

## Description of Bolt Torque Tables

Nominal Pipe Size (in)	Raised Face Contact I.D. (in)	Raised Face Contact O.D. (in)	Gasket Contact Area (sq.in.)	Number Of Bolts	Size of Bolts (in)	Bolt Torque at 60ksi Stress (ft.lbs.)	Comp Force Per Bolt @ 60ksi (psi)	Max. Gasket Stress Avail. (psi)	Internal Pressure (psig)	Min. Rec'd Gasket Stress (psi)	Min. Rec'd Torque/Bolt (ft.lbs.)	Max. Rec'd/Avail. Gasket Stress (psi)	Preferred Torque/Bolt (ft.lbs.)
0.5	0.84	1.38	0.94	4	0.5	60	7560	32134	<300	2500	5	15000	28
0.75	1.06	1.69	1.36	4	0.5	60	7560	22235	<300	2500	7	15000	40
1	1.31	2	1.79	4	0.5	60	7560	16867	<300	2500	9	15000	53
1.25	1.66	2.5	2.74	4	0.5	60	7560	11024	<300	2500	14	11024	60
1.5	1.91	2.88	3.65	4	0.5	60	7560	8291	<300	2500	18	8291	60
2	2.38	3.62	5.84	4	0.63	120	12120	8301	<300	2500	36	8301	120
2.5	2.88	4.12	6.81	4	0.63	120	12120	7115	<300	2500	42	7115	120
3	3.5	5	10.01	4	0.63	120	12120	4844	<300	2500	62	4844	120
Nominal pipe size (inches - actual line size	Contacted I.D. - inside diameter of the gasket (inches).	Contacted O.D. - outside diameter of the raised face portion of the flange (inches).	Gasket contact area (square inches) as defined by previous columns (1)	Number of bolts used	Size of bolts (inches)	Maximum torque per bolt at 60,000 psi bolt stress (foot pounds). See <i>Load on Stud Bolts Under Torque</i> table in the Engineered Gasketing Products catalog.	Compressive force per bolt at 60,000 psi bolt stress (pounds). See <i>Load on Stud Bolts Under Torque</i> table in the Engineered Gasketing Products catalog.	Maximum gasket compression available (psi). Based on 60,000 psi tensile stress in the bolts. (2)	Internal pressure rating (psig) of the piping system.	Garlock's minimum recommended gasket stress (psi) for GYLON, GRAPH-LOCK and compressed sheet products.	Minimum torque required per bolt (foot pounds) to arrive at the minimum gasket stress shown in the previous column. (3)	Maximum gasket stress recommended or available (psi). Garlock does not recommend exceeding 15,000 psi on GYLON, GRAPH-LOCK or compressed sheet materials. Therefore the maximum compression is based on 15,000 psi gasket stress or 60,000 psi bolt stress:	Maximum (preferred) torque required per bolt (foot pounds) to arrive at the maximum available / recommended gasket stress shown in the previous column. (4)

(1) See sample calculation #1    (2) See sample calculation #2    (3) See sample calculation #3    (4) See sample calculation #4

## Garlock Bolt Torque Values for .031" thick Compressed Sheet<sup>1</sup> & GYLON® Ring Gaskets - ANSI B16.5 Class 400# Flanges

NOTE: PLEASE CONSULT APPLICATIONS ENGINEERING WHEN USING NON-METALLIC GASKETS IN FLANGE CLASSES ABOVE 300#.

