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3S-Superior Sealing Services, LLC.

Mission Statement

To be the premier supplier of high-quality gaskets in the industrial market. We will provide value added services to our customers through quick response, competitive pricing, and superior fluid sealing products.

About 3S-Superior Sealing Services

3S manufactures and stocks superior quality semi-metallic gaskets at our Houston facility, and by utilizing the latest technology in equipment, we provide a higher level of service from quoting to shipping. We only sell through distribution- we do not compete with our customer.

With a leadership team that has over 150 years of experience in the industry, along with a sister company producing our standard spiral wound gaskets, 3S provides a new standard in quality and in service.

All of our materials are fully traceable including wire, sheet and bar; therefore, all gaskets are etched with the material heat number on the rings. Customers can retrieve their MTR's at any moment from our website. This fully traceable element along with the use of 98% purity inhibited graphite as standard offers a higher quality product into the marketplace.

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Spiral-Wound Gasket Product Range

Description:

3S SWG gaskets are wound with a "V" section profiled metal strip along with a soft filler material. The "V" section metal strip ensures the gasket has excellent compressibility and recovery under various applications. The soft filler material ensures sealability against the flange face, offering optimum performance. 3S SWG can be produced in a wide range of sizes, thickness and material combinations to suit the application.

Style:



Style S - SI is a spiral wound gasket that is fabricated by utilizing the metal wire along with soft non-metallic filler. Suitable for tongue and groove, male and female, or grooved to flat face flange assemblies, also available with pass bars



Style GS are comprised of the metal wire with designated filler incorporating the use of a solid metal outer ring. The outer guide ring promotes the correct centering of the gasket in a standard flange, offers radial support for the outer portion of the spiral wound, and acts as a compression gauge to prevent over compression of the spiral wound.



Style GSI are the same as our Style GS with a addition of an inner ring. Like the outer ring, the inner ring serves multiple functions including: radial support for the inner portion of the spiral wound, prevents inward buckling and helps to provide uniform gasket stress

FIRE SAFE APPROVED ACCORDING TO API 6FB (GRAPHITE FACING)



Maximum Temperature (Filler)				
3S Inhibited Graphite	850°F (454°C)			
APX2 [®] Graphite	975°F (524°C)			
PTFE	500°F (260°C)			
Mica	1800°F (982°C)			
	Min -238°F (-150°C)			
Mica/APX2 [®] /Mica (HTG)	Max 1500°F (815°C)			
Ceramic	2000°F (1093°C)			
Maximum Temperature (Alloys)				
304 / 304L SS	1400°F (760°C)			
316 SS	1400°F (760°C)			
316L SS	1400°F (760°C)			
321 SS	1500°F (815°C)			
347 SS	1500°F (815°C)			
Monel	1500°F (815°C)			
Inconel 600	2000°F (1093°C)			
Carbon Steel	900°F (482°C)			

Spiral Wound Gasket Low Load (LL) Product Range



Description:

3S SWG gaskets are wound with a "V" section profiled metal strip along with a soft filler material. The "V" section metal strip ensures the gasket has excellent compressibility and recovery under various applications. The soft filler material ensures sealability against the flange face, offering optimum performance.

Our range of Low Load (LL) Spiral Would Gaskets offer the sealing performance of our standard SWG but will create a tight seal at lower gasket stresses due to a slight variation in our manufacturing process.

Features:

- Ideal where limited gasket stress is available
- Complies dimensionally with all gasket standards i.e. ASME B16.20-2017, EN1514-2.
- Available in all filler and alloy types

Style:



Style S - SI- LL : is a spiral wound gasket that is fabricated by utilizing the metal wire along with soft non-metallic filler. Suitable for tongue and groove, male and female, or grooved to flat face flange assemblies, also available with pass bars



Style GS-LL : are comprised of the metal wire with designated filler incorporating the use of a solid metal outer ring. The outer guide ring promotes the correct centering of the gasket in a standard flange, offers radial support for the outer portion of the spiral wound, and acts as compression gauge to prevent over compression of the spiral wound.



Style GSI-LL : are same as our Style GS with the only difference being an additional inner ring. Just like the outer ring, the inner ring serves multiple functions including: radial support for the inner portion of the spiral wound, prevents inward buckling and helps to provide uniform gasket stress



Maximum Temperature (Filler)					
3S Inhibited Graphite	850°F (454°C)				
APX2 [®] Graphite	975°F (524°C)				
PTFE	500°F (260°C)				
Mica	1800°F (982°C)				
	Min -238°F (-150°C)				
MICa/APX2®/MICa (HTG)	Max 1500°F (815°C)				
Ceramic 2000°F (1093°C)					
Maximum Temperature (Alloys)					
304 / 304L SS	1400°F (760°C)				
316 SS	1400°F (760°C)				
316L SS	1400°F (760°C)				
321 SS	1500°F (815°C)				
347 SS	1500°F (815°C)				
Monel	1500°F (815°C)				
Inconel 600	2000°F (1093°C)				
Carbon Steel	900°F (482°C)				

Gasket Properties (All Styles)

5000 psi

m

All 3S SWG have full material traceability through the MTR # etched on the guide ring and inner ring, the MTR can be retrieved through the 3S website.



Spiral-Wound Gasket MIL-G-24716A (SH) Product Range

Description:

3S MIL SWG gaskets are wound with a "V" section profiled metal strip along with a soft filler material. The "V" section metal strip ensures the gasket has excellent compressibility and recovery under various applications. The soft filler material ensures sealability against the flange face, offering optimum performance. 3S MIL SWG are manufactured in accordance with MIL-G-24716A (SH).

