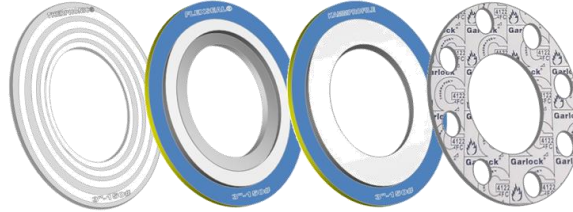


## Installation Guide for THERMa-PUR™ Gaskets (FLEXSEAL®, Kammprofile, THERPHONIC® & 4122-FC)



### Factors Affecting Gasket Performance

A gasket has one basic function: to create a positive seal between two relatively stationary parts. The gasket must do several different jobs well to function properly - first, create an initial seal; second, maintain the seal over a desired length of time; third, be easily removed and replaced. Varying degrees of success are dependent on how well the gasket does the following:

1. Seals system fluid.
2. Chemically resists the system fluid to prevent serious impairment of its physical properties.
3. Deforms enough to flow into the imperfections on the gasket seating surfaces to provide intimate contact between the gasket and the sealing surfaces.
4. Withstands system temperatures without serious impairments of its performance properties.
5. Is resilient and creep resistant enough to maintain an adequate portion of the applied load.
6. Has enough strength to resist crushing under the applied load and maintain its integrity when being handled and installed.
7. Does not contaminate the system fluid.
8. Does not promote corrosion of the gasket seating surfaces.
9. Is easily and cleanly removable at the time of replacement.

During the gasket selection process that follows, we recommend that these nine (9) factors be used as a checklist from the viewpoint of the user's degree of need for each factor and the manufacturer's degree of compliance.

## Installation

A few simple steps must be followed during installation to ensure optimum performance:

1. Verify the flange faces are clean, free of debris/fluids, and in good working condition (flat, aligned, no major defects, etc.).
  2. Check to ensure the face of the gasket (4122-FC), facing on the metal core (kammprofiles or corrugate metal gaskets) and/or windings (spiral wound gaskets) are not damaged.
  3. Center the gasket on the flange. This is extremely vital where raised faces are involved.
  4. NOTE: When using spiral wound gaskets make sure the windings are fully contacted by the flange faces (especially at the ID). Failure to do so could result in windings being “sprung or buckled” when compression is applied.
  5. Bolts/studs and nuts should be in good working order (ideally new) and turn together freely.
  6. Bolt/stud threads should be lubricated with a good quality thread lubricant and installed with at least one hardened flat washer under each nut being turned to reduce friction and optimize load translation.
  7. Finger-tighten and lightly snug all bolts/studs and nuts using a crossing pattern (see Figure 1) prior to beginning the torqueing process.
  8. Using a calibrated torque wrench, tighten the nuts in multiple steps using a crossing pattern (see Figure 1) to evenly compress the gasket.
  9. Once the final torque is achieved make a final pass at the final torque moving consecutively from bolt to bolt (see Figure 2).
  10. Retorque 12-24 hours after initial installation when possible (see Figure 2). For safety reasons, Garlock does not recommend retightening a flange connection once it is brought up to temperature and/or pressure. All applicable safety standards including lockout/tagout procedures should be observed.
- NOTE: Never use liquid or metallic based anti-stick or lubricating compounds on the gaskets. Premature failure could occur as a result.

### Correct Bolting Pattern

Figure 1 – Crossing Pattern

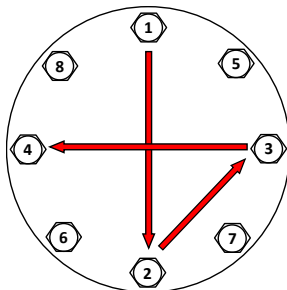
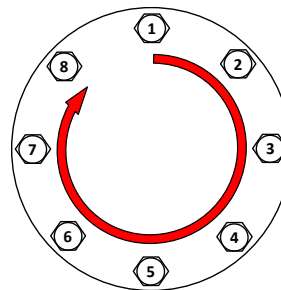