Nominal Pipe Size (in)	Raised Face Contact I.D. (in)	Raised Face Contact O.D. (in)	Gasket Contact Area (sq.in.)	Number Of Bolts	Size of Bolts (in)	Bolt Torque at 60ksi Stress (ft.lbs.)	Comp Force Per Bolt @ 60ksi (lbs.)	Max. Gasket Stress Avail. (psi)	Internal Pressure (psig)	Min. Rec'd Gasket Stress (psi)	Min. Rec'd Torque/Bolt (ft.lbs.)	Max. Rec'd/Avail. Gasket Stress (psi)	Preferred Torque/Bolt (ft.lbs.)
0.5	0.84	1.38	0.94	4	0.50	60	7560	32134	<1000	4800	9	15000	28
0.75	1.06	1.69	1.36	4	0.63	120	12120	35647	<1000	4800	16	15000	51
1	1.31	2.00	1.79	4	0.63	120	12120	27041	<1000	4800	21	15000	67
1.25	1.66	2.50	2.74	4	0.63	120	12120	17673	<1000	4800	33	15000	102
1.5	1.91	2.88	3.65	4	0.75	200	18120	19872	<1000	4800	48	15000	151
2	2.38	3.62	5.84	8	0.63	120	12120	16602	<1000	4800	35	15000	108
2.5	2.88	4.12	6.81	8	0.75	200	18120	21274	<1000	4800	45	15000	141
3	3.50	5.00	10.01	8	0.75	200	18120	14483	<1000	4800	66	14483	200
3.5	4.00	5.50	11.19	8	0.88	320	25140	17979	<1000	4800	85	15000	267
4	4.50	6.19	14.18	8	0.88	320	25140	14181	<1000	4800	108	14181	320
5	5.56	7.31	17.68	8	0.88	320	25140	11375	<1000	4800	135	11375	320
6	6.62	8.50	22.31	12	0.88	320	25140	13520	<1000	4800	114	13520	320
8	8.62	10.62	30.21	12	1.00	490	33060	13133	<1000	5000	187	13133	490
10	10.75	12.75	36.90	16	1.13	710	43680	18942	<1000	5400	202	15000	562
12	12.75	15.00	49.01	16	1.25	1000	55740	18196	<1000	5400	297	15000	824
14	14.00	16.25	53.43	20	1.25	1000	55740	20865	<1000	5400	259	15000	719
16	16.00	18.50	67.71	20	1.38	1360	69300	20471	<1000	5400	359	15000	997
18	18.00	21.00	91.85	24	1.38	1360	69300	18109	<1000	5400	406	15000	1127
20	20.00	23.00	101.27	24	1.50	1600	84300	19979	<1000	5400	432	15000	1201
24	24.00	27.25	130.75	24	1.75	3000	118800	21806	<1000	5600	770	15000	2064

NOTE: The values shown above are based on raised face metallic flanges. For lined and/or non-metallic raised face flanges consult the flange manufacturer to confirm the suitability of the values shown.

<sup>1</sup> The maximum recommended gasket stress on Multi-Swell™ 3760 is 10,000psi.

## Garlock Bolt Torque Values for .062" thick Compressed Sheet<sup>1</sup> & GYLON® Ring Gaskets - ANSI B16.5 Class 400# Flanges

NOTE: PLEASE CONSULT APPLICATIONS ENGINEERING WHEN USING NON-METALLIC GASKETS IN FLANGE CLASSES ABOVE 300#.

Nominal Pipe Size (in)	Raised Face Contact I.D. (in)	Raised Face Contact O.D. (in)	Gasket Contact Area (sq.in.)	Number Of Bolts	Size of Bolts (in)	Bolt Torque at 60ksi Stress (ft.lbs.)	Comp Force Per Bolt @ 60ksi (lbs.)	Max. Gasket Stress Avail. (psi)	Internal Pressure (psig)	Min. Rec'd Gasket Stress (psi)	Min. Rec'd Torque/Bolt (ft.lbs.)	Max. Rec'd/Avail. Gasket Stress (psi)	Preferred Torque/Bolt (ft.lbs.)
0.5	0.84	1.38	0.94	4	0.50	60	7560	32134	<1000	6200	12	15000	28
0.75	1.06	1.69	1.36	4	0.63	120	12120	35647	<1000	6200	21	15000	51
1	1.31	2.00	1.79	4	0.63	120	12120	27041	<1000	6400	28	15000	67
1.25	1.66	2.50	2.74	4	0.63	120	12120	17673	<1000	6400	43	15000	102
1.5	1.91	2.88	3.65	4	0.75	200	18120	19872	<1000	6400	64	15000	151
2	2.38	3.62	5.84	8	0.63	120	12120	16602	<1000	6400	46	15000	108
2.5	2.88	4.12	6.81	8	0.75	200	18120	21274	<1000	6400	60	15000	141
3	3.50	5.00	10.01	8	0.75	200	18120	14483	<1000	6400	88	14483	200
3.5	4.00	5.50	11.19	8	0.88	320	25140	17979	<1000	6400	114	15000	267
4	4.50	6.19	14.18	8	0.88	320	25140	14181	<1000	6400	144	14181	320
5	5.56	7.31	17.68	8	0.88	320	25140	11375	<1000	6400	180	11375	320
6	6.62	8.50	22.31	12	0.88	320	25140	13520	<1000	6400	151	13520	320
8	8.62	10.62	30.21	12	1.00	490	33060	13133	<1000	6400	239	13133	490
10	10.75	12.75	36.90	16	1.13	710	43680	18942	<1000	6400	240	15000	562
12	12.75	15.00	49.01	16	1.25	1000	55740	18196	<1000	6400	352	15000	824
14	14.00	16.25	53.43	20	1.25	1000	55740	20865	<1000	6600	316	15000	719
16	16.00	18.50	67.71	20	1.38	1360	69300	20471	<1000	6600	438	15000	997
18	18.00	21.00	91.85	24	1.38	1360	69300	18109	<1000	6400	481	15000	1127
20	20.00	23.00	101.27	24	1.50	1600	84300	19979	<1000	6400	513	15000	1201
24	24.00	27.25	130.75	24	1.75	3000	118800	21806	<1000	6400	880	15000	2064

NOTE: The values shown above are based on raised face metallic flanges. For lined and/or non-metallic raised face flanges consult the flange manufacturer to confirm the suitability of the values shown.