Style:



Style S (TY1) is a spiral wound gasket that is fabricated by utilizing the metal wire along with soft non-metallic filler. Suitable for tongue and groove or grooved to flat face flange assemblies.

Style GS (TY2) comprises of the metal wire with designated filler incorporating the use of a solid metal outer ring. The outer guide ring promotes the correct centering of the gasket in a standard flange, offers radial support for the outer portion of the spiral wound, and acts as compression gauge to prevent over compression of the spiral wound.

3S Inhibited Graphite meets MIL-P-24503.

All GS Style gaskets are compression tested in accordance with MIL-G-24716A (SH) Tables I through to V.

Test reports following MIL-G-24716A (SH) are issued with each order.

CL-A = 347SS CL-B = INC 600 CL-C = Monel 400

Maximum Temperature (Filler)				
3S Inhibited Graphite	850°F (454°C)			
Maximum Temp	erature (Alloys)			
304 / 304L SS	1400°F (760°C)			
316 SS	1400°F (760°C)			
316L SS	1400°F (760°C)			
321 SS	1500°F (815°C)			
347 SS	1500°F (815°C)			
Monel	1500°F (815°C)			
Inconel 600	2000°F (1093°C)			
Carbon Steel	900°F (482°C)			

Spiral Wound Gasket GSI-GS DS (Dual Service) Product Range



Description:

3S SWG gaskets are wound with a "V" section profiled metal strip along with a soft filler material. The "V" section metal strip ensures the gasket has excellent compressibility and recovery under various applications. The soft filler material ensures sealability against the flange face, offering optimum performance.

GSI – GS DS gaskets are designed to reduce inventory in Class 150lb and 300lb pressure classes from ½" to 24" nominal pipe sizes ONLY.

Style:



Style GS are comprised of the metal wire with designated filler incorporating the use of a solid metal outer ring. The outer guide ring promotes the correct centering of the gasket in a standard flange, offers radial support for the outer portion of the spiral wound, and acts as compression gauge to prevent over compression of the spiral wound.



Style GSI are same as our Style GS with the only difference being an additional inner ring. Just like the outer ring, the inner ring serves multiple functions including: radial support for the inner portion of the spiral wound, prevents inward buckling and helps to provide uniform gasket stress





8" 300lb Flange

Maximum Temperature (Filler)					
3S Inhibited Graphite	850°F (454°C)				
APX2 [®] Graphite	975°F (524°C)				
PTFE	500°F (260°C)				
Mica	1800°F (982°C)				
	Min -238°F (-150°C)				
Mica/APX2 [®] /Mica (HTG)	Max 1500°F (815°C)				
Ceramic 2000°F (1093°C)					
Maximum Temperature (Alloys)					
304 / 304L SS	1400°F (760°C)				
316 SS	1400°F (760°C)				
316L SS	1400°F (760°C)				
321 SS	1500°F (815°C)				
347 SS	1500°F (815°C)				
Monel	1500°F (815°C)				
Inconel 600	2000°F (1093°C)				
Carbon Steel	900°F (482°C)				



Example of a GSI - DS 8" 150 & 300lb Gasket



Spiral-Wound Gasket GS-AB (Anti-Buckling) Product Range

Description:

3S SWG gaskets are wound with a "V" section profiled metal strip along with a soft filler material. The "V" section metal strip ensures the gasket has excellent compressibility and recovery under various applications. The soft filler material ensures sealability against the flange face, offering optimum performance.

GS-AB gaskets are designed to reduce inward buckling of the inner winding towards the bore of the pipe.

Style GS-AB comprises of the metal wire with designated filler. The outside diameter of the guide ring promotes the correct centering of the gasket on the flange face.

The notched inner diameter of the outer ring helps reduce inward buckling of the sealing element towards the bore of the pipe.



Maximum Temperature (Filler)					
3S Inhibited Graphite	850°F (454°C)				
APX2 [®] Graphite	975°F (524°C)				
PTFE	500°F (260°C)				
Mica	1800°F (982°C)				
	Min -238°F (-150°C)				
Mica/APX2 [®] /Mica (HTG)	Max 1500°F (815°C)				
Ceramic	2000°F (1093°C)				
Maximum Temperature (Alloys)					
304 / 304L SS	1400°F (760°C)				
316 SS	1400°F (760°C)				
316L SS	1400°F (760°C)				
321 SS	1500°F (815°C)				
347 SS	1500°F (815°C)				
Monel	1500°F (815°C)				
Inconel 600	2000°F (1093°C)				
Carbon Steel	900°F (482°C)				

Kammprofile Gasket Product Range



Description:

3S - Kammprofile gaskets are manufactured with the best practices utilizing the latest manufacturing technology. This style is the preferred gasket choice to maintain a tight seal for heat exchangers, pressure vessels, and other equipment that are subjected to excessive thermal cycling. Kammprofile gaskets are constructed with concentrically serrated solid metal core faced on both sides with a flexible sealing material. These are commonly specified to improve performance where lower gasket seating stresses are required for an effective seal. This design limits the movement of the sealing material within the serrations while the solid metal core provides blowout resistance and firmness for ease of installation.

