E		C & M	F
14	11	6 <sup>1</sup> / <sub>2</sub> *	11	12	16 <sup>1</sup> / <sub>4</sub>
16	12	7*	12	12	18 <sup>1</sup> / <sub>2</sub>
18	13 <sup>1</sup> / <sub>2</sub>	8*	13 <sup>1</sup> / <sub>2</sub>	12	21
20	15	9*	15	12	23
22	16 <sup>1</sup> / <sub>2</sub>	10	—	—	—
24	17	10 <sup>1</sup> / <sub>2</sub>	17	12	27 <sup>1</sup> / <sub>4</sub>
26	19 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>2</sub>	—	—	—
30	22	10 <sup>1</sup> / <sub>2</sub>	—	—	—
34	25	10 <sup>1</sup> / <sub>2</sub>	—	—	—
36	26 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>2</sub>	—	—	—
42	C=30,M=28	12	—	—	—

\*Dimensions apply to STD and XS only.  
All dimensions shown are in inches.

## WELD FITTING—REDUCERS AND REDUCING OUTLET TEES



**H:** Concentric & Eccentric Reducers    **C, M:** Reducing Outlet Tees

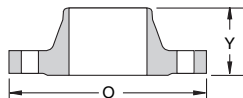
Nom. Pipe Size	H	C	M
1/2 x 1/4	—	1	1
3/8	—	1	1
3/4 x 3/8	1 1/2	1 1/8	1 1/8
1/2	1 1/2	1 1/8	1 1/8
1 x 3/8	2	1 1/2	1 1/2
1/2	2	1 1/2	1 1/2
3/4	2	1 1/2	1 1/2
1 1/4 x 1/2	2	1 7/8	1 7/8
3/4	2	1 7/8	1 7/8
1	2	1 7/8	1 7/8
1 1/2 x 1/2	2 1/2	2 1/4	2 1/4
3/4	2 1/2	2 1/4	2 1/4
1	2 1/2	2 1/4	2 1/4
1 1/4	2 1/2	2 1/4	2 1/4
2 x 3/4	3	2 1/2	1 3/4
1	3	2 1/2	2
1 1/4	3	2 1/2	2 1/4
1 1/2	3	2 1/2	2 3/8

Nom. Pipe Size	H	C	M
2 1/2 x 1	3 1/2	3	2 1/4
1 1/4	3 1/2	3	2 1/2
1 1/2	3 1/2	3	2 5/8
2	3 1/2	3	2 3/4
3 x 1	—	3 3/8	2 5/8
1 1/4	3 1/2	3 3/8	2 3/4
1 1/2	3 1/2	3 3/8	2 7/8
2	3 1/2	3 3/8	3
2 1/2	3 1/2	3 3/8	3 1/4
3 1/2 x 1 1/4	4	—	—
1 1/2	4	3 3/4	3 1/8
2	4	3 3/4	3 1/4
2 1/2	4	3 3/4	3 1/2
3	4	3 3/4	3 5/8
4 x 1 1/2	4	4 1/8	3 3/8
2	4	4 1/8	3 1/2
2 1/2	4	4 1/8	3 3/4
3	4	4 1/8	3 7/8
3 1/2	4	4 1/8	4

Nom. Pipe Size	H	C	M
5 x 2	5	4 7/8	4 1/8
2 1/2	5	4 7/8	4 1/4
3	5	4 7/8	4 3/8
3 1/2	5	4 7/8	4 1/2
4	5	4 7/8	4 5/8
6 x 2 1/2	5 1/2	5 5/8	4 3/4
3	5 1/2	5 5/8	4 7/8
3 1/2	5 1/2	5 5/8	5
4	5 1/2	5 5/8	5 1/8
5	5 1/2	5 5/8	5 3/8
8 x 3	—	7	6
3 1/2	6	7	6
4	6	7	6 1/8
5	6	7	6 3/8
6	6	7	6 5/8
10 x 4	7	8 1/2	7 1/4
5	7	8 1/2	7 1/2
6	7	8 1/2	7 5/8
8	7	8 1/2	8
12 x 5	8	10	8 1/2
6	8	10	8 5/8
8	8	10	9
10	8	10	9 1/2
14 x 6	13	11	9 3/8
8	13	11	9 3/4
10	13	11	10 1/8
12	13	11	10 5/8

All dimensions shown are in inches.

## WELD FITTING—WELDING NECK FLANGES



Nom. Pipe Size	150 LB.		300 LB.		400 LB.		600 LB.	
	O	Y <sup>(1)</sup>	O	Y <sup>(1)</sup>	O	Y <sup>(2)</sup>	O	Y <sup>(2)</sup>
1/2	3 1/2	1 7/8	3 3/4	2 1/16	3 3/4	2 1/16	3 3/4	2 1/16
3/4	3 7/8	2 1/16	4 5/8	2 1/4	4 5/8	2 1/4	4 5/8	2 1/4
1	4 1/4	2 3/16	4 7/8	2 7/16	4 7/8	2 7/16	4 7/8	2 7/16
1 1/4	4 5/8	2 1/4	5 1/4	2 9/16	5 1/4	2 5/8	5 1/4	2 5/8
1 1/2	5	2 7/16	6 1/8	2 11/16	6 1/8	2 3/4	6 1/8	2 3/4
2	6	2 1/2	6 1/2	2 3/4	6 1/2	2 7/8	6 1/2	2 7/8
2 1/2	7	2 3/4	7 1/2	3	7 1/2	3 1/8	7 1/2	3 1/8
3	7 1/2	2 3/4	8 1/4	3 1/8	8 1/4	3 1/4	8 1/4	3 1/4
3 1/2	8 1/2	2 13/16	9	3 3/16	9	3 3/8	9	3 3/8
4	9	3	10	3 3/8	10	3 1/2	10 3/4	4
5	10	3 1/2	11	3 7/8	11	4	13	4 1/2
6	11	3 1/2	12 1/2	3 7/8	12 1/2	4 1/16	14	4 5/8
8	13 1/2	4	15	4 3/8	15	4 5/8	16 1/2	5 1/4
10	16	4	17 1/2	4 5/8	17 1/2	4 7/8	20	6
12	19	4 1/2	20 1/2	5 1/8	20 1/2	5 3/8	22	6 1/8

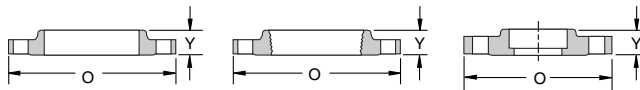
Nom. Pipe Size	150 LB.		300 LB.		400 LB.		600 LB.	
	O	Y <sup>(1)</sup>	O	Y <sup>(1)</sup>	O	Y <sup>(2)</sup>	O	Y <sup>(2)</sup>
14	21	5	23	5 5/8	23	5 7/8	23 3/4	6 1/2
16	23 1/2	5	25 1/2	5 3/4	25 1/2	6	27	7
18	25	5 1/2	28	6 1/4	28	6 1/2	29 1/4	7 1/4
20	27 1/2	5 11/16	30 1/2	6 3/8	30 1/2	6 5/8	32	7 1/2
22	29 1/2	5 7/8	33	6 1/2	33	6 3/4	34 1/4	7 3/4
24	32	6	36	6 5/8	36	6 7/8	37	8
26	34 1/4	5	38 1/4	7 1/4	38 1/4	7 5/8	40	8 3/4
30	38 3/4	5 1/8	43	8 1/4	43	8 5/8	44 1/2	9 3/4
34	43 3/4	5 5/16	47 1/2	9 1/8	47 1/2	9 1/2	49	10 5/8
36	46	5 3/8	50	9 1/2	50	9 7/8	51 3/4	11 1/8
42	53	5 5/8	50 3/4	7 7/8	52	8 13/16	55 1/4	11

(1) The 1/16" raised face **is** included in length thru Hub, "Y".

(2) The 1/4" raised face **is not** included in length thru Hub, "Y".

All dimensions shown are in inches.

## SLIP-ON, THREADED AND SOCKET FLANGES



Nom. Pipe Size	150 LB.		300 LB.		400 LB.†		600 LB.	
	O	Y <sup>(1)</sup>	O	Y <sup>(1)</sup>	O	Y <sup>(2)</sup>	O	Y <sup>(2)</sup>
1/2	3 1/2	5/8	3 3/4	7/8	3 3/4	7/8	3 3/4	7/8
3/4	3 7/8	5/8	4 5/8	1	4 5/8	1	4 5/8	1
1	4 1/4	1 1/16	4 7/8	1 1/16	4 7/8	1 1/16	4 7/8	1 1/16
1 1/4	4 5/8	1 3/16	5 1/4	1 1/16	5 1/4	1 1/8	5 1/4	1 1/8
1 1/2	5	7/8	6 1/8	1 3/16	6 1/8	1 1/4	6 1/8	1 1/4
2	6	1	6 1/2	1 5/16	6 1/2	1 7/16	6 1/2	1 7/16
2 1/2	7	1 1/8	7 1/2	1 1/2	7 1/2	1 5/8	7 1/2	1 5/8
3	7 1/2	1 3/16	8 1/4	1 11/16	8 1/4	1 13/16	8 1/4	1 13/16
3 1/2	8 1/2	1 1/4†	9	1 3/4†	9	1 15/16	9	1 15/16†
4	9	1 5/16†	10	1 7/8†	10	2	10 3/4	2 1/8†
5	10	1 7/16†	11	2†	11	2 1/8	13	2 3/8†
6	11	1 9/16†	12 1/2	2 1/16†	12 1/2	2 1/4	14	2 5/8†
8	13 1/2	1 3/4†	15	2 7/16†	15	2 11/16	16 1/2	3†
10	16	1 15/16†	17 1/2	2 5/8†	17 1/2	2 7/8	20	3 3/8†
12	19	2 3/16†	20 1/2	2 7/8†	20 1/2	3 1/8	22	3 5/8†
14	21	2 1/4†	23	3†	23	3 5/16	23 3/4	3 11/16†
16	23 1/2	2 1/2†	25 1/2	3 1/4†	25 1/2	3 11/16	27	4 3/16†
18	25	2 11/16†	28	3 1/2†	28	3 7/8	29 1/4	4 5/8†

Nom. Pipe Size	150 LB.		300 LB.		400 LB.†		600 LB.	
	O	Y <sup>(1)</sup>	O	Y <sup>(1)</sup>	O	Y <sup>(2)</sup>	O	Y <sup>(2)</sup>
20	27 1/2	2 7/8†	30 1/2	3 3/4†	30 1/2	4	32	5†
22	29 1/2	3 1/8 *†	33	4*†	33	4 1/4*	34 1/4	5 1/4*†
24	32	3 1/4†	36	4 3/16†	36	4 1/2	37	5 1/2†
26	34 1/4	3 3/8*†	38 1/4	7 1/4*†	38 1/4	7 5/8*	40	8 3/4*†
30	38 3/4	3 1/2*†	43	8 1/4*†	43	8 5/8*	44 1/2	9 3/4*†
34	43 3/4	3 11/16*†	47 1/2	9 1/8*†	47 1/2	9 1/2*	49	10 5/8*†
36	46	3 3/4*†	50	9 1/2*†	50	9 7/8*	51 3/4	11 1/8*†
42	53	4*†	-	-	-	-	-	-

\* Not available in Threaded type

† Not available in Socket type

(1) The 1/16" raised face is included in length thru Hub, "Y".

(2) The 1/4" raised face is **not** included in length thru Hub, "Y".

All dimensions shown are in inches.

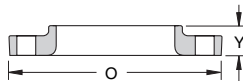
## STANDARD CAST IRON COMPANION FLANGES & BOLTS

(for working pressures up to 125 psi steam, 175 psi WOG)

Size	Flange Dia.	Bolt Circle	No. Bolts	Bolt Size	Bolt Length
3/4	3 1/2	2 1/2	4	3/8	1 3/8
1	4 1/4	3 1/8	4	1/2	1 1/2
1 1/4	4 5/8	3 1/2	4	1/2	1 1/2
1 1/2	5	3 7/8	4	1/2	1 3/4
2	6	4 3/4	4	5/8	2
2 1/2	7	5 1/2	4	5/8	2 1/4
3	7 1/2	6	4	5/8	2 1/2
3 1/2	8 1/2	7	8	5/8	2 1/2
4	9	7 1/2	8	5/8	2 3/4
5	10	8 1/2	8	3/4	3
6	11	9 1/2	8	3/4	3
8	13 1/2	11 3/4	8	3/4	3 1/4
10	16	14 1/4	12	7/8	3 1/2
12	19	17	12	7/8	3 3/4
14	21	18 3/4	12	1	4 1/4
16	23 1/2	21 1/4	16	1	4 1/4

All dimensions shown are in inches.

## LAP JOINT FLANGES



Nom. Pipe Size	150 LB.		300 LB.		400 LB.		600 LB.	
	O	Y	O	Y	O	Y	O	Y
1/2	3 1/2	5/8	3 3/4	7/8	3 3/4	7/8	3 3/4	7/8
3/4	3 7/8	5/8	4 5/8	1	4 5/8	1	4 5/8	1
1	4 1/4	1 1/16	4 7/8	1 1/16	4 7/8	1 1/16	4 7/8	1 1/16
1 1/4	4 5/8	1 3/16	5 1/4	1 1/16	5 1/4	1 1/8	5 1/4	1 1/8
1 1/2	5	7/8	6 1/8	1 3/16	6 1/8	1 1/4	6 1/8	1 1/4
2	6	1	6 1/2	1 5/16	6 1/2	1 7/16	6 1/2	1 7/16
2 1/2	7	1 1/8	7 1/2	1 1/2	7 1/2	1 5/8	7 1/2	1 5/8
3	7 1/2	1 3/16	8 1/4	1 11/16	8 1/4	1 13/16	8 1/4	1 13/16
3 1/2	8 1/2	1 1/4	9	1 3/4	9	1 15/16	9	1 15/16
4	9	1 5/16	10	1 7/8	10	2	10 3/4	2 1/8
5	10	1 7/16	11	2	11	2 1/8	13	2 3/8
6	11	1 9/16	12 1/2	2 1/16	12 1/2	2 1/4	14	2 5/8
8	13 1/2	1 3/4	15	2 7/16	15	2 11/16	16 1/2	3
10	16	1 15/16	17 1/2	3 3/4	17 1/2	4	20	4 3/8
12	19	2 3/16	20 1/2	4	20 1/2	4 1/4	22	4 5/8
14	21	3 1/8	23	4 3/8	23	4 5/8	23 3/4	5
16	23 1/2	3 7/16	25 1/2	4 3/4	25 1/2	5	27	5 1/2
18	25	3 13/16	28	5 1/8	28	5 3/8	29 1/4	6
20	27 1/2	4 1/16	30 1/2	5 1/2	30 1/2	5 3/4	32	6 1/2
24	32	4 3/8	36	6	36	6 1/4	37	7 1/4

All dimensions shown are in inches.

## EXTRA HEAVY CAST IRON COMPANION FLANGES AND BOLTS

(for working pressures up to 250 psi steam, 400 psi WOG)

Size	Flange Dia.	Bolt Circle	No. Bolts	Bolt Size	Bolt Length
1	4 <sup>7/8</sup>	3 <sup>1/2</sup>	4	5/8	2 <sup>1/4</sup>
1 <sup>1/4</sup>	5 <sup>1/4</sup>	3 <sup>7/8</sup>	4	5/8	2 <sup>1/2</sup>
1 <sup>1/2</sup>	6 <sup>1/8</sup>	4 <sup>1/2</sup>	4	3/4	2 <sup>1/2</sup>
2	6 <sup>1/2</sup>	5	8	5/8	2 <sup>1/2</sup>
2 <sup>1/2</sup>	7 <sup>1/2</sup>	5 <sup>7/8</sup>	8	3/4	3
3	8 <sup>1/4</sup>	6 <sup>5/8</sup>	8	3/4	3 <sup>1/4</sup>
3 <sup>1/2</sup>	9	7 <sup>1/4</sup>	8	3/4	3 <sup>1/4</sup>
4	10	7 <sup>7/8</sup>	8	3/4	3 <sup>1/2</sup>
5	11	9 <sup>1/4</sup>	8	3/4	3 <sup>3/4</sup>
6	12 <sup>1/2</sup>	10 <sup>5/8</sup>	12	3/4	3 <sup>3/4</sup>
8	15	13	12	7/8	4 <sup>1/4</sup>
10	17 <sup>1/2</sup>	15 <sup>1/4</sup>	16	1	5
12	20 <sup>1/2</sup>	17 <sup>3/4</sup>	16	1 <sup>1/8</sup>	5 <sup>1/2</sup>
14 O.D.	23	20 <sup>1/4</sup>	20	1 <sup>1/8</sup>	5 <sup>3/4</sup>
16 O.D.	25 <sup>1/2</sup>	22 <sup>1/2</sup>	20	1 <sup>1/4</sup>	6
18 O.D.	28	24 <sup>3/4</sup>	24	1 <sup>1/4</sup>	6 <sup>1/4</sup>
20 O.D.	30 <sup>1/2</sup>	27	24	1 <sup>1/4</sup>	6 <sup>3/4</sup>
24 O.D.	36	32	24	1 <sup>1/2</sup>	7 <sup>1/2</sup>
30 O.D.	43	39 <sup>1/4</sup>	28	1 <sup>3/4</sup>	8 <sup>1/2</sup>
36 O.D.	50	46	32	2	9 <sup>1/2</sup>
42 O.D.	57	52 <sup>3/4</sup>	36	2	10
48 O.D.	65	60 <sup>3/4</sup>	40	2	11

## BLIND FLANGES



Nom. Pipe Size	150 LB.		300 LB.		400 LB.		600 LB.	
	O	Y <sup>(1)</sup>	O	Y <sup>(1)</sup>	O	Y <sup>(2)</sup>	O	Y <sup>(2)</sup>
1/2	3 <sup>1/2</sup>	7/16	3 <sup>3/4</sup>	9/16	For sizes	3 <sup>3/4</sup>	9/16	
3/4	3 <sup>7/8</sup>	1/2	4 <sup>5/8</sup>	5/8		4 <sup>5/8</sup>	5/8	
1	4 <sup>1/4</sup>	9/16	4 <sup>7/8</sup>	1 <sup>1/16</sup>	3 <sup>1/2</sup>	4 <sup>7/8</sup>	1 <sup>1/16</sup>	
1 <sup>1/4</sup>	4 <sup>5/8</sup>	5/8	5 <sup>1/4</sup>	3/4	and smaller	5 <sup>1/4</sup>	1 <sup>3/16</sup>	
1 <sup>1/2</sup>	5	1 <sup>1/16</sup>	6 <sup>1/8</sup>	1 <sup>3/16</sup>	use	6 <sup>1/8</sup>	7/8	
2	6	3/4	6 <sup>1/2</sup>	7/8	600 LB. Standard	6 <sup>1/2</sup>	1	
2 <sup>1/2</sup>	7	7/8	7 <sup>1/2</sup>	1		7 <sup>1/2</sup>	1 <sup>1/8</sup>	
3	7 <sup>1/2</sup>	1 <sup>5/16</sup>	8 <sup>1/4</sup>	1 <sup>1/8</sup>		8 <sup>1/4</sup>	1 <sup>1/4</sup>	
3 <sup>1/2</sup>	8 <sup>1/2</sup>	1 <sup>5/16</sup>	9	1 <sup>3/16</sup>		9	1 <sup>3/8</sup>	
4	9	1 <sup>3/16</sup>	10	1 <sup>1/4</sup>	10	1 <sup>3/8</sup>	10 <sup>3/4</sup>	1 <sup>1/2</sup>
5	10	1 <sup>5/16</sup>	11	1 <sup>3/8</sup>	11	1 <sup>1/2</sup>	13	1 <sup>3/4</sup>
6	11	1	12 <sup>1/2</sup>	1 <sup>7/16</sup>	12 <sup>1/2</sup>	1 <sup>5/8</sup>	14	1 <sup>7/8</sup>
8	13 <sup>1/2</sup>	1 <sup>1/8</sup>	15	1 <sup>5/8</sup>	15	1 <sup>7/8</sup>	16 <sup>1/2</sup>	2 <sup>3/16</sup>
10	16	1 <sup>3/16</sup>	17 <sup>1/2</sup>	1 <sup>7/8</sup>	17 <sup>1/2</sup>	2 <sup>1/8</sup>	20	2 <sup>1/2</sup>
12	19	1 <sup>1/4</sup>	20 <sup>1/2</sup>	2	20 <sup>1/2</sup>	1/4	22	2 <sup>5/8</sup>
14	21	1 <sup>3/8</sup>	23	2 <sup>1/8</sup>	23	2 <sup>3/8</sup>	23 <sup>3/4</sup>	2 <sup>3/4</sup>
16	23 <sup>1/2</sup>	1 <sup>7/16</sup>	25 <sup>1/2</sup>	2 <sup>1/4</sup>	25 <sup>1/2</sup>	2 <sup>1/2</sup>	27	3
18	25	1 <sup>9/16</sup>	28	2 <sup>3/8</sup>	28	2 <sup>5/8</sup>	29 <sup>1/4</sup>	3 <sup>1/4</sup>
20	27 <sup>1/2</sup>	1 <sup>11/16</sup>	30 <sup>1/2</sup>	2 <sup>1/2</sup>	30 <sup>1/2</sup>	2 <sup>3/4</sup>	32	3 <sup>1/2</sup>
22	29 <sup>1/2</sup>	1 <sup>13/16</sup>	33	2 <sup>5/8</sup>	33	2 <sup>7/8</sup>	34 <sup>1/4</sup>	3 <sup>3/4</sup>
24	32	1 <sup>7/8</sup>	36	2 <sup>3/4</sup>	36	3	37	4
26	34 <sup>1/4</sup>	2	38 <sup>1/4</sup>	3 <sup>1/8</sup>	38 <sup>1/4</sup>	3 <sup>1/2</sup>	40	4 <sup>1/4</sup>
30	38 <sup>3/4</sup>	2 <sup>1/8</sup>	43	3 <sup>3/8</sup>	43	4	44 <sup>1/2</sup>	4 <sup>1/2</sup>
34	43 <sup>3/4</sup>	2 <sup>5/16</sup>	47 <sup>1/2</sup>	4	47 <sup>1/2</sup>	4 <sup>3/8</sup>	49	4 <sup>3/4</sup>
36	46	2 <sup>3/8</sup>	50	4 <sup>1/8</sup>	50	4 <sup>1/2</sup>	51 <sup>3/4</sup>	4 <sup>7/8</sup>
42	53	2 <sup>5/8</sup>	57	4 <sup>3/8</sup>	57	5 <sup>1/8</sup>	58 <sup>3/4</sup>	5 <sup>1/2</sup>

(1) The 1/16" raised face is included in Thickness, "Y".

(2) The 1/4" raised face is not included in Thickness, "Y".

## BOLTING DIMENSIONS FOR 150 TO 300 LB. STEEL FLANGE

125/150 LB. FLANGE						250/300 LB. FLANGE					
Nom. Pipe Size	Bolt Circle Dia.	Bolt Dia.	No. of Bolts	*Stud Len.	Bolt Len.	Bolt Circle Dia.	Bolt Dia.	No. of Bolts	*Stud Len.	Bolt Len.	
1/2	23/8	1/2	4	2 1/4	1 3/4	2 5/8	1/2	4	2 1/2	2	
3/4	2 3/4	1/2	4	2 1/4	2	3 1/4	5/8	4	2 3/4	2 1/2	
1	3 1/8	1/2	4	2 1/2	2	3 1/2	5/8	4	3	2 1/2	
1 1/4	3 1/2	1/2	4	2 1/2	2 1/4	3 7/8	5/8	4	3	2 3/4	
1 1/2	3 7/8	1/2	4	2 3/4	2 1/4	4 1/2	3/4	4	3 1/2	3	
2	4 3/4	5/8	4	3	2 3/4	5	5/8	8	3 1/4	3	
2 1/2	5 1/2	5/8	4	3 1/4	3	5 7/8	3/4	8	3 3/4	3 1/4	
3	6	5/8	4	3 1/2	3	6 5/8	3/4	8	4	3 1/2	
3 1/2	7	5/8	8	3 1/2	3	7 1/4	3/4	8	4 1/4	3 3/4	
4	7 1/2	5/8	8	3 1/2	3	7 7/8	3/4	8	4 1/4	3 3/4	
5	8 1/2	3/4	8	3 3/4	3 1/4	9 1/4	3/4	8	4 1/2	4	
6	9 1/2	3/4	8	3 3/4	3 1/4	10 5/8	3/4	12	4 3/4	4 1/4	
8	11 3/4	3/4	8	4	3 1/2	13	7/8	12	5 1/4	4 3/4	
10	14 1/8	7/8	12	4 1/2	3 3/4	15 1/4	1	16	6	5 1/4	
12	17	7/8	12	4 1/2	4	17 3/4	1 1/8	16	6 1/2	5 3/4	
14	18 3/4	1	12	5	4 1/4	20 1/4	1 1/8	20	6 3/4	6	
16	21 1/4	1	16	5 1/4	4 1/2	22 1/2	1 1/4	20	7 1/4	6 1/2	
18	22 3/4	1 1/8	16	5 3/4	4 3/4	24 3/4	1 1/4	24	7 1/2	6 3/4	

125/150 LB. FLANGE						250/300 LB. FLANGE					
Nom. Pipe Size	Bolt Circle Dia.	Bolt Dia.	No. of Bolts	*Stud Len.	Bolt Len.	Bolt Circle Dia.	Bolt Dia.	No. of Bolts	*Stud Len.	Bolt Len.	
20	25	1 1/8	20	6	5 1/4	27	1 1/4	24	8	7	
22	27 1/4	1 1/4	20	6 1/2	5 1/2	29 1/4	1 1/2	24	8 3/4	7 1/2	
24	29 1/2	1 1/4	20	6 3/4	5 3/4	32	1 1/2	24	9	7 3/4	
26	31 3/4	1 1/4	24	7	6	34 1/2	1 5/8	28	10	8 3/4	
30	36	1 1/4	28	7 1/4	6 1/4	39 1/4	1 3/4	28	11 1/4	10	
34	40 1/2	1 1/2	32	8	7	43 1/2	1 7/8	28	12 1/4	10 3/4	
36	42 3/4	1 1/2	32	8 1/4	7	46	2	32	12 3/4	11 1/4	
42	49 1/2	1 1/2	36	8 3/4	7 1/4	52 3/4	2	36	13 3/4	13 1/2	

\*1/16" Raised Face

Stud lengths for lap joint flanges are equal to lengths shown plus the thickness of two laps of the stub ends.