<sup>1</sup> The maximum recommended gasket stress on Multi-Swell™ 3760 is 10,000psi.

## Garlock Bolt Torque Values for .125" thick Compressed Sheet<sup>1</sup> & GYLON® Ring Gaskets - ANSI B16.5 Class 400# Flanges

NOTE: PLEASE CONSULT APPLICATIONS ENGINEERING WHEN USING NON-METALLIC GASKETS IN FLANGE CLASSES ABOVE 300#.

Nominal Pipe Size (in)	Raised Face Contact I.D. (in)	Raised Face Contact O.D. (in)	Gasket Contact Area (sq.in.)	Number Of Bolts	Size of Bolts (in)	Bolt Torque at 60ksi Stress (ft.lbs.)	Comp Force Per Bolt @ 60ksi (lbs.)	Max. Gasket Stress Avail. (psi)	Internal Pressure (psig)	Min. Rec'd Gasket Stress (psi)	Min. Rec'd Torque/Bolt (ft.lbs.)	Max. Rec'd/Avail. Gasket Stress (psi)	Preferred Torque/Bolt (ft.lbs.)
0.5	0.84	1.38	0.94	4	0.50	60	7560	32134	<1000	7200	13	15000	28
0.75	1.06	1.69	1.36	4	0.63	120	12120	35647	<1000	7200	24	15000	51
1	1.31	2.00	1.79	4	0.63	120	12120	27041	<1000	7400	33	15000	67
1.25	1.66	2.50	2.74	4	0.63	120	12120	17673	<1000	7400	50	15000	102
1.5	1.91	2.88	3.65	4	0.75	200	18120	19872	<1000	7400	74	15000	151
2	2.38	3.62	5.84	8	0.63	120	12120	16602	<1000	7400	53	15000	108
2.5	2.88	4.12	6.81	8	0.75	200	18120	21274	<1000	7400	70	15000	141
3	3.50	5.00	10.01	8	0.75	200	18120	14483	<1000	7400	102	14483	200
3.5	4.00	5.50	11.19	8	0.88	320	25140	17979	<1000	7400	132	15000	267
4	4.50	6.19	14.18	8	0.88	320	25140	14181	<1000	7400	167	14181	320
5	5.56	7.31	17.68	8	0.88	320	25140	11375	<1000	7400	208	11375	320
6	6.62	8.50	22.31	12	0.88	320	25140	13520	<1000	7400	175	13520	320
8	8.62	10.62	30.21	12	1.00	490	33060	13133	<1000	7400	276	13133	490
10	10.75	12.75	36.90	16	1.13	710	43680	18942	<1000	7400	277	15000	562
12	12.75	15.00	49.01	16	1.25	1000	55740	18196	<1000	7400	407	15000	824
14	14.00	16.25	53.43	20	1.25	1000	55740	20865	<1000	7600	364	15000	719
16	16.00	18.50	67.71	20	1.38	1360	69300	20471	<1000	7600	505	15000	997
18	18.00	21.00	91.85	24	1.38	1360	69300	18109	<1000	7400	556	15000	1127
20	20.00	23.00	101.27	24	1.50	1600	84300	19979	<1000	7400	593	15000	1201
24	24.00	27.25	130.75	24	1.75	3000	118800	21806	<1000	7400	1018	15000	2064

NOTE: The values shown above are based on raised face metallic flanges. For lined and/or non-metallic raised face flanges consult the flange manufacturer to confirm the suitability of the values shown.

<sup>1</sup> The maximum recommended gasket stress on Multi-Swell™ 3760 is 10,000psi.

## Garlock Bolt Torque Values for .031" thick Compressed Sheet<sup>1</sup> & GYLON® Ring Gaskets - ANSI B16.5 Class 600# Flanges

NOTE: PLEASE CONSULT APPLICATIONS ENGINEERING WHEN USING NON-METALLIC GASKETS IN FLANGE CLASSES ABOVE 300#.

