Installation Instructions

INSTALLATION PROCEDURE FOR AC BACKING FLANGE

Installation

1. Inspect box for damage from shipping. Notify carrier of any damage and make claims as required.

2. After removing the AC Backing Flange from the box, inspect the beveled surface between the AC Backing Flange inside diameter (ID) for any sharp protrusion which could come into contact with the flange adapter. Any sharp edge in this area is cause for rejection.

3. When installation is required, verify that each AC Backing Flange is the proper size, flange type, and coating for the given application.

4. If AC Backing Flange is rejected due to a surface deformation in the above noted area, set aside for return and specify reason for rejection.

5. Slip AC Backing Flange over flange adapter and rotate ring to confirm correct fit and size.

Note: Beveled surface on AC Backing Flange faces flange adapter; washers, bolts, and nuts go on flat surface of AC Backing Flange. As with any flange made to ANSI drilling, optimal distribution of clamping force is obtained through the use of heavy-duty washers.

6. Select one AC Backing Flange on each joint for determining the flange tightening sequence, and follow the "star" pattern for all tightening passes on that joint.

7. Install all AC Backing Flanges using a calibrated torque wrench or a KC Multi-Ring® SmartBox™. Whenever possible, apply the torque to the nut. All passes are to be made following the tightening sequence described above. For pass 1, torque each nut to 33% of the desired torque value. For pass 2, re-torque each nut to 66% of the desired torque value. For pass 3, re-torque each nut to 100% of the desired torque value. Wait two minutes and re-torque to 100% value. (Note that for speed and ease of installation, the KC Multi-Ring® SmartBox™ is calibrated to the recommended bolt torque for each pipe size using KC Multi-Ring® gaskets, allowing the use of an electric impact wrench for the first 3 passes - a calibrated torque wrench is always used for the final Quality Control pass.)

Note: Optimal results are obtained when used in conjunction with KC Multi-Ring® reduced surface area low-torque gaskets.

INSTALLATION PROCEDURE FOR KC MULTI-RING ULTRAPURE GASKET

The gaskets will arrive cleaned and individually packaged in sealed bags. Each bag will be labeled with a part number which will correlate with pipe type(s) and dimension. Gaskets of similar size and type will be aggregated and packaged in a larger sealed bag, typically in groups of ten (10).

Installation

1. When installation is required, verify that the gasket is the proper size and flange type. When installing the gasket, installer shall wear appropriate garments to meet the appropriate clean zone protocol in effect at the time. Specifically, clean room gloves are to be worn at all times while handling gaskets.

2. While gasket is in the individually sealed bag, inspect for any surface deformations such as tears, rips, or non-uniform cuts. Any material defect of the inner surface is cause for rejection.

3. If a gasket is rejected due to a surface deformation, place aside for return and specify reason for rejection.

4. **Great care should be taken to protect the gasket surface from exposure to oil or other contaminants.**

5. Remove gasket from bag.

6. Immediately prior to installing, pay particular attention to the inner surface. **Do not wipe the surface with or expose the surface to IPA (Isopropyl Alcohol).**

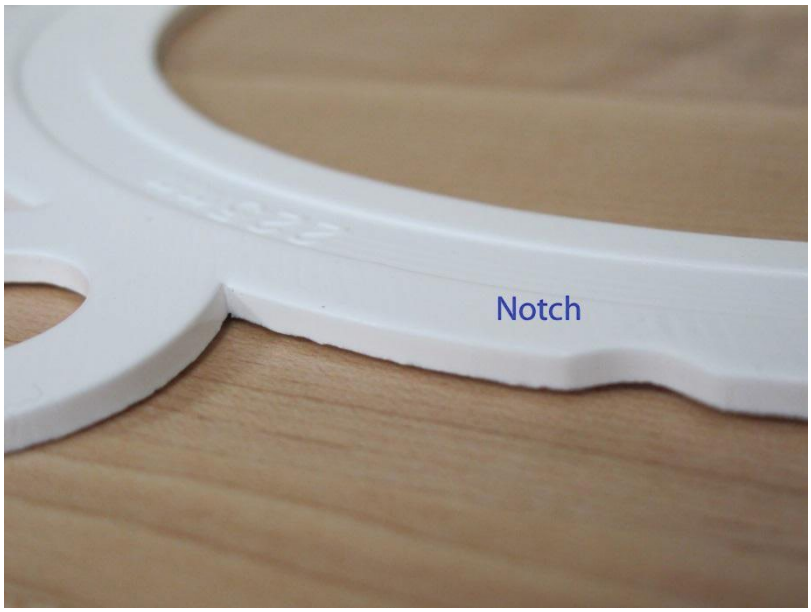
7. Pay particular attention to keeping the gasket and flange adapters on the same axis (that is, geometrically centered).

