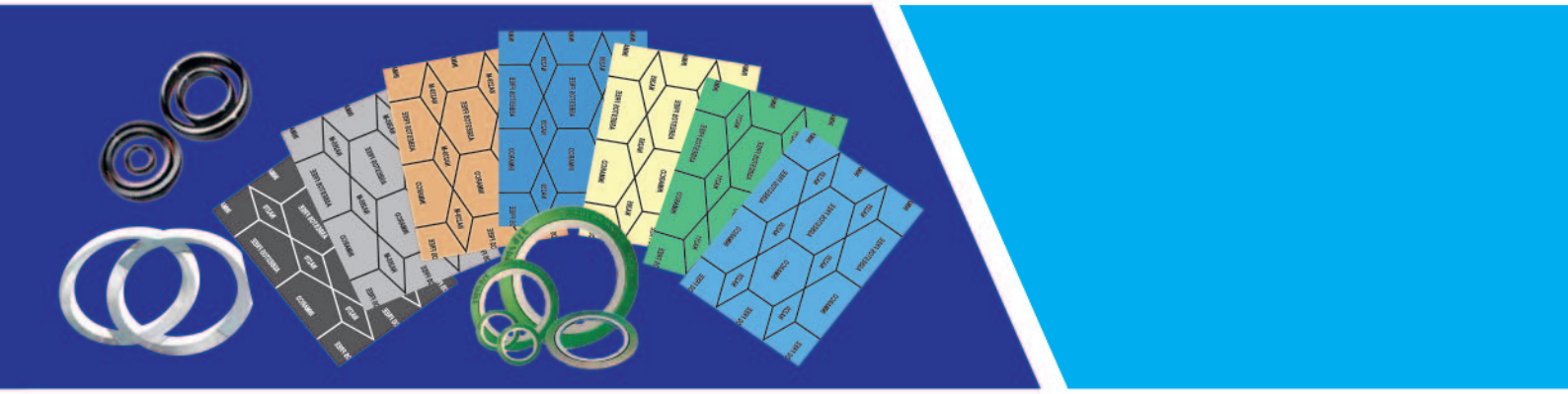
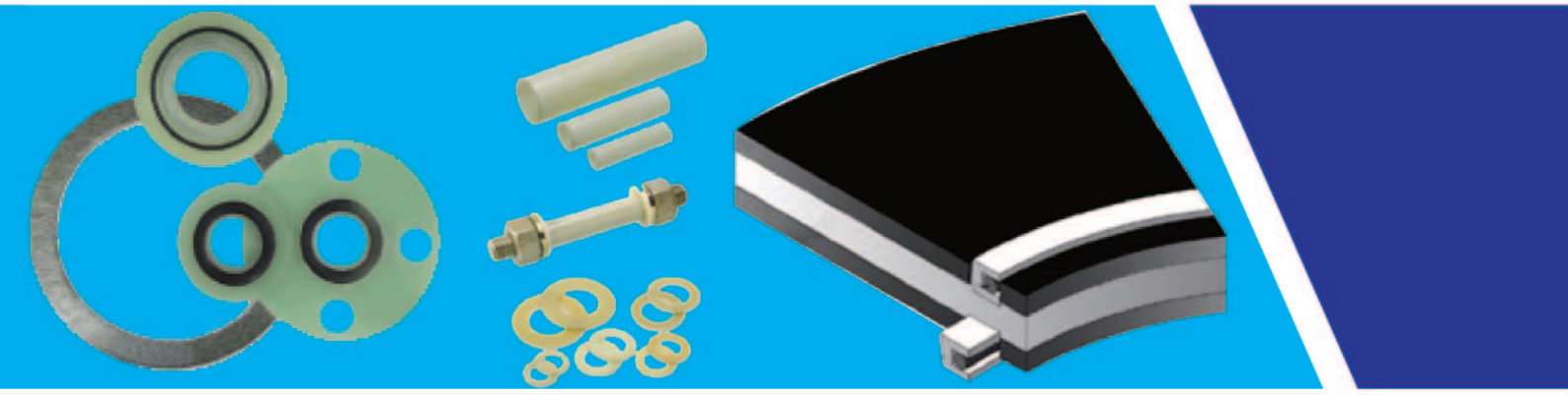
INMARCO®

Innovations in Fluid Sealing.

www.inmarco.ae



High Performance Gasketing



TÜVRheinland® CERT ISO 9001

ISSUE 1

Our philosophy towards 'Non - Asbestos' fluid sealing products led to the establishment of Inmarco Industries Private Ltd., in 1982. Since then, Inmarco has grown on this initiative and has dedicated itself towards the development of 'Hi - Tech' industrial sealing products. All our products subscribe to the international standards & this is authenticated by several associations and clientele worldwide.

"I take this opportunity to thank you for your interest in INMARCO, and we at INMARCO stand committed in serving you to your expectations . . ."