Nominal Pipe Size (in)	Raised Face Contact I.D. (in)	Raised Face Contact O.D. (in)	Gasket Contact Area (sq.in.)	Number Of Bolts	Size of Bolts (in)	Bolt Torque at 60ksi Stress (ft.lbs.)	Comp Force Per Bolt @ 60ksi (lbs.)	Max. Gasket Stress Avail. (psi)	Internal Pressure (psig)	Min. Rec'd Gasket Stress (psi)	Min. Rec'd Torque/Bolt (ft.lbs.)	Max. Rec'd/Avail. Gasket Stress (psi)	Preferred Torque/Bolt (ft.lbs.)
0.5	0.84	1.38	0.94	4	0.50	60	7560	32134	<1500	7400	14	15000	28
0.75	1.06	1.69	1.36	4	0.63	120	12120	35647	<1500	7400	25	15000	50
1	1.31	2.00	1.79	4	0.63	120	12120	27041	<1500	7400	33	15000	67
1.25	1.66	2.50	2.74	4	0.63	120	12120	17673	<1500	7400	50	15000	102
1.5	1.91	2.88	3.65	4	0.75	200	18120	19872	<1500	7400	74	15000	151
2	2.38	3.62	5.84	8	0.63	120	12120	16602	<1500	7400	53	15000	108
2.5	2.88	4.12	6.81	8	0.75	200	18120	21274	<1500	7400	70	15000	141
3	3.50	5.00	10.01	8	0.75	200	18120	14483	<1500	7400	102	14483	200
3.5	4.00	5.50	11.19	8	0.88	320	25140	17979	<1500	7400	132	15000	267
4	4.50	6.19	14.18	8	0.88	320	25140	14181	<1500	7400	167	14181	320
5	5.56	7.31	17.68	8	1.00	490	33060	14959	<1500	7400	242	14959	490
6	6.62	8.50	22.31	12	1.00	490	33060	17779	<1500	7400	204	15000	413
8	8.62	10.62	30.21	12	1.13	710	43680	17352	<1500	7400	303	15000	614
10	10.75	12.75	36.90	16	1.25	1000	55740	24172	<1500	7400	306	15000	621
12	12.75	15.00	49.01	20	1.25	1000	55740	22745	<1500	7400	325	15000	659
14	14.00	16.25	53.43	20	1.38	1360	69300	25941	<1500	7400	388	15000	786
16	16.00	18.50	67.71	20	1.50	1600	84300	24902	<1500	7400	475	15000	964
18	18.00	21.00	91.85	20	1.63	2200	100800	21950	<1500	7400	742	15000	1503
20	20.00	23.00	101.27	24	1.63	2200	100800	23890	<1500	7400	681	15000	1381
24	24.00	27.25	130.75	24	1.88	4000	138240	25375	<1500	7400	1167	15000	2365

NOTE: The values shown above are based on raised face metallic flanges. For lined and/or non-metallic raised face flanges consult the flange manufacturer to confirm the suitability of the values shown.

<sup>1</sup> The maximum recommended gasket stress on Multi-Swell™ 3760 is 10,000psi.

## Garlock Bolt Torque Values for .062" thick Compressed Sheet<sup>1</sup> & GYLON® Ring Gaskets - ANSI B16.5 Class 600# Flanges

NOTE: PLEASE CONSULT APPLICATIONS ENGINEERING WHEN USING NON-METALLIC GASKETS IN FLANGE CLASSES ABOVE 300#.

Nominal Pipe Size (in)	Raised Face Contact I.D. (in)	Raised Face Contact O.D. (in)	Gasket Contact Area (sq.in.)	Number Of Bolts	Size of Bolts (in)	Bolt Torque at 60ksi Stress (ft.lbs.)	Comp Force Per Bolt @ 60ksi (lbs.)	Max. Gasket Stress Avail. (psi)	Internal Pressure (psig)	Min. Rec'd Gasket Stress (psi)	Min. Rec'd Torque/Bolt (ft.lbs.)	Max. Rec'd/Avail. Gasket Stress (psi)	Preferred Torque/Bolt (ft.lbs.)
0.5	0.84	1.38	0.94	4	0.50	60	7560	32134	<1500	8400	16	15000	28
0.75	1.06	1.69	1.36	4	0.63	120	12120	35647	<1500	8400	28	15000	50
1	1.31	2.00	1.79	4	0.63	120	12120	27041	<1500	8400	37	15000	67
1.25	1.66	2.50	2.74	4	0.63	120	12120	17673	<1500	8400	57	15000	102
1.5	1.91	2.88	3.65	4	0.75	200	18120	19872	<1500	8400	85	15000	151
2	2.38	3.62	5.84	8	0.63	120	12120	16602	<1500	8400	61	15000	108
2.5	2.88	4.12	6.81	8	0.75	200	18120	21274	<1500	8400	79	15000	141
3	3.50	5.00	10.01	8	0.75	200	18120	14483	<1500	8400	116	14483	200
3.5	4.00	5.50	11.19	8	0.88	320	25140	17979	<1500	8400	150	15000	267
4	4.50	6.19	14.18	8	0.88	320	25140	14181	<1500	8400	190	14181	320
5	5.56	7.31	17.68	8	1.00	490	33060	14959	<1500	8400	275	14959	490
6	6.62	8.50	22.31	12	1.00	490	33060	17779	<1500	8400	232	15000	413
8	8.62	10.62	30.21	12	1.13	710	43680	17352	<1500	8400	344	15000	614
10	10.75	12.75	36.90	16	1.25	1000	55740	24172	<1500	8400	348	15000	621
12	12.75	15.00	49.01	20	1.25	1000	55740	22745	<1500	8400	369	15000	659
14	14.00	16.25	53.43	20	1.38	1360	69300	25941	<1500	8400	440	15000	786
16	16.00	18.50	67.71	20	1.50	1600	84300	24902	<1500	8400	540	15000	964
18	18.00	21.00	91.85	20	1.63	2200	100800	21950	<1500	8400	842	15000	1503
20	20.00	23.00	101.27	24	1.63	2200	100800	23890	<1500	8400	774	15000	1381
24	24.00	27.25	130.75	24	1.88	4000	138240	25375	<1500	8400	1324	15000	2365

