| Service | Quality | Performance |

DURLON®

SEALING SOLUTIONS

ALL CUSTOM GASKET & MATERIALS LIMITED
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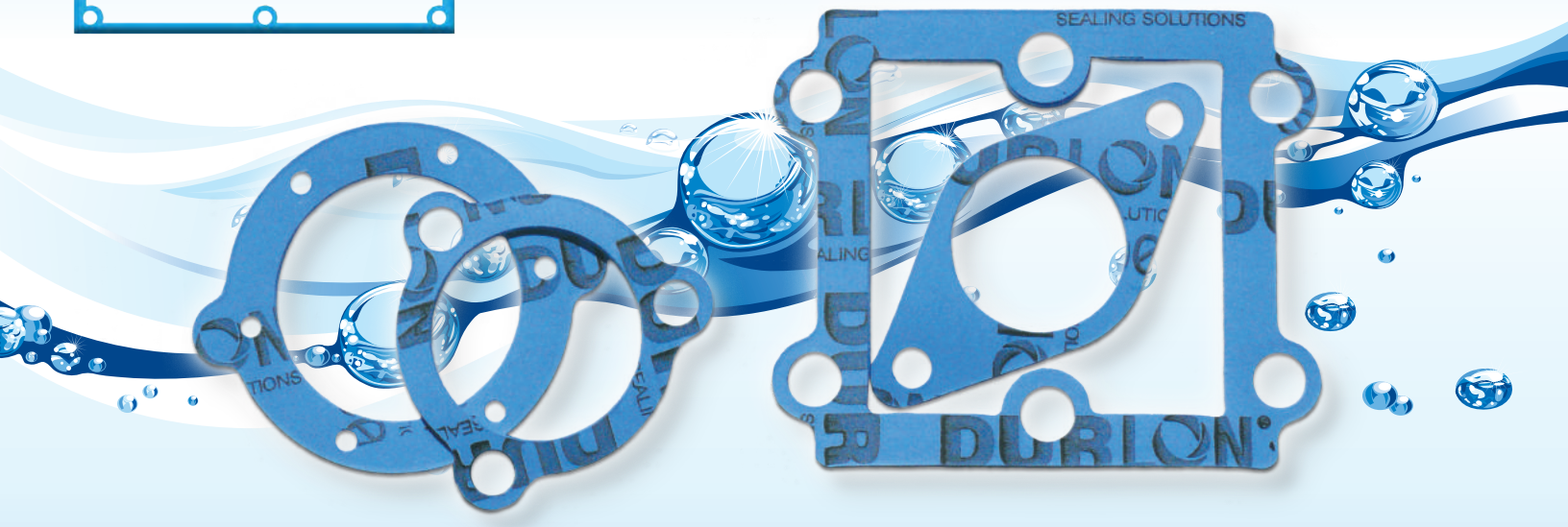
ALL CUSTOM GASKET
& MATERIALS LTD.



- PTFE
- METALLICS
- COMPRESSED NON-ASBESTOS
- CUSTOM FABRICATION

GASKET MANUAL

Our Sealing Products

Durlon® Sealing Products have the widest possible range of service applications in comparison to major competitors, 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® compressed gasket materials are high-density products featuring the most homogenous combination of minerals, synthetic fibres, and elastomers. They are used in a wide variety of industries on a broad range of chemical applications at varying temperatures and pressures. Their excellent flexibility prevents large, narrow flange gaskets from breaking during cutting and installation, and their superior recovery ensures tight sealing during thermal cycling.

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 customer's expectations and requirements
- Continual improvements of our products, services and processes
- Remembering that we are here because of our customers

Additional features

- Close-range compressibility for consistency and accurate spacing
- Reliability backed by many years of experience
- Local distribution for quick and easy delivery
- Branding for easy identification and assurance of genuine Durlon® gasket material helps prevent misapplication
- All full-sized sheets are date coded and quality assurance traceable
- A release agent on both sides of the sheet ensures good anti-stick properties
- Durlon® filled PTFE and flexible graphite gasket materials complement our compressed sheet family, by giving you the right gasket for all of your gasket needs.

Durlon® products are used in virtually every industrialized corner of the world. Our gasket materials are manufactured to ISO 9001 quality standards and are subjected to continuous testing and rigid quality control, ensuring 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, as well as various regulations in other countries. One of our prime design objectives is to maximize the sealability of our gasket materials to meet and exceed fugitive emission requirements.

DURLON®
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Gasket Fundamentals

Finishes

It is common for pipe flange finishes to vary depending on the age and condition of the piping and the gasket material considered in the initial design. Concentric-serrated finishes are most commonly used in industry, with spiral-serrated (phonographic) finishes being less prevalent. The recommended flange finish depends on the type of gasket being used. The following table illustrates Durlon®'s recommended flange surface finishes by gasket type.

The finish or the condition of the gasket seating surface has a definite effect on the ability of the gasket to create a seal. Soft gaskets made from sheet material are designed to have a seating stress that allows the gasket material to "flow" into the serrations and irregularities of the flange face. The serration's "bite" aids the gasket in resisting the effects of internal pressure, creep, and cold flow.

"Smooth" finishes are usually found on machinery or flanged joints other than pipe flanges. When working with a smooth finish, it is important to consider using a thinner gasket to lessen the effects of creep and cold flow. It should be noted, however, that both a thinner gasket and the smooth finish, in and of themselves, require a higher compressive force (i.e. bolt torque) to achieve the seal. Therefore, due to the flange design, one may have to resort to a thicker gasket, which requires a lower compressive force to seat the gasket. Another way to seat the gasket, when there is insufficient compressive force available, is to lessen the area of the gasket. This can sometimes be accomplished by using a Durlon® RCA (Reduced Contact Area) style gasket, or by simply modifying the seating dimensions of the gasket.

Gasket Description	Gasket Cross Section	Flange Surface Finish Microinch Ra.	Flange Surface Finish Micrometre Ra.
Metallic Serrated Gaskets		63 Max.	1.6 Max.
Spiral Wound Gaskets		125 - 250	3.2 - 6.3
Kammprofile Gaskets		125 - 250	3.2 - 6.3
CFG / Durtec		125 - 250	3.2 - 6.3

Flange Types

The majority of flange materials used in industry are metallic and come in a variety of metallurgies, depending on the nature of the application's pressure, temperature and media requirements. Some applications require non-metallic flange materials, such as reinforced plastic, glass-lined steel, and glass. However, these materials are less robust and "softer" gasketing materials must be used.

The most common industrial use flange types are: Raised Face (RF); Flat Face or Full Face (FF); Tongue and Groove (T&G); Male and Female (MF) or Spigot; Flat Face and Groove (FF&G); and Ring Type Joint (RTJ) or API Ring.

It is always recommended to contact a Durlon® Applications Engineer for precise installation information regarding any flange type, however, there are two conditions which must be addressed with the Applications Engineer: Full Face Flanges and Raised Face to Full Face Flanges. **(see next page)**

Gasket Fundamentals

FULL FACE FLANGES

In a bolted joint using ANSI full face (or flat face) flanges, it must be remembered that the same bolts used in the corresponding raised face joint are now being asked to seal three to four times the gasket area with full face flanges. It is almost impossible to create an effective seal and high strength bolts should be considered. ANSI Class 150 full face bolted joints are poor design and should only be used for non-critical fluids.

RAISED FACE to FULL FACE

We do not recommend mating a full face flange to a raised face flange especially when the full face flange is cast or ductile iron. So as not to warp the flange, or worst case, crack it, the utmost care should be taken. Even if a spacer that fits on the raised face flange outside the raised face area is used, damage to the flanges can still occur.

Fasteners

Bolted flange connections are only as good as the fastener system being used and unfortunately the fastener system is often overlooked within the system. The majority of fastener systems being used in the industrial world are threaded. The fastener system consists of at least the bolt/stud and the nut but it is recommended to also include washers.

Bolts, studs, and nuts should be of sufficient strength to achieve proper compression of the gasket, not only to seal the joint, but to maintain the seal without exceeding the yield strength of the bolts being used. The torque values in our torque tables (p. 49 - 53) are based on ASTM A193 Grade B7 studs and 2H heavy hex nuts lubricated with anti-seize paste (K=0.17).

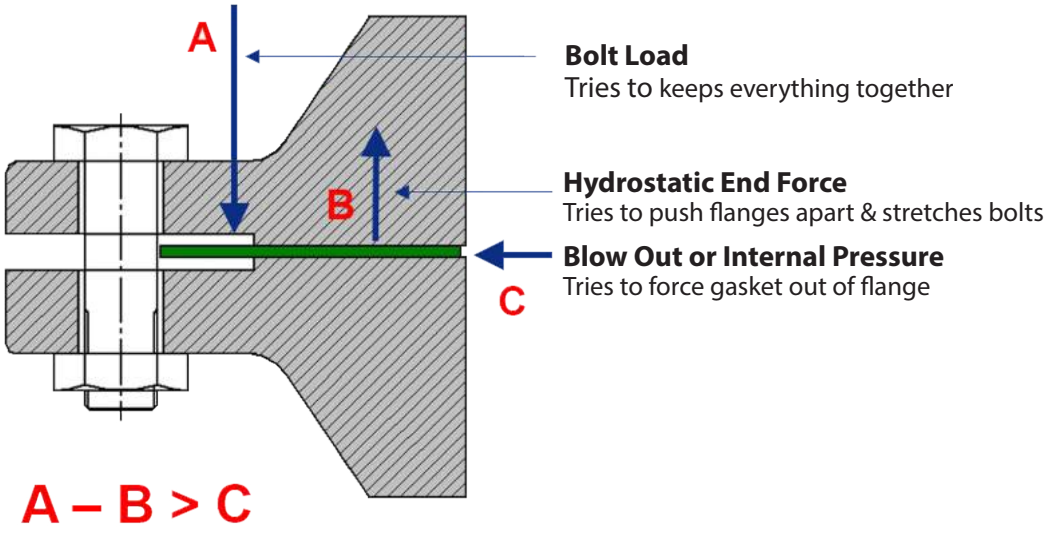
The application and distribution of torque can be improved through the use of washers under the head of the bolt and between the flange and nut. Washers effectively reduce the friction between the turning surfaces of the nut and bolt head to the flange, thus translating into a more accurate load being applied to the gasket. For standard applications it is recommended to use through-hardened washers, in order to prevent washer galling.

Since sheet gasket materials have micropores, they must be sufficiently compressed to reduce porosity. Without adequate compression, the system pressure can force the contained fluid into the gasket and degrade it. Therefore, when installing the gasket, it is important that good technique be followed. This includes cleaning the flanges, inspecting the flange face and the bolts, and bringing the flanges together parallel as well as in stages. Many field problems arise from improperly installed gaskets. Refer to the Bolt Tightening Worksheet (p. 47) for more information on installation procedures.

The Seal

The purpose of a gasket is to create a static seal between two stationary flanges. The seal itself is effected by achieving the proper compression on the gasket, thus causing it to flow into the imperfections on the surface of the flange. This results in a tight, unbroken barrier, impervious to the fluid being contained.

In many instances, a good seal is obtained through the limited "swell" caused by the reaction of the inside edge of the gasket material with the fluid being contained. A certain amount of swell is desirable, as long as it reaches an equilibrium and does not reach a condition of degradation where the gasket begins to breakdown. In many instances, the fluid being contained may "cauterize" the inside edge of the gasket and "seal off" the gasket from further fluid penetration.

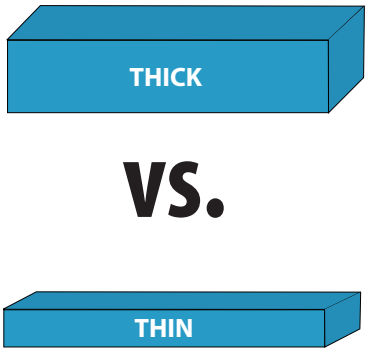


Gasket Fundamentals

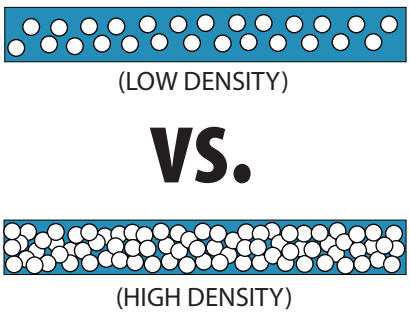
Torque

Proper gasket selection and installation should be based on minimizing torque loss. Torque loss can be caused by the tendency of the gasket to relax or remold after it has been compressed and/or by elongation of the bolts. This loss can be minimized several ways:

(1) Use of a thinner gasket: The surface of the gasket is actually the sealing surface. The internal portion of the gasket is used primarily to ensure that the imperfections in the sealing surface are filled. Since it is this internal portion that is primarily effected by creep relaxation, the thinner the gasket, the more effective the seal. However, if the surface to be sealed is pitted, marred or somewhat distorted, it may not be feasible to switch to a thinner gasket.

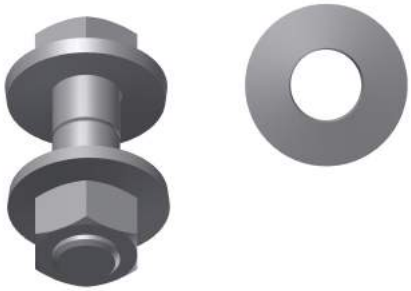


(2) Use of a denser gasket: In general, the denser the gasket material, the less creep relaxation will occur. With materials of similar composition, greater density will require greater seating stresses to seal. Therefore, some lighter flanges may not be strong enough to use with a denser material.



(3) Use of a conical washer: The elastic effect of a conical washer helps to compensate for some of the loss in gasket resilience. The washer also lengthens the bolt to a slight degree, lessening the effect of bolt elongation.

(4) Greater bolt load: The use of stronger bolts or more bolts can also help in the reduction of torque loss. Care should be taken to insure that the maximum loads on the bolts are not exceeded.



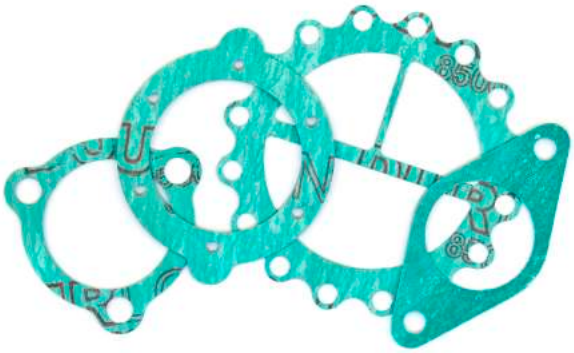
Washers and Placement

Typical ASTM Bolts/Nut Materials used in Bolted Flange Connections

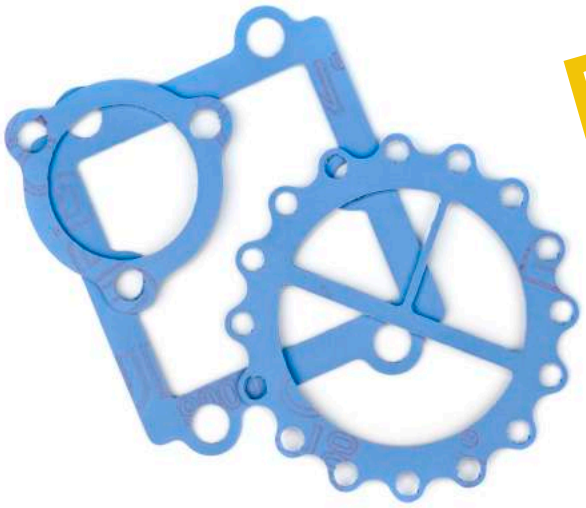
Bolt Grade Designation	Nut Grade Designation	Bolt Yield Strength [1]	Applications
A 193 B7/L7	A 194 2H	517 to 724 MPa (75 to 105 ksi)	General Use
A 193 B16	A 194 7	586 to 724 MPa (85 to 105 ksi)	High Temperatures
A 193 B8 cl. 2 [2]	A 194 8	345 to 689 MPa (50 to 100 ksi)	Higher Temperatures & Stainless Steel Flanges
A 193 B8M cl. 2 [2]	A 194 8M	345 to 655 MPa (50 to 95 ksi)	Higher Temperatures & Stainless Steel Flanges
A 320 L7	A 194 4 or 7	517 to 724 MPa (75 to 105 ksi)	Cryogenic & Low Temperature

1 – Yield strength at room temperature varies with bolt/stud nominal diameter.
2 – Bolt/stud A 193 B8 cl. 1 and A 193 B8M cl.1 have yield strength less than the cl. 2 listed in the table. The difference frequently is not recognized and has been the cause of failures.

SAFE.



RELIABLE.



DURLON®
SEALING SOLUTIONS

VERSATILE.

DURLON®
SEALING SOLUTIONS

5300

ASTM F104: F713110-A9B4E12K5L051M5

Mineral/NBR

Durlon® 5300 is a good quality commercial grade compressed non-asbestos sheet for moderate service conditions, where an ABS certified gasket material is required. Durlon® 5300 is suitable for steam, oil, water, mild alkalis, mild acids, hydrocarbons, and solvents.

Durlon® 5300

Typical Properties

Colour	Rust
Fibre System	Mineral
Binder	NBR
Temperature Min Max Max, continuous	 -73ºC (-100ºF) 288ºC (550ºF) 232ºC (450ºF)
Pressure, max, bar (psi)	69 (1,000)
Density, g/cc (lbs/ft^3)	1.7 (106)
Compressibility, % ASTM F36	7 - 17
Recovery, % ASTM F36	40
Creep Relaxation, % ASTM F38	25
Tensile Strength across grain ASTM F152, MPa (psi)	10.3 (1,500)
Fluid Resistance, ASTM F146 IRM 903 Oil 5 hrs at 300ºF Thickness Increase, % Weight Increase, % ASTM Fuel B 5 hrs at 70ºF Thickness Increase, % Weight Increase, %	 5 15 5 15
Nitrogen Sealability, cc/min ASTM F2378	0.1
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 1/8" 1.5 2.5 1,855 (12.8) 2,619 (18.1) 474 (3.3) 902 (6.2) 0.256 0.253 48 (0.3) 4 (0.03)
Flexibility ASTM F147	10x

* See note on ASTM testing properties on page 59.

Certifications

ABS-PDA Certificate	American Bureau of Shipping
RoHS	Compliant

Applications

Durlon® 5300 has been developed to meet the demanding applications found on ships and mobile offshore platforms, while taking into account the economic value that these customers require. With many years of performance material experience, Durlon® has established style 5300 as an easy-to-cut, reliable, and quality gasket material for applications where fire safety has not been specified. Durlon® 5300 is design assessed by the American Bureau of Shipping (ABS) for use in pipe and vessel flanges, and is ideally suited for water, oil, gasoline, and aliphatic hydrocarbon applications. When performance at sea is required, Durlon® 5300 is a trusted and certified ABS solution.

DURLON®
SEALING SOLUTIONS

DURASWELL 7760

ASTM F104: F729990-B5E09L100M9

Aramid-Inorganic/SBR

Durlon® DuraSwell 7760 is gasket material for demanding applications that require excellent sealability, conformity to flange surfaces, and recovery. The material is designed to swell when in contact with oils and fuels, helping to increase the gasket stress for applications that require increased gasket loading and may be previously limited because of insufficient bolting or flange constraints. Applications include water, fuel, oils, coolants, and heavy duty equipment applications such as oil pan covers, gear case, and flywheel housings.

Durlon® 7760

Typical Properties

Colour	Off-White
Fibre System	Synthetic
Binder	Proprietary Blend SBR
Temperature Min Max Max, continuous	 -73°C (-100°F) 344°C (650°F) 205°C (400°F)
Pressure Max, bar (psi) Continuous, bar (psi)	 69 (1000) 34.5 (500)
Density, g/cc (lbs/ft^3) ASTM F1315	1.65 (103)
Compressibility, % ASTM F36	7-17
Recovery, % ASTM F36	50
Creep Relaxation, % ASTM F38	30
Tensile Strength ASTM F152	14.8 (2,100)
Fluid Resistance, ASTM F146 IRM 903 Oil 5hrs at 300°F Thickness Increase, % Weight Increase, % ASTM Oil #1 5hrs at 70°F Thickness Increase, % Weight Increase, %	 <75 <50 15-30 <30
Nitrogen Sealability, cc/min ASTM F2378	0.01
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 6.9 2,412 95 (0.655) 0.609 4 (0.027)
Flexibility ASTM F147	4x

* See note on ASTM testing properties on page 59.

Benefits

- Superior sealing of uneven flange surfaces
- Excellent bolt torque retention
- Tight seal for low bolt load applications
- Ideal for compressors, gear boxes, and transformers
- Better and longer performance life than elastomeric gaskets
- Will not weep – controlled cure process finished the cure cycle after fluid absorption and swell on the ID exposed area
- Seals tighter and accepts higher system pressure than vegetable fibre gaskets
- Controlled swell engineering ensures flange bolts are not overstressed
- Swell characteristics significantly reduce creep relaxation, as compared to vegetable fibre and elastomeric gaskets

DURLON®

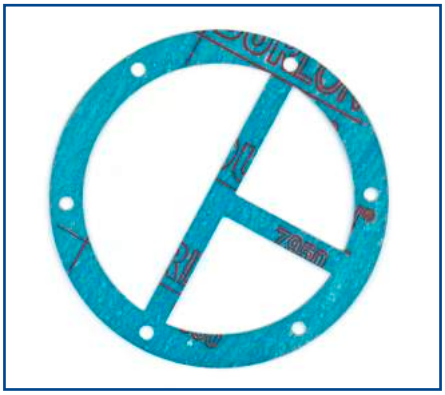
SEALING SOLUTIONS

7900/7925/7950

ASTM F104: F712120-A9B3E22K5L151M5

Aramid/NBR

Durlon® 7900/7925/7950 are economy grade general service sheets with NBR rubber binder for mild service in piping and equipment with applications in steam, hydrocarbons and refrigerants. An economical alternative when service ranges and applications are not severe.



Durlon® 7950

Typical Properties

Colour	7900 - Off-White 7925 -Lgt. Green 7950 - Blue	
Fibre System	Aramid-Inorganic	
Binder	NBR	
Temperature Min Max Max, continuous	 -73°C (-100°F) 371°C (700°F) 260°C (500°F)	
Pressure, max, bar (psi)	83 (1,200)	
Density, g/cc (lbs/ft^3)	1.7 (106)	
Compressibility, % ASTM F36	7 - 17	
Recovery, % ASTM F36	40	
Creep Relaxation, % ASTM F38	20	
Tensile Strength across grain ASTM F152, MPa (psi)	11 (1,600)	
Fluid Resistance, ASTM F 146 IRM 903 Oil 5 hours at 149°C (300°F) Thickness Increase, % Weight Increase, % ASTM Fuel B 5 hours at 21°C (70°F) Thickness Increase, % Weight Increase, %	 0 - 15 15 0 - 10 12	
Sealability, cc/min ASTM 2378 (Nitrogen) Sealability, ml/hr ASTM F37 (Fuel A) ASTM F37 (Nitrogen)	0.05 0.03 0.5	
Gasket Factors m Y, psi (MPa) G_s, psi (MPa) a G_s, psi (MPa)	1/16" 3.0 3,347 (23.1) 497 (3.4) 0.226 3 (0.02)	1/8" 3.2 3,385 (23.3) 486 (3.4) 0.276 0.4 (0.003)
Flexibility, ASTM F147	10x	

* See note on ASTM testing properties on page 59.

Certifications

California Proposition 65	Compliant
RoHS	Compliant

Benefits

- Unsurpassed sealability drastically lowers emission levels
- General purpose sheet outperforms traditional economy sheets
- Anti-stick coating reduces time spent removing gaskets
- Good compressibility and recovery maintains a tight seal
- Cuts easily and cleanly
- Consistency of ingredients provides improved handling
- Minimal wear on tooling

DURLON®

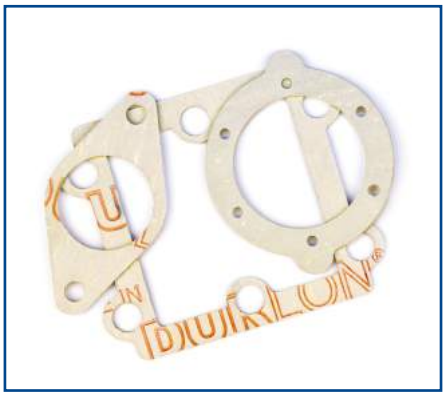
SEALING SOLUTIONS

7910

ASTM F104: F712120-A9B3E22K5L151M5

Aramid-Inorganic/ NBR

Durlon® 7910 is a good quality commercial grade compressed sheet gasket material for moderate service conditions. It was specifically developed to meet the requirement of NSF/ANSI 61 for potable water application 23ºC (73ºF) to commercial hot to 82ºC (180ºF).



Durlon® 7910

Typical Properties

Colour	White
Fibre System	Aramid/Inorganic
Binder	NBR
Temperature Min Max Max, continuous	 -73°C (-100°F) 371°C (700°F) 260°C (500°F)
Pressure, max, bar (psi)	83 (1,200)
Density, g/cc (lbs/ft³)	1.7 (106)
Compressibility, % ASTM F36	9 - 20
Recovery, % ASTM F36	40
Creep Relaxation, % ASTM F38	25
Tensile Strength across grain ASTM F152, MPa (psi)	11 (1,600)
Fluid Resistance, ASTM F 146 IRM 903 Oil 5 hours at 149°C (300°F) Thickness Increase, % Weight Increase, % ASTM Fuel B 5 hours at 21°C (70°F) Thickness Increase, % Weight Increase, %	 0 - 15 15 0 - 10 12
Dielectric Breakdown, kV/mm (V/mil) ASTM D149	11.0 (279)
Sealability, cc/min ASTM 2378 (Nitrogen) Sealability, ml/hr ASTM F37 (Nitrogen)	0.05 0.5

Gasket Factors	1/16"	1/8"
m	1.5	1.5
Y, psi (MPa)	2,416 (16.7)	3,576 (24.7)
G_b, psi (MPa)	502 (3.5)	736 (5.1)
a	0.289	0.237
G_s, psi (MPa)	0.001 (0)	9.1 (0.06)

* See note on ASTM testing properties on page 59.

Certifications

NSF/ANSI 61	Certified to meet the requirement of NSF/ANSI 61 for potable water application at 23ºC (73ºF) to commercial hot to 82ºC (180ºF)
MIL-G-24696B Navy Adhesion Test	186°C (366°F)/48 hrs.

NSF/ANSI 61 Gaskets

The importance of safe, clean drinking water is extremely important to Triangle Fluid Controls. With the world's increasing focus on potable water safety, NSF 61 has taken the lead on setting standards for all materials that come into contact with drinking water. We have developed and obtained NSF 61 certification for Durlon® 7910 gasket material to enable all customers affected by new regulations to remain compliant. With our history of developing premium performance sealing products, you can trust that Durlon® 7910 is your material of choice for safety and long-term reliability. Durlon® 7910 is easy to cut and available in sheet sizes up to 3048 mm x 3200 mm (120" x 126") which allows for very large diameter single-piece gaskets to be cut and eliminates leak paths created from segmented cuts from smaller sheet materials.

NSF®

Certified to NSF/ANSI 61

Durlon® 7910 manufactured by Durabla Canada Ltd.

DURLON®

SEALING SOLUTIONS

8300

ASTM F104: F712120-A9B3E22K5L311M5

Carbon/NBR

Durlon® 8300 is our premium grade, multi-service, high strength carbon fibre and NBR gasket sheet. It is designed to handle the extremes of pressure and temperature. As with all of our premium products, the versatility of this sheet enables the end user to standardize on one sheet for a multitude of applications and avoid the confusion of having to choose fromseveral different sheets.

Specifically designed for applications commonly found in the power generation and chemical processing industries, Durlon® 8300 maintains excellent sealability during thermal cycling, even in steam, hot oil, aliphatic hydrocarbons, natural gas, gasoline, solvents, inert gases, mild alkalis and acids.

Typical Properties

Colour	Black	
Fibre System	Carbon	
Binder	NBR	
Temperature Min Max Max, continuous	 -73°C (-100°F) 482°C (900°F) 343°C (650°F)	
Pressure, max, bar (psi)	139 (2,000)	
Density, g/cc (lbs/ft³)	1.6 (100)	
Compressibility, % ASTM F36	8 - 16	
Recovery, % ASTM F36	50	
Creep Relaxation, % ASTM F38	18	
Tensile Strength across grain ASTM F152, MPa (psi)	12.4 (1,800)	
Fluid Resistance, ASTM F 146 IRM 903 Oil 5 hours at 149°C (300°F) Thickness Increase, % Weight Increase, % ASTM Fuel B 5 hours at 21°C (70°F) Thickness Increase, % Weight Increase, %	 0 - 10 10 0 - 10 12	
Sealability ASTM F37 (Fuel A), ml/hr ASTM F37 (Nitrogen), ml/hr ASTM F2378 (Nitrogen), cc/min	 0.03 0.5 0.05	
Volume Resistivity, ohm-cm ASTM D257	5.0 x 10^9	
Dielectric Breakdown ASTM D149, kV/mm (V/mil)	0.04 (1)	
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 3.7 3,515 (24.2) 512 (2.5) 0.355 13 (0.09)	1/8" 3.0 4,014 (27.7) 1,716 (11.8) 0.209 70 (0.5)
Flexibility, ASTM F147	10x	

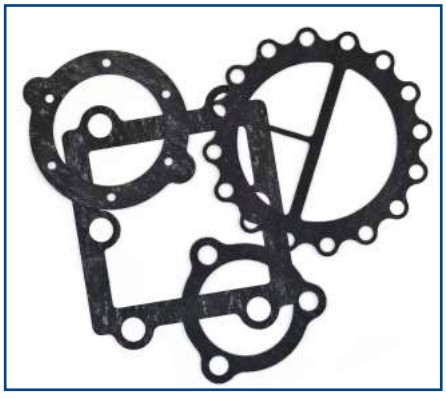
* See note on ASTM testing properties on page 59.

Certifications

California Proposition 65	Compliant
RoHS	Compliant

Benefits

- Chemical and thermal versatility
- Broad range of chemical and thermal services
- Emissions control
- Maintains tight seal during thermal cycling in saturated steam and hot oils
- Very good chemical resistance
- Easy to install and remove
- Much easier to handle, install, and remove than traditional graphite high temperature gaskets
- Anti-stick coating for ease of removal



Durlon® 8300

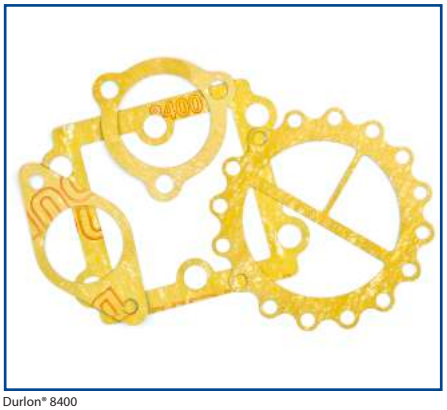
DURLON®
SEALING SOLUTIONS

8400

ASTM F104: F712120-A9B4E22K5L911M5

Phenolic/NBR

Durlon® 8400 is our outstanding next generation material that provides the widest range of chemical resistance of any compressed asbestos-free material available today. It's designed for high pH applications in the demanding services found in the pulp & paper, chemical processing, and power generation industries where traditional compressed gasket materials have fallen short.



Durlon® 8400

Typical Properties

Colour	Gold
Fibre System	Phenolic
Binder	NBR
Temperature Min Max Max, continuous	 -73°C (-100°F) 427°C (800°F) 290°C (554°F)
Pressure, max, bar (psi)	103 (1,500)
Density, g/cc (lbs/ft^3)	1.7 (106)
Compressibility, % ASTM F36	8 - 16
Recovery, % ASTM F36	50
Creep Relaxation, % ASTM F38	25
Tensile Strength across grain ASTM F152, MPa (psi)	12.4 (1,800)
Fluid Resistance, ASTM F 146 IRM 903 Oil 5 hours at 149°C (300°F) Thickness Increase, % Weight Increase, % ASTM Fuel B 5 hours at 21°C (70°F) Thickness Increase, % Weight Increase, %	 0 - 15 15 0 - 10 15
Sealability ASTM F37 (Fuel A), ml/hr ASTM F37 (Nitrogen), ml/hr ASTM F2378 (Nitrogen), ml/hr	 0.01 0.3 0.03
Volume Resistivity, ohm-cm ASTM D257	3.1 x 10^{13}
Dielectric Breakdown, ASTM D149, kV/mm (V/mil)	14.6 (371)
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 1/8" 2.9 4.5 2,410 (16.6) 3,967 (27.4) 2,000 (13.8) 1,076 (7.4) 0.194 0.289 340 (2.3) 9.4 (0.7)
Flexibility, ASTM F147	8x

* See note on ASTM testing properties on page 59.

Certifications

California Proposition 65	Compliant
RoHS	Compliant

Benefits

- Temperature and chemical resistant
- Our ingredients and manufacturing methodology results in superior sealing in a wide range of difficult chemical services
- Perfect for OEM applications such as pump casings, valves, and filters
- Perfect for flange insulation kits
- Unsurpassed dielectric break-down and volume resistivity
- Excellent torque retention to maintain Cathodic Protection (CP)
- MIL-G-24696B

DURLON®

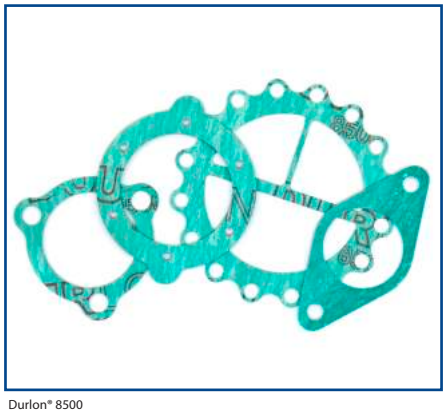
SEALING SOLUTIONS

8500

ASTM F104: F712120-A9B3E12K5L151M6

Aramid-Inorganic/ NBR

Durlon® 8500, our general-purpose "workhorse" material, contains our unique blend of high strength aramid and inorganic fibres, providing excellent results in steam, hydrocarbons, and new generation refrigerants. Durlon® 8500 passed the API 6FB fire test at an independent laboratory and has proven to be reliable in situations where temperature and pressure cycling causes failures of lesser quality materials.