## BOLTING DIMENSIONS FOR 400 LB./600LB. STEEL FLANGE

Nom Pipe Size	400 LB. STEEL FLANGES				600 LB. STEEL FLANGES			
	Diam of Bolt Circle	Diam of Bolts	No. of Bolts	Length of Studs 1/4" Raised Face	Diam of Bolt Circle	Diam of Bolts	No of Bolts	Length of Studs 1/4" Raised Face
1/2	2 <sup>5</sup> / <sub>8</sub>	1/2	4	3	2 <sup>5</sup> / <sub>8</sub>	1/2	4	3
3/4	3 <sup>1</sup> / <sub>4</sub>	5/8	4	3 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>4</sub>	5/8	4	3 <sup>1</sup> / <sub>4</sub>
1	3 <sup>1</sup> / <sub>2</sub>	5/8	4	3 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>	5/8	4	3 <sup>1</sup> / <sub>2</sub>
1 <sup>1</sup> / <sub>4</sub>	3 <sup>7</sup> / <sub>8</sub>	5/8	4	3 <sup>3</sup> / <sub>4</sub>	3 <sup>7</sup> / <sub>8</sub>	5/8	4	3 <sup>3</sup> / <sub>4</sub>
1 <sup>1</sup> / <sub>2</sub>	4 <sup>1</sup> / <sub>2</sub>	3/4	4	4	4 <sup>1</sup> / <sub>2</sub>	3/4	4	4
2	5	5/8	8	4	5	5/8	8	4
2 <sup>1</sup> / <sub>2</sub>	5 <sup>7</sup> / <sub>8</sub>	3/4	8	4 <sup>1</sup> / <sub>2</sub>	5 <sup>7</sup> / <sub>8</sub>	3/4	8	4 <sup>1</sup> / <sub>4</sub>
3	6 <sup>5</sup> / <sub>8</sub>	3/4	8	4 <sup>3</sup> / <sub>4</sub>	6 <sup>5</sup> / <sub>8</sub>	3/4	8	4 <sup>3</sup> / <sub>4</sub>
3 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>4</sub>	7/8	8	5 <sup>1</sup> / <sub>4</sub>	7 <sup>1</sup> / <sub>4</sub>	7/8	8	5 <sup>1</sup> / <sub>4</sub>
4	7 <sup>7</sup> / <sub>8</sub>	7/8	8	5 <sup>1</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	7/8	8	5 <sup>1</sup> / <sub>2</sub>
5	9 <sup>1</sup> / <sub>4</sub>	7/8	8	6 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>2</sub>	1	8	6 <sup>1</sup> / <sub>4</sub>
6	10 <sup>5</sup> / <sub>8</sub>	7/8	12	5 <sup>3</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>2</sub>	1	12	6 <sup>1</sup> / <sub>2</sub>
8	13	1	12	6 <sup>1</sup> / <sub>2</sub>	13 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	12	7 <sup>1</sup> / <sub>2</sub>
10	15 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	16	7 <sup>1</sup> / <sub>4</sub>	17	1 <sup>1</sup> / <sub>4</sub>	16	8 <sup>1</sup> / <sub>4</sub>
12	17 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	16	7 <sup>3</sup> / <sub>4</sub>	19 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	20	8 <sup>1</sup> / <sub>2</sub>
14	20 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	20	8	20 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>8</sub>	20	9
16	22 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>8</sub>	20	8 <sup>1</sup> / <sub>2</sub>	23 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	20	9 <sup>3</sup> / <sub>4</sub>
18	24 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>8</sub>	24	8 <sup>3</sup> / <sub>4</sub>	25 <sup>3</sup> / <sub>4</sub>	1 <sup>5</sup> / <sub>8</sub>	20	10 <sup>1</sup> / <sub>2</sub>

Nom Pipe Size	400 LB. STEEL FLANGES				600 LB. STEEL FLANGES			
	Diam of Bolt Circle	Diam of Bolts	No. of Bolts	Length of Studs 1/4" Raised Face	Diam of Bolt Circle	Diam of Bolts	No of Bolts	Length of Studs 1/4" Raised Face
20	27	1 <sup>1</sup> / <sub>2</sub>	24	9 <sup>1</sup> / <sub>2</sub>	28 <sup>1</sup> / <sub>2</sub>	1 <sup>5</sup> / <sub>8</sub>	24	11 <sup>1</sup> / <sub>4</sub>
22	29 <sup>1</sup> / <sub>4</sub>	1 <sup>5</sup> / <sub>8</sub>	24	10	30 <sup>5</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>4</sub>	24	12
24	32	1 <sup>3</sup> / <sub>4</sub>	24	10 <sup>1</sup> / <sub>2</sub>	33	1 <sup>7</sup> / <sub>8</sub>	24	12 <sup>3</sup> / <sub>4</sub>
26	34 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>4</sub>	28	11 <sup>1</sup> / <sub>2</sub>	36	1 <sup>7</sup> / <sub>8</sub>	28	13 <sup>1</sup> / <sub>4</sub>
30	39 <sup>1</sup> / <sub>4</sub>	2	28	13	40 <sup>1</sup> / <sub>4</sub>	2	28	14
34	43 <sup>1</sup> / <sub>2</sub>	2	28	13 <sup>3</sup> / <sub>4</sub>	44 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>4</sub>	28	15
36	46	2	32	14	47	2 <sup>1</sup> / <sub>2</sub>	28	15 <sup>3</sup> / <sub>4</sub>
42	52 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>2</sub>	32	16 <sup>1</sup> / <sub>4</sub>	53 <sup>3</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>4</sub>	28	17 <sup>1</sup> / <sub>2</sub>

Stud lengths for lap joint flanges are equal to lengths shown minus 1/2" plus the thickness of two laps of the stub ends.

## ASTM CARBON STEEL PIPE & FLANGE SPECIFICATIONS

Pipe and Tubing Description and Applications	Spec No.	ASTM or Type	Grade Strength PSI	Yield Point or Strength PSI	Elongation (% in 2")			Chemical Composition, %				
					STD Round	Rectangular			C	MN	P	S
						t	5/16"	5/16"				
Seamless milled steel pipe for high-temperature service, suitable for bending, flanging & similar forming operations.	(1) A106	A	48,000	30,000	28 long-OR (4) 20 trans.	17.5+ or 12.5+	56t 40t	35 25	.25 max	.27 to .93	.048 max	.058 max
As above, except use Grade A for close coiling, cold bending or forge welding.	(1) A106	B	60,000	35,000	28 long-OR (4) 12 trans.	17.5+ or 6.5+	56t 32t	35 16.5	30 max	.27 to 1.06	.048 max	.058 max
Black or hot-dip galvanize seamless or res-welded steel pipe suitable for coiling, bending, flanging, & other special purposes, suitable for welding.	A 53	A	48,000	30,000	28	17.5+	56t	35	(2)	-	(3)	-
As above, except use Grade A for close coiling, cold bending or forge welding.	A 53	B	60,000	35,000	22	15+	48t	30	(2)	-	(3)	-
Black or hot-dip galvanize seamless or res. welded steel pipe suitable for ordinary uses. (When tension, flattening or bend test required, order to A-53).	A 120 (obsolete)	-	-	-	-	-	-	-	-	-	-	-
Resistance welded steel pipe for liquid, gas or vapor.	A 135	A	48,000	30,000	-	17.5+	56t	35	-	-	.050 max	.060 max
As above, except use Grade A for flanging & bending.	A 135	B	60,000	35,000	-	15+	48t	30	-	-	.050 max	.060 max

## ASTM CARBON STEEL PIPE & FLANGE SPECIFICATIONS

Pipe and Tubing Description and Applications	Spec No.	ASTM or Type	Grade Strength PSI	Yield Point or Strength PSI	Elongation (% in 2")			Chemical Composition, %				
					STD Round	Rectangular		C	MN	P	S	
						t	5/16"					5/16"
Electric-fusion-welded straight- or spiral-seam pipe for liquid, gas or vapor from mill grades of plate.	A 139	A	48,000	30,000	–	17.5+	56t	35	–	.30 to 1.00	.040 max	.050 max
As above	A 139	B	60,000	35,000	–	15+	48t	30	.30 max	.30 to 1.00	.040 max	.050 max
Forged Pipe, Flanges Description and Applications												
Forged or rolled steel pipe flanges, fittings (6) values and parts for high temperature service. Heat treatment required; may be annealed or normalized.	A105	I	60,000	30,000	25		–	–	.35 (5) max	.90 max	.05 max	.05 max
As above	A 105	II	70,000	36,000	22		–	–	.35 (5) max	.90 max	.05 max	.05 max
As above except for general service. Heat treatment is not required.	A 181	I	60,000	30,000	22		–	–	.35 (5) max	.90 max	.05 max	.05 max
As above	A 181	II	70,000	36,000	18		–	–	.35 (5) max	.90 max	.05 max	.05 max

(1) 0.10% silicon minimum.

(2) Open hearth, 0.13 max for 1/8" and 1/4" size resistance welded pipe only

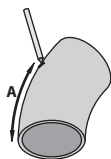
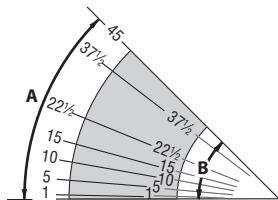
(3) Seamless: open hearth 0.048 max, acid bessemer 0.11 max;  
Res. welded: open hearth 0.050 max.

(4) Longitudinal or transverse direction of test specimen with respect to pipe axis

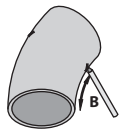
(5) When flanges will be subject to fusion welding, carbon content shall be  $\leq 0.35\%$ . If carbon is  $\leq 0.35\%$ , it may be necessary to add silicon to meet required tensile properties. The silicon content shall be  $\leq 0.35\%$ .

(6) Factor-made Wrought Carbon Steel and Ferritic Alloy Steel Welding Fitting Specifications are covered under ASTM A234.

## HOW TO CUT ODD-ANGLE ELBOWS



**Step 1-** Measure distance on outside arc using the values from the previous table & make a mark.



**Step 2-** Measure distance on inside arc using the values from the table below & make a mark.



**Step 3-** Wrap tape around elbow & mark cutting line.

Nom.	O.D.	1°		5°		10°		15°		22 <sup>1</sup> / <sub>2</sub> °		37 <sup>1</sup> / <sub>2</sub> °		45°	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
2	2.38	1/16	1/32	3/8	5/32	23/32	5/16	13/32	15/32	12 <sup>1</sup> / <sub>32</sub>	23/32	23/4	13/16	39/32	17/16
2 1/2	2.88	3/32	1/32	7/16	3/16	29/32	13/32	11 <sup>1</sup> / <sub>32</sub>	19/32	21/32	29/32	313/32	1 1/2	41/16	113/16
3	3.50	3/32	1/16	17/32	1/4	13/32	15/32	15/8	23/32	215/32	13/32	43/32	113/16	429/32	25/32
3 1/2	4.00	1/8	1/16	5/8	9/32	11/4	9/16	129/32	27/32	227/32	19/32	43/4	2/8	511/16	29/16
4	4.50	5/32	1/16	23/32	5/16	17/16	21/32	25/32	31/32	31/4	115/32	513/32	215/32	615/32	215/16
5	5.56	3/16	3/32	29/32	13/32	125/32	13/16	211/16	1/4	41/32	127/32	623/32	33/32	81/16	323/32
6	6.63	7/32	3/32	11/16	1/2	25/32	1	37/32	1/2	427/32	27/32	81/16	323/32	921/32	415/32
8	8.63	9/32	1/8	17/16	21/32	227/32	111/32	49/32	2	613/32	31/32	1011/16	51/32	1213/16	61/32
10	10.75	11/32	5/32	125/32	27/32	39/16	111/16	511/32	217/32	8	325/32	1311/32	65/16	16	79/16
12	12.75	7/16	3/16	21/8	1	41/4	21/32	63/8	31/32	99/16	49/16	1531/32	719/32	195/32	91/8
14	14.00	1/2	1/4	27/16	7/32	47/8	27/16	711/32	321/32	11	51/2	185/16	95/32	22	11
16	16.00	9/16	9/32	225/32	113/32	519/32	225/32	83/8	43/16	129/16	69/32	2015/16	1015/32	251/8	19/16
18	18.00	5/8	5/16	35/32	19/16	69/32	35/32	97/16	423/32	141/8	71/16	239/16	1125/32	289/32	141/8
20	20.00	11/16	11/32	31/2	13/4	631/32	31/2	1015/32	51/4	1523/32	727/32	23/16	133/32	3113/32	1523/32
22	22.00	25/32	3/8	327/32	129/32	711/16	327/32	1117/32	53/4	179/32	85/8	2813/16	1413/32	349/16	179/32
24	24.00	27/32	13/32	43/16	23/32	83/8	43/16	129/16	69/32	1827/32	97/16	3113/32	1523/32	3711/16	1827/32
26	26.00	29/32	15/32	417/32	29/32	91/16	417/32	135/8	613/16	2013/32	107/32	341/32	171/32	4027/32	2013/32
30	30.00	11/16	17/32	51/4	25/8	1015/32	51/4	1523/32	727/32	239/16	1125/32	399/32	195/8	471/8	239/16
34	34.00	13/16	19/32	515/16	231/32	117/8	515/16	1713/16	829/32	2623/32	1311/32	441/2	221/4	5313/32	2623/32
36	36.00	11/4	5/8	69/32	35/32	129/16	69/32	1827/32	97/16	289/32	141/8	471/8	239/16	569/16	289/32
42	42.00	115/32	23/32	711/32	321/32	1421/32	711/32	22	11	33	161/2	5431/32	271/2	6531/32	33

## ALIGNMENT OF PIPE

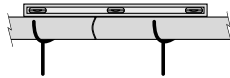
Proper alignment is important if a piping system is to be correctly fabricated.

Poor alignment may result in welding difficulties and a system that does not function properly.

Welding rings may be employed to assure proper alignment as well as the correct welding gap. In addition to using welding rings, some simple procedures can be followed to assist the pipe fitter. Below and on the following page are alignment procedures commonly used by today's craftsmen.

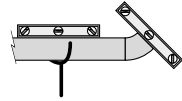
### PIPE-TO-PIPE

1. Level one length of pipe using spirit level.
2. Bring lengths together leaving only small welding gap.
3. Place spirit level over both pipes as shown and maneuver unpositioned length until both are level.
4. Tack weld top and bottom.
5. Rotate pipe 90°.
6. Repeat procedure.



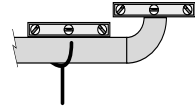
### 45° ELBOW-TO-PIPE

1. Level pipe using spirit level.
2. Place fitting to pipe leaving small welding gap.
3. Place 45" spirit level on face of elbow and maneuver elbow until bubble is centered.
4. Tack weld in place.



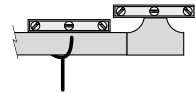
### 90° ELBOW-TO-PIPE

1. Level pipe using spirit level.
2. Place fitting to pipe leaving small welding gap.
3. Place spirit level on face of elbow and maneuver elbow until level.
4. Tack weld in place.



### TEE-TO-PIPE

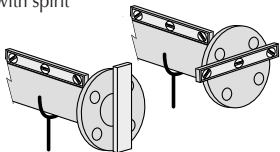
1. Level pipe using spirit level.
2. Place tee to pipe leaving small welding gap.
3. Place spirit level on face of tee and maneuver tee until level.
4. Tack weld in place.



## ALIGNMENT OF PIPE, CONT'D.

## FLANGE-TO-PIPE

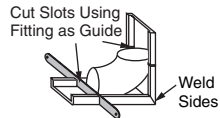
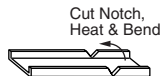
1. Bring flange to pipe end leaving small welding gap.
2. Align top two holes of flange with spirit level.
3. Tack weld in place.
4. Center square on face of flange as shown.
5. Tack weld in place.
6. Check sides in same way.



## JIG FOR SMALL DIAMETER PIPING

The jig is made from channel iron 3' 9" long. Use  $\frac{1}{8}$ " x  $1\frac{1}{2}$ " for pipe sizes  $1\frac{1}{4}$ " thru 3";  $\frac{1}{8}$ " x  $\frac{3}{4}$ " for sizes 1" or smaller.

1. Cut out 90° notches about 9" from end.
2. Heat bottom of notch with torch.
3. Bend channel iron to 90° angle and weld sides.
4. Place elbow in jig and saw half thru sides of channel iron as shown. Repeat this step with several elbows so jig may be used for different operations.
5. A used hack saw blade placed in notch as shown will provide proper welding gap.



## DRILL SIZES FOR NPT PIPE TAPS

Tap Size	Threads/In.	Drill Dia.
1/8	27	R
1/4	18	7/16
3/8	18	37/64
1/2	14	23/32
3/4	14	59/64
1	11 1/2	15 3/32
1 1/4	11 1/2	1 1/2
1 1/2	11 1/2	1 47/64
2	11 1/2	2 7/32
2 1/2	8	2 5/8
3	8	3 1/4
3 1/2	8	3 3/4
4	8	4 1/4

## TAP & DRILL SIZES

(Unified National Coarse)

Tap Size	Threads/In.	Drill Size
1/4	20	7
5/16	18	F
3/8	16	5/16
7/16	14	U
1/2	13	27/64
9/16	12	31/64
5/8	11	17/32
3/4	10	21/32
7/8	9	49/64
1	8	7/8
1 1/8	7	63/64
1 1/4	7	17/64
1 3/8	6	17/32
1 1/2	6	1 11/32
1 3/4	5	1 9/16
2	4 1/2	1 25/32

## PIPE & WATER WEIGHT/FOOT

Nom. Pipe Size	WEIGHT (Lb.)		WEIGHT (Lb.)	
	STD Pipe	Water	XS Pipe	Water
1/2	0.851	0.132	1.088	0.101
3/4	1.131	0.230	1.474	0.188
1	1.679	0.374	2.172	0.311
1 1/4	2.273	0.648	2.997	0.555
1 1/2	2.718	0.882	3.631	0.765
2	3.653	1.455	5.022	1.280
2 1/2	5.793	2.076	7.661	1.837
3	7.580	3.200	10.250	2.864
3 1/2	9.110	4.280	12.510	3.850
4	10.790	5.510	14.980	4.980
5	14.620	8.660	20.780	7.890
6	18.970	12.510	28.570	11.290
8	28.550	21.690	43.390	19.800
10	40.480	34.100	54.740	32.300
12	49.580	49.000	65.420	47.000
14	54.570	59.700	72.090	57.500
16	62.580	79.100	82.770	76.500
18	70.590	101.200	93.450	98.400
20	78.600	126.000	104.130	122.800
24	94.620	183.800	125.490	180.100
30	119.000	291.200	158.000	286.200

**WEIGHT/FOOT - SEAMLESS BRASS & COPPER PIPE**

Nominal Pipe Size	REGULAR			EXTRA STRONG		
	Yellow Brass	Red Brass	Copper	Yellow Brass	Red Brass	Copper
1/2	0.91	0.93	0.96	1.19	1.23	1.25
3/4	1.23	1.27	1.30	1.62	1.67	1.71
1	1.73	1.78	1.82	2.39	2.49	2.51
1 1/4	2.56	2.63	2.69	3.29	3.39	3.46
1 1/2	3.04	3.13	3.20	3.99	4.10	4.19
2	4.01	4.12	4.22	5.51	5.67	5.80

**BOILING POINTS OF WATER AT VARIOUS PRESSURES**

Vacuum, in Inches of Mercury	Boiling Point	Vacuum, in Inches of Mercury	Boiling Point	Pressure Gauge Lbs	Boiling Point
				0	212.0
29	76.62	14	181.82	1	215.6
28	99.93	13	184.61	2	218.5
27	114.22	12	187.21	4	224.4
26	124.77	11	189.75	6	229.8
25	133.22	10	192.19	8	234.8
24	140.31	9	194.50	10	239.4
23	146.45	8	196.73	15	249.8
22	151.87	7	198.87	25	266.8
21	156.75	6	200.96	50	297.7
20	161.19	5	202.25	75	320.1
19	165.24	4	204.85	100	337.9
18	169.00	3	206.70	125	352.9
17	172.51	2	208.50	200	387.9
16	175.80	1	210.25		
15	178.91				



## WATER PRESSURE TO FEET HEAD

Lbs./Sq.In. Feet Head		Lbs./Sq.In. Feet Head		Lbs./Sq.In. Feet Head	
1	2.31	40	92.36	180	77.96
2	4.62	50	115.45	200	86.62
3	6.93	60	138.54	250	108.27
4	9.24	70	161.63	300	129.93
5	11.54	80	184.72	350	151.58
6	13.85	90	207.81	400	173.24
7	16.16	100	43.31	500	216.55
8	18.47	110	47.64	600	259.85
9	20.78	120	51.97	700	303.16
10	23.09	130	56.30	800	346.47
15	34.63	140	60.63	900	389.78
20	46.18	150	64.96	1,000	433.00
25	57.72	160	69.29		
30	69.27	170	73.63		

## FEET HEAD TO WATER PRESSURE

Feet Head	Lbs./Sq.In.	Feet Head	Lbs./Sq.In.	Feet Head	Lbs./Sq.In.
1	0.43	40	17.32	180	77.96
2	0.87	50	21.65	200	86.62
3	1.30	60	25.99	250	108.27
4	1.73	70	30.32	300	129.93
5	2.17	80	34.65	350	151.58
6	2.60	90	38.98	400	173.24
7	3.03	100	43.31	500	216.55
8	3.46	110	47.64	600	259.85
9	3.90	120	51.97	700	303.16
10	4.33	130	56.30	800	346.47
15	6.50	140	60.63	900	389.78
20	8.66	150	64.96	1,000	433.00
25	10.83	160	69.29		
30	12.99	170	73.63		

**NOTE:** One foot of water at 62°F equals 0.433 pound pressure per square inch. To find the pressure per square inch for any feet head not given in the table above, multiply the feet head by 0.433.

## FLOW CONVERSION CHART

The accompanying chart provides fast answers to many problems that may confront the pipe fitter. Procedures for using the chart are as follows:

Note that there are three sets of figures shown in connection with the extreme left-hand column **A**.

“Standard” gives the internal diameter of standard pipe (somewhat greater than 1" for 1 in. standard pipe).

“Exact” gives the exact diameter.

“Extra Heavy” gives the internal diameter of extra heavy pipe.

**EXAMPLE:**How much water is passing through a pipe with parameters:

I.D. of exactly 1 in.

Velocity of the water being 3 F.P.S.

To apply the chart to the problem locate 1 in. in column “**A**” using the scale “**Exact**” and run a straight line from the point through the 3 in column “**C**”. From the intersection of this line with column “**B**”. run a straight line horizontally to column “**G**”. The intersection of this line at columns “**D**”, “**E**” and “**F**” gives the following information:

“**D**” shows the cubic feet/minute flowing through the pipe.