NOTE: The values shown above are based on raised face metallic flanges. For lined and/or non-metallic raised face flanges consult the flange manufacturer to confirm the suitability of the values shown.

<sup>1</sup> The maximum recommended gasket stress on Multi-Swell™ 3760 is 10,000psi.

## Garlock Bolt Torque Values for .125" thick Compressed Sheet<sup>1</sup> & GYLON® Ring Gaskets - ANSI B16.5 Class 600# Flanges

NOTE: PLEASE CONSULT APPLICATIONS ENGINEERING WHEN USING NON-METALLIC GASKETS IN FLANGE CLASSES ABOVE 300#.

Nominal Pipe Size (in)	Raised Face Contact I.D. (in)	Raised Face Contact O.D. (in)	Gasket Contact Area (sq.in.)	Number Of Bolts	Size of Bolts (in)	Bolt Torque at 60ksi Stress (ft.lbs.)	Comp Force Per Bolt @ 60ksi (lbs.)	Max. Gasket Stress Avail. (psi)	Internal Pressure (psig)	Min. Rec'd Gasket Stress (psi)	Min. Rec'd Torque/Bolt (ft.lbs.)	Max. Rec'd/Avail. Gasket Stress (psi)	Preferred Torque/Bolt (ft.lbs.)
0.5	0.84	1.38	0.94	4	0.50	60	7560	32134	<1500	9400	18	15000	28
0.75	1.06	1.69	1.36	4	0.63	120	12120	35647	<1500	9400	32	15000	50
1	1.31	2.00	1.79	4	0.63	120	12120	27041	<1500	9400	42	15000	67
1.25	1.66	2.50	2.74	4	0.63	120	12120	17673	<1500	9400	64	15000	102
1.5	1.91	2.88	3.65	4	0.75	200	18120	19872	<1500	9400	95	15000	151
2	2.38	3.62	5.84	8	0.63	120	12120	16602	<1500	9400	68	15000	108
2.5	2.88	4.12	6.81	8	0.75	200	18120	21274	<1500	9400	88	15000	141
3	3.50	5.00	10.01	8	0.75	200	18120	14483	<1500	9400	130	14483	200
3.5	4.00	5.50	11.19	8	0.88	320	25140	17979	<1500	9400	167	15000	267
4	4.50	6.19	14.18	8	0.88	320	25140	14181	<1500	9400	212	14181	320
5	5.56	7.31	17.68	8	1.00	490	33060	14959	<1500	9400	308	14959	490
6	6.62	8.50	22.31	12	1.00	490	33060	17779	<1500	9400	259	15000	413
8	8.62	10.62	30.21	12	1.13	710	43680	17352	<1500	9400	385	15000	614
10	10.75	12.75	36.90	16	1.25	1000	55740	24172	<1500	9400	389	15000	621
12	12.75	15.00	49.01	20	1.25	1000	55740	22745	<1500	9400	413	15000	659
14	14.00	16.25	53.43	20	1.38	1360	69300	25941	<1500	9400	493	15000	786
16	16.00	18.50	67.71	20	1.50	1600	84300	24902	<1500	9400	604	15000	964
18	18.00	21.00	91.85	20	1.63	2200	100800	21950	<1500	9400	942	15000	1503
20	20.00	23.00	101.27	24	1.63	2200	100800	23890	<1500	9400	866	15000	1381
24	24.00	27.25	130.75	24	1.88	4000	138240	25375	<1500	9400	1482	15000	2365

NOTE: The values shown above are based on raised face metallic flanges. For lined and/or non-metallic raised face flanges consult the flange manufacturer to confirm the suitability of the values shown.

<sup>1</sup> The maximum recommended gasket stress on Multi-Swell™ 3760 is 10,000psi.