Durlon® 8500

Typical Properties

Colour	Green
Fibre System	Aramid-Inorganic
Binder	NBR
Temperature Min Max Max, continuous	 -73°C (-100°F) 371°C (700°F) 287°C (548°F)
Pressure, max, bar (psi)	103 (1,500)
Density, g/cc (lbs/ft^3)	1.7 (106)
Compressibility, % ASTM F36	8 - 16
Recovery, % ASTM F36	50
Creep Relaxation, % ASTM F38	20
Tensile Strength across grain ASTM F152, MPa (psi)	13.8 (2,000)
Fluid Resistance, ASTM F 146 IRM 903 Oil 5 hours at 149°C (300°F) Thickness Increase, % Weight Increase, % ASTM Fuel B 5 hours at 21°C (70°F) Thickness Increase, % Weight Increase, %	 0 - 15 15 0 - 10 12
Sealability ASTM F37 (Fuel A), ml/hr ASTM F37 (Nitrogen), ml/hr ASTM F2378 (Nitrogen), ml/hr	 0.01 0.4 0.03
Volume Resistivity, ohm-cm ASTM D257	4.2 x 10^{13}
Dielectric Breakdown ASTM D149, , kV/mm (V/mil)	11.7 (297)
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 1/8" 2.7 4.2 2,359 (16.3) 2,931 (20.2) 650 (4.5) 400 (2.8) 0.330 0.350 200 (1.4) 20 (0.1)
Flexibility, ASTM F147	10x

* See note on ASTM testing properties on page 59.

Certifications

California Proposition 65	Compliant
RoHS	Compliant
API 6FB Fire Test Burn Period: Avg. Temperature: Test Pressure: Test Medium: Leask Rate:	 30 min. >650ºC (1202ºF) 40 bar (580 psi) Water 0.05 ml/(inch-min)

Benefits

- Versatile
- Our very best general purpose premium gasket material
- Thermal strength
- Our unique fibre matrix provides superior sealing in cyclical applications including steam and hot oils
- Passed the API 6FB fire test at an independent laboratory
- HVAC OEM service proven
- Durlon® 8500 has passed HVAC service fitness and compatibility test for most of the next generation refrigerants and lubricants

DURLON®

SEALING SOLUTIONS

8600

ASTM F104: F712440-A9B3E24K5L152M5

Aramid-Inorganic/ SBR

Durlon® 8600 is an outstanding gasket material containing our unique blend of high strength aramid and inorganic fibres, providing excellent sealability in steam, condensate and dilute acids where a "white" gasket material or an SBR binder is required.

Durlon® 8600

Typical Properties

Colour	White
Fibre System	Aramid/Inorganic
Binder	SBR
Temperature Min Max Max, continuous	 -73°C (-100°F) 371°C (700°F) 287°C (548°F)
Pressure, max, bar (psi)	103 (1,500)
Density, g/cc (lbs/ft³)	1.7 (106)
Compressibility, % ASTM F36	8 - 16
Recovery, % ASTM F36	45
Creep Relaxation, % ASTM F38	20
Tensile Strength across grain ASTM F152, MPa (psi)	12.4 (1,800)
Fluid Resistance, ASTM F 146 IRM 903 Oil 5 hours at 149°C (300°F) Thickness Increase, % Weight Increase, % ASTM Fuel B 5 hours at 21°C (70°F) Thickness Increase, % Weight Increase, %	 15 - 30 30 5 - 20 30
Sealability ASTM F37 (Fuel A), ml/hr ASTM F37 (Nitrogen), ml/hr ASTM F2378 (Nitrogen), ml/hr	 0.03 0.5 0.05
Volume Resistivity, ohm-cm ASTM D257	4.2 x 10^{13}
Dielectric Breakdown ASTM D149, kV/mm (V/mil)	11.7 (297)

Gasket Factors	1/16"	1/8"
m	2.9	n/a
Y, psi (MPa)	2,540 (17.5)	n/a
G_b, psi (MPa)	n/a	n/a
a	n/a	n/a
G_s, psi (MPa)	n/a	n/a

Flexibility, ASTM F147	8x

* See note on ASTM testing properties on page 59.

Certifications

California Proposition 65	Compliant
RoHS	Compliant

Benefits

- Thermal strength
- Our unique fibre matrix provides superior sealing in cyclical applications
- Passed MIL-G-24696B Navy Adhesion Test (366°F/48 hrs)
- Excellent hand and die cutting characteristics

DURLON®

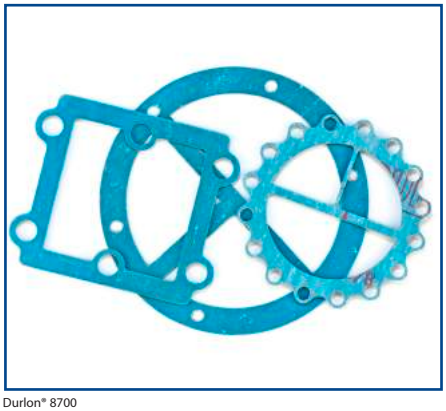
SEALING SOLUTIONS

8700

ASTM F104: F712330-A9B5E45K5L153M5

Aramid-Inorganic/ CR

Durlon 8700® is our premium neoprene (CR) gasket sheet, combined with our unique blend of high strength aramid and inorganic fibres. It provides excellent sealability in services such as ammonia containing refrigerant systems.



Durlon® 8700

Typical Properties

Colour	Blue
Fibre System	Aramid/Inorganic
Binder	CR
Temperature Min Max Max, continuous	 -73°C (-100°F) 371°C (700°F) 287°C (548°F)
Pressure, max, bar (psi)	103 (1,500)
Density, g/cc (lbs/ft³)	1.7 (106)
Compressibility, % ASTM F36	8 - 16
Recovery, % ASTM F36	45
Creep Relaxation, % ASTM F38	20
Tensile Strength across grain ASTM F152, MPa (psi)	10.3 (1,500)
Fluid Resistance, ASTM F 146 IRM 903 Oil 5 hours at 149°C (300°F) Thickness Increase, % Weight Increase, % ASTM Fuel B 5 hours at 21°C (70°F) Thickness Increase, % Weight Increase, %	 0 - 15 20 5 - 20 20
Sealability ASTM F37 (Fuel A), ml/hr ASTM F37 (Nitrogen), ml/hr ASTM F2378 (Nitrogen), ml/hr	 0.03 0.7 0.05
Volume Resistivity, ohm-cm ASTM D257	4.2 x 10^{13}
Dielectric Breakdown ASTM D149, kV/mm (V/mil)	11.7 (297)
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 1/8" 3.1 n/a 3,127 (21.6) n/a n/a n/a n/a n/a n/a n/a
Flexibility, ASTM F147	8x

* See note on ASTM testing properties on page 59.

Certifications

California Proposition 65	Compliant
RoHS	Compliant

Benefits

- Our top performer for original style HVAC OEM applications
- Proven to provide a tight seal in refrigerants, oils and fuels
- Passed MIL-G-24696B Navy Adhesion Test (366° F/48 hrs)
- Excellent hand and die cutting characteristics

DURLON® SEALING SOLUTIONS

8900

ASTM F104: F712120-A9B2E21L101M6

Aramid-Inorganic/ NBR

DURLON® 8900 is a premium grade compressed non-asbestos sheet gasket material for service conditions to 496°C (925°F) and continuous operating temperatures of -73°C to 400°C (-100°F to 752°F), or 13.8 MPa (2000 psi). It is suitable for saturated and superheated steam, oil, dilute acids and alkalis, hydrocarbons, and solvents. DURLON® 8900 has achieved the requirements of the Fire Test Certification ANSI/API 607, 6th Edition with zero leakage.

Durlon® 8900

Typical Properties

Colour	Black
Fibre System	Aramid/Inorganic
Binder	NBR
Temperature Min Max Max, continuous	 -73°C (-100°F) 496°C (925°F) 400°C (752°F)
Pressure, max, bar (psi)	138 (2,000)
Density, g/cc (lbs/ft^3)	1.6 (100)
Compressibility, % ASTM F36	7 - 17
Recovery, % ASTM F36	50
Creep Relaxation, % ASTM F38	15
Tensile Strength across grain ASTM F152, MPa (psi)	13.8 (2,000)
Fluid Resistance, ASTM F 146 IRM 903 Oil 5 hours at 149°C (300°F) Thickness Increase, % Weight Increase, % ASTM Fuel B 5 hours at 21°C (70°F) Thickness Increase, % Weight Increase, %	 3 15 4 12
Sealability, cc/min ASTM 2378 (Nitrogen)	0.2
Volume Resistivity, ohm-cm ASTM D991	4.01 x 10^0
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 1/8" 4.8 7.3 4,851 (33.4) 3,730 (25.70) 915 (6.3) 567 (3.9) 0.428 0.556 0.02 (0.0001) 0.26 (0.02)
Flexibility, ASTM F147	12x
Stress Relaxation, DIN 52913 @ 7,252 psi (50 MPa) 16 hr @ 347F (175C) 16 hr @ 572F (300C)	 6,500 (44.8) Minimum 6,000 (41.4) Minimum

* See note on ASTM testing properties on page 59.

Certifications

ANSI/API 607 Fire Test	6th Ed., Zero leakage

Benefits

- Thermal strength
- Our unique fibre matrix provides superior sealing in cyclical applications
- Passed MIL-G-24696B Navy Adhesion Test (366°F/48 hours)
- Excellent hand and die cutting characteristics

DURLON®

SEALING SOLUTIONS

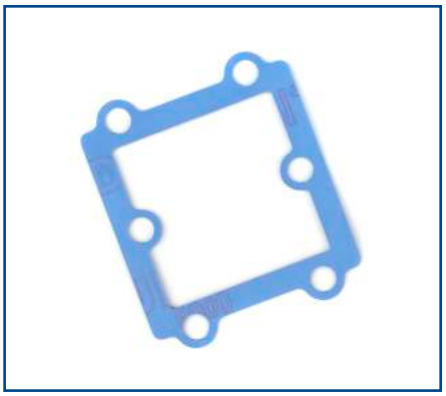
9000/9000N

ASTM F104: F452111-A9B5E11K6M6

Inorganic/PTFE

Durlon® 9000 (blue) and 9000N (white) are designed for use in process piping and equipment in chemical, pulp and paper, pharmaceutical, oxygen and industrial gases, food and beverage, and other general industrial applications, where physical properties such as non-contamination and resistance to highly aggressive chemicals are required.

Durlon® 9000/9000N is available in a continuous length sheet (varies depending on sheet thickness) providing gasket cutters with significantly improved material yields versus traditional sheet dimensions.



Durlon® 9000

Typical Properties

Colour	9000 - Blue 9000N - White
Filler System	Inorganic
Temperature Min Max Max, continuous	 -212ºC (-350ºF) 271ºC (520ºF) 260ºC (500ºF)
Pressure, max, bar (psi)	103 (1,500)
Density, g/cc (lbs/ft^3)	2.2 (138)
Compressibility, % ASTM F36	8 - 16
Recovery, % ASTM F36	40
Creep Relaxation, % ASTM F38	30
Tensile Strength across grain ASTM F152, MPa (psi)	13.8 (2,000)
Sealability, cc/min ASTM F2378	0.01
Volume Resistivity, ohm-cm ASTM D257	1.0 x 10^5
Dielectric Breakdown ASTM D149, kV/mm (V/mil)	16 (406)
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 1/8" 2.2 4.6 1,937 (13.4) 1,639 (11.3) 639 (4.4) 495 (3.4) 0.220 0.262 55 (0.4) 65 (0.4)

* See note on ASTM testing properties on page 59.

Certifications

TA-Luft (VDI Guidline 2440) Approved Temperature Exposure: Period of Exposure: Test Pressure (helium): Leak rate: Period of leak rate measured:	 180°C (356°F) 48 h 1 bar (14.5 psig) 7.55E-6 mbar*l(m*s) 24h
BAM- Oxygen Testing: a) Gaseous oxygen:	 Up to 52 bar (754 psig)
Pamphlet 95, The Chlorine Institute	Listed Table 3-1, for dry chlorine service and Table 3-3, for wet chlorine service
FDA	Conforms to the requirements of 21 CFR 177.1550 for food and drug contact
Reach Statement	Compliant
USP Class VI	121°C (250°F) for 30 min.

Benefits

- Versatile and reliable seal
- Recommended for a wide range of severe chemical services vs. competitive filled PTFE blends
- Maintains a tighter seal than conventional PTFE gasketing
- Has a higher bolt torque retention vs. other filled PTFE and conventional PTFE gasketing materials
- Exceptional performance in emissions control
- Does not exhibit cold flow problems associated with virgin or generic skived PTFE, or the hardness problems of some other filled PTFE products
- USP Class VI Certified
- ABS–PDA Certificate (American Bureau of Shipping)
- Complies with (EC) 1935/2004 & (EU) 10/2011
- DNV-GL (Det Norske Veritas - Germanischen Lloyd) Certificate No. 13 560 - 14HH

Teflon™ fluoroplastic

Durlon® 9000 is made with Teflon™ fluoropolymer. Teflon™ is a trademark of The Chemours Company FC, LLC used under license by Triangle Fluid Controls Ltd.

DURLON® SEALING SOLUTIONS

9002

ASTM F104: F452111-A9B5E11K6M6

Inorganic/PTFE

Modern gaseous and liquid oxygen services require extreme gasket performance flexibility in order to withstand the extremes that these services demand. Typically PTFE is not recommended for cryogenic applications, however, we have developed Durlon® 9002 as an adaptation of our original glass-filled formula to better meet these extreme system demands. Durlon® 9002 has passed both gaseous, up to 260°C (500°F) and 52 bar (754 psi), and liquid oxygen tests performed by BAM Federal Institute for Materials Research and Testing. Durlon® 9002 has also been tested for LOX Mechanical Impact Sensitivity, passing with zero reactions out of twenty tests (0/20) at a test reaction frequency of 0%.

Durlon® 9002 has the benefit of being readily available through our standard manufacturing process and requires no secondary heat or cleansing treatments prior to gasket cutting. Once gaskets are cut, traditional oxygen cleaning standards must be applied for safety. Triangle Fluid Controls also offers oxygen cleaned gaskets, bagged, labelled, and sealed according to the European Industrial Gases Association standard for Cleaning of Equipment for Oxygen Service.

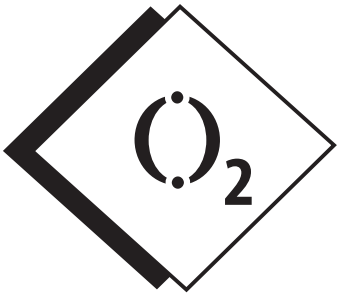
Typical Properties

Colour	Blue
Filler System	Inorganic
Temperature Min Max Max, continuous	 -212ºC (-350ºF) 271ºC (520ºF) 260ºC (500ºF)
Pressure, max, bar (psi)	103 (1,500)
Density, g/cc (lbs/ft³)	2.2 (138)
Compressibility, % ASTM F36	8 - 16
Recovery, % ASTM F36	40
Creep Relaxation, % ASTM F38	30
Tensile Strength across grain ASTM F152, MPa (psi)	13.8 (2,000)
Sealability, cc/min ASTM F2378	0.01
Volume Resistivity, ohm-cm ASTM D257	1.0 x 105
Dielectric Breakdown ASTM D149, kV/mm (V/mil)	16 (406)
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 1/8" 2.2 4.6 1,937 (13.4) 1,639 (11.3) 639 (4.4) 495 (3.4) 0.220 0.262 55 (0.4) 65 (0.4)

* See note on ASTM testing properties on page 59.

Certifications

BAM- Oxygen Testing: a) Gaseous oxygen: b) Liquid Oxygen	 Up to 52 bar (754 psig) 260°C (500°F)
FDA	Conforms to the requirements of 21 CFR 177.1550 for food and drug contact
LOX Mechanical Impact Sensitivity ASTM G86-98a	Zero reactions out of 20 0/20



Benefits

- Versatile and reliable seal
- Recommended for a wider range of severe chemical services than competitive filled PTFE blends
- Maintains a tighter seal than conventional PTFE gasketing
- Has a higher bolt torque retention than other filled PTFE and conventional PTFE gasketing materials
- Exceptional performance in emissions control
- Does not exhibit cold flow problems associated with virgin or generic skived PTFE, or the hardness problems of some other filled PTFE products

Durlon® 9002

DURLON®

SEALING SOLUTIONS

9200

ASTM F104: F452111-A9B5E11K6M6

Barium Sulfate/PTFE

Durlon® 9200 is a filled PTFE gasket material designed for use in process piping and equipment for use in the chemical, pulp and paper, food and beverage, and other general industrial applications. It can be used where resistance to highly aggressive chemicals is required.

The physical properties of Durlon® 9200 make it an excellent material option for low seating stress applications when traditional filled PTFE materials require more gasket load than is available. When combined with the Durlon® Reduced Contact Area (RCA) design, Durlon® 9200 can often outperform common ePTFE materials.

Typical Properties

Colour	Granite White (standard)
Filler System	Barium Sulfate
Temperature Min Max Max, continuous	 -212ºC (-350ºF) 271ºC (520ºF) 260ºC (500ºF)
Pressure, max, bar (psi)	103 (1,500)
Density, g/cc (lbs/ft^3)	2.5 (156)
Compressibility, % ASTM F36	8 - 16
Recovery, % ASTM F36	35
Creep Relaxation, % ASTM F38	30
Tensile Strength across grain ASTM F152, MPa (psi)	13.2 (1,920)
Nitrogen Sealability, cc/min ASTM 2378	0.01
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 1/8" 1.5 4.2 952 (6.5) 827 (5.7) 153 (1.1) 96 (0.66) 0.360 0.437 15 (0.1) 14 (0.1)

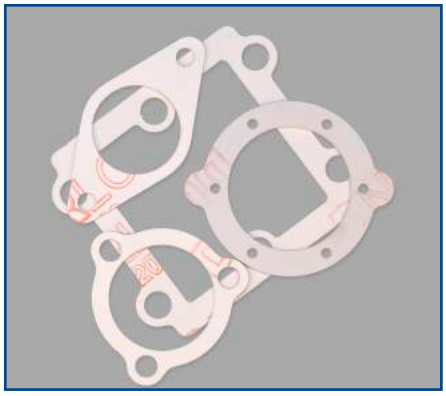
* See note on ASTM testing properties on page 59.

Composition

Barium sulfate fillers are homogeneously blended with pure PTFE resins to give Durlon® 9200 its physical and mechanical properties. Testing shows the fillers to be more evenly dispersed than filled PTFE with layered construction. The result is more consistent physical and mechanical properties without the voids, separation, and chemical compatibility problems found in layered filled PTFE. It is suitable for use in steel flanges and will not exhibit the cold flow problems associated with virgin or generic skived PTFE, or the hardness problems of some other filled PTFE products.

Certifications

FDA	Conforms to the requirements of 21 CFR 177.1550 for food and drug contact
Reach Statement	Compliant
ABS-PDA Certificate	American Bureau of Shipping
BAM- Oxygen Testing: a) Gaseous oxygen: b) Liquid Oxygen	 Up to 52 bar (754 psig) 260°C (500°F)



Durlon® 9200

DURLON®

SEALING SOLUTIONS

9400

ASTM F104: F452111-A9B5E11K6M6

Carbon/PTFE

Durlon® 9400 is made from pure PTFE resins and carbon fillers designed for use in piping and equipment for chemical, pharmaceutical, food, and other severe service industrial applications where chemical resistance and sealability are paramount. Durlon® 9400 does not exhibit cold flow problems associated with conventional PTFE. It has been developed to be used in hydrofluoric acid, anhydrous hydrogen fluoride (AHF) in railroad tank cars, and chemical plant applications where barium sulfate PTFE may not prove suitable.

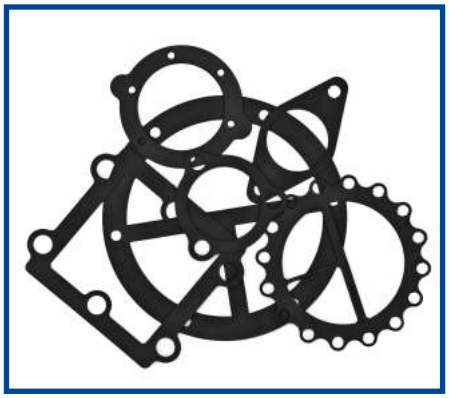
Typical Properties

Colour	Black
Filler System	Carbon
Temperature Min Max Max, continuous	 -212ºC (-350ºF) 288ºC (550ºF) 260ºC (500ºF)
Pressure, max, bar (psi)	103 (1,500)
Density, g/cc (lbs/ft^3)	2.1 (103)
Compressibility, % ASTM F36	5 - 12
Recovery, % ASTM F36	40
Creep Relaxation, % ASTM F38	30
Tensile Strength ASTM F152, MPa (psi)	14.5 (2,100)
Volume Resitivity, ohm-cc ASTM D257	0 - 14
Dielectric Breakdown, kV/mm ASTM D149, kV/mm (V/mil)	1 (33)
Nitrogen Sealability, cc/min ASTM 2378	0.01
Gasket Factors m Y, psi (MPa) G_b, psi (MPa) a G_s, psi (MPa)	1/16" 1/8" 6.8 6.8 2,765 (19.1) 3,105 (21.4) 1,701 (11.7) 1,412 (9.7) 0.173 0.164 99 (0.7) 248 (1.7)

* See note on ASTM testing properties on page 59.

Unique Characteristics

- The unique formulation of PTFE and carbon provides an extremely tight matrix for enhanced sealability in flanged applications
- Durlon® 9400 exhibits good electrical conducting properties for applications where flange electrical continuity is required
- Low compressibility reduces deformation under load



Durlon® 9400

Certifications

Reach Statement	Compliant

DURLON®

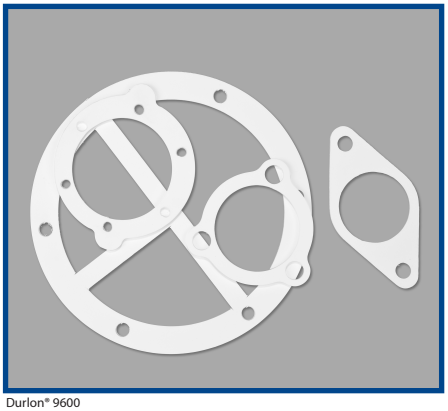
SEALING SOLUTIONS

9600

ASTM F104: F428111-A9B5

Expanded PTFE

Durlon® 9600 is a bi-axially expanded PTFE gasket material designed to seal at low loads and resist creep and cold flow while being able to withstand high flange load, and high pressure. Durlon® 9600 will easily conform to irregular surfaces that may be warped, etched, pitted, or tool marked. These characteristics make Durlon® 9600 your best choice for a broad range of aggressive chemicals where plastic flanges and low bolt loads are required.



Durlon® 9600

Typical Properties

Colour	White
Resin System	Pure PTFE
Temperature Min Max Max, continuous	 -212ºC (-350ºF) 316ºC (600ºF) 260ºC (500ºF)
Pressure, max, bar (psi)	124 (1,800)
Density, g/cc (lbs/ft^3)	0.8 (49.9)
Compressibility, % ASTM F36	40 - 60
Recovery, % ASTM F36	12
Creep Relaxation, % ASTM F38	30
Nitrogen Sealability, cc/min ASTM 2378	0.01
Gasket Factors G_b, psi a G_s, psi	1/16″ 1/8″ 1,200 (8.3) 1,400 (9.6) 0.2 0.2 3.5 (0.024) 1.5 (0.01)

* See note on ASTM testing properties on page 59.

Certifications

FDA	Conforms to the requirements of 21 CFR 177.1550 for food and drug contact
Reach Statement	Compliant
ABS-PDA Certificate	American Bureau of Shipping

Unique Characteristics

- Premium grade PTFE offers compressibility up to 60%
- Generates tight seals in cast iron valves, filters, and strainers
- Handles higher temperatures than filled PTFE
- Excellent performance in high pressures
- Conforms to irregular flange surfaces
- Conforms to FDA standards
- Superior containment of gases
- Exceptional service life
- The unique process of expanding Durlon® 9600 PTFE creates a high degree of fibrillation with nearly uniform strength in all directions
- Durlon® 9600's structure minimizes cold flow and creep while maximizing performance stability and reliability

DURLON®
SEALING SOLUTIONS

Virgin PTFE

Virgin PTFE

Durlon® Virgin PTFE gasket material is a high performance PTFE product designed for use in piping and equipment in chemical and other general industrial applications where resistance to highly aggressive chemicals (including hydrofluoric acid) is required. Durlon® Virgin PTFE is suitable for service to a maximum temperature of 260°C (500°F) or with pressures up to 1,250 psi (8.6 MPa).

Virgin PTFE sheet material is available in two grades: Skived and Mechanical (Reprocessed). Durlon® Virgin skived PTFE has better physical properties, is a good electrical insulator, and FDA approved. Durlon® Virgin Mechanical PTFE is recycled PTFE processed into skived or molded sheet. Both are 100% PTFE.

Typical Properties

Material	Skived	Reprocessed
Colour	White	White
Temperature Min Max	 -212ºC (-350ºF) 260ºC (500ºF)	 -212ºC (-350ºF) 260ºC (500ºF)
Pressure, max, bar (psi)	86 (1,250)	86 (1,250)
Density, g/cc (lbs/ft³)	2.1 (135)	2.1 (135)
Compressibility, % ASTM F36	12 - 20	18 - 25
Recovery, % ASTM F36	35 - 40	30 - 35
Creep Relaxation, % ASTM F38	40	50
Tensile Strength ASTM F152, MPa (psi)	2,800 (19.3)	1,500 (10.3)
Nitrogen Sealability, cc/min ASTM F2378	0.01	0.015
Gasket Factors m Y, psi (MPa)	 - -	1/16" 1/8" 3.0 3.0 1,500 (10.3) 1,700 (11.7)

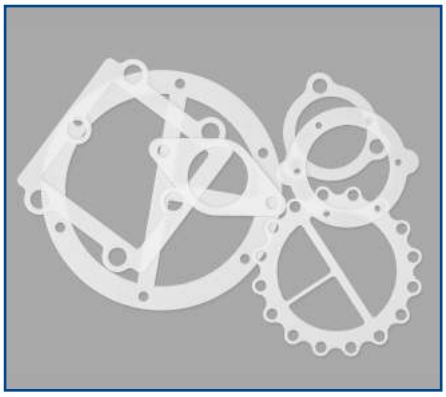
* See note on ASTM testing properties on page 59.

Certifications

FDA	Conforms to the requirements of 21 CFR 177.1550 for food and drug contact (Applies to Skived grade only)

Benefits

- Durlon® Virgin PTFE is a higher grade, purer material with better physical properties than Durlon® mechanical grade
- Virgin PTFE retains good flexibility in low temperature applications and exhibits good electrical insulation and high dielectric properties
- Durlon® Virgin PTFE is suitable for food contact where most mechanical grade PTFE's are not
- All Virgin PTFE is well suited for envelope gaskets which can be machined from small billets



Durlon® Virgin PTFE

DURLON®
SEALING SOLUTIONS

Joint Sealant

Durlon® Joint Sealant

Durlon® Joint Sealant is a highly fibrillated expanded PTFE form-in-place sealant for gasketed joints. Supplied on spools, it is not dependent on flange dimensions. Durlon® Joint Sealant comes in various thicknesses with a high quality adhesive backing to ease in installation, and is ideal for worn flanges of all sizes. It exhibits flexibility, compressibility, stability under high temperature, and high tensile strength. Durlon® Joint Sealant is chemically inert and resists creep relaxation to maintain a tight seal. Durlon® Joint Sealant conforms to the requirement of 21 CFR 177.1550 for food and drug (FDA) contact.

Typical Properties

Colour	White
Resin System	PTFE
Temperature Min Max	 -240°C (-400°F) 316°C (600°F)
Density, g/cc (lbs/ft^3)	0.85 (53)
Compressibility, % ASTM F36	72
Creep Relaxation, % ASTM F38	25
Nitrogen Sealability, cc/min ASTM F2378	0.05

* See note on ASTM testing properties on page 59.

Recommended Uses

NPS Class 150/300	DN	Joint Sealant (W x T x L)
2" - 4"	50 - 100	1/4" x 1/8" x 25 ft
5" - 8"	125 - 200	3/8" x 1/8" x 25 ft
10" - 16"	250 - 400	1/2" x 3/16" x 15 ft
18" - 24"	450 - 600	5/8" x 3/16" x 15 ft
26" - 48"	650 - 1,200	3/4" x 3/16" x 15 ft
48" and up	1,200	1" x 3/16" x 15 ft

Certifications

FDA	Conforms to the requirements of 21 CFR 177.1550 for food and drug contact
Reach Statement	Compliant

Composition

Durlon® Joint Sealant is made with only 100% pure PTFE resins and exhibits the same chemical resistance of virgin PTFE. Durlon® Joint Sealant is easily cut with scissors to the correct length. The FDA compliant adhesive backing holds the sealant in place while positioning around the flange inside the bolt circle to isolate the flow media. The ends should overlap 3/4" to 1" on either side of a bolt to ensure leak-tight performance. It is recommended to use a size about 40-50% of the sealing surface.

Durlon® Joint Sealant

Metallic Gasketing

To be able to achieve an effective seal, proper gasket selection must occur with metallic gaskets. The following elements must be considered when determining the correct gasket for the application.

Temperature

Most gaskets consist of two or more components or ingredients. The overall temperature resistance of a gasket is determined through analysis of the upper and lower limits for each component. There are two parts that need to be considered and verified when selecting the correct gasket material. The first part is to verify the metal component used to ensure the maximum temperature for the material is not exceeded. Secondly, the maximum temperature rating for the filler or facing material must be verified to ensure it is not exceeded. In most cases the filler/facing material will be the sacrificial element and will be the governing factor when selecting a semi-metallic gasket.

Chemical Compatability

The gasket must be resistant to chemical corrosion or chemical attack. The rate of corrosion is dependent on the time, temperature, and concentration of the media and must be considered when selecting both the gasket metallurgy and filler/facing material. For chemical compatibility of metals and semi-metallic gaskets, see pages 58 - 60.

Flange Compatability

The flange itself must be designed so that it can apply a sufficient amount of clamping force to ensure the flange serrations are biting into, or seating the gasket. Flange materials also need to be verified against the specified metallurgy in semi-metallic gaskets. If left unverified, it is possible for galvanic type corrosion to occur due to dissimilar metals. In the use of RTJ gaskets, the gasket must deform enough to create an effective seal. If the material of the gasket is harder than the flange, it will damage the flange; hence the material hardness is critical when dealing with RTJ flanges and gaskets.

Gasket Seating Stress

The gasket seating stress is the minimum force required to compress the gasket so that it forms an effective seal while resisting the blow out or internal pressure of the system. Seating stress must also be taken in consideration with both the gasket type and flange surface finish. The minimum and maximum seating stresses are product specific and recommended by the manufacturer, the table below shows the recommended minimum and maximum stresses for Durlon® metallic gasketing products.

Gasket Type/Style	Minimum Gasket Stress (1,3)		Maximum Gasket Stress (3)	
	psi	bar	psi	bar
Graphite Sheet	1,000 - 2,000	68.95 - 137.9	10,000 - 24,000	689.5 - 1,655
Premium Corrugated Gasket (Durtec)	2,500 - 4,000	172.4 - 275.8	15,000 - 35,000	1,034 - 2,413
Kammprofile (Grooved Metal Gaskets with Covering Layers)	2,500 - 4,000	172.4 - 275.8	35,000 - 40,000	2,413 - 2,758
Corrugated Gaskets (CFG)	4,000 - 5,000	275.8 - 344.7	15,000	1,034
Low Stress Spiral Wound Gasket	5,500	379.2	30,000 - 35,000	2,068 - 2,413
Spiral Wound Gasket	7,500 -10,000	517.1 - 689.5	30,000 - 35,000 (2)	2,068 - 2,413
HT1000®	(5)	-	30,000	2,068
Ring Type Joint (RTJ)	(6)	-	35,000 - 40,000 (2)	2,413 - 2,758

Notes:

1. Minimum gasket stresses shown do not necessarily ensure any specific level of leak tightness. They generally reflect minimum seating stresses found in published documents. Specific manufacturer's data may fall outside of this range.
2. Maximum gasket stress shown may be dependant upon gasket materials used.
3. The gasket stresses shown above are not specific to any given leak tightness class (ie. T1, T2, T3, etc.)
4. Maximum gasket stress based on gasket diameter.
5. Contact **tech@trianglefluid.com** with application specific details.
6. Minimum seating stress based on ring material selected.

DURLON® SEALING SOLUTIONS

Flexible Graphite

Durlon® Flexible Graphite is unaffected by heat over a wide range of temperatures. It exhibits low electrical resistivity, high thermal conductivity, and is suitable for cryogenic temperatures. Durlon® Flexible Graphite is suitable for applications in automotive, refining, and petrochemical plant processes.

Durlon® Flexible Graphite is available in several styles. These include homogeneous sheet and laminated styles with various types of core materials. Durlon® Flexible Graphite can also be special ordered with various inhibitors, grades of graphite and core materials to suit specific critical applications.

Nominal Thickness		Sheet Sizes in.	mm
1/32"	0.8mm	39.4 x 39.4	1,000 x 1,000
		59.1 x 59.1	1,500 x 1,500
1/16"	1.5mm	39.4 x 39.4	1,000 x 1,000
		59.1 x 59.1	1,500 x 1,500
1/8"	3.0mm	39.4 x 39.4	1,000 x 1,000
		59.1 x 59.1	1,500 x 1,500

Sizes & Types

FGS95

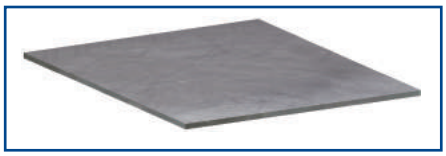
Standard industrial grade sheet containing no binders or resins. This product is used in industrial applications such as oil refineries, power plants, and chemical process plants.