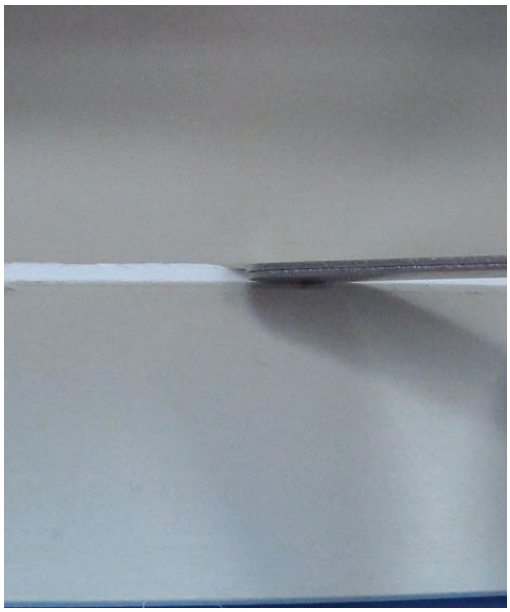
8. Install all flanges using a calibrated torque wrench. Whenever possible, apply the torque to the nut. Tighten the flanges in a star pattern to the following torque values using progressive 4-pass tightening. Following the star pattern, torque each nut to 33% of the desired torque value. Then re-torque to 66% of the desired torque value. Re-torque to 100% of the desired torque value. **Wait two minutes and re-torque to 100% value.**

9. Using a clean feeler gauge select a pair of blades that add up to 54 or 55 1/1000's. If you can get the feeler gauge into the notch then the seal is not certain and you will need to make another pass. If after that it is still not compressed to <54/1000's then up the force by 2% and make another pass. The use of the feeler gauge to measure compression is the only certain way to measure if the KCMR expanded PTFE gasket is sealed.

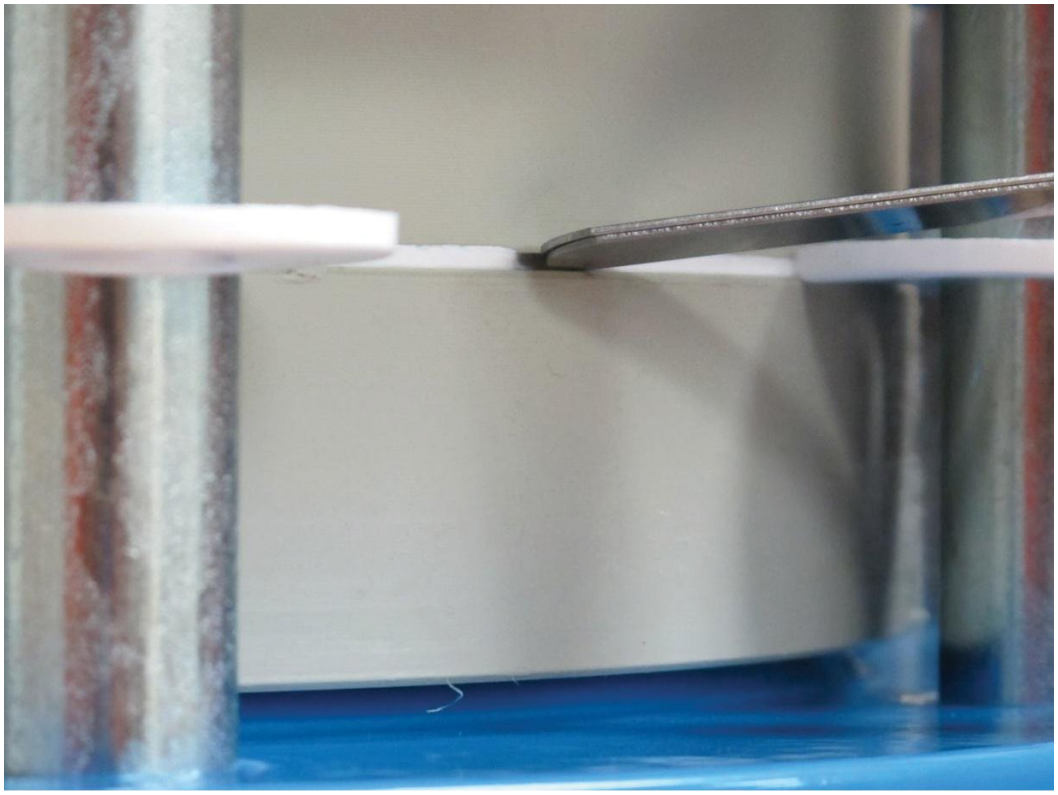
Note: Optimal results are obtained when KC Multi-Ring® gaskets are used in conjunction with KC Multi-Ring® AC backing flanges.