Style:



KP-1 is constructed with solid serrated core only for use in confined spaces, male and female, tongue and groove, or recessed flange compositions. These are most commonly found in heat exchanger flanges as upgrade from double jacketed or solid metal where lower bolt load is required



KP-2 is fabricated similar to KP-1, except with an integral outer guide ring to assist in proper alignment on flange facing. This gasket is recommended for raised face or flat face mating flanges



KP-3 is very similar to our KP-2 with minor difference of utilizing a loose-fitting guide ring for alignment. This design is used in place of KP-2 where thermal expansion is encountered

FIRE SAFE APPROVED ACCORDING TO API 6FB (GRAPHITE FACING)



Maximum Temperature (Filler)					
3S Inhibited Graphite	850°F (454°C)				
APX2 [®] Graphite	975°F (524°C)				
PTFE	500°F (260°C)				
Mica	1800°F (982°C)				
	Min -238°F (-150°C)				
MICa/APX2®/MICa (HTG)	Max 1500°F (815°C)				
Ceramic	2000°F (1093°C)				
Maximum Temperature (Alloys)					
304 / 304L SS	1400°F (760°C)				
316 SS	1400°F (760°C)				
316L SS	1400°F (760°C)				
321 SS	1500°F (815°C)				
347 SS	1500°F (815°C)				
Monel	1500°F (815°C)				
Inconel 600	2000°F (1093°C)				
Carbon Steel	900°F (482°C)				



Kammprofile KP3-RJ Product Information

Description:

3S provides a sealing solution for Ring Type Joint flanges where the gasket groove(s) are damaged or where there is a Raised Face flange connecting to a Ring Type Joint flange. The sealing solution consists of a kammprofile core that is positioned on the inside of the grooved flange, the guide ring extends out to sit on the inside of the bolts. An example is shown in the image below.





With the KP3-RJ gasket being a Kammprofile (Grooved Metal Gasket) sealing element, the design can be utilzed on flanges up to ASME B16.5 Class 2500#.

FIRE SAFE APPROVED ACCORDING TO API 6FB (GRAPHITE FACING)



Maximum Temperature (Filler)				
3S Inhibited Graphite	850°F (454°C)			
APX2 [®] Graphite	975°F (524°C)			
PTFE	500°F (260°C)			
Mica	1800°F (982°C)			
	Min -238°F (-150°C)			
Mica/APX2 [®] /Mica (HTG)	Max 1500°F (815°C)			
Ceramic	Ceramic 2000°F (1093°C)			
Maximum Temperature (Alloys)				
304 / 304L SS	1400°F (760°C)			
316 SS	1400°F (760°C)			
316L SS	1400°F (760°C)			
321 SS	1500°F (815°C)			
347 SS	1500°F (815°C)			
Monel	1500°F (815°C)			
Inconel 600	2000°F (1093°C)			
Carbon Steel	900°F (482°C)			

ACHE (Air Cooled Heat Exchanger) Gasket Product Range



Description:

3S ACHE gaskets are manufactured as a Kammprofile KP-1 seal with a range of metallic core and sealing layers available. The Kammprofile serrations are in accordance with ASME B16.20-2017 (figure GM-2.1-1). The core thickness on these style gaskets is typically 1/16" (1.6mm) or 1/8" (3.2mm).



PLUG DESCRIPTION	PLUG SIZE			
G5	5/8			
G6	3/4			
G7	7/8			
G8	1			
G9	1 1/8			
G10	1 1/4			
G11	1 3/8			
G12	1 1/2			
G13	1 5/8			
G14	1 3/4			

Standard Stock

<u>Cores</u> Carbon Steel 304 SS 316 SS Sealing Layers Graphite (all grades) PTFE (all grades) Mica Ceramic CNAF

Other core materials are available on request with a quick turnaround time.









The compression, recovery and leakage properties are achieved from. Fig 1.1

- Profile offset
- Precisely machined flats (length of flats) in-between the raised sections.
- Tested and qualified angles on the raised sections of XRG.

• The precisely machined gasket core design.

RECOVERY TESTING XRG

Fig 1.2 details the thickness change of XRG and a Spiral Wound Gasket (SWG). The gasket stress is increased and reduced at three different temperatures.

XRG vs SWG - Thickness Change at Varying Gasket Stresses & Temperatures



The compression and recovery is constant at the three temperatures for XRG and remains stable as the stress increases. The XRG has the ability to compress and recover at high loads.

- XRG demonstrates consistent recovery throughout the gasket stress range.
- The resilience of the XRG remains, even at the different temperatures.
- Conversely, the SWG simply compresses to the guide ring and then fails to recovery after compression.







Fig. 1.3 Illustrates the leakage rate at increasing gasket stresses in according with EN13555.

- XRG has lower leakage rates over SWG at all gasket stress levels.
- As gasket stress is reduced, a higher-level of recovery is again demonstrated as the XRG displays no significant leakage increase.



Fig 1.4 Highlights that XRG seals many times tighter compared to SWG at a gasket stress of 17,453 psi. Fig 1.5: Qmin/L (psi) is the amount of gasket stress needed to achieve a certain leakage rate in assembly. For example, to achieve a leakage rate of 0.001 in assembly XRG requires a gasket stress of 2466 psi, whereas; SWG requires 7687 psi -- more than 3 times higher, making XRG a superior gasket solution.

All test results for XRG, in accordance with EN13555 leakage and compression, are available upon request. Leakage rates at different temperatures and internal pressures were also tested. All data shown for SWG obtained from available public domains.