## Garlock Bolt Torque Values for .031" thick Compressed Sheet<sup>1</sup> & GYLON® Ring Gaskets - ANSI B16.5 Class 900# Flanges

NOTE: PLEASE CONSULT APPLICATIONS ENGINEERING WHEN USING NON-METALLIC GASKETS IN FLANGE CLASSES ABOVE 300#.

Nominal Pipe Size (in)	Raised Face Contact I.D. (in)	Raised Face Contact O.D. (in)	Gasket Contact Area (sq.in.)	Number Of Bolts	Size of Bolts (in)	Bolt Torque at 60ksi Stress (ft.lbs.)	Comp Force Per Bolt @ 60ksi (lbs.)	Max. Gasket Stress Avail. (psi)	Internal Pressure (psig)	Min. Rec'd Gasket Stress (psi)	Min. Rec'd Torque/Bolt (ft.lbs.)	Max. Rec'd/Avail. Gasket Stress (psi)	Preferred Torque/Bolt (ft.lbs.)
0.5	0.84	1.38	0.94	4	0.75	200	18120	77020	<2250	7200	19	15000	39
0.75	1.06	1.69	1.36	4	0.75	200	18120	53294	<2250	7200	27	15000	56
1	1.31	2.00	1.79	4	0.88	320	25140	56089	<2250	7400	42	15000	86
1.25	1.66	2.50	2.74	4	0.88	320	25140	36659	<2250	7400	65	15000	131
1.5	1.91	2.88	3.65	4	1.00	490	33060	36257	<2250	7400	100	15000	203
2	2.38	3.62	5.84	8	0.88	320	25140	34436	<2250	7400	69	15000	139
2.5	2.88	4.12	6.81	8	1.00	490	33060	38815	<2250	7400	93	15000	189
3	3.50	5.00	10.01	8	0.88	320	25140	20094	<2250	7400	118	15000	239
4	4.50	6.19	14.18	8	1.13	710	43680	24640	<2250	7400	213	15000	432
5	5.56	7.31	17.68	8	1.25	1000	55740	25221	<2250	7400	293	15000	595
6	6.62	8.50	22.31	12	1.13	710	43680	23490	<2250	7400	224	15000	453
8	8.62	10.62	30.21	12	1.38	1360	69300	27530	<2250	7400	366	15000	741
10	10.75	12.75	36.90	16	1.38	1360	69300	30053	<2250	7400	335	15000	679
12	12.75	15.00	49.01	20	1.38	1360	69300	28278	<2250	7400	356	15000	721
14	14.00	16.25	53.43	20	1.50	1600	84300	31556	<2250	7600	385	15000	761
16	16.00	18.50	67.71	20	1.63	2200	100800	29776	<2250	7600	562	15000	1108
18	18.00	21.00	91.85	20	1.88	4000	138240	30103	<2250	7400	983	15000	1993
20	20.00	23.00	101.27	20	2.00	4400	159120	31426	<2250	7400	1036	15000	2100
24	24.00	27.25	130.75	20	2.50	8800	257520	39391	<2250	7400	1653	15000	3351

NOTE: The values shown above are based on raised face metallic flanges. For lined and/or non-metallic raised face flanges consult the flange manufacturer to confirm the suitability of the values shown.

<sup>1</sup> The maximum recommended gasket stress on Multi-Swell™ 3760 is 10,000psi.



## Garlock Bolt Torque Values for .062" thick Compressed Sheet<sup>1</sup> & GYLON® Ring Gaskets - ANSI B16.5 Class 900# Flanges

NOTE: PLEASE CONSULT APPLICATIONS ENGINEERING WHEN USING NON-METALLIC GASKETS IN FLANGE CLASSES ABOVE 300#.