“**E**” shows the volume of flow in gallons/minute

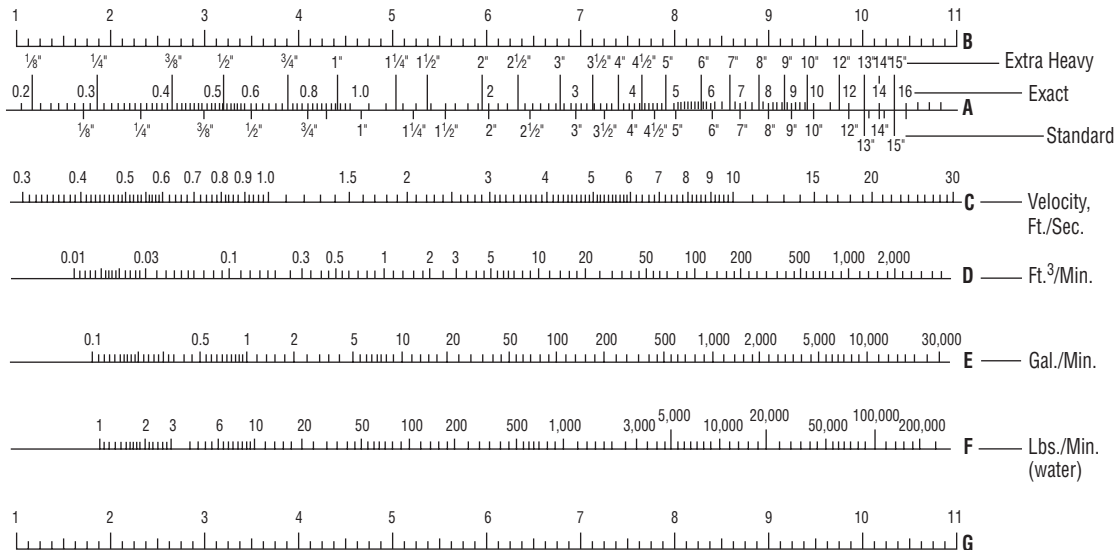
“**F**” gives the weight of the water in pounds/minute. (For liquids other than water. multiply the value of column “**F**” by the specific gravity of the liquid for accurate weight conversion.)

If a quantity in columns “**D**”, “**E**” and “**F**” is known then velocity may be determined by reversing the procedure. Draw a horizontal line from the known point to column “**G**”. From this intersection draw a line to the exact I.D. of the pipe in column “**A**” and extend this line to cross column “**C**”. The intersection with column “**C**” gives the velocity in feet/second.

The chart can be used as a conversion chart to determine the number of gallons in a certain number of cubic feet of liquid. The horizontal line already drawn to determine answers in columns “**C**” and “**D**” will provide the answer to the conversion in column “**E**”.

A little practice will prove this chart to be a real time-saver.

# FLOW CONVERSION CHART



### HEAT LOSSES FROM HORIZONTAL BARE STEEL PIPE

(BTU per hour per linear foot at 70°F room temperature)

PIPE Nom. Pipe Size	HOT WATER (180°F)	STEAM 5 PSIG (20 PSIA)
1/2	60	96
3/4	73	118
1	90	144
1 1/4	112	179
1 1/2	126	202
2	155	248
2 1/2	185	296
3	221	355
3 1/2	244	401
4	279	448

### COLORS & APPROXIMATE TEMPERATURE FOR CARBON STEEL

Black Red . . . . .	990°F
Dark Blood Red . . . . .	1,050°F
Dark Cherry Red . . . . .	1,175°F
Medium Cherry Red . . . . .	1,250°F
Full Cherry Red . . . . .	1,375°F
Light Cherry, Scalding . . . . .	1,550°
Salmon, Free Scalding . . . . .	1,650°F
Light Salmon . . . . .	1,725°F
Yellow . . . . .	1,825°F
Light Yellow . . . . .	1,975°F
White . . . . .	2,220°F

### TOTAL THERMAL EXPANSION OF PIPING MATERIAL

(Inches Per 100 Ft. Above 32°F)

Temp °F	Carbon & Carbon Molly Cast		Brass & Wrought		
	Steel	Iron	Copper	Bronze	Iron
32	0.0	0.0	0.0	0.0	0.0
100	0.5	0.5	0.8	0.8	0.5
150	0.8	0.8	1.4	1.4	0.9
200	1.2	1.2	2.0	2.0	1.3
250	1.7	1.5	2.7	2.6	1.7
300	2.0	1.9	3.3	3.2	2.2
350	2.5	2.3	4.0	3.9	2.6
400	2.9	2.7	4.7	4.6	3.1
450	3.4	3.1	5.3	5.2	3.6
500	3.8	3.5	6.0	5.9	4.1
550	4.3	3.9	6.7	6.5	4.6
600	4.8	4.4	7.4	7.2	5.2
650	5.3	4.8	8.2	7.9	5.6
700	5.9	5.3	9.0	8.5	6.1
750	6.4	5.8	-	-	6.7
800	7.0	6.3	-	-	7.2
850	7.4	-	-	-	-
900	8.0	-	-	-	-
950	8.5	-	-	-	-
1000	9.1	-	-	-	-

### WEIGHTS OF METALS

Material	Chemical Symbol	Wt.in Lbs. Per Cubic In.	Wt. in Lbs. Per Cubic Ft.
Aluminum	Al	0.093	160
Antimony	Sb	0.2422	418
Brass	-	0.303	524
Bronze	-	0.32	552
Chromium	Cr	0.2348	406
Copper	Cu	0.323	558
Gold	Au	0.6975	1,205
Iron (cast)	Fe	0.26	450
Iron (wrought)	Fe	0.2834	490
Lead	Pb	0.4105	710
Maganese	Mn	0.2679	463
Mercury	Hg	0.491	849
Molybdenum	Mo	0.309	534
Monel	-	0.318	550
Platinum	Pt	0.818	1,413
Steel (mild)	-	0.2816	490
Steel (stainless)	-	0.277	484
Tin	Sn	0.265	459
Titanium	Ti	0.1278	221
Zinc	Zn	0.258	446

## SPECIFIC GRAVITY OF GASES

Dry Air (1 cu. Ft. at 60°F. & 29.92" Hg. Weighs.07638 pound)		.1.000
Acetylene	C <sub>2</sub> H <sub>2</sub>	.0.91
Ethane	C <sub>2</sub> H <sub>4</sub>	.1.05
Methane	CH <sub>4</sub>	.0.554
Ammonia	NH <sub>3</sub>	.0.596
Carbon-dioxide	CO <sub>2</sub>	.1.53
Carbon_monoxide	CO	.0.967
Butane	C <sub>4</sub> H <sub>10</sub>	.2.067
Butene	C <sub>4</sub> H <sub>8</sub>	.1.93
Chlorine	Cl <sub>2</sub>	.2.486
Helium	He	.0.138
Hydrogen	H <sub>2</sub>	.0.0696
Nitrogen	N <sub>2</sub>	.0.9718
Oxygen	O <sub>2</sub>	.1.1053

## SPECIFIC GRAVITY OF LIQUIDS

Liquid	Temp °F	Specific Gravity
Water (1 cu.-ft. weights 62.41 lb.)	50	1.00
Brine (Sodium Chloride 25%)	32	1.20
Pennsylvania Crude Oil	80	0.85
Fuel Oil No. 1 and 2	85	0.95
Gasoline	80	0.74
Kerosene	85	0.82
Lubricating Oil SAE 10-20-30	115	0.94

## TYPICAL BTU VALUES OF FUELS

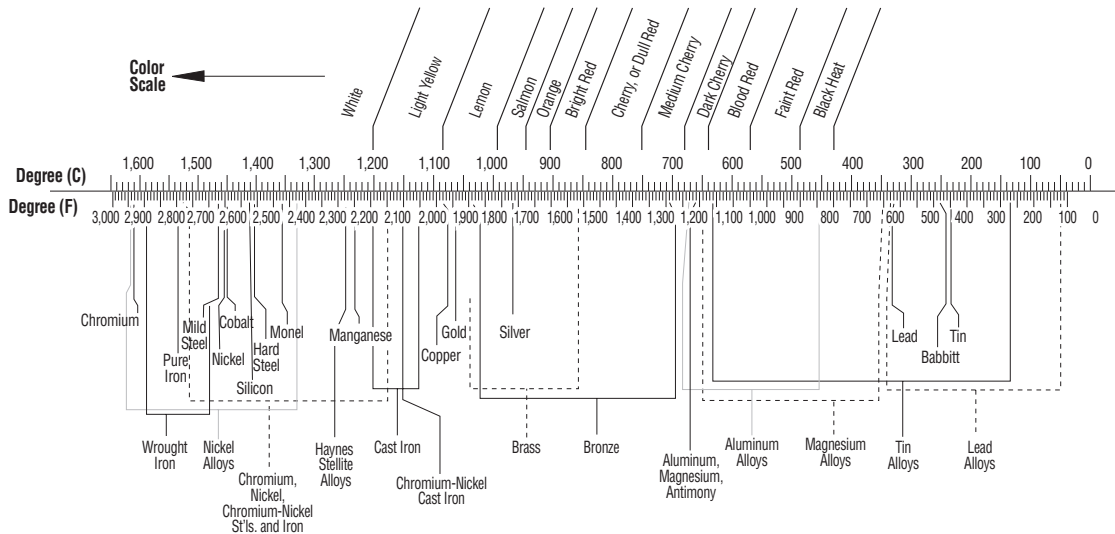
ASTM RANK SOLIDS	BTU VALUES PER POUND
Anthracite Class I	11,230
Bituminous Class II Group 1	14,100
Bituminous Class II Group 3	13,080
Sub-Bituminous Class III Group 1	10,810
Sub-Bituminous Class III Group 2	9,670

LIQUIDS	BTU VALUES PER GALLON
Fuel Oil No. 1	136,000
Fuel Oil No. 2	138,000
Fuel Oil No. 4	145,000
Fuel Oil No. 5	148,000
Fuel Oil No. 6	152,000

GASES	BTU VALUES PER CU. FT.
Natural Gas	935 to 1132
Producers Gas	163
Illuminating Gas	534
Mixed (Coke oven and water gas)	545

MELTING POINT OF METALS

Melting Points of Metals & Alloys of Practical Importance



## USEFUL DEFINITIONS

**ALLOY STEEL:** A Steel which owes its distinctive properties to elements other than carbon.

**AREA OF A CIRCLE:** The measurement of the surface within a circle. To find the area of a circle, multiply the product of the radius times the radius by Pi (3.142). Commonly written  $A = \pi r^2$ .

**BRAZE WELD OR BRAZING:** A process of joining metals using a nonferrous filler metal or alloy, the melting point of which is higher than 800°F but lower than that of the metals to be joined.

**BUTT WELD:** A circumferential weld in pipe fusing the abutting pipe walls completely from inside wall to outside wall.

**CARBON STEEL:** A steel which owes its distinctive properties chiefly to the various percentages of carbon (as distinguished from the other elements) which it contains.

**CIRCUMFERENCE OF A CIRCLE:** The measurement around the perimeter of a circle. To find the circumference, multiply Pi (3.142) by the diameter. (Commonly written as  $\pi d$ ).

**COEFFICIENT OF EXPANSION:** A number indicating the degree of expansion or contraction of a substance.

The coefficient of expansion is not constant and varies with changes in temperature. For linear expansion it is expressed as the change in length of one unit of length of a substance having one degree rise in temperature.

**CORROSION:** The gradual destruction or alteration of a metal or alloy caused by direct chemical attack or by electrochemical reaction.

**CREEP:** The plastic flow of pipe within a system; the permanent set in metal caused by stresses at high temperatures. Generally associated with a time rate of deformation.

**DIAMETER OF A CIRCLE:** A straight line drawn through the center of a circle from one extreme edge to the other. Equal to twice the radius.

**DUCTILITY:** The property of elongation, above the elastic limit, but under the tensile strength.

A measure of ductility is the percentage of elongation of the fractured piece over its original length.

**ELASTIC LIMIT:** The greatest stress which a material can withstand without a permanent deformation after release of the stress.

**EROSION:** The gradual destruction of metal or other material by the abrasive action of liquids, gases, solids or mixtures thereof.

**RADIUS OF A CIRCLE:** A straight line drawn from the center to the extreme edge of a circle.

**SOCKET FITTING:** A fitting used to join pipe in which the pipe is inserted into the fitting. A fillet weld is then made around the edge of the fitting and the outside wall of the pipe.

## USEFUL DEFINITIONS

**SOLDERING:** A method of joining metals using fusible alloys, formerly tin and lead, having melting points under 700°F

**STRAIN:** Change of shape or size of a body produced by the action of a stress.

**STRESS:** The intensity of the internal, distributed forces which resist a change in the form of a body. When external forces act on a body they are resisted by reactions within the body which are termed stresses.

**TENSILE STRESS:** One that resists a force tending to pull a body apart.

**COMPRESSIVE STRESS:** One that resists a force tending to crush a body.

**SHEARING STRESS:** One that resists a force tending to make one layer of a body slide across another layer.

**TORSIONAL STRESS:** One that resists forces tending to twist a body.

**TENSILE STRENGTH:** The maximum tensile stress which a material will develop. The tensile strength is usually considered to be the load in pounds per square inch at which a test specimen ruptures.

**TURBULENCE:** Any deviation from parallel flow in a pipe due to rough inner walls, obstructions or directional changes.

**VELOCITY:** Time rate of motion in a given direction and sense, usually expressed in feet per second.

**VOLUME OF A PIPE:** The measurement of the space within the walls of the pipe. To find the volume of a pipe, multiply the length (or height) of the pipe by the product of the inside radius times the inside radius by Pi (3.142). Commonly written as  $V = h\pi r^2$ .

**WELDING:** A process of joining metals by heating until they are fused together, or by heating and applying pressure until there is a plastic joining action. Filler metal may or may not be used.

**YIELD STRENGTH:** The stress at which a material exhibits a specified limiting permanent set. (.2% or .5%)



## UNIT CONVERSIONS

### FLOW

1 gpm	= 0.134 cu. ft. per min = 500 lb. per hr. x sp. gr.
500 lb. per hr.	= 1 gpm / sp. gr.
1 cu. ft. per min. (cfm)	= 448.8 gal. per hr. (gph)

### POWER

1 Btu per hr.	= 0.293 watt = 12.96 ft. lb. per min. = 0.00039 hp
1 ton refrigeration (U.S.)	= 288,000 Btu per 24 hr. = 12,000 Btu per hr. = 200 Btu per min. = 83.33 lb. ice melted per 24 hr. from & at 32°F. = 2,000 lb. ice melted per 24 hr. from & at 32°F
1 hp	= 550 ft. lb. per sec. = 746 watt = 2,545 Btu per hr.
1 boiler hp	= 33,480 Btu per hr. = 34.5 lb. water evap. per hr. from & at 212°F = 9.8 kw.
1 kw.	= 3,413 Btu per hr.

### MASS

1 lb. (avoir.)	= 16 oz. (avoir.) = 7,000 grain
1 ton (short)	= 2,000 lb.
1 ton (long)	= 2,240 lb.

### PRESSURE

1 lb. Per sq. in.	= 3.13 ft. water at 60°F = 2.04 in. hg at 60°F
1 ft. water at 60°F	= .433 lb. per sq. in. = .884 in. hg at 60°F
1 in. Hg at 60°F	= .49 lb. per sq. in. = 1.13 ft. water at 60°F
1 lb. Per sq. in.	= lb. per sq. in. gauge (psig)
Absolute (psia)	= 14.7

### TEMPERATURE

°C	= (°F-32) x 5/9
----	-----------------

### VOLUME

1 gal. (U.S.)	= 128 fl. oz. (U.S.) = 231 cu. in. = .833 gal. (Brit.)
1 cu. ft.	= 7.48 gal. (U.S.)

### WEIGHT OF WATER

1 cu. ft. at 50°F.	= 62.41 lb.
1 gal. at 50°F.	= 8.34 lb.
1 cu. ft. of ice	= 57.2 lb.
1 cu. ft. at 39.2°F.	= 62.43 lb.

Note: Water is at its greatest density at 39.2°F

### WEIGHT OF LIQUID

1 gal. (U.S.)	= 8.34 lb. x sp. gr.
1 cu. ft.	= 62.4 lb. x sp. gr.
1 lb.	= .12 U.S. gal. / sp. gr. = .016 cu. ft. / sp. gr.

### WORK

1 Btu (mean)	= 778 ft. lb. = .293 watt hr. = $\frac{1}{180}$ of heat required to change temp of 1 lb. water from 32°F to 212°F
1 hp-hr	= 2545 Btu (mean) = .746 kw hr
1 Kw hr	= 3413 Btu (mean) = 1.34 hp-hr

## GEOMETRY FORMULAS

A = AREA

A<sub>1</sub> = SURFACE AREA OF SOLIDS

V = VOLUME

C = CIRCUMFERENCE    π = Pi (3.14159)

### CIRCLE

$$A = \pi \cdot R^2 \quad C = \pi \cdot D$$

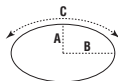
$$R = D / 2 \quad D = 2 \cdot R$$



### ELLIPSE

$$A = \pi \cdot A \cdot B$$

$$C = 2 \cdot \pi \cdot \sqrt{\frac{A^2 + B^2}{2}}$$



### PARALLELOGRAM

$$A = H \cdot L$$



### RECTANGLE

$$A = H \cdot L$$



### TRAPEZOID

$$A = H \cdot (L_1 + L_2) / 2$$



### SECTOR OF CIRCLE

$$A = (\pi \cdot R^2 \cdot \alpha) / 360$$

$$L = (\pi \cdot R \cdot \alpha) / 180$$

$$\alpha = (L \cdot 180) / (\pi \cdot R)$$

$$R = (L \cdot 180) / (\pi \cdot \alpha)$$



### TRIANGLE

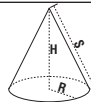
$$A = (W \cdot H) / 2$$



### CONE

$$A_1 = (\pi \cdot R \cdot S) + (\pi \cdot R^2)$$

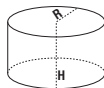
$$V = (\pi \cdot R^2 \cdot H) / 3$$



### CYLINDER

$$A_1 = (2 \cdot \pi \cdot R^2) + (2 \cdot \pi \cdot R \cdot H)$$

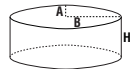
$$V = \pi \cdot R^2 \cdot H$$



### ELLIPTICAL TANKS

$$A_1 = 2 \cdot \pi \cdot \left( A \cdot B + H \cdot \sqrt{\frac{A^2 + B^2}{2}} \right)$$

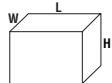
$$V = \pi \cdot A \cdot B \cdot H$$



### RECTANGULAR SOLID

$$A_1 = 2 \cdot [(W \cdot L) + (L \cdot H) + (H \cdot W)]$$

$$V = W \cdot L \cdot H$$



### SPHERE

$$A_1 = 6 \cdot \pi \cdot R^2$$

$$V = (4 \cdot \pi \cdot R^3) / 3$$



### CAPACITY IN GALLONS

For the above contains, capacity in gallons (G) is:

$G = (V / 231)$ ; when V is in cubic inches

$G = (V \cdot 7.48)$ ; when V is in cubic feet

## SPRINKLER SYSTEM FORMULAS

### Simple Flow Rate

$$Q = K \cdot P^{0.5}, \text{ where}$$

Q = flow rate (GPM)

K = discharge coefficient of pipe

P = pressure (PSI)

### General Volumetric Flow Rate

$$Q = 29.8 \cdot D^2 \cdot Cd \cdot P^{0.5}, \text{ where}$$

Q = flow rate (GPM)

D = outlet diameter (Inches)

Cd = discharge coefficient based on outlet geometry

P = pressure (PSI)

### Pressure Tank Sizing (Tank above sprinklers)

$$P = (30/A) - 15, \text{ where}$$

P = air pressure in tank (PSI)

A = proportion of air in the tank

### Pressure Tank Sizing (Tank below sprinklers)

$$P = (30/A) - 15 + (0.43 \cdot H/A), \text{ where}$$

P = air pressure carried in tank (PSI)

A = proportion of air in the tank

H = height of highest sprinkler above tank bottom (Ft)

### Pressure Tank Sizing (Hydraulically calculated)

$$P_i = [(P_f + 15)/A] - 15, \text{ where}$$

P<sub>i</sub> = tank air pressure to use (PSI)

A = proportion of air in the tank

P<sub>f</sub> = system pressure req'd per hydraulic calc. (PSI)

### Darcy-Weisbach Formula for Friction Loss

$$HL = f \cdot (L/D) \cdot (v^2/2g), \text{ where}$$

HL = friction loss (Ft)

Re = Reynolds number ( $pVd / \mu$ )

f = friction factor ( $f=64/Re$ )

v = water velocity (Ft/Sec)

g = gravitational constant (32.174ft/sec<sup>2</sup>)

D = pipe diameter (Ft)

L = pipe length (Ft)

### PRESSURE VELOCITY

$$P_v = 0.001123 \cdot Q^2 / D^4, \text{ where}$$

P<sub>v</sub> = pressure velocity (PSI)

Q = flow rate (GPM)

D = internal dia. of pipe (Inches)

### Hazen-Williams Formula for Pressure Loss

$$P = (4.52 \cdot Q^{1.85}) / (C^{1.85} \cdot d^{4.87}), \text{ where:}$$

P = pressure loss (PSI) per lineal ft.

Q = flow rate (GPM)

C = friction factor of pipe (constant)

d = internal diameter of pipe (Inches)

Typical "C" values:

Unlined cast or ductile iron . . . . . 100

Black steel (dry sys.incl.preaction) . . 100

Black steel (wet sys.incl.deluge) . . . 120

Galvanized (all) . . . . . 120

Plastic (listed)– all . . . . . 150

Cement lined cast or ductile iron . . 140

Copper tube or stainless steel . . . . . 150

### Hazen-Williams Formula for Pressure Loss

(in SI units)

$$P = 6.05 \cdot 10^5 \cdot Q^{1.85} / (C^{1.85} \cdot d^{4.87}),$$

where

P = pressure loss (Bars) per lineal meter

Q = flow rate (Litre/Min)

C = friction factor of pipe (constant)

d = internal diameter of pipe (mm)

**STANDARD CONVERSIONS**

<b>TO CHANGE</b>	<b>TO</b>	<b>MULTIPLY BY</b>
Inches . . . . .	Feet . . . . .	0.0833
Inches . . . . .	Millimeters . . . . .	25.4
Feet . . . . .	Inches . . . . .	12
Feet . . . . .	Yards . . . . .	0.3333
Yards . . . . .	Feet . . . . .	3
Square Inches . . . . .	Square feet . . . . .	0.00694
Square feet . . . . .	Square inches . . . . .	144
Square feet . . . . .	Square yards . . . . .	0.11111
Square yards . . . . .	Square feet . . . . .	9
Cubic Inches . . . . .	Cubic feet . . . . .	0.00058
Cubic feet . . . . .	Cubic inches . . . . .	1728
Cubic feet . . . . .	Cubic yards . . . . .	0.03703
Cubic yards . . . . .	Cubic feet . . . . .	27
Cubic Inches . . . . .	Gallons . . . . .	0.00433
Cubic feet . . . . .	Gallons . . . . .	7.48
Gallons . . . . .	Cubic inches . . . . .	231
Gallons . . . . .	Cubic feet . . . . .	0.1337
Gallons . . . . .	Pounds of water . . . . .	8.33
Pounds of water . . . . .	Gallons . . . . .	0.12004
Ounces . . . . .	Pounds . . . . .	0.0625
Pounds . . . . .	Ounces . . . . .	16

<b>TO CHANGE</b>	<b>TO</b>	<b>MULTIPLY BY</b>
Inches of water . . . . .	Pounds per square inch . . . . .	0.0361
Inches of water . . . . .	Inches of mercury . . . . .	0.0735
Inches of water . . . . .	Ounces per square inch . . . . .	0.578
Inches of water . . . . .	Pounds per square foot . . . . .	5.2
Inches of mercury . . . . .	Inches of water . . . . .	13.6
Inches of mercury . . . . .	Feet of water . . . . .	1.1333
Inches of mercury . . . . .	Pounds per square inch . . . . .	0.4914
Ounces per square inch . . . . .	Inches of mercury . . . . .	0.127
Ounces per square inch . . . . .	Inches of water . . . . .	1.733
Pounds per square inch . . . . .	Inches of water . . . . .	27.72
Pounds per square inch . . . . .	Feet of water . . . . .	2.31
Pounds per square inch . . . . .	Inches of mercury . . . . .	2.04
Pounds per square inch . . . . .	Atmospheres . . . . .	0.0681
Feet of water . . . . .	Pounds per square inch . . . . .	0.434
Feet of water . . . . .	Pounds per square foot . . . . .	62.5
Feet of water . . . . .	Inches of mercury . . . . .	0.8824
Atmospheres . . . . .	Pounds per square inch . . . . .	14.696
Atmospheres . . . . .	Inches of mercury . . . . .	29.92
Atmospheres . . . . .	Feet of water . . . . .	34
Long tons . . . . .	Pounds . . . . .	2240
Short tons . . . . .	Pounds . . . . .	2000
Short tons . . . . .	Long tons . . . . .	0.89285

## HARDNESS CONVERSION NUMBERS

- (1) Brinell Indentation Diameter, MM.  
 (2) Standard or Tungsten Carbide Ball, Brinell Hardness No. – 10MM. Ball 3000-KG. Load  
 (3) Diamond Pyramid Hardness Number. 50-KG. Load