EXTRA RECOVERY GASKET

CONSTANTS

ROTT Data

	XRG	
Gb	392	psi
а	0.317	
Gs	0.604	psi
S100	1686	psi
S1000	3498	psi
S10000	7258	psi
Tpmin	1383	
Tpmax	77799	

m & y Values

	XRG	
m		
У	2500	psi

Materials

Maximum Temperature (Filler)						
3S Inhibited Graphite	850°F (454°C)					
Super Inhibited	975°F (524°C)					
Graphite						
PTFE	500°F (260°C)					
Mica	1800°F (982°C)					
HTG	1500°F (815°C)					
Ceramic	2000°F (1093°C)					
Maximum Temp	erature (Alloys)					
304 / 304L SS	1400°F (760°C)					
316 SS	1400°F (760°C)					
316L SS	1400°F (760°C)					
321 SS	1500°F (815°C)					
347 SS	1500°F (815°C)					
Monel	1500°F (815°C)					
Inconel 600	2000°F (1093°C)					
Carbon Steel	900°F (482°C)					

XRG SUMMARY

- Extremely low leakage rates as shown in EN13555 & ROTT testing.
- Low modulus of elasticity values at varying temperatures.
- High compression and recovery values at varying temperatures across a wide gasket stress range.
- Seals under minimal gasket stress due to its unique design.
- Performs consistently at diverse temperatures.

XRG ThicknessXRG DiameterXRG WidthStandard 3/32"Minimum
2" ODMinimum
3/8"Other
1/8"Maximum
140" ODMaximum
2"

Facing thickness as standard = 0.020" (0.5mm) each side. This is not included in the above "XRG Thickness"



ROTT DATA COMPARISON										
	Gb	а	Gs	S100	S1000	S10000	Tpmin	Tpmax	m	у
XRG	392	0.317	0.604	1686	3498	7258	1383	77799	2	2500
CMG	315	0.36	1855	1653	3787				2.5	6400
Kammprofile	387	0.334	14	1802	3888			55000	2	2500
SWG	365	0.413	5.52	2445	6328	16378	213	17362	3	10000

All 3S Gaskets have full material traceability through the MTR # etched on the guide ring and inner ring if applicable, the MTR can be retrieved at 3sgaskets.com

Manufacturing Details

Corrugated Metal Gasket (CMG) Product Range



Description:

All below CMG styles can be manufactured for standard size flanges (CMS) or for heat exchanger gaskets (CMH).

CMG gaskets are suitable for ASME B16.5 flanges, class 150# and 300# where minimal bolt load is available. The metallic core design promotes good compression and recovery at lower gasket stresses.

Style:





CMG with graphite facings can be used in standard piping up to Class 600lb and on small to large heat exchangers. It is seen as a good replacement for Double Jacketed gaskets where leaks have occurred.

CMG-PTFE (EPTFE) can offer a great sealing solution in aggressive media applications where a conventional PTFE sheet could creep and extrude.



CMG-FG-PTFE (EPFTE) is a good solution where aggressive chemicals are present but the application requires fire safe properties.

Technical Information

m = 2.75 y = 3,700 psi

FIRE SAFE APPROVED ACCORDING TO API 6FB (GRAPHITE FACING)

Maximum Temperature (Filler)		
3S Inhibited Graphite 850°F (454°C)		
APX2 [®] Graphite	975°F (524°C)	
PTFE	500°F (260°C)	
Mica 1800°F (982°C		
Mica/APX2®/Mica (HTG)	Min -238°F (-150°C)	
	Max 1500°F (815°C)	
Ceramic	mic 2000°F (1093°C)	
Maximum Temperature (Alloys)		
304 / 304L SS	1400°F (760°C)	
316 SS	1400°F (760°C)	
316L SS	1400°F (760°C)	
321 SS	1500°F (815°C)	
347 SS	1500°F (815°C)	
Monel	1500°F (815°C)	
Inconel 600	2000°F (1093°C)	
Carbon Steel	900°F (482°C)	



Double Jacketed Gasket (DJ) Product Range

Description:

3S DJ Gaskets are mainly used in Heat Exchanger applications but can also used in standard piping flanges. The metallic jacketed part of the gasket can be manufactured in a range of materials as specified below. The filler material is typically graphite but PTFE can also be used for media resistance

3S Style DJ100:	Standard Double Jacketed Gasket
3S Style DJ200:	Standard Double Jacketed Gasket with a soft facing material
3S Style DJ300:	Corrugated Double Jacketed Gasket
3S Style DJ400:	Multiple Corrugated Double Jacketed Gasket – no soft filler material
3S Style DJ500:	Multiple Corrugated Double Jacketed Gasket – with soft filler material

Gasket Properties			
DJ Steel			
m 3.75			
У	7600 psi		
DJ SS			
m	3.75		
У	8500 psi		

Maximum Temperature (Filler)		
3S Inhibited Graphite 850°F (454°C)		
APX2 [®] Graphite	975°F (524°C)	
PTFE	500°F (260°C)	
Maximum Temperature (Alloys)		
304L SS	1400°F (760°C)	
316 SS	1400°F (760°C)	
316L SS	1400°F (760°C)	
321 SS	1500°F (815°C)	
347 SS	1500°F (815°C)	
Monel	1500°F (815°C)	
Inconel 600	2000°F (1093°C)	
Carbon Steel	900°F (482°C)	

High Temperature - HTG Gasket Product Range



Description:

3S HTG product range is designed for higher operating temperatures where the limits of standard graphite are exceeded. The HTG sealing element consists of a combination of mica and APX2[®] graphite. The mica acts as an oxidation shield for the graphite.

Style:



XRG (eXtra Recovery Gasket) is available with our HTG sealing layers, the inner section of the sealing element is mica, the middle section is APX2[®] Graphite, the outer section again is mica. The mica inner and outer sealing rings act as an oxidation shield for the APX2[®]. Enabling this design to operate up to a maximum temperature of 1500 Deg F (815 Deg C).



