Triangle Fluid Controls Ltd.®

www.TriangleFluid.com

Metallic Gasket Handbook

Products

- Spiral Wound Gaskets (SWG)
- Ring Type Joint Gaskets (RTJ)
- Corrugated Flexible Graphite (CFG)
- Durtec™
- Kammprofile

DURLON® SEALING PRODUCTS

Our Sealing Products

Durlon® Sealing products have the widest possible range of service applications, therefore, the number of different types of gaskets required to be inventoried can be greatly reduced. This impacts process safety because limiting the number of gasket styles reduces the chance of installing the wrong gasket in the wrong service. For these reasons, more and more original equipment manufacturers and industrial consumers are specifying Durlon® gasket materials for their needs.

Durlon® products are used in virtually every industrialized corner of the world. Our gasket materials are manufactured to IS0 9001 quality standards and are subjected to continuous testing and rigid quality control. This ensures unvarying performance on the job.

Our state-of-the-art research and development facility is geared to meet the ever-changing demands required in today's variety of service conditions. Since their inception, Durlon® gasket materials have undergone many enhancements, each incorporating the latest technology to better meet the wide variety of industry's changing needs.

Triangle Fluid Controls Ltd. recognizes that today more emphasis is being placed on fugitive emissions via the Clean Air Act in Canada and the United States, and various regulations in other countries. Therefore one of our prime design objectives is to maximize the sealability of our gasket materials to meet fugitive emission requirements.

TFC's Quality Policy

We will strive to provide our customers and industry with quality products and superior service. We will accomplish this by:

- Our commitment to understanding and meeting or exceeding our customers expectations and requirements;
- Continual improvement of our products, services and processes
- Remembering that we are here because of our customers!

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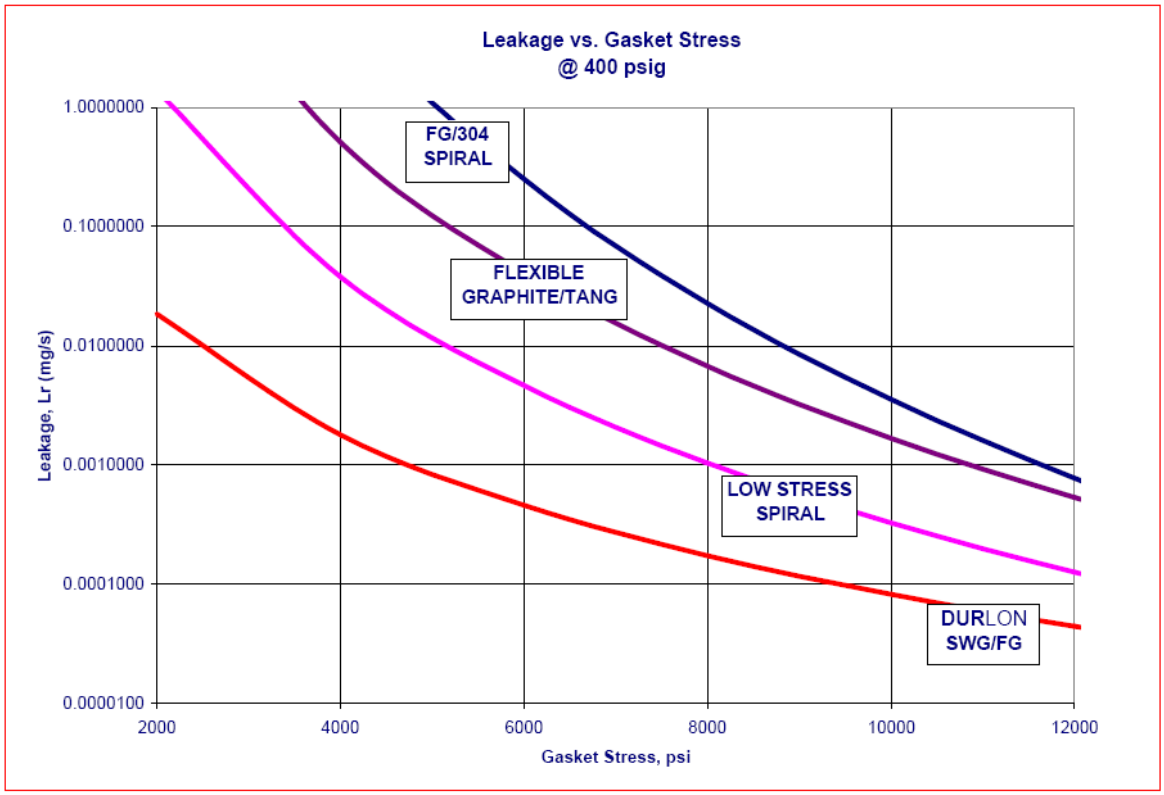
DURLON® Spiral Wound Gaskets

The Durlon® Advantage

Durlon® Spiral Wound Gaskets (SWG) are made with an alternating combination of a preformed engineered metal strip and a more compressible filler material which creates an excellent seal when compressed. The engineered shape of the metal strip acts as a spring under load, resulting in a very resilient seal under varying conditions. The strip metallurgy and filler material can be selected to seal a wide range of applications. All Durlon® SWG styles have been engineered to precise manufacturing tolerances that allow for lower stress (bolt load) sealing compared to conventional spiral wound gaskets. All Durlon® SWGs are manufactured according to ASME B16.20 standards. Quality Assurance complies with API Specification Q1 and ISO 9001 standards.

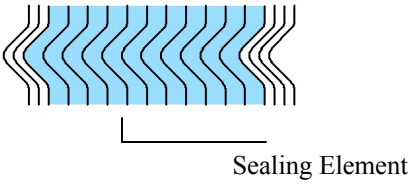
Trusted Durlon® Performance

Durlon® SWGs obtain their initial seal with very low seating stresses and provide a tighter seal than typical low stress spiral wound gaskets and other high temperature alternative gaskets. Our advanced manufacturing process allows all Durlon® SWGs to perform better under low bolt stress applications while maintaining seal integrity under normal spiral wound gasket conditions.



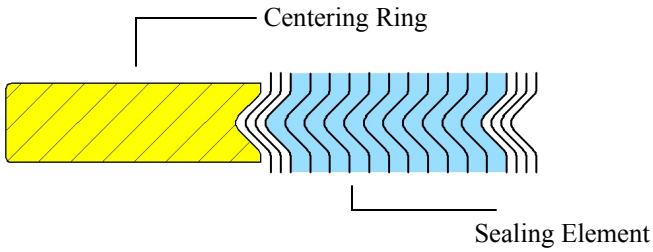
Style D

- Sealing element only consisting of preformed engineered metal and more compressible filler material
- Commonly used in tongue and groove or male and female flanges
- Can also be supplied with an inner ring as Style DI



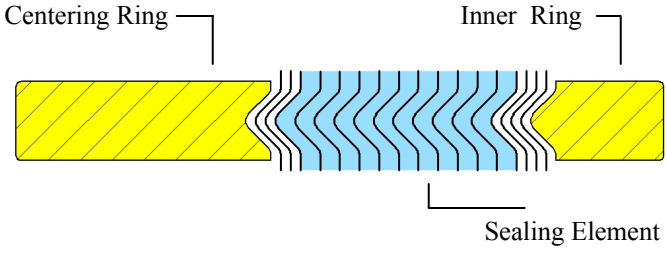
Style DR

- Sealing element (D) combined with a centering ring (R) which reinforces the gasket and acts as a compression stop
- Commonly used with standard raised face and full face type flanges
- Centering ring is electroplated with zinc (silver in color) which provides superior corrosion resistance compared to powder or liquid coating and facilitates easier identification of the gasket



Style DRI

- Sealing element (D) combined with a centering ring (R) and an inner ring (I) which improves radial strength and protects the sealing element from erosion and inward bucking
- Commonly used with standard raised face and full face type flanges
- Inner rings are recommended for all spiral wound gaskets bur are mandatory (ASME Bl6.20-2007) for all PTFE filled gaskets, NSP 24" and larger Class 900, NSP 12" , larger Class 1500 and NPS 4" and larger Class 2500

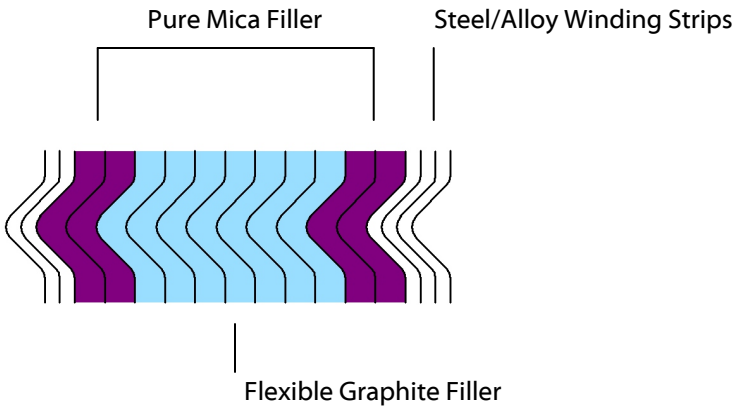


Enhanced Mica-Graphite Technology

Traditional mica-graphite filler is only a blend of graphite and mica materials which only moderately improves upper temperature limits over conventional graphite filler.

Durlon® mica-graphite filled spiral wound gaskets are made with graphite filler layers surrounded by pure mica filler layers. This construction method enhances gasket performance in many ways without the added expense of special filler materials offered by competing brands.