FGL316

Standard industrial grade sheet laminated with an adhesive bond on both sides of a 0.05 mm (0.002") thick 316 stainless steel foil core. This product is used where high performance and handleability are important.

FGT316

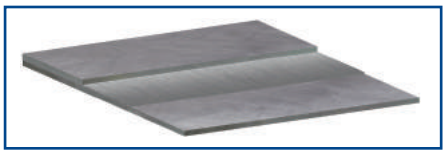
Standard industrial grade sheet mechanically bonded on both sides of a 0.10 mm (0.004") thick 316 stainless steel tang core. This product is used where stresses and pressures are high and improved handleability is important.



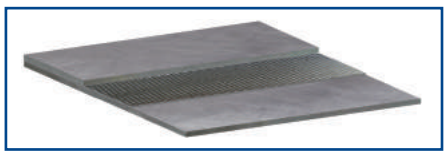
Durlon® Flexible Graphite - FGS95

FGM316

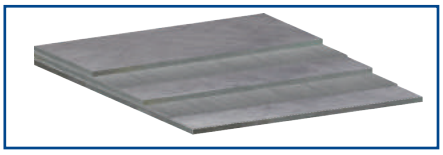
Multiple layers of premium industrial grade graphite and 0.05 mm (0.002") thick 316 stainless steel foil with high mechanical strength and rigidity for a wide range of temperature and pressure fluctuations. Layers are bonded together with premium grade adhesive to ensure stable material for cutting and installation. This fire safe gasket is suitable for refining, rail tank cars, and petrochemical plant processes.



Durlon® Flexible Graphite - FGL316



Durlon® Flexible Graphite - FGT316



Durlon® Flexible Graphite - FGM316

Physical Properties

Physical Properties				
Material	FGS95	FGL316	FGT316	FGM316
Temperature				
Min	-260ºC (-450ºF)	-260ºC (-450ºF)	-260ºC (-450ºF)	-260ºC (-450ºF)
Max, in air	454ºC (850ºF)	454ºC (850ºF)	454ºC (850ºF)	550ºC (1,022ºF)
Max, in steam	650ºC (1,200ºF)	650ºC (1,200ºF)	650ºC (1,200ºF)	650ºC (1,200ºF)
Pressure, max bar (psi)	207 (3,000)	207 (3,000)	207 (3,000)	250 (3,625)
Compressibility, % ASTM F36	35 - 40	35 - 40	35 - 40	35 - 40
Recovery, % ASTM F38	20	18	20	10 - 15
Creep Relaxation, % ASTM F38	5	5	5	5
Ignition Loss, %				
@ 454ºC (850ºF)	1	1	1	<1
@650ºC (1200ºF)	8	6	6	<3
Sealability, cc/min ASTM F2378	0.4	0.4	0.8	0.4
ASTM F104 & F868 Line Call Outs	F104 - F517000B1M3	F868 - 9FMF2	F868 - 9FMF1	F868 - 9FMF2

DURLON®
SEALING SOLUTIONS

HT1000®

Ultimate Mica Technology

Durlon® HT1000® consists of phlogopite mica paper impregnated with an inorganic binder at less than half the binder amount found in typical vermiculite-phyllosilicate filled products. This lower binder content allows for superior weight retention, less than 4% weight loss at 800ºC (1,472ºF), and results in ultimate extreme temperature sealing performance up to 1,000ºC (1,800ºF).

Phlogopite mica is a non-toxic naturally occurring hydrated silicate of potassium and magnesium with a lamellar and non-fibrous structure. It is flexible, elastic, has a high tensile strength, can withstand substantial mechanical pressure perpendicular to the lamellar plane, is chemically resistant, fireproof, infusible, non-combustible, non-flammable, and is a known alternative to asbestos. Durlon® HT1000® ensures efficient sealing and performance characteristics in extreme temperature applications.

Typical Properties

Colour	Metallic Gold
Fibre System	Phlogopite Mica, 90% min.
Binder	Silicone
Temperature Min Max	 -55°C (-67°F) 1,000°C (1,800°F)
Density, g/cc (lbs/ft³)	1.7 (106)
Compressibility, % ASTM F36	18 - 22
Recovery, % ASTM F36J	39 - 43
Creep Relaxation, % ASTM F38	55
Tensile Strength across grain ASTM F152, MPa (psi)	29.6 (4,300)
Ignition Loss @ 800ºC DIN 52911	<4%
Nitrogen Sealability, cc/min ASTM F2378	8
Dielectric Breakdown, kV/mm (V/mil) ASTM D149	20 (508)

* See note on ASTM testing properties on page 59.

Certifications

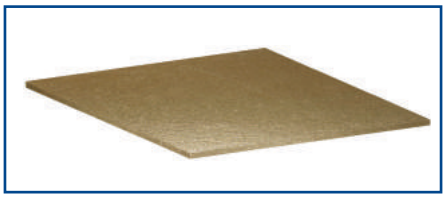
ANSI/API 607 Fire Test	Passed

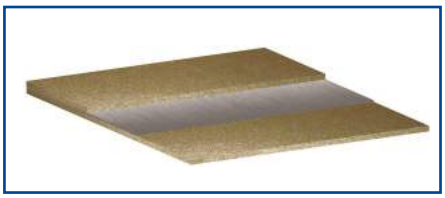
Sheet and Cut Gaskets

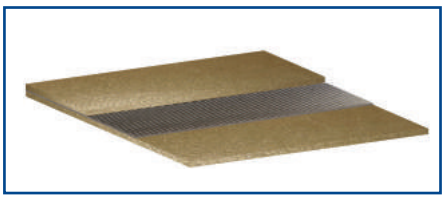
HT1000® - S90
Phlogopite mica paper impregnated with an inorganic binder and no carrier.
Size: 1,000 x 1,200 mm (39.4" x 47.24")

HT1000® - L316
Phlogopite mica paper impregnated with an inorganic binder laminated with a 0.05 mm (0.002") thick 316 stainless steel carrier.
Size: 1,000 x 1,000 mm (39.4" x 39.4")

HT1000® - T316
Phlogopite mica paper impregnated with an inorganic binder laminated with a 0.10 mm (0.004") thick 316 stainless steel perforated carrier.
Size: 1,000 x 1,000 mm (39.4" x 39.4")


Durlon® HT1000® - S90


Durlon® HT1000® - L316


Durlon® HT1000® - T316

A high-temperature form-in-place sealing compound designed to be used with our HT1000® sheet material on dovetail gaskets. It is available as a standard adder to your gasket order or can be purchased separately. The paste allows end users to cut large diameter gaskets using cost effective dovetail gasket segments. The HT1000® Paste eliminates possible leak paths through traditional dovetail designs and provides one-piece gasket construction and lower leakage rates at an affordable price point. Please see www.trianglefluid.com for techinical documentation.

DURLON®
SEALING SOLUTIONS

CFG

Corrugated Flexible Graphite

Durlon® CFG is designed for severe service conditions. The proprietary design of the corrugations gives Durlon® 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's maintain a tight seal in various seating stresses making it the universal replacement for spiral wound, double jacketed, and traditional flexible graphite gaskets.

Durlon® CFG

Physical Properties

Temperature Min Max, in air Max, in steam	 -200°C (-328°F) 454°C (850°F) 650°C (1,200°F)
Pressure, max, bar (psi)	207 (3,000)
pH range, room temp	0 - 14
Gasket Factors G_b, psi a G_s, psi	 557 (3.84) 0.325 2.21(0.015)

Durlon® CFG

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 wound gaskets
- One thickness - 3/32" for all applications. (1/16" and 1/8" thicknesses are also available)
- Core material comes standard as 316 stainless steel. Other metals are available upon request.

DURLON®
SEALING SOLUTIONS

Durtec®

Premium Corrugated Metal Core

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 proprietary technology that allows the finished gasket to have the best possible mechanical support function. Corrugations in the Durtec® core (DurCore™) 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.

Advantages

- Reusable - On larger sizes and for special configurations, the core may be refaced with new material, and reused, providing lower cost of ownership
- Superior DurCore™ 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 versus spiral wound and kammprofile gaskets

Typical Properties

Temperature	
Min	-200°C (-328°F)
Max, in air	1,000°C (1,832°F)
Max, in steam	650°C (1,200°F)
Pressure, Max, bar (psi)	320 (4,600)
pH range, room temp	0 - 14
Gasket Factors	
G_b, psi	187 (1.29)
a	0.467
G_s, psi	0.5 (0.003)
m	1.5
Y, psi	833 (5.74)

Certifications

ANSI/API 607 Fire Test	4th Ed., Exxon Modifications
TA-Luft (VDI Guideline 2440) Approved (PTFE)	
Temperature Exposure:	180°C (356°F)
Period of Exposure:	48 hours
Test Pressure (helium):	1 bar (14.5 psig)
Leak rate:	7.55E-6 mbar*l(m*s)
Period of leak rate measured:	24 hours

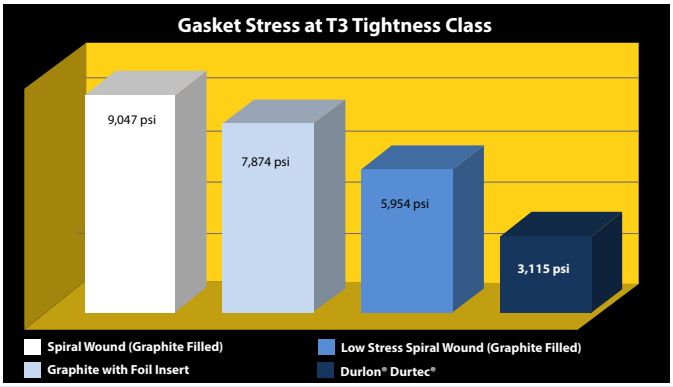
Applications

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.

Sizes, Types and Materials

- Standard ASME, DIN, JIS and BS EN sizes
- Non-Standard MSS SP-44, API 605, and other sizes up to 4 m 157" in diameter
- Circular heat exchangers with and without ribs
- Standard core material is 316L tainless steel. Other core materials such as SS304, SS321, SS316Ti, Monel®, Titanium, Hastelloy®, and Alloy 20 can be manufactured to your specifications on request
- Standard facing in super inhibited flexible graphite
- Alternate facing material is available upon request. Popular materials include Durlon® 9600 expanded PTFE (ePTFE), ETG, HT1000®, mica, and ceramic



DURLON® SEALING SOLUTIONS

Spiral Wound Gaskets

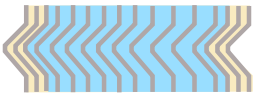
Durlon® Spiral Wound Gaskets (SWG) are made with an alternating combination of a preformed engineered metal strip and a more compressible filler material which creates an excellent seal when compressed. The engineered shape of the metal strip acts as a spring under load, resulting in a very resilient 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 Specifications Q1 and ISO 9001 standards. Custom size capabilities are available up to 4m (157").

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 or other high temperature 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.

Styles

Style D

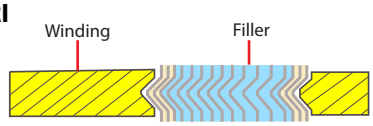


- Sealing element only consisting of preformed engineered metal and more compressible filler material
- Commonly used in tongue and groove or male and female flanges
- Can also be supplied with an inner ring as Style DI

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 epoxied which provides superior corrosion resistance compared to powder or liquid coating

Style DRI

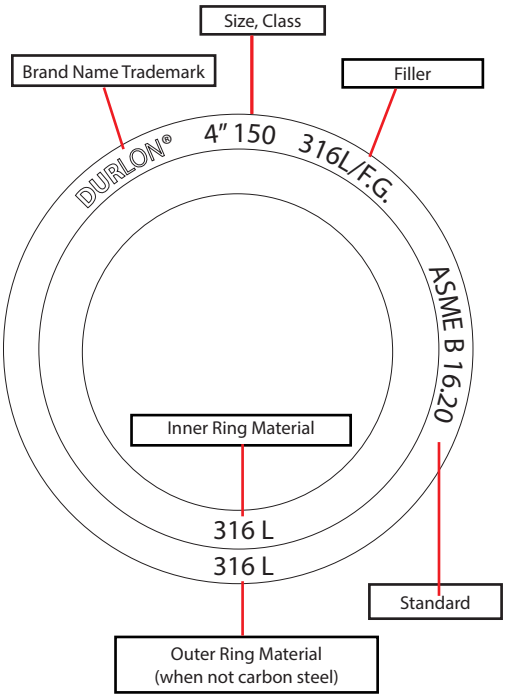


- Sealing element (D) combined with a centering ring (R) and an inner ring (I) which improves radial strength and protects the sealing element from erosion and inward bucking
- Commonly used with standard raised face and full face type flanges
- In accordance with ASME B16.20 (current version), inner rings for all gaskets are recommended for all sizes, materials, and classes.
- Recommended for all PTFE filled gaskets and the following:
  - Class 900-NPS 24" and larger
  - Class 1500-NPS 12" and larger
  - Class 2500-NPS 4" and larger
  - All flexible graphite gaskets unless otherwise requested by customer

Markings

Durlon® Style DR and DRI gasket centering rings (in carbon steel) are epoxy coated to provide protection against corrosion.

Durlon® SWGs are packaged with the utmost care to prevent damage during shipping to the job site.

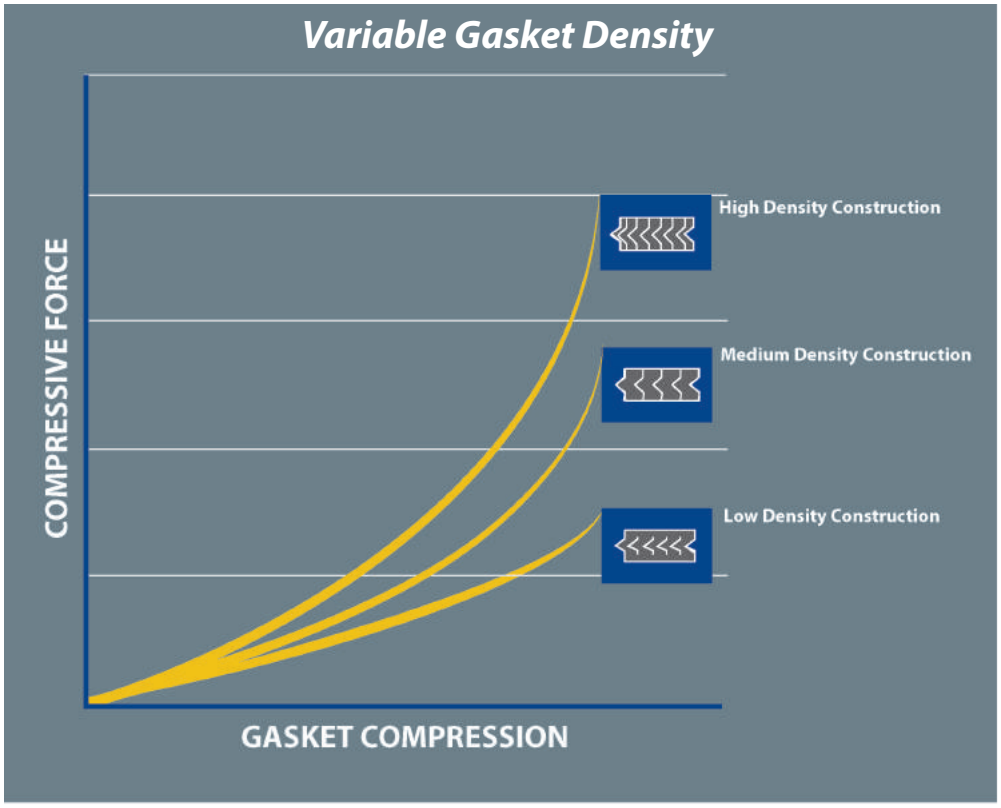


m & Y Factors	m	Y, psi
Type D, DR & DRI, Graphite, Graphite/ Mica & PTFE	2.8	5,800

ROTT Factors	G_b, psi	a	G_s, psi
Type D, DR & DRI, Graphite, Graphite/Mica & PTFE	80	0.594	0.1
Type D, DR, DRI-Graphite/Mica	90	0.590	0.1
Type D, DR, DRI-PTFE	173	0.405	1.0

SWG Gasket Density

During the manufacturing process of alternately winding the metal strip with the soft filler material under pressure and tension, the density of the resulting sealing element can be changed in order to suit specific gasket loading and sealability requirements. By combining different pressures, tension, and filler thicknesses, the loading requirements or compressive force needed to seat the gasket can vary significantly. Generally speaking, higher density sealing elements are used with higher pressure classes as they require higher compressive forces to establish a seal at optimum bolt loads.



Adapted from Fluid Sealing Association® gasket training presentation material.

Durlon® SWG Low-Stress Spirals

For applications in Class 150 and 300 where low seating stresses are required, it is common practice to require a specially made spiral wound gasket with appropriate gasket factors to suit the requirement. Durlon®'s solution is to manufacture all our Class 150 and 300 gaskets using a process that allows these gaskets to be seated at lower stresses while still performing as expected at traditional seating loads. This approach has several advantages including reduced costs and better product availability.
For demanding low seating stress requirements, we can manufacture tailored sealing element density profiles to suit the application based on recommendations by our Applications Engineers.

Colour Coding Guidelines

WINDING

Guide Ring Colour*	Material	Min. (°F)	Min. (°C)	Max. (°F)	Max. (°C)	Code
Yellow	304 Stainless Steel	-320	-195	1,400	760	304
Green	316L Stainless Steel	-150	-100	1,400	760	316L
Maroon	317L Stainless Steel	-150	-100	1,400	760	317L
Turquoise	321 Stainless Steel	-320	-195	1,400	760	321
Blue	347 Stainless Steel	-320	-195	1,700	925	347
Silver	Carbon Steel	-40	-40	1,000	540	CRS
Black	20Cb-3 (Alloy 20)	-300	-185	1,400	760	A-20
Brown	HASTELLOY® B 2	-300	-185	2,000	1,090	HAST B
Beige	HASTELLOY® C 276	-300	-185	2,000	1,090	HAST C
White	INCOLOY® 800	-150	-100	1,600	870	IN 800
White	INCOLOY® 825	-150	-100	1,600	870	IN 825
Gold	INCONEL® 600	-150	-100	2,000	1,090	INC 600
Gold	INCONEL® 625	-150	-100	2,000	1,090	INC625
NO COLOUR	INCONEL® X750	-150	-100	2,000	1,090	INX
Orange	MONEL® 400	-200	-130	1,500	820	MON
Red	Nickel 200	-320	-195	1,400	760	NI
Purple	Titanium	-320	-195	2,000	1,090	TI

FILLER

Stripe Colour	Materials	Min. (°F)	Min. (°C)	Max. (°F)	Max. (°C)	Code
White	PTFE	-400	-240	500	260	PTFE
Grey	Flexible Graphite incl. Inhibited	-350	-212	950	510	F.G.
Pink	Mica Graphite	-350	-212	1,400	760	MICA-GRA
Light Blue	Phyllosilicate	-67	-55	1,800	1,000	ETG
Light Green	Ceramic	-350	-212	2,000	1,090	CER

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 (304SS/316SS) 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, however, 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.

Physical Properties

Temperature Min Max	 -200°C (-328°F) 1,000°C (1,832°F)
Pressure, max, bar (psi)	414 (6,000)
pH range, room temp	0 - 14
Gasket Factors m Y, psi	 4.00 1,000

Applications

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.

Core Materials

- Standard core material is 316 stainless steel with a nominal thickness of 3mm (0.125")
- 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

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, with ribs etc.

Facing Materials

Standard facing material is super inhibited flexible graphite with a nominal thickness of 0.5mm (0.02"). Other facing materials and thicknesses are available to suit specific applications

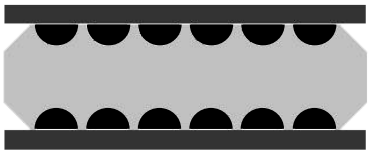
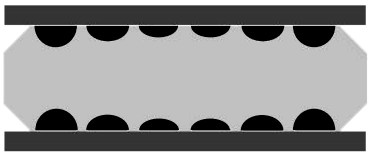
Durlon® PK40P

Durlon® K40CI

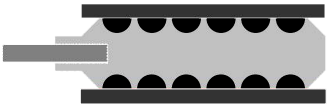
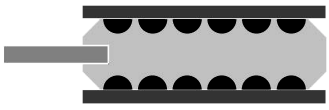
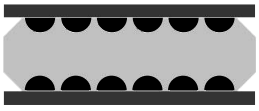
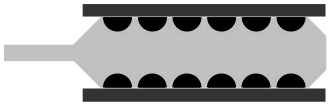
Kammprofile

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

Core Designs

K40P Parallel Root Core	K40C Convex Root Core
This core design is where the main sealing faces of the serrated metal core are parallel to each other. This is the standard design of Kammprofile gaskets.	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 during bolt up of weaker flanges.
	

Styles

K40PEF & K40CEF Extended Core Floating Centering Ring	K40PF & K40CF Floating Centering Ring	K40P & K40C No Centering Ring	K40PI & K40CI Integral Centering Ring
Similar to the floating centering ring, this style has an extended core providing additional strength and stability to the overall floating design.	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.	This basic configuration is most often used in tongue/groove and male/female flanges.	The centering ring is used to position the gasket between flat face and raised face type flanges.
			

DURLON®
SEALING SOLUTIONS

ETG Series

Extreme Temperature Gaskets

Durlon® Extreme Temperature Gaskets (ETG) have been engineered to provide the preeminent solution to sealing gasketed joints exposed to high temperatures, typically greater than 650ºC (1,200ºF) and up to 1,000ºC (1,800ºF). At extreme temperatures, flange assembly torque retention is the key component to maintaining a tight seal. Durlon® ETG has combined an oxidation boundary material with the excellent stability and sealing characteristics of flexible graphite in order to preserve seal integrity and to retain the initial assembly torque.

The Durlon® ETG's engineered design principle is focused around providing oxidation protection zones around the central oxidation super inhibited flexible graphite sealing component. Standard industrial grade flexible graphite typically begins to rapidly oxidize at around 650ºC (1,200ºF). By adding oxidation inhibitors to the graphite, the rate and amount of oxidation can be significantly reduced which can extend the seal life of the material, however, oxidation still occurs and at extreme temperatures can be fatal to the integrity of the joint.

Durlon® ETG adds an inner and outer protection boundary in the form of a mica-phyllosilicate based sealing material called Durlon® HT1000®. Durlon® HT1000® consists of phlogopite mica paper impregnated with an inorganic binder at less than half the binder amount found in typical vermiculite-phyllosilicate filled products.

This lower binder content allows for superior weight retention resulting in ultimate extreme temperature sealing performance.

The Durlon® ETG's design is the sealing industry's current best available technology for effectively sealing extreme temperature applications.

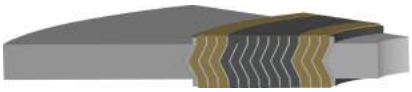
Styles

DRI-ETG Spiral Wound Gaskets

Durlon® takes our standard mica-graphite manufacturing technology two steps further by:

(1) incorporating 3 full layers of HT1000® on the I.D. and O.D. of the sealing element and ***(2)*** using oxidation super inhibited flexible graphite layers as the central sealing component. This oxidation boundary created by the HT1000® material, allows for temperature stability up to 1,000ºC (1,800ºF).

As both mica and graphite offer outstanding natural chemical resistance, the Durlon® DRI-ETG is also capable of withstanding many aggressive chemicals and environments subject to elevated temperatures. The DRI-ETG can be manufactured in virtually any metal alloy combination required by the application.



Durlon® ETG Spiral Wound Gaskets

Durtec® - ETG

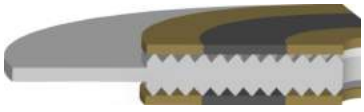
The Durtec® gasket concept just got better. By using the ETG engineered design concept, the Durtec® gasket's facing layers get an extreme temperature upgrade, providing both temperature resistance and enhanced sealability. On both faces of the unique DurCore® design lays a central oxidation super inhibited flexible graphite ring, surrounded on its ID and OD with a ring of HT1000® which acts as the oxidation barrier.

The entire combination of materials and core design provides unsurpassed bolt torque retention, fire safety, sealability, and extreme temperature resistance to 1,000ºC (1,800ºF). There is no other single gasket on the market which exhibits the performance characteristics of the Durtec®-ETG.

Durlon® Durtec® ETG

K40-ETG Kammprofile Gaskets

Kammprofile gaskets are a common gasket used to improve sealability in tough thermal cycling applications, such as heat exchangers and large vessel seals. Durlon® K40 Kammprofile Gaskets naturally provide a tight seal with enhanced load bearing and distribution abilities. However, with the addition of the ETG engineered design concept similar to that used on the Durtec®-ETG, Durlon® K40-ETG gaskets can now offer those abilities at extreme temperatures up to 1,000ºC (1,800ºF).



Durlon® K40-ETG Kammprofile Gaskets

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 as the ring joint gasket is softer than the flange material in order to prevent damage to the flanges, 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.

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 1,093°C (2,000°F) with properly selected metal
- All gaskets have a thin protective coating to eliminate oxidation effects due to atmospheric contact

Styles

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

RTJ - Octagonal

RTJ - Oval

Style RX

- The Durlon® Style RX ring joint has a unique self-sealing action. The outside bevels of the ring make the initial contact providing a seal against the groove's outer surfaces. As the internal pressure increases, so does the gasket loading stress against the groove improving the gasket's 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 RX gaskets are taller and will add length to the finished assembly

RTJ - Style RX

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

RTJ - Style BX

DURLON®
SEALING SOLUTIONS

iGuard™ Isolation & Sealing Kits

Flange Isolation Kits

iGuard™ flange isolation and sealing systems consist of all the necessary components to seal, electrically isolate, and for cathodic protection (corrosion control) between flanges, from general to severe service applications such as water, wastewater, natural gas, hydrocarbons, caustics, acids, and other aggressive media to 232ºC (450ºF). Gaskets are available for full face (Type E), raised face (Type F), and ring type joint (RTJ) flanges (Type D) from NPS ½" (DN 15) to NPS 144" (DN 3600) or equivalent, to meet all international piping sizes. iGuard™ gaskets meet AWWA, ANSI, API, DN, JIS, and all other dimensional standards. The standard iGuard™ flange isolation kit consists of a gasket, isolating washers, backing washers, and isolating bolt/stud sleeves. Gasket selection can be made from a wide variety of materials to best suit the sealing and performance characteristics of the application. In gaskets with phenolic or glass carrier rings, the double-ogee sealing element provides a reliably concentrated unit load on the flanges using the lowest torqueing conditions possible.

General Features

- Auto-Energizing double-ogee seal
- Low torque requirements
- Tri-directional seal movement for a tighter seal
- Pressure ratings to API Class 3000 and ANSI Class 2500

Applications

- Gas
- Waste Water
- Potable Water
- Steam
- Oil
- Chemicals (caustic, acid)
- Pipelines
- LNG

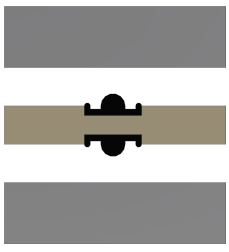
Industries

- Oil & Gas
- Pulp & Paper
- Petro Chemical
- Refining
- Water / Wastewater
- Food & Beverage
- Marine
- Aerospace
- Chemical
- LNG

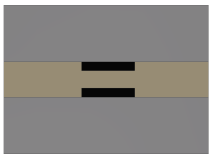
Carrier	Sealing Element			
	Nitrile	EPDM	Viton	PTFE
Plain Phenolic	√	√	√	√
Neo-Faced Phenolic	√	√	√	√
Hi-Temp Phenolic	√	√	√	√
Silicone Glass G-7	√	√	√	√
Epoxy Glass G-10	√	√	√	√
Epoxy Glass G-11	√	√	√	√
Durlon® 8400	n/a	n/a	n/a	n/a
Durlon® 8500	n/a	n/a	n/a	n/a
Durlon® 9000	n/a	n/a	n/a	n/a

Typical Physical Properties

ASTM	Test Method	Plain Phenolic	Neo-Faced Phenolic	Hi-Temp Phenolic G-3	Silicone Glass G-7	Expoxy Glass G-10	Epoxy Glass G-11
D149	Dielectric Strength, Volts/Mil	500	500	550	350-400	550	550
D696	Compressive Strength, MPa (psi)	172 (25,000)	172 (25,000)	345 (50,000)	276 (40,000)	345 (50,000)	345+ (50,000+)
D229	Water Absorption, %	1.60	1.60	0.70	0.07	0.10	0.10
D257	Insulation Resistance, Meg/Ohms	40,000	40,000	46,000	2,500	200,000	200,000
D790	Flexural Strength, MPa (psi)	155 (22,500)	155 (22,500)	414 (60,000)	186 (27,000)	414 (60,000)	517+ (75,000+)
D785	Hardness Rockwell, "M"	85	85	115	105	115	115
D265	IZOD Impact Strength, J/cm (ft-lbs/In.)	0.64 (1.2)	0.64 (1.2)	6.41 (12)	4.27 (8)	2.47 (14)	6.41 (12)
D732	Shear Strength, MPa (psi)	69 (10,000)	69 (10,000)	124 (18,000)	138 (20,000)	152 (22,000)	152 (22,000)
	Operating Temperature	-54°C TO 104°C	-54°C TO 79°C	-54°C TO 200°C	Cryogenic to 232°C	Cryogenic to 138°C	Cryogenic to 177°C
		-65°F TO 220°F	-65°F TO 175°F	-65°F TO 392°F	Cryogenic to 450°F	Cryogenic to 280°F	Cryogenic to 177°F



Before Tightening
The flange faces make contact with the sealing elements which sit slightly higher than the isolating carrier ring.



After Tightening
The sealing element is compressed and moves bi-laterally through the gasket radius, thus filling the small gaps on either side of the sealing element. This radial movement provides a tighter seal with less stress on the carrier ring, compared to rectangular sealing elements used in other gasket styles on the market. The tri-directional movement of the sealing element provides better elastic recovery over time as bolt loads relax and pressure/temperature cycles occur.

DURLON® SEALING SOLUTIONS

iGuard™ Isolation & Sealing Kits

Styles

iGuard™ EN

The iGuard™ EN style isolation gasket is manufactured from Nema grade G-10 / FR-4 glass epoxy material incorporating a Viton double-ogee sealing element. These kits come standard with one iGuard™ EN gasket, two isolating Nema grade G-10 washers, two SAE zinc plated steel backup washers, and one Nema grade G-10 sleeve tube for every bolt/stud.

iGuard™ HC

The iGuard™ HC style isolation gasket is manufactured from special high-compression 6mm (¼") thick Nema grade G-10 glass epoxy material incorporating a spring energized PTFE sealing element to prevent cold flow under high pressures. These kits come standard with one iGuard™ HC gasket, two isolating Nema grade G-10 washers, two SAE zinc plated steel backup washers, and one Nema grade G-10 sleeve tube for every bolt/stud.

iGuard™ CS

The iGuard™ CS style isolation gasket is manufactured from 3mm (1/8") thick Nema grade G-10 glass epoxy material bonded to a 316 stainless steel internal core with a spring energized PTFE sealing element to prevent cold flow in critical service applications, under continuous reciprocating movement or internal pressure surges at elevated temperatures. This design makes the iGuard™ CS ideal for API Class 15,000 and ANSI Class 600, 900, and 2,500 flange applications. These kits come standard with one iGuard™ CS gasket, two isolating Nema grade G-10 washers, two SAE zinc plated steel backup washers, and one Nema grade G-10 sleeve tube for every bolt/stud.

iGuard™ HT

The iGuard™ HT style isolation gasket is manufactured from 6mm (¼") thick Nema grade G-10 glass epoxy material. It incorporates a spring energized PTFE sealing element to prevent cold flow in critical service applications at higher temperatures, under continuous reciprocating movement, with internal pressure surges, and requiring frequent removal and installation such as those found in offshore drilling platforms, natural gas compressors, and pumping stations. This design makes the iGuard™ HT ideal for ANSI Class 150 to 2,500 and API Class 3,000 to 10,000 and comes in sizes from NPS ½" (DN 25) to NPS 24" (DN 600) or international equivalents in Type E (full face) or Type F (raised face) configurations. These kits come standard with one iGuard™ HT gasket, two isolating Nema grade G-10 washers, two SAE zinc plated steel backup washers, and one Nema grade G-10 sleeve tube for every bolt/stud.

iGuard™ 8400

The iGuard™ 8400 style isolation gasket is manufactured from 3mm (1/8") thick genuine Durlon® 8400 phenolic fibre gasket material to improve sealability in critical service chemical environments from pH 2-13 and other aggressive media to 232ºC (450ºF). This design makes the iGuard™ 8400 ideal for ANSI Class 150 and 300 and is available in sizes from NPS ½" (DN 25) to NPS 96" (DN 2400), or international equivalents in Type E (full face) or Type F (raised face) configurations. These kits come standard with one iGuard™ 8400 gasket, two isolating Nema grade G-10 washers, two SAE zinc plated steel backup washers, and one Nema grade G-10 sleeve tube for every bolt/stud.

Guard™ 8500

The iGuard™ 8500 style isolation gasket is manufactured from 3mm (1/8") thick genuine Durlon® 8500 aramid fibre gasket material to improve sealability in steam environments to 232ºC (450ºF). This design makes the iGuard™ 8500 ideal for ANSI Class 150 and 300 and comes in sizes from NPS ½" (DN 25) to NPS 96" (DN 2400) or international equivalents in Type E (full face) or Type F (raised face) configurations. These kits come standard with one iGuard™ 8500 gasket, two isolating Nema grade G-10 washers, two SAE zinc plated steel backup washers, and one Nema grade G-10 sleeve tube for every bolt/stud.

iGuard™ 9000

The iGuard™ 9000 style isolation gasket is manufactured from 3mm (1/8") thick genuine Durlon® 9000 glass filled PTFE gasket material to improve sealability in critical service chemical environments from pH 0 - 14 and other aggressive media, and from temperatures ranging between -73ºC (-100ºF) to 232ºC (450ºF). This design makes the iGuard™ 9000 ideal for cryogenic, petrochemical, pharmaceutical, semiconductor manufacturing, and food and beverage manufacturing applications in ANSI Class 150 and 300, or international equivalents. It is available in sizes from NPS ½" (DN 25) to NPS 144" (DN 3600) in Type E (full face) or Type F (raised face) configurations. These kits come standard with one iGuard™ 9000 gasket, two isolating PTFE washers, two SAE zinc plated steel backup washers, and one PTFE sleeve tube for every bolt/stud.

