FIG. F-3 Grooved Flange Adapter

SPF/ANVIL

The SPF® F-3 Flange allows direct connection of Class 125 or Class 150 flanged components to a grooved piping system. The two interlocking halves of the SPF Flange are hinged for ease of handling, and are drawn together by a latch bolt which eases assembly on the pipe. Precision machined bolt holes, key and mating surfaces assure concentricity and flatness to provide exact fit-up with flanged, lug, and wafer styles of pipe system equipment. A specially designed gasket provides a leak-tight seal on both the pipe and the mating flange face.

All SPF F-3 Flanges have designed-in anti-rotation tines which bite into and grip the sides of the pipe grooves to provide a secure, rigid connection.

The SPF F-3 Flange requires the use of a steel adapter insert when used against rubber faced surfaces, wafer/lug design valves and serrated or irregular sealing surfaces.
(See Installation and Assembly Instructions Section or contact your Anvil Rep. for details.)

c UL us LISTED FM APPROVED

For Listings/Approval Details and Limitations, visit our website at www.anvilintl.com or contact an Anvil® Sales Representative.

MATERIAL SPECIFICATIONS

HOUSING:
Ductile Iron conforming to ASTM A-536, Grade 65-45-12

LATCH BOLTS AND SEGMENT BOLTS:
SAE J429, Grade 5, Zinc Electroplated
ISO 898-1, Class 8.8, Zinc Electroplated followed by a Yellow Chromate Dip

LATCH NUTS AND SEGMENT NUTS:
ASTM A563, Grade A, Zinc Electroplated
ISO 898-2, Class 8.8, Zinc Electroplated followed by a Yellow Chromate Dip

COATINGS:
☐ Rust inhibiting paint Color: ORANGE (standard)
☐ Hot Dipped Zinc Galvanized (optional)
☐ Other available options: Example: RAL3000 or RAL9000 Series
For other coating requirements contact an Anvil Representative.

LUBRICATION:
☐ Standard Gruvlok
☐ Gruvlok Xtreme™ required for dry pipe systems and freezer applications.

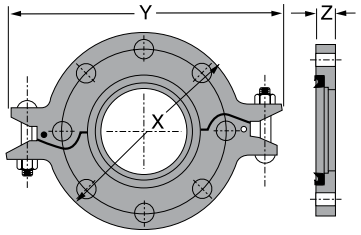
GASKETS: Materials
Properties as designated in accordance with ASTM D-2000.

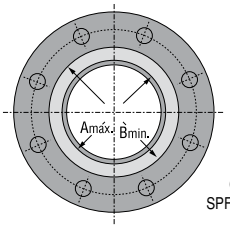
☐ **Grade "E" EPDM** (Green color code)
-40°F to 100°F (Service Temperature Range)(-40°C to 38°C)
Recommended for water service, diluted acids, alkalies solutions, oil-free air and many chemical services.
NOT FOR USE IN PETROLEUM APPLICATIONS.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

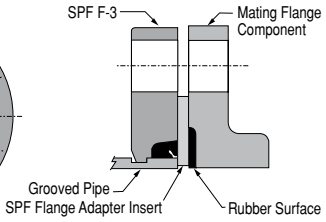
FIG. F-3 Grooved Flange Adapter

SPF/ANVIL

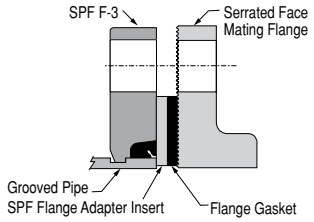




Note A



Notes 1 and 2



Notes 3 and 4

SPF F-3 FLANGE: ANSI CLASS 150 OR ISO PN10 OR PN16 BOLT PATTERNS

Nominal Size	Pipe 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.						Quantity	Size	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*	*ANSI PN10 (16)*	*ANSI 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 7/16	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*	*7/8*	*5 9/16*	*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
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 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*
12 (PN)	*12.750*	*300*	*38,303*	*-*	*30*	*45*	*18 1/8*	*21 1/4*	*1*	*12 3/4*	*14 1/8*	*12*	*-*	*320*	*400*	*20.9*
300	323.9	20.7	170.38	M10 x 70	40	60	460	540	25	324	359	12	M20 x 90	439	542	9.5

+ PN 16 uses M24 x 90 (PN) dimensions for 10" and 12" sizes. The specified mating flange bolt torque for M24 bolts is 434 - 542 N-m.

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

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

▲ – Working Pressure Ratings are for reference only and based on Sch. 40 pipe. For the latest UL/ULC, FM, VdS and LPCB pressure ratings versus pipe schedule, please visit anvilintl.com or contact your local Anvil Representative.

§ – For additional Bolt Torque information, see Technical Data Section.

⚠ WARNING

For dry pipe systems and freezer applications lubrication of the gasket is required, Gruvlok® Xtreme™ Lubricant is required.

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. SPF Flanges are to be assembled on butterfly valves so as not to interfere with actuator or handle operation.

C. Do not use SPF Flanges within 90 degrees of one another on standard fittings because the outside dimensions may cause interference.

D. SPF Flanges should not be used as anchor points for tierods across non-restrained joints.

E. SPF F-3 Flange sealing gaskets require a hard flat surface for adequate sealing. The use of a SPF Flange Adapter Insert is required for applications against rubber faced valves or other equipment. The SPF Flange Adapter Insert is installed between the SPF Flange sealing gasket and the mating flange or surface to provide a good sealing surface area.

