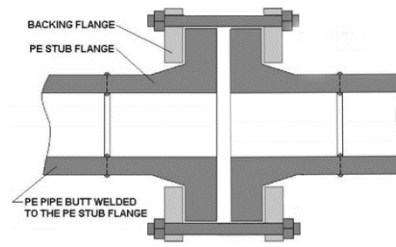
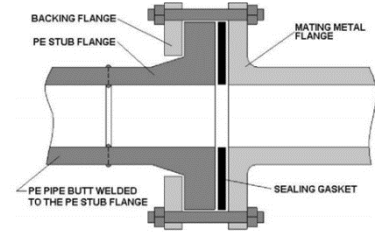


## Flange Adapter Installation

### Torque Values & Tightening Sequence



HDPE Flange to HDPE Flange



HDPE Flange to Metal Flange

The Flange Adapter is a high-density polyethylene fitting that allows you to make a mechanical transition to or from a **polyethylene-to-polyethylene** system or a **polyethylene to non-polyethylene** system by use of a standard ANSI/AWWA Backup Ring (*also known as a metal lap joint flange*).

To make this kind of connection you need to have on-hand, a **Flange Adapter**, (2) **Backup Rings or a flanged appurtenance**, and a **bolt set**. The neck of the Flange Adapter is sufficiently long enough so that it can be clamped in a fusion machine or electrofused onto a polyethylene pipe end, but the Backup Ring will need to be placed loosely on the Flange Adapter prior to being fused on the pipe.

## Flange Assembly Methods

There are two methods commonly used when making the Flange Adapter connection between various combinations of pipe materials such as HDPE to HDPE; HDPE to Steel; HDPE to Ductile Iron; HDPE to PVC; HDPE to Fiberglass.

- **Non-Gasketed Method**, uses the specified HDPE seating torque initially applied to the HDPE Flange Adapters, followed by a mandatory re-torque applied 4 – 24 hours after completion of the torque application.
- **Gasketed Method**, uses a low gasket seating bolt torque, applied to a soft elastomeric gasket, for lower pressure applications (like landfill gas collection or use with torque limited PVC or fiberglass flanges), followed by the mandatory re-torque 4 – 24 hours later.

## Flange Gaskets

**Gaskets are not usually needed for properly torqued self-gasketing HDPE flange assemblies.** However, gaskets may be needed for applications working at higher pressures or for connections being made between a polyethylene flange and non-polyethylene flanges.

***NOTE:** IF gaskets are to be used, the gasket materials should be chemically and thermally compatible with the internal fluid and the external environment. They should be of proper hardness, thickness, and style. They should also be recommended by the gasket manufacturer for use with polyethylene flanges. Upon seating, a gasket must be capable of overcoming minor alignment and flange imperfections such as non-parallel flanges, distortion troughs/grooves, surface waviness. Or surface scoring.*

*When gaskets harder than HDPE are used, the hard gasket seating stress may be more than the HDPE seating stress. When higher seating stress gaskets are used with mating metal flanges, the HDPE may seat on its side of the gasket but may not be able to seat the harder gasket into the metal on the other metal flange face. Hence, there is a limit on the gasket seating stress when other material gaskets are used.*

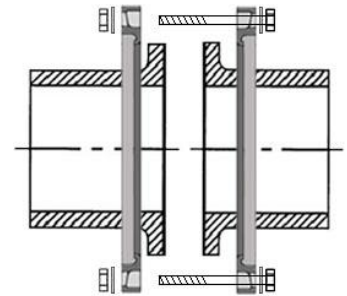
### Flange Assembly

- Before fitting the flange assembly, lubricate the flange bolt threads, washers and nuts with a non-fluid lubricant grease.
- Flange surfaces, and gasket surfaces if being used, must be clean and free of cut or gouges.
- Fit the flange components together loosely.
- Tighten bolts by hand and recheck alignment.
- Adjust alignment if necessary.
- Flange bolts should be tightened to the proper torque value (see Table 1) by turning the nut.
- Tighten the flange nuts according to the sequential numbered patterns provided (see Figure 1).
- Tighten all the bolts in the sequential pattern before changing to a higher torque value.
- Establish a sealing surface pressure by tightening the bolts to a torque value of 5 ft-lbs., then increase torque increments to about 15 ft-lbs. or less.
- Tighten bolts to the torque value recommended.

**Caution** – Mating flanges must be aligned to each other before tightening. Tightening misaligned flanges can cause leakage or flange failure. Do not try to align flange faces by tightening bolts.

**Caution** – Improperly assembled flange connections may leak. The assembly for polyethylene flange connections is different from assembly of metallic flange connections. It is important that the installer be aware of the differences. Retightening is essential in achieving a seal.