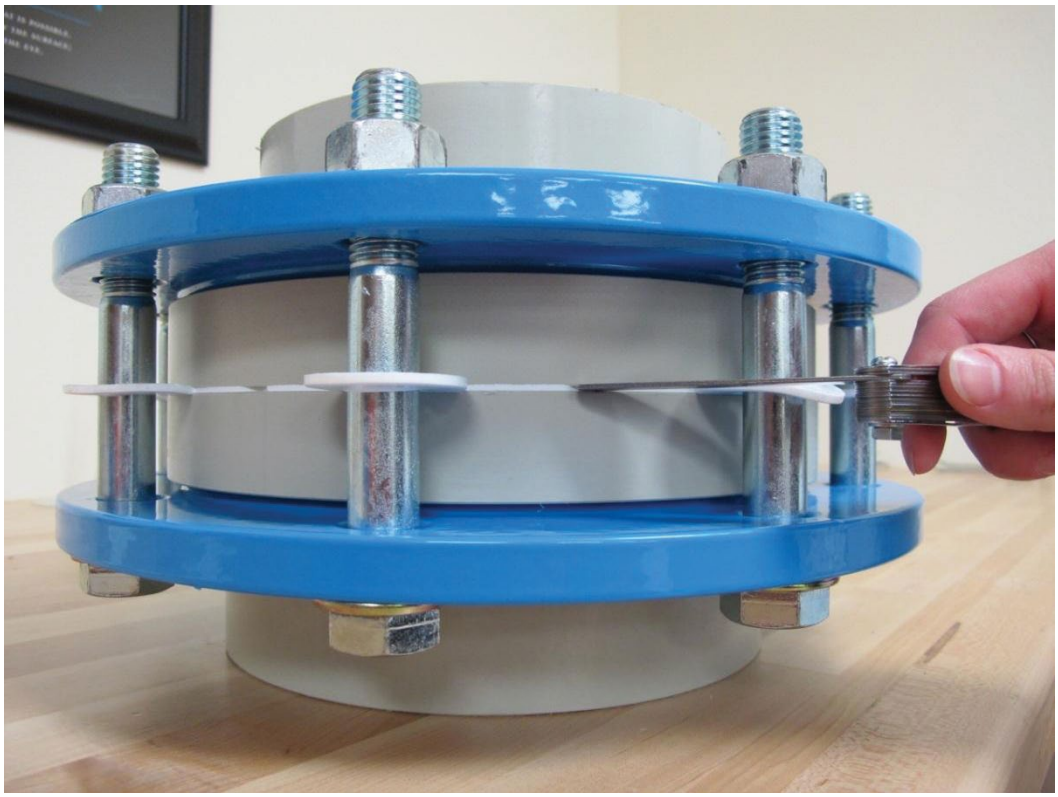
Relying on torque alone does not allow for all the variations that can happen in the field. Torque alone does not measure the force that is applied to the gasket. Variations in nuts and bolts, ability to access the flange fittings, tension due to slight misalignment all compromise being able to rely on torque alone as the measure of gasket compression. Using a feeler gauge on the KCMR Patented notch assures there has been enough force to cause the gasket to seal. A .125" ePTFE gasket needs to be compressed to less than .055/1000's to assure seal. Using the feeler gauge will avoid leaks at hydro-testing which are much harder to seal later.