Nominal Pipe Size (in)	Raised Face Contact I.D. (in)	Raised Face Contact O.D. (in)	Gasket Contact Area (sq.in.)	Number Of Bolts	Size of Bolts (in)	Bolt Torque at 60ksi Stress (ft.lbs.)	Comp Force Per Bolt @ 60ksi (lbs.)	Max. Gasket Stress Avail. (psi)	Internal Pressure (psig)	Min. Rec'd Gasket Stress (psi)	Min. Rec'd Torque/Bolt (ft.lbs.)	Max. Rec'd/Avail. Gasket Stress (psi)	Preferred Torque/Bolt (ft.lbs.)
0.5	0.84	1.38	0.94	4	0.75	200	18120	77020	<2250	8200	21	15000	39
0.75	1.06	1.69	1.36	4	0.75	200	18120	53294	<2250	8200	31	15000	56
1	1.31	2.00	1.79	4	0.88	320	25140	56089	<2250	8400	48	15000	86
1.25	1.66	2.50	2.74	4	0.88	320	25140	36659	<2250	8400	73	15000	131
1.5	1.91	2.88	3.65	4	1.00	490	33060	36257	<2250	8400	114	15000	203
2	2.38	3.62	5.84	8	0.88	320	25140	34436	<2250	8400	78	15000	139
2.5	2.88	4.12	6.81	8	1.00	490	33060	38815	<2250	8400	106	15000	189
3	3.50	5.00	10.01	8	0.88	320	25140	20094	<2250	8400	134	15000	239
4	4.50	6.19	14.18	8	1.13	710	43680	24640	<2250	8400	242	15000	432
5	5.56	7.31	17.68	8	1.25	1000	55740	25221	<2250	8400	333	15000	595
6	6.62	8.50	22.31	12	1.13	710	43680	23490	<2250	8400	254	15000	453
8	8.62	10.62	30.21	12	1.38	1360	69300	27530	<2250	8400	415	15000	741
10	10.75	12.75	36.90	16	1.38	1360	69300	30053	<2250	8400	380	15000	679
12	12.75	15.00	49.01	20	1.38	1360	69300	28278	<2250	8400	404	15000	721
14	14.00	16.25	53.43	20	1.50	1600	84300	31556	<2250	8600	436	15000	761
16	16.00	18.50	67.71	20	1.63	2200	100800	29776	<2250	8600	635	15000	1108
18	18.00	21.00	91.85	20	1.88	4000	138240	30103	<2250	8400	1116	15000	1993
20	20.00	23.00	101.27	20	2.00	4400	159120	31426	<2250	8400	1176	15000	2100
24	24.00	27.25	130.75	20	2.50	8800	257520	39391	<2250	8400	1877	15000	3351

NOTE: The values shown above are based on raised face metallic flanges. For lined and/or non-metallic raised face flanges consult the flange manufacturer to confirm the suitability of the values shown.

<sup>1</sup> The maximum recommended gasket stress on Multi-Swell™ 3760 is 10,000psi.

## Garlock Bolt Torque Values for .125" thick Compressed Sheet<sup>1</sup> & GYLON® Ring Gaskets - ANSI B16.5 Class 900# Flanges

NOTE: PLEASE CONSULT APPLICATIONS ENGINEERING WHEN USING NON-METALLIC GASKETS IN FLANGE CLASSES ABOVE 300#.

Nominal Pipe Size (in)	Raised Face Contact I.D. (in)	Raised Face Contact O.D. (in)	Gasket Contact Area (sq.in.)	Number Of Bolts	Size of Bolts (in)	Bolt Torque at 60ksi Stress (ft.lbs.)	Comp Force Per Bolt @ 60ksi (lbs.)	Max. Gasket Stress Avail. (psi)	Internal Pressure (psig)	Min. Rec'd Gasket Stress (psi)	Min. Rec'd Torque/Bolt (ft.lbs.)	Max. Rec'd/Avail. Gasket Stress (psi)	Preferred Torque/Bolt (ft.lbs.)
0.5	0.84	1.38	0.94	4	0.75	200	18120	77020	<2250	9200	24	15000	39
0.75	1.06	1.69	1.36	4	0.75	200	18120	53294	<2250	9200	35	15000	56
1	1.31	2.00	1.79	4	0.88	320	25140	56089	<2250	9400	54	15000	86
1.25	1.66	2.50	2.74	4	0.88	320	25140	36659	<2250	9400	82	15000	131
1.5	1.91	2.88	3.65	4	1.00	490	33060	36257	<2250	9400	127	15000	203
2	2.38	3.62	5.84	8	0.88	320	25140	34436	<2250	9400	87	15000	139
2.5	2.88	4.12	6.81	8	1.00	490	33060	38815	<2250	9400	119	15000	189
3	3.50	5.00	10.01	8	0.88	320	25140	20094	<2250	9400	150	15000	239
4	4.50	6.19	14.18	8	1.13	710	43680	24640	<2250	9400	271	15000	432
5	5.56	7.31	17.68	8	1.25	1000	55740	25221	<2250	9400	373	15000	595
6	6.62	8.50	22.31	12	1.13	710	43680	23490	<2250	9400	284	15000	453
8	8.62	10.62	30.21	12	1.38	1360	69300	27530	<2250	9400	464	15000	741
10	10.75	12.75	36.90	16	1.38	1360	69300	30053	<2250	9400	425	15000	679
12	12.75	15.00	49.01	20	1.38	1360	69300	28278	<2250	9400	452	15000	721
14	14.00	16.25	53.43	20	1.50	1600	84300	31556	<2250	9600	487	15000	761
16	16.00	18.50	67.71	20	1.63	2200	100800	29776	<2250	9600	709	15000	1108
18	18.00	21.00	91.85	20	1.88	4000	138240	30103	<2250	9400	1249	15000	1993
20	20.00	23.00	101.27	20	2.00	4400	159120	31426	<2250	9400	1316	15000	2100
24	24.00	27.25	130.75	20	2.50	8800	257520	39391	<2250	9400	2100	15000	3351

NOTE: The values shown above are based on raised face metallic flanges. For lined and/or non-metallic raised face flanges consult the flange manufacturer to confirm the suitability of the values shown.