- Pure mica layers protect graphite from rapid oxidation at high temperatures
- Mica offers enhanced fire protection
- Maintains original ASME B16.20 “pink strip” filler marking
- Eliminates the need for many high-temperature and high-cost special gaskets



Dimensions for Spiral Wound Gaskets used with ASME B16.5 Flanges

Table 1

FLANGE SIZE (NPS)	WINDINGS OD[2]		DURLON SWG STYLE DR BY PRESSURE CLASS[1][5]														DURLON SWG STYLE DRI BY PRESSURE CLASS[6]						
	CLASS 150, 300 400, 600	CLASS 900, 1500 2500	150		300		400[3]		600		900[3][4]		1500[4]		2500[3][4]		150	300	400[3]	600	900[3][4]	1500[4]	2500[3][4]
			ID	OD	ID	OD	ID	OD	ID	OD	ID	OD	ID	OD	ID	OD	ID	ID	ID	ID	ID	ID	ID
½	1.25	1.25	0.75	1.88	0.75	2.13	—	—	0.75	2.13	—	—	0.75	2.50	0.75	2.75	0.56	0.56	—	0.56	—	0.56	0.56
¾	1.56	1.56	1.00	2.25	1.00	2.63	—	—	1.00	2.63	—	—	1.00	2.75	1.00	3.00	0.81	0.81	—	0.81	—	0.81	0.81
1	1.88	1.88	1.25	2.63	1.25	2.88	—	—	1.25	2.88	—	—	1.25	3.13	1.25	3.38	1.06	1.06	—	1.06	—	1.06	1.06
1 ¼	2.38	2.38	1.88	3.00	1.88	3.25	—	—	1.88	3.25	—	—	1.56	3.50	1.56	4.13	1.50	1.50	—	1.50	—	1.31	1.31
1 ½	2.75	2.75	2.13	3.38	2.13	3.75	—	—	2.13	3.75	—	—	1.88	3.88	1.88	4.63	1.75	1.75	—	1.75	—	1.63	1.63
2	3.38	3.38	2.75	4.13	2.75	4.38	—	—	2.75	4.38	—	—	2.31	5.63	2.31	5.75	2.19	2.19	—	2.19	—	2.06	2.06
2 ½	3.88	3.88	3.25	4.88	3.25	5.13	—	—	3.25	5.13	—	—	2.75	6.50	2.75	6.63	2.62	2.62	—	2.62	—	2.50	2.50
3	4.75	4.75	4.00	5.38	4.00	5.88	—	—	4.00	5.88	3.75	6.63	3.63	6.88	3.63	7.75	3.19	3.19	—	3.10	3.10	3.10	3.10
4	5.88	5.88	5.00	6.88	5.00	7.13	4.75	7.00	4.75	7.63	4.75	8.13	4.63	8.25	4.63	9.25	4.19	4.19	4.04	4.04	4.04	3.85	3.85
5	7.00	7.00	6.13	7.75	6.13	8.50	5.81	8.38	5.81	9.50	5.81	9.75	5.63	10.00	5.63	11.00	5.19	5.19	5.05	5.05	5.05	4.90	4.90
6	8.25	8.25	7.19	8.75	7.19	9.88	6.88	9.75	6.88	10.50	6.88	11.38	6.75	11.13	6.75	12.50	6.19	6.19	6.10	6.10	6.10	5.80	5.80
8	10.38	10.13	9.19	11.00	9.19	12.13	8.88	12.00	8.88	12.63	8.75	14.13	8.50	13.88	8.50	15.25	8.50	8.50	8.10	8.10	7.75	7.75	7.75
10	12.50	12.25	11.31	13.38	11.31	14.25	10.81	14.13	10.81	15.75	10.88	17.13	10.50	17.13	10.63	18.75	10.56	10.56	10.05	10.05	9.69	9.69	9.69
12	14.75	14.50	13.38	16.13	13.38	16.63	12.88	16.50	12.88	18.00	12.75	19.63	12.75	20.50	12.50	21.63	12.50	12.50	12.10	12.10	11.50	11.50	11.50
14	16.00	15.75	14.63	17.75	14.63	19.13	14.25	19.00	14.25	19.38	14.00	20.50	14.25	22.75	—	—	13.75	13.75	13.50	13.50	12.63	12.63	—
16	18.25	18.00	16.63	20.25	16.63	21.25	16.25	21.13	16.25	22.25	16.25	22.63	16.00	25.25	—	—	15.75	15.75	15.35	15.35	14.75	14.50	—
18	20.75	20.50	18.69	21.63	18.69	23.50	18.50	23.38	18.50	24.13	18.25	25.13	18.25	27.75	—	—	17.69	17.69	17.25	17.25	16.75	16.75	—
20	22.75	22.50	20.69	23.88	20.69	25.75	20.50	25.50	20.50	26.88	20.50	27.50	20.25	29.75	—	—	19.69	19.69	19.25	19.25	19.00	18.75	—
24	27.00	26.75	24.75	28.25	24.75	30.50	24.75	30.25	24.75	31.13	24.75	33.00	24.25	35.50	—	—	23.75	23.75	23.25	23.25	23.25	22.75	—

Notes:

1. The gasket inside diameter tolerance for NPS 1/2 through NPS 8 is ±0.016in.: for NPS 24, ±0.03 in.
2. The gasket outside diameter tolerance for NPS 1/2 through NPS 8 is ±0.03 in. for NPS 10 through 24 ±0.03in.,
3. There are no Class 400 flanges in NPS 1/2 through NPS 3 (use Class 600), Class 900 flanges in NPS 1/2 through NPS 2-1/2 (uses Class 1500), or Class 2500 flanges NPS 14 and larger.
4. Inner rings are required for all PTFE filled gaskets and for Class 900 gaskets, NPS 24; Class 1500 gaskets, NPS 12 through 24; and Class 2500 gaskets, NPS 4 through NPS 12
5. The centering ring outside diameter tolerance is ±0.03 in.
6. For sizes NPS 1-1/4 through NPS 3, the inside diameter tolerance is ±0.03 in.; for larger sizes the inside diameter tolerance is ±0.06in.
7. Adapted from ASME B16.20-2007 Table 9 and Table 12

Ring Type Joint Gaskets

Durlon® RTJ gaskets are precision machined from solid metal and are designed for high pressure and high temperature services. They seal by creating very high unit load, metal-to-metal line contact with special mating flanges. Metals are typically chosen such that the ring joint gasket is softer than the flange material in order to prevent damage to the flanges and thereby causing plastic flow of the gasket into the flange faces. The design of the gasket or cross section is chosen based on the existing flange configuration and designed maximum system pressure. Gasket and flange surface finishes and dimensional accuracy along with gasket hardness must be carefully controlled in order to obtain and maintain an effective seal.

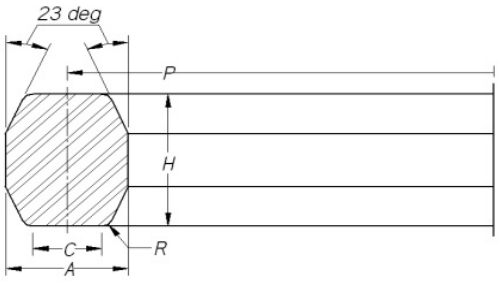
Durlon® RTJ Characteristics

- All gaskets are completely identified with low-stress permanent markings indicating style, ring number, material, and applicable standard
- All gaskets fully comply with the ASME B16.20 standard and the API spec 6A (where applicable)
- All materials are fully traceable and documentation can be supplied upon request
- Material hardness is carefully controlled which ensures a good seal without damaging the surfaces of the flanges
- RTJ gaskets can withstand aggressive chemicals and temperatures up to 1,000ºC with properly selected metal
- All gaskets have a thin protective coating to eliminate oxidation effects due to atmospheric contact

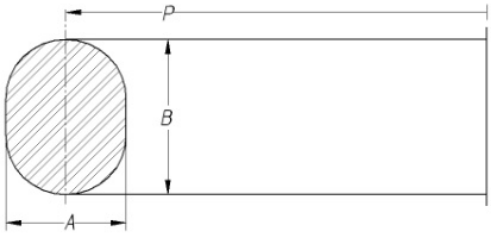
Style R

- Available in oval and octagonal cross-sections
- Durlon® Style R gaskets are interchangeable on modern octagonal flat bottom grooved flanges
- Standard sizes of Style R gaskets are manufactured in accordance with ASME B16.20 and API 6A specifications.

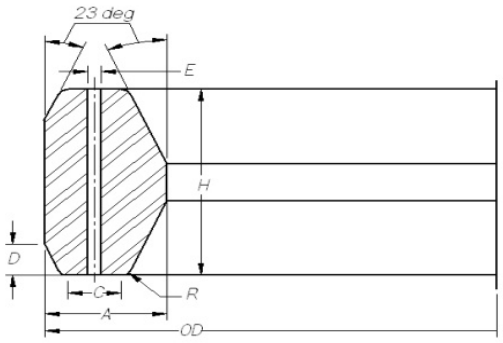
Style R Octagonal



Style R Oval

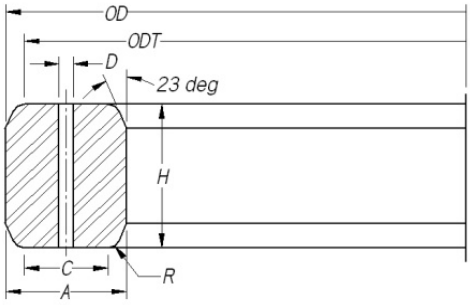


Style RX



- The Durlon® Style RX ring joint has a unique self-sealing action. The outside levels of the ring make the initial contact providing a seal against the grooves outer surfaces. As the internal pressure increases, so does the gasket loading stress against the groove thus improving the gaskets sealing characteristics
- Design features of the Style RX gasket make it more resistant to shock load, test pressure shock, and drilling vibration
- Style RX ring joints are completely interchangeable with standard Style R groove designs. Care should be taken when interchanging these styles as Style RX gaskets are taller and will add length to the finished assembly

Style BX



- Durlon® Style BX gaskets have a pitch diameter slightly larger than the groove pitch diameter. This allows for initial contact to be made on the outside of the ring, pre-loading the gasket which creates a pressure energized seal
- All Durlon® Style BX gaskets incorporate a pressure passage to enable trapped pressure to balance itself in the joint
- Style BX ring joint gaskets can only be used with API BX flanges and are not interchangeable with style RX

Dimensions for Ring Type Joint Gaskets Style R (mm)