Style S, SI, GS, GSI are available with our HTG sealing layers, the inner section of the sealing element is mica, the middle section is APX2[®] Graphite and the outer section again is mica. The mica inner and outer sealing rings act as an oxidation shield for the APX2[®]. Enabling this design to operate up to a maximum temperature of 1500 Deg F (815 Deg C).



KP-1-2 & 3 are all available with our HTG sealing layers, the inner section of the sealing element is mica, the middle section is APX2[®] Graphite, the outer section again is mica. The mica inner and outer sealing rings act as an oxidation shield for the APX2[®]. Enabling this design to operate up to a maximum temperature of 1500 Deg F (815 Deg C).



CMG-HTG offers good recovery when thermal contraction and expansion in the flange assembly occurs. CMG-HTG can also be used at higher temperatures and in oxidizing environments because of the Mica sealing layers on the inner and outer diameters.



Maximum Temperature (Filler)			
Mica	1800°F (982°C)		
Mica/APX2 [®] /Mica (HTG)	Max 1500°F (815°C)		
Ceramic	2000°F (1093°C)		
Maximum Temperature (Alloys)			
304 / 304L SS	1400°F (760°C)		
316 SS	1400°F (760°C)		
316L SS	1400°F (760°C)		
321 SS	1500°F (815°C)		
347 SS	1500°F (815°C)		
Monel	1500°F (815°C)		
Inconel 600	2000°F (1093°C)		
Carbon Steel	900°F (482°C)		

More alloy materials available on request



Vermiculite Gaskets HTG-VRM

Description:

3S introduces the development of new high temperature Semi-Metallic gaskets that also operates at high pressures.

The design of the HTG-VRM sealing element has taken a proven Vermiculite based material and encapsulates it in a special moisture resistance Mica based material. The design of the gaskets, once installed between flanges, works to prevent the Vermiculite material from expanding when moisture may be present in the media the gasket is working to seal.



High Temperature & Pressure
Oxidation resistant
API 6FB Fire Safe (both styles)
ASME B16.20 - 150# to 2500#

Any Semi-Metallic gasket is available with 100% vermiculite filler / facing (XRG-VRM / GSI-VRM / KP1 or KP3-VRM); however, without the Mica, the benefit in moisture applications could be compromised. Ask our technical department about what version is right for your application. All XRG, Spiral Wound and Kammprofiles gaskets are available in this sealing element: HTG-VRM XRG - XRG-O GSI - SI - S KP1 - KP2 - KP3

OPERATING TEMPERATURE				
Gasket Material	Minimum Deg F (Deg C)		Maximum Deg F (Deg C)	
304 Stainless Steel	-320	(-195)	1400	(760)
316L Stainless Steel	-150	(-100)	1400	(760)
Alloy 20	-300	(-185)	1000	(540)
Hastelloy B2	-300	(-185)	2000	(1090)
Hastelloy C276	-300	(-185)	2000	(1090)
Titanium	-320	(-195)	2000	(1090)
Incoloy 800	-150	(-100)	1600	(870)
Incoloy 825	-150	(-100)	1600	(870)
Inconel 600	-150	(-100)	2000	(1090)
Inconel 625	-150	(-100)	2000	(1090)
Inconel X750	-150	(-100)	2000	(1090)
Filler Materials				
Vermiculite	-350	(-212)	1832	(1000)
Mica	-350	(-212)	1832	(1000)
For reference use only				

All 3S gaskets have full material traceability through the MTR # etched on the guide ring and inner ring, the MTR can be retrieved through the 3S website.

Spiral Wound Gasket High Temperature - HTG-VRM



Mica

Vermiculite

Mica

Description:

3S introduces the development of new high temperature Spiral Wound Gasket that also operates at high pressures.

The design of the sealing element has taken a proven Vermiculite based material and encapsulates it in a special moisture resistance Mica based material. The design of the gaskets, once installed between flanges, works to prevent the Vermiculite material from expanding when moisture may be present in the media the gasket is working to seal.



All styles of gasket are available with 100% vermiculite filler (GSI-VRM, SI-VRM, S-VRM) but will not benefit from the assurances of the mica protecting the vermiculite from expanding in environments where moisture is present.

- High Temperature & Pressure
- Oxidation resistant
- API 6FB Fire Safe (both styles)
- ASME B16.20 150# to 2500#



OPERATING TEMPERATURE				
Gasket Material	Minimum Deg F (Deg C)		Maximum Deg F (Deg C)	
304 Stainless Steel	-320	(-195)	1400	(760)
316L Stainless Steel	-150	(-100)	1400	(760)
Alloy 20	-300	(-185)	1000	(540)
Hastelloy B2	-300	(-185)	2000	(1090)
Hastelloy C276	-300	(-185)	2000	(1090)
Titanium	-320	(-195)	2000	(1090)
Incoloy 800	-150	(-100)	1600	(870)
Incoloy 825	-150	(-100)	1600	(870)
Inconel 600	-150	(-100)	2000	(1090)
Inconel 625	-150	(-100)	2000	(1090)
Inconel X750	-150	(-100)	2000	(1090)
Filler Materials				
Vermiculite	-350	(-212)	1832	(1000)
Mica	-350	(-212)	1832	(1000)
For reference use only				

All 3S SWG have full material traceability through the MTR # etched on the guide ring and inner ring, the MTR can be retrieved through the 3S website.

Style



XRG-HF Product Range HF Alkylation Service

Description:

Style XRG-HF gaskets are designed for highly corrosive applications, such as Hydrofluoric Acid (HF). This style offers the advantage of having double sealing design which occupies all the space from the bore of the pipe to the outer diameter of raised face flanges.