Recommended Application Guide

SERVICE	GASKET	SEAL	SLEEVE	WASHER	TEMPERATURE			
					LOW		HIGH	
Acetone	Phenolic	EPDM	Mylar	Phenolic	0	32	27	80
Air	G10	Nitrile	Mylar	Phenolic	-40	-40	107	225
Ammonia	G10	PTFE	Mylar	G10	-54	-65	104	220
Bleach	G10	PTFE	Mylar	G10	0	32	27	100
Carbon Dioxide	G10	Nitrile	Mylar	G10	0	32	38	150
Caustic Soda	ePTFE		ePTFE	ePTFE	-	-	-	-
Cryogenic	G10	PTFE	G10	G10	-184	-300	138	280
Ethanol	G10	EPDM	Mylar	G10	0	32	38	100
Ethylene	G10	PTFE	G10	G10	0	32	27	80
Fuel Oil	G10	Viton	Mylar	G10	-29	-20	138	280
Jet Fuel	G10	Viton	Mylar	G10	-29	-20	107	225
Natural Gas	Phenolic	Nitrile	Mylar	Phenolic	-40	-40	104	220
Sour gas	G10	Viton	Mylar	Phenolic	-29	-20	104	220
Gasoline	G10	PTFE	Mylar	G10	-54	-65	107	225
Unleaded Gasoline	Phenolic	Viton	Mylar	Phenolic	-40	-40	104	220
Unleaded Gasoline	G10	Viton	Mylar	Phenolic	-29	-20	138	280
Hydrogen	G10	Nitrile	Mylar	G10	0	32	38	150
Black Liquor	ePTFE	-	G10	G10	-	-	-	-
White Liquor	ePTFE	-	G10	G10	-	-	-	-
Spent Liquor	ePTFE	-	G10	G10	-	-	-	-
LNG	G11	PTFE	G10	G10	-184	-300	38	100
Mercaptan	G10	PTFE	G10	G10	-184	-300	138	280
Methanol	G10	PTFE	G10	G10	-184	-300	138	280
Methyl Tertiary Butyl Ether	G10	PTFE	G10	G10	-184	-300	138	280
Nitrogen	Phenolic	Nitrile	Mylar	Phenolic	-40	-40	104	220
Crude Oil	G10	Viton	Mylar	G10	-29	-20	138	280
Oxygen	ePTFE	-	G10	G10	-54	-65	121	250
Pentane	G10	PTFE	G10	G10	-184	-300	138	280
Propane	G10	PTFE	G10	G10	-184	-300	138	280
Propylene	G10	Viton	G10	G10	0	32	27	80
Sewage	G10	Viton	Mylar	G10	-29	-20	138	280
Steam	-	-	-	-	-	-	-	-
Styrene	G10	PTFE	G10	G10	-184	-300	138	280
Sulphur (Molten)	G10	PTFE	G10	G10	-184	-300	138	280
Tolulene	G10	Viton	G10	G10	0	32	66	150
Tolulene	Phenolic	Viton	Mylar	Phenolic	-40	-40	104	220
Water, HOT	G10	EPDM	Mylar	G10	79	175	138	280
Water, Potable	G10	EPDM	Mylar	Phenolic	0	32	138	280
Water, Sea	G10	EPDM	Mylar	Phenolic	0	32	138	280
Sulfuric Acid	ePTFE	-	ePTFE	ePTFE	-	-	-	-
Sulfuric Acid < 10%	G10	PTFE	G10	G10	-184	-300	138	280
Nitric	ePTFE	-	ePTFE	ePTFE	-	-	-	-
Nitric Acid < 5%	G10	PTFE	G10	G10	-184	-300	138	280
Citric Acid	ePTFE	-	ePTFE	ePTFE		-	-	-
Hydrochloric Acid < 10%	G10	PTFE	G10	G10	-184	-300	138	280
Hydrochloric Acid	ePTFE	-	ePTFE	ePTFE	-	-	-	-
Acetic Acid < 10%	G10	PTFE	G10	G10	-184	-300	138	280
Phosphoric Acid < 25%	G10	PTFE	G10	G10	-184	-300	138	280
Potassium Hydroxide	G10	PTFE	G10	G10	-184	-300	138	280
Ammonium Hydroxide	G10	PTFE	G10	G10	-184	-300	138	280
Trichloroethylene	Phenolic	Viton	Mylar	Phenolic	-40	-40	104	220
Auto Transmission Fluid	G10	Viton	G10	G10	0	32	66	150
Auto Transmission Fluid	Phenolic	Viton	Mylar	Phenolic	-40	-40	104	220

DURLON®
SEALING SOLUTIONS

Custom Fabricated Gaskets

Nearly every facility requires some custom fabricated gaskets that fall outside of industry-standard dimensions. Triangle Fluid Controls prides itself in offering high-quality fabricated sealing components with high-precision and fast turnaround capabilities. Our facility in Belleville, Ontario, Canada, manufactures and fabricates sealing products from sheet materials using 3 primary methods: gasket cutting, welding, and lathe cutting. Through our extensive network of global fabricators, TFC can also offer custom sealing solutions using materials and equipment not available internally. We have solutions for your custom fabrication requirements.

Cutting in general is considered to be the most common type of gasket fabrication method. Many fabricators use stamping machines of various speeds and accuracies to cut gaskets. This method requires tool and die builds which can add to the unit cost and delivery time of the finished parts. This method is not ideal when true custom-shaped gaskets are required.

Gasket Cutting

Triangle Fluid Controls uses modern digital flatbed cutting machines that can cut gaskets with more precision and accuracy with less start-up time, resulting in improved quality of the finished parts. Gaskets cut from this method come out perfectly every time and require very little secondary finishing. Our machines work with various styles of sheet gasket materials – single and multilayer – in thicknesses up to 8mm (5/16").

TFC also offers single-piece construction hand-cut gaskets from compressed sheet material in sizes greater than 1,524mm (60") and up to 3,048mm (120"). Using carefully crafted digitally cut templates,

our skilled craftspeople can replicate intricate gasket patterns, and produce finished cut quality similar to digital cutting machines.

Welding

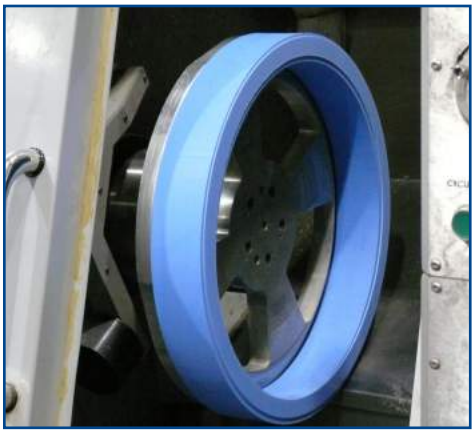
Some applications used in designs for chemical reactors, food and beverage vessels, and heat exchangers, require PTFE gaskets larger than 1,524mm (60") in diameter. Many fabricators simply use a traditional dovetail design joining several segments together to form the finished large gasket. Sometimes these dovetails are wrapped in additional material and are covered in wraps or special form-in-place liquid sealants in order to seal the leak paths created from this dovetail design. This approach often leads to leaks and makes the gasket very hard to install.

Triangle Fluid Controls solves this dovetail design problem using a proprietary welding procedure and one-of-a-kind equipment designed by our in-house mechanical engineering experts. By using segments cut from our digital flatbed cutting machine, we can bond segments together creating a superior performing gasket compared to dovetail gaskets. Finished gaskets can be nearly any shape, ring type or full-face, and can be made with cross sections up to 229mm (9") wide giving our customers reassurance that their large diameter sealing requirements will perform as expected.

DURLON® SEALING SOLUTIONS

Custom Fabricated Gaskets

Lathe Cutting



The only PTFE gasket material approved for use with a number of important industrial chlor-alkali chemicals — wet chlorine, dry chlorine, oxygen and sulfuric acid, ethylene dichloride, vinyl chrloride, and sodium hydroxide — is Durlon® 9000. The best way to create ring gaskets with Durlon® 9000 is with lathe cutting.

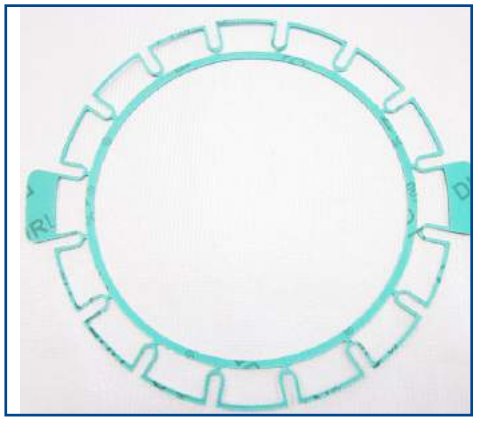
The manufacturing process for these smaller PTFE billets follows the same stringent quality control parameters as does our large sheet billet process which ensures that the lathe cutting process produces an extremely precise and accurately cut, finished gasket. Triangle Fluid Controls makes lathe cut PTFE gaskets using only the best quality billets of Durlon® 9000, 9000N, 9200, and 9400.

Custom Fabricated Metallic Gaskets

Triangle Fluid Controls also manufactures custom spiral wound and kammprofile gaskets to customer dimensional and material requirements. Both gasket styles can be manufactured with common pass bar styles typically used in heat exchangers up to 2,642mm (104") in diameter. Using sophisticated semi-automatic digital equipment, TFC can ensure that dimensional stability and assembly precision are met on every gasket produced. Combined with full internal traceability on raw materials, Triangle Fluid Controls provides custom fabricated metallic gaskets that can be depended upon for the entire lifespan of the installation.

RCA Gaskets

The Durlon® RCA (Reduced Contact Area) sealing system combined with Durlon® PTFE styles can replace standard full face gaskets in FRP, PVC, and other non-metallic and metallic pipe flanges where a low stress gasket is required. The RCA configuration reduces the total gasket contact area resulting in a lower seating stress at a given torque level, while preventing flange rotation. The RCA configuration can be cut from standard sheets resulting in a cost savings versus other low stress gaskets.



Available Materials

- 1/16" and 1/8" Durlon® PTFE styles and 1/16" compressed asbestos-free styles
- For FRP, PVE, Glass Lined or steel flanges where a low stress gasket is required
- Reduced Contact Area means a lower seating stress
- Lower sealing stress versus standard full face gaskets
- Available sizes: 1" to 24" Class 150 Full Face RCA
- Significant cost savings - cut from standard Durlon® sheet
- RCA full face replaces standard full face gaskets
- Alignment guides for easy positioning during installation
- Identification tabs extend beyond the flange OD so even when bolted up, you know the size and gasket material being used

Cut Gaskets

Triangle Fluid Controls provides a variety of gasket cutting services utilizing all Durlon® sheet gasketing materials in addition to some customer supplied materials. Our primary gasket cutting equipment is a CNC controlled flatbed cutting table which allows for virtually any custom shape to be cut quickly and precisely with no minimum order requirements. Our equipment eliminates the need to have dies made, which are costly and come with long lead times. TFC packages all cut gaskets with lot traceability identification tags for compliance to customer specifications.

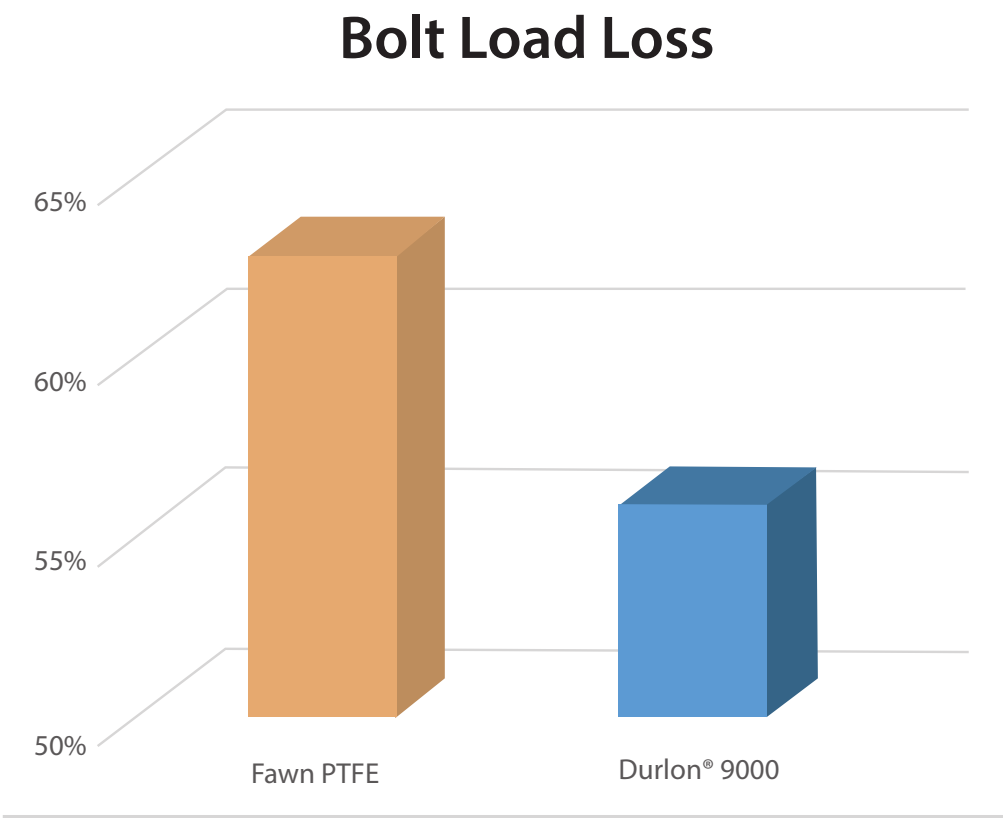
Step Gaskets for Acid Piping Systems

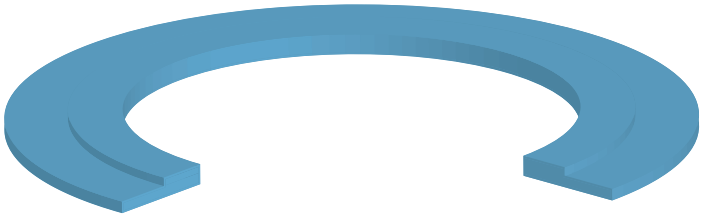
Acid piping systems are designed for many years of continuous operation and are subject to thermal cycling and aggressive chemical corrosion. It is important to use the proper gasket.

The Durlon® single-piece construction Step Ring Gasket is custom machined from solid Durlon® 9000. Durlon® 9000 filled PTFE gasket material is compatible with sulfuric acid in all concentrations and has excellent physical properties such as sealability and recovery, that maintain the seal even with extreme thermal cycling and vibration.

With recommended installation and torqueing procedures, Durlon® Step Ring Gaskets normally do not need to be retorqued and will not cold flow into the pipe ID or outside the flange OD like other materials. Tests have shown that Durlon® 9000 Step Ring Gaskets can retain up to 7% more load than traditional fawn PTFE Step Ring Gaskets which translates into a tighter seal over a longer period of time.

Traditional fawn PTFE Step Ring Gasket design requires two different sized 1.5mm (1/16") thick ring gaskets to be bonded together with some form of industrial strength adhesive. Over time the adhesive breaks down due to thermal and chemical exposure. In severe applications the adhesive is attacked immediately and is dissolved within hours of installation. This then requires disassembly of the bolted connection, new gaskets, and more downtime. Durlon® has significantly improved upon the traditional design by machining gaskets from a solid piece of genuine Durlon® 9000 PTFE gasket material, thus eliminating the adhesive component and any possibility of gasket separation and/or leakage. Durlon® 9000 Step Ring Gaskets have been used in MONDI™ Ductile Iron Sulfuric Acid Piping with excellent performance and safety results since 1985 and are also commonly used in Class 150 raised face (floating) lap joint flanges.





Gasket Factors

Gasket factors are very important to understand but unfortunately can be difficult to understand or are easily misinterpreted. This section contains some of the more popular versions of Gasket Factors used in determining the recommended torque for gasket installation.

EN 13555

EN 13555 is a working standard, much like ASME PVRC gasket factors, in the EU. It provides the testing procedures to allow persons to derive the gasket parameters: Q_{smax}, $Q_{(minL)}$, $Q_{smin(L)}$, P_{QR}, and E_G so they can be used in design equations found in EN 1591-1 (Flanges and Their Joints - Design Rules for Gasketed Circular Flange Connections - Part 1: Calculation). For a further definition of the gasket parameters see chart.

When the final torque values are calculated using the previous gasket parameters, leakage can be classified into three tightness classes:

Tightness Class	Specific Leak Rates (mg/s/m)
$L_{1.0}$	1.0
$L_{0.1}$	0.1
$L_{0.01}$	0.01

Gasket Parameters	
Q_{smax}	Maximum seating stress required on the gasket at a given temperature without crushing the material.
$Q_{(minL)}$	Minimum seating stress that is required in assembly at ambient temperature to seat gasket into the flange serrations and seal internal leakage, based on tightness class, L, and specified test pressure.
$Q_{smin(L)}$	Minimum gasket seating stress required in service conditions after unloading gasket (at service temperature) so that the specified tightness class, L, is maintained based on internal test pressure.
P_{QR}	This factor allows for the gasket's effect on the load applied and the relaxation of the gasket from start (final bolt-up) and after the extended life term of the material`s intended service temperature.
E_G	This is the unloading moduli, which is derived from the recovery of the gasket thickness between the initial compression seating stress and unloading the gasket to 1/3 of its initial seating stress.

Gasket Factors

m & Y

m and Y values are for flange design only and are not meant to be used as gasket seating stress values in actual service. "m" is known as the maintenance factor or the multiplier. The "Y" factor is the minimum stress required (psi) over the sealing area of the gasket to provide a seal at an internal pressure of 2 psig. "Y" is not considered to be the minimum seating stress for the gasket in service. These values are used in formulas in the ASME Boiler and Pressure Vessel Code, Division 1, Section VIII, Appendix 2 to give a WM1 (minimum required bolt load for operating conditions, psi) or WM2 (minimum required bolt load for gasket seating, psi) value based on either gasket seating or the internal pressure. The flange is designed based on the greater of these two values (WM1 or WM2). This will ensure that the flange is robust enough to maintain adequate gasket seating stress which can decline due to flange rotation with weaker flanges when bolted up and internal pressure is introduced. These values do not take fugitive emissions into account and therefore, based on leakage, newer gasket constants, G_b, a, and G_s are being developed, based on leakage, to take this into account.

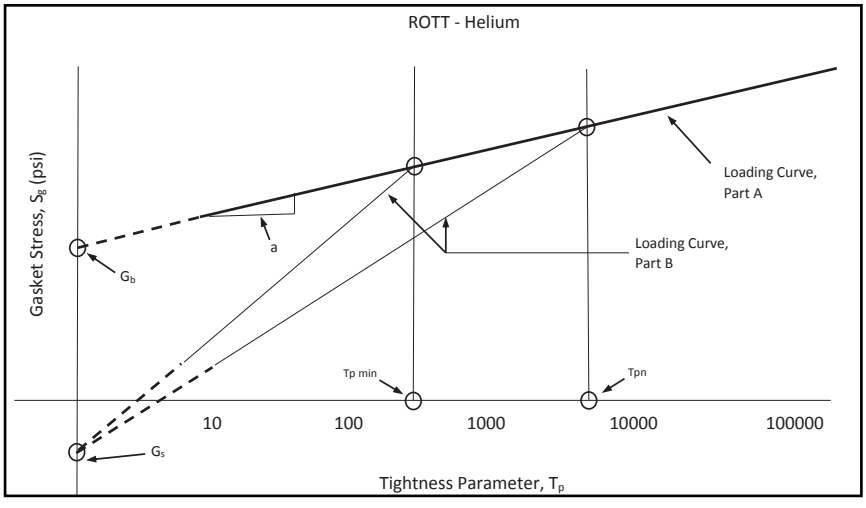
Table for m & Y, MPa (psi)

Tightness Type	Economy		Standard		High		Exceptional	
Tightness Class	T1	T1.5	T2	T2.5	T3	T3.5	T4	T4.5
Leak Rate (mg/s/mm)	2.0E-01	2.0E-02	2.0E-03	2.0E-04	2.0E-05	2.0E-06	2.0E-07	2.0E-08
Compressed Non-Asbestos & PTFE Materials	2.5;20 (2,900)			14.2;20 (2,900)	32.3;60 (8,700)	14.3;100 (14,500)	11.5;160 (23,200)	98.9;160 (23,200)
				7.9;40 (5,800)	7.9;80 (11,600)			
				2.7;60 (8,700)	2.4;100 (14,500)			
					1.7;160 (23,200)	3.4;160 (23,200)		
Graphite Filled Spiral Wound Gasket	8;20 (2,900)					7;80 (11,600)	8;120 (17,400)	
	4;40 (5,800)					4;160 (23,200)		
	2.5;60 (8,700)							

Recommended Value
Possible Value
Not Recommended Value
No Available Data

Proposed ASME PVRC Gasket Factors: G_b, a and G_s

New gasket factors to replace the ASME Code m and Y are currently being developed by the Pressure Vessel Research Council (PVRC) and ASME. The current m and Y are difficult to replicate for non-asbestos gaskets and do not take joint leakage into account. The new approach to bolted joint design makes the tightness of the joint a design parameter. In a manner similar to that of the traditional ASME Code method, the design bolt load for a joint is calculated for operating and seating requirements from the new constants G_b, a, and G_s, and the required tightness class associated with the minimum tightness.



G_b and "a" provide the gasket seating load; similar to Y in the present Code. G_s is associated with the operating stress and is similar to the m value in the present Code. The proposed ASME constants G_b, a, and G_s give a design bolt load, obtained by interpretation of leakage test data as plots of gasket stress, S_g, versus a tightness parameter, T_p. T_p is the pressure (in atmospheres) normalized to the atmospheric pressure required to cause a helium leak rate of 1 mg/sec for a 150 mm OD gasket in a joint. Since this is about the same as the OD of an NPS 4 joint, the pressure to cause a leak of 1 mg/sec of helium for that joint is its tightness. A standard test procedure, the PVRC Room Temperature Tightness Test (ROTT), has been designed to produce the constants G_b, a, and G_s. Low values for G_b, a, and G_s are desirable while a higher value of T_p means a tighter joint.

Tightness Class	Mass Leak Rate/Unit Diameter (L_{rm}) mg/sec-min (lb/hr per " of OD)
T1	2×10^{-1} (0.04)
T2	2×10^{-2} (0.0004)
T3	2×10^{-3} (0.000004)
T4	2×10^{-4} (0.00000004)
T5	2×10^{-5} (0.0000000004)

Pressure x Temperature

Conventional Approach

In all piping systems the flanges, valves, and the piping itself, have a pressure – temperature relationship. This PxT factor is the result of multiplying the operating pressure times the operating temperature to arrive at a numerical value. This value is not constant and is different at each temperature and pressure combination. The table below shows the PxT factors for carbon steel piping per ANSI B16.34 and saturated steam. The fact that PxT values exist for piping should indicate that such values also exist for gasketing and just like piping, those values change with differences in the pressure and temperature.

Durlon® Approach

With gasketing there is a relationship of pressure to temperature. Generally, the higher the temperature, the lower the allowable gasket working pressure.

This is called the PxT factor or the gasket pressure times temperature. For example, if the pressure is 48.3 bar (700 psi) and the temperature is 260°C (500°F), we would need a material with a PxT factor of 350,000. Again, this value is not constant and is different for each pressure and temperature combination. Some manufacturers feel this is the maximum level for safety.

Compressed non-asbestos PxT factors are not as easy to predict as some older gasketing technologies.

Generally, we find that all asbestos-free gasket material is temperature sensitive, requiring the pressure to drop more quickly as temperature rises, to ensure the seal is maintained. We have reviewed performance by in-house tests, controlled operating performance, and in the field – *there is no one PxT factor to use.*

Pressure-temperature charts for individual products are provided on pages 44-45. The line on these charts indicates the highest operating pressure for a given temperature. All relationships under this line in the green zone are considered to be "safe." For relationships outside this zone or above the line, please contact TFC's technical department for further assistance and guidance. Multiplications of any pressure value with a temperature value will give you a conventional PxT factor.

It is always assumed that the flange is correct and in good condition, the fluid is not aggressive and that the gasket thickness is 1/16". The limits will increase for 1/32" but will decrease 20-30% for 1/8".

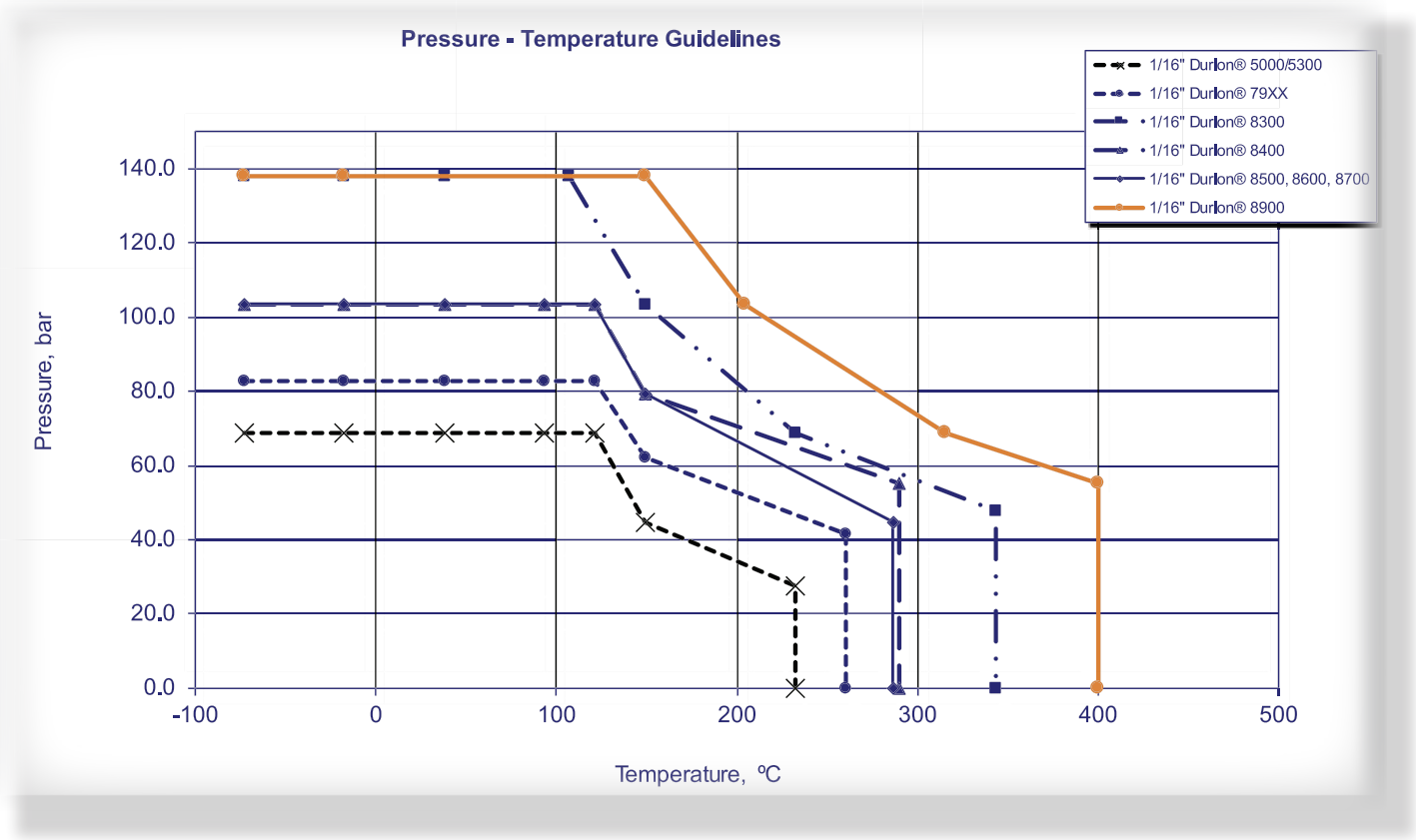
Consult our technical department for applications above Class 300.

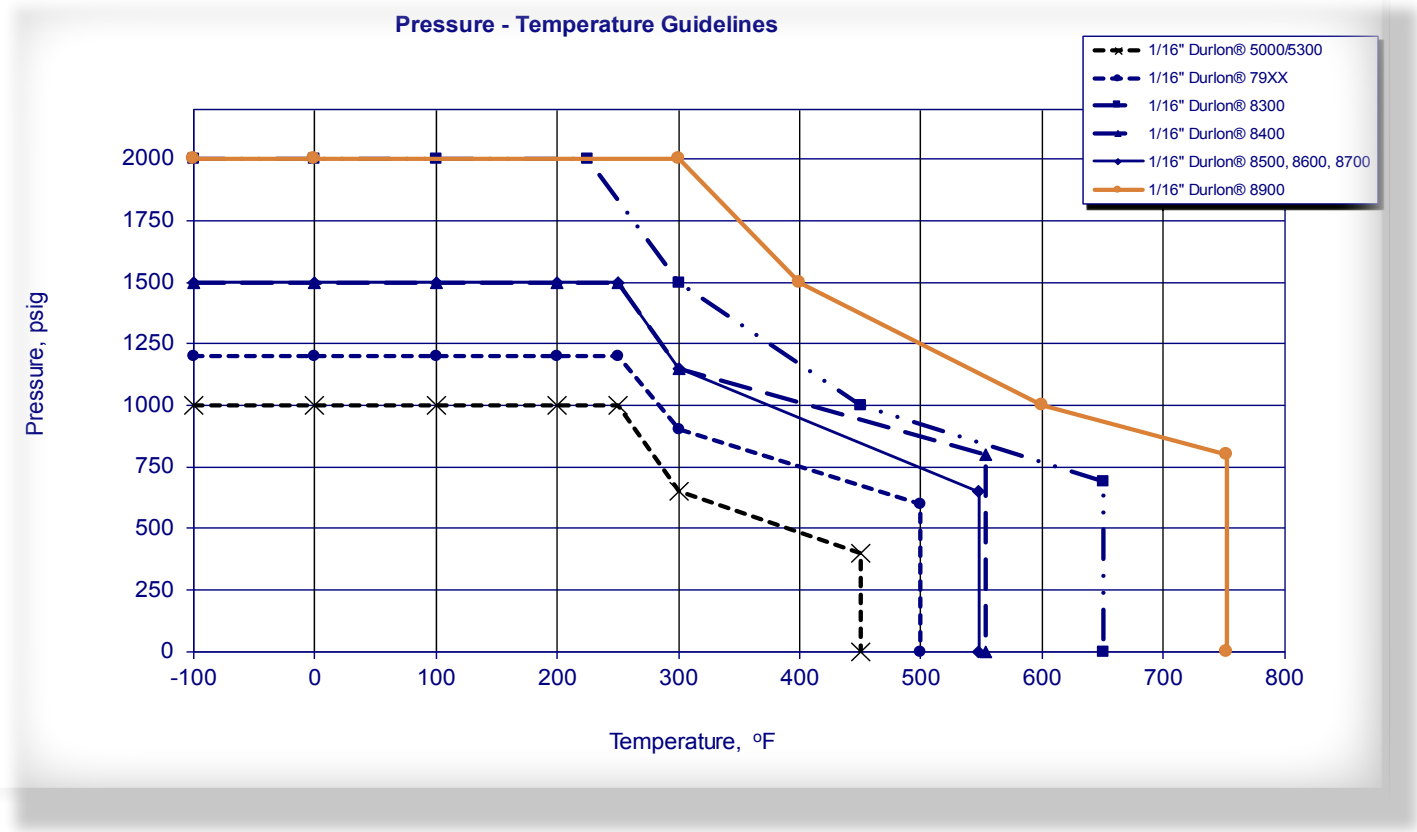
Pressure-Temperature Relationships

Temperature		Carbon Steel Class 150			Carbon Steel Class 300		
°C	°F	psi	bar	(P x T)	psi	bar	(P x T)
38	100	285	19.65	(28,500)	740	51.02	(74,000)
93	200	260	17.93	(52,000)	675	46.54	(135,000)
149	300	230	14	(69,000)	655	45.16	(196,500)
204	400	200	13.79	(80,000)	635	43.78	(254,000)
260	500	170	11.72	(85,000)	600	41.37	(300,000)
316	600	140	9.65	(84,000)	550	37.92	(330,000)
371	700	110	7.58	(77,000)	535	36.89	(374,500)