Figure 2 – Final Pass / Retorque





**Bolt Torque Values for THERMa-PUR™ Products in  
ASME B16.5 Raised Face Flanges with A193 Grade B7 Bolts**

**150# Raised Face Flanges**

Nominal Pipe Size (inches)	Number of Bolts	Size of Bolts (inches)	FLEXSEAL®		EDGE®		Kammprofile		THERPHONIC™		4122-FC	
			Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)
0.5	4	0.50	16	47	9	52	8	42	7	14	9	14
0.75	4	0.50	22	60	12	60	11	54	10	20	13	20
1	4	0.50	30	60	15	60	13	60	13	27	17	27
1.25	4	0.50	33	60	16	60	24	60	20	41	26	41
1.5	4	0.50	47	60	23	60	31	60	26	54	35	54
2	4	0.63	74	120	36	120	55	120	52	108	69	108
2.5	4	0.63	87	120	43	120	63	120	61	120	81	120
3	4	0.63	120	120	63	120	102	120	89	120	119	120
4	8	0.63	92	120	47	120	76	120	63	120	84	120
5	8	0.75	124	200	63	200	106	200	88	183	117	183
6	8	0.75	178	200	89	200	137	200	111	200	148	200
8	8	0.75	200	200	128	200	190	200	150	200	200	200
10	12	0.88	236	320	120	320	178	320	141	294	188	294
12	12	0.88	320	320	163	320	178	320	187	320	250	320
14	12	1.00	408	490	209	490	268	490	238	490	317	490
16	16	1.00	412	490	210	490	267	490	226	470	301	470
18	16	1.13	649	710	328	710	381	710	336	700	448	700
20	20	1.13	572	710	289	710	335	710	296	617	395	617
24	20	1.25	820	1000	415	1000	438	1000	422	880	563	880

Based on ASTM A193 B7 bolts - 60,000 psi maximum bolt stress

**300# Raised Face Flanges**

Nominal Pipe Size (inches)	Number of Bolts	Size of Bolts (inches)	FLEXSEAL®		EDGE®		Kammprofile		THERPHONIC™		4122-FC	
			Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)
0.5	4	0.50	16	47	9	52	8	42	9	14	12	14
0.75	4	0.63	28	84	15	88	14	68	16	25	21	25
1	4	0.63	38	114	19	115	17	84	21	33	28	33
1.25	4	0.63	41	120	20	120	30	120	33	51	43	51
1.5	4	0.75	66	198	32	191	43	200	48	75	64	75
2	8	0.63	37	112	18	109	27	120	35	54	46	54
2.5	8	0.75	48	145	24	144	35	177	45	71	60	71
3	8	0.75	71	200	35	200	57	200	66	104	88	104
4	8	0.75	103	200	52	200	84	200	94	147	125	147
5	8	0.75	124	200	63	200	106	200	117	183	156	183
6	12	0.75	118	200	60	200	92	200	99	154	131	154
8	12	0.88	194	320	98	320	146	320	154	240	205	240
10	16	1.00	206	490	105	490	155	490	164	256	219	256
12	16	1.13	309	710	156	710	171	710	239	373	319	373
14	20	1.13	269	710	138	710	177	710	209	326	287	326
16	20	1.25	399	1000	203	1000	259	1000	292	456	401	456
18	24	1.25	478	1000	241	1000	280	1000	330	515	439	515
20	24	1.25	526	1000	266	1000	308	1000	364	568	484	568
24	24	1.50	723	1600	366	1600	386	1600	497	775	662	775

Based on ASTM A193 B7 bolts - 60,000 psi maximum bolt stress



**Bolt Torque Values for THERMa-PUR™ Products in  
ASME B16.5 Raised Face Flanges with A193 Grade B7 Bolts**

**400# Raised Face Flanges**

Nominal Pipe Size (inches)	Number of Bolts	Size of Bolts (inches)	FLEXSEAL®		EDGE®		Kammprofile		THERPHONIC™		4122-FC	
			Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)
0.5	4	0.50	16	47	17	52	8	42	Contact Engineering	Contact Engineering		
0.75	4	0.63	28	84	29	88	14	68				
1	4	0.63	38	114	38	115	17	84				
1.25	4	0.63	41	120	40	120	30	120				
1.5	4	0.75	66	198	64	191	43	200				
2	8	0.63	37	112	36	109	27	120				
2.5	8	0.75	48	145	48	144	35	177				
3	8	0.75	71	200	71	200	57	200				
4	8	0.88	149	320	120	320	97	320				
5	8	0.88	190	320	146	320	123	320				
6	12	0.88	173	320	138	320	106	320				
8	12	1.00	280	490	229	490	170	490				
10	16	1.13	314	710	230	691	170	710				
12	16	1.25	456	1000	345	1000	188	941				
14	20	1.25	373	1000	304	911	195	975				
16	20	1.38	532	1360	445	1335	283	1360				
18	24	1.38	567	1360	527	1360	306	1360				
20	24	1.50	604	1600	563	1600	326	1600				
24	24	1.75	962	2887	975	2924	513	2566				

Based on ASTM A193 B7 bolts - 60,000 psi maximum bolt stress

**600# Raised Face Flanges**

Nominal Pipe Size (inches)	Number of Bolts	Size of Bolts (inches)	FLEXSEAL®		EDGE®		Kammprofile		THERPHONIC™		4122-FC	
			Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)
0.5	4	0.50	16	47	17	52	8	42	Contact Engineering	Contact Engineering		
0.75	4	0.63	28	84	29	88	14	68				
1	4	0.63	38	114	38	115	17	84				
1.25	4	0.63	41	120	40	120	30	120				
1.5	4	0.75	66	198	64	191	43	200				
2	8	0.63	37	112	36	109	27	120				
2.5	8	0.75	48	145	48	144	35	177				
3	8	0.75	71	200	71	200	57	200				
4	8	0.88	149	320	120	320	97	320				
5	8	1.00	221	490	170	490	143	490				
6	12	1.00	202	490	160	480	123	490				
8	12	1.13	307	710	251	710	187	710				
10	16	1.25	346	1000	254	763	188	938				
12	20	1.25	365	1000	276	829	151	753				
14	20	1.38	408	1224	332	996	213	1066				
16	20	1.50	514	1543	430	1291	274	1370				
18	20	1.63	757	2200	704	2112	409	2044				
20	24	1.63	695	2085	647	1941	375	1875				
24	24	1.88	1103	3308	1117	3350	588	2940				