Table 2

RING NO.	PRESSURE CLASS RATING (PSI)							PITCH DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING		GASKET WEIGHTS, kg.	
	ANSI, BS & MSS					API (PSI)							
	150	300/600	900	1500	2500	2000/ 3000	5000			OVAL	OCTAGONAL	OVAL	OCTAGONAL
	NOMINAL PIPE SIZE (INCHES)							P	A	B	H		
R11	-	0.5	-	-	-	-	-	34.13	6.35	11.1	9.5	0.111	0.104
R12	-	-	0.5	0.5	-	-	-	39.69	7.95	14.3	12.7	0.216	0.2
R13	-	0.75	-	-	0.5	-	-	42.86	7.95	14.3	12.7	0.234	0.216
R14	-	-	0.75	0.75	-	-	-	44.45	7.95	14.3	12.7	0.242	0.224
R15	1.0	-	-	-	-	-	-	47.63	7.95	14.3	12.7	0.26	0.24
R16	-	1.0	1.0	1.0	0.75	-	-	50.8	7.95	14.3	12.7	0.278	0.256
R17	1.25	-	-	-	-	-	-	57.15	7.95	14.3	12.7	0.311	0.328
R18	-	1.25	1.25	1.25	1.0	-	-	60.33	7.95	14.3	12.7	0.328	0.304
R19	1.5	-	-	-	-	-	-	65.09	7.95	14.3	12.7	0.354	0.328
R20*	-	1.5	1.5	1.5	-	-	-	68.28	7.95	14.3	12.7	0.372	0.344
R21	-	-	-	-	1.25	-	-	72.23	11.11	17.5	15.9	0.66	0.643
R22	2.0	-	-	-	-	-	-	82.55	7.95	14.3	12.7	0.45	0.415
R23*	-	2.0	-	-	1.5	2.06	-	82.55	11.11	17.5	15.9	0.755	0.734
R24*	-	-	2.0	2.0	-	2.06	2.0	95.25	11.11	17.5	15.9	0.87	0.846
R25	2.5	-	-	-	-	-	-	101.6	7.95	14.3	12.7	0.553	0.51
R26*	-	2.5	-	-	2.0	2.56	-	101.6	11.11	17.5	15.9	0.93	0.904
R27*	-	-	2.5	2.5	-	(2.56)	2.56	107.95	11.11	17.5	15.9	1.05	0.96
R28	-	-	-	-	-	2.5	-	111.13	12.7	19.1	17.5	1.255	1.23
R29	3.0	-	-	-	-	-	-	114.3	7.95	14.3	12.7	0.622	0.575
R30†	-	3.0	-	-	-	-	-	117.48	11.11	17.5	15.9	1.075	1.047
R31*	-	3.0	3.0	-	-	3.13	-	123.83	11.11	17.5	15.9	1.13	1.1
R32	-	-	-	-	3.0	-	-	127	12.7	19.1	17.5	1.435	1.405
R33	3.5	-	-	-	-	-	-	131.76	7.95	14.3	12.7	0.718	0.664
R34	-	3.5	-	-	-	-	-	131.76	11.11	17.5	15.9	1.2	1.17
R35*	-	-	-	3.0	-	-	3.13	136.53	11.11	17.5	15.9	1.25	1.21

*Denotes ring number specified in API 6A
Nominal Pipe Sized marked ** applies to class rating 2000 only
Nominal Pipe Sizes in brackets apply to class rating 3000 only
† Ring no. R30 is suitable for lapping flanges only
Adapted from ASME B16.20-2007 Tables 3 and 4

Dimensions for Ring Type Joint Gaskets Style R (mm)

Table 3

RING NO.	PRESSURE CLASS RATING (PSI)							PITCH DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING		GASKET WEIGHTS, kg.	
	ANSI, BS & MSS					API (PSI)							
	150	300/600	900	1500	2500	2000/ 3000	5000			OVAL	OCTAGONAL	OVAL	OCTAGONAL
	NOMINAL PIPE SIZE (INCHES)							P	A	B	H		
R36	4	-	-	-	-	-	-	149.23	7.95	14.3	12.7	0.813	0.74
R37*	-	4	4	-	-	4.06	-	149.23	11.11	17.5	15.9	1.36	1.33
R38	-	-	-	-	4	-	-	157.16	15.88	22.4	20.6	2.56	2.52
R39*	-	-	-	4	-	-	4.06	161.93	11.11	17.5	15.9	1.48	1.44
R40	5	-	-	-	-	-	-	171.45	7.95	14.3	12.7	0.94	0.865
R41*	-	5	5	-	-	-	-	180.98	11.11	17.5	15.9	1.66	1.61
R42	-	-	-	-	5	-	-	190.5	19.05	25.4	23.9	4.21	4.16
R43	6	-	-	-	-	-	-	193.68	7.95	14.3	12.7	1.055	0.975
R44*	-	-	-	5	-	-	-	193.68	11.11	17.5	15.9	1.77	1.73
R45*	-	6	6	-	-	7.06	-	211.14	11.11	17.5	15.9	1.93	1.88
R46*	-	-	-	6	-	-	7.06	211.14	12.7	19.1	17.5	2.39	2.33
R47*	-	-	-	-	6	-	-	228.6	19.05	25.4	23.9	5.06	4.99
R48	8	-	-	-	-	-	-	247.65	7.95	14.3	12.7	1.35	1.24
R49*	-	8	8	-	-	9	-	269.88	11.11	17.5	15.9	2.47	2.4
R50*	-	-	-	8	-	-	9	269.88	15.88	22.4	20.6	4.4	4.32
R51	-	-	-	-	8	-	-	279.4	22.23	28.6	27	8.05	8.17
R52	10	-	-	-	-	-	-	304.8	7.95	14.3	12.7	1.66	1.53
R53*	-	10	10	-	-	11	-	323.85	11.11	17.5	15.9	3	2.88
R54*	-	-	-	10	-	-	11	323.85	15.88	22.4	20.6	5.29	5.18
R55	-	-	-	-	10	-	-	342.9	28.58	36.5	34.9	16.23	17.04
R56	12	-	-	-	-	-	-	381	7.95	14.3	12.7	2.07	1.92
R57*	-	12	12	-	-	13.63	-	381	11.11	17.5	15.9	3.48	3.38

*Denotes ring number specified in API 6A
Adapted from ASME B16.20-2007 Tables 3 and 4

Dimensions for Ring Type Joint Gaskets Style R (mm)

Table 4

RING NO.	PRESSURE CLASS RATING (PSI)							PITCH DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING		GASKET WEIGHTS, kg.	
	ANSI, BS & MSS					API (PSI)							
	150	300/600	900	1500	2500	2000/ 3000	5000			OVAL	OCTAGONAL	OVAL	OCTAGONAL
	NOMINAL PIPE SIZE (INCHES)							P	A	B	H		
R59	14.0	-	-	-	-	-	-	396.88	7.95	14.3	12.7	2.16	2.0
R60	-	-	-	-	12.0	-	-	406.4	31.75	39.7	38.1	23.1	23..50
R61	-	14.0	-	-	-	-	-	419.1	11.11	17.5	15.9	3.83	3.7
R62	-	-	14.0	-	-	-	-	419.1	15.88	22.2	20.6	6.84	6.7
R63*	-	-	-	14.0	-	-	-	419.1	25.4	33.3	31.8	16.2	16.7
R64	16.0	-	-	-	-	-	-	454.03	7.95	14.3	12.7	2.47	2.3
R65*	-	16.0	-	-	-	16.8	-	469.9	11.11	17.5	15.9	4.3	4.2
R66*	-	-	16.0	-	-	(16.0)	-	469.9	15.88	22.2	20.6	7.67	7.5
R67	-	-	-	16.0	-	-	-	469.9	28.58	36.5	34.9	22.3	23.4
R68	18.0	-	-	-	-	-	-	517.53	7.95	14.3	12.7	2.82	2.6
R69*	-	18.0	-	-	-	-	-	533.4	11.11	17.5	15.9	4.87	4.7
R70*	-	-	18.0	-	-	(18.0)	-	533.4	19.05	25.4	23.9	11.8	11.6
R71	-	-	-	18.0	-	-	-	533.4	28.58	36.5	34.9	25.2	26.5
R72	20.0	-	-	-	-	-	-	558.8	7.95	14.3	12.7	3.04	2.8
R73*	-	20.0	-	-	-	21.25**	-	584.2	12.7	19.1	17.5	6.6	6.5
R74*	-	-	20.0	-	-	(20.8)	-	584.2	19.05	25.4	23.9	12.95	12.8
R75	-	-	-	20.0	-	-	-	584.2	31.75	39.7	38.1	33.3	35.3
R76	24.0	-	-	-	-	-	-	673.1	7.95	14.3	12.7	3.66	3.4
R77	-	24.0	-	-	-	-	-	692.15	15.88	22.4	20.6	11.3	11.1
R78	-	-	24.0	-	-	-	-	692.15	25.4	33.3	31.8	27.1	27.6
R79	-	-	-	24.0	-	-	-	692.15	34.93	44.5	41.3	48.7	49.8

*Denotes ring number specified in API 6A
Nominal Pipe Sized marked ** applies to class rating 2000 only
Nominal Pipe Sized in brackets apply to class rating 3000 only
†Ring no. R30 is suitable for lapping flanges only
Adapted from ASME B16.20-2007 Tables 3 and 4

Dimensions for Ring Type Joint Gaskets Style R Cont. (mm)