Pressure x Temperature Charts

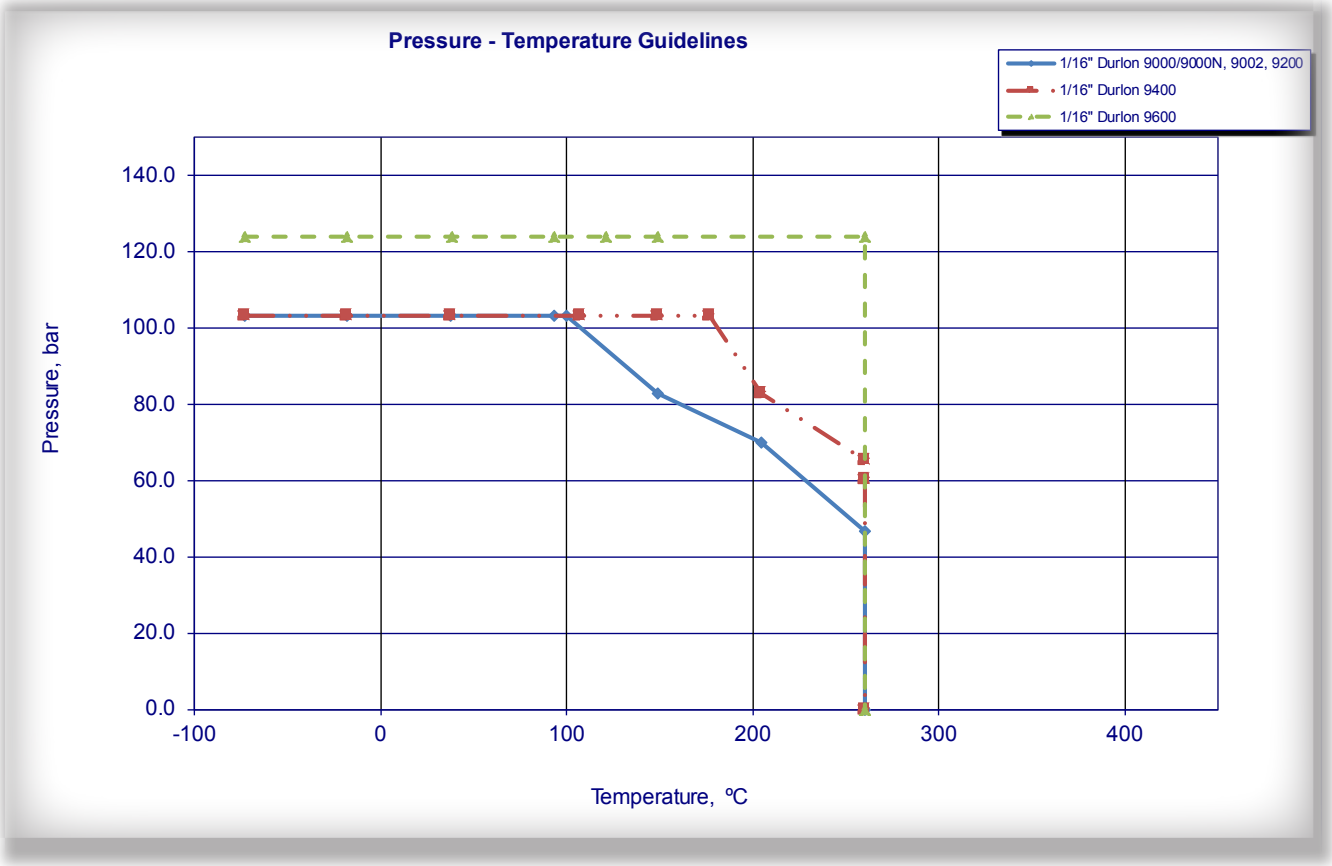
Compressed Non-Asbestos

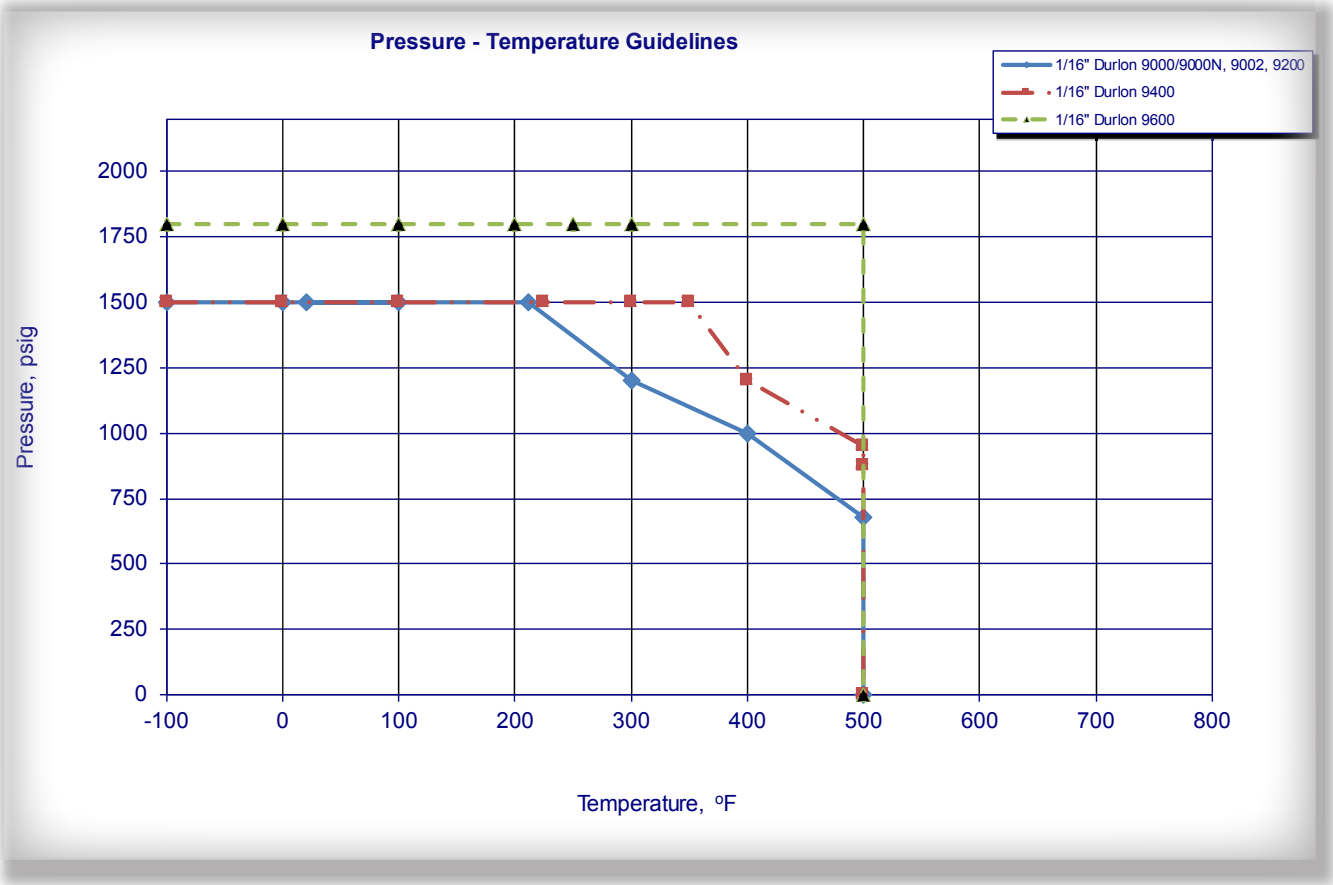




Pressure x Temperature Charts

PTFE





Gasketing Failures

Torque loss is inherent in any bolted joint. The combined effects of bolt relaxation, gasket creep, vibration in the system, thermal expansion, and elastic interaction during bolt tightening, contribute to torque loss. When torque loss reaches an extreme, the internal pressure exceeds the compressive force, holding the gasket in place and a leak or blowout occurs.

A key to reducing these effects is proper gasket installation. Reduced maintenance costs and increased safety can be obtained by bringing the flanges together slowly and parallel when installing a new gasket, taking a minimum of four bolt tightening passes, and following the correct bolt tightening sequence/pattern.

Even when installation is ideal where the bolt stress is uniformly applied to each bolt, and the gasket is properly compressed, problems can still arise.

Inherently with time, loosening will occur due to gasket factors already mentioned. If other factors such as cycling, thermal upsets or vibration are present, periodic retorquing might be necessary.

Causes of Gasket Failure

- Uneven loading of flanges holding gasket in place
- Gasket load too low
- Bolt strength too low
- Torque loss
- Bolt relaxation/strength (approximately 10% torque lost in first 24 hours)
- Gasket creep
- Vibration in the system
- Thermal cycling
- Water hammer
- Elastic interaction during bolt tightening
- Improper gasket installation practice

Reducing Gasket Failures

- Use proper gasket installation practices
- Lubricate bolts and nut facings
- Bring the flanges together slowly and parallel (multiple passes with increasing torque, each pass following proper tightening sequence).
- Use a 1/16" thick gasket up to 8" flanges and 1/8" for 10" and above. (1/16" has less gasket creep)
- Be sure there is adequate gasket stress
- Periodic retorquing
- Use the correct tightening pattern/method for the job. Order of efficiency (least to greatest):

  1) Wrench and cheater bar or sledge hammer
  2) Air impact gun
  3) Torque wrench
  4) Hydraulic torque wrench
  5) Hydraulic stud tensioners

- Use the installation procedures that follow on the bolt tightening worksheet (p. 47)
- Refer to torque information from your gasket manufacturer (TFC torque data tables can be found on p. 49-53)

DURLON - Gasketing: Bolt Tightening Worksheet

Location/Identification: _____ Nominal Bolt Size: _____

Gasket Contact Surface Finish on Flange: _____ Lubricant Used: _____

(Instructions: Initial each step when completed in space provided below)

___ **1.** Visually examine and clean flanges, bolts, nuts, and washers. Replace defective components if necessary.

___ **2.** Lubricate bolts, nuts, and flange surface around bolt holes and use hardened steel washers.

___ **3**. Install new gasket. Do not reuse old gasket or use multiple gaskets.

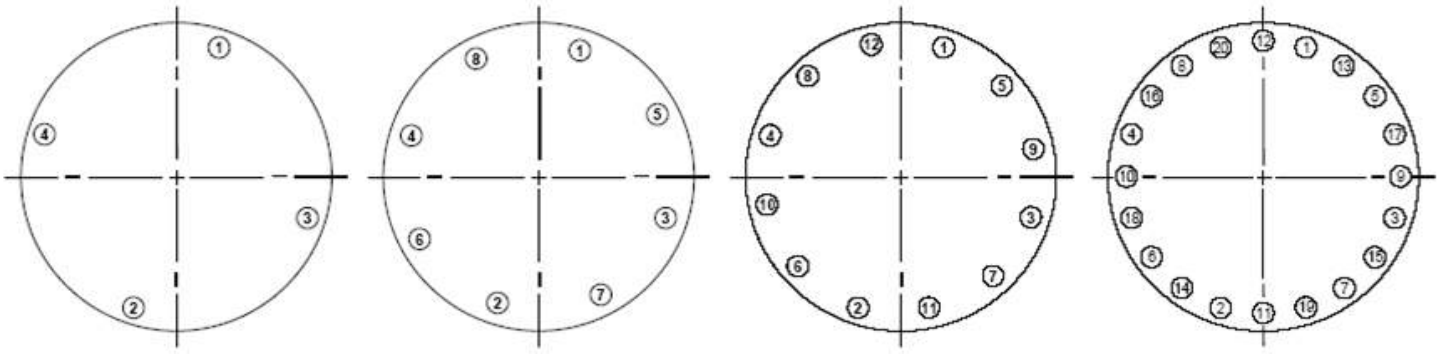
___ **4.** Number bolts in cross-pattern sequence according to the sketch below.

___ **5.** Important! Hand tighten then pre-tighten bolts to 10/20 ft-lbs torque but do not exceed 20% of target torque.

___ **6.** Check gap uniformity.

___ **7.** Use the appropriate cross-pattern tightening sequence in the sketch below for Rounds 1, 2, 3, and Round 4 (each sequence constitutes a Round).

___ **8.** Target Torque: ____ft-lbs



___4-bolt & 8-bolt flanges:

Round 1: Tighten to _____ft-lbs (30% target)

Round 2: Tighten to _____ft-lbs (60% target)

Round 3: Tighten to _____ft-lbs (100% target)

___12-bolt flanges & above:

Round 1: Tighten to_____ ft-lbs (20% target)

Round 2: Tighten to_____ ft-lbs (40% target)

Round 3: Tighten to_____ ft-lbs (80% target)

Round 4: Tighten to_____ ft-lbs (100% target)

Check gap around the circumference between each of these rounds, measured at every other bolt. If the gap is not reasonably uniform around the circumference, make the appropriate adjustments by selective bolt tightening before proceeding.

__ **9.** Rotational Round: 100% of the Target Torque. Use rotational, clockwise tightening sequence starting with Bolt #1 for one complete round and continue until no further nut rotation occurs at 100% of the Target Torque value for any nut.

__ **10.** Final Round: Retorque after 24 hours. Repeat Round 4 above followed by a Rotational Round. A large percentage of short-term preload loss occurs within 24 hours after initial tightening. This Round covers this loss. This is especially important for PTFE gaskets.

Tightening Method Used:

_____Hand Wrench _____Manual Torque Wrench _____Hydraulic Torque Wrench

_____Impact Wrench _____Other

Contact Triangle Fluid Controls for tightening pattern for large diameter flanges.

Worksheet Information By: _____ Date: _____

Joint Assembled By: _____ Date: _____

Gasket Application Data Form

Triangle Fluid Controls Ltd.
399 College Street E.,
Belleville, ON K8N 5S7
Fax: 613.968.1099
www.trianglefluid.com
tech@trianglefluid.com

Company: _____ Date: _____
Contact: _____
Title: _____ Application:
City: _____ ☐ Pipe Flange ☐ Heat Exchanger
Province: _____ ☐ Manway ☐ Compressor
Phone: _____ ☐ Valve Bonnet ☐ Flu Duct
Fax: _____ ☐ Pump Casing ☐ Pressure Vessel
E-mail: _____ ☐ Other:

General Service Conditions

Temperature: (°F/°C)
Continuous Operating: _____
Minimum Design: _____
Maximum Design: _____
Thermal Cycling: ☐Yes ☐ No _____cycles/24hrs
Vibration: ☐ Yes ☐ No

Pressure: (psig/bar)
Normal Operating:_____
Minimum Design: _____
Maximum Design: _____
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:

Torque Values - Cut Gaskets/CFG, Class 150, 300

ASME B16.5 Raised Face Flanges/ANSI B16.21 (current version) • Ring Gaskets 1/16" and 1/8" Durlon® Gasket Material
*Torque: ft-lbs (N-m)

FLANGE SIZE		150		300	
NPS	DN	Recommended Torque ft-lbs (N-m)	# Bolts & Diameter	Recommended Torque ft-lbs (N-m)	# Bolts &
1/2"	15	16 (22)	4 @ 1/2"	16 (22)	4 @ 1/2"
3/4"	20	23 (31)	4 @ 1/2"	38 (52)	4 @ 5/8"
1"	25	30 (41)	4 @ 1/2"	38 (52)	4 @ 5/8"
1-1/4"	32	46 (63)	4 @ 1/2"	55 (75)	4 @ 5/8"
1-1/2"	40	56 (76)	4 @ 1/2"	92 (125)	4 @ 3/4"
2"	50	113 (153)	4 @ 5/8"	62 (84)	8 @ 5/8"
2-1/2"	65	113 (153)	4 @ 5/8"	87 (118)	8 @ 3/4"
3"	80	130 (177)	4 @ 5/8"	126 (171)	8 @ 3/4"
3-1/2"	90	113 (153)	8 @ 5/8"	141 (192)	8 @ 3/4"
4"	100	113 (153)	8 @ 5/8"	179 (243)	8 @ 3/4"
5"	125	202 (275)	8 @ 3/4"	202 (275)	8 @ 3/4"
6"	150	202 (275)	8 @ 3/4"	187 (245)	12 @ 3/4"
8"	200	236 (321)	8 @ 3/4"	297 (404)	12 @ 7/8"
10"	250	327 (445)	12 @ 7/8"	310 (422)	16 @ 1"
12"	300	327 (445)	12 @ 7/8"	464 (631)	16 @ 1-1/8"
14"	350	492 (669)	12 @ 1"	405 (551)	20 @ 1-1/8"
16"	400	492 (669)	16 @ 1"	570 (775)	20 @ 1-1/4"
18"	450	731 (994)	16 @ 1-1/8"	644 (876)	24 @ 1-1/4"
20"	500	731 (994)	20 @ 1-1/8"	710 (965)	24 @ 1-1/4"
24"	600	1,036 (1,408)	20 @ 1-1/4"	1,100 (1,496)	24 @ 1-1/2"

*Based on 1/16" Durlon® 8500. Minimum values for Durlon® 8300, 9400 and 9600 may require higher loads. Minimum sealing requirements for other Durlon® materials may be lower.

Note: It is assumed that new ASTM A193 Gr. B7 studs with 2H heavy hex nuts and hardened steel washers are used and studs, nuts, and nut facings are lubricated with a anti-seize paste (K=0.17) using the installation and bolt tightening practices outlined above. Torque is based the higher of 40% of bolt yield, T3 or 4,800 psi gasket stress up to either the maximum allowable material stress or a maximum bolt yield of 60%. The above was calculated using the proposed ASME Gasket Constants (ROTT Testing, École Polytechnique) for each material.

Flat face flanges using full face gaskets, the recommended torque value is generally the maximum allowable torque based on the allowable bolt area. Flat face flanges have the same bolting as raised face flanges but roughly 3 to 4 times the surface area being compressed. This makes flat face flanges very difficult to seal unless a gasket with low compression characteristics is used.

Bolt stresses may exceed those allowed by ASME.

Torque Values - Spiral Wound Gaskets, Class 150, 300, 400, 600

Flange Size		CLASS 150 - DR		CLASS 150 - DRI		# of Bolts & Diameter	CLASS 300 - DR		CLASS 300 - DRI		# of Bolts & Diameter
NPS	DN	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)		Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	
1/2″	15	30 (41)	40 (54)	30 (41)	50(67)	4 @ 0.500"	30 (41)	40 (54)	30 (41)	40 (54)	4 @ 0.500"
3/4″	20	30 (41)	40 (54)	30 (41)	60 (81)	4 @ 0.500"	60 (81)	70 (95)	60 (81)	80 (108)	4 @ 0.625"
1″	25	30 (41)	40 (54)	30 (41)	60 (81)	4 @ 0.500"	60 (81)	70 (95)	60 (81)	80 (108)	4 @ 0.625"
1-1/4″	32	35 (47)	40 (54)	35 (47)	60 (81)	4 @ 0.500"	60 (81)	70 (95)	60 (81)	80 (108)	4 @ 0.625"
1-1/2″	40	50 (67)	60 (81)	50 (67)	60 (81)	4 @ 0.500"	100 (136)	120 (163)	100 (136)	140 (190)	4 @ 0.750"
2″	50	75 (102)	90 (122)	75 (102)	120 (163)	4 @ 0.625"	60 (81)	70 (95)	60 (81)	80 (108)	8 @ 0.625"
2-1/2″	65	90 (122)	110 (149)	90 (122)	120 (163)	4 @ 0.625"	100 (136)	120 (163)	100 (136)	140 (190)	8 @ 0.750"
3″	80	120 (163)	120 (163)	120 (163)	120 (163)	4 @ 0.625"	100 (136)	120 (163)	100 (136)	150 (203)	8 @ 0.750"
4″	100	95 (129)	120 (163)	95 (129)	120 (163)	8 @ 0.625"	100 (136)	140 (190)	100 (136)	200 (271)	8 @ 0.750"
5″	125	100 (136)	160 (217)	100 (136)	200 (271)	8 @ 0.625"	110 (149)	160 (217)	110 (149)	200 (271)	8 @ 0.750"
6″	150	180 (244)	200 (271)	180 (244)	200 (271)	8 @ 0.750"	110 (149)	160 (217)	110 (149)	200 (271)	12 @ 0.750"
8″	200	236 (320)	236 (320)	236 (320)	236 (320)	8 @ 0.750"	180 (244)	260 (352)	180 (244)	320 (434)	8 @ 0.875"
10″	250	240 (325)	320 (434)	240 (325)	327 (443)	12 @ 0.875"	250 (339)	290 (393)	250 (339)	460 (624)	16 @ 1.000"
12″	300	327 (443)	327 (444)	327 (443)	327 (443)	12 @ 0.875"	360 (488)	420 (569)	360 (488)	700 (949)	16 @ 1.125"
14″	350	410 (556)	490 (664)	410 (556)	492 (667)	12 @ 1.000"	360 (488)	420 (569)	360 (488)	610 (827)	20 @ 1.125"
16″	400	410 (556)	490 (664)	410 (556)	492 (667)	16 @ 1.000"	500 (678)	590 (799)	500 (678)	920 (1,247)	20 @ 1.250"
18″	450	500 (678)	710 (962)	650 (881)	710 (962)	16 @ 1.125"	500 (678)	680 (921)	500 (678)	1,000 (1,356)	24 @ 1.250"
20″	500	430 (583)	710 (962)	570 (773)	710 (962)	20 @ 1.125"	500 (678)	740 (1,003)	500 (678)	1,000 (1,356)	24 @ 1.250"
24″	600	620 (840)	1,036 (1405)	820 (1,112)	1,036 (1,405)	20 @ 1.250"	800 (1,084)	1,030 (1,396)	800 (1084)	1,600 (2,169)	20 @ 1.500"

Flange Size		CLASS 400 - DR		CLASS 400 - DRI		# of Bolts & Diameter	CLASS 600 - DR		CLASS 600 - DRI		# of Bolts & Diameter
NPS	DN	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)		Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	
1/2"	15	30 (41)	40 (54)	30 (41)	40 (54)	4 @ 0.500"	30 (41)	40 (54)	30 (41)	40 (54)	4 @ 0.500"
3/4"	20	60 (81)	70 (95)	60 (81)	80 (108)	4 @ 0.625"	60 (81)	70 (95)	60 (81)	80 (108)	4 @ 0.625"
1"	25	60 (41)	70 (95)	60 (81)	80 (108)	4 @ 0.625"	60 (81)	70 (95)	60 (81)	80 (108)	4 @ 0.625"
1-1/4"	32	60 (41)	70 (95)	60 (81)	80 (108)	4 @ 0.625"	60 (81)	70 (95)	60 (81)	80 (108)	4 @ 0.625"
1-1/2"	40	100 (136)	120 (163)	100 (136)	140 (190)	4 @ 0.750"	100 (136)	120 (163)	100 (136)	140 (190)	4 @ 0.750"
2"	50	60 (81)	70 (95)	60 (81)	80 (108)	8 @ 0.625"	60 (81)	70 (95)	60 (81)	80 (108)	8 @ 0.625"
2-1/2"	65	100 (136)	120 (163)	100 (136)	140 (190)	8 @ 0.750"	100 (136)	120 (163)	100 (136)	140 (190)	8 @ 0.750"
3"	80	100 (136)	120 (163)	100 (136)	150 (203)	8 @ 0.750"	100 (136)	120 (163)	100 (136)	150 (203)	8 @ 0.750"
4"	100	160 (217)	200 (271)	160 (217)	320 (434)	8 @ 0.875"	190 (257)	240 (325)	190 (257)	320 (434)	8 @ 0.875"
5"	125	210 (285)	260 (352)	210 (285)	320 (434)	8 @ 0.875"	280 (379)	360 (488)	280 (379)	490 (664)	8 @ 1.000"
6"	150	150 (203)	240 (325)	190 (257)	320 (434)	12 @ 0.875"	260 (352)	330 (447)	260 (352)	460 (623)	12 @ 1.000"
8"	200	310 (420)	400 (542)	310 (420)	490 (664)	12 @ 1.000"	400 (542)	500 (678)	400 (542)	710 (963)	12 @ 1.125"
10"	250	340 (461)	440 (596)	360 (488)	710 (962)	16 @ 1.125"	500 (678)	590 (799)	500 (678)	850 (1,152)	16 @ 1.250"
12"	300	510 (691)	640 (867)	510 (691)	1,000 (1,355)	16 @ 1.250"	500 (678)	610 (827)	500 (678)	900 (1,220)	20 @ 1.250"
14"	350	500 (678)	890 (1206)	500 (678)	870 (1,179)	20 @ 1.250"	680 (921)	800 (1,084)	680 (921)	1,020 (1,383)	20 @ 1.375"
16"	400	680 (921)	800 (1084)	680 (921)	1,250 (1,694)	20 @ 1.375"	800 (1,084)	940 (1,274)	800 (1,084)	1,290 (1,749)	20 @ 1.500"
18"	450	680 (921)	810 (1,098)	680 (921)	1,340 (1,816)	24 @ 1.375"	1,100 (1,491)	1,290 (1,748)	1,100 (1,491)	1,790 (2,427)	20 @ 1.625"
20"	500	800 (1,084)	940 (1,274)	800 (1,084)	1,430 (1,938)	24 @ 1.500"	1,100 (1,491)	1,290 (1,748)	1,100 (1,491)	1,735 (2,352)	24 @1.625"
24"	600	1,500 (2,033)	1,750 (2,371)	1,500 (2,033)	2,270 (3,076)	24 @ 1.750"	2,000 (2,710)	2,340 (3,171)	2,000 (2,710)	2,755 (3,735)	24 @ 1.875"

Torque Values - Spiral Wound Gaskets, Class 900, 1500, 2500

Flange Size		CLASS 900 - DR		CLASS 900 - DRI		# of Bolts & Diameter	CLASS 1500 - DR		CLASS 1500 - DRI		# of Bolts & Diameter
NPS	DN	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)		Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	
1/2"	15	70 (95)	120 (163)	70 (95)	100 (136)	4 @ 0.750"	70 (95)	100 (136)	70 (95)	100 (136)	4 @ 0.750"
3/4"	20	70 (95)	120 (163)	70 (95)	100 (136)	4 @ 0.750"	70 (95)	100 (136)	70 (95)	100 (136)	4 @ 0.750"
1"	25	110 (149)	190 (257)	110 (149)	160 (217)	4 @ 0.875"	110 (149)	160 (217)	110 (149)	160 (217)	4 @ 0.875"
1-1/4"	32	110 (149)	190 (257)	110 (149)	160 (217)	4 @ 0.875"	140 (190)	170 (230)	140 (190)	164 (222)	4 @ 0.875"
1-1/2"	40	170 (230)	290 (393)	170 (230)	275 (373)	4 @ 1.000"	200 (271)	250 (339)	200 (271)	250 (339)	4 @ 1.000"
2"	50	110 (149)	190 (257)	110 (149)	170 (230)	8 @ 0.875"	130 (176)	170 (230)	130 (176)	170 (230)	8 @ 0.875"
2-1/2"	65	170 (230)	290 (393)	170 (230)	240 (325)	8 @ 1.000"	190 (257)	250 (339)	190 (257)	250 (339)	8 @ 1.000"
3"	80	140 (190)	230 (312)	140 (190)	235 (319)	8 @ 0.875"	270 (366)	360 (488)	270 (366)	360 (488)	8 @ 1.125"
4"	100	260 (353)	420 (569)	260 (353)	420 (569)	8 @ 1.125"	420 (569)	520 (705)	420 (569)	520 (705)	8 @ 1.250"
5"	125	360 (488)	600 (813)	360 (488)	590 (800)	8 @ 1.250"	590 (800)	800 (1,084)	590 (800)	800 (1,084)	8 @ 1.500"
6"	150	300 (407)	500 (678)	300 (407)	550 (746)	12 @ 1.125"	530 (718)	680 (921)	530 (718)	720 (976)	12 @ 1.375"
8"	200	485 (657)	800 (1,084)	485 (657)	835 (1,132)	12 @ 1.375"	850 (1,152)	1,100 (1,491)	850 (1,152)	1,100 (1,491)	12 @ 1.625"
10"	250	505 (684)	760 (1,030)	505 (684)	760 (1,030)	16 @ 1.375"	1,570 (2,129)	2,000 (2,710)	1,570 (2,129)	2,000 (2,710)	12 @ 1.875"
12"	300	560 (759)	850 (1,152)	560 (759)	920 (1,247)	20 @ 1.375"	Not Applicable, Use DRI		1,500 (2,034)	2,200 (2,983)	16 @ 2.000"
14"	350	630 (854)	940 (1,274)	630 (854)	970 (1,315)	20 @ 1.500"			2,120 (2,873)	3,180 (4,312)	16 @ 2.125"
16"	400	910 (1,233)	1,290 (1,748)	910 (1,233)	1,285 (1,742)	20 @ 1.625"			2,940 (3,984)	4,400 (5,966)	16 @ 2.500"
18"	450	1,570 (2,127)	2,340 (3,171)	1,570 (2,127)	2,475 (3,356)	20 @ 1.875"			3,950 (5,352)	5,920 (8,026)	16 @ 2.750"
20"	500	1,745 (2,364)	2,570 (3,482)	1,745 (2,364)	2,335 (3,166)	20 @ 2.000"			5,150 (6,978)	7,720 (10,467)	16 @ 3.000"
24"	600	Not Applicable, Use DRI		2,845 (3,857)	3,800 (5,152)	20 @ 2.500"			8,340 (11,301)	12,500 (16,938)	16 @ 3.500"

Flange Size		CLASS 2500 - DR		CLASS 2500 - DRI		# of Bolts & Diameter
NPS	DN	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	Min Torque ft-lbs (N-m)	Recommended Torque ft-lbs (N-m)	
1/2"	15	50 (68)	100 (136)	50 (68)	100 (136)	4 @ 0.750"
3/4"	20	70 (95)	100 (136)	63 (85)	100 (136)	4 @ 0.750"
1"	25	110 (149)	160 (217)	110 (149)	160 (217)	4 @ 0.875"
1-1/4"	32	210 (285)	250 (339)	210 (285)	250 (339)	4 @ 1.000"
1-1/2"	40	310 (420)	360 (488)	310 (420)	360 (488)	4 @ 1.125"
2"	50	220 (298)	250 (339)	220 (298)	250 (339)	8 @ 1.000"
2-1/2"	65	300 (407)	360 (488)	300 (407)	360 (488)	8 @ 1.125"
3"	80	460 (623)	500 (678)	460 (623)	500 (678)	8 @ 1.250"
4"	100	Not Applicable, Use DRI		710 (962)	800 (1,085)	8 @ 1.500"
5"	125			1,280 (1,734)	1,500 (2,034)	8 @ 1.750"
6"	150			1,870 (2,534)	2,200 (2,983)	8 @ 2.000"
8"	200			1,780 (2,412)	2,200 (2,983)	12 @ 2.000"
10"	250			3,040 (4,122)	4,400 (5,966)	12 @ 2.500"
12"	300			4,610 (6,247)	5,920 (8,026)	12 @ 2.750"

Note: Torque values are in ft-lbs and assume Alloy Steel Bolts (A193 B7 with 2H nuts) with oil/graphite lubrication. Nut factors used on these charts are within .15 to .19. Triangle Fluid Controls does not generally recommend a bolt stress above 60% of bolt yield. Torque values limit minimum and maximum gasket seating stresses based upon pressure class and certain operating conditions (i.e.: maximum pressure ratings for given pressure class, not hydrotest pressure). Extreme operating conditions such as high temperature may reduce bolt yield strength. Caution should be used in these applications. The above torque values are for general use only. For critical or extreme applications (high temperature) consult with Triangle Fluid Controls technical department. Triangle Fluid Controls does not accept responsibility for the misuse of this information.

Torque Values - Durtec®, Class 150, 300, 400, 600

FLANGE SIZE		Class 150		Class 300		Class 400	
NPS	DN	Recommended Torque ft-lbs (N-m)	# Bolts & Diameter	Recommended Torque ft-lbs (N-m)	# Bolts & Diameter	Recommended Torque ft-lb (N-m)	# Bolts & Diameter
1/2″	15	25 (34)	4 @ 1/2″	25 (34)	4 @ 1/2″	25 (34)	4 @ 1/2″
3/4″	20	36 (49)	4 @ 1/2″	45 (61)	4 @ 5/8″	45 (61)	4 @ 5/8″
1″	25	48 (65)	4 @ 1/2″	59 (80)	4 @ 5/8″	59 (80)	4 @ 5/8″
1-1/4″	32	56 (76)	4 @ 1/2″	91 (123)	4 @ 5/8″	91 (123)	4 @ 5/8″
1-1/2″	40	56 (76)	4 @ 1/2″	145 (196)	4 @ 3/4″	145 (196)	4 @ 3/4″
2″	50	113 (153)	4 @ 5/8″	98 (133)	8 @ 5/8″	98 (133)	8 @ 5/8″
2-1/2″	65	113 (153)	4 @ 5/8″	137 (186)	8 @ 3/4″	137 (186)	8 @ 3/4″
3″	80	113 (153)	4 @ 5/8″	199 (270)	8 @ 3/4″	199 (270)	8 @ 3/4″
3-1/2″	90	113 (153)	8 @ 5/8″	202 (274)	8 @ 3/4″	202 (274)	8 @ 7/8″
4″	100	113 (153)	8 @ 5/8″	202 (274)	8 @ 3/4″	202 (274)	8 @ 7/8″
5″	125	202 (274)	8 @ 3/4″	202 (274)	8 @ 3/4″	202 (274)	8 @ 7/8″
6″	150	202 (274)	8 @ 3/4″	202 (274)	12 @ 3/4″	327 (443)	12 @ 7/8″
8″	200	202 (274)	8 @ 3/4″	327 (443)	12 @ 7/8″	394 (534)	12 @ 1″
10″	250	327 (443)	12 @ 7/8″	490 (664)	16 @ 1″	731 (991)	16 @ 1-1/8″
12″	300	327 (443)	12 @ 7/8″	731 (991)	16 @ 1-1/8″	613 (831)	16 @ 1-1/4″
14″	350	492 (667)	12 @ 1″	639 (866)	20 @ 1-1/8″	651 (882)	20 @ 1-1/4″
16″	400	492 (667)	16 @ 1″	900 (1,220)	20 @ 1-1/4″	781 (1,058)	20 @ 1-3/8″
18″	450	731 (991)	16 @ 1-1/8″	1,017 (1,378)	24 @ 1-1/4″	781 (1,058)	24 @ 1-3/8″
20″	500	731 (991)	20 @ 1-1/8″	1,036 (1,404)	24 @ 1-1/4″″	1,080 (1,463)	24 @ 1-1/2″
24″	600	1,036 (1,404)	20 @ 1-1/4″	1,737 (2,354)	24 @ 1-1/2″	2,025 (2,744)	24 @ 1-3/4″

FLANGE SIZE		Class 600		Class 900	
NPS	DN	Recommended Torque	# Bolts & Diameter	Recommended Torque	# Bolts & Diameter
1/2″	15	25 (34)	4 @ 1/2″	37 (50)	4 @ 3/4″
3/4″	20	45 (61)	4 @ 5/8″	54 (73)	4 @ 3/4″
1″	25	59 (80)	4 @ 5/8″	83 (112)	4 @ 7/8″
1-1/4″	32	91 (123)	4 @ 5/8″	128 (173)	4 @ 7/8″
1-1/2″	40	145 (196)	4 @ 3/4″	193 (262)	4 @ 1″
2″	50	98 (133)	8 @ 5/8″	137 (186)	8 @ 7/8″
2-1/2″	65	137 (186)	8 @ 3/4″	183 (248)	8 @ 1″
3″	80	199 (270)	8 @ 3/4″	233 (316)	8 @ 7/8″
3-1/2″	90	202 (274)	8 @ 7/8″	-	8 @ 1-1/8″
4″	100	327 (443)	8 @ 7/8″	423 (573)	8 @ 1-1/8″
5″	125	470 (637)	8 @ 1″	588 (797)	8 @ 1-1/4″
6″	150	394 (534)	12 @ 1″	444 (602)	12 @ 1-1/8″
8″	200	602 (816)	12 @ 1-1/8″	736 (997)	12 @ 1-3/8″
10″	250	613 (831)	16 @ 1-1/4″	674 (913)	16 @ 1-3/8″
12″	300	651 (882)	20 @ 1-1/4″	716 (970)	20 @ 1-3/8″
14″	350	781 (1,058)	20 @ 1-3/8″	852 (1,154)	20 @ 1-1/2″
16″	400	1,080 (1,463)	20 @ 1-1/2″	1,170 (1,585)	20 @ 1-5/8″
18″	450	1,587 (2,150)	20 @ 1-5/8″	1,831 (2,481)	20 @ 1-7/8″
20″	500	1,458 (1,976)	24 @ 1-5/8″	2,153 (2,917)	20 @ 2″
24″	600	2,172 (2,943)	24 @ 1-7/8″	3,475 (4,709)	20 @ 2-1/2″

Note: It is assumed that new ASTM A193 Gr. B7 studs with 2H heavy hex nuts and hardened steel washers are used and studs, nuts and nut facings are lubricated with a anti-seize paste (K=0.17) using the installation and bolt tightening practices outlined above. Torque is based the higher of 40% of bolt yield, T3 or 4,800 psi gasket stress up to either the maximum allowable material stress or a maximum bolt yield of 60%. The above was calculated using the proposed ASME Gasket Constants (ROTT Testing, École Polytechnique) for each material.