Based on ASTM A193 B7 bolts - 60,000 psi maximum bolt stress



**Bolt Torque Values for THERMa-PUR™ Products in  
ASME B16.5 Raised Face Flanges with A193 Grade B7 Bolts**

**900# Raised Face Flanges**

Nominal Pipe Size (inches)	Number of Bolts	Size of Bolts (inches)	FLEXSEAL®		EDGE®		Kammprofile		THERPHONIC™		4122-FC	
			Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)
0.5	4	0.75	22	100	24	100	12	100	Contact Engineering	Contact Engineering		
0.75	4	0.75	31	100	33	100	15	100				
1	4	0.88	49	160	49	160	22	160				
1.25	4	0.88	53	160	52	160	39	193				
1.5	4	1.00	89	266	85	256	58	289				
2	8	0.88	48	160	47	160	35	176				
2.5	8	1.00	65	245	65	245	47	245				
3	8	0.88	106	319	81	244	66	328				
4	8	1.13	191	572	153	458	124	622				
5	8	1.25	268	804	206	617	173	865				
6	12	1.13	221	664	176	527	135	675				
8	12	1.38	333	1000	303	909	225	1127				
10	16	1.38	306	919	278	835	205	1026				
12	20	1.38	368	1103	302	907	165	824				
14	20	1.50	388	1164	321	963	206	1031				
16	20	1.63	514	1541	495	1485	315	1575				
18	20	1.88	991	2972	933	2800	542	2710				
20	20	2.00	934	2802	984	2952	570	2850				
24	20	2.50	1382	4400	1582	4747	833	4400				

Based on ASTM A193 B7 bolts - 60,000 psi maximum bolt stress

**1500# Raised Face Flanges**

Nominal Pipe Size (inches)	Number of Bolts	Size of Bolts (inches)	FLEXSEAL®		EDGE®		Kammprofile		THERPHONIC™		4122-FC	
			Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)
0.5	4	0.75	22	100	24	100	20	100	Contact Engineering	Contact Engineering		
0.75	4	0.75	31	100	33	100	25	100				
1	4	0.88	49	160	49	160	36	160				
1.25	4	0.88	80	240	52	160	64	193				
1.5	4	1.00	118	353	85	256	96	289				
2	8	0.88	76	227	47	160	59	176				
2.5	8	1.00	108	325	65	245	79	245				
3	8	1.13	150	451	104	355	140	419				
4	8	1.25	231	694	169	506	229	686				
5	8	1.50	323	970	218	800	305	915				
6	12	1.38	289	867	212	680	272	815				
8	12	1.63	432	1297	337	1100	418	1253				
10	12	1.88	754	2262	547	2000	673	2018				
12	16	2.00	647	2200	532	2200	484	2200				
14	16	2.25	684	3180	655	3180	701	3180				
16	16	2.50	1141	4400	969	4400	1027	4400				
18	16	2.75	1606	5920	1513	5920	1464	5920				
20	16	3.00	1921	7720	1810	7720	1748	7720				
24	16	3.50	3100	13000	2867	13000	2516	13000				

Based on ASTM A193 B7 bolts - 60,000 psi maximum bolt stress



**Bolt Torque Values for THERMa-PUR™ Products in  
ASME B16.5 Raised Face Flanges with A193 Grade B7 Bolts**

**2500# Raised Face Flanges**

Nominal Pipe Size (inches)	Number of Bolts	Size of Bolts (inches)	FLEXSEAL®		EDGE®		Kammprofile		THERPHONIC™		4122-FC	
			Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)	Minimum Torque (ft.lbs.)	Preferred Torque (ft.lbs.)
0.5	4	0.75	22	100	24	100	20	100				
0.75	4	0.75	31	100	33	100	25	100				
1	4	0.88	49	160	49	160	36	160				
1.25	4	1.00	93	279	60	245	75	245				
1.5	4	1.13	129	387	94	355	106	355				
2	8	1.00	88	264	55	245	68	245				
2.5	8	1.13	119	357	71	355	87	355				
3	8	1.25	166	500	115	500	154	500	Contact Engineering	Contact Engineering		
4	8	1.50	245	800	178	800	242	800				
5	8	1.75	430	1500	289	1500	406	1500				
6	8	2.00	611	2200	448	2200	574	2200				
8	12	2.00	548	2200	427	2200	529	2200				
10	12	2.50	831	4400	646	4400	794	4400				
12	12	2.75	1326	5920	963	5920	875	5920				

Based on ASTM A193 B7 bolts - 60,000 psi maximum bolt stress

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