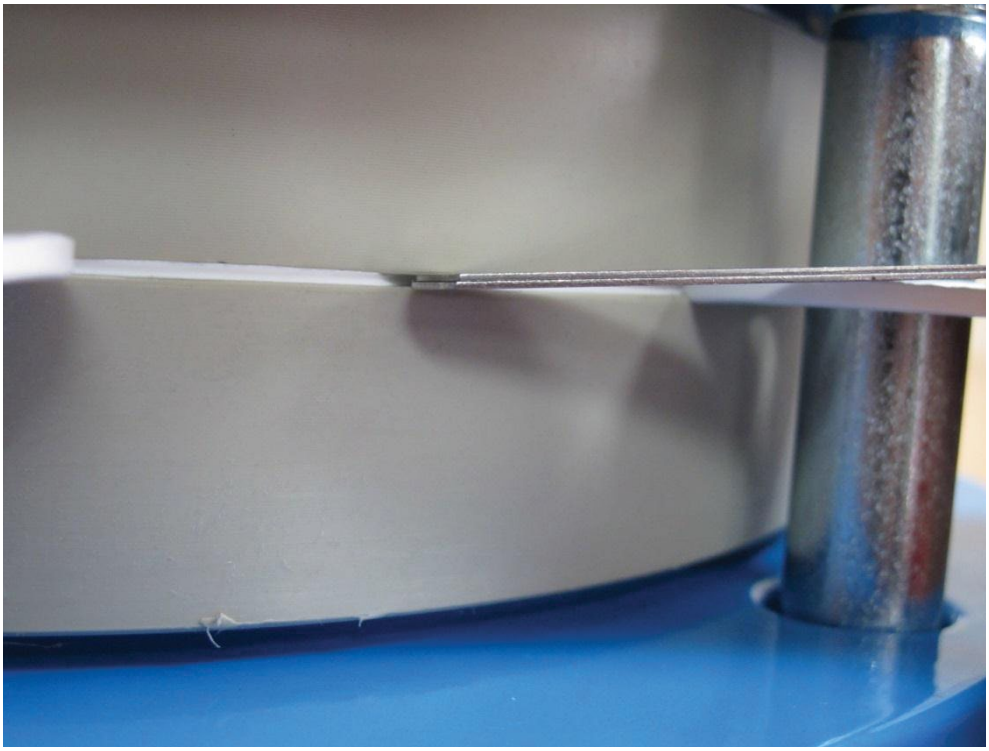


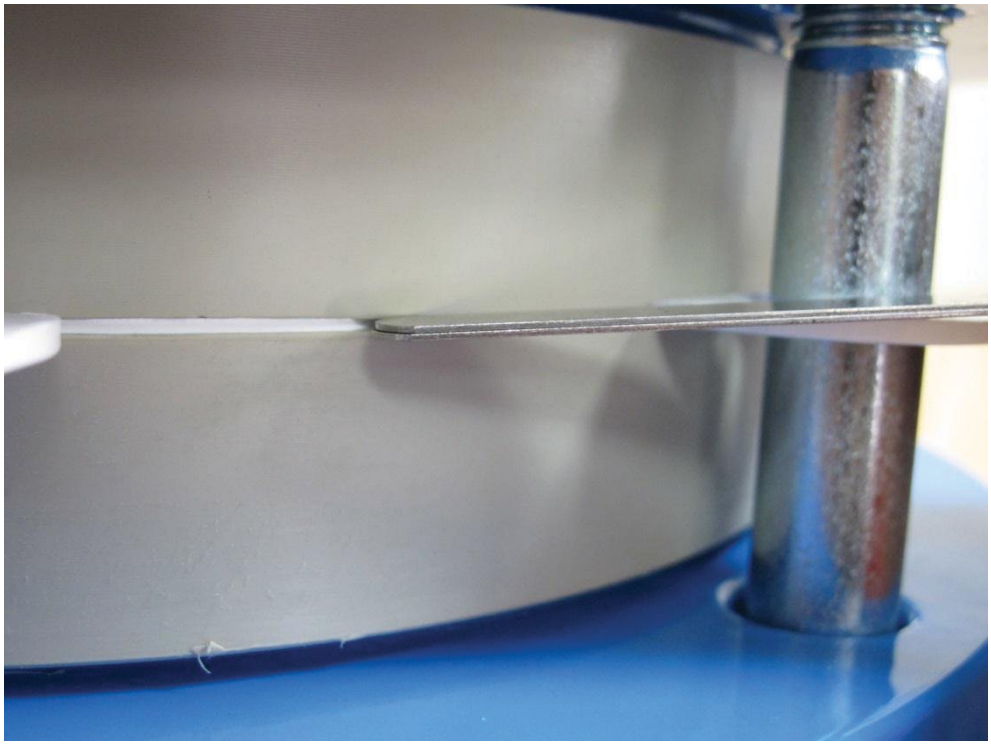
Install procedure for KCMR gasket





Install procedure for KCMR gasket





Install procedure for KCMR gasket

OPTIMUM AND MINIMUM TORQUE REQUIREMENTS FOR FLANGES WITH KC MULTI-RING® ULTRAPURE GASKETS

(33% - 66% - 100% values shown in parentheses)

PVDF AND POLYPROPYLENE PIPE FLANGES USING KC MULTI-RING BACKING FLANGES AND ZINC-PLATED SAE GRADE A-307 FASTENERS, WITH SAE HARDENED FLAT WASHERS ON BOTH SIDES; BELLEVILLE WASHERS CAN BE USED WITH, BUT DO NOT REPLACE, FLAT HARDENED WASHERS

			Torque (in foot-pounds) *Torque (in newton-meters)*			
SIZE	Bolt Size	Number of Bolts	Optimum Torque		Minimum Torque	
20mm	1/2"	4	**7** *10*	**(2/5/7)** *(3/6/10)*	**5** *7*	**(2/3/5)** *(2/5/7)*
25mm	1/2"	4	**9** *12*	**(3/6/9)** *(4/8/12)*	**7** *10*	**(2/5/7)** *(3/6/10)*
32mm	1/2"	4	**12** *16*	**(4/8/12)** *(5/11/16)*	**9** *12*	**(3/6/9)** *(4/8/12)*
40mm	1/2"	4	**20** *27*	**(7/13/20)** *(9/18/27)*	**15** *20*	**(5/10/15)** *(7/14/20)*
50mm	1/2"	4	**24** *33*	**(8/16/24)** *(11/22/33)*	**18** *24*	**(6/12/18)** *(8/16/24)*