Flat face flanges using full face gaskets, the recommended torque value is generally the maximum allowable torque based on the allowable bolt area. Flat face flanges have the same bolting as raised face flanges but roughly 3 to 4 times the surface area being compressed. This makes flat face flanges very difficult to seal unless a gasket with low compression characteristics is used.

Bolt stresses may exceed those allowed by ASME.

Torque Values - iGuard™ EN, HC, CS and HT Gaskets

Flange Size		150			300			400		
NPS	DN	# Bolts	Bolt Diameter	Recommended Torque ft-lbs (N-m)	# Bolts	Bolt Diameter	Recommended Torque ft-lbs (N-m)	# Bolts	Bolt Diameter	Recommended Torque ft-lbs (N-m)
½″	15	4	0.50″	40	4	0.625″	80	4	0.625″	80
¾″	20	4	0.50″	40	4	0.625″	80	4	0.625″	80
1″	25	4	0.50″	40	4	0.625″	80	4	0.625″	80
1¼″	32	4	0.50″	40	4	0.625″	80	4	0.625″	110
1½″	40	4	0.50″	40	4	0.75″	110	4	0.75″	110
2″	50	4	0.625″	80	8	0.75″	110	8	0.625″	110
2½″	65	4	0.625″	80	8	0.625″	150	8	0.75″	150
3″	80	4	0.625″	110	8	0.75″	150	8	0.75″	150
3½″	90	8	0.625″	80	8	0.75″	150	8	0.875″	180
4″	100	8	0.625″	100	8	0.75″	180	8	0.875″	180
5″	125	8	0.75″	120	8	0.75″	180	8	0.875″	215
6″	150	8	0.75″	130	12	0.75″	170	12	0.875″	215
8″	200	8	0.75″	130	12	0.875″	265	12	1.00″	320
10″	250	12	0.875″	215	16	1.00″	320	16	1.125″	450
12″	300	12	0.875″	220	16	1.125″	450	16	1.25″	650
14″	350	12	1.00″	320	20	1.125″	450	20	1.25″	625
16″	400	16	1.00″	320	20	1.25″	650	20	1.375″	820
18″	450	16	1.125″	450	24	1.25″	650	24	1.375″	820
20″	500	20	1.125″	450	24	1.25″	650	24	1.50″	1,100
22″	600	20	1.125″	460	24	1.50″	1,125	24	1.625″	1,425
24″	600	20	1.25″	650	24	1.50″	1,200	24	1.75″	1,775

Note: Triangle Fluid Controls does not take any responsibility for any of these torque values; they are theoretical values and should be utilized for reference only. These torque values are intended for use as guidelines only and are based on perfect conditions using weldneck flanges and lubricated stud bolts with a 0.15 friction factor.

Chemical Resistance - Non-Metallic Gaskets

The following information is a general guide only for the selection of a suitable gasket material as there are unlimited combinations of fluid, pressure and temperature conditions.

A = Acceptable
C = Caution-Dependent on Conditions
NS = Not Suitable
- = No Data Available

FLUID	DURLON® COMPRESSED SHEET						DURLON® PTFE				DURLON® FLEXIBLE GRAPHITE			DURLON® HT1000®		
	5300 7900 7910 7925 7950	8300 8900	8400	8500	8600	8700	9000 9000N 9002	9200W	9400	Virgin Joint Sealant 9600	FGS95	CFG FGL316 FGM316	FGT316	S90	L316	T316
Acetaldehyde	C	NS	C	C	C	C	A	A	A	A	A	A	A	C	C	C
Acetic Acid, Glacial	C	C	C	C	C	C	A	A	A	A	A	A	A	A	A	A
Acetic Acid, 37%	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Acetic Anhydride	C	A	C	C	C	C	A	A	A	A	A	A	A	-	-	-
Acetone	C	C	C	C	C	C	A	A	A	A	A	A	A	C	C	C
Acetonitrile	NS	NS	NS	NS	NS	C	A	A	A	A	NS	NS	NS	-	-	-
Acetylene	A	A	A	A	C	A	A	A	A	A	A	A	A	C	C	C
Acrolein	C	C	C	C	NS	C	A	A	A	A	NS	NS	NS	-	-	-
Acrylic Acid	NS	NS	NS	NS	NS	NS	A	A	A	A	A	NS	NS	-	-	-
Acrylonitrile	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Air	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Alum	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Aluminum Acetate	A	A	A	A	A	A	A	A	A	A	C	C	C	A	A	A
Aluminum Hydroxide	A	A	A	A	A	A	A	A	A	A	A	NS	NS	A	-	-
Aluminum Nitrate	C	C	C	C	C	C	A	A	NS	A	C	C	C	-	-	-
Aluminum Sulfate	A	A	A	A	A	A	A	A	A	A	A	NS	NS	-	-	-
Amines	C	C	C	C	A	C	A	A	A	A	A	A	A	-	-	-
Ammonia, Gas<150°F	C	A	A	A	A	A	A	A	A	A	A	C	C	A	-	-
Ammonia, Gas>150°F	NS	NS	NS	NS	NS	C	A	A	A	A	A	NS	NS	A	-	-
Ammonia, Liquid, Anhydrous	C	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A
Ammonium Bisulfite	A	A	A	A	C	A	A	A	A	A	NS	NS	NS	-	-	-
Ammonium Chloride	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ammonium Hydroxide	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ammonium Nitrate	C	C	C	C	C	C	A	A	NS	A	A	A	A	-	-	-
Amyl Chloride	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	A	A	A
Aniline, Aniline Oil	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	C	C	C
Aqua Regia	NS	NS	NS	NS	NS	NS	A	A	NS	A	NS	NS	NS	-	-	-
Arsenic Acid	A	A	A	A	A	A	A	A	A	A	A	A	A	-	-	-
Asphalt	A	A	A	A	NS	NS	A	A	A	A	A	A	A	A	A	A
Aviation Fuels	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Baking Soda	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Barium Chloride	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Beer	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Benzaldehyde	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Benzene (Benzol)	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	C	C	C
Benzoic Acid	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	A	A	A
Benzoyl Chloride	NS	NS	NS	NS	NS	NS	A	A	A	A	C	NS	NS	-	-	-
Benzyl Alcohol	NS	NS	NS	NS	NS	C	A	A	A	A	A	C	C	-	-	-
Benzyl Chloride	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Black Sulfate Liquor <350°F	A	NS	A	A	C	C	A	A	A	A	C	C	C	C	C	C
Black Sulfate Liquor >350°F	NS	NS	C	NS	NS	NS	A	A	A	A	NS	NS	NS	NS	NS	NS
Bleach Solutions	C	C	A	C	C	C	A	A	A	A	C	NS	NS	A	-	-
Boiler Feed Water	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Borax	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Boric Acid	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Brine	A	A	A	A	A	A	A	A	A	A	A	C	C	-	-	-
Butadiene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	A	A	A
Butane	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
2-Butanone	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	C	C	C
Butyl Acetate	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	C	C	C
Butyl Alcohol (Butanol)	A	A	A	A	A	A	A	A	A	A	A	A	A	C	C	C
n-Butyl Amine	C	C	C	C	NS	NS	A	A	A	A	A	A	A	C	C	C
tert-Butyl Amine	C	C	C	C	NS	NS	A	A	A	A	A	A	A	-	-	-
Butyl Methacrylate	NS	NS	NS	NS	NS	NS	A	A	A	A	C	NS	NS	-	-	-
Butylene (butene)	A	A	A	A	NS	C	A	A	A	A	A	A	A	-	-	-
Butyric Acid	A	A	A	A	C	C	A	A	A	A	A	A	A	C	C	C
Calcium Bisulfite	A	A	A	A	NS	C	A	A	A	A	A	A	A	-	-	-
Calcium Carbonate	A	A	A	A	A	A	A	A	A	A	A	A	A	-	-	-
Calcium Chloride	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Calcium Hydroxide	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Calcium Hypochlorite	C	C	A	C	C	C	A	A	A	A	A	A	A	A	A	A
Calcium Nitrate	C	C	C	C	C	C	A	A	NS	A	A	A	A	-	-	-
Caprolactam	NS	NS	NS	NS	NS	NS	A	A	A	A	NS	NS	NS	-	-	-
Carbon Dioxide, dry	A	A	A	A	C	C	A	A	A	A	A	A	A	A	A	A
Carbon Dioxide, wet	A	A	A	A	C	C	A	A	A	A	A	A	A	A	A	A
Carbon Disulfide	NS	NS	C	NS	NS	NS	A	A	A	A	A	A	A	C	C	C
Carbon Monoxide	A	A	A	A	NS	NS	A	A	A	A	A	A	A	A	A	A
Carbon Tetrachloride	C	NS	C	C	NS	NS	A	A	A	A	A	A	A	C	C	C
Caustic Soda (NaOH)	C	NS	A	C	C	NS	A	A	A	A	A	A	C	A	A	A

Chemical Resistance - Non-Metallic Gaskets

FLUID	DURLON® COMPRESSED SHEET						DURLON® PTFE				DURLON® FLEXIBLE GRAPHITE			DURLON® HT1000®		
	5300 7900 7910 7925 7950	8300 8900	8400	8500	8600	8700	9000 9000N 9002	9200W	9400	Virgin Joint Sealant 9600	FGS95	CFG FGL316 FGM316	FGT316	S90	L316	T316
Chlorine, liquid (dry) *	NS	NS	NS	NS	NS	NS	A	A	A	A	A	C	C	-	-	-
Chlorine (wet) *	NS	NS	C	NS	NS	NS	A	A	A	A	A	NS	NS	-	-	-
Chlorine Dioxide	NS	NS	NS	NS	NS	NS	A	A	NS	A	C	NS	NS	-	-	-
Chlorobenzene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Chloroethane	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Chloroethylene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	C	C	-	-	-
Chloroform	C	C	A	C	NS	NS	A	A	A	A	A	A	A	C	C	C
Chromic Acid	NS	NS	NS	NS	NS	NS	A	A	NS	A	A	A	A	C	C	C
Citric Acid	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Coal Gas	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Copper Sulfate	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Corn Oil	C	A	C	C	NS	C	A	A	A	A	A	A	A	A	A	A
Cotton Seed Oil	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Creosote (Coal Tar)	A	A	A	A	NS	NS	A	A	A	A	A	A	A	A	A	A
Cresol	C	C	A	C	NS	NS	A	A	A	A	A	A	A	A	A	A
Crude Oil	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Cumene	NS	NS	NS	NS	NS	C	A	A	A	A	NS	NS	NS	-	-	-
Cyclohexane	C	A	A	C	NS	C	A	A	A	A	A	A	A	-	-	-
Cyclohexanone	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	A	A	A
Detergent Solutions	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Diacetone Alcohol	C	A	A	A	C	C	A	A	A	A	A	A	A	-	-	-
Diazomethane	NS	NS	NS	NS	NS	NS	A	A	A	A	NS	NS	NS	-	-	-
Dibenzyl Ether	C	NS	C	C	NS	NS	A	A	A	A	A	NS	NS	C	NS	NS
Dibutylamine	C	C	C	C	NS	C	A	A	A	A	C	C	C	-	-	-
1,4-Dichlorobenzene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
3,3-Dichlorobenzidene	NS	NS	NS	NS	NS	NS	A	A	A	A	NS	NS	NS	-	-	-
Dichlorobenzidene	NS	NS	NS	NS	NS	NS	A	A	A	A	NS	NS	NS	-	-	-
1,1-Dichloroethylene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Dichloroethyl Ether	NS	NS	NS	NS	NS	NS	A	A	A	A	C	NS	NS	-	-	-
Dichloromethane	NS	NS	NS	NS	NS	NS	A	A	A	A	A	NS	NS	-	-	-
Diesel Fuel	A	A	A	A	C	C	A	A	A	A	A	A	A	A	A	A
Diethyl Carbonate	NS	NS	NS	NS	NS	NS	A	A	A	A	A	NS	NS	-	-	-
Dimethyl Acetamide	NS	NS	C	NS	NS	NS	A	A	A	A	C	C	C	-	-	-
Dimethylformamide (DMF)	NS	NS	C	NS	NS	NS	A	A	A	A	NS	NS	NS	-	-	-
Dioxane	NS	NS	NS	NS	NS	NS	A	A	A	A	A	C	C	-	-	-
Dowtherm A, E	C	NS	C	C	NS	NS	A	A	A	A	A	A	A	A	A	A
Epichlorohydrin	NS	NS	NS	NS	NS	NS	A	A	A	A	A	C	C	-	-	-
Ethane	A	A	A	A	C	C	A	A	A	A	A	A	A	A	A	A
Ethyl Acetate	C	C	C	C	C	NS	A	A	A	A	A	A	A	C	C	C
Ethyl Alcohol (Ethanol)	A	A	A	A	A	A	A	A	A	A	A	A	A	C	C	C
Ethylbenzene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Ethylchloride	NS	NS	A	NS	NS	NS	A	A	A	A	A	A	A	C	C	C
Ethylene	A	A	A	A	NS	C	A	A	A	A	A	A	A	C	C	C
Ethylene Dichloride (EDC)	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Ethylene Glycol	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ethyl Ether	C	C	C	C	NS	C	A	A	A	A	A	A	A	C	C	C
Ethylene Oxide	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Fatty Acids	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Ferric Chloride	A	A	A	A	A	A	A	A	A	A	A	NS	NS	-	-	-
Ferrous Chloride	A	A	A	A	A	A	A	A	A	A	A	NS	NS	-	-	-
Fluorine (Gas, Liquid)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	NS	NS	-	-	-
Formaldehyde	A	A	C	A	C	C	A	A	A	A	A	A	A	C	C	C
Formic Acid	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	A	A	A	A
Freon (See Refrigerants)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fuel Oil	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Gas – Natural	A	A	A	A	NS	A	A	A	A	A	A	A	A	A	A	A
Gasoline	A	A	A	A	NS	NS	A	A	A	A	A	A	A	C	C	C
Glucose	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Glycerin (Glycerol)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Green Sulfate Liquor	C	C	A	C	NS	C	A	A	A	A	C	C	C	-	-	-
Glycol	A	A	A	A	A	A	A	A	A	A	A	C	C	A	C	C
Heptane	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Hexane	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Hydraulic Oil (mineral)	A	A	A	A	C	C	A	A	A	A	A	A	A	A	A	A
Hydraulic Oil (phosp. ester)	C	C	C	C	NS	NS	A	A	A	A	A	A	A	A	A	A
Hydrazine	C	C	A	C	C	C	A	A	A	A	A	A	A	A	A	A
Hydrochloric Acid, 30%	NS	NS	C	NS	NS	NS	A	NS	A	A	A	NS	NS	A	NS	NS
Hydrochloric Acid, Conc	NS	NS	C	NS	NS	NS	A	NS	A	A	A	NS	NS	A	A	A
Hydrofluoric Acid<150°F	NS	NS	NS	NS	NS	NS	NS	NS	A	A	A	NS	NS	-	-	-
Hydrofluoric Acid>150°F	NS	NS	NS	NS	NS	NS	NS	NS	A	A	A	NS	NS	-	-	-
Hydrogen	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Hydrogen Chloride, (dry)	NS	A	NS	NS	NS	NS	A	A	A	A	A	NS	NS	-	-	-
Hydrogen Fluoride (HF)	NS	NS	NS	NS	NS	NS	NS	NS	A	A	A	NS	NS	A	NS	NS
Hydrogen Peroxide, 10%	C	C	C	C	C	C	A	A	A	A	C	C	C	A	A	A

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FLUID	DURLON® COMPRESSED SHEET						DURLON® PTFE				DURLON® FLEXIBLE GRAPHITE			DURLON® HT1000®		
	5300 7900 7910 7925 7950	8300 8900	8400	8500	8600	8700	9000 9000N 9002	9200W	9400	Virgin Joint Sealant 9600	FGS95	CFG FGL316 FGM316	FGT316	S90	L316	T316
Hydrogen Sulfide (dry)	C	A	A	C	C	A	A	A	A	A	A	A	A	-	-	-
Hydrogen Sulfide, (wet)	C	C	C	C	NS	C	A	A	A	A	A	A	A	-	-	-
Hydroquinone	NS	NS	NS	NS	C	NS	A	A	A	A	A	A	A	-	-	-
Iodine	A	A	A	A	A	NS	A	A	A	A	NS	NS	NS	-	-	-
Isobutane	A	A	A	A	NS	C	A	A	A	A	A	C	C	-	-	-
Isooctane	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Isopropyl Alcohol	A	A	A	A	A	A	A	A	A	A	A	A	A	C	C	C
Jet Fuel	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Kerosene	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Lacquer Solvents	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	A	A	A
Lactic Acid	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Linseed Oil	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Lubricating Oil	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Magnesium Chloride	A	A	A	A	A	A	A	A	A	A	A	NS	NS	-	-	-
Magnesium Hydroxide	A	A	A	A	A	A	A	A	A	A	A	A	A	-	-	-
Magnesium Sulfate	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Maleic Acid	A	A	A	A	C	NS	A	A	A	A	A	A	A	A	A	A
Maleic Anhydride	NS	NS	NS	NS	NS	NS	A	A	A	A	NS	NS	NS	-	-	-
Mercuric Chloride	A	A	A	A	A	C	A	A	A	A	NS	NS	NS	-	-	-
Mercury	A	A	A	A	A	A	A	A	A	A	C	C	C	-	-	-
Methane	A	A	A	A	NS	C	A	A	A	A	A	A	A	C	C	C
Methylacrylic Acid	C	C	C	C	C	C	A	A	A	A	C	NS	NS	-	-	-
Methyl Alcohol	A	A	A	A	A	A	A	A	A	A	A	A	A	C	C	C
Methylene Chloride	NS	NS	NS	NS	NS	NS	A	A	A	A	A	NS	NS	C	NS	NS
Methyl Ethyl Ketone, MEK	C	C	C	C	NS	C	A	A	A	A	A	A	A	C	C	C
Methyl Isobutyl Ketone	C	C	C	C	NS	C	A	A	A	A	A	A	A	-	-	-
Methyl Isocyanate	NS	NS	NS	NS	NS	NS	A	A	A	A	NS	NS	NS	-	-	-
Methyl Methacrylate	NS	NS	NS	NS	NS	NS	A	A	A	A	NS	NS	NS	-	-	-
Milk	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Mineral Oil	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Muriatic Acid	NS	NS	C	NS	NS	NS	A	A	A	A	A	NS	NS	-	-	-
Naphtha	A	A	A	A	C	NS	A	A	A	A	A	A	A	A	A	A
Naphthalene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Natural Gas	A	A	A	A	NS	A	A	A	A	A	A	A	A	A	A	A
Nickel Sulfate	A	A	A	A	A	A	A	A	A	A	A	A	A	-	-	-
Nitric Acid, < 20%	NS	NS	NS	NS	NS	NS	A	A	NS	A	A	A	A	A	A	A
Nitric Acid, 50%	NS	NS	NS	NS	NS	NS	A	A	NS	A	NS	NS	NS	A	A	A
Nitrogen	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Nitrogen Dioxide	NS	NS	NS	NS	NS	NS	A	A	NS	A	NS	NS	NS	-	-	-
Nitrogen Tetroxide	NS	NS	NS	NS	NS	NS	A	A	NS	A	NS	NS	NS	-	-	-
Octane	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Oil, Crude	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Oil, Mineral	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Oleic Acid	C	C	C	C	NS	C	A	A	A	A	A	A	A	A	A	A
Oleum, fuming H2SO4	NS	NS	NS	NS	NS	NS	A	NS	NS	A	NS	NS	NS	A	-	-
Oxalic Acid	C	A	A	C	NS	C	A	A	A	A	A	A	A	A	A	A
Oxygen, gas	NS	NS	NS	NS	NS	NS	A	A	A	A	A	NS	A	A	A	A
Oxygen, liquid*	NS	NS	NS	NS	NS	NS	A	A	A	A	A	NS	A	A	A	A
Ozone	NS	NS	NS	NS	NS	NS	A	A	C	A	NS	NS	NS	-	-	-
Paraffin	A	A	A	A	C	C	A	A	A	A	A	A	A	-	-	-
Pentane	A	A	A	A	NS	C	A	A	A	A	A	C	C	-	-	-
Perchloroethylene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	C	C	C
Petroleum	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Phenol	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	A	A	A
Phosphoric Acid, <40%	C	C	C	C	NS	C	A	A	A	A	A	C	C	A	C	C
Phthalic Acid	NS	NS	NS	NS	NS	C	A	A	A	A	A	A	A	A	A	A
Phthalic Anhydride	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	A	A	A
Polyacrylonitrile	A	A	A	A	A	A	A	A	A	A	A	A	A	-	-	-
Potash	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Chloride	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Dichromate	A	A	A	A	C	C	A	A	A	A	A	A	A	A	A	A
Potassium Hydroxide	C	C	A	C	C	C	A	A	A	A	C	C	C	A	A	A
Potassium Nitrate	C	C	C	C	C	C	A	A	C	A	A	A	A	A	A	A
Potassium Sulfate	A	A	A	A	A	A	A	A	A	A	A	A	A	-	-	-
Propane	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Propylene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	A	A	A
Pydrauls, Skydrols	C	C	C	C	NS	NS	A	A	A	A	C	C	C	-	-	-
Pyridine	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	C	C	C
Red Sulfite Liquor	NS	NS	NS	NS	NS	NS	A	A	A	A	C	C	C	-	-	-
Red Sulfite Liquor>380°F	NS	NS	NS	NS	NS	NS	C	C	C	C	A	NS	NS	-	-	-
Refrigerant R-11 **	A	A	A	A	NS	NS	A	A	A	A	A	A	A	-	-	-
Refrigerant R-12 **	A	A	A	A	C	A	A	A	A	A	A	C	C	-	-	-
Refrigerant R-22 **	C	C	C	C	C	A	A	A	A	A	A	A	A	-	-	-
Refrigerant R-113 **	A	A	A	A	C	A	A	A	A	A	C	C	C	-	-	-
Refrigerant HCFC 123 **	C	NS	C	C	NS	C	A	A	A	A	-	-	-	-	-	-

Chemical Resistance - Non-Metallic Gaskets

FLUID	DURLON® COMPRESSED SHEET						DURLON® PTFE				DURLON® FLEXIBLE GRAPHITE			DURLON® HT1000®		
	5300 7900 7910 7925 7950	8300 8900	8400	8500	8600	8700	9000 9000N 9002	9200W	9400	Virgin Joint Sealant 9600	FGS95	CFG FGL316 FGM316	FGT316	S90	L316	T316
Refrigerant HCFC 124 *	C	NS	C	C	NS	A	A	A	A	A	-	-	-	-	-	-
Refrigerant HFC 125 *	C	C	C	C	NS	A	A	A	A	A	-	-	-	-	-	-
Refrigerant HFC 134a *	A	A	A	A	C	A	A	A	A	A	-	-	-	-	-	-
Refrigerant HCFC 141b	A	A	A	A	NS	A	A	A	A	A	-	-	-	-	-	-
Refrigerant HFC 236fa	A	A	A	A	NS	A	A	A	A	A	-	-	-	-	-	-
Refrigerant Blend HP 62*	A	A	A	A	NS	A	A	A	A	A	-	-	-	-	-	-
Refrigerant Blend HP 80	C	C	C	C	NS	A	A	A	A	A	-	-	-	-	-	-
Refrigerant Blend HP 81	C	C	C	C	NS	A	A	A	A	A	-	-	-	-	-	-
Refrigerant Blend 404a*	A	A	A	A	NS	A	A	A	A	A	-	-	-	-	-	-
Sea Water	A	A	A	A	A	A	A	A	A	A	A	NS	NS	A	NS	N
Silver Nitrate	C	C	A	C	C	C	A	A	A	A	A	A	A	-	-	-
Soap Solutions	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A
Soda Ash	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Bicarbonate	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Bisulfite	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Carbonate	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Chloride	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Hydroxide	C	C	A	C	C	NS	A	A	A	A	C	C	C	A	A	A
Sodium Hypochlorite	NS	NS	NS	NS	C	C	A	A	C	A	C	NS	NS	-	-	-
Sodium Nitrate	A	A	A	A	C	C	A	A	A	A	C	C	C	-	-	-
Sodium Silicate	A	A	A	A	A	A	A	A	A	A	A	C	C	A	C	C
Sodium Sulfate	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sour Crude Oil	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Soybean Oil	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Steam (to 450°F)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Steam (over 450°F)	A	A	A	A	C	C	NS	NS	NS	NS	A	A	A	A	A	A
Stearic Acid	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A
Stoddard Solvent	A	A	A	A	NS	C	A	A	A	A	A	A	A	-	-	-
Styrene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Sulfite Liquors	C	C	A	C	C	C	A	A	A	A	A	C	C	-	-	-
Sulfur (molten)	C	C	C	C	NS	C	A	A	A	A	A	A	A	A	A	A
Sulfur Dioxide	NS	NS	C	NS	NS	NS	A	A	A	A	A	A	A	A	A	A
Sulfuric Acid, 20%	NS	NS	NS	NS	NS	NS	A	A	A	A	A	NS	NS	NS	NS	NS
Sulfuric Acid, Conc	NS	NS	NS	NS	NS	NS	A	C	A	A	NS	NS	NS	NS	NS	NS
Sulfuric Acid,Conc>200°F	NS	NS	NS	NS	NS	NS	A	NS	NS	A	NS	NS	NS	NS	NS	NS
Fuming Sulfuric Acid, Oleum	NS	NS	NS	NS	NS	NS	A	NS	NS	A	NS	NS	NS	-	-	-
Tar	A	A	A	A	C	C	A	A	A	A	A	A	A	A	A	A
Tetrachloroethane	C	C	C	C	NS	NS	A	A	A	A	A	A	A	C	C	C
Tetrahydrofuran (THF)	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Toluene	NS	NS	NS	NS	NS	C	A	A	A	A	A	A	A	A	A	A
Transformer Oil	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Transmission Fluid	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
1,1,2-Trichloroethane	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	C	C	C
Trichloroethylene	C	C	C	C	NS	NS	A	A	A	A	A	A	A	C	C	C
Triethanolamine	C	C	C	C	C	A	A	A	A	A	C	C	C	A	C	C
Turpentine	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Urea	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Varsol	A	A	A	A	NS	NS	A	A	A	A	A	A	A	A	A	A
Vegetable Oil	A	A	A	A	NS	C	A	A	A	A	A	A	A	A	A	A
Vinegar	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A
Vinyl Acetate	C	C	C	C	NS	C	A	A	A	A	A	A	A	A	A	A
Vinyl Chloride	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	-	-	-
Water	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Whiskey and Wines	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
White Sulfate Liquor	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
White Spirit	A	A	A	A	C	C	A	A	A	A	A	A	A	-	-	-
Xylene	NS	NS	NS	NS	NS	NS	A	A	A	A	A	A	A	A	A	A
Zinc Chloride	A	A	A	A	A	A	A	A	A	A	A	A	A	-	-	-
Zinc Nitrate	C	C	C	C	C	C	A	A	C	A	C	C	C	-	-	-
Zinc Sulfate	A	A	A	A	A	A	A	A	A	A	A	A	A	-	-	-

* with mineral oil
** with polyol ester oil

This information is a general guide for the selection of a suitable gasket material. The substances listed above are evaluated for their effect on the gasket materials at ambient temperature -40°F/C to 38°C (100°F) unless stated otherwise. For unusual conditions of fluid concentrates, internal pressures or temperature consult your representative. This evalation is based on laboratory or field tests, or experience; however, no guarantee can be given as to the actual performance experienced by the end user.

There are several fluids used in food which can be sealed by SBR, however due to flavour pickup, we have marked these products "Caution."

These chemical resistance charts supersede and obsolete all previously issued charts.

Chemical Resistance - Metallic Gaskets

The following information is a general guide only for the selection of a suitable gasket material as there are unlimited combinations of fluid, pressure and temperature conditions. Triangle Fluid Controls Ltd.® does not warrant (neither expressed, nor implied) that the informationin 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.

A = Acceptable
B = Caution-Dependent on Conditions
C = Not Suitable
- = No Data Available

FLUID	CARBON STEEL	304 SS	316SS	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	-	A	-	C	A	A	-
Acetylene	A	A	A	A	A	A	-	A	A	A	B
Acrylonitrile	A	A	A	A	-	B	A	A	A	A	-
Aluminum Acetate	A	A	A	A	B	A	A	B	A	A	A
Aluminum Chloride	C	B	A	A	A	A	A	-	-	A	A
Aluminum Fluoride	C	C	B	B	A	B	A	-	-	-	-
Aluminum Hydroxide	C	A	A	A	B	B	A	A	A	-	-
Aluminum Nitrate	C	A	A	A	C	A	A	B	A	-	-
Aluminum Sulfate	C	A	A	B	B	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	A	B	B	A	A	A	-	A
Ammonium Nitrate	A	A	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	-
Ammonium Sulfide	C	B	B	B	B	A	-	C	A	A	-
Amyl Chloride	A	A	A	A	A	A	B	A	A	A	-
Aniline	C	A	C	A	A	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	B	A	A	A	A	A
Barium Hydroxide	C	A	A	A	A	A	A	-	-	A	-
Barium Sulfate	A	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	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	C	A	A	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	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	B	A	A	A	A	B	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	A	-	B
Calcium Bisulfite	C	A	A	A	C	A	-	A	A	-	-
Calcium Carbonate	B	A	A	A	A	A	A	A	A	A	-

FLUID	CARBON STEEL	304 SS	316SS	ALLOY 20	MONEL	HASTELLOY C	TITANIUM	GRAPHITE	PTFE	CERAMIC	MICA
Calcium Chlorate	B	B	A	A	A	B	-	-	-	A	-
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	B	A	A	A	B	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	-	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	A
Caustic Potash	B		A	A	A	-	C	-	C	-	-
Caustic Soda (NaOH)	B	B	A	A	A	-	B	B	A	A	A
Chloric Acid, 10%	C	C	B	A	C	A	-	C	A	A	-
Chloric Acid, 20%	C	C	C	A	C	A	-	C	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	C	C	A	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	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	A	B	A	A	-	A	-	-
Coke Oven Gas	A	A	A	-	B	A	-	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	A	B	A	-	A	A	-	-
Cottonseed Oil	A	A	A	A	A	A	A	A	A	A	-
Creosote (Coal Tar)	A	A	A	A	A	A	A	A	A	-	A
Crude Oil	B	A	A	A	B	A	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	B	A	A	A	-	-
Diacetone Alcohol	A	A	A	A	A	A	-	A	A	-	-
Diesel Fuel	A	A	A	A	A	B	A	A	A	-	
Dimethylamine	C	A	A	A	B	A	A	A	C	-	-
Dimethylformamide (DMF)	B	A	A	A	A	-	-	C	A	-	-
Dowtherm A, E	A	A	A	A	A	A	-	A	A	-	B
Ether	B	A	A	A	A	A	A	-	A	-	-
Ethyl Acetate	A	A	A	A	A	A	A	A	A	-	B

Chemical Resistance - Metallic Gaskets

FLUID	CARBON STEEL	304 SS	316SS	ALLOY 20	MONEL	HASTELLOY C	TITANIUM	GRAPHITE	PTFE	CERAMIC	MICA
Ethyl Alcohol (Ethanol)	A	A	A	A	A	A	A	A	A	A	B
Ethylbenzene	B	-	A	A	A	A	-	A	A	-	-
Ethylchloride	C	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	B	A	A	A	A	-
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	-	-
Ferric Hydroxide	A	A	A	A	A	A	A	A	-	A	-
Ferric Nitrate	C	A	A	A	C	A	A	A	A	A	
Ferrous Chloride	C	C	C	C	-	B	A	A	A	A	-
Ferrous Sulfate	C	A	A	A	A	A	A	-	-	A	-
Fish Oil	A	A	A	A	A	A	-	-	A	-	-
Flue Gas	A	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	B	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	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	A	-	A	-	-
Glucose	A	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	A	-	B
Hydrogen Peroxide, 50%	B	A	A	A	A	B	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	A	-	B
Isopropyl Ether	A	A	A	A	A	A	A	A	B	A	-
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
Lead Sulfate	C	-	B	B	B	-	-	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	B	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	-

FLUID	CARBON STEEL	304 SS	316SS	ALLOY 20	MONEL	HASTELLOY C	TITANIUM	GRAPHITE	PTFE	CERAMIC	MICA
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	A	A	-	-
Methyl Chloride	B	A	A	A	A	A	A	A	A	-	B
Milk	C	A	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	B	A	A	A	-	-
Nickel Nitrate	C	A	A	A	C	B	-	-	-	A	-
Nitric Acid	C	A	A	A	C	B	A	C	A	A	A
Nitrobenzene	A	A	A	A	A	A	A	-	A	-	A
Nitrogen	A	A	A	A	A	A	A	A	A	-	A
Nitroglycerine	B	A	A	A	B	A	-	-	A	-	-
Nitrous Acid, 10%	C	B	B	B	C	A	A	A	A	A	-
Nitrous Oxide	B	A	A	A	C	A	-	C	A	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	A	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	A	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	B	A	A	A	C	-
Potassium Chloride	B	B	B	A	A	A	A	A	A	-	A
Potassium Dichromate	C	A	A	A	A	B	A	A	A	A	A
Potassium Hydroxide	B	A	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	A	-	-	-	A	-	-
Silver Nitrate	C	A	A	A	C	A	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	B	A	A	A	A	-
Sodium Bisulfite	C	A	A	A	C	B	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	A	B	B	A	A	A
Sodium Hypochlorite	C	C	C	C	C	A	B	B	A	A	-

Chemical Resistance - Metallic Gaskets

FLUID	CARBON STEEL	304 SS	316SS	ALLOY 20	MONEL	HASTELLOY C	TITANIUM	GRAPHITE	PTFE	CERAMIC	MICA
Sodium Nitrate	A	A	A	A	A	A	A	B	A	A	-
Sodium Phosphate	B	A	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	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	-	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	A	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
Turpentine	A	A	A	A	A	A	A	A	A	A	A
Urea	C	A	A	A	B	-	A	A	A	A	A
Vegetable Oil	A	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	A	-	-
Xylene	A	A	A	A	A	A	A	A	A	A	A
Zinc Chloride	C	A	B	A	A	A	A	A	A	C	-
Zinc Nitrate	-	A	A	A	-	A	-	A	A	-	-
Zinc Sulfate	C	A	A	A	A	A	A	A	A	C	-

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 Ltd. 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.