- (4) Rockwell Hardness Number  
 B-Scale 100-KG. Load;  $\frac{1}{16}$ " Diameter Ball  
 (5) Rockwell Hardness Number  
 C-Scale 150-KG. Load Brale Penetrator  
 Rockwell Superficial Hardness Number

- Superficial Brale Penetrator:  
 (6) 15-N Scale 15-KG. Load  
 (7) 30-N Scale 30-KG. Load  
 (8) 45-N Scale 45-KG. Load  
 (9) Shore Scleroscope Hardness Number  
 (10) Tensile Strength (Approx.) 1000 PSI.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2.95	429	455	–	45.7	83.4	64.6	49.9	61	217
3.00	415	440	–	44.5	82.8	63.5	48.4	59	210
3.05	401	425	–	43.1	82.0	62.3	46.9	58	202
3.10	388	410	–	41.8	81.4	61.1	45.3	56	195
3.15	375	396	–	40.4	80.6	59.9	43.6	54	188
3.20	363	383	–	39.1	80.0	58.7	42.0	52	182
3.25	352	372	(110.0)	37.9	79.3	57.6	40.5	51	176
3.30	341	360	(109.0)	36.9	78.6	56.4	39.1	50	170
3.35	331	350	(108.5)	35.5	78.0	55.4	37.8	48	166
3.40	321	339	(108.0)	34.3	77.3	54.3	36.4	47	160
3.45	311	328	(107.5)	33.1	76.7	53.3	34.4	46	155
3.50	302	319	(107.0)	32.1	76.1	52.2	33.8	45	150
3.55	293	309	(106.0)	30.9	75.5	51.2	32.4	43	145
3.60	285	301	(105.5)	29.9	75.0	50.3	31.2	–	141
3.65	277	292	(104.5)	28.8	74.4	49.3	29.9	41	137
3.70	269	284	(104.0)	27.6	73.7	48.3	28.5	40	133
3.75	262	276	(103.0)	26.6	73.1	47.3	27.3	39	129
3.80	255	269	(102.0)	25.4	72.5	46.2	26.0	38	126
3.85	248	261	(101.0)	24.2	71.7	45.1	24.5	37	122
3.90	241	253	100.0	22.8	70.9	43.9	22.8	36	118
3.95	235	247	99.0	21.7	70.3	42.9	21.5	35	115
4.00	229	241	98.2	20.5	69.7	41.9	20.1	34	111

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
4.05	223	234	97.3	(18.8)	–	–	–	–	–
4.10	217	228	96.4	(17.5)	–	–	–	33	105
4.15	212	222	95.5	(16.0)	–	–	–	–	102
4.20	207	218	94.6	(15.2)	–	–	–	32	100
4.25	201	212	93.8	(13.8)	–	–	–	31	98
4.30	197	207	92.8	(12.7)	–	–	–	30	95
4.35	192	202	91.9	(11.5)	–	–	–	29	93
4.40	187	196	90.7	(10.0)	–	–	–	–	90
4.45	183	192	90.0	(9.0)	–	–	–	28	89
4.50	179	188	89.0	(8.0)	–	–	–	27	87
4.55	174	182	87.8	(6.4)	–	–	–	–	85
4.60	170	178	86.8	(5.4)	–	–	–	26	83
4.65	167	175	86.0	(4.4)	–	–	–	–	81
4.70	163	171	85.0	(3.3)	–	–	–	25	79
4.80	156	163	82.9	(0.9)	–	–	–	–	76
4.90	149	156	80.8	–	–	–	–	23	73
5.00	143	150	78.7	–	–	–	–	22	71
5.10	137	143	76.4	–	–	–	–	21	67
5.20	131	137	74.0	–	–	–	–	–	65
5.30	126	132	72.0	–	–	–	–	20	63
5.40	121	127	69.8	–	–	–	–	19	60
5.50	116	122	67.6	–	–	–	–	18	58
5.60	111	117	65.7	–	–	–	–	15	56

## COATED ARC WELDING ELECTRODES - TYPES & STYLES

### A. W. S. CLASSIFICATION

- E6010 Direct Current, Reverse polarity, All Positions.**  
All purpose. Moderately smooth finish. Good penetration. This is the electrode used for most carbon steel pipe welding.
- E6011 Alternating Current, All Positions.**  
All purpose. Moderately smooth finish. Good penetration.
- E6012 Direct Current, Straight Polarity, All Positions.**  
High bead. Smooth. Fast. "Cold rod".
- E6013 Alternating Current, All Positions.**  
High bead. Smooth. Fast. "Cold rod".
- E6015 Direct Current, Reverse polarity, All Positions.**  
"Low hydrogen" electrode.
- E6016 Direct Current or Alternating Current, All Positions**  
"Low hydrogen" electrode.
- E6018 Direct Current, All Positions.**  
"Low hydrogen" iron powder electrodes
- E6020 Direct Current, Straight Polarity, Flat Position Only.**  
Flat bead. Smooth. Fast. Deep penetration. Can be used w/ A.C. also. "Hot rod".
- E6024 Direct Current, Straight Polarity or Alternating and Current, and Flat Position Only. Flat bead. Smooth. Fast. Deep penetration.**
- E6027 "Iron powder electrodes".**

**NOTE:** This information also applies to E70, E80, E90, and E100 Series.

The last two numbers (**in bold type**) designate the types or styles and the first two numbers the minimum specified tensile strength in 1,000 psi of the weld deposit as welded.

## PHYSICAL PROPERTIES OF E60 & E70 SERIES ELECTRODES

### TYPICAL VALUES

AWS ASTM Electrode	Tensile Strength	Yield Strength	Elongation	Red. in Area Min. %
E6010	62,000–70,000	52,000–58,000	22 to 28%	35
E6011	62,000–73,000	52,000–61,000		
E6012	68,000–78,000	55,000–65,000	17 to 22%	25

### MINIMUM VALUES

AWS ASTM Electrode	Tensile Strength	Yield Strength	Elongation
E7010	70,000	57,000	22
E7011	70,000	57,000	22
E7015	70,000	57,000	22
E7016	70,000	57,000	22
E7020	70,000	52,000	25

### WELDING AND BRAZING TEMPERATURES

Carbon Steel Welding . . . . .	2700–2790°F
Stainless Steel Welding . . . . .	2490–2730°F
Cast Iron Welding . . . . .	1920–2500°F
Copper Welding and Brazing . . . . .	1980°F
Brazing Copper-Silicon with Phosphor-Bronze . . . . .	1850–1900°F
Brazing Naval Bronze with Manganese Bronze . . . . .	1600–1700°F
Silver Solder . . . . .	1175–1600°F
Low Temperature Brazing . . . . .	1175–1530°F
Soft Solder . . . . .	200–730°F
Wrought Iron . . . . .	2700–2750°F

## TROUBLE SHOOTING ARC WELDING EQUIPMENT

### **PROBLEM: Welder will not start (Starter not operating)**

Cause: Power circuit dead.

Remedy: Check voltage.

Cause: Broken power lead.

Remedy: Repair.

Cause: Wrong supply voltage.

Remedy: Check nameplate against supply.

Cause: Open power switches

Remedy: Close.

Cause: Blown fuses.

Remedy: Replace.

Cause: Overload relay tripped.

Remedy: Let set cool. Remove cause of overloading.

Cause: Open circuit to starter button.

Remedy: Repair.

Cause: Defective operating coil.

Remedy: Replace.

Cause: Mechanical obstruction in contactor.

Remedy: Remove.

### **PROBLEM: Welder will not start (Starter operating)**

Cause: Wrong motor connections.

Remedy: Check connection diagram.

Cause: Wrong supply voltage.

Remedy: Check nameplate against supply.

Cause: Rotor stuck.

Remedy: Try turning by hand.

Cause: Power circuit single-phased.

Remedy: Replace fuse; repair open line.

Cause: Starter single-phased.

Remedy: Check contact of starter tips.

Cause: Poor motor connection.

Remedy: Tighten.

Cause: Open circuit in windings.

Remedy: Repair.

### **PROBLEM: Welder runs but soon stops**

Cause: Wrong relay heaters.

Remedy: Renewal part recommendations.

Cause: Welder overloaded.

Remedy: Considerable overload can be carried only for a short time.

Cause: Duty cycle too high.

Remedy: Do not operate continually at overload currents.

Cause: Leads too long or too narrow in cross section.

Remedy: Should be large enough to carry welding current without excessive voltage drop.

Cause: Power circuit single-phased.

Remedy: Check for one dead fuse or line.

Cause: Ambient temperature too high.

Remedy: Operate at reduced loads where temperature exceeds 100° F.

Cause: Ventilation blocked.

Remedy: Check air inlet & exhaust openings.

## TROUBLE SHOOTING ARC WELDING EQUIPMENT, CONT'D.

**PROBLEM: Starter operates & blows fuse**

Cause: Fuse too small.

Remedy: Should be two to three times rated motor current.

Cause: Short circuit in motor connections.

Remedy: Check starter &amp; motor leads for insulation from around &amp; from each other

**PROBLEM: Welding arc is loud & spatters excessively**

Cause: Current setting too high

Remedy: Check setting &amp; output with ammeter

Cause: Polarity wrong

Remedy: Check polarity, try reversing, or an electrode of opposite polarity

**PROBLEM: Welding arc sluggish**

Cause: Current too low

Remedy: Check output, &amp; current recommended for electrode being used

Cause: Poor connections

Remedy: Check all electrode-holder, cable &amp; ground-cable connections. Strap iron is poor ground return

Cause: Cable long or too small

Remedy: Check cable voltage drop &amp; change cable

**PROBLEM: Touching set gives shock**

Cause: Frame not grounded

Remedy: Ground solidly

**PROBLEM: Generator control fails to vary current**

Cause: Any part of field circuit may be short circuited or open circuited

Remedy: Find faulty contact &amp; repair

**PROBLEM: Welder starts but will not deliver welding current**

Cause: Wrong direction of rotation

Remedy: See INITIAL STARTING

Cause: Brushes worn or missing

Remedy: Check that all brushes bear on commutator with sufficient tension

Cause: Brush connections loose

Remedy: Tighten

Cause: Open field circuit

Remedy: Check connection to rheostat, resistor, &amp; auxiliary brush studs

Cause: Series field &amp; armature circuit open

Remedy: Check with test lamp or bell ringer

Cause: Wrong driving speed

Remedy: Check name plate against speed of motor or belt drive

Cause: Dirt, grounding field coils

Remedy: Clean &amp; reinsulate

Cause: Welding terminal shorted

Remedy: Electrode holder or cable grounded



## TROUBLE SHOOTING ARC WELDING EQUIPMENT, CONT'D.

### PROBLEM: Welder generating but current falls off when welding

Cause: Electrode or ground connection loose

Remedy: Clean & tighten all connections

Cause: Poor ground

Remedy: Check ground-return circuit

Cause: Brushes worn worn off

Remedy: Replace with recommended grade. Sand to fit. Blow out carbon dust.

Cause: Weak brush spring pressure.

Remedy: Replace or readjust brush springs

Cause: Brush not properly fitted

Remedy: Sand brushes to fit

Cause: Brushes in backwards

Remedy: Reverse

Cause: Wrong brushes used

Remedy: Renewal part recommendations

Cause: Brush pigtails damaged

Remedy: Replace brushes

Cause: Rough or dirty commutator

Remedy: Turn down or clean commutator

Cause: Motor connection single-phased

Remedy: Check all connections

## BASIC ARC & GAS WELDING SYMBOLS

1. In plan or elevation, near, far, and both sides, locations refer to nearest member parallel to plane of drawing and not to others farther behind.
2. In section or end views only, when weld is not drawn, the side to which arrow points is considered near side.
3. Welds on both sides are of same size unless otherwise shown.
4. Symbols govern to break in continuity of structure or to extent of hatching or dimension lines.
5. Tail of arrow used for specification reference.
6. All welds are continuous and of user's standard proportions and all except V-grooved and bevel-grooved welds are closed unless otherwise shown.
7. When welds are drawn in section or end views, obvious information is not given by symbol.
8. In joints in which one member only is to be grooved, arrows point to that member.

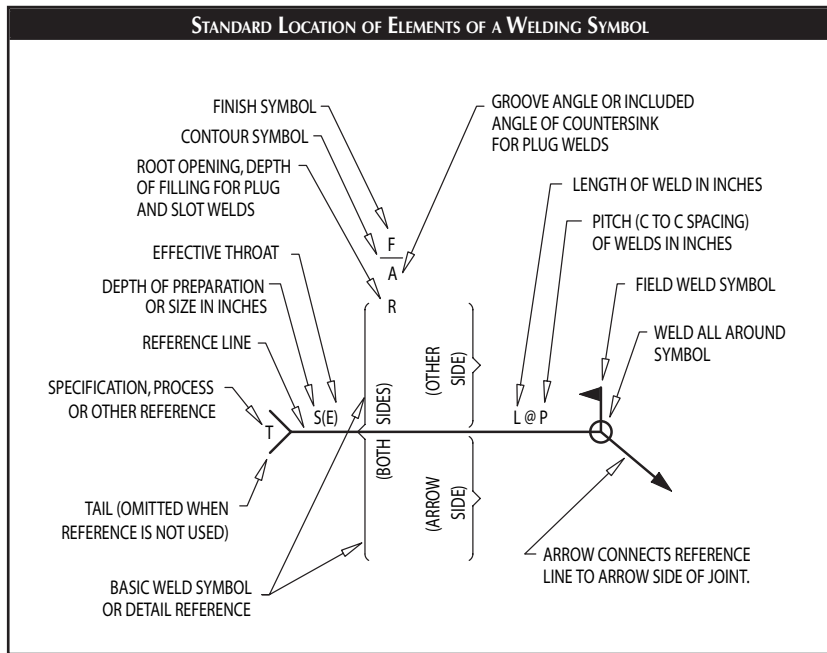
BASIC WELD SYMBOLS									
Back	Fillet	Plug or Slot	GROOVE OR BUTT						
			Square	V	Bevel	U	J	Flare V	Flare Bevel

SUPPLEMENTARY WELD SYMBOLS						
Backing	Spacer	Weld All-Around	Field Weld	CONTOUR		See AWS A2.4 for a detailed review of standard welding symbols
				Flush	Convex	

## BASIC ARC & GAS WELDING SYMBOLS, CONT'D.

### NOTE:

1. Size, weld symbol, length of weld and spacing must read in that order from left to right along the reference line. Neither orientation of reference line nor location of the arrow alter this rule.
2. The perpendicular leg of  $\nabla$ ,  $\sphericalangle$ ,  $\sphericalangle$ ,  $\sphericalangle$  weld symbols must be at left.
3. Arrow and other side welds are of the same size unless otherwise shown. Dimensions of fillet welds must be shown on both the arrow side and other side symbol.
4. The point of the field weld symbol must point toward the tail.
5. Symbols apply between abrupt changes in direction of welding unless governed by the "All Around" symbol or otherwise dimensioned.



**SYMBOLS FOR PIPE FITTINGS**

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Bushing-Reducing					
Cap					
Cross (Reducing)					
Cross (Straight)					
Crossover					
Elbow - 45					

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Elbow - 90					
Elbow - Turned Down					
Elbow - Turned Up					
Elbow - Base					
Elbow - Double Branch					
Elbow - Long Radius					

## SYMBOLS FOR PIPE FITTINGS

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Elbow - Reducing					
Elbow - Side Outlet (Outlet Down)					
Elbow - Side Outlet (Outlet Up)					
Elbow - Street					
Joint - Conn. Pipe					
Joint - Expansion					


















	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Lateral					
Orifice Plate					
Reducing Flange					
Plug - Bull					
Plug - Pipe					
Reducer - Concentric					


















**SYMBOLS FOR PIPE FITTINGS**

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Reducer - Eccentric					
Valve - Gate Angle Gate (Plan)					
Valve - Globe Angle Globe (Elevation)					
Valve - Globe (Plan)					
Valve (Auto)- B-Pass					
Valve (Auto)- Governor Oper.					

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Valve - Reducing					
Valve - Check (Straight Way)					
Valve - Cock					
Valve - Diaphragm					
Valve - Float					
Valve - Gate*					

## SYMBOLS FOR PIPE FITTINGS

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Valve - Gate Motor Operated					
Valve - Globe					
Valve - Globe Motor Operated					
Valve - Angle Hose Angle					
Valve - Hose Gate					
Valve - Hose Globe					

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Valve - Lockshield					
Valve - Quick Opening					
Valve - Saftey					
Sleeve					

**SYMBOLS FOR PIPE FITTINGS**

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Tee - Straight					
Tee - Outlet Up					
Tee - Outlet Down					
Tee - Double Sweep					
Tee - Reducing					
Tee - Single Sweep					

	Flanged	Screwed	Bell & Spigot	Welded	Soldered
Tee - Side Outlet (Outlet Down)					
Tee - Side Outlet (Outlet Up)					
Union					
Angle Valve Check					
Angle Valve Gate					



## WIRE ROPE

### OVERVIEW

Strength of wire ropes vary, depending on the material from which the individual strands are made and the method used in forming the cable, ranging between 30 and 100 tons per square inch. Primarily there are 3 classes of wire rope:

- (1) **Iron** – Iron wire is soft with low tensile strength of 30 to 40 tons per square inch. Commonly used for drum type elevator cables and to some extent for derrick guys; being replaced by low-carbon steel wire in these uses.
- (2) **Cast Steel** – May have a tensile strength up to 90 tons per square inch and because of its greater strength is generally used for hoisting purposes. To check quickly whether a piece of wire is iron or cast steel, bend it. Iron will bend easily and take a long time to regain its original shape, while cast steel will be harder to bend and will snap back to its original shape very quickly.
- (3) **Plow Steel** - Plow steel wire rope is made from high grade, open hearth furnace steel and has an average tensile strength of 110 tons per square inch. This is the best and safest wire rope for cranes, derricks, dredges and slings or straps for heavy loads.

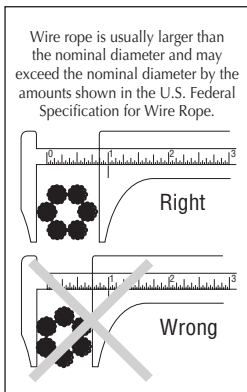
### LUBRICATION — WIRE ROPE

All wire rope, whether used indoors or out, should be considered as a group of moving wires constantly rubbing against one another. The resulting friction causes incessant wear on the moving parts of the wire rope or cable and will shorten its life very rapidly unless lubricants are used to overcome the friction. Lubrication also prevents rusting.

Lubricating intervals will depend on the types and amount of work encountered. Under average conditions, if worked steadily on equipment, wire rope or cable will require lubrication once every 3 weeks. Where heavy abrasive dusts exist, more frequent lubrication is in order. Rusty ropes may break without warning.

### SHEAVES

The life of wire rope or cable is directly affected by the condition and size of the sheaves over which it is used. Sheaves should be at least 16 x the diameter of the rope or cable that is used over them. In passing over a sheave, the inside portion of the cable, which is against the sheave, is shortened and compression is developed in that section of the cable. The outside portion (away from the sheave) is lengthened or stretched, causing tension in that section. These compressive and tensional stresses combine to create bending



**WIRE ROPE**

stresses which increase rapidly as the diameter of the sheaves decrease. As these bending stresses cause much undue wear and directly shorten the safe working life of the rope or cable, the ratio mention between sheaves and rope should be maintained.

New wire rope may be damaged and not work properly in sheaves that have become worn or in which the grooves have become irregular in shape. When sheaves are worn or damaged, it is more economical to renew the sheaves rather than to allow excessive wear on the cable.

One cause of very severe wear in wire rope or cables is reverse bending, which will shorten the life of the rope by approximately 1/2. Reverse bending refers to the bending of a cable or rope over sheaves, first in one direction then in another.

Another cause of severe rope wear is twisting of the fall rope. When the fall rope is twisted and a hoist is made, the wear produced is equal to more than that resulting from weeks of normal use. The person in charge of lifting operations should guard against twisting of the fall rope and should not allow a lift to be made if the fall rope is twisted.

No. of Crosby or Safety Clips & Dist. Between Clips Needed for Safety		
Rope Dia. Inches	No. of Clips	Dist. Between Clips, Inches
1/4 - 3/8	3	2 1/4
7/16 - 5/8	3	3 3/4
3/4 - 1 1/8	4	6 3/4
1 1/4 - 1 1/2	5	9
1 5/8 - 1 3/4	6	10 1/2
2 and over	7	6 x diam. of cable

**HANDLING CABLE OR WIRE ROPE**

Cable or wire rope must not be coiled or uncoiled like manila rope. Cable or wire rope must be taken off the reel in a straight line, avoiding kinking. The reel may be mounted on a heavy pipe or roller to facilitate unwinding. If space is limited, the cable as it comes off the reel may be layed out in a figure 8, after which it can be reeved into the line for which it is intended.

**CLAMP FASTENINGS**

When it is necessary to make a short bend. as in attaching wire rope or when it is to be looped. thimbles should always be used.

In clamping a strap or an eye, the loose or “dead” end is clamped against the main part of the rope with the damp spaced apart a distance equal to 6 x diameter of the rope. Clamp fastenings seldom develop more than 4/5 of rope strength at best.

The point of greatest fatigue and/or wear in a rope usually develops at or near the end where it is clamped around the boom or where attached to the becket on the block. Clamps should be inspected at least once weekly and tightened if they show signs of loosening. All clamped or spliced fastenings, especially those on cranes or derricks, should be shifted and changed at least once every six months.

**U BOLTS OF ALL CLAMPS MUST BE ON THE DEAD END OF THE ROPE.**

## WIRE ROPE

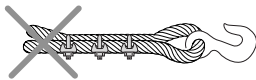


**CORRECT** - U-Bolts on short end of rope. (No distortion on live end of rope.)

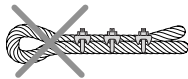


**CORRECT**

**INCORRECT** - Thimble should be used to increase strength of eye and reduce wear on rope.



**INCORRECT** - U-Bolts on live end of rope. (Causes mashed spots on live end of rope.)



**INCORRECT** - Staggered clips. (Causes a mashed spot in live end of rope due to incorrect position of center clip.)



**INCORRECT** - Wire rope knot with clip efficiency 50% or less



**SAFE LOAD (IN POUNDS) ON IMPROVED PLOW STEEL WIRE ROPE**  
(6 Strands, 19 or 37 Wires per Strand, Hempcore)

Dia. In.	Circum. In.	Single Vertical Wire rope	TWO PART SLING			Breaking Strength	
			60°	45°	30°	Wt./Ft. Lbs.	Tons (2000 lbs)
1/4	3/4	1,100	1,900	1,550	1,100	0.10	2.74
3/8	1 1/8	2,500	4,230	3,460	2,450	0.23	6.1
1/2	1 1/2	4,300	7,450	6,080	4,300	0.40	10.7
5/8	2	6,600	11,600	9,430	6,670	0.63	16.7
3/4	2 1/4	9,400	16,500	13,450	9,520	0.90	23.8
7/8	2 3/4	12,800	22,300	18,200	12,800	1.23	32.2
1	3	16,000	29,000	23,690	16,790	1.60	41.8
1 1/8	3 1/2	21,000	36,450	29,780	21,040	2.03	52.6
1 1/4	4	26,000	44,700	36,570	25,870	2.50	64.6
1 3/8	4 1/4	31,000	53,800	43,900	31,050	3.03	77.7
1 1/2	4 3/4	37,000	63,700	52,000	36,800	3.60	92.0
1 5/8	5	43,000	74,400	60,700	42,900	4.23	107.0
1 3/4	5 1/2	49,600	86,000	70,260	49,700	4.90	124.0
2	6 1/4	64,000	110,700	90,400	64,000	6.40	160.0
2 1/8	6 5/8	63,000	125,200	102,200	72,200	7.22	181.0
2 1/4	7 1/8	81,000	140,300	114,600	79,000	8.10	202.0
2 1/2	7 7/8	98,000	170,000	139,100	98,400	10.00	246.0
2 3/4	8 5/8	117,600	203,500	166,700	117,700	12.10	294.0



### GRUVLOK® XTREME™ LUBRICANT

Gruvlok® Xtreme™ Lubricant has been developed for use with Gruvlok couplings in services where improved lubrication is beneficial. This lubricant has an operating temperature range from -65°F to 400°F, well exceeding the temperature range of Gruvlok gaskets. This lubricant is waterproof, thereby eliminating water wash-out and it will not dry out in the absence of water. There are five primary applications where the Xtreme Lubricant will provide increased benefits: low temperature applications (below -20°F), high temperature applications (above 150°F), applications where increased pipe joint flexibility is needed, lubrication of gaskets in copper systems, and for the lubrication of gaskets on HDPE couplings. Since it is formulated from a non-hydro carbon base, it can be used with EPDM, Nitrile and Fluoroelastomer gasket materials. **It is not to be used with Silicone gaskets.**

- In low temperature applications the gasket will shrink, thereby lowering the sealing force on the gasket sealing lips. The temperature change will also force the gasket to slightly re-position itself. This will cause pipe end sealing surfaces, with small cuts or damage, to become more susceptible to leakage. Gruvlok Xtreme Lubricant will maintain it's lubricating properties at lower temperatures allowing a properly lubricated pipe end and gasket (assembly) to re-position itself during temperature cycles.
- For high temperature service and copper systems, it is required that the gasket be lubricated not only on the outside, as with the



normal installation of a Gruvlok gasket, but also on the inside. Lubrication on the inside of the gasket is easily accomplished by turning the gasket inside out and applying the lubricant. Gruvlok Xtreme Lubricant will maintain it's lubricating properties at higher temperatures, allowing a properly lubricated pipe end and gasket assembly to re-position itself during temperature cycles. Lubrication of the pipe end and gasket will help the gasket to adjust into the proper sealing position during temperature cycles. The lubricant on the interior of the gasket will act to improve the chemical resistance of the gasket material by providing a thin lubricant barrier between the piping system fluid and the gasket surface. This is particularly important at higher temperatures where oxidizing agents in the piping system become more aggressive. **However, gasket chemical compatibility must still be considered.**

## GRUVLOK® LUBRICANTS, CONT'D.

## GRUVLOK® XTREME™ LUBRICANT (CONT'D)

- The Gruvlok Xtreme Lubricant has been formulated from low viscosity, non-petroleum based oils to ease spreading of the lubricant. In applications where pipe movement is expected, proper lubrication of the gasket's exterior assists the gasket into the proper sealing position as pipe system movement occurs. This lubricating film enhances our flexible coupling gasket's ability to compensate for axial, transverse and rotational pipe movements.
- Gruvlok Xtreme Lubricant is the only Gruvlok lubricant that is to be used with Gruvlok couplings and gaskets in HDPE and copper piping systems. It's low temperature capability and lubricity ensure a highly reliable connection.