63mm	5/8"	4	**30** *41*	**(10/20/30)** *(14/27/41)*	**22** *30*	**(7/15/22)** *(10/20/30)*
75mm	5/8"	4	**35** *47*	**(12/23/35)** *(16/32/47)*	**26** *35*	**(9/17/26)** *(12/23/35)*
90mm	5/8"	4	**40** *54*	**(13/27/40)** *(18/36/54)*	**30** *41*	**(10/20/30)** *(14/27/41)*
110mm	5/8"	8	**38** *52*	**(13/25/38)** *(17/34/52)*	**33** *45*	**(11/22/33)** *(15/30/45)*
160mm	3/4"	8	**65** *88*	**(22/44/65)** *(29/59/88)*	**44** *60*	**(15/30/44)** *(20/40/60)*
225mm	3/4"	8	**80** *108*	**(27/53/80)** *(36/72/108)*	**56** *76*	**(19/37/56)** *(25/51/76)*
250mm	7/8"	12	**131** *178*	**(44/87/131)** *(59/108/178)*	**100** *136*	**(33/68/100)** *(45/90/136)*
315mm	7/8"	12	**240** *326*	**(80/160/240)** *(108/216/326)*	**180** *244*	**(60/120/180)** *(81/162/244)*

NOTE: For speed and ease of installation, the KC Multi-Ring® SmartBox™ is calibrated to the recommended bolt torque for each pipe size, allowing the use of an electric impact wrench for the first 3 passes (a calibrated torque wrench is always used for the final Quality Control pass).