The inner kammprofile seats the encapsulated PTFE seal, the thickness of the PTFE can vary depending on the flange corrosion, standard thickness is 1/8". The outer XRG (eXtra Recovery Gasket) sealing portion offers excellent compression and recovery as a standard and can consist of APX2[®] Graphite or PTFE soft sealing layers.

XRG-HF gaskets are designed for standard and non-standard flanges.

Styles:



Core Material: Monel or Carbon Steel Facing Materials: PTFE - APX2[®] Graphite



Core Material: Monel or Carbon Steel Facing Materials: PTFE - PTFE

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Gasket Properties		
m 2.5		
У	2500 psi	

All 3S SWG have full material traceability through the MTR # etched on the guide ring and inner ring, the MTR can be retrieved through the 3S website.

The inner kammprofile is designed to sit on the inner bore of the pipe to stop HF build up in this area. The soft PTFE inner seal will conform to flange corrosion and create a tight seal.

GSI-HF Product Range HF Alkylation Service



Description:

Style GSI-HF gaskets are designed for highly corrosive applications, such as Hydrofluoric Acid (HF). This style offers the advantage of having double sealing design which occupies all the space from the bore of the pipe to the outer diameter of raised face flanges. The spiral wound can be fabricated to the customers specifications. Typically, we will use either Kammprofile Carbon Steel (Teflon Coated) or Monel Inner ring faced with Graphite or PTFE. This Kammprofile Inner ring is affixed to the "special" spiral wound. The GSI-HF gaskets are designed to prevent corrosion on the flange faces, especially in HF service.

Style:



The winding portion is the main sealing element but once compressed the inner kammprofile creates a seal and stops HF attack on the inner bore of the flange faces.

Faced





Heat Exchanger Gasket Product Range

Description:

3S provides high quality heat exchanger gaskets. Gaskets can be manufactured in the following styles:

- XRG (eXtra Recovery Gasket)
- Spiral Wound Gasket
- Kammprofile (Grooved Metal Gasket)
- CMG (Corrugated Metal Gasket)
- DMJ (Double Metal Jacketed) Gasket

All gasket types are USA manufactured and can be made with any type of metallic and sealing layer combinations.







Heat Exchanger Gasket Shapes







Boiler / Manhole Gasket Product Range

Description:

3S provides high quality Boiler / Manhole gaskets used in industrial applications. Gaskets can be manufactured in the following styles:

- Spiral Wound Gasket
- Kammprofile (Grooved Metal Gasket)
- CMG (Corrugated Metal Gasket)

All gasket types are USA manufactured and can be made with any type of metallic and sealing layer combinations.





Maximum Temperature (Filler)			
3S Inhibited Graphite	phite 850°F (454°C)		
APX2 [®] Graphite 975°F (524°C)			
PTFE	500°F (260°C)		
Mica	1800°F (982°C)		
Mica/APX2 [®] /Mica (HTG)	Min -238°F (-150°C)		
	Max 1500°F (815°C)		
Ceramic	2000°F (1093°C)		
Maximum Temperature (Alloys)			
304 / 304L SS	1400°F (760°C)		
316 SS	1400°F (760°C)		
316L SS	1400°F (760°C)		
321 SS	1500°F (815°C)		
347 SS	1500°F (815°C)		
Monel	1500°F (815°C)		
Inconel 600	2000°F (1093°C)		
Carbon Steel	900°F (482°C)		

All 3S SWG have full material traceability through the MTR # etched on the guide ring and inner ring, the MTR can be retrieved through the 3S website.

Valve Gasket Product Range



Description:

3S provides high quality gaskets for all valve types including gate, ball, butterfly, globe, check, plug and relief valves used in industrial applications.

Gaskets can be manufactured in the following styles:

- Spiral Wound Gasket
- Kammprofile (Grooved Metal Gasket)
- CMG (Corrugated Metal Gasket)
- XRG (Extra Recovery Gasket)

All gasket types are USA manufactured and can be made with any type of metallic and sealing layer combinations.







Maximum Temperature (Filler)		
3S Inhibited Graphite 850°F (454°C)		
APX2 [®] Graphite	975°F (524°C)	
PTFE	500°F (260°C)	
Mica	1800°F (982°C)	
Mica/APX2 [®] /Mica (HTG)	Min -238°F (-150°C)	
	Max 1500°F (815°C)	
Ceramic	2000°F (1093°C)	
Maximum Temperature (Alloys)		
304 / 304L SS	1400°F (760°C)	
316 SS	1400°F (760°C)	
316L SS	1400°F (760°C)	
321 SS	1500°F (815°C)	
347 SS	1500°F (815°C)	
Monel	1500°F (815°C)	
Inconel 600	2000°F (1093°C)	
Carbon Steel	900°F (482°C)	

All 3S SWG have full material traceability through the MTR # etched on the guide ring and inner ring, the MTR can be retrieved through the 3S website.