Table 5

RING NO.	PRESSURE CLASS RATING (PSI)							PITCH DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING		GASKET WEIGHTS, kg.	
	ANSI, BS & MSS					API (PSI)							
	150	300/600	900	1500	2500	2000/ 3000	5000			OVAL	OCTAGONAL	OVAL	OCTAGONAL
	NOMINAL PIPE SIZE (INCHES)							P	A	B	H		
R80	22	-	-	-	-	-	-	615.95	7.95	-	12.7	-	1.41
R81	-	22	-	-	-	-	-	635	14.29	-	19.1	-	3.88
R83*	-	-	-	-	-	-	-	57.14	11.11	-	15.9	-	0.23
R84*	-	-	-	-	-	-	-	63.5	11.11	-	15.9	-	0.25
R85*	-	-	-	-	-	-	-	79.38	12.7	-	17.5	-	0.44
R86*	-	-	-	-	-	-	-	90.5	15.88	-	20.6	-	0.66
R87*	-	-	-	-	-	-	-	100.03	15.88	-	20.6	-	0.72
R88*	-	-	-	-	-	-	-	122.83	19.05	-	23.9	-	1.24
R89*	-	-	-	-	-	-	-	114.3	19.05	-	23.9	-	1.15
R90*	-	-	-	-	-	-	-	155.58	22.23	-	26.9	-	2.06
R91*	-	-	-	-	-	-	-	260.25	31.75	-	38.1	-	6.83
R92	-	-	-	-	-	-	-	228.6	11.11	17.5	15.9	0.94	0.91
R93	-	26	-	-	-	-	-	749.3	19.05	-	23.9	-	7.41
R94	-	28	-	-	-	-	-	800.1	19.05	-	23.9	-	7.91
R95	-	30	-	-	-	-	-	857.25	19.05	-	23.9	-	8.48
R96	-	32	-	-	-	-	-	914.4	22.23	-	27	-	12.09
R97	-	34	-	-	-	-	-	965.2	22.23	-	27	-	12.76
R98	-	36	-	-	-	-	-	1022.35	22.23	-	27	-	13.51
R99*	-	-	-	-	-	-	-	234.95	11.11	-	15.9	-	0.94
R100	-	-	26	-	-	-	-	749.3	28.58	-	34.9	-	-
R101	-	-	28	-	-	-	-	800.1	31.75	-	38.1	-	-
R102	-	-	30	-	-	-	-	857.25	31.75	-	38.1	-	-
R103	-	-	32	-	-	-	-	914.4	31.75	-	38.1	-	-
R104	-	-	34	-	-	-	-	965.2	34.93	-	41.3	-	-
R105	-	-	36	-	-	-	-	1022.35	34.93	-	41.3	-	-

*Denotes ring number specified in API 6A
Adapted from ASME B16.20-2007 Tables 3 and 4

Dimensions for Ring Type Joint Gaskets Style RX (mm)

Table 6

RING NO.	PRESSURE CLASS RATING (PSI)			PITCH DIAMETER OF RING	OUTSIDE DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING	WEIGHT , kg.
	2000	3000	5000					
	NOMINAL PIPE SIZE (INCHES)			P	OD	A	H	
RX20	-	-	-	68.26	76.2	8.73	19.05	0.24
RX20†	-	-	2 1/16	68.26	76.2	8.73	19.05	0.24
RX23	2 1/6	-	-	82.55	93.27	11.91	25.4	0.52
RX24	-	2 1/16	2 1/16	95.25	105.97	11.91	25.4	0.60
RX25†	-	-	3 1/8	101.6	109.54	8.73	19.05	0.64
RX26	2 9/16	-	-	101.6	111.92	11.91	25.4	0.68
RX27	-	2 4/7	2 4/7	107.95	118.27	11.91	25.4	0.78
RX31	3 1/8	3 1/8	-	123.83	134.54	11.91	25.4	0.87
RX35	-	-	3 1/8	136.53	147.24	11.91	25.4	0.95
RX37	4 1/16	4 1/ 16	-	149.23	159.94	11.91	25.4	1.03
RX39	-	-	4 1/16	161.93	172.64	11.91	25.4	1.15
RX41	-	-	-	180.98	191.69	11.91	25.4	1.23
RX44	-	-	-	193.68	204.39	11.91	25.4	1.34
RX45	7 1/16	7 1/16	-	211.14	211.93	11.94	25.4	1.66
RX46	-	-	7 1/16	211.14	222.25	13.49	28.58	3.88
RX47	-	-	-	228.6	245.27	19.84	41.28	1.72
RX49	9	9	-	269.88	280.59	11.91	25.4	2.43
RX50	-	-	9	269.88	283.37	16.67	31.75	2.07

†Denotes API RTJ gaskets for segmented flanges for dual completions to API Standard 6A
Adapted from ASME B16.20-2007 Tables 3 and 4

Dimensions for Ring Type Joint Gaskets Style RX (mm)

Table 7

RING NO.	PRESSURE CLASS RATING (PSI)			PITCH DIAMETER OF RING	OUTSIDE DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING	WEIGHT , kg.
	2000	3000	5000					
	NOMINAL PIPE SIZE (INCHES)			P	OD	A	H	
RX53	11	11	-	323.85	334.57	11.91	25.4	6.45
RX54	-	-	11	323.85	337.34	16.67	31.75	5.36
RX57	13 5/8	13 5/8	-	381	391.72	11.91	25.4	26.4
RX63	-	-	-	419.1	441.72	26.99	50.8	6.63
RX65	16 3/4	-	-	469.9	480.62	11.91	25.4	9.39
RX66	-	16 3/4	-	469.9	483.39	16.67	31.75	7.52
RX69	-	-	-	533.4	544.12	11.91	25.4	20.14
RX70	-	-	-	533.4	550.07	19.84	41.28	11.63
RX73	21 1/4	-	-	584.2	596.11	13.49	31.75	22.1
RX74	-	20 3/4	-	584.2	600.87	19.84	41.28	0.79
RX82	-	-	-	57.15	67.87	11.91	25.4	0.88
RX84	-	-	-	63.5	74.22	11.91	25.4	0.88
RX85	-	-	-	79.38	90.09	13.49	25.4	1.79
RX86	-	-	-	90.49	103.58	15.08	28.58	1.98
RX87	-	-	-	100.01	113.11	15.08	28.58	3.22
RX88	-	-	-	123.83	139.3	17.46	31.75	2.98
RX89	-	-	-	114.3	129.78	18.26	31.75	6.82
RX90	-	-	-	155.58	174.63	19.84	44.45	17.1
RX91	-	-	-	260.35	286.94	30.16	45.24	3.31
*RX99	-	-	-	234.95	245.67	11.91	25.4	-
RX201†	-	-	1 3/8	46.04	46.04	5.74	11.3	-
*RX205†	-	-	1 13/16	57.15	62.31	5.56	11.1	-
*RX210†	-	-	2 4/7	88.9	97.63	9.53	19.05	-
*RX215	-	-	4	130.18	140.89	11.91	25.4	-
*RX215†	-	-	4 1/16 x 4 1/4	130.18	140.89	11.91	25.4	-

*API allows more liberal tolerances on RX 201-215
†Denotes API RTJ gaskets for segmented flanges for dual completions to API Standard 6A
Adapted from ASME B16.20-2007 Tables 3 and 4

Dimensions for Ring Type Joint Gaskets Style BX (mm)

Table 8

RING NO.	PRESSURE CLASS RATING (PSI)				OUTISIDE DIAMETER OF RING	HEIGHT OF RING	WIDTH OF RING	HOLE SIZE	GASKET WEIGHT Kg
	5000	10000	15000	20000					
	NOMINAL PIPE SIZE (INCHES)				OD	H	A	D	
BX150	-	-	-	-	72.19	9.30	9.30	1.59	0.30
BX151	-	1.81	1.81	1.81	76.40	9.63	9.63	1.59	0.34
BX152	-	2.06	2.06	2.06	84.68	10.24	10.24	1.59	0.43
BX153	-	2.56	2.56	2.56	100.94	11.38	11.38	1.59	0.63
BX154	-	3.06	3.06	3.06	116.84	12.40	12.40	1.59	0.88
BX155	-	4.06	4.06	4.06	147.96	14.22	14.22	1.59	1.22
BX156	-	7.06	7.06	7.06	237.92	18.62	18.62	3.18	4.14
BX157	-	9.00	9.00	9.00	294.46	20.98	20.98	3.18	6.55
BX158	-	11.00	11.00	11.00	352.04	23.14	23.14	3.18	9.60
BX159	-	13.63	13.63	13.63	426.72	25.70	25.70	3.18	14.41
BX160	13.63	-	-	-	402.59	23.83	13.74	3.18	6.75
BX161	16.75	-	-	-	491.41	28.07	16.21	3.18	-
BX162	16.75	16.75	16.75	-	475.49	14.22	14.22	1.59	-
BX163	18.75	-	-	-	556.16	30.10	17.37	3.18	-
BX164	-	18.75	18.75	-	570.56	30.10	24.59	3.18	-
BX165	21.25	-	-	-	624.71	32.03	18.49	3.18	-
BX166	-	21.25	-	-	640.03	32.03	26.14	3.18	-
BX167*	-	-	-	-	759.36	35.87	13.11	1.59	-
BX168†	-	-	-	-	765.25	35.87	16.05	1.59	-
BX169**	-	-	-	-	173.51	15.85	12.93	1.59	-
BX170	-	-	-	-	218.03	14.22	14.22	1.59	-
BX171	-	-	-	-	267.44	14.22	14.22	1.59	-
BX172	-	-	-	-	33.07	14.22	14.22	1.59	-
BX303††	-	-	-	-	852.75	37.95	16.97	1.59	-

*BX167 is suitable for 23 3/4 Nominal Pipe Size 2,000 psi rating
**BX169 is suitable for 5 3/4 Nominal Pipe Size 10,000 psi rating
†BX168 is suitable for 26 3/4 Nominal Pipe Size 3,000 psi rating
††BX303 is suitable for 30 Nominal Pipe Size 2,000 and 3,000 psi rating
Adapted from ASME B16.20-2007 Tables 5 and 6

Corrugated Flexible Graphite (CFG)

Designed for severe service conditions, this proprietary design of the corrugations gives CFG its superior sealing and recovery characteristics for tough conditions in the refining, chemical, petrochemical, and pulp and paper industries. CFG is suitable for service in steam, oil, water, mild alkalis, hydrocarbons, mild acids, and solvents.

Durlon® CFG will maintain a tight seal in a wide range of initial seating stress making it the universal replacement for spiral wound, double jacketed, and traditional flexible graphite gaskets.