OPTIMUM AND MINIMUM TORQUE REQUIREMENTS FOR FLANGES WITH KC MULTI-RING® ULTRAPURE GASKETS

(33% - 66% - 100% values shown in parentheses)

PVDF AND POLYPROPYLENE PIPE FLANGES USING KC MULTI-RING BACKING FLANGES AND ZINC-PLATED SAE GRADE A-307 FASTENERS, WITH SAE HARDENED FLAT WASHERS ON BOTH SIDES; BELLEVILLE WASHERS CAN BE USED WITH, BUT DO NOT REPLACE, FLAT HARDENED WASHERS

			Torque (in foot-pounds) *Torque (in newton-meters)*	
SIZE	Bolt Size	Number of Bolts	Optimum Torque	Minimum Torque
355mm	1″	12	**311 (104/208/311)** *422 (141/281/1422)*	**232 (77/155/232)** *315 (105/210/315)*
400mm	1″	16	**280 (93/187/280)** *380 (127/253/380)*	**209 (70/139/209)** *284 (95/189/284)*
450mm	1 - 1/8″	20	**315 (105/210/315)** *428 (143/285/428)*	**235 (78/157/235)** *319 (106/213/319)*
500mm	1 - 1/8″	20	**297 (99/198/297)** *403 (134/269/403)*	**222 (74/148/222)** *301 (100/200/301)*

NOTE: For speed and ease of installation, the KC Multi-Ring® SmartBox™ is calibrated to the recommended bolt torque for each pipe size, allowing the use of an electric impact wrench for the first 3 passes (a calibrated torque wrench is always used for the final Quality Control pass).

OPTIMUM AND MINIMUM TORQUE REQUIREMENTS FOR STAINLESS STEEL FLANGES WITH KC MULTI-RING® SCHEDULE 10 ULTRAPURE GASKETS

(33% - 66% - 100% values shown in parentheses)

CONFIRM FLANGE FACES ARE TRANSVERSELY PARALLEL TO ONE ANOTHER BEFORE INSTALLING GASKET. USE ZINC OR CADMIUM PLATED FASTENERS WITH SAE HARDENED FLAT WASHERS ON BOTH SIDES; BELLEVILLE WASHERS CAN BE USED WITH, BUT DO NOT REPLACE, FLAT HARDENED WASHERS.

			Torque (in foot-pounds) *Torque (in newton-meters)*	
SIZE	Bolt Size	Number of Bolts	Optimum Torque	Minimum Torque
1/2"	1/2"	4	**10 (3/7/10)** *14 (5/9/14)*	**6 (2/4/6)** *8 (3/5/8)*
3/4"	1/2"	4	**14 (5/9/14)** *19 (6/13/19)*	**9 (3/6/9)** *12 (4/8/12)*
1"	1/2"	4	**19 (6/13/19)** *26 (9/17/26)*	**12 (4/8/12)** *16 (5/11/16)*
1 - 1/4"	1/2"	4	**28 (9/19/28)** *38 (13/25/38)*	**18 (6/12/18)** *25 (8/16/25)*
1 - 1/2"	1/2"	4	**38 (13/25/38)** *52 (17/34/52)*	**24 (8/16/24)** *33 (11/22/33)*
2"	5/8"	4	**76 (25/50/76)** *103 (34/68/103)*	**49 (16/32/49)** *67 (22/44/67)*
2 - 1/2"	5/8"	4	**88 (24/58/88)** *120 (40/79/120)*	**57 (19/38/57)** *78 (26/51/78)*
3"	5/8"	4	**130 (43/86/130)** *177 (58/117/177)*	**84 (28/55/84)** *114 (38/75/114)*
4"	5/8"	8	**92 (30/61/92)** *125 (41/83/125)*	**60 (20/40/60)** *82 (27/54/82)*
6"	3/4"	8	**174 (57/115/174)** *237 (78/156/237)*	**112 (37/74/112)** *152 (50/101/152)*
8"	3/4"	8	**235 (78/155/235)** *320 (106/211/320)*	**152 (50/100/152)** *207 (68/136/207)*
10"	7/8"	12	**223 (74/147/223)** *303 (100/200/303)*	**144 (48/95/144)** *196 (65/129/196)*
12"	7/8"	12	**297 (98/196/297)** *404 (133/267/404)*	**192 (63/127/192)** *261 (86/172/261)*

NOTE: Allow 2 minutes for initial creep and relaxation to occur the re-torque to final toque using a calibrated torque wrench for the final quality control pass. Confirm compressed gasket is maximum .055 inches installed thickness between each bolt using the KC Multi-Ring patented gauge notch. It is the installer's responsibility to confirm flanges and fasteners will handle the torque values.