Gruvlok® Xtreme™ Lubricant is a Teflon® fortified white, tasteless and odorless grease made from Silicone Oil and other ingredients that are safe to ingest. It is sanctioned by the FDA under C.F.R. 21.172.878 & 21.177.1550 (Incidental Food Contact). It is NSF approved for use with potable water.

**CAUTION:** Silicone based lubricants are not allowed in some facilities.  
®Teflon is a registered trademark of Dupont.

## GRUVLOK® QUICK DRY LUBRICANT

Gruvlok® Quick Dry Lubricant is a fast drying lubricant that has been developed for applications where the piping system is exposed. The service temperature range for this lubricant is from 0° F to 150° F and may be used with all Gruvlok gasket material grades. The lubricant is made from a water emulsion that is non-toxic, it will not impart taste or odor, and does not support bacterial growth. Gruvlok Quick Dry Lubricant is non-corrosive, non-flammable, and is NSF approved for use with potable water.

This lubricant is easy to apply by brush or hand, and it quickly dries to a thin film when in contact with air. It is water-soluble. The quick drying quality of the lubricant eliminates lubricant drips caused by over lubrication. If necessary, reapply lubricant prior to assembly. Do not thin or mix with solvents.

## GRUVLOK® LUBRICANT

Gruvlok® Lubricant is the standard lubricant that has been provided for use with Gruvlok products for years. Gruvlok Lubricant is water soluble, non-toxic, non-corrosive, non-flammable, and will not impart taste or odor. It is NSF approved for use with potable water. This lubricant is acceptable for most applications, however, the Gruvlok Xtreme Lubricant and Gruvlok Quick Dry Lubricant are now available to improve the performance of the couplings and flanges in certain applications.

**CAUTION:** HDPE pipe requires the use of Gruvlok Xtreme Lubricant and should not be used with Gruvlok Lubricant

## DESIGN FACTORS

### MOVEMENT:

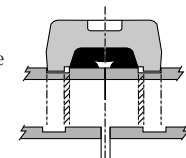
Each flexible design Gruvlok coupling can provide for pipe system movement up to the design maximum for the specific size and type coupling being utilized. Movement is possible in the Gruvlok coupling due to two factors: (1) designed-in clearance between the key of the coupling and the groove diameter and groove width, and (2) the gap between pipe ends joined by the coupling.

### LINEAR MOVEMENT:

#### FLEXIBLE COUPLING LINEAR MOVEMENT

Linear movement is accommodated within the coupling by allowing the pipe ends to move together or apart in response to pressure thrusts and temperature changes. The available linear movement provided by Standard Gruvlok couplings is shown below:

LINEAR MOVEMENT		
Sizes	Roll Groove Pipe	Cut Groove Pipe
1" thru 3½"	⅛"	⅛"
4" thru 24"	⅜"	⅜"

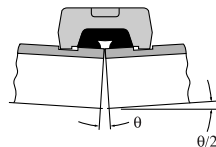


 Represents Linear Movement Capabilities

### ANGULAR MOVEMENT:

#### FLEXIBLE COUPLING ANGULAR MOVEMENT

Designed-in clearances allow limited deflection of the pipe joint within the coupling, without introducing eccentric loads into the coupling joint.



The maximum available angular movement of Gruvlok coupling joints is shown in the performance data for each coupling type. The amount of angular flexibility varies for each coupling size and type. For design purposes the published figures should be reduced by the below listed factors to account for pipe, groove and coupling tolerances.

ANGULAR MOVEMENT		
Sizes	Design Factor	
	Roll Groove	Cut Groove
1" thru 3½"	Reduce 50%	Reduce 50%
4" thru 24"	Reduce 50%	Reduce 25%

### RIGID COUPLINGS

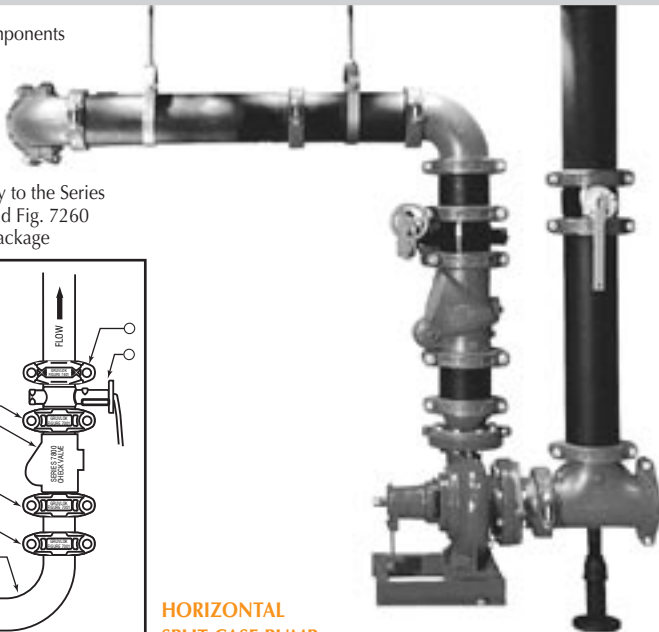
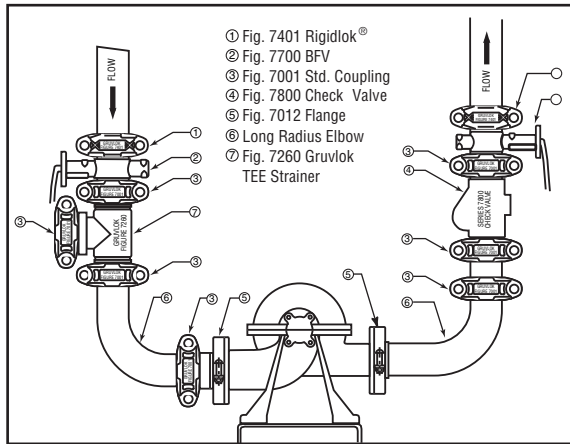
Gruvlok rigid couplings Fig. 7400, Fig. 7401 and Fig. 7004 HPR are designed to provide a joint with the attributes of a welded or flanged connection. Therefore, these joints would remain in strict alignment and would resist deflection and linear movement during service.

### FLEXIBLE COUPLINGS

Figs. 7000, 7001, 7003, 7010 are the flexible couplings provided in the Gruvlok product line. The following information on movement applies to these flexible couplings.

**GRUVLOK® FLOW CONTROL COMPONENTS**

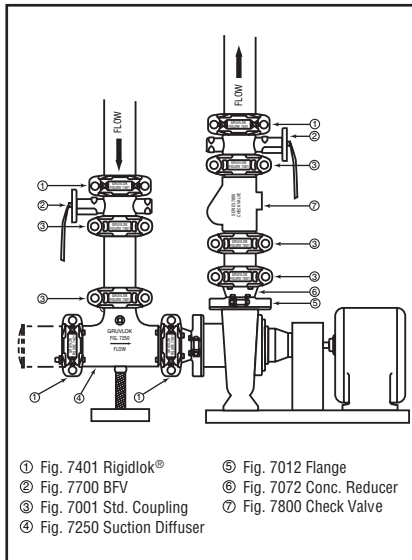
Anvil has put together a complete array of Gruvlok components necessary to provide pump protection for HVAC and industrial piping needs. With the combination of the Fig. 7401 Rigidlok and Fig. 7001 Standard coupling, flex connectors can be eliminated thus reducing cost. The Series 7700 Gruvlok® Butterfly valve has superior flow characteristics. The Gruvlok® Series 7800 Check Valve is full waterway valve and can be stacked directly to the Series 7700 Butterfly Valve. The Fig. 7250 Suction Diffuser and Fig. 7260 Tee Strainer complete the Gruvlok® pump protection package



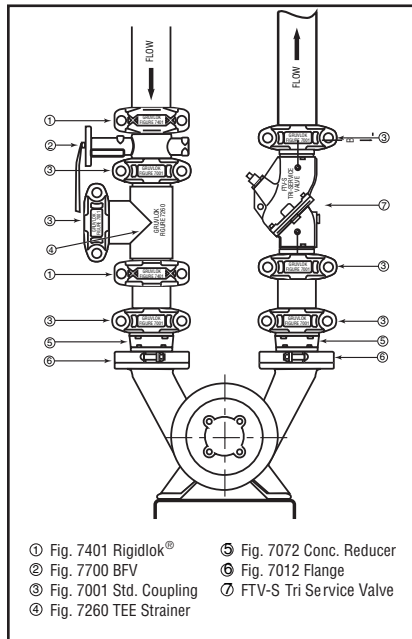
**HORIZONTAL  
SPLIT CASE PUMP**



END SUCTION PUMP



VERTICAL SPLIT CASE PUMP

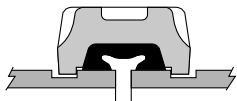


## GRUVLOK® GASKET STYLES

Gruvlok offers a variety of pressure responsive gasket styles. Each serves a specific function while utilizing the same basic sealing concept. Proper installation of the gasket compresses the inclined gasket lips on the pipe O.D., forming a leak-tight seal. This sealing action is reinforced when the gasket is encompassed and compressed by the coupling housings. The application of internal line pressure energizes the elastometric gasket and further enhances the gasket sealing action.

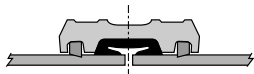


## "C" STYLE



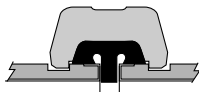
The "C" Style cross section configuration is the most widely used gasket. It is the gasket style provided as standard in many Gruvlok Couplings (Fig. 7000, 7011, 7001, 7003, 7004HPR, 7307, 7400 and 7401). Grade "E" and "T" are standard grades while other grades are available for special applications.

## ROUGHNECK®



This "C" style gasket is similar in appearance and design to the Standard gasket but is only used with Fig. 7005 Roughneck Couplings and Fig. 7305 HDPE Couplings. The Roughneck gasket is wider, which allows for minor pipe end separation as line pressure sets the grippers into the plain end pipe.

## END GUARD®

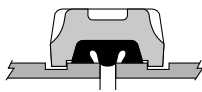


The projecting rib fits between the ends of lined pipe to prevent damage to unprotected pipe ends during coupling joint assembly.

The E.G. gasket is provided as standard with the Fig. 7004 E.G. Coupling.

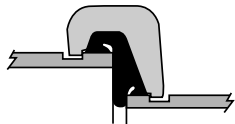
Grade "E" and "T" gaskets are available.

## FLUSH GAP®



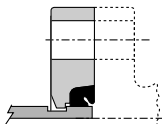
Designed to prohibit contaminants from building up in the gasket cavity. The centering rib fits flush over the gap between the two pipe ends thus closing off the gasket cavity. It can be used with Fig. 7000, 7001, 7003, 7004, 7400 and 7401 Couplings for many applications. Recommended for use in dry fire protection systems. Not recommended for temperatures above 160°F.

## REDUCING COUPLING



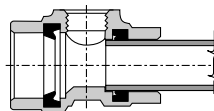
The centering rib allows for pipe positioning and serves to keep the smaller pipe from telescoping during installation. Used only with the Fig. 7010 Reducing Coupling.

## FLANGE



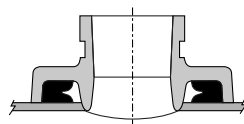
A specially designed gasket for the Fig. 7012, 7013 and 7312 Flange provides for a reliable seal on both the pipe and the mating flange.

## SOCK-IT®



Used in Sock-It fittings only, this pressure energized gasket provides a leak-tight seal on plain end seal pipe. Available in Grade "E" material only.

## CLAMP-T®



These gaskets conform to the curved exterior of the pipe to provide a pressure responsive seal. This unique design is only used with Fig. 7045, 7046 Clamp-T and Fig. 7047, 7048, and 7049 Clamp-T Crosses.

## VACUUM SERVICE

VACUUM SERVICE		
Size	Vacuum Level	Gasket Recommendation
1" - 6"	0" - 29.92" Hg	Standard or Flush Gap
8" - 12"	0" - 15 Hg	Standard or Flush Gap
1½" - 12"	0" - 29.92 Hg	Flush Gap

**LARGER SIZES:** Contact a Gruvlok Representative for more information.

**GASKET GRADE INDEX & GASKET RECOMMENDATION**

The lists are provided as an aid in selecting the optimum gasket grade for a specific application to assure the maximum service life.

The recommendations have been developed from current information supplied by manufacturers of the elastomers, technical publications, and industry applications. The information supplied should be considered as a basis for evaluation but not as a guarantee.

Selection of the optimum gasket grade for a specific service requires the consideration of many factors; primarily temperature, fluid concentration, and continuity of service. Unless otherwise noted, all gasket recommendations are based on 100°F (38°C) maximum temperature service condition. Where more than one gasket grade is shown, the preferred grade is listed first.


Combinations of fluids should be referred to a Gruklok Representative for an engineering evaluation and recommendation. In unusual or severe services, gasket materials should be subjected to simulated service conditions to determine the most suitable gasket grade.

Gasket recommendations apply only to Gruklok gaskets. Contact a Gruklok Representative for recommendations for services not listed. These listings do not apply to Gruklok Butterfly Valves.

All Gruklok products marked with UL/ULC Listed, FM approved VdS and/or LPC symbols are Listed/Approved with EPDM material. For other Listed/Approved materials, please contact a Gruklok Representative for more information.

**GASKET GRADE INDEX**

STANDARD GASKETS				
Grade	Temp. Range	Compound	Color Code	General Service Applications
E	-40°F to +230°F	EPDM	Green	Water, dilute acids, alkalis, salts, & many chemical services not involving hydrocarbons, oils, or gases. Excellent oxidation resistance. <b>NOT FOR USE WITH HYDROCARBONS</b>
T	-20°F to +180°F	Nitrile (Buna-N)	Orange	Petroleum products, vegetable oils, mineral oils, & air contaminated with petroleum oils. <b>NOT FOR USE IN HOT WATER SERVICES</b>

SPECIAL GASKETS				
Grade	Temp. Range	Compound	Color Code	General Service Applications
O	+20°F to +300°F	Fluoro Elastomer	Blue	High temperature resistance to oxidizing acids, petroleum oils, hydraulic fluids, halogenated hydrocarbons & lubricants.
L	-40°F to +350°F	Silicone	Red Gasket	Dry, hot air & some high temperature chemical services.
E Type A	-40°F to +150°F		Violet	Wet & Dry (oil free air) Pipe in Fire Protection Systems. For dry pipe systems, Gruklok Xtreme™ Temperature Lubricant is required.

GASKET RECOMMENDATION LISTING

WATER & AIR	
Service	Gasket Grade
Air, (no oil vapors) Temp. -40°F to 230°F (-40°C to 110°C)	E
Air, (no oil vapors) Temp. -40°F to 350°F (-40°C to 177°C)	L
Air, Oil vapor Temp. -20°F to 150°F (-29°C to 66°C)	T
Air, Oil vapor Temp. 20°F to 300°F (-7°C to 149°C)	O
Water, Temp to 150°F (66°C)	E/T
Water, Temp to 230°F (110°C)	E
Water, Acid Mine	E/T
Water, Chlorine	(E/O)
Water, Deionized	E/T
Water, Seawater	E/T
Water, Waste	E/T
Water, Lime	E/T

Where more than one gasket grade is shown the preferred gasket grade is listed first. Where the gasket grade is shown in parentheses, Contact a Gruzlok Representative for an engineering evaluation and recommendation. Specify gasket grade when ordering. Use Gruzlok lubricant on gasket. Check gasket color code to be certain it is recommended for the service intended.

PETROLEUM PRODUCTS	
Service	Gasket Grade
Crude Oil - Sour	T
Diesel Oil	T
Fuel Oil	T
Gasoline, Leaded	T
Gasoline, Unleaded*	(O)
Hydraulic Oil	T
JP-3, JP-4 and JP-5	T/O
JP-6, 100°F (38°C) Maximum Temp.	O
Kerosene	T
Lube Oil, to 150°F (66°C)	T
Motor Oil	T
Tar and Tar Oil	T
Transmission Fluid --Type A	O
Turbo Oil #15 Diester Lubricant	O

Unless otherwise noted, all gasket listings are based upon 100°F (38°C) maximum temperature service conditions. For services not listed Contact a Gruzlok Representative for recommendation. \*Contact a Gruzlok Representative for service evaluation.

COUPLING DATA CHART NOTES

COUPLING DATA CHART NOTES														
NOMINAL SIZE	O.D.	MAX. WK. PRESSURE	MAX. END LOAD	RANGE OF PIPE END SEPARATION	DEFLECTION FROM CL		COUPLING DIMENSIONS			COUPLING BOLTS		SPECIFIED TORQUE		APPROX. WT. EA.
					PER COUPLING	PER IN./FT.	X	Y	Z	QTY.	SIZE	MIN.	MAX.	
In./DN(mm)	In./mm	PSI/bar	Lbs./kN	In./mm	Degrees	mm/m	In./mm	In./mm	In./mm		In./mm	Ft.-Lbs/N-M		Lbs./Kg
1	2	3	4	5	6		7			8	9		10	

1 Gruvlok Couplings are identified by either the nominal ANSI pipe size in inches or pipe O.D. in millimeters (see column 2).

2 Nominal Outside Diameter of Pipe.

3 Maximum line pressure, including surge, to which a joint can be subjected. Working pressure ratings are based on standard wall steel pipe with standard cut or roll grooves in accordance with Gruvlok specifications. For Performance Data on other than standard wall pipe, refer to Technical data section.  
**NOTE: For one time field test only the maximum joint working pressure may be increased to 1.5 times the figure shown.**

4 Maximum end load from all interior and/or exterior forces to which the joint can be subjected are based on standard wall steel pipe with standard cut or roll grooves in accordance with Gruvlok specifications.

5 Range of pipe end separation is the gap between the pipe ends due to assembly.

6 Maximum allowable angular deflection of pipe from centerline when using standard cut grooved steel pipe. For details see design factors in Gruvlok Technical data section.

7 "X", "Y", and "Z" are external dimensions for reference purposes only.

8 The quantity of bolts equals the number of housing segments per coupling.

9 Nuts must be tightened alternating and evenly to the specified bolt torque. See individual product installation instructions for additional important information.

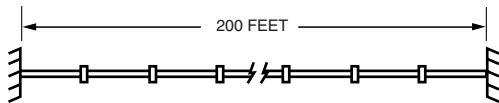
10 Approximate weight for a fully assembled coupling with gasket, bolts, and nuts.

**THERMAL MOVEMENT:**

A sufficient amount of coupling joints must be provided to accommodate the calculated movement (expansion or contraction) in a pipe run or segment thereof.

**EXAMPLE:**

A 200 foot long straight run of 4" steel cut grooved pipe between anchor points. Minimum Temperature: 40°F. (at time of installation). Maximum Oper. Temperature: 160°F.



Thermal expansion tables show this system will expand a total of 1.80" due to the temperature change.

**DESIGN QUESTION:**

How many couplings are required to account for the thermal growth?

**AVAILABLE LINEAR MOVEMENT PER FLEXIBLE COUPLING:**

Using the table on the previous page, we see that there is 0.188" linear movement per coupling (4" Flexible Coupling)

**COUPLINGS REQUIRED**

As indicated above, the total movement is 1.80". Thus, the number of couplings is determined as follows:

No. of Couplings = Tot. Movement / Avail. Movement per Coupling

**FOR OUR EXAMPLE:**

No. of Couplings =  $(1.80") / (0.187") = 9.6$ ,  
Therefore 10 couplings are needed

**POSITION OF COUPLINGS**

In order for the couplings to provide for the movement indicated by the above example, it would be necessary to install all couplings with the maximum gap between pipe ends. Conversely, if the thermal movement was contraction due to a reduction of system temperature, the coupling joints would have to be installed with the pipe ends abutted, thus accommodating the "shrink" of the pipe system.

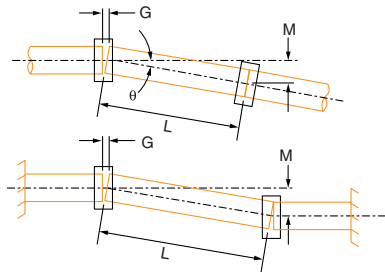
In either case the pipe run in question would have to be anchored at the proper locations to direct pipe system expansion or contraction into the coupling joints.

As can be seen from the above example, the pipe end gap within the coupling joint must be considered when designing a grooved-end pipe system to accommodate thermal movement. The couplings do not automatically provide for expansion and contraction of piping.

**MISALIGNMENT & DEFLECTIONS:**

The angular movement capability of the Gvuvlok coupling permits the assembly of pipe joints where the piping is not properly aligned. At least two couplings are required to provide for lateral pipe misalignment. Deflection (longitudinal misalignment) may be accommodated within a single coupling as long as the angle of deflection does not exceed the value shown in the coupling performance data for the particular size and coupling type.

A pipe joint that utilizes the angular deflection capability of the Gvuvlok coupling will react to pressure and thermal forces dependent upon the manner in which it is restrained. An unrestrained joint will react to these forces by straightening, thus reducing, if not eliminating, the deflection at the joint. If joint deflection has been designed into the pipe layout and must be maintained, then sufficient anchors must be provided to resist the lateral forces and hold the joint in the deflected condition.



The amount of deflection from pipe run centerline can be calculated utilizing the following equations:

$$M = L (\sin \theta)$$

$$\theta = \text{ArcSin} (G/D)$$

$$M = (G \times L)/D$$

**WHERE:**

M = Misalignment (inches)

G = Maximum Allowable Pipe End Movement (Inches) as shown under "Performance Data" (Value to be reduced by Design Factor)

$\theta$  = Maximum Deflection (Degrees) from centerline as shown under "Performance Data" (Value to be reduced by Design Factor)

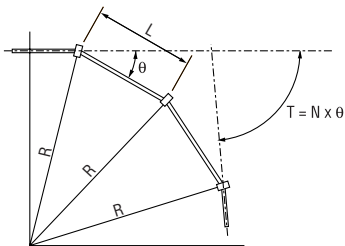
D = Pipe Outside Diameter (Inches)

L = Pipe Length (Inches)



**CURVE LAYOUT:**

Utilizing the angular deflection at each coupling joint curves may be laid out using straight pipe lengths and Gruvlok Couplings.



This example shows how to calculate the curve radius, required pipe lengths, and number of required couplings.

$$R = L / (2 \times \sin(\theta/2))$$

$$L = 2 \times R \times \sin(\theta/2)$$

$$N = T / \theta$$

**WHERE:**

N = Number of Couplings

R = Radius of Curve (feet)

L = Pipe Length (feet)

$\theta$  = Deflection from centerline (Degrees) of each Coupling  
(See coupling performance data, value to be reduced by Design Factor)

T = Total Angular Deflection of all Couplings.

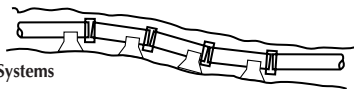
**DRAINAGE, BURIED SYSTEMS, ETC.:**

The flexible design of the Gruvlok coupling makes it ideal for use in a wide variety of systems in which random changes of the pipe direction can be accommodated by the Gruvlok coupling's angular deflection capability rather than requiring the use of special fittings.