Sizes & Types

- Standard ANSI Class 150 and 300 Ring and Full Face: 1/2 to 24"
- Non-Standard MSS SP-44 & API 605: 26" to 96"
- Non- Standard Ovals: Handhole and Manway Gaskets

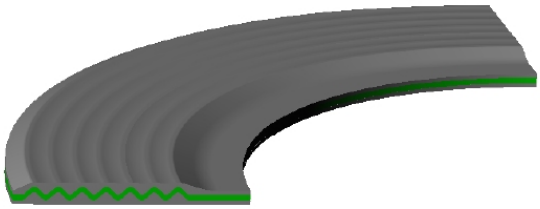
Advantages

- **Fire tested/ Fire resistant-** Passed the modified API 607 fire test
- **Recovery/Spring Back** characteristics for excellent sealing and thermal cycling
- **Blow out Resistant-** Metal core counteracts internal pressure spikes
- **Superior Emission Control** - DIN 3535 Part 4 gas permeability/leakage <0.01cc/min
- **Easy to handle and install**
- **Seals tightly with lower bolt loads** vs. spiral wounds
- **One thickness - 3/32"** for all applications

Physical Properties

Temperature	
Min	-328˚F (200˚C)
Max, in Air	850˚F (454˚C)
Max, in Steam	1200˚F (650˚C)
Pressure, Max, psi (bar)	3000 (207)
pH Range, Room Temp.	0 to 14

Gasket Factors	
Gb, psi	557
a	0.325
Gs, psi	2.21



Durlon® Durtec™ gaskets are made with a specially engineered corrugated metal core that is bonded on both sides with soft covering layers, typically flexible graphite. The core is produced by patented technology that allows the finished gasket to have the best possible mechanical support function. Corrugations in the Durtec™ core are virtually uncrushable unlike conventional corrugated metal core gaskets. The precision construction guarantees that Durlon® Durtec™ gaskets will have excellent sealing characteristics even under low bolt loads.

Application

Durlon® Durtec™ gaskets can be used in any industry where excellent sealing characteristics are required. We manufacture gaskets for virtually any connection configuration such as pipeline flanges, valves, small and large pressure vessels, heat exchangers, towers, tanks, etc. The Durtec™ gasket is designed to withstand high temperatures and pressures, to be blowout resistant, to be fire safe, and to resist toxic and/or corrosive chemicals. The design of the Durtec™ gasket also makes it an excellent choice for tough to seal cyclical pressure and temperature applications. Durlon® Durtec™ gaskets will meet all of your sealing requirements.

Durlon® Durtec™ gaskets have a much lower leakage rate as compared with spiral wound type gaskets under conditions of the same loading stresses. They provide excellent sealing performance and safety after installation and are an excellent choice to replace spiral wound gaskets.

Sizes, Types, & Materials

- Standard ASME, DIN, JIS, and BS EN sizes
- Non-Standard MSS SP-44, API 605, and other sizes up to 236" (6m) in diameter
- Ovals (normal or irregular), manways, track shapes, diamonds, squares/rectangles, with ribs, etc.
- Standard core material is 316L stainless steel. Other core materials such as SS304, SS321, SS316Ti, Monel®, Titanium, Hastelloy®, and Alloy 20 can be manufactured to your specifications upon request.
- Alternate facing material is available upon request. Popular materials include Durlon® 9600 expanded PTFE (ePTFE), mica, and ceramic.

Monel in a registered trademark of Special Metals Corporation.
Hastelloy is a registered trademark of Haynes International Inc.

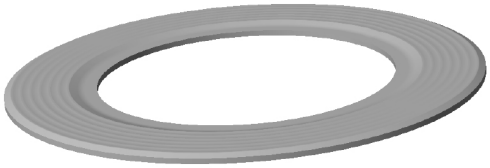
Superior Durtec™ Fire Safety

Test results of API Standard 607 4th Edition with Exxon Modifications

- Average bolt torque loss (with no adjustments):
  Upstream 45%; Downstream 33%
- Fire & Cool Down: Combined Leak Rate (2 gaskets)
  1 mL/min at 30 psig avg.
- Post Burn: Combined Leak Rate (2 gaskets)
  0 mL/min at 30 psig avg.
- Exxon Requirements Post Burn: Combined Leak Rate (2 gaskets) with no flange bolt retorques at any test pressure
  0 mL/min at 30 psig
  0 mL/min at 50 psig
  0 mL/min at 100 psig
  0 mL/min at 200 psig
  0 mL/min at 300 psig
  0 mL/min at 700 psig

The Durtec™ Advantage

- **Fire Safe** – SS316L/Graphite Passed Modified API 607 fire test
- **Blow Out Resistant** – Metal core provides excellent resistance to internal pressure spikes
- **Reusable** – On larger sizes and for special configurations, the core may be refaced with new material and reused providing lower cost of ownership (Contact your representative for details)



- **Superior Core Technology** – Durtec™ design can allow for complete replacement of spiral wound and Kammprofile gaskets with improved performance and lower life cycle cost
- **Easy and safe to handle, easy to install**
- **Seals tightly with lower bolt loads** vs. spiral wounds and Kammprofiles

Physical Properties

Temperature (according to selected materials)	
Min.	-200°C (-328°F)
Max.	1000°C (1832°F)
Pressure, max	4600 psi (320 bar)
pH Range, Room Temp.	0 to 14
Thickness:	1/16" to 5.0mm

Gasket Factors	
Gb, psi	187
a	0.467
Gs, psi	0.5
m	1.5
Y, psi	833

Dimensions for DURLON® Durtec™ (inch)
For ASME B16.5 Pipe Flanges and Flange Fittings

Table 9: Class 150

Nominal Pipe Size	Gasket I.D	Gasket O.D
1/2	0.84	1.88
3/4	1.06	2.25
1	1.31	2.62
1 1/4	1.66	3.00
1 1/2	1.91	3.38
2	2.38	4.12
2 1/2	2.88	4.88
3	3.50	5.38
3 1/2	4.00	6.38
4	1.50	6.88
5	5.56	7.75
6	6.62	8.75
8	8.62	11.00
10	10.75	13.38
12	12.75	16.13
14	14.00	17.75
16	16.00	20.25
18	18.00	21.62
20	20.00	23.88
24	24.00	28.25

Table 10: Classes 300, 400, 600, and 900

Nominal Pipe Size	Gasket I.D	Gasket O.D			
		Class 300	Class 400	Class 600	Class 900
1/2	0.84	2.12	2.12	2.12	2.50
3/4	1.06	2.62	2.62	2.62	2.75
1	1.31	2.88	2.88	2.88	3.12
1 1/4	1.66	3.25	3.25	3.25	3.50
1 1/2	1.91	3.75	3.75	3.75	3.88
2	2.38	4.38	4.38	4.38	5.62
2 1/2	2.88	5.12	5.12	5.12	6.50
3	3.50	5.88	5.88	5.88	6.62
3 1/2	4.00	6.5	6.38	6.38	---
4	4.50	7.12	7.00	7.62	8.12
5	5.56	8.5	8.38	9.50	9.75
6	6.62	9.88	9.75	10.50	11.38
8	8.62	12.12	12	12.62	14.12
10	10.75	14.25	14.12	15.75	17.12
12	12.75	16.62	16.50	18.00	19.62
14	14.00	19.12	19.00	19.38	20.50
16	16.00	21.25	21.12	22.25	22.62
18	18.00	23.5	23.38	24.12	25.12
20	20.00	25.75	25.50	26.88	27.50
24	24.00	30.5	30.25	31.12	33.00

Dimensions for DURLON® Durtec™ (inch)
For ASME B16.47 Series A Flanges

Table 11: Classes 150, 300, 400, and 600

Nominal Pipe Size	Gasket I.D	Gasket O.D			
		Class 150	Class 300	Class 400	Class 600
26	26.00	28.56	30.38	29.38	30.12
28	28.00	30.56	32.50	31.50	32.25
30	30.00	32.56	34.88	33.75	34.62
32	32.00	34.69	37.00	35.88	36.75
34	34.00	36.81	39.12	37.88	39.25
36	36.00	38.88	41.25	40.25	41.25
38	38.00	41.12	43.25	---	---
40	40.00	43.12	45.25	---	---
42	42.00	45.12	47.25	---	---
44	44.00	47.12	49.25	---	---
46	46.00	49.44	51.88	---	---
48	48.00	51.44	53.88	---	---
50	50.00	53.44	55.88	---	---
52	52.00	55.44	57.88	---	---
54	54.00	57.62	61.25	---	---
56	56.00	59.62	62.75	---	---
58	58.00	62.19	65.19	---	---
60	60.00	64.19	67.12	---	---

WARNING

Materials should never be recommended when both temperature and pressure are at the maximum listed. Properties and applications in this handbook are typical. No application should be undertaken by anyone without independent study and evaluation for suitability. Never use more than one gasket in one flange joint and never reuse a gasket. Improper use or gasket selection could cause property damage and/or serious personal injury. Data reported in this handbook in a compilation of field testing, field service reports, and/or in-house testing. While the utmost care has gone into publishing the information contained herein, we assume no responsibility for errors. Specifications and information contained in this book are subject to change without notice. This edition cancels and obsoletes all previous editions.

DURLON® Kammprofile

Durlon® Kammprofile gaskets have a solid metal core with concentrically serrated grooves machined into the top and bottom faces. The metal core is typically stainless steel but it can be supplied in various metallurgies as per the customer's request. The serrated core is covered with soft sealing material and is dependent on the service conditions of the system. Flexible graphite and expanded PTFE sealing layers are most common but other soft materials can be used as well. While providing the Durlon® Kammprofile gasket with excellent sealing properties, the soft sealing layers also fill in minor flange imperfections and protect the flange surfaces from damage.

Application

Durlon® Kammprofile gaskets are the preferred choice for applications requiring improved performance at low seating stresses. The serrated peaks provide reduced contact area and when combined with the soft conformable sealing layers, the Durlon® Kammprofile gasket provides a virtual metal-to-metal connection. They feature excellent resistance to blowout and provide superior stability for ease of handling and installation.

The Durlon® Kammprofile gasket is an excellent choice for tough heat exchanger, vessel, and reactor applications in various flange configurations where traditional jacketed gaskets tend to be ineffective. They are particularly effective in applications where high temperatures, high pressures, and fluctuating conditions are encountered.

Core Materials

- Standard core material is 316 stainless steel with a nominal thickness of 0.125" (3mm).
- Other core materials and thicknesses are available to suit specific applications.
- Core material is generally selected in an identical material to the piping system in order to reduce corrosion problems.