Description:

NA-3S is a general-purpose sheet jointing material for use in light to medium gasket stress applications. Constructed with Aramid (Kevlar) & Synthetic fiber and a highquality nitrile rubber binder. For ASME B16.5 flanges NA-3S gaskets are manufactured in accordance with ASME B16.21



Temperature & Pressure Limits:

General Temperature Range = Maximum Short-Term Temperature = Maximum Pressure @ Maximum	-55 Deg F (-48 Deg C) to 464 Deg F (240 Deg C) 750 Deg F (400 Deg C)
Continuous Temperature =	580 psi (40 Bar)
Color = Thickness = Sheet Size = Cut Gaskets are also available	Green 1/64", 1/32", 1/16" & 1/8" (0.4mm, 0.8mm, 1.6mm & 3.2mm) 60" x 60" – 120" x 60"
Other thicknesses available on request	

Properties:

Density		1.7 to 2.0 g/cm3
Sealability	DIN 3535	< 1.0 ml/min
Compressibility	ASTM F-36 J	5 – 15%
Recovery	ASTM F-36 J	40% min
Dielectric Strength	ASTM D149-95a	17 kV/mm
Tensile Strength	ASTM F-152	1000 psi (7 MPa)
	ASTM F-146	
Thickness Increase	ASTM Oil 3, 5 hours / 300°F	<10%
	ASTM Fuel B, 5 Hours / 73°F	<15%
m & y values	1/16" thickness	1/8" thickness
m	2.0	2.6
у	2800 psi	3200 psi

The above data is relevant to the test standard thickness

ASTM F104: F712120-A9B3E22K5L151M5

3S-GF Product Information



Description:

Style GF is a high purity graphite sheet with .002" foil 316L stainless steel reinforcement. The sheet construction is a minimum of 98% high purity flexible graphite without use of any fillers or binders, which is bonded to the stainless steel core (Foil). 3S-GF offers excellent sealing properties for applications requiring lower bolt loads. Flexible graphite is pliable enough to "flow" into irregular flange surfaces while maintaining a positive seal and exhibiting low "creep relation" properties. In addition, this style provides outstanding chemical resistance for nearly all media with the exception of concentrated and extreme oxidizing acids



Temperature & Pressure Limits:

Maximum Continuous Temperature = Maximum Short-Term Temperature = Maximum Pressure @ Maximum Continuous Temperature =

None Oxidizing Environment Maximum Temperature =

Color = Black / Gray Thickness = 1/16" & 1/8" (1.6mm & 3.2mm) Sheet Size = 60" x 60" Cut Gaskets are also available Other thicknesses available on request

Properties:

Density		70 lb./ft ³
Sealability	DIN 3535	< 0.01 ml/min
Compressibility	ASTM F-36 J	30 – 40%
Recovery	ASTM F-36 J	20% min
Creep Relaxation	ASTM F-38	<4%
Graphite Purity		>98%
Ash Content		<2%
Total Chlorides		<50 ppm
m & y values	1/16" thickness	1/8" thickness
m	2.0	2.0
v	900 psi	900 psi

The above data is relevant to the test standard thickness

All 3S SWG have full material traceability through the MTR # etched on the guide ring and inner ring, the MTR can be retrieved through the 3S website.

850 Deg F (454 Deg C) 900 Deg F (482 Deg C) 740 psi (51 Bar)

1500 Deg F (815 Deg C)





Description:

Style GT is a high purity graphite sheet with .004" thick tanged 316L stainless steel tanged reinforcement. The sheet construction is a minimum of 98% high purity flexible graphite without use of any fillers or binders, which is mechanically bonded to the stainless-steel core. 3S-GT delivers excellent sealing properties for application requiring lower bolt loads. Flexible graphite is pliable enough to "flow" into irregular flange surfaces while maintaining a positive seal and exhibits very low "creep relation" properties. Furthermore, this material provides outstanding chemical resistance for nearly all media with the exception of concentrated and extreme oxidizing acids.



Temperature & Pressure Limits:

General Service	
Maximum Continuous Temperature =	850 Deg F (454 Deg C)
Maximum Short-Term Temperature =	900 Deg F (482 Deg C)
Maximum Pressure @ Maximum Continuous Temperature =	870 psi (60 Bar)

None Oxidizing Environment Maximum Temperature =

0 Deg F (482 Deg C) '0 psi (60 Bar)

1500 Deg F (815 Deg C)

Color = Black / Gray Thickness = 1/16" & 1/8" (1.6mm & 3.2mm) Sheet Size = $60'' \times 60''$ Cut Gaskets are also available Other thicknesses available on request

Properties:

Density		70 lb./ft ³
Sealability	DIN 3535	< 0.05 ml/min
Compressibility	ASTM F-36 J	30 – 40%
Recovery	ASTM F-36 J	20% min
Creep Relaxation	ASTM F-38	<4%
Graphite Purity		>98%
Ash Content		<2%
Total Chlorides		<50 ppm
m & y values	1/16" thickness	1/8" thickness
m	2.0	2.0
y	2500 psi	2500 psi

The above data is relevant to the test standard thickness

Color Coding Information



Meta	allic Winding Mat	terials
Material	Abbreviation	Color Code
Carbon Steel	CRS	Silver
Type 304 SS	304	Yellow
Type 304 L SS	304 L	No Color
Type 309 SS	309	No Color
Type 310 SS	310	No Color
Type 316L SS	316L	Green
Type 317L SS	317L	Maroon
Type 321 SS	321	Turquoise
Type 347 SS	347	Blue
Type 430 SS	430	No Color
Ni-Cu		
Monel 400	MON	Orange
Grade 400		
Nickel 200	NI	Red
Titanium	TI	Purple
20Cb-3 alloy	A-20	Black
Ni-Mo		
Hastelloy B	HAST B	Brown
Grade B2		
Ni-Mo-Cr		
Hastelloy C	HAST C	Beige
Grade C-276		
Ni-Cr-Fe		
Inconel 600	INC 600	Gold
Grade 600		
Ni-Cr-Fe-Cb		
Inconel 625	INC 625	Gold
Grade 625		
Ni-Cr-Fe-Ti		
Inconel X-750	INX	No Color
Grade X-750		
Ni-Fe-Cr		
Incoloy 800	IN 800	White
Grade 800		
Ni-Fe-Cr-Mo-Cu		
Incoloy 825	IN 825	White
Grade 825		
Zirconium	ZIRC	No Color