Pitched drainage systems, buried pipe systems where pipe laying conditions are subject to settlement, and exposed pipe systems laid on rough ground are but a few of the many types of pipe installations that present conditions where the functional capability of the Gruvlok coupling are useful.



Pitched for Drainage



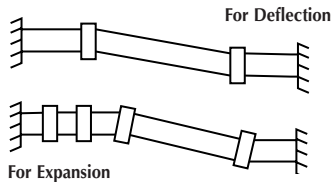
Buried Pipe Systems

## MOVEMENT—APPLICATIONS, CONT'D.

**COMBINED LINEAR & ANGULAR MOVEMENT:**

The clearance in the grooved coupling joint, will allow a limited capability for combined linear and angular movement. A partially deflected joint will not provide full linear movement capability. A fully deflected joint provides no linear movement capability. The Gruvlok coupling will not allow for both maximum linear and maximum angular movement simultaneously.

In systems where both are expected, additional joints may be required.



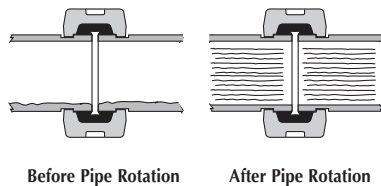
**NOTE:** Fully Deflected Joint Will Not Allow For Linear Expansion.

In the example above, two couplings were added to account for thermal expansion and the other couplings accommodate only the misalignment.

The additional stress from the combined movement is therefore relieved.

**ROTATIONAL MOVEMENT:**

Piping systems designed with Gruvlok Couplings can accommodate minor rotational movement from thermal expansion, settlement, vibration, or other similar movements. However, Gruvlok Couplings *should never be used as a continuous swivel joint*.

**EXAMPLE:**

Utilizing the rotational capability of the Gruvlok Coupling, the pipe life of a slurry or similar coarse material piping system can be extended.

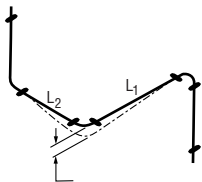
For pipe rotation, the system must be shut down and internal pressure relieved.

The pipe may then be rotated one-quarter turn, the couplings retightened, and service resumed. If performed on a regular basis, pipe rotation will evenly distribute wear over the entire inner surface of the pipe.

The grooved coupling's capability to allow angular and rotational movement within the coupling joint must be considered when deciding hanger and support locations. Spring hangers and supports providing for movement in more than one plane are often used to allow the pipe system to move without introducing additional stress into the pipe system.

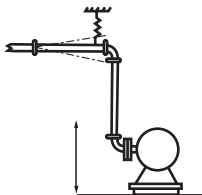
### EXAMPLE 1

This example demonstrates the need for each pipe length in a grooved system to be supported. The sag due to the flexibility of the Gruvlok joint could be eliminated with the proper positioning of hangers on both pipe segments "L1" and "L2".



### EXAMPLE 2

This illustrates the effect of pump oscillation on a piping system. A spring hanger should be used to support the pipe section and also respond to the induced vibrations. The couplings in the horizontal run above the riser, should accommodate the deflection without transmitting bending stresses through the pipe system.



### PRESSURE THRUSTS:

Gruvlok couplings react to the application of system pressure and restrain the pipe ends from separation due to the pressure force. However, the coupling joint may not be in the self-restraining configuration prior to the application of system pressure. The Gruvlok coupling does not restrain adjacent pipe sections from separation due to pressure forces until the coupling key sections engage the groove walls.

Random flexible coupling joint installation will produce installed coupling conditions ranging from pipe ends full butted to fully separated to the maximum available gap. Thus, only after system pressurization will the self-restraining function of the coupling be in effect.

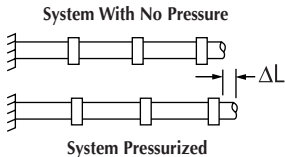
The designer must account for the movement to be encountered when the system is pressurized and the joints are fully separated. Anchor and guide positions must be defined to direct the pipe joint movement that it is not detrimental to the pipe system.

COUPLING FLEXIBILITY, CONT'D.

Examples of the effect of pressure thrust are shown in the following illustrations.

**EXAMPLE 1**

The coupling joints have been installed butted or partially open. When pressurized the pipe ends in the coupling joints will separate to the maximum amount permitted by the coupling design.



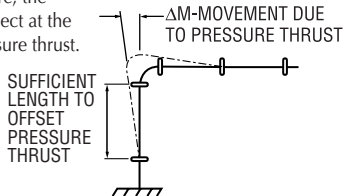
The coupling key sections will make contact with the groove walls and restrain the pipe from further separation.

The movement at each coupling joint will add with all other joints and produce  $\Delta L$ .

**EXAMPLE 2**

In the system shown here, the pipe will move and deflect at the elbow joint due to pressure thrust.

The pipe designer must assure himself that the system has the capability of deflecting sufficiently to absorb this movement without



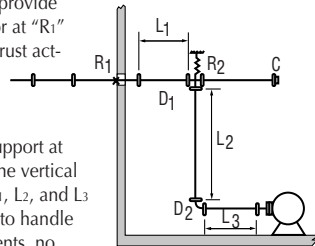
introducing additional stresses into the pipe system. In the deflected condition shown, temperature increases would produce further expansion of the pipe system thus increasing the deflection.

**EXAMPLE 3**

To restrain this system provide a pressure thrust anchor at "R1" to resist the pressure thrust acting through the tee "D1" at the cap "C".

Provide a hanger at Point "R2", or a base support at Point "D2" to support the vertical column. If the offsets L1, L2, and L3 are of adequate length to handle expected pipe movements, no additional anchoring is required.

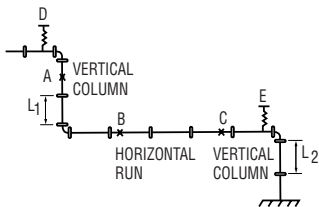
Thermal movement of the pipe system should also be considered, and intermediate anchors located as required, to direct the pipe movement so as to prevent introducing bending stresses into the system.



### EXAMPLE 4

Anchor at "A" to support weight of vertical water column. Use spring hanger at "D" and "E" to allow movement of vertical piping.

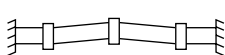
Anchors at "B" and "C" if offsets at L1 and L2 are insufficiently long to handle expected pipe movements.



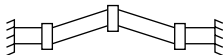
### LATERAL RESTRAINT

#### EXAMPLE 5

System with no pressure partially deflected



System pressurized fully deflected



A grooved coupling joint installed in a partially deflected condition between anchor locations will deflect to its fully deflected condition when pressurized. Hangers and supports must be selected with consideration of the hanger's capability to provide lateral restraint.

Light duty hangers, while acceptable in many installations, may deflect against the application of lateral forces and result in "snaking" conditions of the pipe system.

### RISER DESIGN:

Risers assembled with Gruvlok Flexible couplings are generally installed in either of two ways. In the most common method, the pipe ends are butted together within the coupling joint. Note that when installing risers, the gasket is first placed onto the lower pipe and rolled back away from the pipe end prior to positioning the upper pipe. Anchoring of the riser may be done prior to pressurization with the pipe ends butted or while pressurized, when, due to pressure thrust, the pipe ends will be fully separated.

An alternative method of riser installation is to place a metal spacer of a predetermined thickness, between the pipe ends when an additional length of pipe is added to the riser stack. The upper pipe length is anchored, the spacer removed and the coupling is then installed. This method creates a predetermined gap at each pipe joint which can be utilized in pipe systems where thermal movement is anticipated and in systems with rigid (threaded, welded, flanged) branch connections where shear forces due to pressure thrust could damage the rigid connections.

The following examples illustrate methods of installing commonly encountered riser designs.

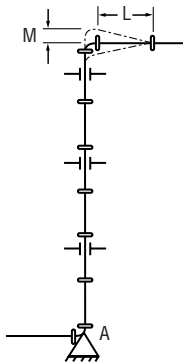
## COUPLING FLEXIBILITY, CONT'D.

## RISERS WITHOUT BRANCH CONNECTIONS

Install the riser with the pipe ends butted.

Locate an anchor at the base of the riser (A) to support the total weight of the pipe, couplings and fluid. Provide pipe guides on every other pipe length, as a minimum, to prevent possible deflection of the pipe line at the coupling joints as the riser expands due to pressure thrust or thermal growth. Note that no intermediate anchors are required.

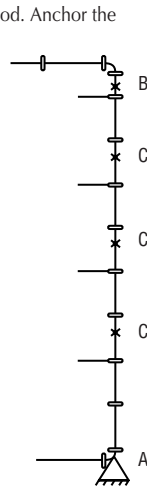
When the system is pressurized the pipe stack will "grow" due to pressure thrust which causes maximum separation of pipe ends within the couplings. The maximum amount of stack growth can be predetermined (see Linear Movement). In this example the pipe length "L" at the top of the riser must be long enough to permit sufficient deflection (see Angular Movement) to accommodate the total movement "M" from both pressure thrust and thermal gradients.



## RISERS WITH BRANCH CONNECTIONS

Install the riser with the predetermined gap method. Anchor the pipe at or near the base with a pressure thrust anchor "A" capable of supporting the full pressure thrust, weight of pipe and the fluid column. Anchor at "B" with an anchor capable of withstanding full pressure thrust at the top of the riser plus weight of pipe column. Place intermediate anchors "C" as shown, between anchors "A" and "B". Also place intermediate clamps at every other pipe length as a minimum.

When this system is pressurized, the pipe movement due to pressure thrust will be strained and there will be no shear forces acting at the branch connections.



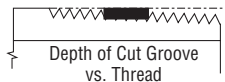
## PIPE PREPARATION

To create a Gruvlok pipe joint, all pipe must be prepared to receive Gruvlok coupling or other Gruvlok pipe system components. The required pipe preparation may be grooving or cleaning the pipe ends, or cutting a hole in the pipe wall.

For grooved-end joints, pipe may be grooved by either of two methods; cut or roll grooving. Branch outlet connections require a properly sized and correctly located hole to be cut into the pipe. Sock-it connections require cleaning of the pipe end. Gruvlok plain-end pipe couplings

### CUT GROOVING:

Cut grooving is intended for use with standard and heavier wall pipe. Cut grooving produces a groove in the pipe wall by removing metal from the pipe O.D. The groove removes less than one half of the pipe wall and does not cut as deeply into the pipe wall as do standard pipe threads. The square cut edge of the groove allows for the full expansion, contraction, and deflection capabilities of the Gruvlok coupling.



Volume of Metal Removed  
Cut Groove vs. Threaded

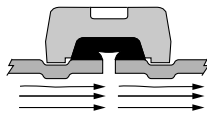


require that the pipe be free of burrs and other sharp projections which could damage the gasket; grooving is not required.

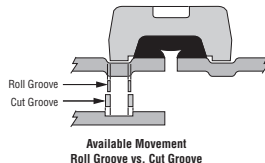
Gruvlok pipe grooving and hole cutting machines are available in a wide variety of designs to meet specific or general requirements. Gruvlok roll grooving machines produce a groove to proper dimensional tolerances, concentric with the pipe O.D., even on out-of-round pipe. Gruvlok hole cutting tools properly center holes for correct assembly of Gruvlok branch outlet components.

### ROLL GROOVING:

Roll grooving does not remove metal. Instead, metal is displaced while a groove is formed into the outer surface of the pipe wall. The groove configuration has slightly rounded edges resulting in a less flexible joint than a cut groove joint. This reduces available pipe joint movement by 50% over cut grooved coupling joints. Roll grooving is commonly used on a wide range of pipe thicknesses up to 0.375" wall steel pipe and sizes to 24" O.D.



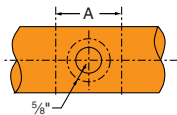
The I.D. "dimple" formed from roll grooving reduces the I.D. (on an average) less than 2%.



PIPE PREPARATION, CONT'D.

**BRANCH OUTLET PIPE: CLAMP-T®**

Clamp-T installations require the cutting of a hole through the pipe wall. The hole must be properly sized and located on the centerline of the pipe to assure reliable performance of the Clamp-T gaskets.



After the hole has been cut into the pipe wall, any burrs and sharp or rough edges must be removed from the hole. The outside pipe surfaces within  $\frac{5}{8}$ " of the hole must be clean and smooth. Any scale, projections or indentation which might effect the gasket sealing on the pipe must be removed. The surface around the entire circumference of the pipe within the "A" dimension in the charts must be free from dirt, scale, or projections which might effect the proper assembly of the Clamp-T.

CLAMP-T INSTALLATION			
Branch Size	Hole Dimensions		Surface Prep. "A"
	Hole Saw Size	Max. Perm. Diameter	
DN/mm	In./mm	In./mm	In./mm
1/2, 3/4, 1	1 1/2	1 1/8	3 1/2
15, 20, 25	38.1	41.3	88.9
1 1/4, 1 1/2	2	2 1/8	4
32, 40	50.8	54.0	101.6
2	2 1/2	2 1/8	4 1/2
50	63.5	66.7	114.3
2 1/2	2 3/4	2 1/8	4 3/4
65	69.9	73.0	120.7
3	3 1/2	3 1/8	5 1/2
80	88.9	92.1	139.7
4	4 1/2	4 1/8	6 1/2
100	114.3	117.5	165.1

**SOCK-IT®**

For Sock-It Fittings, the pipe ends must be square cut as measured from a true square line.

The maximum allowable tolerance is 0.030" (0.76mm) for all sizes. Any sharp edges, burrs, etc. left on the pipe from cutting must be removed. If these are not removed, they may damage the gasket as the pipe is inserted into the Sock-It Fitting.

After cutting, pipe ends must be completely cleaned a minimum of 1" (25.4mm) back from the pipe end to remove all pipe coating, weld beads, rust, sharp projections, etc., which might effect gasket sealing integrity.

PIPE TOLERANCES				
Size	Schedule 10 & 40		Min. O.D.	XL Min. O.D.
	Nom O.D.	Max. O.D.		
DN/mm	In./mm	In./mm	In./mm	In./mm
1	1.315	1.325	1.295	1.285
25	33.4	33.6	32.9	32.6
1 1/4	1.660	1.670	1.642	1.630
32	42.2	42.4	41.7	41.4
1 1/2	1.900	1.910	1.882	1.875
40	48.3	48.5	47.8	47.6
2	2.375	2.385	2.357	2.352
50	60.3	60.6	59.9	59.7
2 1/2	2.875	2.904	2.846	2.837
65	73.0	73.8	72.3	72.1

**NOTE:** When Allied XL pipe is used it is necessary only to remove sharp edges and burrs at the end of the pipe. No additional *cleaning* is required.

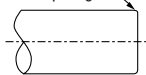


SOCK-IT®, CONT'D.

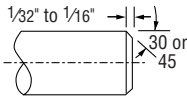
ACCEPTABLE PIPE END CONFIGURATION



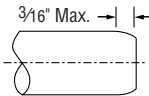
Remove Burr & Sharp Edge



Square cut pipe with O.D. burr & sharp edge removed is preferred configuration.

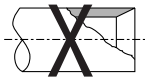


Beveled pipe. Bevel not to exceed 1/16".



Soft pipe when roll cut may be swaged inward. Swaged portion not to exceed 3/16"

UNACCEPTABLE



Excessive chamfer on I.D. will tend to cut gasket during assembly.



Abrasive wheels & saws leave edge burrs especially pronounced on one side.



Dull wheel cutter produces a raised ridge at the pipe O.D. giving an oversize diameter.

The sharp O.D. edge left by different methods of cutting pipe **must be removed**. If this sharp edge is not removed, it may damage the gasket as the pipe is inserted into the Sock-It Fitting.

ROUGHNECK®

Plain-End pipe for use with Fig. 7005 Roughneck Couplings must be free of any notches, bumps, weld bead, score marks, etc. for at least 1 1/2" (38mm) back from the pipe end to provide a smooth sealing surface for the gasket. Pipe ends (plain or beveled end) must be square cut as measured from a true square line with the maximum allowable tolerance as follows: 0.030" (0.7mm) for 2" through 3"; 0.045 (1.1mm) for 4" through 6"; and 0.060" (1.5mm) for 8" sizes. The nominal outside diameter of pipe should not vary more than ±1% for sizes up to 2 1/2", +1% - 1/32" for sizes 3"-5"; +1/16" - 1/32" for sizes 6" and larger. Pipe ends must be marked a distance of 1" from the pipe end for Sizes 2"-4" and 1 1/4" from the pipe end for Sizes 5"-8" as a guide for centering of the gasket on the pipe ends.

PIPE SUPPORT

When designing the hangers, supports and anchors for a grooved-end pipe system, the piping designer must consider certain unique characteristics of the grooved type coupling in addition to many universal pipe hanger and support design factors. As with any pipe system, the hanger or support system must provide for

- 1) the weight of the pipe, couplings, fluid & pipe system components;
- 2) reduce stresses at pipe joints; and
- 3) permit required pipe system movement to relieve stress.

The following factors should be considered when designing hangers and supports for a grooved-end pipe system.

**PIPE HANGER SPACING:**

The following charts show the maximum span between pipe hangers for straight runs of standard weight steel pipe filled with water or other similar fluids.

Do not use these values where critical span calculations are made or where there are concentrated loads between supports.

For straight runs without concentrated loads and where full linear movement is **NOT** required use the table on right.

HANGER SPACING LINEAR MOVEMENT NOT REQ'D	
Nominal Pipe Size Range	Maximum Span Between Supports
In./DNmm	Feet/meters
1	7
25	2.6
1¼-2	10
32-50	3.0
2½-4	12
65-100	3.7
5-8	14
125-200	4.3
10-12	16
250-300	4.9
14-16	18
350-400	5.5
18-24	20
450-600	6.1

For straight runs without concentrated loads and where full linear movement **IS** required use the table below.

HANGER SPACING - FLEXIBLE SYSTEM, STEEL PIPE FULL LINEAR MOVEMENT IS REQ'D AVERAGE HANGERS PER PIPE LENGTH EVENLY SPACED										
Nominal Pipe Size Range	Pipe Length in Feet/Meters									
	7	10	12	15	20	22	25	30	35	40
In.	2.1	3.3	3.7	4.6	6.1	6.7	7.6	9.1	10.7	12.2
DNmm	2.1	3.3	3.7	4.6	6.1	6.7	7.6	9.1	10.7	12.2
1-2	1	2	2	2	3	3	4	4	5	6
25-50										
2½-4	1	1	2	2	2	2	2	3	4	4
65-100										
5-24	1	1	1	2	2	2	2	3	3	3
125-600										

HANGER SPACING - RIGID SYSTEMS SUGGESTED MAXIMUM SPAN BETWEEN SUPPORTS								
Nominal Size	STEEL PIPE						COPPER TUBE	
	Suggested Maximum Span Between Supports-Feet/Meters						Water Service	Gas & Air Service
	Water Service			Air Service				
In./DNmm	*	**	***	*	**	***	**	**
1	7	9	12	9	10	12	-	-
25	2.1	2.7	3.7	2.7	3.0	3.7		
1¼	7	11	12	9	12	12	-	-
32	2.1	3.4	3.7	2.7	3.6	3.7		
1½	7	12	15	9	13	15	-	-
40	2.1	3.7	4.6	2.7	4	4.6		
2	10	13	15	13	15	15	9	12
50	3	4	4.6	4	4.6	4.6	2.7	3.6
2½	11	15	15	14	17	15	9	12
65	3.4	4.6	4.6	4.3	5.1	4.6	2.7	3.6
3 OD	11	15	15	14	17	15	-	-
65	3.4	4.6	4.6	4.3	5.1	4.6		
3	12	16	15	15	19	15	10	14
80	3.7	4.8	4.6	4.6	5.7	4.6	3	4.2
3½	13	18	15	15	21	15	-	-
90	4	5.4	4.6	4.6	6.3	4.6		
4	14	18	15	17	21	15	12	17
100	4.3	5.4	4.6	5.2	6.4	4.6	3.7	5.1
4¼	14	18	15	17	19	15	-	-
100	4.3	5.4	4.6	5.2	5.7	4.6		
5	16	20	15	20	24	15	13	18
125	4.9	6.0	4.6	6.1	7.3	4.6	4	5.7
5¼	15	18	15	19	22	15	-	-
125	4.6	5.5	4.6	5.2	6.6	4.6		
5½	16	19	15	20	24	15	-	-
125	4.9	5.8	4.6	6.1	7.3	4.6		

- \* Spacing by ANSI-B31.1 Power Piping Code.
- \*\* Spacing by ANSI-B31.9 Building Service Piping Code, (1996 Edition), Fig. 921.1.3c, Table a, 250 psi and Fig. 921.1.3D, table a
- \*\*\* Spacing by NFPA-13 Installation of Sprinkler Systems, (1999 Edition), Table 6-2.2.

HANGER SPACING - RIGID SYSTEMS SUGGESTED MAXIMUM SPAN BETWEEN SUPPORTS								
Nominal Size	STEEL PIPE Suggested Maximum Span Between Supports-Feet/Meters						COPPER TUBE	
	Water Service			Air Service			Water Service	Gas & Air Service
	*	**	***	*	**	***	**	**
In./DNmm	*	**	***	*	**	***	**	**
6 150	17 5.2	21 6.3	15 4.6	21 6.4	26 7.8	15 4.6	14 4.2	21 6.3
6¼ 150	16 4.9	20 6.0	15 4.6	20 6.1	24 7.3	15 4.6	-	-
6½ OD 150	17 5.2	21 6.3	15 4.6	21 6.4	25 7.6	15 4.6	-	-
8 200	19 5.8	23 6.9	15 4.6	24 7.3	29 8.7	15 4.6	-	-
10 250	19 5.8	25 7.5	15 4.6	24 7.3	33 9.9	15 4.6	-	-
12 300	23 7	26 7.8	15 4.6	30 9.1	36 10.8	15 4.6	-	-
14 350	23 7	26 7.8	15 4.6	30 9.1	37 11.1	15 4.6	-	-
16 400	27 8.2	26 7.8	15 4.6	35 10.7	40 12.0	15 4.6	-	-
18 450	27 8.2	27 8.1	15 4.6	35 10.7	42 12.6	15 4.6	-	-
20 500	30 9.1	27 8.1	15 4.6	39 11.9	45 13.5	15 4.6	-	-
24 600	32 9.8	26 7.8	15 4.6	42 12.8	48 14.7	15 4.6	-	-

- \* Spacing by ANSI-B31.1 Power Piping Code.
- \*\* Spacing by ANSI-B31.9 Building Service Piping Code, (1996 Edition), Fig. 921.1.3c, Table a, 250 psi and Fig. 921.1.3D, table a
- \*\*\* Spacing by NFPA-13 Installation of Sprinkler Systems, (1999 Edition), Table 6-2.2.

### Considerations for the Hanging or Supporting of Grooved Piping Systems

Grooved piping products have a very good maintenance track record out in the field. Whenever there is a “perceived” problem with installed grooved product, a high percentage are often related to the hanging or supporting method or application chosen. Although supported very similarly to welded piping systems, a few considerations should be given to assure the proper selection and application of hangers and supports used on a grooved piping system such as Anvil’s Gruvlok® brand.

#### REVIEW REQUIREMENTS AND LOGISTICS

A variety of hangers and supports are typically used on grooved piping systems, ranging from a simple band hanger, clevis hanger, and trapeze supports to more intricate rack designs using structural steel or a mechanical framing/strut system. All of these are acceptable hanging or supporting methods but they are dependent on the project’s type, design and specification requirements. With this in mind, a vital first step is to refer to the project and code requirements when choosing the proper hanging or supporting method.

Project logistics is another consideration regardless of system type. Quite often hangers and supports are an after thought on a project simply because the big-ticket items, such as labor, major equipment and schedule, are the focus of the project team. However, hangers and supports are one of the first components needed on a project since you cannot hang pipe without them.

In nearly every hanger or support assembly there are three components that make up the assembly. These components are an upper attachment (beam or structural attachment), intermediate attachment (rod, couplings, eye nuts, etc.) and the lower attachment (pipe clamps, U-bolts, trapezes). See accompanying illustrations for examples of typical assemblies. All three components should arrive on the project site together and early. To save costly field labor hours, consideration might be given to having the hangers or supports pre-assembled by the manufacturer or fabricated in the contractor’s shop. Components can also be bundled and tagged by system or area of the project so they can be easily assembled and located on-site.

#### MAKE A MATCH

The type of grooved coupling used on a project is the next consideration to choosing the correct hanger or support method. The proper maximum spacing allowables governed by project specifications, the applicable code and/or the hanger manufacturer’s recommendations all must also be reviewed. Flexible couplings used on horizontal runs of pipe need to be supported at every coupling and usually require intermediate supports to satisfy the maximum spacing allowable requirements. Rigid couplings, on the other hand, can be hung or supported based on the maximum spacing requirements only. In addition, whenever there is a change in direction of the piping system a hanger or support is usually required immediately following that change in direction and then the system is hung or supported accordingly.