**Caution** – Retightening. Polyethylene and the gasket (if used) will undergo compression set that may loosen the bolts. About an hour or so after the final tightening, retighten each flange bolt nut to the final torque value. As before, retighten in the correct pattern sequence and in increments of 15 ft-lbs. or less. For flange adapters 12" and smaller, a second retightening after 4 hours is recommended. For flange adapters larger than 12", the second retightening is recommended after 12 to 24 hours.



### Flange Bolts

Flange bolts are typically sized 1/8" smaller than the bolt hole diameter and mating flanges are usually joined together with Hex-head bolts, flat washers and hex nuts, or threaded studs, flat washers and hex nuts. Generally Hex-head and stud bolts are SAE Grade 2 or ASTM A307 Grade B when used to join flanges with rubber gaskets. When using non-rubber gaskets or when using Class 300 backup rings, higher strength bolts may be needed to provide sufficient clamping force to seal the gaskets. Check with the gasket supplier. Flange bolts must span the entire width of the flange joint and provide sufficient thread length to engage the nut. Flat washers should be used between the nut and the backup ring.

Because the length of bolt is heavily dependent on the specific application, and the type of flanged fitting or appurtenance being bolted to – standard bolt lengths are difficult to provide, and in many applications **All-Thread** is used in the place of the Hex Head Bolts.

# Flange Adapter Installation

## Torque Values & Tightening Sequence

Flange Size	Flange SDR	HDPE to HDPE		HDPE to 150# Flange		Bolt Dia.	Bolt TPI	Stud or Bolt Qty.	Washer Qty.	Socket Size	
		Hex Bolt Length	150# Stud Length	Hex Bolt Length	150# Stud Length					Std Head	Heavy Head
2"	17	3 -1/2"	3 -1/2"	2-3/4"	3-1/4"	5 / 8"	11	4	8	15/16"	1-1/16"
	11										
3"	17	3 -1/2"	3-7/8"	3-1/4"	3-3/4"	5 / 8"	11	4	8	15/16"	1-1/16"
	11										
4"	17	4"	4-1/2"	3-1/2"	4"	5 / 8"	11	8	16	15/16"	1-1/16"
	11										
6"	17	4-1/4"	4-3/4"	3-3/4"	4-1/4"	3 / 4"	10	8	16	1-1/8"	1-1/4"
	11										
8"	17	4-3/4"	5-1/4"	4-1/4"	4-5/8"	3 / 4"	10	8	16	1-1/8"	1-1/4"
	11										
10"	17	5-1/2"	5-7/8"	4-3/4"	5-1/4"	7 / 8"	9	12	24	1-5/16"	1-7/16"
	11	6-1/4"	6-5/8"	5"	5-1/2"						
12"	17	6-1/4"	6-5/8"	5"	5-1/2"	7 / 8"	9	12	24	1-5/16"	1-7/16"
	11	7-1/4"	7-5/8"	5-1/2"	6"						
14"	17	6-3/4"	7-1/4"	5-3/4"	6-1/4"	1"	8	12	24	1-1/2"	1-5/8"
	11	8"	8-1/2"	6-1/4"	6-3/4"						
16"	17	7-1/2"	8"	6"	6-1/2"	1"	8	16	32	1-1/2"	1-5/8"
	11	9"	9-1/2"	6-3/4"	7-1/4"						
18"	17	8 1/4"	8-5/8"	6-3/4"	7-1/4"	1-1/8"	8	16	32	1-1/16"	1-13/16
	11	9-7/8"	10"	7-1/2"	7-7/8"						
20"	17	8-7/8"	9-1/4"	7"	7-1/2"	1-1/8"	8	20	40	1-1/16"	1-13/16
	11	10-1/4"	10-3/4"	7-3/4"	8-1/4"						
24"	17	10-1/8"	10-5/8"	8"	8-1/2"	1-1/4"	8	20	40	1-7/8"	2"
	11	12-1/2"	12-7/8"	9-1/4"	9-3/4"						

**NOTICE: This list of bolt lengths is a general guideline to be used for reference purposes only. The lengths given in this list are based on general industry information and may not be appropriate for your specific application.**

## Bolt Tightening

**Multiple rounds of tightening should be used to ensure uniform bolt tightness.**

After hand-tightening, a minimum of **three (3) rounds of incremental tightening** is suggested, tightening to approximately **30%** of the target torque value on the first round. Tighten to **50-70%** on the second round, and to **100%** on the third round.