Nonmetallic Filler Materials							
Material	Abbreviation	Color Code					
Polytetrafluoroethylene	PTFE	White Stripe					
Vermiculite		Light Blue Stripe					
Phlogopite (magnesium mica)		Light Blue Stripe					
Flexible Graphite	FG	Gray Stripe					
Ceramic	CER	Light Green Stripe					



Example Markings for Spiral-Wound Gaskets

3S Spiral Wound Gasket Types



For our full product range and to view more details on the different gasket styles please visit <u>3SGASKETS.COM</u>



	TARGET GAS	KET STRESS			
Carlas	Minimum	Optimum	Maximum		
Gasket	psi	psi	psi		
Spiral Wound					
GS	6000	12000	25000		
GSI	8000	22000	45000		
GSI-LL	5000	10000	45000		
GSI-HF	7000	20000	45000		
GSI-HTG	10000	30000	45000		
Kammprofile					
KP-1, 2 & 3 (PTFE / FG)	2500	18000	60000		
KP-1, 2 & 3 (HTG)	2500	30000	60000		
CMG					
CMS (Standard Sizing)	3700	10000	20000		
CMH (Heat Exchanger)	3700	18000	35000		
DJ					
Steel	7500	20000	30000		
Stainless Steel	10000	25000	35000		
Graphite Sheet					
GF	800	4000	15000		
GT	2000	8000	20000		
CNAF					
NA-3S (1/16")	2000	5000	10000		
NA-3S (1/8")	3000	6000	9000		
ASSEMBLY GAS	KET STRESS (API 660 - ⁻	Table 3) - REFERENCE TO	ASME PPC-1		
	Maximum Permissible	Minimum Gasket Seating	Minimum Gasket		
Caskat	Gasket Stress	Stress	Operating Stress		
Gasket	Sgmax	Sgmin-s	Sgmin-O		
	psi	psi	psi		
Kammprofile (soft facing)	55000	20000	14000		
Corrugated Metal (soft facing)	40000	20000	14000		
Spiral Wound	b	12000	8000		
a: These stresses are based on the use o core materials of carbon steel, brass, co	f facing layers or filler materials, suc pper or aluminum alloys	h as flexible graphite, PTFE, or other cor	formable materials, and excludes		
o: The maximum permissible gasket stre with spiral wound gaskets)	ess does not apply when a means to p	prevent over-compression of the gasket	is employed (e.g. centering rings		

Notes



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SPIRALWOUND GASKETS

STYLE	DESCRIPTION
S	SPIRAL ONLY
SI	SPIRAL WITH INNER RING
GS	SPIRAL AND OUTER RING
GSI	SPIRAL WITH INNER AND OUTER RING
GSI-LL	LOW LOAD SPIRAL WITH INNER AND OUTER RING
GSI-HF	SPIRAL FOR HF TYPE APPLICATIONS
S, SI, GSI- HTG	HIGH TEMPERATURE APPLICATIONS MICA/FG/MICA
S, SI, GSI- HTG VRM	HIGH TEMPERATURE APPLICATIONS MICA/VERMICULITE/MICA
S, SI, GSI- VRM	HIGH TEMPERATURE APPLICATIONS VERMICULITE
GSI / GS – KP-3 RJ	SPIRAL TO SEAL DAMAGED RTJ GROOVES – RF TO RTJ FLANGES
MW / MWI	SPIRAL FOR BOILER DOOR APPLICATIONS

≝EXTRA RECOVERY **G**ASKET

STYLE	DESCRIPTION
XRG	EXTRA RECOVERY GASKET
XRG-O	EXTRA RECOVERY GASKET – OUTER RING
XRG-HTG	HIGH TEMPERATURE APPLICATIONS MICA/FG/MICA
XRG-HTG VRM	HIGH TEMPERATURE APPLICATIONS MICA/VERMICULITE/MICA
XRG-VRM	HIGH TEMPERATURE APPLICATIONS VERMICULITE

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KAMMPROFILE GASKETS

STYLE	DESCRIPTION
KP-1	KAMMPROFILE RING FOR HEAT EXCHANGER APPLICATIONS
KP-2	KAMMPROFILE WITH AN INTEGRAL OUTER RING
KP-3	KAMMPROFILE WITH LOOSE FITTING OUTER RING
KP-1,2,3 HTG	HIGH TEMPERATURE APPLICATIONS MICA/FG/MICA
KP-1,2,3 HTG-VRM	HIGH TEMPERATURE APPLICATIONS MICA/VERMICULITE/MICA
KP-1,2,3 VRM	HIGH TEMPERATURE APPLICATIONS VERMICULITE

CORRUGATED METAL GASKETS

STY	'LE	DESCRIPTION
CN	1S	CORRUGATED FOR STANDARD SIZED FLANGES
CIV	1H	CORRUGATED FOR HEAT EXCHANGERS

DOUBLE JACKETED

STYLE	DESCRIPTION
DJS	DJ FOR STANDARD SIZED FLANGES
DJH	DJ FOR HEAT EXCHANGERS

OTHER SEALING PRODUCTS

PTFE SHEET IN VARIOUS FORMS

NON-ASBESTOS SHEET – NA-3S

GRAPHITE SHEET – STYLE GF & GT