<sup>1</sup> The maximum recommended gasket stress on Multi-Swell™ 3760 is 10,000psi.



To: Distribution

From: Applications  
Engineering

Re: Sample Torque Calculation

Date: January 14, 2000

***Sample Torque Calculation  
(Example based on 3"-150# raised face flanges  
and ASTM A193 B7 bolts)***

<u>Sample</u>	<u>Calculation</u>
# 1	<p><b>Gasket Contact Area</b> = Area of the raised face flange – Area of the gasket I.D.</p> <p><b>Gasket Contact Area</b> = <math>\pi (O.D.^2 - I.D.^2) \div 4</math></p> <p><b>Gasket Contact Area</b> = <math>\pi (5^2 - 3.5^2) \div 4</math></p> <p><b>Gasket Contact Area</b> = 10.01 in.<sup>2</sup></p>
# 2	<p><b>Maximum Gasket Compression Available</b> = (# of Bolts) x (Maximum Compressive Force per Bolt) <math>\div</math> (Gasket Contact Area).</p> <p><b>Max. Gasket Comp. Avail.</b> = (4 bolts) x (12,120 lbs/bolt) <math>\div</math> (10.01 in.<sup>2</sup>)</p> <p><b>Max. Gasket Comp. Avail.</b> = 4,844 psi</p>
# 3	<p><b>Minimum Torque recommended per Bolt</b> = (Minimum Recommended Gasket Compression) <math>\div</math> (Maximum Gasket Compression Available) x (Maximum Torque per Bolt @ 60ksi Bolt Stress)</p> <p><b>Minimum Torque recommended per Bolt</b> = (2,500 psi) <math>\div</math> (4,844 psi) x (120 ft.lbs.)</p> <p><b>Minimum Torque recommended per Bolt</b> = 62 ft.lbs.</p>
# 4	<p>Neither 15,000 psi compressive stress on the gasket (crush point) or 60,000 psi bolt stress (60% of bolt yield for a A193 B7 bolt) should be exceeded. The preferred torque is identical to the bolt torque available at 60,000 psi bolt stress unless this value generates a compressive stress on the gasket greater than 15,000 psi. Where this occurs, the preferred torque is calculated as follows:</p> <p><b>Preferred Torque</b> = (15,000 psi gasket stress) <math>\div</math> (Maximum Gasket Stress Available) x (Bolt Torque Available @ 60 ksi Bolt Stress).</p>



***Qualification Statement for the use of Garlock Bolt Torque Tables - 600# - 900# Class Flanges with Compressed Sheet, GYLON® or HOCHDRUCK® Style 3128 Ring Gaskets***

NOTE: The compressive stress and pressure rating of the gasketing materials may be exceeded with the higher flange class ratings. Please consult Applications Engineering for assistance.

- These bolt torque tables are only to be used as a general guide. They should not be considered to contain absolute values due to the large number of uncontrollable variables involved with bolted joints.
- The tables were developed to be used with all of our IFG, BLUE-GARD, HTC, G-9900, ST-706, HOCHDRUCK® 3128 and GYLON® Styles. NOTE: The pressure rating of the gasketing materials may be exceeded with the higher flange class ratings.
- All bolt torque values are based upon the use of new nuts (A194 Grade 2H) and new bolts (A193 Grade B7) of proper design, acceptable quality and approved materials of construction as well as metallurgy. It is also required that two hardened steel flat washers be used under each nut and that a lubricant be used on the nuts, bolts and washers, but **not on the gasket**.
- The contact dimensions used to calculate the gasket area are based on the I.D. of the gasket, per ANSI B16.21, and the O.D. of the raised face of the flange.
- The flanges are assumed to be in good condition and in compliance with ANSI B16.5 or B16.47 specifications. Special attention with respect to the seating surface finish and flatness should be given.
- The relationship between the bolt torque values and their transmitted loads is taken from the bolt tables listed in the Engineered Gasketing Products catalog.
- Only torque wrenches that have been calibrated shall be used. The proper bolt tightening pattern must be followed (see Installation Instructions section of the Engineered Gasketing Products catalog for proper bolting pattern) with the desired ultimate torque value arrived at in a minimum of three even increments. All bolts in the flanges should then be checked in consecutive order in a counter-clockwise direction.
- The ring contact dimensions listed are the actual flange raised face dimensions which are different from the ANSI ring gasket dimensions.
- No provisions have been made in these tables to account for vibration effects on the bolts. These tables are not compensated for elevated or fluctuating temperatures,