OPTIMUM AND MINIMUM TORQUE REQUIREMENTS FOR STAINLESS STEEL FLANGES WITH KC MULTI-RING® SCHEDULE 10 ULTRAPURE GASKETS

(33% - 66% - 100% values shown in parentheses)

CONFIRM FLANGE FACES ARE TRANSVERSELY PARALLEL TO ONE ANOTHER BEFORE INSTALLING GASKET. USE ZINC OR CADMIUM PLATED FASTENERS WITH SAE HARDENED FLAT WASHERS ON BOTH SIDES; BELLEVILLE WASHERS CAN BE USED WITH, BUT DO NOT REPLACE, FLAT HARDENED WASHERS.

			Torque (in foot-pounds) *Torque (in newton-meters)*	
SIZE	Bolt Size	Number of Bolts	Optimum Torque	Minimum Torque
14″	1″	12	**370 (122/244/370)** *503 (166/332/503)*	**239 (79/158/239)** *325 (107/215/325)*
16″	1″	16	**351 (116/232/351)** *477 (158/315/477)*	**227 (75/150/227)** *309 (102/204/309)*
18″	1 - 1/8″	20	**536 (177/354/536)** *729 (241/481/729)*	**347 (115/229/347)** *472 (156/312/472)*
20″	1 - 1/8″	20	**473 (156/312/473)** *643 (212/425/643)*	**306 (101/202/306)** *416 (137/275/416)*

NOTE: Allow 2 minutes for initial creep and relaxation to occur the re-torque to final toque using a calibrated torque wrench for the final quality control pass. Confirm compressed gasket is maximum .055 inches installed thickness between each bolt using the KC Multi-Ring patented gauge notch. It is the installer's responsibility to confirm flanges and fasteners will handle the torque values.

INSTALLATION PROCEDURE FOR "BLIND" KC MULTI-RING® ULTRAPURE GASKETS

The gaskets will arrive cleaned and individually packaged in sealed bags. Each bag will be labeled with a part number which will correlate with pipe type(s) and dimension. Gaskets of similar size and type will be aggregated and packaged in a larger sealed bag, typically in groups of ten (10).

Installation

1. When installation is required, verify that the gasket is the proper size and flange type. When installing the gasket, installer shall wear appropriate garments to meet the appropriate clean zone protocol in effect at the time. Specifically, clean room gloves are to be worn at all times while handling gaskets.

2. While gasket is in the individually sealed bag, inspect for any surface deformations such as tears, rips, or non-uniform cuts. Any material defect of the inner surface is cause for rejection.

3. If a gasket is rejected due to a surface deformation, place aside for return and specify reason for rejection.

4. **Great care should be taken to protect the gasket surface from exposure to oil or other contaminants.**

5. Remove gasket from bag.

6. Immediately prior to installing, pay particular attention to the inner surface. **Do not wipe the surface with or expose the surface to IPA (Isopropyl Alcohol).**

7. Pay particular attention to keeping the gasket and flange adapters on the same axis (that is, geometrically centered).

8. Install all flanges using a calibrated torque wrench, or a KC Multi-Ring® SmartBox™. Whenever possible, apply the torque to the nut. Tighten the flanges in a star pattern to the following torque values using progressive 4-pass tightening. (Note that the pipe size and tightening sequence is cast into the face of the AC Backing Flange.) Following the star pattern, torque each nut to 33% of the desired torque value. Then re-torque to 66% of the desired torque value. Re-torque to 100% of the desired torque value. **Wait two minutes and re-torque to 100% value**. (Note for speed and ease of installation, the KC Multi-Ring® SmartBox™ is calibrated to the recommended bolt torque for each pipe size, allowing the use of an electric impact wrench for the first 3 passes - a calibrated torque wrench is always used for the final Quality Control pass.)

Special Note: If the gasket is to be installed on a plastic "blind" flange, install a KC Multi-Ring® **AC** backing flange behind the "blind" flange; this will prevent "dishing" of the plastic "blind" flange and subsequent leakage.