Facing Materials

- Standard facing material is flexible graphite with a nominal thickness of 0.020" (0.5mm).
- Other facing materials and thicknesses are available to suit specific applications.

Flange Surface Finish

- The ideal flange surface finish for use with Kammprofile gaskets is 125–250 RMS (3.2 – 6.3 µm Ra).

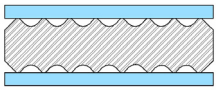
Shapes

- Round, ovals (normal or irregular), manways, track shapes, diamonds, squares/rectangles, with ribs, etc.
- Correctly dimensioned drawings are required to make non-standard gaskets and gasket shapes.

Styles

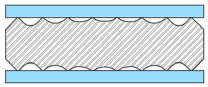
Durlon® Kammprofile gaskets are offered in 4 styles in each of 2 core designs. Selection of the best configuration of your Durlon® Kammprofile gasket can be achieved by following the guide below.

K40P
Parallel Root Core



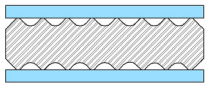
This core design is where the main sealing faces of the serrated metal core are parallel to each other. These are the standard design of Kammprofile gaskets.

K40C
Convex Root Core



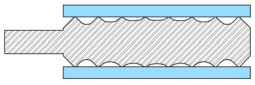
This core design is where the main sealing faces of the serrated metal core are slightly convex in profile.
The convex core helps compensate when flange rotation is experienced on bolt up of weaker flanges.

K40P and K40C
No Centering Ring



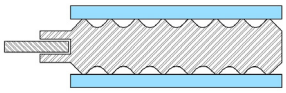
This basic configuration is most often used in tongue/ groove and male/female flanges.

K40PI and K40CI
Integral Centering Ring



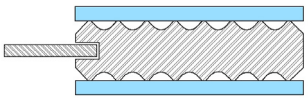
The centering ring is used to position the gasket between flat face and raised face type flanges.

K40PEF and K40CEF
Extended Core Floating Centering Ring



Similar to the floating centering ring, this style has an extended core whereby providing additional strength and stability to the overall floating design.

K40PF and K40CF
Floating Centering Ring



A loose fitting centering ring is recommended on applications where thermal or pressure cycling can affect the integrity of the serrated metal core. It allows for expansion and contraction of the core through these cycling conditions

Physical Properties

Temperature (according to selected materials)	
Min.	-200°C (-328°F)
Max.	1000°C (1832°F)
Pressure, max	Class 2500 ratings
pH Range, room temp.	0 to 14

Gasket Factors	
m	4.00
Y, psi	1,000

Dimensions for Kammprofile (mm)

Table 12

NPS	Serrated Metal Ring (mm)		Centering Ring Outside Diameter						
	ANSI, BS & MSS		Pressure Class						
	Inside Diameter	Outside Diameter	150	300	400	600	900	1500	2500
1/2	23.1	33.3	47.6	54.0	54.0	54.0	63.5	63.5	69.9
3/4	28.6	39.7	57.2	66.7	66.7	66.7	69.9	69.9	76.2
1	36.5	47.5	66.7	73	73	73	79.4	79.4	85.7
1 1/4	44.5	60.2	76.2	82.6	82.6	82.6	88.9	88.9	104.8
1 1/2	52.4	69.9	85.7	95.3	95.3	95.3	98.4	98.4	117.5
2	69.9	88.9	104.8	111.1	111.1	111.1	142.9	142.9	146.1
2 1/2	82.6	101.6	123.8	130.2	130.2	130.2	165.1	165.1	168.3
3	98.3	123.8	136.5	149.2	149.2	149.2	168.3	174.8	196.9
3 1/2	111	136.5	161.9	165.1	161.9	161.9	190.5	187.5	----
4	123.7	154.0	174.6	181	177.8	193.7	206.4	209.6	235
5	150.8	182.6	196.9	215.9	212.7	241.3	247.7	254	279.4
6	177.8	212.6	222.3	250.8	247.7	266.7	288.9	282.7	317.5
8	228.6	266.7	279.4	308	304.8	320.7	358.8	352.6	387.4
10	282.6	320.7	339.7	362	358.8	400.1	435	435	476.3
12	339.6	377.7	409.6	422.3	419.1	457.2	498.5	520.7	549.3
14	371.5	409.6	450.9	485.8	482.6	192.3	520.7	577.9	----
16	422.3	466.7	514.4	539.8	536.6	565.2	574.7	641.4	----
18	479.3	530.1	549.3	596.9	593.7	612.8	638.2	704.9	----
20	530.1	580.9	606.4	654.1	647.7	682.6	698.5	755.7	----
24	631.8	682.5	717.6	774.7	768.4	790.6	838.2	901.7	----

Adapted from Fluid Sealing Association Standard FSA-MG-502-05 Table 2

Chemical Resistance Chart for Common Materials

The following information is a general guide only for the selection of suitable materials as there are unlimited combinations of fluid, pressure, and temperature conditions. Triangle Fluid Controls Ltd. does not warrant (neither expressed nor implied) that the information in this chart is accurate or complete or that any material is suitable for any purpose. For more specific compatibility information please complete an application data form and submit it to your representative for analysis.

RATINGS

A Acceptable
B Caution
C Not Suitable
— No Data Available

FLUID	CARBON STEEL	304SS	316 SS	ALLOY 20	MONEL	HASTELLOY C	TITANIUM	GRAPHITE	PTFE	CERAMIC	MICA
Acetaldehyde	A	A	A	A	A	A	A	A	A	—	B
Acetic Acid	C	C	A	A	A	A	A	A	A	A	A
Acetic Anhydride	C	B	B	B	B	A	A	A	A	A	—
Acetone	A	A	A	A	A	A	A	A	A	A	B
Acetonitrile	—	A	A	A	—	A	—	C	A	—	—
Acetylene	A	A	A	A	A	—	—	A	A	—	B
Acrylonitrile	A	A	A	A	—	B	—	A	A	—	—
Aluminum Acetate	—	—	A	A	B	—	—	B	A	—	A
Aluminum Chloride	C	B	A	A	A	—	A	—	—	A	A
Aluminum Fluoride	C	C	B	B	A	—	A	—	—	—	—
Aluminum Hydroxide	C	A	A	A	B	—	A	A	A	—	—
Aluminum Nitrate	C	A	A	A	C	—	A	B	A	—	—
Aluminum Sulfate	C	A	—	—	—	A	A	A	A	A	—
Ammonia, Gas	A	A	A	A	A	A	B	A	A	A	A
Ammonia, Liquid	A	A	A	A	A	A	B	A	A	A	A
Ammonium Chloride	C	B	B	B	B	B	A	A	A	A	A
Ammonium Hydroxide, 10%	C	A	A	A	B	A	A	A	A	A	A
Ammonium Hydroxide, Sat'd	C	A	A	—	B	B	A	A	A	—	A
Ammonium Nitrate	—	A	—	A	A	A	A	A	A	A	—
Ammonium Phosphate	C	A	A	A	B	A	A	—	—	—	—
Ammonium Sulfate	C	B	B	A	B	A	A	—	—	A	—
Amyl Chloride	A	A	A	A	A	A	B	A	A	A	—
Aniline	C	B	C	—	A	—	B	A	A	A	B
Aqua Regia	C	C	B	B	—	B	A	C	A	—	—
Arsenic Acid	C	A	A	A	A	A	A	A	A	—	—
Asphalt	A	A	A	A	B	A	—	A	A	—	A
Barium Chloride	C	A	A	A	A	—	A	A	A	A	A
Barium Hydroxide	C	A	A	A	A	A	A	—	—	A	—
Barium Sulfate	A	A	A	A	A	—	A	—	—	A	—
Barium Sulfide	C	A	A	A	A	—	A	—	—	A	—
Beer	C	A	A	A	A	—	A	A	A	—	—
Benzaldehyde	B	A	A	A	B	A	A	A	A	A	
Benzene (Benzol)	A	A	A	A	A	A	A	A	A	A	B
Benzoic Acid	—	A	A	A	—	—	A	A	A	A	A
Black Sulfate Liquor	B	A	A	A	B	—	A	B	A	—	—
Bleach Solutions	C	C	C	C	C	A	A	B	A	—	A
Borax	B	A	A	A	A	A	A	A	A	—	A
Boric Acid	B	A	A	A	A	A	A	A	A	A	A
Brine	C	—	A	A	A	A	A	A	A	—	—
Bromine, Liquid	C	C	C	C	C	A	C	—	—	A	—
Bromine, Gas	C	C	C	A	A	A	C	—	—	—	—
Butadiene	A	A	A	A	A	A	—	A	A	—	—
Butane	A	A	A	A	A	A	A	A	A	—	—
Butyl Acetate	B	A	A	A	A	A	A	A	A	—	B
Butyl Alcohol	—	A	A	A	—	—	A	A	A	A	B
Butylene (butene)	A	A	A	A	A	A	—	A	A	—	—
Butyric Acid	C	A	A	A	A	—	A	A	A	—	B
Calcium Bisulfite	C	A	A	A	C	A		A	A	—	—
Calcium Carbonate	B	A	A	A	A	A	A	A	A	A	—
Calcium Chlorate	B	—	A	A	A	—	—	—	—	A	—