## Considerations for the Hanging or Supporting of Grooved Piping Systems

### PRESSURE POINT

System pressurization should also be reviewed when choosing the proper hanging or support method. As the couplings are installed, the pipe ends can either be butted up tight to one another or a gap can exist. Once the system is pressurized, those areas or joints where the pipe ends are butted up tight and held by a grooved coupling can “pop” or grow to the maximum gap depending on the coupling chosen. The joint at a flexible grooved coupling can expand about  $\frac{1}{4}$ " at each coupling whereas the joint at a rigid grooved coupling can grow about  $\frac{3}{32}$ ". If there is a long run of horizontal or vertical pipe with multiple joints the overall length of the system will grow depending upon which grooved coupling you have chosen.

For example, if you have a grooved piping system that is 400 ft. long there will be roughly 19 grooved joints (assuming 21 ft. lengths of pipe are used). If you multiply the number of joints by the growth of each joint you can determine the overall growth of the system due to pressurization. If it is a flexible system,  $19 \text{ joints} \times .25" = 4.75"$  of overall growth. A rigid system would be  $19 \text{ joints} \times .0938" = 1.78"$  of overall growth.

As one can see, this growth due to pressurization can have a significant impact on the hangers or supports used on a project. One way to avoid this growth is to install the grooved joints at full gap so that pressurization has no impact at testing or start up. If this is not possible, then periodic air pressurization as the system is installed will expand the grooved joints to full gap and the hangers or supports can be adjusted accordingly.

### HOT AND COLD

Thermal expansion is another important consideration when choosing hangers or supports for a grooved system. This is especially important on hot systems versus chilled systems since the amount of thermal expansion will be greater on hot systems as opposed to the thermal contraction that will occur on chilled systems. This is all due to the temperature variation from ambient conditions when the pipe is installed to operating conditions.

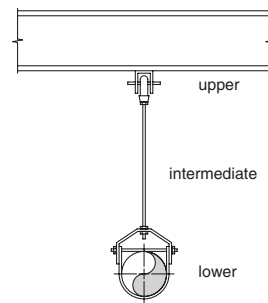
For example, if you again take 400 ft. of grooved piping, let us assume the system is heating hot water that will operate at 170°F. The pipe is installed under ambient conditions assumed to be at 70°F so you have a 100°F variation in temperature. At 70°F the pipe has a coefficient of thermal expansion of 0.0 in/ft but at 170°F the pipe has a coefficient of thermal expansion of 0.0076 in/ft. To determine the total thermal expansion of the pipe from ambient temperature to operating temperature you multiply the length of pipe by the coefficient of thermal expansion. In this case  $400 \text{ ft.} \times 0.0076 \text{ in/ft.} = 3.04 \text{ in.}$  In other words the pipe has grown in length over 3 inches because of the thermal expansion.

This is significant growth especially if there is a change of direction at the end of the 400 ft. pipe run or there are branch lines coming off the main run. If this thermal growth exceeds the allowable deflection of a grooved joint, especially where a change of direction or a branch line connects, then problems could occur. Thermal growth cannot be stopped. It can only be controlled by the use of anchors and expansion joints or expansion loops.

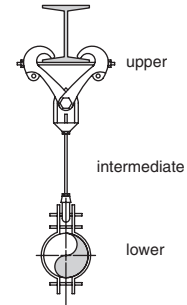
## Considerations for the Hanging or Supporting of Grooved Piping Systems

It is also important to hang or support the pipe with rolls or slides and use guides to control the thermal expansion of the pipe into an expansion joint or expansion loop. The use of static hangers, such as clevis hangers, should not be considered on pipe that is thermally expanding. When using trapeze hangers for multiple systems it is important to have "like" systems on the trapeze, that is, systems that are operating near the same temperature. If you combine hot systems with cold systems on a trapeze, the thermal expansion of the hot system can cause the trapeze to possibly twist and fail or excessive stress could be induced on the grooved joints on all of the systems on the trapeze. Hot systems should be hung or supported independently of cold or ambient systems or a means should be provided, such as pipe rolls or pipe slides, to allow the hot systems to thermally expand on the trapeze.

If the pipe is a vertical riser then consideration must be given to the use of spring hangers to allow the pipe to grow vertically up or down depending upon how the pipe is anchored while still supporting the pipe. Vertical pipe thermally expands the same amount as horizontal pipe and this has to be taken into consideration relating to supports, expansion joints or expansion loops. If the vertical pipe is supported by friction/riser clamps only and the pipe expands vertically upward, the clamps will grow with the pipe off the penetration or supporting structure and no longer provide support. If the growth is downward, the friction clamps resting on the penetration or supporting structure can either fail or the pipe may overcome the friction force and push it's way through the clamp as the pipe thermally expands downward. In either



**Clevis Hanger Assembly**



**Double Bolt Pipe Clamp Assembly**

case the clamps are no longer supporting the pipe as intended and this may induce excessive stress on the grooved joints.

Whether it is horizontal or vertical grooved pipe, growth of the piping system due to pressurization and thermal expansion must be considered. On hot systems, both must be taken into account and added together to determine the overall growth of the system and the effect on the hangers or supports that are used. In the previous examples, pressurization expansion on the 400 ft. run of pipe was 4.75" for a flexible joint system and 1.78" for a rigid joint system and the thermal expansion was 3.04". Adding these combinations together would result in

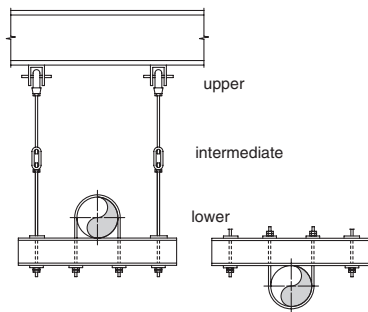
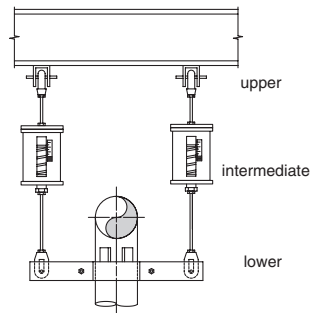
## PIPE SUPPORT, CONT'D.

## Considerations for the Hanging or Supporting of Grooved Piping Systems

a total pipe growth of 7.79" for a flexible system or 4.82" for a rigid system, regardless of the horizontal or vertical orientation of the pipe. Again, this is a significant amount of growth relating to hangers and supports and the resulting stresses induced on grooved joints.

**CONSIDER SOME RESTRAINT**

Although grooved systems in seismic zones perform extremely well, consideration should be given to how a grooved system is seismically restrained. If you have growth due to pressurization and/or thermal expansion consideration should be given on how to restrain the system while still allowing growth to occur. Seismic restraints in the longitudinal direction of a long pipe run may restrict the growth of the pipe inducing stresses into the grooved couplings. Seismic restraints in the lateral direction should have little impact on expansion except where the system has a change in direction. If the seismic restraints are placed laterally after a change in direction at the end of a long run of pipe, the expansion of the long pipe run may be restricted and this could induce excessive stress into the grooved joints.

**Trapeze Assembly****Spring Riser Hanger Assembly**

By reviewing the couplings to be used on a project, pressurization, thermal expansion and seismic restraints, one can best determine the proper selection and application of hangers and supports for a grooved piping system. This will, in turn, help ensure that grooved piping systems will continue to enjoy a solid reputation in the areas of maintenance and downtime.



### 1. SCOPE

This specification shall apply for the design and fabrication of all hangers, supports, anchors, and guides. Where piping design is such that exceptions to this specification are necessary, the particular system will be identified, and the exceptions clearly listed through an addendum which will be made a part of the specification.

### 2. DESIGN

- (a) All supports and parts shall conform to the latest requirements of the ASME Code for Pressure Piping B31.1 and MSS Standard Practice SP-58, SP-69, SP-89 and SP-90 except as supplemented or modified by the requirements of this specification.
- (b) Designs generally accepted as exemplifying good engineering practice, using stock or production parts, shall be utilized wherever possible.
- (c) Accurate weight balance calculations shall be made to determine the required supporting force at each hanger location and the pipe weight load at each equipment connection.
- (d) Pipe hangers shall be capable of supporting the pipe in all conditions of operation. They shall allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being introduced into the pipe or connected equipment.

- (e) Wherever possible, pipe attachments for horizontal piping shall be pipe clamps.
- (f) For critical high-temperature piping, at hanger locations where the vertical movement of the piping is  $\frac{1}{2}$ " or more, or where it is necessary to avoid the transfer of load to adjacent hangers or connected equipment, pipe hangers shall be an approved constant support design, as Anvil Fig. 80-V and Fig. 81-H Constant Support Hangers, or equal.

Where transfer of load to adjacent hangers or equipment is not critical, and where the vertical movement of the piping is less than  $\frac{1}{2}$ ", Variable Spring Hangers may be used, provided the variation in supporting effect does not exceed 25% of the calculated piping load through its total vertical travel.

- (g) The total travel for Constant Support Hangers will be equal to actual travel plus 20%. In no case will the difference between actual and total travel be less than 1". The Constant Support Hanger will have travel scales on both sides of the support frame to accommodate inspections.
- (h) Constant Support Hanger should be individually calibrated before shipment to support the exact load specified. The calibration record of constant support shall be maintained for a period of 20 years to assist the customer in any redesign of the piping system. Witness marks shall be stamped on the Load Adjustment Scale to establish factory calibration reference point.

## A TYPICAL PIPE HANGER SPECIFICATION, CONT'D.

- (i) In addition to the requirements of ASTM-125 all alloy springs shall be shot peened and examined by magnetic particle. The spring rate tolerance shall be  $\pm 5\%$ . All three critical parameters (free height, spring rate and loaded height) of spring coils must be tested for. Each spring coiled must be purchased with a C.M.T.R. and be of domestic manufacture.
- (j) Constant Supports should have a wide range of load adjustability. No less than 10% of this adjustability should be provided either side of the calibrated load for plus or minus field adjustment. Load adjustment scale shall be provided to aid the field in accurate adjustment of loads. Additionally, the constant support should be designed so that load adjustments can be made with-out use of special tools and not have an impact on the travel capabilities of the supports.
- (k) Constant Supports shall be furnished with travel stops which shall prevent upward and downward movement of the hanger. The travel stops will be factory installed so that the hanger level is at the "cold" position. The travel stops will be of such design as to permit future re-engagement, even in the event the lever is at a position other than "cold", without having to make hanger adjustments.
- (l) For non-critical, low temperature systems, where vertical movements up to 2" are anticipated, an approved pre-compressed Variable Spring design similar to Anvil Fig. B-268 may be used. Where movements are of a small magnitude, spring hangers similar to Anvil Fig. 82 may be used.
- (m) Each Variable Spring shall be individually calibrated at the factory and furnished with travel stops. Spring coils must be square to within  $1^\circ$  to insure proper alignment. Each spring coil must be purchased with a C.M.T.R. and be of domestic manufacture.
- (n) All rigid rod hangers shall provide a means of vertical adjustment after erection.
- (o) Where the piping system is subject to shock loads, such as seismic disturbances or thrusts imposed by the actuation of safety valves, hanger design shall include provisions for rigid restraints or shock absorbing devices of approved design, such as Anvil Fig. 200 shock and sway suppressor, or equal.
- (p) Selection of vibration control devices shall not be part of the standard hanger contract. If vibration is encountered after the piping system is in operation, appropriate vibration control equipment shall be installed.
- (q) Hanger rods shall be subject to tensile loading only (see Table III). At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit swing.
- (r) Where horizontal piping movements are greater than  $\frac{1}{2}$ " and where the hanger rod angularly from the vertical is less than or equal to 4 degrees from the cold to hot position of the pipe, the hanger pipe and structural attachments shall be offset in such manner that the rod is vertical in the hot position. When the hanger rod angularity

## A TYPICAL PIPE HANGER SPECIFICATION, CONT'D.

- is greater than 4 degrees from vertical, then structural attachment will be offset so that at no point with the rod angularity exceed 4 degrees from vertical.
- (t) Hangers shall be spaced in accordance with Table 1 and Table 2 on the following page.
  - (u) Where practical, riser piping shall be supported independently of the connected horizontal piping.

Pipe support attachments to the riser piping shall be riser clamp lugs. Welded attachments shall be of material comparable to that of the pipe, and designed in accordance with governing codes.
  - (v) Supports, guides, and anchors shall be so designed that excessive heat will not be transmitted to the building steel. The temperature of supporting parts shall be based on a temperature gradient of 100F° per inch distance from the outside surface of the pipe.
  - (w) Hanger components shall not be used for purposes other than for which they were designed. They shall not be used for rigging and erection purposes.
  - (x) Hydraulic Snubbers - The hydraulic units shall have a temperature stable control valve. The valve shall provide a locking and bleed rate velocity that provides for tamper proof settings. The fluid level indicator for exact reading of reservoir fluid level in any snubber orientation.

The valve device shall offer a minimum amount of resistance to thermal movement. Any shock force shall cause the suppressor valve to close. With the suppressor valve closed the fluid flow shall essentially stop, thereby causing the unit to resist and absorb the disturbing forces. After the disturbing forces subside, the suppressor valve shall open again to allow free thermal movement of the piping. The suppressor shall have a means of regulating the amount of movement under shock conditions up to the design load for faulted conditions without release of fluid. The suppressor design shall include a fluid bleed system to assure continued free thermal movement after the shock force subsides. The suppressor shall have a hard surfaced, corrosion resistant piston rod supported by a rod bushings and shall be designed so that it is capable of exerting the required force in tension and compression, utilizing the distance.

- (y) Paint - Variable Spring and Constant Support units will be furnished painted with Stewart Bros. Green Semi-Gloss Primer (#10947). All other material will receive one shop coat of a red chromate primer meeting the requirements of Federal Specification TT-P-636.

For corrosive conditions hangers will be galvanized or painted with carbo-zinc #11.

- (z) All threads are UNC unless otherwise specified.

**A TYPICAL PIPE HANGER SPECIFICATION, CONT'D.**

**HANGER DESIGN SERVICE**

Hanger for piping 2 1/2" and larger, and all spring support for assemblies, shall be completely engineered.

- (a) Engineered hanger assemblies shall be detailed on 8 1/2" x 11" sheets. Each sketch will include a location plan showing the location of the hanger in relation to columns of equipment. Each sketch will include an exact bill of material for the component parts making up each assembly.

- (b) Each engineered hanger assembly will be individually bundled and tagged as far as practical, ready for installation.

Hanger material for piping 2" and smaller shall be shipped as loose material, identified by piping system only. A piping drawing marked with approximate hanger locations and types, and hanger sketches showing typical support arrangements will be furnished.

- (c) Hanger inspections shall be performed in accordance with MSS-SP-89 (Section 7.7) and ASME B31.1 (Appendix V).

**TABLE 1: Maximum Horizontal Spacing Between Pipe Supports for Standard Weight Steel Pipe\***

	Nominal Pipe Size (in)																				
	1/2	3/4	1	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24	30	
<b>Max. Span (Ft) Water Service</b>	7	7	7	9	10	11	12	13	14	16	17	19	22	23	25	27	28	30	32	33	
<b>Max. Span (Ft) Vapor Service</b>	8	9	9	12	13	14	15	16	17	19	21	24	26	30	32	35	37	39	42	34	
<b>Recommended Hanger Rod Sizes</b>	3/8			1/2				5/8			3/4		7/8			1		1	1 1/4	1 1/2	1 1/2
	or trapeze																				

The above spacing and capacities are based on pipe filled with water. Additional valves and fittings increase the load and therefore closer hanger spacing is required.

\*Many codes and specifications state "pipe hangers must be spaced every 10ft. regardless of size." This local specification must be followed.

**TABLE 2: Maximum Horizontal Spacing Between Copper Tubing Supports**

	Nominal Tubing Size (in)									
	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
<b>Max. Span (Ft) Water Service</b>	5	5	6	7	8	8	9	10	11	12
<b>Max. Span (Ft) Vapor Service</b>	6	7	8	9	10	11	13	14	15	16

**NOTE:** Spans shown in Tables 1 and 2 do not apply where there are concentrated loads between supports or where temperatures exceed 750°F.

**TABLE 3: Load Carrying Capacities of Threaded Hanger Rods.**  
**Materials Carbon Steel with Minimum Actual Tensile Strength of 50 Ksi.**

Rod Diameter (in)	Threads per Inch	Root Area of Coarse Thread (in <sup>2</sup> )	Maximum Safe Load (lbs) Rod Temperature, 650° F	Maximum Safe Load (lbs) Rod Temperature, 750° F
3/8	16	0.068	730	572
1/2	13	0.126	1,350	1,057
5/8	11	0.202	2,160	1,692
3/4	10	0.302	3,230	2,530
7/8	9	0.419	4,480	3,508
1	8	0.552	5,900	4,620
1 1/4	7	0.889	9,500	7,440
1 1/2	6	1.293	13,800	10,807
1 3/4	5	1.744	18,600	14,566
2	4 1/2	2.292	24,600	19,265
2 1/4	4 1/2	3.021	32,300	25,295
2 1/2	4	3.716	39,800	31,169
2 3/4	4	4.619	49,400	38,687
3	4	5.621	60,100	47,066
3 1/4	8 UN	6.720	71,900	56,307
3 1/2	8 UN	7.918	84,700	66,331
3 3/4	8 UN	9.214	98,500	77,139
4	8 UN	10.608	113,400	88,807
4 1/4	8 UN	12.100	129,400	101,337
4 1/2	8 UN	13.690	146,600	114,807
4 3/4	8 UN	15.379	164,700	128,982
5	8 UN	17.165	184,000	144,096

Standard UNC thread thru 3" diameter and 8-UN-2A thread series for 3 1/4" diameter and larger.

**THERMAL EXPANSION OF PIPE MATERIAL**

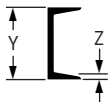
THERMAL EXPANSION OF PIPE MATERIAL – (IN/FT)										
Temp F	Carbon Steel - Low Chrome Steel (thru 3% Cr)									
	0	10	20	30	40	50	60	70	80	90
-200	-0.0180	-0.0187	-0.0192	-0.0198	-0.0203	-0.0209	-0.0215	-0.0220	-0.0225	-0.0230
-100	-0.0121	-0.0127	-0.0133	-0.0140	-0.0146	-0.0152	-0.0158	-0.0163	-0.0169	-0.0174
-0	-0.0051	-0.0058	-0.0065	-0.0073	-0.0080	-0.0087	-0.0096	-0.0103	-0.0109	-0.0116
0	-0.0051	-0.0044	-0.0037	-0.0029	-0.0022	-0.0015	-0.0007	0	0.0008	0.0015
100	0.0023	0.0030	0.0038	0.0046	0.0053	0.0061	0.0068	0.0076	0.0084	0.0091
200	0.0099	0.0107	0.0116	0.0124	0.0132	0.0141	0.0149	0.0157	0.0165	0.0174
300	0.0182	0.0191	0.0200	0.0208	0.0217	0.0226	0.0235	0.0244	0.0252	0.0261
400	0.0270	0.0279	0.0288	0.0298	0.0307	0.0316	0.0325	0.0334	0.0344	0.0353
500	0.0362	0.0372	0.0382	0.0391	0.0401	0.0411	0.0421	0.0431	0.0440	0.0450
600	0.0460	0.0470	0.0481	0.0491	0.0501	0.0512	0.0522	0.0532	0.0542	0.0553
700	0.0563	0.0574	0.0584	0.0595	0.0606	0.0617	0.0627	0.0638	0.0649	0.0659
800	0.0670	0.0681	0.0692	0.0703	0.0714	0.0726	0.0737	0.0748	0.0759	0.0770
900	0.0781	0.0792	0.0803	0.0813	0.0824	0.0835	0.0846	0.0857	0.0867	0.0878
1,000	0.0889	0.0901	0.0912	0.0924	0.0935	0.0946	0.0958	0.0970	0.0981	0.0993
1,100	0.1004	0.1015	0.1025	0.1036	0.1046	0.1057	0.1068	0.1078	0.1089	0.1099
1,200	0.1110	0.1121	0.1132	0.1144	0.1155	0.1166	0.1177	0.1188	0.1200	0.1211
1,300	0.1222	0.1233	0.1244	0.1256	0.1267	0.1278	0.1299	0.1320	0.1342	0.1363
1,400	0.1334	-	-	-	-	-	-	-	-	-

## THERMAL EXPANSION OF PIPE MATERIAL

THERMAL EXPANSION OF PIPE MATERIAL – (IN/FT)										
Temp F	Austenitic Stainless Steels (304, 316, 347)									
	0	10	20	30	40	50	60	70	80	90
-200	-0.0281	-0.0295	-0.0305	-0.0314	-0.0324	-0.0334	-0.0343	-0.0353	-0.0362	-0.0372
-100	-0.0187	-0.0197	-0.0207	-0.0216	-0.0226	-0.0236	-0.0245	-0.0254	-0.0263	-0.0272
-0	-0.0078	-0.0089	-0.0100	-0.0112	-0.0123	-0.0134	-0.0145	-0.0155	-0.0166	-0.0176
0	-0.0078	-0.0067	-0.0056	-0.0044	-0.0033	-0.0022	-0.0011	0	0.0012	0.0023
100	0.0034	0.0045	0.0056	0.0068	0.0079	0.0090	0.0101	0.0112	0.0124	0.0135
200	0.0146	0.0158	0.0169	0.0181	0.0192	0.0203	0.0215	0.0227	0.0238	0.0250
300	0.0261	0.0273	0.0285	0.0297	0.0309	0.0321	0.0332	0.0344	0.0356	0.0368
400	0.0380	0.0392	0.0404	0.0416	0.0428	0.0440	0.0453	0.0465	0.0477	0.0489
500	0.0501	0.0513	0.0526	0.0538	0.0550	0.0562	0.0575	0.0587	0.0599	0.0612
600	0.0624	0.0637	0.0649	0.0662	0.0674	0.0687	0.0700	0.0712	0.0725	0.0737
700	0.0750	0.0763	0.0776	0.0789	0.0802	0.0815	0.0828	0.0841	0.0854	0.0867
800	0.0880	0.0893	0.0906	0.0920	0.0933	0.0946	0.0959	0.0972	0.0986	0.0999
900	0.1012	0.1260	0.1039	0.1053	0.1066	0.1080	0.1094	0.1107	0.1121	0.1134
1,000	0.1148	0.1162	0.1175	0.1189	0.1202	0.1216	0.1229	0.1243	0.1257	0.1270
1,100	0.1284	0.1298	0.1311	0.1325	0.1338	0.1352	0.1366	0.1379	0.1393	0.1406
1,200	0.1420	0.1434	0.1447	0.1461	0.1474	0.1488	0.1502	0.1515	0.1529	0.1542
1,300	0.1556	0.1570	0.1583	0.1597	0.1610	0.1624	0.1638	0.1651	0.1665	0.1678
1,400	0.1692	0.1704	0.1717	0.1731	0.1744	0.1757	0.1771	0.1784	0.1796	0.1811

**NOTE:** Intersect “10” Degree increments across the top of each table with the “100” degree increments down the left side to determine the coefficient of thermal expansion for the desired temperature.