FASTENER LENGTH FOR ANSI PVDF FLANGES (PVDF Bolt Lengths)

								Flange to Flange		Flange to Valve	
"DIN" mm	ANSI inch	Bolt Hole #	Bolt Diameter inch	Bolt Size inch	SAE Washer Thickness inch	Gasket Thickness inch	Flange Face Thickness inch	Standard Duty Bolt Length inch	Heavy Duty Bolt Length inch	Standard Duty Bolt Length inch	Heavy Duty Bolt Length inch
20mm	1/2"	4	0.625	0.500	0.09375	0.125	0.245	2.50	2.5	1.5	1.5
25mm	3/4"	4	0.625	0.500	0.09375	0.125	0.286	2.50	2.5	1.5	1.5
32mm	1"	4	0.625	0.500	0.09375	0.125	0.286	2.50	2.5	1.5	1.5
40mm	1 ¼"	4	0.625	0.500	0.09375	0.125	0.327	2.50	2.5	1.5	1.5
50mm	1 ½"	4	0.625	0.500	0.09375	0.125	0.327	3.00	3.0	1.5	1.5
63mm	2"	4	0.750	0.625	0.09375	0.125	0.367	3.00	3.0	1.5	1.5
75mm	2 ½"	4	0.750	0.625	0.09375	0.125	0.408	3.00	3.0	1.5	1.5
90mm	3"	4	0.750	0.625	0.09375	0.125	0.490	-	3.5	-	1.5
110mm	4"	8	0.750	0.625	0.09375	0.125	0.531	-	3.5	-	2.0
125mm	5"	8	0.750	0.625	0.09375	0.125	0.571	-	4.0	-	2.0
140mm	5 ½"	8	0.750	0.625	0.09375	0.125	0.653	-	4.0	-	2.0
160mm	6"	8	0.875	0.750	0.140625	0.125	0.694	-	4.0	-	2.0
200mm	8"	8	0.875	0.750	0.140625	0.125	0.898	-	4.5	-	2.5
225mm	9"	8	0.875	0.750	0.140625	0.125	0.898	-	4.5	-	2.5
250mm	10"	12	1.000	0.875	0.140625	0.125	0.939	-	5.0	-	2.5
315mm	12"	12	1.000	0.875	0.140625	0.125	0.980	-	5.5	-	2.5
355mm	14"	16	1.125	1.000	0.140625	0.125	1.224	-	6.0	-	3.0
400mm	16"	16	1.125	1.000	0.140625	0.125	1.306	-	6.5	-	3.0
450mm	18"	20	1.250	1.125	0.140625	0.125	1.469	-	7.0	-	3.5

FASTENER LENGTH FOR ANSI POLYPROPYLENE FLANGES (Poly Pro PN10)

"DIN" mm	ANSI inch	Bolt Hole inch	Bolt Diameter inch	Bolt Size inch	SAE Washer Thickness (inch)	Gasket Thickness inch	Flange Face Thickness inch	Flange to Flange inch	Flange to Flange inch
20mm	1/2"	4	0.625	0.500	0.10	0.125	0.286	2.5	1.5
25mm	3/4"	4	0.625	0.500	0.10	0.125	0.367	3.0	1.5
32mm	1"	4	0.625	0.500	0.10	0.125	0.408	3.0	1.5
50mm	1 ½"	4	0.625	0.500	0.10	0.125	0.490	3.0	1.5
63mm	2"	4	0.750	0.625	0.12	0.125	0.571	3.5	2.0
90mm	3"	4	0.750	0.625	0.12	0.125	0.694	4.0	2.0
110mm	4"	8	0.750	0.625	0.12	0.125	0.735	4.0	2.0
160mm	6"	8	0.875	0.750	0.15	0.125	1.020	5.0	2.5
225mm	9"	8	0.875	0.750	0.15	0.125	1.306	5.5	2.5
250mm	10"	12	1.000	0.875	0.17	0.125	1.429	6.0	3.0
315mm	12"	12	1.000	0.875	0.17	0.125	1.429	6.5	3.0
355mm	14"	12	1.125	1.000	0.18	0.125	2.653	9.0	4.5
400mm	16"	16	1.125	1.000	0.18	0.125	2.816	9.5	5.0
450mm	18"	16	1.250	1.125	0.20	0.125	4.408	13.0	6.0
500mm	20"	20	1.250	1.125	0.20	0.125	3.673	12.0	6.0