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°C to 39°C or -40°F to 100°F) 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 Ltd. will not guarantee any performance of any materials selected based on the information contained in this chart.

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

NOTES

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

ASTM Testing

*ASTM properties are based on 1/16" sheet thickness, except ASTM F38 which is based on 1/32" sheet thickness. This is a general guide only and should not be the sole means of accepting or rejecting this material. The data listed here falls within the normal range of product properties, but should not be used to establish specifications limits nor used alone as the basis of design. For applications above Class 300, contact our technical department.

Gasket Dimensions - Cut Gaskets (Imperial, Metric)

Nominal Pipe Size	Class 125/150 Ring Type		Class 125/150 Full Face		Class 250/300 Ring Type		Class 250/300 Full Face	
	mm	in.	mm	in.	mm	in.	mm	in.
1/2″	21 x 48	27/32 x 1-7/8	21 x 89	27/32 x 3-1/2	21 x 54	27/32 x 2-1/8	21 x 95	27/32 x 3-3/4
3/4″	27 x 57	1-1/16 x 2-1/4	27 x 98	1-1/16 x 3-7/8	27 x 67	1-1/16 x 2-5/8	27 x 117	1-1/16 x 4-5/8
1″	33 x 67	1-5/6 x 2-5/8	33 x 108	1-5/16 x 4-1/4	33 x 73	1-5/16 x 2-7/8	33 x 124	1-5/16 x 4-7/8
1-1/4″	42 x 76	1-21/32 x 3	42 x 117	1-21/32 x 4-5/8	42 x 83	1/21/32 x 3-1/4	42 X 133	1-21/32 x 5-1/4
1-1/2″	48 x 86	1-29/32 x 3-3/8	48 x 127	2-29/32 x 5	49 x 95	1-29/32 x 3-3/4	49 X 155	1-29/32 x 6-1/8
2″	60 x 105	2-3/8 x 4-1/8	60 x 152	2-3/8 x 6	60 x 111	2-3/8 x 4-3/8	60 x 165	2-3/8 x 6-1/2
2-1/2″	73 x 124	2-7/8 x 4-7/8	73 x 178	2-7/8 x 7	73 x 130	2-7/8 x 5-1/8	73 X 191	2-7/8 x 7-1/2
3″	89 x 137	3-1/2 x 5-3/8	89 x 191	3-1/2 x 7-1/2	89 x 149	3-1/2 x 5-7/8	89 X 210	3-1/2 x 8-1/4
3-1/2″	102 x 162	4 x 6-3/8	102 x 216	4 x 8-1/2	102 x 165	4 x 6-1/2	102 X 229	4 x 9
4″	114 x 175	4-1/2 x 6-7/8	114 x 229	4-1/2 x 9	114 x 181	4-1/2 x 7-1/8	114 x 254	4-1/2 x 10
5″	141 x 197	5-9/16 x 7-3/4	141 x 254	5-9/16 x 10	141 x 216	5-9/16 x 8-1/2	141 x 279	5-9/16 x 11
6″	168 x 222	6-5/8 x 8-3/4	168 x 279	6-5/8 x 11	168 x 251	6-5/8 x 9-7/8	168 x 318	6-5/8 x 12-1/2
8″	219 x 279	8-5/8 x 11	219 x 343	8-5/8 x 13-1/2	219 x 308	8-5/8 x 12-1/8	219 x 381	8-5/8 x 15
10″	273 x 340	10-3/4 x 13-3/8	273 x 406	10-3/4 x 16	273 x 362	10-3/4 x 14-1/4	273 x 445	10-3/4 x 17-1/2
12″	324 x 410	12-3/4 x 16-1/8	324 x 483	12-3/4 x 19	324 x 422	12-3-4 x 16-5/8	324 x 521	12-3/4 x 20-1/2
14″	356 x 451	14 x 17-3/4	356 x 533	14 x 21	356 x 486	14 x 19-1/8	356 x 584	14 x 23
16″	406 x 514	16 x 20-1/4	406 x 597	16 x 23-1/2	406 x 540	16 x 21-1/4	406 x 648	16 x 25-1/2
18″	457 x 549	18 x 21-5/8	457 x 635	18 x 25	457 x 597	18 x 23-1/2	457 x 711	18 x 28
20″	508 x 606	20 x 23-7/8	508 x 699	20 x 27-1/2	508 x 654	20 x 25-3/4	508 x 775	20 x 30-1/2
22″	610 x 718	22 x 26	610 x 749	22 x 29-1/2	610 x 775	22 x 27-5/8	610 x 838	22 x 33
24″	609 x 718	24 x 28-1/4	610 x 813	24 x 32	610 x 775	24 x 30-1/2	610 X 914	24 x 36
26″	660 x 775	26 x 30-1/2	660 x 870	26 x 34-1/4	660 x 835	26 x 32-7/8	660 x 972	26 x 38-1/4
28″	711 x 832	28 x 32-3/4	711 x 927	28 x 36-1/2	711 x 899	28 x 35-19/50	711 x 1035	28 x 40-3/4
30″	762 x 883	30 x 34-3/4	762 x 984	30 x 38-3/4	762 x 953	30 x 37-1/2	762 x 1,092	30 x 43
32″	813 x 940	32 x 37	813 x 1,060	32 x 41-3/4	813 x 1,006	32 x 39-5/8	813 x 1,149	32 x 45 1/4
34″	864 x 991	34 x 39	864 x 1,111	34 x 43-3/4	864 x 1,057	34 x 41-5/8	864 x 1,207	34 x 49-1/2
36″	914 x 1,048	36 x 41-1/4	914 x 1,168	36 x 46	914 x 1,118	36 x 44	914 x 1,270	36 x 50
38″	965 x 1,111	38 x 43-3/4	965 x 1,238	38 x 48-3/4	965 x 1,054	38 x 41-1/2	965 x 1,168	38 x 46
40″	1,016 x 1,162	40 x 45-3/4	1,016 x 1,289	40 x 50-3/4	1,016 x 1,115	40 x 43-7/8	1,016 x 1,238	40 x 48 3/4
42″	1,067 x 1,219	42 x 48	1,067 x 1,346	42 x 53	1,067 x 1,165	42 x 45-7/8	1,067 x 1,289	42 x 50-3/4
44″	1,118 x 1,276	44 x 50-1/4	1,118 x 1,403	44 x 55-1/4	1,118 x 1,219	44 x 48	1,118 x 1,353	44 x 53-1/4
46″	1,168 x 1,327	46 x 52-1/4	1,168 x 1,454	46 x 57-1/4	1,168 x 1,273	46 x 50-1/8	1,168 x 1,416	46 x 55-3/4
48″	1,219 x 1,384	48 x 54-1/2	1,219 x 1,511	48 x 59-1/2	1,219 x 1,324	48 x 52-1/8	1,219 x 1,467	48 x 57-3/4
50″	1,270 x 1,435	50 x 56-1/2	1,270 x 1,568	50 x 61-3/4	1,270 x 1,378	50 x 54-1/4	1,270 x 1,530	50 x 60-1/4
52″	1,321 x 1,492	52 x 58-3/4	1,321 x 1,626	52 x 64	1,321 x 1,429	52 x 56-1/4	1,321 x 1,581	52 x 62-1/4
54″	1,372 x 1,549	54 x 61	1,372 x 1,683	54 x 66-1/4	1,372 x 1,492	54 x 58-3/4	1,372 x 1,657	54 x 65-1/4
56″	1,422 x 1,607	56 x 63-1/4	1,422 x 1,746	56 x 68-3/4	1,422 x 1,543	56 x 60-3/4	1,422 x 1,780	56 x 67-1/4
58″	1,473 x 1,664	58 x 65-1/2	1,473 x 1,803	58 x 71	1,473 x 1,594	58 x 62-3/4	1,473 x 1,759	58 x 69-1/4
60″	1,524 x 1,715	60 x 67-1/2	1,524 x 1,854	60 x 73	1,524 x 1,645	60 x 64-3/4	1,524 x 1,810	60 x 71-1/4

Note: Dimensions for pipe sizes 26″- 48″ are per ANSI B16.47 Class 150 Series A Flanges. Dimensions given above are for reference only and should be checked prior to establishing any specifications.

Gasket Dimensions - Durtec®/CFG (Metric)

Nominal Pipe Size	Gasket I.D.	Gasket O.D.				
		Class 150	Class 300	Class 400	Class 600	Class 900
1/2″	21	48	54	54	54	64
3/4″	27	57	67	67	67	70
1″	33	67	73	73	73	79
1-1/4″	42	76	83	83	83	89
1-1/2″	48	86	95	95	95	98
2″	60	105	111	111	111	143
2-1/2″	73	124	130	130	130	165
3″	89	137	149	149	149	168
3-1/2″	102	162	165	162	162	-
4″	114	175	181	178	194	206
5″	141	197	216	213	241	248
6″	168	222	251	248	267	289
8″	219	279	308	305	321	359
10″	273	340	362	359	400	435
12″	324	410	422	419	457	498
14″	356	451	486	483	492	521
16″	406	514	540	537	565	575
18″	457	549	597	594	613	638
20″	508	606	654	648	683	699
24″	610	718	775	768	791	838

Nominal Pipe Size	Gasket I.D.	Gasket O.D.			
		Class 150	Class 300	Class 400	Class 600
26″	660.40	725.42	769.11	746.25	765.05
28″	711.20	776.22	825.50	800.10	819.15
30″	762.00	827.02	885.95	857.25	879.35
32″	812.80	881.13	939.80	911.35	933.45
34″	863.60	934.97	993.65	962.15	996.95
36″	914.40	985.52	1,047.75	1,022.35	1,047.75
38″	965.20	1,044.45	1,098.55	-	-
40″	1,016.00	1,095.25	1,149.35	-	-
42″	1,066.80	1,146.05	1,200.15	-	-
44″	1,117.60	1,196.85	1,250.95	-	-
46″	1,168.40	1,255.78	1,317.75	-	-
48″	1,219.20	1,306.58	1,368.55	-	-
50″	1,270.00	1,357.38	1,419.35	-	-
52″	1,320.80	1,408.18	1,470.15	-	-
54″	1,371.60	1,463.55	1,555.75	-	-
56″	1,422.40	1,514.35	1,593.85	-	-
58″	1,473.20	1,579.63	1,655.83	-	-
60″	1,524.00	1,630.43	1,704.85	-	-

Gasket Dimensions - Durtec®/CFG (Imperial)

Nominal Pipe Size	Gasket I.D.	Gasket O.D.				
		Class 150	Class 300	Class 400	Class 600	Class 900
1/2″	0.84	1.88	2.12	2.12	2.12	2.50
3/4″	1.06	2.25	2.62	2.62	2.62	2.75
1″	1.31	2.62	2.88	2.88	2.88	3.12
1-1/4″	1.66	3.00	3.25	3.25	3.25	3.50
1-1/2″	1.91	3.38	3.75	3.75	3.75	3.88
2″	2.38	4.12	4.38	4.38	4.38	5.62
2-1/2″	2.88	4.88	5.12	5.12	5.12	6.50
3″	3.50	5.38	5.88	5.88	5.88	6.62
3-1/2″	4.00	6.38	6.50	6.38	6.38	-
4″	4.50	6.88	7.12	7.00	7.62	8.12
5″	5.56	7.75	8.50	8.38	9.50	9.75
6″	6.62	8.75	9.88	9.75	10.50	11.38
8″	8.62	11.00	12.12	12.00	12.62	14.12
10″	10.75	13.38	14.25	14.12	15.75	17.12
12″	12.75	16.13	16.62	16.50	18.00	19.62
14″	14.00	17.75	19.12	19.00	19.38	20.50
16″	16.00	20.25	21.25	21.12	22.25	22.62
18″	18.00	21.62	23.50	23.38	24.12	25.12
20″	20.00	23.88	25.75	25.50	26.88	27.50
24″	24.00	28.25	30.50	30.25	31.12	33.00

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	-	-

Gasket Dimensions - Spiral Wound Gaskets (Metric)

Flange Size (NPS)	Windings OD"		Durlon® SWG Style By Pressure Class														Durlon® SWG Style DRI By Pressure Class						
	Class 150, 300, 400, 600	Class 900, 1500, 2500	150		300		400		600		900		1500		2500		150	300	400	600	900	1500	2500
			ID	OD	ID	OD	ID	OD	ID	OD	ID	OD	ID	OD	ID	OD	ID	ID	ID	ID	ID	ID	ID
1/2"	31.80	31.80	19.10	47.80	19.10	54.10	-	-	19.10	54.10	-	-	19.10	63.50	19.10	69.90	14.20	14.20	-	14.20	-	14.20	14.20
3/4"	39.60	39.60	25.40	57.20	25.40	66.80	-	-	25.40	66.80	-	-	25.40	69.90	25.40	76.20	20.60	20.60	-	20.60	-	20.60	20.60
1"	47.80	47.80	31.80	66.80	31.80	73.20	-	-	31.80	73.20	-	-	31.80	79.50	31.80	85.90	26.90	26.90	-	26.90	-	26.90	26.90
1-1/4"	60.50	60.50	47.80	76.20	47.80	82.60	-	-	47.80	82.60	-	-	39.60	88.90	39.60	104.90	38.10	38.10	-	38.10	-	33.30	33.30
1-1/2"	69.90	69.90	54.10	85.90	54.10	95.30	-	-	54.10	95.30	-	-	47.80	98.60	47.80	117.60	44.50	44.50	-	44.50	-	41.40	41.40
2"	85.90	85.90	69.90	104.90	69.90	111.30	-	-	69.90	111.30	-	-	58.70	143.00	58.70	146.10	55.60	55.60	-	55.60	-	52.30	52.30
2-1/2"	98.60	98.60	82.60	124.00	82.60	130.30	-	-	82.60	130.30	-	-	69.90	165.10	69.90	168.40	66.50	66.50	-	66.50	-	63.50	63.50
3"	120.70	120.70	101.60	136.70	101.60	149.40	-	-	101.60	149.40	95.30	168.40	92.20	174.80	92.20	196.90	81.00	81.00	-	81.00	78.70	78.70	78.70
4"	149.40	149.40	127.00	174.80	127.00	181.10	120.70	177.80	120.70	193.80	120.75	206.50	117.60	209.60	117.60	235.00	106.40	106.40	102.60	102.60	102.60	97.80	97.80
5"	177.80	177.80	155.70	196.90	155.70	215.90	147.60	212.90	147.60	241.30	147.60	247.70	143.00	254.00	143.00	279.40	131.80	131.80	128.30	128.30	128.30	124.50	124.50
6"	209.60	209.60	182.60	222.30	182.60	251.00	174.80	247.70	174.80	266.70	174.80	289.10	171.50	282.70	171.50	317.50	157.20	157.20	154.90	154.90	154.90	147.30	147.30
8"	263.70	257.30	233.40	279.40	233.40	308.10	225.60	304.80	225.60	320.80	222.30	358.90	215.90	352.60	215.90	387.40	215.90	215.90	205.70	205.70	196.90	196.90	196.90
10"	317.50	311.20	287.30	339.90	287.30	362.00	274.60	358.90	274.60	400.10	276.40	435.10	266.70	435.10	270.00	476.30	268.20	268.20	255.30	255.30	246.10	246.10	246.10
12"	374.70	368.30	339.90	409.70	339.90	422.40	327.20	419.10	327.20	457.20	323.90	498.60	323.90	520.70	317.50	549.40	317.50	317.50	307.30	307.30	292.10	292.10	292.10
14"	406.40	400.10	371.60	450.90	371.60	485.90	362.00	482.60	362.00	492.30	355.60	520.70	362.00	577.90	-	-	349.30	349.30	342.90	342.90	320.80	320.80	-
16"	463.60	457.20	422.40	514.40	422.40	539.80	412.80	536.70	412.80	565.20	412.80	574.80	406.40	641.40	-	-	400.10	400.10	389.90	389.90	374.70	368.30	-
18"	527.10	520.70	474.70	549.40	474.70	596.90	469.90	593.90	469.90	612.90	463.60	638.30	463.60	704.90	-	-	449.30	449.30	438.20	438.20	425.50	425.50	-
20"	577.90	571.60	525.50	606.60	525.50	654.10	520.70	647.70	520.70	682.80	520.70	698.50	514.40	755.70	-	-	500.10	500.10	489.00	489.00	482.60	476.30	-
24"	685.80	679.50	628.70	717.60	628.70	774.70	628.70	768.40	628.70	790.70	628.70	838.20	616.00	901.70	-	-	603.30	603.30	590.60	590.60	590.60	577.90	-

Notes:

1. The gasket inside diameter tolerance for NPS 1/2" through NPS 8" is ±0.4mm; for NPS 10" through 24", ±0.8mm
2. The gasket outside diameter tolerance for NPS 1/2" through NPS 8" is ±0.8mm for NPS 10" through 24" +1.5mm, -0.8mm
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 ±0.8mm
6. For sizes NPS 1-1/4" through NPS 3", the inside diameter tolerance is ±0.8mm
7. Adapted from ASME B16.20 (current version), Table 9 and Table 12

Gasket Dimensions - Spiral Wound Gaskets (Imperial)

Flange Size (NPS)	Windings OD"		Durlon® SWG Style By Pressure Class														Durlon® SWG Style DRI By Pressure Class						
	Class 150, 300, 400, 600	Class 900, 1500, 2500	150		300		400		600		900		1500		2500		150	300	400	600	900	1500	2500
			ID	OD	ID	OD	ID	OD	ID	OD	ID	OD	ID	OD	ID	OD	ID	ID	ID	ID	ID	ID	ID
1/2"	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
3/4"	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
1-1/4"	2.38	2.38	1.88	3.00	1.88	3.25	-	-	1.88	3.25	-	-	1.88	3.50	1.56	4.13	1.50	1.50	-	1.50	-	1.31	1.31
1-1/2"	2.75	2.75	2.13	3.38	2.13	3.75	-	-	2.13	3.75	-	-	2.13	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	-	-	2.75	5.63	2.31	5.75	2.19	2.19	-	2.19	-	2.06	2.06
2-1/2"	3.88	3.88	3.25	4.88	3.25	5.13	-	-	3.25	5.13	-	-	3.25	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	4.00	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	5.00	7.13	4.75	8.13	5.00	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	6.13	8.50	5.81	9.75	6.13	10.00	5.63	11.00	5.19	5.19	5.05	6.05	6.05	4.90	4.90
6"	8.25	8.25	7.19	8.75	7.19	9.88	6.88	9.75	7.19	9.88	6.88	11.38	7.19	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	9.19	12.13	8.75	14.13	9.19	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	11.31	14.25	10.88	17.13	11.31	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	13.38	16.63	12.75	19.63	13.38	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	14.63	19.13	14.00	20.50	14.63	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	16.63	21.25	16.25	22.63	16.63	25.25	-	-	15.75	15.75	15.35	15.35	14.75	14.75	-
18"	20.75	20.50	18.69	21.63	18.69	23.50	18.50	23.38	18.69	23.50	18.25	25.13	18.69	27.27	-	-	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	20.69	25.75	20.50	27.50	20.69	29.75	-	-	19.69	19.69	19.25	19.25	19.00	19.00	-
24"	27.00	26.75	24.75	28.25	24.75	30.50	24.75	30.25	24.75	30.50	24.75	33.00	24.75	35.50	-	-	23.75	23.75	23.25	23.25	23.25	23.25	-

Notes:

1. The gasket inside diameter tolerance for NPS 1/2" through NPS 8" is ±0.4mm; for NPS 10" through 24", ±0.8mm
2. The gasket outside diameter tolerance for NPS 1/2" through NPS 8" is ±0.8mm for NPS 10" through 24" +1.5mm, -0.8mm
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 ±0.8mm
6. For sizes NPS 1-1/4" through NPS 3", the inside diameter tolerance is ±0.8mm
7. Adapted from ASME B16.20 (current version), Table 9 and Table 12

Gasket Dimensions - Kammprofiles (Metric)

NPS	DN	Serrated Metal Ring (mm) ANSI, BS & MSS		Centering Ring Outside Diameter Pressure Class						
		ID	OD	150	300	400	600	900	1500	2500
1/2″	15	23.1	33.3	47.8	54.1	54.1	54.1	63.5	63.5	69.9
3/4″	20	28.7	39.6	57.2	66.8	66.8	66.8	69.9	69.9	76.2
1″	25	36.6	47.5	66.8	73.2	73.2	73.2	79.5	79.5	85.9
1-1/4″	32	44.5	60.2	76.2	82.6	82.6	82.6	88.9	88.9	104.9
1-1/2″	40	52.3	69.9	85.9	95.3	95.3	95.3	98.6	98.6	117.6
2″	50	69.9	88.9	104.9	111.1	111.3	111.3	143.0	143.0	146.1
2-1/2″	65	82.6	101.6	124.0	130.3	130.3	130.3	165.1	165.1	168.4
3″	80	98.3	123.7	136.7	149.4	149.4	149.4	168.4	174.8	196.9
3-1/2″	90	111.0	136.5	161.9	165.1	161.9	161.9	190.5	187.5	-
4″	100	123.7	153.9	174.8	181.0	177.8	193.8	206.5	209.6	235.0
5″	125	150.9	182.6	196.9	215.9	212.9	241.3	247.7	254.0	279.4
6″	150	177.8	212.6	222.3	251.0	247.7	266.7	289.1	282.7	317.5
8″	200	228.6	266.7	279.4	308.1	304.8	320.8	358.9	352.6	387.4
10″	250	282.7	320.8	339.9	362.0	358.9	400.1	435.1	435.1	476.3
12″	300	339.6	377.7	409.7	422.4	419.1	457.2	498.6	520.7	549.4
14″	350	371.6	409.7	450.9	485.9	482.6	492.3	520.7	577.9	-
16″	400	422.4	466.6	514.4	539.8	536.7	565.2	574.8	641.4	-
18″	450	479.3	530.1	549.4	596.9	593.9	612.9	638.3	704.9	-
20″	500	530.1	580.9	606.6	654.1	647.7	682.8	698.5	755.7	-
24″	600	631.7	682.5	717.6	774.7	768.4	790.7	838.2	901.7	-

NPS	DN	Grooved Core (mm) ANSI, BS & MSS		Class 150 Centering Ring OD	Grooved Core (mm) ANSI, BS & MSS		Class 300 Centering Ring OD	Grooved Core (mm) ANSI, BS & MSS		Class 400 Centering Ring OD
		ID	OD		ID	OD		ID	OD	
26″	650	673.1	704.9	774.7	685.8	736.6	835.2	685.8	736.6	831.9
28″	700	723.9	755.7	831.9	736.6	787.4	898.7	736.6	787.4	892.3
30″	750	774.7	806.5	882.7	793.8	844.6	952.5	793.8	844.6	946.2
32″	800	825.5	860.6	939.8	850.9	901.7	1,006.6	850.9	901.7	1,003.3
34″	850	876.3	811.4	990.6	901.7	952.5	1,057.4	901.7	952.5	1,054.1
36″	900	927.1	968.5	1,047.8	955.8	1,006.6	1,117.6	955.8	1,006.6	1,117.6
38″	950	977.9	1,019.3	1,111.3	977.9	1,016.0	1,054.1	971.6	1,022.4	1,073.2
40″	1,000	1,028.7	1,070.1	1,162.1	1,022.4	1,070.1	1,114.6	1,025.7	1,076.5	1,127.3
42″	1,050	1,079.5	1,124.0	1,219.2	1,073.2	1,120.9	1,165.4	1,076.5	1,127.3	1,178.1
44″	1,100	1,130.3	1,178.1	1,276.4	1,130.3	1,181.1	1,219.2	1,130.3	1,181.1	1,231.9
46″	1,150	1,181.1	1,228.9	1,327.2	1,178.1	1,228.9	1,273.3	1,193.8	1,244.6	1,289.1
48″	1,200	1,231.9	1,279.7	1,384.3	1,235.2	1,286.0	1,324.1	1,244.6	1,295.4	1,346.2
50″	1,250	1,282.7	1,333.5	1,435.1	1,295.4	1,346.2	1,378.0	1,295.4	1,346.2	1,403.4
52″	1,300	1,333.5	1,384.3	1,492.3	1,346.2	1,397.0	1,428.8	1,346.2	1,397.0	1,454.2
54″	1,350	1,384.3	1,435.1	1,549.4	1,403.4	1,454.2	1,492.3	1403.4	1,454.2	1,517.7
56″	1,400	1,435.1	1,485.9	1,606.6	1,454.2	1,505.0	1,543.1	1,454.2	1,505.0	1,568.5
58″	1,450	1,485.9	1,536.7	1,663.7	1,511.3	1,562.1	1,593.9	1,505.0	1,555.8	1,619.3
60″	1,500	1,536.7	1,587.5	1,714.5	1,562.1	1,612.9	1,664.7	1,568.5	1,619.3	1,682.8

Gasket Dimensions - Kammprofiles (Metric, Imperial)

NPS	DN	Grooved Core (mm) ANSI, BS & MSS		Class 600 Centering Ring OD	Grooved Core (mm) ANSI, BS & MSS		Class 900 Centering Ring OD
		ID	OD		ID	OD	
26″	650	685.8	736.6	866.9	685.8	736.6	882.7
28″	700	736.6	787.4	914.4	736.6	787.4	946.2
30″	750	793.8	844.6	971.6	793.8	844.6	1,009.7
32″	800	850.9	901.7	1,022.4	850.9	901.7	1,073.2
34″	850	901.7	952.5	1,073.2	901.7	952.5	1,136.7
36″	900	955.8	1,006.6	1,130.3	958.9	1,009.7	1,200.2
38″	950	990.6	1,041.4	1,104.9	1,035.1	1,085.9	1,200.2
40″	1,000	1,047.8	1,098.6	1,155.7	1,098.6	1,149.4	1,251.0
42″	1,050	1,104.9	1,155.7	1,219.2	1,149.4	1,202.2	1,301.8
44″	1,100	1,162.1	1,212.9	1,270.0	1,206.5	1,257.3	1,368.6
46″	1,150	1,212.9	1,263.7	1,327.2	1,270.0	1,320.8	1,435.1
48″	1,200	1,270.0	1,320.8	1,390.7	1,320.8	1,371.6	1,485.9
50″	1,250	1,320.8	1,371.6	1,447.8	-	-	-
52″	1,300	1,371.6	1,422.4	1,498.6	-	-	-
54″	1,350	1,428.8	1,479.6	1,555.8	-	-	-
56″	1,400	1,479.6	1,530.4	1,612.9	-	-	-
58″	1,450	1,536.7	1,587.5	1,663.7	-	-	-
60″	1,500	1,593.9	1,644.7	1,733.6	-	-	-

NPS	Serrated Metal Ring (mm) ANSI, BS & MSS		Centering Ring Outside Diameter Pressure Class						
	ID	OD	150	300	400	600	900	1500	2500
1/2″	0.91	1.31	1.88	2.13	2.13	2.13	2.50	2.50	2.75
3/4″	1.13	1.56	2.25	2.63	2.63	2.63	2.75	2.75	3.00
1″	1.44	1.87	2.63	2.88	2.88	2.88	3.13	3.13	3.38
1-1/4″	1.75	2.37	3.00	3.25	3.25	3.25	3.50	3.50	4.13
1-1/2″	2.06	2.75	3.38	3.75	3.75	3.75	3.88	3.88	4.63
2″	2.75	3.50	4.13	4.38	4.38	4.38	5.63	5.63	5.75
2-1/2″	3.25	4.00	4.88	5.13	5.13	5.13	6.50	6.50	6.63
3″	3.87	4.87	5.38	5.88	5.88	5.88	6.63	6.88	7.75
3-1/2″	4.37	5.37	6.37	6.50	6.37	6.37	7.50	7.38	-
4″	4.87	6.06	6.88	7.13	7.00	7.63	8.13	8.25	9.25
5″	5.94	7.19	7.75	8.50	8.38	9.50	9.75	10.00	11.00
6″	7.00	8.37	8.75	9.88	9.75	10.50	11.38	11.13	12.50
8″	9.00	10.50	11.00	12.13	12.00	12.63	14.13	13.88	15.25
10″	11.13	12.63	13.38	14.25	14.13	15.75	17.13	17.13	18.75
12″	13.37	14.87	16.13	16.63	16.5	18.00	19.63	20.50	21.63
14″	14.63	16.13	17.75	19.13	19.00	19.38	20.50	22.75	-
16″	16.63	18.37	20.25	21.25	21.13	22.25	22.63	25.25	-
18″	18.87	20.87	21.63	23.50	23.38	24.13	25.13	27.75	-
20″	20.87	22.87	23.88	25.75	25.50	26.88	27.50	29.75	-
24″	24.87	26.87	28.25	30.50	30.25	31.13	33.00	35.50	-

Gasket Dimensions - Kammprofiles (Imperial)

NPS	DN	Grooved Core (in.) ANSI, BS & MSS		Class 150 Centering Ring OD	Grooved Core (in.) ANSI, BS & MSS		Class 300 Centering Ring OD	Grooved Core (in.) ANSI, BS & MSS		Class 400 Centering Ring OD
		ID	OD		ID	OD		ID	OD	
26″	650	26.50	27.75	30.50	27.00	29.00	32.88	27.00	29.00	32.75
28″	700	28.50	29.75	32.75	29.00	31.00	35.38	29.00	31.00	35.13
30″	750	30.50	31.75	34.75	31.25	33.25	37.50	31.25	33.25	37.25
32″	800	32.50	33.88	37.00	33.50	35.50	39.63	33.50	35.50	39.50
34″	850	34.50	31.94	39.00	35.50	37.50	41.63	35.50	37.50	41.50
36″	900	36.50	38.13	41.25	37.63	39.63	44.00	37.63	39.63	44.00
38″	950	38.50	40.13	43.75	38.50	40.00	41.50	38.25	40.25	42.25
40″	1,000	40.50	42.13	45.75	40.25	42.13	43.88	40.38	42.38	44.38
42″	1,050	42.50	44.25	48.00	42.25	44.13	45.88	42.38	44.38	46.38
44″	1,100	44.50	46.38	50.25	44.50	46.50	48.00	44.50	46.50	48.50
46″	1,150	46.50	48.38	52.25	46.38	48.38	50.13	47.00	49.00	50.75
48″	1,200	48.50	50.38	54.50	48.63	50.63	52.13	49.00	51.00	53.00
50″	1,250	50.50	52.50	56.50	51.00	53.00	54.25	51.00	53.00	55.25
52″	1,300	52.50	54.50	58.75	53.00	55.00	56.25	53.00	55.00	57.25
54″	1,350	54.50	56.50	61.00	55.25	57.25	58.75	55.25	57.25	59.75
56″	1,400	56.50	58.50	63.25	57.25	59.25	60.75	57.25	59.25	61.75
58″	1,450	58.50	60.50	65.50	59.50	61.50	62.75	59.25	61.25	63.75
60″	1,500	60.50	62.50	67.50	61.50	63.50	65.54	61.75	63.75	66.25