After the third round, it is recommended that all the bolts should be checked and retorqued to 100% in a circular pattern to ensure that no bolts were inadvertently missed during the tightening sequence. Bolt tightening torque values are provided in **Table 1** and are typically sufficient for obtaining a seal. However, if using a gasket, bolts should be tightened to the gasket manufacturers recommended torque for the selected gasket and the application conditions.

The effectiveness of the seal is strongly dependent on field assembly technique. Over tightening rubber gaskets may damage or extrude the gasket. Under tightening could result in blow outs or leakage. Flange connections should be left exposed until leak testing is complete.

*NOTE: There are conditions that can affect proper bolt tightening. These include bolt thread condition, thread cleanliness, earlier usage of bolts, lubricants and weather.*

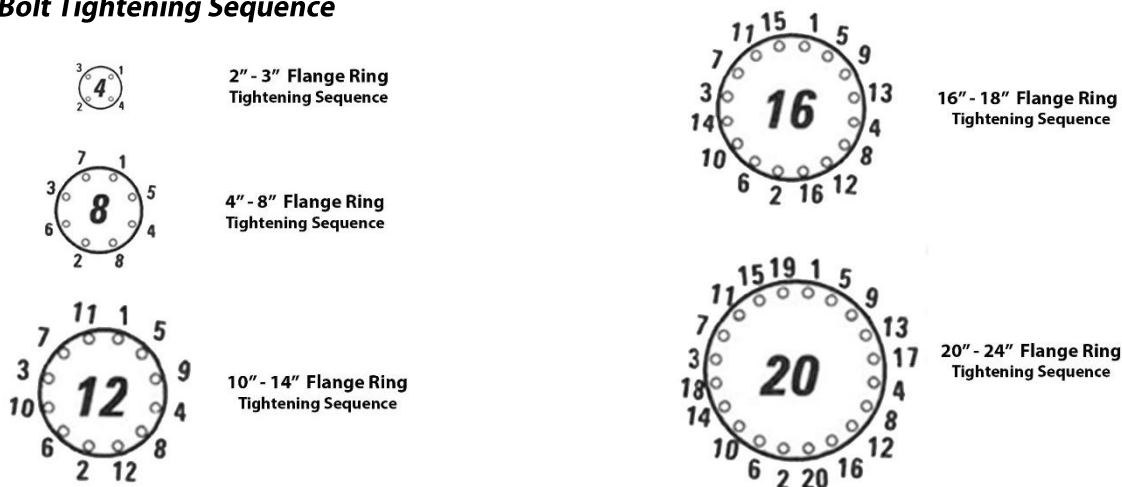
Bolts should be lubricated. Dry bolts require higher torque to provide the same clamping force as lubricated bolts. Lubricate with a non-fluid lubricant grease.

**Table 1 - Bolt Torque Values Using Lubricated Bolts**

Bolt Size		With Rubber Gasket **	PE to PE With No Gasket	Maximum Torque
In.	TPI	Ft.-lbs.	Ft.-lbs.	Ft.-lbs.
5/8	11	40	60	100
3/4	10	65	100	125
7/8	9	120	150	150
1	8	150	150	200
1-1/8	8	160	160	250
1 1/4	8	220	220	300

\*\* Verify with the gasket supplier that the torque meets minimum clamping force for the gasket.

**Figure 1 – Bolt Tightening Sequence**



### Special Flange Installation Considerations

- Surface and above grade flanges must be properly supported to avoid bending stresses.
- Below grade flange connections to heavy appurtenances such as valves or hydrants or to metal pipes require a support foundation of compacted, stable granular soil (crushed stone), compacted cement stabilized granular backfill, or reinforced concrete.
- Flange connections next to pipes passing through structural walls must be structurally supported to avoid shear and bending loads.
- When flanging to brittle materials such as cast iron, correct alignment and careful tightening are necessary. Polyethylene flange adapters and stub ends are not full-face, so tightening places a bending stress across the flange face. Over-tightening, misalignment, or uneven tightening can break brittle material flanges.

### Butterfly Valves

When joining a polyethylene flange adapter to a flanged butterfly valve, **the inside diameter of the pipe flange should be checked for valve disk rotation clearance.** The open valve disk may extend into the pipe flange. Valve operation may be restricted if the pipe flange interferes with the disk. If disk rotation clearance is a problem, a Beveled Flange Adapter having sufficient clearance to allow the complete opening of standard valves may be obtained from Integrity Fusion Products.

Butterfly valves must be centered in the flange for proper operation. Installing a butterfly valve with the disk rotated open may aid with alignment. After fitting up and tightening flange bolts to the 5 ft.-lbs. torque value, check the valve to ensure that the valve disk can rotate without interference. Realign, if necessary, then tighten up.