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

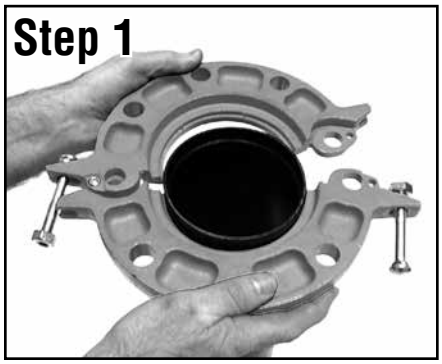
Applications which require a SPF® Flange Adapter Insert

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 SPF Flange Adapter Insert between the valve and the SPF Flange.
2. When mating to a rubber-faced metal flange, the SPF Flange Adapter Insert is placed between the SPF Flange and the rubber-faced flange.
3. When mating to a serrated flange surface, a standard fullfaced flange gasket is installed against the serrated flange face, and the SPF Flange Adapter Insert is placed between the SPF 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.

FIG. F-3 Grooved Flange Adapter

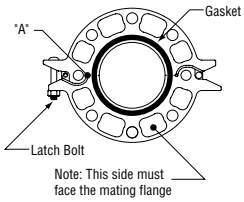
SPF/ANVIL

ALWAYS USE A GRUVLOK® SPF/ANVIL® 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˚C) and below 32°F (0˚C) use Gruvlok® SPF/Anvil® Xtreme Lubricant™ and lubricate all gasket surfaces, internal and external. See Gruvlok SPF/Anvil Lubricants in the Technical Data section of the Anvil SPF catalog for additional important information. **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.**



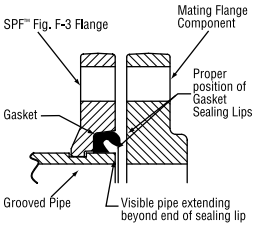
1 On the side without the hinge pin, loosen the latch bolt nut to the end of the bolt thread. (It is not necessary to remove the nut from the latch bolt.) Swing the latch bolt out of the slot. Open the F-3 Flange and place around the grooved pipe end with the key section fitting into the groove. The flange gasket cavity must face the pipe end.

2 Place the latch bolt back into the slotted hole. Tighten the nut until there is a 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.

4 Stretch the 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.



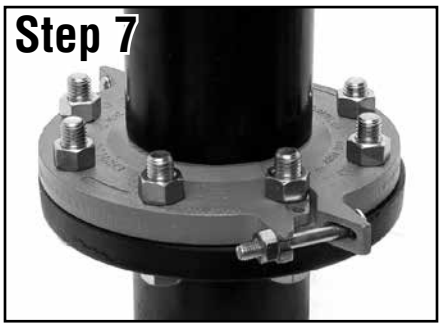
5 With the gasket in place apply lubricant to the exposed gasket tip, which will seal on the mating flange. **Tighten the nuts on the latch bolts alternately to the specified latch bolt torque. The flange housings must be in firm metal-to-metal contact.**

⚠ WARNING

The Fig. F-3 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 1/8" on the 2"-6" sizes and 3/16" on the 8"-12" sizes.

FIG. F-3 Grooved Flange Adapter

SPF/ANVIL



6 Verify that the mating flange face is hard, flat and smooth, free of indentations, which would prevent proper sealing of the flange gasket. Assure the gasket is still in the proper position and align 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.

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.

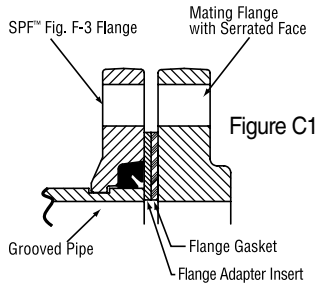


Figure C1

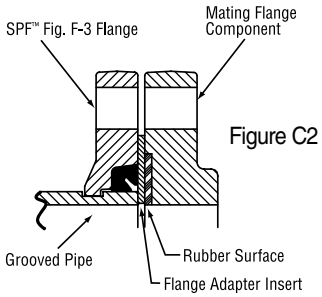


Figure C2

Note: The Fig. F-3 Flange requires the use of a 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.

⚠ WARNING

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

Specified Bolt Torque for Latch and Mating Flange Bolts

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

Caution: Proper torquing of latch and mating 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.

ANSI/METRIC SPECIFIED LATCH BOLT TORQUE

Bolt Size	Wrench Size	Specified Bolt Torque *
In./mm	*In./mm*	*Ft.-Lbs/N-M*
3/8 *M10*	11/16 *16*	30-45 *40-60*
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 –

* Non-lubricated bolt torques.

ANSI/METRIC SPECIFIED MATING FLANGE BOLT TORQUE

Bolt Size	Wrench Size	Specified Bolt Torque *
In./mm	*In./mm*	*Ft.-Lbs/N-M*
5/8 *M16*	1 1/16 *24*	110-140 *149-190*
3/4 *M20*	1 1/4 *30*	220-250 *298-339*
7/8 *M24*	1 7/16 *36*	320-400 *434-542*
1 –	1 5/8 –	360-520 –
1 1/8 –	1 13/16 –	450-725 –
1 1/4 –	2 –	620-1000 –

* Non-lubricated bolt torques.