FLUID	CARBON STEEL	304SS	316 SS	ALLOY 20	MONEL	HASTELLOY C	TITANIUM	GRAPHITE	PTFE	CERAMIC	MICA
Calcium Chloride	C	B	A	A	A	A	A	A	A	A	A
Calcium Hydroxide	C	A	A	A	A	A	A	A	A	A	A
Calcium Hypochlorite	C	B	B	B	C	B	A	A	A	A	A
Calcium Nitrate	—	B	A	A	A	—	A	A	A	A	—
Calcium Sulfate	B	A	A	A	A	A	A	—	—	A	A
Carbon Dioxide, dry	A	A	A	A	A	—	A	A	A	—	A
Carbon Dioxide, wet	B	A	A	A	A	A	A	A	A	A	A
Carbon Disulfide	A	A	A	A	A	A	A	A	A	—	B
Carbon Monoxide	B	A	A	A	A	A	—	A	A	—	—
Carbon Tetrachloride	A	A	A	A	A	A	A	A	A	A	B
Castor Oil	A	—	A	A	A	A	A	—	—	A	A
Caustic Potash	B	—	A	A	A	—	C	—	—	C	—
Caustic Soda (NaOH)	B	B	A	A	A	—	B	B	A	A	A
Chlorine Gas (dry)	A	A	A	A	A	A	C	A	A	—	B
Chlorine Gas (wet)	C	C	C	C	A	A	C	A	A	—	—
Chlorine Liquid	C	C	C	—	—	—	B	A	A	—	—
Chlorinated Water, <3500ppm	C	A	A	A	A	A	A	A	A	A	—
Chlorinated Water, >3500ppm	C	B	A	A	B	A	A	A	A	A	—
Chlorobenzene	B	A	A	A	A	A	A	A	A	A	—
Chloroform	C	A	A	A	A	—	A	A	A	A	B
Chlorosulfonic Acid	C	C	C	B	A	A	A	—	—	A	—
Chromic Acid, 10%	C	B	A[1]	A[2]	B	A	A	A	A	A	B
Chromic Acid, 30%	C	B	B[1]	A[2]	C	A	A	A	A	A	B
Chromic Acid, 40%	C	B	B[1]	—	C	A	A	A	A	A	B
Chromic Acid, 50%	C	C	B[1]	B[3]	C	B	A	A	A	A	B
Citric Acid	C	A	A	A	A	A	A	A	A	A	A
Coconut Oil	B	—	A	A	B	—	A	—	A	—	—
Coke Oven Gas	A	—	A	—	B	—	—	A	—	—	A
Copper Acetate	C	—	A	A	B	A	—	—	—	—	A
Copper Chloride	C	C	A	A	B	A	C	—	—	A	—
Copper Sulfate	C	A	A	A	C	A	A	A	A	A	A
Corn Oil	B	—	A	A	B	—	—	A	A	—	—
Cottonseed Oil	B	—	A	A	B	—	A	A	A	A	—
Creosote (Coal Tar)	A	—	A	A	A	A	A	A	A	—	A
Crude Oil	B	—	A	A	B	—	A	A	A	—	A
Cumene	B	—	B	B	B	A	—	C	A	—	—
Cyclohexane	A	A	A	A	A	A	A	A	A	—	—
Cyclohexanone	B	A	A	A	B	A	—	A	A	A	—
Detergent Solutions	A	A	A	A	A	—	A	A	A	—	—
Diacetone Alcohol	A	A	A	A	A	A	—	A	A	—	—
Diesel Fuel	A	A	A	A	A	—	A	A	A	—	—
Dimethylformamide (DMF)	B	A	A	A	A	—	—	C	A	—	—
Dowtherm A, E	A	—	A	A	A	—	—	A	A	—	B
Ether	B	A	A	A	A	—	A	—	A	—	—
Ethyl Acetate	A	A	A	A	A	A	A	A	A	—	B
Ethyl Alcohol (Ethanol)	A	A	A	A	A	A	A	A	A	A	B
Ethylbenzene	B	—	A	A	A	A	—	A	A	—	—
Ethylchloride	A	A	A	A	A	A	A	A	A	A	B
Ethylene Bromide	A	A	A	A	A	A	—	—	—	—	—
Ethylene Dichloride (EDC)	A	A	A	A	A	—	A	A	A	A	—

Chemical Resistance Chart for Common Materials

FLUID	CARBON STEEL	304SS	316 SS	ALLOY 20	MONEL	HASTELLOY C	TITANIUM	GRAPHITE	PTFE	CERAMIC	MICA
Ethylene Glycol	A	A	A	A	A	A	A	A	A	A	A
Ethylene Oxide	A	A	A	A	B	A	—	A	A	—	—
Fatty Acids	C	A	A	A	A	A	A	A	A	A	A
Ferric Chloride	C	C	C	C	C	A[4]	A	A	A	—	—
Ferrous Chloride	C	C	C	C	—	B	A	A	A	—	—
Ferrous Sulfate	C	A	A	A	A	A	A	—	—	A	—
Fish Oil	A	A	A	A	A	—	—	—	A	—	—
Flue Gas	A	A	A	A	A	—	—	A	A	—	A
Fluorine Gas (dry)	A	A	A	A	A	A	C	B	C	—	—
Fluorine Gas (wet)	C	B	A	A	A	—	C	B	C	—	—
Formaldehyde	B	B	A	A	A	A	A	A	A	—	B
Formic Acid	C	A	A	A	A	A	B	A	A	—	A
Freon (11, 12, 21, 22, 113, 114)	B	A	A	A	—	—	A	A	A	A	C
Gasoline	A	A	A	A	A	A	A	A	A	A	B
Gasoline Sour	A	A	A	A	C	A	—	—	A	—	—
Gelatin	C	B	C	A	—	—	A	—	A	—	—
Glucose	A	A	A	A	A	A	A	A	A	—	—
Glycerin (Glycerol)	A	A	A	A	A	A	A	A	A	A	A
Glycol	A	A	A	A	A	A	—	A	A	—	—
Green Sulfate Liquor	—	A	A	A	A	—	—	B	A	—	—
Heptane	A	A	A	A	A	A	A	A	A	—	—
Hexane	A	A	A	A	A	A	A	A	A	—	—
Hydraulic Oil (mineral)	A	A	A	A	A	A	—	A	A	—	A
Hydrochloric Acid	C	C	A	A	A	A	C	A	A	B	A
Hydrofluoric Acid, 30%	C	C	C	B	A	A	C	A	A	B	—
Hydrofluoric Acid, 40%	C	C	C	B	B	A	C	A	A	B	—
Hydrogen	A	A	A	A	A	A	A	A	A	A	A
Hydrogen Fluoride (HF)	—	—	A	A	—	A	—	A	A	—	B
Hydrogen Peroxide, 50%	B	A	A	A	A	—	A	—	A	A	B
Hydrogen Peroxide, 90%	B	A	A	A	B	B	—	—	A	A	—
Hydrogen Sulfide (dry)	B	B	A	A	A	A	A	A	A	A	—
Hydrogen Sulfide (wet)	C	B	A	A	B	B	A	A	A	A	—
Iodine	C	C	C	B	A	A	A	C	A	—	—
Isobutane	A	A	A	A	A	A	—	A	A	—	—
Isooctane	A	A	A	A	A	A	—	A	A	—	A
Isopropyl Alcohol	A	A	A	A	A	—	—	A	A	—	B
Jet Fuel	A	A	A	A	A	A	A	A	A	—	—
Kerosene	A	A	A	A	A	A	A	A	A	A	A
Lactic Acid	C	A	A	A	A	A	A	A	A	A	A
Linoleic Acid	C	B	B	A	A	A	—	—	A	—	—
Linseed Oil	A	A	A	A	A	A	A	A	A	A	A
Lubricating Oil	A	A	A	A	A	A	A	A	A	—	—
Magnesium Carbonate	B	A	A	A	A	—	A	—	—	A	—
Magnesium Chloride	C	C	C	B	A	A	A	A	A	A	—
Magnesium Sulfate	A	A	A	A	A	A	A	A	A	—	A
Maleic Acid	C	A	A	A	B	A	A	A	A	—	A
Mercuric Chloride	C	C	C	B	C	A	A	C	A	A	—
Mercury	A	A	A	A	B	A	A	B	A	A	—
Methane	A	A	A	A	A	A	—	A	A	—	B
Methanol	A	A	A	A	A	A	A	A	A	A	—
Methyl Acetone	A	A	A	A	A	—	—	—	A	—	—
Methyl Alcohol	A	A	A	A	A	A	A	A	A	A	B
Methyl Amine	B	A	A	A	C	—	—	—	A	—	—
Methylene Chloride	A	A	A	A	A	A	A	A	A	—	B
Methyl Ethyl Ketone, MEK	A	A	A	A	A	A	A	A	A	A	B
Methyl Isobutyl Ketone	—	A	A	A	A	—	A	A	A	—	—
Methyl Chloride	B	A	A	A	A	A	A	A	A	—	B
Milk	C	A	A	A	A	—	A	A	A	A	—
Mineral Oil	A	A	A	A	A	A	A	A	A	A	A
Muriatic Acid	C	B	B	B	C	—	—	A	A	—	—
Naphtha	A	A	A	A	A	A	A	A	A	—	—
Naphthalene	A	A	A	A	A	A	A	A	A	A	—
Natural Gas	A	A	A	A	A	A	—	A	A	—	B
Nickel Ammonium Sulfate	C	A	A	A	C	—	A	A	A	—	—
Nickel Nitrate	C	A	A	A	C	—	—	—	—	A	—
Nitric Acid	C	A	A	A	C	—	A	C	A	A	A