NPS	DN	Grooved Core (in.) ANSI, BS & MSS		Class 600 Centering Ring OD	Grooved Core (in.) ANSI, BS & MSS		Class 900 Centering Ring OD
		ID	OD		ID	OD	
26″	650	27.00	29.00	34.13	27.00	29.00	34.75
28″	700	29.00	31.00	36.00	29.00	31.00	37.25
30″	750	31.25	33.25	38.25	31.25	33.25	39.75
32″	800	33.50	35.50	40.25	33.50	35.50	42.25
34″	850	35.50	37.50	42.25	35.50	37.50	44.75
36″	900	37.63	39.63	44.50	37.75	39.75	47.25
38″	950	39.00	41.00	43.50	40.75	42.75	47.25
40″	1,000	41.25	43.25	45.50	43.25	45.25	49.25
42″	1,050	43.50	45.50	48.00	45.25	47.33	51.25
44″	1,100	45.75	47.75	50.00	47.50	49.50	53.88
46″	1,150	47.75	49.75	52.25	50.00	52.00	56.50
48″	1,200	50.00	52.00	54.75	52.00	54.00	58.50
50″	1,250	52.00	54.00	57.00	-	-	-
52″	1,300	54.00	56.00	59.00	-	-	-
54″	1,350	56.25	58.25	61.25	-	-	-
56″	1,400	58.25	60.25	63.50	-	-	-
58″	1,450	60.50	62.50	65.50	-	-	-
60″	1,500	62.75	64.75	68.25	-	-	-

Adapted from ASME B16.20 (current version), Table 26

Notes:

1) The gasket inside diameter tolerance is ± 0.08 mm

2) The gasket outside diameter tolerance is ± 0.08 mm

3) The centering ring outside diameter (d3) tolerance is ± 0.08 mm

4) There are no Class 400 flanges in NPS 1/2" through NPS 3". (Use Class 600)

5) There are no Class 900 flanges in NPS 1/2" through NPS 2 1/2" (Use Class 1500)

6) There are no Class 2500 flanges NPS 14" and larger

Gasket Dimensions - RTJ, Type R (Metric)

RING NO.	PRESSURE CLASS RATING (psi)							PITCH DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING		GASKET WEIGHT, kg	
	ANSI, BS & MSS					API (psi)				OVAL	OCTAGONAL	OVAL	OCTAGONAL
	150	300/600	900	1500	2500	2000/3000	5000						
	NOMINAL PIPE SIZE (in.)							P	A	B	H		
R11	-	1/2	-	-	-	-	-	34.13	6.35	11.10	9.50	0.11	0.10
R12	-	-	1/2	1/2	-	-	-	39.69	7.95	14.30	12.70	0.21	0.20
R13	-	3/4	-	-	1/2	-	-	42.86	7.95	14.30	12.70	0.23	0.21
R14	-	-	3/4	3/4	-	-	-	44.45	7.95	14.30	12.70	0.24	0.22
R15	1	-	-	-	-	-	-	47.63	7.95	14.30	12.70	0.26	0.24
R16	-	1	1	1	3/4	-	-	50.80	7.95	14.30	12.70	0.28	0.26
R17	1-1/4		-	-	-	-	-	57.15	7.95	14.30	12.70	0.31	0.33
R18	-	1-1/4	1-1/4	1-1/4	1	-	-	60.33	7.95	14.30	12.70	0.33	0.30
R19	1-1/2	-	-	-	-	-	-	65.09	7.95	14.30	12.70	0.35	0.33
R20*	-	1-1/2	1-1/2	1-1/2	-	-	-	68.28	7.95	14.30	12.70	0.37	0.34
R21	-	-	-	-	1-1/4	-	-	72.23	11.11	17.50	15.90	0.66	0.64
R22	2	-	-	-	-	-	-	82.55	7.95	14.30	12.70	0.45	0.42
R23*	-	2	-	-	1-1/2	2.06	-	82.55	11.11	17.50	15.90	0.76	0.73
R24*	-	-	2	2	-	2.06	2	95.25	11.11	17.50	15.90	0.87	0.85
R25	2-1/2	-	-	-	-	-	-	101.60	7.95	14.30	12.70	0.55	0.51
R26*	-	2-1/2	-	-	2	2.56	-	101.60	11.11	17.50	15.90	0.93	0.90
R27*	-	-	2-1/2	2-1/2	-	(2.56)	2.56	107.95	11.11	17.50	15.90	1.05	0.96
R28	-	-	-	-	-	2-1/2	-	111.13	12.70	19.10	17.50	1.26	1.23
R29	3	-	-	-	-	-	-	114.30	7.95	14.30	12.70	0.62	0.58
R30†	-	3	-	-	-	-	-	117.48	11.11	17.50	15.90	1.08	1.05
R31*	-	3	3	-	-	3.13	-	123.83	11.11	17.50	15.90	1.13	1.10
R32	-	-	-	-	3	-	-	127.00	12.70	19.10	17.50	1.43	1.41
R33	3-1/2	-	-	-	-	-	-	131.76	7.95	14.30	12.70	0.71	0.66
R34	-	3-1/2	-	-	-	-	-	131.76	11.11	17.50	15.90	1.20	1.17
R35*	-	-	-	3	-	-	3.13	136.53	11.11	17.50	15.90	1.25	1.21
R36	4	-	-	-	-	-	-	149.23	7.95	14.30	12.70	0.81	0.74
R37*	-	4	4	-	-	4.06	-	149.23	11.11	17.50	15.90	1.36	1.33
R38	-	-	-	-	4	-	-	157.16	15.88	22.40	20.60	2.56	2.52
R39*	-	-	-	4	-	-	4.06	161.93	11.11	17.50	15.90	1.48	1.44
R40	5	-	-	-	-	-	-	171.45	7.95	14.30	12.70	0.94	0.87
R41*	-	5	5	-	-	-	-	180.98	11.11	17.50	15.90	1.66	1.61
R42	-	-	-	-	5	-	-	190.50	19.05	25.40	23.90	4.21	4.16
R43	6	-	-	-	-	-	-	193.68	7.95	14.30	12.70	1.06	0.98
R44*	-	-	-	5	-	-	-	193.68	11.11	17.50	15.90	1.77	1.73
R45*	-	6	6	-	-	7.06	-	211.14	11.11	17.50	15.90	1.93	1.88
R46*	-	-	-	6	-	-	7.06	211.14	12.70	19.10	17.50	2.39	2.33
R47*	-	-	-	-	6	-	-	228.60	19.05	25.40	23.90	5.06	4.99
R48	8	-	-	-	-	-	-	247.65	7.95	14.30	12.70	1.35	1.24
R49*	-	8	8	-	-	9	-	269.88	11.11	17.50	15.90	2.47	2.40
R50*	-	-	-	8	-	-	9	269.88	15.88	22.40	20.60	4.40	4.32
R51	-	-	-	-	8	-	-	279.40	22.23	28.60	27.00	8.05	8.17
R52	10	-	-	-	-	-	-	304.80	7.95	14.30	12.70	1.66	1.53
R53*	-	10	10	-	-	11	-	323.85	11.11	17.50	15.90	3.00	2.88
R54*	-	-	-	10	-	-	11	323.85	15.88	22.40	20.60	5.29	5.18
R55	-	-	-	-	10	-	-	342.90	28.58	36.50	34.90	16.23	17.04
R56	12	-	-	-	-	-	-	381.00	7.95	14.30	12.70	2.07	1.92
R57*	-	12	12	-	-	13.63	-	381.00	11.11	17.50	15.90	3.48	3.38
R58	-	-	-	-	-	-	-	-	-	-	-	-	-

Gasket Dimensions - RTJ, Type R (Metric)

RING NO.	PRESSURE CLASS RATING (psi)							PITCH DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING		GASKET WEIGHT, kg	
	ANSI, BS & MSS					API (psi)				OVAL	OCTAGONAL	OVAL	OCTAGONAL
	150	300/600	900	1500	2500	2000/3000	5000						
	NOMINAL PIPE SIZE (in.)							P	A	B	H		
R59	14	-	-	-	-	-	-	396.88	7.95	14.30	12.70	2.16	2.00
R60	-	-	-	-	12	-	-	406.40	31.75	39.70	38.10	23.10	23.50
R61	-	14	-	-	-	-	-	419.10	11.11	17.50	15.90	3.83	3.70
R62	-	-	14	-	-	-	-	419.10	15.88	22.20	20.60	6.84	6.70
R63*	-	-	-	14	-	-	-	419.10	25.4	33.30	31.80	16.20	16.70
R64	16	-	-	-	-	-	-	454.03	7.95	14.30	12.70	2.47	2.30
R65*	-	16	-	-	-	16.8	-	469.90	11.11	17.50	15.90	4.30	4.20
R66*	-	-	16	-	-	(16.0)	-	469.90	15.88	22.20	20.60	7.67	7.50
R67	-	-	-	16	-	-	-	469.90	28.58	36.50	34.90	22.30	23.40
R68	18	-	-	-	-	-	-	517.53	7.95	14.30	12.70	2.82	2.60
R69*	-	18	-	-	-	-	-	533.40	11.11	17.50	15.90	4.87	4.70
R70*	-	-	18	-	-	(18)	-	533.40	19.05	25.40	23.90	11.80	11.60
R71	-	-	-	18	-	-	-	533.40	28.58	36.50	34.90	25.20	26.50
R72	20	-	-	-	-	-	-	558.80	7.95	14.30	12.70	3.04	2.80
R73*	-	20	-	-	-	21.25**	-	584.20	12.70	19.10	17.50	6.60	6.50
R74*	-	-	20	-	-	(20.8)	-	584.20	19.05	25.40	23.90	12.95	12.80
R75	-	-	-	20	-	-	-	584.20	31.75	39.70	38.10	33.30	35.30
R76	24	-	-	-	-	-	-	673.10	7.95	14.30	12.70	3.66	3.40
R77	-	24	-	-	-	-	-	692.15	15.88	22.40	20.60	11.30	11.10
R78	-	-	24	-	-	-	-	692.15	25.40	33.30	31.80	27.10	27.60
R79	-	-	-	24	-	-	-	692.15	34.93	44.50	41.30	48.70	49.80
R80	22	-	-	-	-	-	-	615.95	7.95	-	12.70	-	1.41
R81	-	22	-	-	-	-	-	635.00	14.29	-	19.10	-	3.88
R83*	-	-	-	-	-	-	-	57.14	11.11	-	15.90	-	0.23
R84*	-	-	-	-	-	-	-	63.50	11.11	-	15.90	-	0.25
R85*	-	-	-	-	-	-	-	79.38	12.70	-	17.50	-	0.44
R86*	-	-	-	-	-	-	-	90.50	15.88	-	20.60	-	0.66
R87*	-	-	-	-	-	-	-	100.03	15.88	-	20.60	-	0.72
R88*	-	-	-	-	-	-	-	122.83	19.05	-	23.90	-	1.24
R89*	-	-	-	-	-	-	-	114.30	19.05	-	23.90	-	1.15
R90*	-	-	-	-	-	-	-	155.58	22.23	-	26.90	-	2.06
R91*	-	-	-	-	-	-	-	260.25	31.75	-	38.10	-	6.83
R92	-	-	-	-	-	-	-	228.60	11.11	17.50	15.90	0.94	0.91
R93	-	26	-	-	-	-	-	749.30	19.05	-	23.90	-	7.41
R94	-	28	-	-	-	-	-	800.10	19.05	-	23.90	-	7.91
R95	-	30	-	-	-	-	-	857.25	19.05	-	23.90	-	8.48
R96	-	32	-	-	-	-	-	914.40	22.23	-	27.00	-	12.09
R97	-	34	-	-	-	-	-	965.20	22.23	-	27.00	-	12.76
R98	-	36	-	-	-	-	-	1022.35	22.23	-	27.00	-	13.51
R99*	-	-	-	-	-	-	-	234.95	11.11	-	15.90	-	0.94
R100	-	-	26	-	-	-	-	749.30	28.58	-	34.90	-	-
R101	-	-	28	-	-	-	-	800.10	31.75	-	38.10	-	-
R102	-	-	30	-	-	-	-	857.25	31.75	-	38.10	-	-
R103	-	-	32	-	-	-	-	914.40	31.75	-	38.10	-	-
R104	-	-	34	-	-	-	-	965.20	34.93	-	41.30	-	-
R105	-	-	36	-	-	-	-	1022.35	34.93	-	41.30	-	-

Gasket Dimensions - RTJ, Type R (Imperial)

RING NO.	PRESSURE CLASS RATING (psi)							PITCH DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING		GASKET WEIGHT, lbs	
	ANSI, BS & MSS					API (psi)				OVAL	OCTAGONAL	OVAL	OCTAGONAL
	150	300/600	900	1500	2500	2000/3000	5000						
	NOMINAL PIPE SIZE (in.)							P	A	B	H		
R11	-	1/2	-	-	-	-	-	1.34	0.25	0.44	0.37	0.25	0.23
R12	-	-	1/2	1/2	-	-	-	1.56	0.31	0.56	0.50	0.48	0.44
R13	-	3/4	-	-	1/2	-	-	1.69	0.31	0.56	0.50	0.52	0.48
R14	-	-	3/4	3/4	-	-	-	1.75	0.31	0.56	0.50	0.53	0.49
R15	1	-	-	-	-	-	-	1.88	0.31	0.56	0.50	0.57	0.53
R16	-	1	1	1	3/4	-	-	2.00	0.31	0.56	0.50	0.61	0.56
R17	1-1/4		-	-	-	-	-	2.25	0.31	0.56	0.50	.69	0.72
R18	-	1-1/4	1-1/4	1-1/4	1	-	-	2.38	0.31	0.56	0.50	0.72	0.67
R19	1-1/2	-	-	-	-	-	-	2.56	0.31	0.56	0.50	0.78	0.72
R20*	-	1-1/2	1-1/2	1-1/2	-	-	-	2.69	0.31	0.56	0.50	0.82	0.76
R21	-	-	-	-	1-1/4	-	-	2.84	0.44	0.69	0.63	1.45	1.42
R22	2	-	-	-	-	-	-	3.25	0.31	0.56	0.50	0.99	0.91
R23*	-	2	-	-	1-1/2	2.06	-	3.25	0.44	0.69	0.63	1.66	1.62
R24*	-	-	2	2	-	2.06	2	3.75	0.44	0.69	0.63	1.92	1.86
R25	2-1/2	-	-	-	-	-	-	4.00	0.31	0.56	0.50	1.22	1.12
R26*	-	2-1/2	-	-	2	2.56	-	4.00	0.44	0.69	0.63	2.05	1.99
R27*	-	-	2-1/2	2-1/2	-	(2.56)	2.56	4.25	0.44	0.69	0.63	2.31	2.12
R28	-	-	-	-	2-1/2	-	-	4.38	0.50	0.75	0.69	2.77	2.71
R29	3	-	-	-	-	-	-	4.50	0.31	0.56	0.50	1.37	1.27
R30†	-	3	-	-	-	-	-	4.63	0.44	0.69	0.63	2.37	2.31
R31*	-	3	3	-	-	3.13	-	4.89	0.44	0.69	0.63	2.49	2.43
R32	-	-	-	-	3	-	-	5.00	0.50	0.75	0.69	3.16	3.10
R33	3-1/2	-	-	-	-	-	-	5.19	0.31	0.56	0.50	1.58	1.46
R34	-	3-1/2	-	-	-	-	-	5.19	0.44	0.69	0.63	2.65	2.58
R35*	-	-	-	3	-	-	3.13	5.38	0.44	0.69	0.63	2.76	2.67
R36	4	-	-	-	-	-	-	5.88	0.31	0.56	0.50	1.79	1.63
R37*	-	4	4	-	-	4.06	-	5.88	0.44	0.69	0.63	3.00	2.93
R38	-	-	-	-	4	-	-	6.19	0.63	0.88	0.81	5.64	3.56
R39*	-	-	-	4	-	-	4.06	6.38	0.44	0.69	0.63	3.26	3.17
R40	5	-	-	-	-	-	-	6.75	0.31	0.56	0.50	2.07	1.91
R41*	-	5	5	-	-	-	-	7.13	0.44	0.69	0.63	.66	3.55
R42	-	-	-	-	5	-	-	7.50	0.75	1.0	0.94	9.28	9.17
R43	6	-	-	-	-	-	-	7.63	0.31	0.56	0.50	2.33	2.15
R44*	-	-	-	5	-	-	-	7.63	0.44	0.69	0.63	3.90	3.81
R45*	-	6	6	-	-	7.06	-	8.31	0.44	0.69	0.96	4.25	4.15
R46*	-	-	-	6	-	-	7.06	8.31	0.50	0.75	0.69	5.27	5.14
R47*	-	-	-	-	6	-	-	9.0	0.75	1.0	0.94	11.16	11.00
R48	8	-	-	-	-	-	-	9.65	0.31	0.56	0.50	2.98	2.73
R49*	-	8	8	-	-	9	-	10.63	0.44	0.69	0.63	5.45	5.29
R50*	-	-	-	8	-	-	9	10.63	0.63	0.88	0.81	9.70	9.52
R51	-	-	-	-	8	-	-	11.0	0.88	1.13	1.06	17.75	18.01
R52	10	-	-	-	-	-	-	12.0	0.31	0.56	0.50	3.66	3.37
R53*	-	10	10	-	-	11	-	12.75	0.44	0.69	0.63	6.61	6.35
R54*	-	-	-	10	-	-	11	12.75	0.63	0.88	0.81	11.66	11.42
R55	-	-	-	-	10	-	-	13.5	1.13	1.44	1.37	35.78	15.52
R56	12	-	-	-	-	-	-	15.0	0.31	0.56	0.50	4.56	4.23
R57*	-	12	12	-	-	13.63	-	15.0	0.44	0.69	0.63	7.67	7.45
R58	-	-	-	12	-	-	-	-	-	-	-	-	-
R59	14	-	-	-	-	-	-	15.63	0.31	0.56	0.50	4.76	4.41
R60	-	-	-	-	12	-	-	16.00	1.25	1.56	1.50	50.93	51.81

Gasket Dimensions - RTJ, Type R (Imperial)

RING NO.	PRESSURE CLASS RATING (psi)							PITCH DIAMETRE OF RING	WIDTH OF RING	HEIGHT OF RING		GASKET WEIGHT, lbs	
	ANSI, BS & MSS					API (psi)				OVAL	OCTAGONAL	OVAL	OCTAGONAL
	150	300/600	900	1500	2500	2000/3000	5000						
	NOMINAL PIPE SIZE (in.)							P	A	B	H		
R61	-	14	-	-	-	-	-	16.50	0.44	0.69	0.63	8.44	8.16
R62	-	-	14	-	-	-	-	16.50	0.63	0.87	0.81	15.08	14.77
R63*	-	-	-	14	-	-	-	16.50	1.00	1.31	1.25	35.71	36.82
R64	16	-	-	-	-	-	-	17.88	0.31	0.56	0.50	5.45	5.07
R65*	-	16	-	-	-	16.8	-	18.50	0.44	0.69	0.63	9.48	9.26
R66*	-	-	16	-	-	(16.0)	-	18.50	0.63	0.87	0.81	16.91	16.53
R67	-	-	-	16	-	-	-	18.50	1.13	1.44	1.37	49.16	51.59
R68	18	-	-	-	-	-	-	20.38	0.31	0.56	0.50	6.22	5.73
R69*	-	18	-	-	-	-	-	21.00	0.44	0.69	0.63	10.74	10.36
R70*	-	-	18	-	-	(18)	-	21.00	0.75	1.00	0.94	26.01	25.37
R71	-	-	-	18	-	-	-	21.00	1.13	1.44	1.37	55.56	58.42
R72	20	-	-	-	-	-	-	22.00	0.31	0.56	0.50	6.70	6.17
R73*	-	20	-	-	-	21.25**	-	23.00	0.50	0.75	0.69	14.55	14.33
R74*	-	-	20	-	-	(20.8)	-	23.00	0.75	1.00	0.94	28.55	28.22
R75	-	-	-	20	-	-	-	23.00	1.25	1.56	1.50	73.41	77.82
R76	24	-	-	-	-	-	-	26.50	0.31	0.56	0.50	8.08	7.50
R77	-	24	-	-	-	-	-	27.25	0.63	0.88	0.81	24.91	24.47
R78	-	-	24	-	-	-	-	27.25	1.00	1.31	1.50	59.75	60.85
R79	-	-	-	24	-	-	-	27.25	1.38	1.75	1.63	107.37	109.79
R80	22	-	-	-	-	-	-	24.25	0.31	-	0.50	-	3.11
R81	-	22	-	-	-	-	-	25.00	0.56	-	0.75	-	8.55
R83*	-	-	-	-	-	-	-	2.25	0.44	-	0.63	-	0.51
R84*	-	-	-	-	-	-	-	2.50	0.44	-	0.63	-	0.55
R85*	-	-	-	-	-	-	-	3.13	0.50	-	0.69	-	0.97
R86*	-	-	-	-	-	-	-	3.56	0.63	-	0.81	-	1.46
R87*	-	-	-	-	-	-	-	3.93	0.63	-	0.81	-	1.59
R88*	-	-	-	-	-	-	-	4.84	0.75	-	0.94	-	2.73
R89*	-	-	-	-	-	-	-	4.50	0.75	-	0.94	-	2.54
R90*	-	-	-	-	-	-	-	6.13	0.88	-	1.06	-	4.54
R91*	-	-	-	-	-	-	-	10.25	1.25	-	1.50	-	15.06
R92	-	-	-	-	-	-	-	9.00	0.44	0.69	0.63	2.07	2.01
R93	-	26	-	-	-	-	-	29.50	0.75	-	0.94	-	16.34
R94	-	28	-	-	-	-	-	31.50	0.75	-	0.94	-	17.44
R95	-	30	-	-	-	-	-	33.75	0.75	-	0.94	-	18.70
R96	-	32	-	-	-	-	-	36.00	0.88	-	1.06	-	26.65
R97	-	34	-	-	-	-	-	38.00	0.88	-	1.06	-	28.13
R98	-	36	-	-	-	-	-	40.25	0.88	-	1.06	-	29.78
R99*	-	-	-	-	-	-	-	9.25	0.44	-	0.63	-	2.07
R100	-	-	26	-	-	-	-	29.50	1.13	-	1.37	-	-
R101	-	-	28	-	-	-	-	31.50	1.25	-	1.50	-	-
R102	-	-	30	-	-	-	-	33.75	1.25	-	1.50	-	-
R103	-	-	32	-	-	-	-	36.00	1.25	-	1.50	-	-
R104	-	-	34	-	-	-	-	38.00	1.38	-	1.63	-	-
R105	-	-	36	-	-	-	-	40.25	1.38	-	1.63	-	-

* 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 B16.20-2012 Tables 3 and 4

Gasket Dimensions - RTJ, Type RX (Metric)

RING NO.	PRESSURE CLASS RATING (psi)			PITCH DIAMETER OF RING	OUTSIDE DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING	GASKET WEIGHT, kg
	2000	3000	5000					
	NOMINAL PIPE SIZE (in.)			P	OD	A	H	
RX20	-	-	-	68.26	76.20	8.73	19.05	0.24
RX20†	-	-	2-1/16	68.26	76.20	8.73	19.05	0.24
RX23	2-1/6	-	-	82.55	93.27	11.91	25.40	0.52
RX24	-	2 -1/16	2-1/16	95.25	105.97	11.91	25.40	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	25.40	0.68
RX27	-	2-4/7	2-4/7	107.95	118.27	11.91	25.40	0.78
RX31	3-1/8	3-1/8	-	123.83	134.54	11.91	25.40	0.87
RX35	-	-	3-1/8	136.53	147.24	11.91	25.40	0.95
RX37	4-1/16	4 -1/ 16	-	149.23	159.94	11.91	25.40	1.03
RX39	-	-	4-1/16	161.93	172.64	11.91	25.40	1.15
RX41	-	-	-	180.98	191.69	11.91	25.40	1.23
RX44	-	-	-	193.68	204.39	11.91	25.40	1.34
RX45	7-1/16	7-1/16	-	211.14	211.93	11.94	25.40	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	25.40	2.43
RX50	-	-	9	269.88	283.37	16.67	31.75	2.07
RX 51	-	-	-	-	-	-	-	-
RX 52	-	-	-	-	-	-	-	-
RX53	11	11	-	323.85	334.57	11.91	25.40	6.45
RX54	-	-	11	323.85	337.34	16.67	31.75	5.36
RX57	13-5/8	13-5/8	-	381.00	391.72	11.91	25.40	26.4
RX63	-	-	-	419.10	441.72	26.99	50.80	6.63
RX65	16 -3/4	-	-	469.90	480.62	11.91	25.40	9.39
RX66	-	16-3/4	-	469.90	483.39	16.67	31.75	7.52
RX69	-	-	-	533.40	544.12	11.91	25.40	20.14
RX70	-	-	-	533.40	550.07	19.84	41.28	11.63
RX73	21-1/4	-	-	584.20	596.11	13.49	31.75	22.10
RX74	-	20-3/4	-	584.20	600.87	19.84	41.28	0.79
RX82	-	-	-	57.15	67.87	11.91	25.40	0.88
RX84	-	-	-	63.50	74.22	11.91	25.40	0.88
RX85	-	-	-	79.38	90.09	13.49	25.40	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	-	-	-	114.30	129.78	18.26	31.75	6.82
RX90	-	-	-	155.58	174.63	19.84	44.45	17.10
RX91	-	-	-	260.35	286.94	30.16	45.24	3.31
*RX99	-	-	-	234.95	245.67	11.91	25.40	-
RX201†	-	-	1 -3/8	46.04	46.04	5.74	11.30	-
*RX205†	-	-	1-13/16	57.15	62.31	5.56	11.10	-
*RX210†	-	-	2-4/7	88.90	97.63	9.53	19.05	-
*RX215	-	-	4	130.18	140.89	11.91	25.40	-
*RX215†	-	-	4-1/16 x 4-1/4	130.18	140.89	11.91	25.40	-

Gasket Dimensions - RTJ, Type RX (Imperial)

RING NO.	PRESSURE CLASS RATING (psi)			PITCH DIAMETER OF RING	OUTSIDE DIAMETER OF RING	WIDTH OF RING	HEIGHT OF RING	GASKET WEIGHT, lbs
	2000	3000	5000					
	NOMINAL PIPE SIZE (in.)			P	OD	A	H	
RX20	-	-	-	2.69	3.00	0.34	0.75	0.53
RX20†	-	-	2-1/16	2.69	3.00	0.34	0.75	0.53
RX23	2 -1/6	-	-	3.25	3.67	0.47	1.00	1.15
RX24	-	2 -1/16	2-1/16	3.75	4.17	0.47	1.00	1.32
RX25†	-	-	3 -1/8	4.00	4.31	0.34	0.75	1.41
RX26	2-9/16	-	-	4.00	4.40	0.47	1.00	1.5
RX27	-	2-4/7	2-4/7	4.25	4.66	0.47	1.00	1.72
RX31	3-1/8	3-1/8	-	4.88	5.30	0.47	1.00	1.92
RX35	-	-	3-1/8	5.38	5.80	0.47	1.00	2.09
RX37	4 -1/16	4 -1/ 16	-	5.88	6.30	0.47	1.00	2.27
RX39	-	-	4-1/16	6.38	6.80	0.47	1.00	2.54
RX41	-	-	-	7.13	7.55	0.47	1.00	2.71
RX44	-	-	-	7.63	8.05	0.47	1.00	2.95
RX45	7-1/16	7-1/16	-	8.31	8.34	0.47	1.00	3.66
RX46	-	-	7-1/16	8.31	8.75	0.53	1.13	8.55
RX47	-	-	-	9.00	9.66	0.78	1.63	3.79
RX49	9	9	-	10.63	11.05	0.47	1.00	5.36
RX50	-	-	9	10.63	11.16	0.66	1.25	4.56
RX 51	-	-	-	-	-	-	-	-
RX 52	-	-	-	-	-	-	-	-
RX53	11	11	-	12.75	13.17	0.47	1.00	14.22
RX54	-	-	11	12.75	13.28	0.66	1.25	11.82
RX57	13-5/8	13 -5/8	-	15.00	15.42	0.47	1.00	58.2
RX63	-	-	-	16.50	17.40	1.06	2.00	14.62
RX65	16-3/4	-	-	18.50	18.92	0.47	1.00	20.7
RX66	-	16 -3/4	-	18.50	19.03	0.66	1.25	16.58
RX69	-	-	-	21.00	21.42	0.47	1.00	44.4
RX70	-	-	-	21.00	21.66	0.78	1.63	25.64
RX73	21-1/4	-	-	23.00	23.47	0.53	1.25	48.72
RX74	-	20-3/4	-	23.00	23.66	0.78	1.63	1.74
RX82	-	-	-	2.25	2.67	0.47	1.00	1.94
RX84	-	-	-	2.50	2.92	0.47	1.00	1.94
RX85	-	-	-	3.13	3.55	0.53	1.00	3.95
RX86	-	-	-	3.56	4.08	0.59	1.13	4.37
RX87	-	-	-	3.94	4.45	0.59	1.13	7.1
RX88	-	-	-	4.88	5.48	0.69	1.25	6.57
RX89	-	-	-	4.50	5.11	0.72	1.25	15.04
RX90	-	-	-	6.13	6.88	0.78	1.75	37.7
RX91	-	-	-	10.25	11.30	1.19	1.78	7.3
*RX99	-	-	-	9.25	9.67	0.47	1.00	-
RX201†	-	-	1 -3/8	1.81	1.81	0.23	0.44	-
*RX205†	-	-	1-13/16	2.25	2.45	0.22	0.44	-
*RX210†	-	-	2-4/7	3.50	3.84	0.38	0.75	-
*RX215	-	-	4	5.13	5.55	0.47	1.00	-
*RX215†	-	-	4 - 1/16 x 4 -1/4	5.13	5.55	0.47	1.00	-

* 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 B16.20-2012 Tables 3 and 4

Gasket Dimensions - RTJ, Type BX (Metric, Imperial)

RING NO.	PRESSURE CLASS RATING (psi)				OUTSIDE DIAMETER	HEIGHT OF RING	WIDTH OF RING	HOLE SIZE	GASKET WEIGHT, kg
	5000	10000	15000	20000					
	NOMINAL PIPE SIZE (in.)				P	OD	A	H	
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	9	9	294.46	20.98	20.98	3.18	6.55
BX158	-	11	11	11	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	16-3/4	-	-	-	491.41	28.07	16.21	3.18	-
BX162	16-3/4	16-3/4	16-3/4	-	475.49	14.22	14.22	1.59	-
BX163	18-3/4	-	-	-	556.16	30.10	17.37	3.18	-
BX164	-	18-3/4	18-3/4	-	570.56	30.10	24.59	3.18	-
BX165	21-1/4	-	-	-	624.71	32.03	18.49	3.18	-
BX166	-	21-1/4	-	-	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	-

RING NO.	PRESSURE CLASS RATING (psi)				OUTSIDE DIAMETR	HEIGHT OF RING	WIDTH OF RING	HOLESIZE	GASKET WEIGHT, lbs
	5000	10000	15000	20000					
	NOMINAL PIPE SIZE (in.)				P	OD	A	H	
BX150	-	-	-	-	2.84	0.37	0.37	0.06	0.66
BX151	-	1.81	1.81	1.81	3.01	0.38	0.38	0.06	0.75
BX152	-	2.06	2.06	2.06	3.33	0.40	0.40	0.06	0.95
BX153	-	2.56	2.56	2.56	3.97	0.45	0.45	0.06	1.39
BX154	-	3.06	3.06	3.06	4.60	0.49	0.49	0.06	1.94
BX155	-	4.06	4.06	4.06	5.83	0.56	0.56	0.06	2.69
BX156	-	7.06	7.06	7.06	9.37	0.73	0.73	0.13	9.13
BX157	-	9	9	9	11.60	0.83	0.83	0.13	14.44
BX158	-	11	11	11	13.86	0.91	0.91	0.13	21.16
BX159	-	13.63	13.63	13.63	16.80	1.01	1.01	0.13	31.77
BX160	13.63	-	-	-	15.85	0.94	0.54	0.13	14.88
BX161	16-3/4	-	-	-	19.35	1.11	0.64	0.13	-
BX162	16-3/4	16-3/4	16-3/4	-	18.72	0.56	0.56	0.06	-
BX163	18-3/4	-	-	-	21.90	1.19	0.68	0.13	-
BX164	-	18-3/4	18-3/4	-	22.46	1.19	0.97	0.13	-
BX165	21 -1/4	-	-	-	24.59	1.26	0.73	0.13	-
BX166	-	21-1/4	-	-	25.20	1.26	1.03	0.13	-
BX167*	-	-	-	-	29.90	1.41	0.52	0.06	-
BX168†	-	-	-	-	30.13	1.41	0.63	0.06	-
BX169**	-	-	-	-	6.83	0.62	0.51	0.06	-
BX170	-	-	-	-	8.58	0.56	0.56	0.06	-
BX171	-	-	-	-	10.53	1.56	0.56	0.06	-
BX172	-	-	-	-	1.30	0.56	0.56	0.06	-
BX303††	-	-	-	-	33.57	1.49	0.67	0.06	-

*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

Conversions

Length	Pressure	Area
1cm = 0.3937 in. 1mm = 0.0394 in. 1m = 3.2802 ft 1in. = 1,000 mil	1MPa = 145.035 psi 1N/mm^2 = 1 MPa 1bar = 14.504 psi 1std atm = 14.696 psi 1in. Hg = 0.4912 psi 1in. H^{2}O = 0.036 psi	1cm^2 = 0.155 in.^{2} 1m^2 = 1,550 in.^{2} 1m^2 = 10.76 ft^2 1ft^2 = 144 in.^{2} 1ft^2 = 0.111 yd^2
Volume 1L = 1,000 cm^3 1cm^3 = 0.061 in.^{3} 1ft^3 = 1,728 in.^{3} 1ft^3 = 28.32 L 1US gal = 231 in.^{3} 1US gal = 0.8327 lmp gal	**Flow** 1US gpm = 34.28 BPD 1US gpm = 3.785 L/min 1lb/hr = 0.4536 kg/hr 1ft^3/s = 448.8 US gpm 1L/s = 127.13 ft^3/hr	**Temperature** 1°F = 1.8*(°C) + 32 1°C = (°F - 32)/1.8 **Torque** 1g-cm = 1,150 in.-lb 1N-m = 0.738 ft-lb
Weight 1kg = 2.2046 lb 1g = 0.0352 oz 1 metric ton = 2,204.6 lb	**Density** 1gm/cm^3 = 62.428 lbs/ft^3 1kg/L = 1gm/cm^3	**Force** 1N = 0.2248 lbf 1N = 0.102 kgf

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 is 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.

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