BEAM DIMENSIONS



AMERICAN STANDARD CHANNELS			
Nom. Size Y	Weight per Ft., lb.	Flange Width	Thick. of Flange Z
3	4.1	1 $\frac{3}{8}$	0.250
	5.0	1 $\frac{1}{2}$	
	6.0	1 $\frac{5}{8}$	
4	5.4	1 $\frac{5}{8}$	0.313
	7.25	1 $\frac{3}{4}$	
5	6.7	1 $\frac{3}{4}$	0.313
	9.0	1 $\frac{7}{8}$	
6	8.2	1 $\frac{7}{8}$	0.375
	10.5	2	
	13.0	2 $\frac{1}{8}$	
7	9.8	2 $\frac{1}{8}$	0.375
	12.25	2 $\frac{1}{4}$	
	14.75	2 $\frac{1}{4}$	
8	11.5	2 $\frac{1}{4}$	0.375
	13.75	2 $\frac{3}{8}$	
	18.75	2 $\frac{1}{2}$	

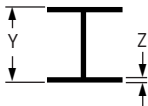
AMERICAN STANDARD CHANNELS			
Nom. Size Y	Weight per Ft., lb.	Flange Width	Thick. of Flange Z
9	13.4	2 $\frac{3}{8}$	0.438
	15.0	2 $\frac{1}{2}$	
	20.0	2 $\frac{5}{8}$	
10	15.3	2 $\frac{5}{8}$	0.438
	20.0	2 $\frac{3}{4}$	
	25.0	2 $\frac{7}{8}$	
	30.0	3	
12	20.7	3	0.500
	25.0	3	
	30.0	3 $\frac{1}{8}$	
	33.9	3 $\frac{3}{8}$	
15	40.0	3 $\frac{1}{2}$	0.625
	50.0	3 $\frac{3}{4}$	
	42.7	4	
	45.8	4	
18	51.9	4 $\frac{1}{8}$	0.625
	58.0	4 $\frac{1}{4}$	

S SHAPES			
Nom. Size Y	Weight per Ft., lb.	Flange Width	Thick. of Flange Z
3	5.7	2 $\frac{3}{8}$	0.250
	7.5	2 $\frac{1}{2}$	
4	7.7	2 $\frac{5}{8}$	0.313
	9.5	2 $\frac{3}{4}$	
5	10.0	3	0.313
	14.75	3 $\frac{1}{4}$	
6	12.5	3 $\frac{3}{8}$	0.375
	17.25	3 $\frac{5}{8}$	
7	15.3	3 $\frac{3}{8}$	0.375
	20.0	3 $\frac{7}{8}$	
8	18.4	4	0.438
	23.0	4 $\frac{1}{8}$	
10	25.4	4 $\frac{5}{8}$	0.500
	35.0	5	
12	31.8	5	0.563
	35.0	5 $\frac{1}{8}$	
	40.8	5 $\frac{1}{4}$	0.688
	50.0	5 $\frac{1}{2}$	

S SHAPES			
Nom. Size Y	Weight per Ft., lb.	Flange Width	Thick. of Flange Z
15	42.9	5 $\frac{1}{2}$	0.625
	50.0	5 $\frac{3}{8}$	
18	54.7	6	0.688
	70.0	6 $\frac{1}{4}$	
20	66.0	6 $\frac{1}{4}$	0.813
	75.0	6 $\frac{3}{8}$	
20.3	86.0	7	0.938
	96.0	7 $\frac{1}{4}$	
24	80.0	7	0.875
	90.0	7 $\frac{1}{8}$	
	100.0	7 $\frac{1}{4}$	



## BEAM DIMENSIONS



W SHAPES			
Nom. Size Y	Weight per Ft., lb.	Flange Width	Thick. of Flange Z
5	19	5	0.430
6	25	6 $\frac{1}{8}$	0.455
8	18	5 $\frac{1}{4}$	0.330
	21	5 $\frac{1}{4}$	0.400
	24	6 $\frac{1}{2}$	0.400
	28	6 $\frac{1}{2}$	0.465
	31	8	0.435
	35	8	0.495
	40	8 $\frac{1}{8}$	0.560
	48	8 $\frac{1}{8}$	0.685
	58	8 $\frac{1}{4}$	0.810
	67	8 $\frac{1}{4}$	0.935
10	22	5 $\frac{3}{4}$	0.360
	26	5 $\frac{3}{4}$	0.440
	30	5 $\frac{3}{4}$	0.510
	33	8	0.435
	39	8	0.530
	45	8	0.620
	49	10	0.560
	54	10	0.615
	60	10 $\frac{1}{8}$	0.680
	68	10 $\frac{1}{8}$	0.770
77	10 $\frac{1}{4}$	0.870	
88	10 $\frac{1}{4}$	0.990	

W SHAPES			
Nom. Size Y	Weight per Ft., lb.	Flange Width	Thick. of Flange Z
12	26	6 $\frac{1}{2}$	0.380
	30	6 $\frac{1}{2}$	0.440
	35	6 $\frac{1}{2}$	0.520
	40	8	0.515
	45	8	0.575
	50	8 $\frac{1}{8}$	0.640
	53	10	0.575
	58	10	0.640
	65	12	0.605
	72	12	0.670
	79	12 $\frac{1}{8}$	0.735
	87	12 $\frac{1}{8}$	0.810
	96	12 $\frac{1}{8}$	0.900
	106	12 $\frac{1}{4}$	0.990

W SHAPES			
Nom. Size Y	Weight per Ft., lb.	Flange Width	Thick. of Flange Z
14	30	6 $\frac{3}{4}$	0.385
	34	6 $\frac{3}{4}$	0.455
	38	6 $\frac{3}{4}$	0.515
	43	8	0.530
	48	8	0.595
	53	8	0.660
	61	10	0.645
	68	10	0.720
	74	10 $\frac{1}{8}$	0.785
	82	10 $\frac{1}{8}$	0.855
	90	14 $\frac{1}{2}$	0.710
	99	14 $\frac{5}{8}$	0.780
	109	14 $\frac{5}{8}$	0.860
	120	14 $\frac{5}{8}$	0.940
132	14 $\frac{3}{4}$	1.030	
16	36	7	0.430
	40	7	0.505
	45	7	0.565
	50	7 $\frac{1}{8}$	0.63
	57	7 $\frac{1}{8}$	0.715
	67	10 $\frac{1}{4}$	0.665
	77	10 $\frac{1}{4}$	0.760
	89	10 $\frac{3}{8}$	0.875
	100	10 $\frac{3}{8}$	0.985

BEAM DIMENSIONS, CONT'D.



W SHAPES			
Nom. Size Y	Weight per Ft., lb.	Flange Width	Thick. of Flange Z
18	50	7½	0.570
	55	7½	0.630
	60	7½	0.695
	65	7¾	0.750
	71	7¾	0.810
	76	11	0.680
	86	11½	0.770
	97	11½	0.870
21	106	11¼	0.940
	62	8¼	0.615
	68	8¼	0.685
	73	8¼	0.740
	83	8¾	0.835
	93	8¾	0.930
	101	12¼	0.800
	111	12¾	0.875
24	122	12¾	0.960
	76	9	0.680
	84	9	0.770
	94	9½	0.875
	104	12¾	0.750
	117	12¾	0.850
131	12¾	0.960	

W SHAPES			
Nom. Size Y	Weight per Ft., lb.	Flange Width	Thick. of Flange Z
27	94	10	0.745
	102	10	0.830
	114	10½	0.930
	146	14	0.975
30	108	10½	0.760
	116	10½	0.850
	124	10½	0.930
	132	10½	1.000
33	118	11½	0.740
	130	11½	0.855
	141	11½	0.960
36	135	12	0.790
	150	12	0.940
	160	12	1.020

MAXIMUM RECOMMENDED APPLIED TORQUES

FOR SET SCREWS IN MSS TYPE 19 & 23 C-CLAMP

Thread Size	Torque Value (in. - lbs)
¼	40
⅜	60
½	125
⅝	250
¾	400
⅞	665

Extracted from MSS-SP-69

FOR FIG. 261 RISER CLAMP

Bolt Size	Torque Value (ft. - lbs)
¼	6
⅜	21
½	46
⅝	100
¾	150
⅞	190
1	280

Bolts per ASTM A307  
Nuts per ASTM A563

## STEEL PIPE DATA

STEEL PIPE DATA — SCHEDULE NO 40 & 80					
Nom. Size	O.D.	Schedule No.	Wall Thick.	Weight. per Foot (lbs)	Weight of Water per Foot (lbs)
3/8	0.675	40	0.091	0.567	0.083
		80	0.126	0.738	0.061
1/2	0.840	40	0.109	0.850	0.132
		80	0.147	1.087	0.101
3/4	1.050	40	0.113	1.130	0.230
		80	0.154	1.473	0.186
1	1.315	40	0.133	1.678	0.374
		80	0.179	2.171	0.311
1 1/4	1.660	40	0.140	2.272	0.647
		80	0.191	2.996	0.555
1 1/2	1.900	40	0.145	2.717	0.882
		80	0.200	3.631	0.765
2	2.375	40	0.154	3.652	1.452
		80	0.218	5.022	1.279
2 1/2	2.875	40	0.203	5.790	2.072
		80	0.276	7.660	1.834
3	3.500	40	0.216	7.570	3.200
		80	0.300	10.250	2.860
3 1/2	4.000	40	0.226	9.110	4.280
		80	0.318	12.510	3.850
4	4.500	40	0.237	10.790	5.510
		80	0.337	14.980	4.980

STEEL PIPE DATA — SCHEDULE NO 40 & 80					
Nom. Size	O.D.	Schedule No.	Wall Thick.	Weight. per Foot (lbs)	Weight of Water per Foot (lbs)
5	5.563	40	0.258	14.620	8.660
		80	0.375	20.780	7.870
6	6.625	40	0.280	18.970	12.510
		80	0.432	28.570	11.290
8	8.625	40	0.322	28.550	21.600
		80	0.500	43.390	19.800
10	10.750	40	0.365	40.480	34.100
		80	0.593	64.400	31.100
12	12.75	40	0.406	53.600	48.500
		80	0.687	88.600	44.000
14	14.000	40	0.437	63.000	58.500
		80	0.750	107.000	51.200
16	16.000	40	0.500	83.000	76.500
		80	0.843	137.000	69.700
18	18.000	40	0.563	105.000	97.200
		80	0.937	171.000	88.500
20	20.000	40	0.593	123.000	120.400
		80	1.031	209.000	109.400
24	24.000	40	0.687	171.000	174.200
		80	1.218	297.000	158.200
30	30.000	20	0.500	158.000	286.000
36	36.000	API	0.500	190.000	417.000

COPPER TUBE DATA

TYPE L					
Tube Size	O.D. Tubing	O.D.	Wall Thick.	Weight per Foot (lbs)	Weight of Water per Foot (lbs)
¼	¾	0.375	0.030	0.126	0.034
¾	½	0.500	0.035	0.198	0.062
½	⅝	0.625	0.040	0.285	0.100
⅝	¾	0.750	0.042	0.362	0.151
¾	⅞	0.875	0.045	0.455	0.209
1	1⅛	1.125	0.050	0.655	0.357
1¼	1⅜	1.375	0.055	0.884	0.546
1½	1⅝	1.625	0.060	1.140	0.767
2	2⅛	2.125	0.070	1.750	1.341
2½	2⅝	2.625	0.080	2.480	2.064
3	3⅛	3.125	0.090	3.330	2.949
3½	3⅝	3.625	0.100	4.290	3.989
4	4⅛	4.125	0.110	5.380	5.188
5	5⅛	5.125	0.125	7.610	8.081
6	6⅛	6.125	0.140	10.200	11.616
8	8⅛	8.125	0.200	19.290	20.289
10	10⅛	10.125	0.250	30.100	31.590
12	12⅛	12.125	0.280	40.400	45.426

TYPE K					
Tube Size	O.D. Tubing	O.D.	Wall Thick.	Weight per Foot (lbs)	Weight of Water per Foot (lbs)
¼	¾	0.375	0.035	0.145	0.032
¾	½	0.500	0.049	0.269	0.055
½	⅝	0.625	0.049	0.344	0.094
⅝	¾	0.750	0.049	0.418	0.144
¾	⅞	0.875	0.065	0.641	0.188
1	1⅛	1.125	0.065	0.839	0.337
1¼	1⅜	1.375	0.065	1.040	0.527
1½	1⅝	1.625	0.072	1.360	0.743
2	2⅛	2.125	0.083	2.060	1.310
2½	2⅝	2.625	0.095	2.920	2.000
3	3⅛	3.125	0.109	4.000	2.960
3½	3⅝	3.625	0.120	5.120	3.900
4	4⅛	4.125	0.134	6.510	5.060
5	5⅛	5.125	0.160	9.670	8.000
6	6⅛	6.125	0.192	13.870	11.200
8	8⅛	8.125	0.271	25.900	19.500
10	10⅛	10.125	0.338	40.300	30.423
12	12⅛	12.125	0.405	57.800	43.675

## OTHER PIPE DATA

FLANGE CAST IRON PIPE ADD WEIGHT OF FLANGES *					
Pipe Size	Class	O.D. C.I. Pipe	Wall Thick.	Weight per ft. (lbs)	Weight of Water per ft. (lbs).
3	150	3.96	0.32	12.2	3.7
4	150	4.80	0.32	16.4	5.7
6	150	6.90	0.38	25.7	12.8
8	150	9.05	0.41	36.7	23.1
10	150	11.10	0.44	48.7	35.5
12	150	13.20	0.48	62.9	51.0
14	150	15.30	0.51	78.8	69.3
16	150	17.40	0.54	95.0	90.3
18	150	19.50	0.58	114.7	114.0
20	150	21.60	0.62	135.9	141.5
24	150	25.80	0.73	190.4	201.0
30	150	32.00	0.85	277.3	312.0
36	150	38.30	0.94	368.9	449.0
42	150	44.50	1.05	479.1	612.0
48	150	50.80	1.14	595.2	803.0

\* Mechanical joint pipe class ISO is approximately the same weight as Bell & Spigot

GLASS PIPE - REGULAR SCHEDULE				
Pipe Size	O.D.	Wall Thick.	Weight/per ft. (lbs)	Weight of Water per ft. (lbs)
1½	1.84	0.12	0.64	0.89
2	2.34	0.14	0.94	1.45
3	3.41	0.17	1.60	3.19
4	4.53	0.20	2.60	5.79
6	6.66	0.24	4.70	12.78

GLASS PIPE - HEAVY SCHEDULE				
Pipe Size	O.D.	Wall Thick.	Weight per ft. (lbs)	Weight of Water per ft. (lbs)
1	1.31	0.16	0.6	0.35
1½	1.84	0.17	0.9	0.76
2	2.34	0.17	1.1	1.36
3	3.41	0.20	2.0	3.06
4	4.53	0.26	3.4	5.44
6	6.66	0.33	6.3	12.42

PVC PIPE SUPPORT SPACING

Pipe Size (in.)	SCHEDULE 40 — Temperature (°F)					SCHEDULE 80 — Temperature (°F)					SCHEDULE 120 — Temperature (°F)				
	60	80	100	120	140	60	80	100	120	140	60	80	100	120	140
¼	4	3½	3½	2	2	4	4	3½	2½	2	—	—	—	—	—
⅜	4	4	3½	2½	2	4½	4½	4	2½	2½	—	—	—	—	—
½	4½	4½	4	2½	2½	5	4½	4½	3	2½	5	5	4½	3	2½
¾	5	4½	4	2½	2½	5½	5	4½	3	2½	5½	5	4½	3	3
1	5½	5	4½	3	2½	6	5½	5	3½	3	6	5½	5	3½	3
1¼	5½	5½	5	3	3	6	6	5½	3½	3	6½	6	5½	3½	3½
1½	6	5½	5	3½	3	6½	6	5½	3½	3½	6½	6½	6	4	3½
2	6	5½	5	3½	3	7	6½	6	4	3½	7½	7	6½	4	3½
2½	7	6½	6	4	3½	7½	7½	6½	4½	4	8	7½	7	4½	4
3	7	7	6	4	3½	8	7½	7	4½	4	8½	8	7½	5	4½
3½	7½	7	6½	4	4	8½	8	7½	5	4½	9	8½	7½	5	4½
4	7½	7	6½	4½	4	9	8½	7½	5	4½	9½	9	8½	5½	5
5	8	7½	7	4½	4	9½	9	8	5½	5	10½	10	9	6	5½
6	8½	8	7½	5	4½	10	9½	9	6	5	11½	10½	9½	6½	6
8	9	8½	8	5	4½	11	10½	9½	6½	5½	—	—	—	—	—
10	10	9	8½	5½	5	12	11	10	7	6	—	—	—	—	—
12	11½	10½	9½	6½	5½	13	12	10½	7½	6½	—	—	—	—	—
14	12	11	10	7	6	13½	13	11	8	7	—	—	—	—	—
16	12½	11½	10½	7½	6½	14	13½	11½	8½	7½	—	—	—	—	—
18	13	12	11	8	7	14½	14	12	11	9	—	—	—	—	—
20	14	12½	11½	10	8½	15½	14½	12½	11½	9½	—	—	—	—	—
24	15	13	12½	11	9½	17	15	14	12½	10½	—	—	—	—	—

## PVC PIPE SUPPORT SPACING, CONT'D.

Pipe Size (in.)	SDR 41					SDR 26					-				
	60	80	100	120	140	60	80	100	120	140	60	80	100	120	140
18	13	12	11	8	7	14½	14	12	9	8	-	-	-	-	-
20	13½	12½	11½	8½	7½	15	14½	12½	9½	8½	-	-	-	-	-
24	14	13	12	9	8	15½	15	13	10	9	-	-	-	-	-

**NOTE:** Although support spacing is shown at 140°F, consideration should be given to the use of CPVC or continuous support above 120°F.

The possibility of temperature overrides beyond regular working temperatures and cost may either make either of the alternatives more desirable. This chart based on continuous spans and for un-insulated line carrying fluids of specific gravity up to 1.00.

The above table is meant as a general guideline, it is recommended that the pipe manufacturer be consulted for specific spacing recommendations relating to their pipe, load conditions, operating temperature and service conditions.

Local codes and specifications may also vary from the above recommended spacing and should be consulted for the applicable spacing requirements prior to installation.

**CPVC PIPE SUPPORT SPACING**

Pipe Size (in.)	SCHEDULE 40 — Temperature (°F)						SCHEDULE 80 — Temperature (°F)					
	73°	100°	120°	140°	160°	180°	73°	100°	120°	140°	160°	180°
½	5	4½	4½	4	2½	2½	5½	5	4½	4½	3	2½
¾	5	5	4½	4	2½	2½	5½	5½	5	4½	3	2½
1	5½	5½	5	4½	3	2½	6	6	5½	5	3½	3
1¼	5½	5½	5½	5	3	3	6½	6	6	5½	3½	3
1½	6	6	5½	5	3½	3	7	6½	6	5½	3½	3½
2	6	6	5½	5	3½	3	7	7	6½	6	4	3½
2½	7	7	6½	6	4	3½	8	7½	7½	6½	4½	4
3	7	7	7	6	4	3½	8	8	7½	7	4½	4
3½	7½	7½	7	6½	4	4	8½	8½	8	7½	5	4½
4	7½	7½	7	6½	4½	4	8½	9	8½	7½	5	4½
6	8½	8	7½	7	5	4½	10	9½	9	8	5½	5
8	9½	9	8½	7½	5½	5	11	10½	10	9	6	5½
10	10½	10	9½	8	6	5½	11½	11	10½	9½	6½	6
12	11½	10½	10	8½	6½	6	12½	12	11½	10½	7½	6½
14	12	11	10	9	8	6	15	13½	12½	11	9½	8
16	13	12	11	9½	8½	7	16	15	13½	12	10	8½

**NOTE:** Although support spacing is shown at 140°F, consideration should be given to the use of CPVC or continuous support above 120°F.

The possibility of temperature overrides beyond regular working temperatures and cost may either make either of the alternatives more desirable. This chart based on continuous spans and for un-insulated line carrying fluids of specific gravity up to 1.00.

The above table is meant as a general guideline, it is recommended that the pipe manufacturer be consulted for specific spacing recommendations relating to their pipe, load conditions, operating temperature and service conditions.

Local codes and specifications may also vary from the above recommended spacing and should be consulted for the applicable spacing requirements prior to installation.



*Anvil offers both Basic and Extended Services...  
Contact your Anvil representative for more information.*

### BASIC SERVICES

Anvil Design Services produces fabrication drawings and Bill of Materials of mechanical room piping 2½" and larger including chillers, heat exchangers, boilers, and pumps from contractor supplied flow diagrams, mechanical drawings, and approved submittals and specifications.

Initially, Anvil personnel meet with you to determine your piping preferences. The project scope and fee is agreed upon in a Design Services contract.

The plans and specifications are then interpreted in terms of economy, accuracy, and compliance. We may suggest modifications in arrangement, construction, equipment location, or product to attain the desired results. Piping layouts are carefully analyzed to determine whether further economies can be attained in the piping system.

Piping drawings are then prepared to determine the most efficient pipe routing, taking equipment location and any interferences into consideration. Preliminary prints are sent to you for revision or approval.

Upon approval, (4) sets of drawings with tags and Bills of Materials of the included system components are sent to you.

With Basic Services, you can plan the mechanical room. The preliminary drawings can be taken to coordination meetings with other trades

### VALVES

Qty	TAG#	SIZE	PART#	DESCRIPTION #1
	4	2.5	GRUVLOK,SER.7000	BUTTERFLY VALVE, GRVD
	25	2.5	GRUVLOK,FIG.758	STRAINER, GROOVED
	27	2.5	GRUVLOK,SER.7800	CHECK VALVE, GRVD
	34	6	GRUVLOK,FIG.7260	STRAINER, GROOVED
	55	10	GRUVLOK,SER.7000	BUTTERFLY VALVE, GRVD
12	58	6	GRUVLOK,SER.7000	BUTTERFLY VALVE, GRVD
	61	10	GRUVLOK,SER.7000	BUTTERFLY VALVE, GRVD
	81	6	GRUVLOK,FIG.722G	3DITY VALVE, GROOVED
	85	6x5	GRUVLOK,FIG.7250	SUCTION DIFF, GROOVED
	89	6	GRUVLOK,FIG.7250	SUCTION DIFF, GROOVED

### FITTINGS

Qty	TAG#	SIZE	PART#	DESCRIPTION #1	DESCRIPTION #2
10	2	2.5	GRUVLOK,FIG.7050	90 ELBOW, GRVD	290390014249
27	5	2.5	GRUVLOK,FIG.7000	COUPLING, FLEX GRVD.	
32	7	2.5	GRUVLOK,FIG.7400	COUPLING, RIGIDLK GRVD.	290390013522
6	8	2.5	GRUVLOK,FIG.7060	TEE, GROOVED	29039001688
4				45 ELBOW, GRVD	290390014249

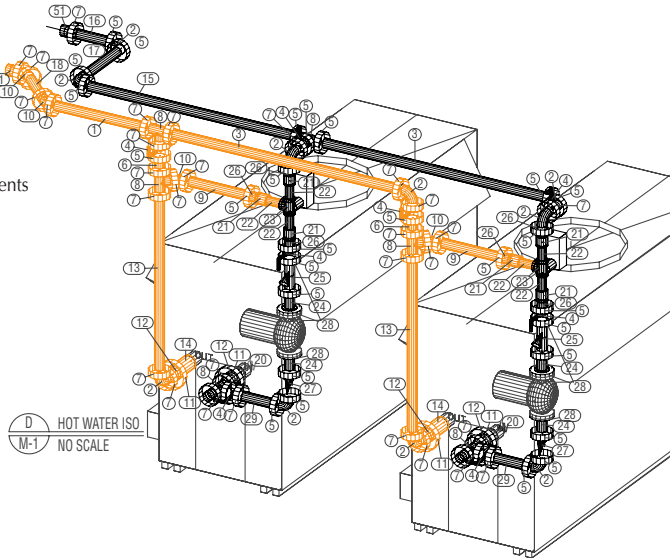
to "reserve" space by "getting in" first. Also, your field supervisor can spend more time supervising and not calculating pipe lengths and pipe routing. The components can be grouped from the finished drawings for better workflow planning.

We usually reduce fitting counts by 10%-15% by moving equipment whenever possible, usually less than a foot. The more movement that is allowed, the more savings can be realized.

**EXTENDED SERVICES**

Extended Services include any scope beyond Basic Services. There are many different types of services offered as extended:

- BOM by component (pump, chiller) or by system
- Unique Tagging – adding unique tags to components
- Air Handling Units – with associated ductwork
- Single Line Routing – non-dimensional
- Distribution Piping
- Dimensioned Floor Penetrations
- AWWA Piping - Total Scope
- Commercial Piping
- Oil Field Piping
- Retrofit Projects - Field Survey
- Hybrid Systems
- Anything Else



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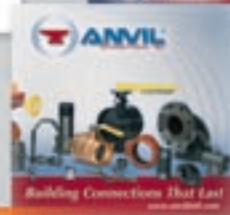
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**Servicing:** CONNECTICUT, DELAWARE, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, EAST PENNSYLVANIA, RHODE ISLAND, VERMONT, VIRGINIA

2530 PEARL BUCK ROAD  
BRISTOL, PA 19007

TEL: 215-788-4056 • FAX: 215-788-4475  
TOLL FREE: 1-800-451-2935

### MIDWEST SERVICE CENTER

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750 CENTRAL AVENUE

UNIVERSITY PARK, IL 60466

TEL: 708-534-1414 • FAX: 708-534-5441

TOLL FREE: 1-800-301-2701

### SOUTHERN SERVICE CENTER

**Servicing:** ALABAMA, ARKANSAS, COLORADO, FLORIDA, GEORGIA, LOUISIANA, MISSISSIPPI, NEW MEXICO, NORTH AND SOUTH CAROLINA, OKLAHOMA, TENNESSEE, TEXAS, WYOMING

1313 AVENUE R  
GRAND PRAIRIE, TX 75050

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### WESTERN SERVICE CENTER

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1385 GREG STREET  
SPARKS, NV 89431

TEL: 775-331-7029 • FAX: 775-331-5075  
TOLL FREE: 1-800-572-0051

## INTERNATIONAL SALES

### CANADA

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470 Seaman St.

Stoney Creek, Ontario L8E 2V9

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### EUROPE & MIDDLE EAST REGION

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U.S. Customer Service

Tel: 708-534-1414 • Fax: 708-534-5441

### LATIN AMERICA, PUERTO RICO & MEXICO

**Art Gutierrez**, Sales Manager

Tel: 813-300-3721

U.S. Customer Service

Tel: 708-534-1414 • Fax: 708-534-5441

**FOR SALES AND SERVICE INFORMATION CONTACT THE REGIONAL SERVICE  
CENTER NEAREST YOU OR VISIT OUR WEBSITE AT [WWW.ANVILINTL.COM](http://WWW.ANVILINTL.COM)**

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