FLUID	CARBON STEEL	304SS	316 SS	ALLOY 20	MONEL	HASTELLOY C	TITANIUM	GRAPHITE	PTFE	CERAMIC	MICA
Nitrobenzene	A	A	A	A	A	A	A	—	A	—	A
Nitrogen	A	A	A	A	A	—	A	A	A	—	A
Nitroglycerine	B	—	A	A	B	—	—	—	A	—	—
Octane	A	A	A	A	A	A	—	A	A	—	A
Oleic Acid	C	A	A	A	A	A	A	A	A	A	A
Oleum, fuming H2SO4	C	B	B	B	C	—	C	C	A	—	A
Olive Oil	A	A	A	A	A	A	A	—	A	A	—
Oxalic Acid, 50%	C	A	A	A	A	A	A	A	A	A	A
Oxygen Gas	A	A	A	A	A	A	—	A	A	—	A
Ozone	A	A	A	A	A	A	—	C	A	—	—
Paraffin	A	A	A	A	A	A	A	A	A	A	—
Pentane	A	A	A	A	A	A	—	A	A	—	—
Perchloroethylene	B	A	A	A	A	A	A	A	A	A	B
Phenol	C	A	A	A	A	A	A	A	A	A	A
Phosphoric Acid	C	C	A	A	C	—	B	A	A	A	A
Phthalic Acid	C	A	A	A	B	A	A	A	A	—	A
Polyvinyl Acetate	C	—	B	B	B	—	—	—	—	—	A
Potash	A	A	A	A	A	—	A	A	A	C	—
Potassium Chloride	B	B	B	A	A	A	A	A	A	—	A
Potassium Dichromate	C	A	A	A	A	—	A	A	A	A	A
Potassium Hydroxide	B	A	A	A	A	—	C	B	A	C	A
Potassium Nitrate	B	A	A	A	A	A	A	A	A	A	A
Potassium Sulfate	A	A	A	A	A	A	A	A	A	A	—
Potassium Sulfide	C	B	B	B	C	A	A	—	—	A	—
Potassium Sulfite	C	A	A	A	B	—	—	—	A	—	—
Propane	A	A	A	A	A	A	—	A	A	—	A
Propyl Alcohol	A	A	A	A	A	A	—	—	A	A	—
Propylene Glycol	A	A	A	A	A	A	A	—	A	A	—
Salicylic Acid	C	A	A	A	B		A	—	A	—	A
Silicone Oil	A	A	A	A	A	A	—	—	A	—	A
Silver Chloride	C	C	C	A[1]	A	—	—	—	A	—	—
Silver Nitrate	C	A	A	A	C	—	A	A	A	—	—
Soap Solutions	B	A	A	A	B	A	A	A	A	A	A
Sodium Bicarbonate	C	A	A	A	A	A	A	A	A	A	A
Sodium Bisulfate	C	C	A	A	A	—	A	A	A	A	—
Sodium Bisulfite	C	A	A	A	C	—	A	A	A	A	A
Sodium Carbonate	A	A	A	A	A	A	A	A	A	A	A
Sodium Chloride	B	B	B	B	B	A	A	B	A	A	A
Sodium Hydroxide, <10%	A	A	A	A	A	A	A	B	A	A	A
Sodium Hydroxide, >10%	B	B	A	A	A	—	B	B	A	A	A
Sodium Hypochlorite	C	C	C	C	C	A	B	B	A	A	—
Sodium Nitrate	A	A	A	A	A	A	A	B	A	A	—
Sodium Phosphate	B	—	A	A	B	A	—	—	A	—	—
Sodium Silicate	A	A	A	A	A	A	A	A	A	A	
Sodium Sulfate	A	A	A	A	A	—	A	A	A	A	A
Sodium Sulfite	B	A	A	A	C	A	A	—	A	—	—
Sour Crude Oil	A	A	A	A	A	A	—	A	A	—	—
Soybean Oil	B	A	A	A	A	—	A	A	A	—	—
Steam (low-med pressure)	A	A	A	A	A	A	—	A	A	—	A
Steam (high pressure)	A	A	A	A	C	A	—	A	C	—	A
Stearic Acid	C	A	A	A	A	A	A	A	A	—	A
Stoddard Solvent	A	A	A	A	A	A	A	A	A	—	—
Styrene	B	A	A	A	A	A	—	A	A	—	—
Sulfate Liquors	—	A	A	A	A	—	—	A	A	—	—
Sulfur	C	A	A	A	A	A	—	A	A	—	A
Sulfur Dioxide	A	C	A	A	A	A	A	A	A	—	A
Sulfuric Acid, <50%	C	C	A	A	A	A	C	B	A	A	C
Sulfuric Acid, 60%	C	C	B	A	B	A	C	C	A	A	C
Sulfuric Acid, 70%	C	C	B	A	C	A	C	C	A	A	C
Sulfuric Acid, >80%	C	C	C	A	C	A	C	C	A	A	C
Sulfuric Acid, Fuming	C	C	B	B	C	—	C	C	A	A	—
Tar	A	A	A	A	A	A	—	A	A	—	A
Tartaric Acid	C	B	A	A	A	A	A	—	A	A	A
Toluene	A	A	A	A	A	A	A	A	A	A	A
Transformer Oil	A	A	A	A	A	A	—	A	A	—	A
Trichloroethylene	B	A	A	A	A	A	A	A	A	A	B

Chemical Resistance Chart for Common Materials

FLUID	CARBON STEEL	304SS	316 SS	ALLOY 20	MONEL	HASTELLOY C	TITANIUM	GRAPHITE	PTFE	CERAMIC	MICA
Turpentine	A	A	A	A	A	A	A	A	A	A	A
Urea	C	A	—	A	B	—	A	A	A	A	A
Vegetable Oil	A	A	A	A	A	—	—	A	A	—	—
Vinegar	C	A	A	A	A	A	A	A	A	A	—
Water, Mine Acid	C	A	A	A	B	B	A	A	A	A	A
Water, Deionized	C	A	A	A	A	A	A	A	A	A	—
Water, Sea	C	A	B	A	A	A	A	A	A	A	A
Whiskey and Wines	C	A	A	A	A	A	A	A	A	A	—
White Sulfate Liquor	C	A	A	A	A	—	—	A	A	—	—
Xylene	A	A	A	A	A	A	A	A	A	A	A
Zinc Chloride	C	A	B	A	A	—	A	A	A	C	—
Zinc Nitrate	—	—	A	A	—	—	—	A	A	—	—
Zinc Sulfate	C	A	A	A	A	A	A	A	A	C	—

The information contained within this Chemical Resistance Chart supersedes and obsoletes all previously issued charts.

NOTES:
1. Satisfactory to 70°F (21°C)
2. Satisfactory to 125°F (52°C)
3. Satisfactory to 212°F (100°C)
4. Satisfactory to 175°F (79°C)

⚠ WARNING

This information is intended to be used as a general guide only for the selection of a suitable material. The substances listed are evaluated for their effect on the various materials at ambient temperature (-40°F to 100°F, or -40°C to 38°C) unless otherwise stated. For unusual conditions of fluid concentrates, internal pressures, or temperatures consult your representative. The information in this chart has been compiled from various independent sources . Triangle Fluid Controls will not guarantee any performance of any materials selected based on the information contained in this chart.

⚠ DANGER

Variations in chemical behavior due to factors such as temperature, pressure, and concentration can cause equipment to fail, even though it passed an initial test. Ratings of chemical behavior listed in this chart apply to a 48-hour exposure period; Triangle Fluid Controls does not make any claims of possible effects beyond this period.

SERIOUS INJURY MAY RESULT.

Use suitable guards and/or personal protective equipment when handling any chemical.

Gasket Application Data Form

Triangle Fluid Controls Ltd.®

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FAX: 613.968.1099

269 University Avenue, Belleville, Ontario, Canada K8N 5A2
info@TriangleFluid.com

Company: _____
Contact: _____
Title: _____
City: _____
Province: _____
Phone: _____
Fax: _____
Email: _____

Date: _____

APPLICATION

❍ Pipe Flange
❍ Manway
❍ Valve Bonnet
❍ Pump Casing
❍ Other _____

❍ Heat Exchanger
❍ Compressor
❍ Flu Duct
❍ Pressure Vessel

GENERAL SERVICE CONDITIONS

Temperature: Continuous Operating _____ °F/°C
Minimum Design _____ °F/°C
Maximum Design _____ °F/°C
Thermal Cycling: ❍ Yes ❍ No _____ cycles/24hrs
Vibration: ❍ Yes ❍ No

Pressure: Normal Operating: _____ psig/bar
Minimum Design _____ psig/bar
Maximum Design _____ psig/bar
Pressure Stability: ❍ Stable ❍ Intermittent ± _____ psig/bar
Installation: ❍ New ❍ Existing

MEDIA DATA

Fluid: _____
pH: _____
Concentration: _____

State: ❍ Liquid ❍ Gas ❍ Mixed
Specific Gravity: _____
Suspended Particulates: ❍ No ❍ Yes _____ size

CONNECTION INFORMATION

STANDARD FLANGE
Material: _____
Size: _____ Rating: _____
Surface Finish: _____
❍ Phonographic Grooves ❍ Concentric Grooves
Facing: ❍ Raised ❍ Flat
❍ Tongue & Groove ❍ Other _____
Bolt Material: _____
Bolt Grade: _____
Bolt Diameter: _____
Number of Bolts: _____

NON-STANDARD FLANGE
Material: _____
Contact Area: ID _____ OD _____
Surface Finish: _____
❍ Phonographic Grooves ❍ Concentric Grooves
Facing: ❍ Raised ❍ Flat ❍ Tongue & Groove
❍ Other _____
Flange Thickness: _____ Bolt Circle Diameter: _____
Bolt Material: _____
Bolt Grade: _____
Bolt Diameter: _____
Number of Bolts: _____

COMMENTS/SPECIAL REQUIREMENTS

_____
_____
_____
_____
_____
_____

Notes

Our company

Triangle Fluid Controls is market driven and technology based, serving customers throughout the world with innovative fluid sealing products.

Our People

TFC regards people as its most important resource. We foster leadership, individual accountability, and teamwork. Our employees are professionals whose entrepreneurial behavior is result-oriented and guided by personal integrity. In return, our employees can count on opportunities for individual and professional development in an empowering work environment.

Pulp& Paper
Utilities/Power Plant
Digesters
Chemical Recovery
Blow Tanks
Pump Discharge
Washing
Bleaching
Refiners
Wet End
Head Box
Dryers
Coating Piping/Storage
General Service

Chemical Processing
Process Piping
A. Acids
B. Alkalies
C. Chlorine
D. Stainless Steel
E. General &
Utility Service
Chemical Pumps
Centrifuges
Heat Exchanger
Tower and Reactors
Tower Trays
Storage Tanks
Manways
General Service
Rail-Tank Car
Multi Housing
Arrangements
Nozzle and Outlet
Arrangements
Cover Flanges
Liquid Connections
Air Connections
Gauging Devices
Manway Covers
Safety Valves
Bottom Outlet Valves
Steam Pipes

Power Generation
Boiler
Ash Handling
Chemical Piping
Steam Turbine and Generator
Circulating Water
Condensate
Diesel Backup
Screen House Pumps and Piping
General Service

FDA& Pharmaceutical
Agitators
Dryers
Mixers
Pumps
Autoclaves
Cookers
Filter Screens
Stainless Piping
Storage Tanks
Blenders
Cooling Vessels
Homogenizer
Loading/Unloading Systems

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