R. M. DOSHI
Managing Director

ABOUT US

INMARCO is one of the leading manufacturer of superior quality ''Fluid Sealing Products'' accepted and approved by variety of industries. Inmarco has attained market leadership in fluid sealing industry through its dedication to customer service and product development. Inmarco is committed for continuous improvement and has grown throughout three decades contributing to the environmental friendly Sealing Solutions. Non Asbestos culture has been driven and many a personnel to understand the asbestos menace in today's life. Inmarco's clientele are happy and satisfied of our untiring support for the sealing problems. Based on technological capabilities and perfection achieved over the years, Inmarco provides a wide range of products and services to the maintenance Industry. Our determinations to conduct business on a global scale is supported by and reflected in a fundamental philosophy utilization of technological expertise/ accumulation over three decades to access changes that occurred with passage of time while continuously evolving previously unexplored areas.

VALUES

With MARKET-oriented structures, new and stronger product offerings, technically skilled-employees and efficient environmental impact MANAGEMENT SYSTEM, armed with global rapport with similar manufacturing companies and access to the latest development in the industry and a resilient local spirit, we are dedicated to delivering the best results. It is our people who make the system come alive and turn these principles, policies, and procedures into reality.

MISSION & VISION

MISSION - Values - a driving force for Change...
A company rooted in unweavering values, INMARCO keeps ahead of change, reaping opportunities for growth. Striving to maintain leadership in industrial sealing products with wide manufacturing range. Providing a high quality product that combines performance with value for pricing, while establishing a successful relationship with the customers.

VISION - To be a market leader surpassing all hurdles of the industry, automate the process, systematized supplies and offer twenty-four-seven on service.

WARE HOUSING

Located in the heart of the world business hub at SAIF Zone Sharjah UAE. Equipped with State of European Machinery.

STOCKS - The Warehouse stocks varieties of exotic raw materials for ever demanding modernized applications.

STORES - The temperature control stores takes care of the wellbeing and enhances shelf life of raw materials and the finished products.

INSPECTION - We never choose cheap materials, every incoming shipment follows stringent inspections system and are stored at predefined locations.

PACKING AND DISPATCH - Latest packing methodology in use with the modern gadgets and simplified equipments to perform efficient packing.

TECHNOLOGIES & RESOURCES

INMARCO is driven by using non asbestos materials and is committed to provide superior and quality products that passed international standards and are environmental friendly. Technologies has helped develop more advance processes and has produced unwanted by-products causing pollution and deplete natural resources to the detriment of the earth and its environment that causes threat not only in the environment but also to mankind. With its philosophy in non-asbestos fluid sealing products INMARCO is able to do its part in conserving the environment.

CREDENTIALS

SERVICES

Inmarco is pleased to offer 24/7 onsite technical and installation services. Inmarco is specialized in manufacture of valve sealing systems and is proud to announce that the recently developed expandable version of valve cart seal has outperformed the expected results. Certificated by American Petroleum institute under standard ANSI/API standard 607 Fifth Edition – and API 589 Second Edition . We offer valve seal refurbishment and can undertake onsite jobs also.

- Construction
- Chemical Processing
- Food & Beverage
- Marine & Dry-docking
- Oil & Gas
- Pharmaceuticals
- Power Generation Desalination & Waster Water
- Paper & Pulp
- Steel & Aluminum

CERTIFICATIONS & APPROVALS

Cartseal Fire Safe Certified As Per Api 607

Packing Style 100fxi-special Conform To Fugitive Emission Norms As Per Api 622

Packing Style 100fxi-special Fire Safe Certified Asper Api 607

Borogue

Takreer

Gasco

Ruwais Fertilizer Industries (Fertil)

Petroleum Development Of Oman

Adgas

Adco

Qatar Petroleum

INTRODUCTION TO GASKETING

WHY DO WE USE GASKET?

If flange surface mated perfectly, there would be no need for gaskets. In practice, flanges always have slight surface irregularities. The gasket with compressible and resilient properties will compensate this irregularities. This provides an uninterrupted barrier against the medium and compensates for slight movement of the flanges during service.

DESIGNING OF GASKET

This involves determining of three basic elements, namely;
Right material | Proper dimension | Correct surface stress

Selection of right gasket material depends on three factors namely;
Medium | Working temperature | Working pressure

SURFACE STRESS

Even at low internal pressure the gasket must be pressed against the flanges with a definite minimum surface stress. The "deformation stress" depends on the structure and compressibility of the gasket material.

HYDROSTATIC END THRUST

In a closed vessel or a closed pipeline, the internal pressure of a medium exerts a thrust on the cover lid. This is called the hydrostatic end thrust, which ends to pull apart the flanges and thereby reduce the "assembly stress" originally applied to the gasket. The assembly stress must therefore compensate for the effect of the hydrostatic end thrust, while still maintaining the "minimum gasket surface stress" needed to seal at the working pressure.

MAXIMUM SURFACE STRESS

Too high a gasket surface stress can cause leakage. This is because the gasket loses the resilience needed to maintain its pressure against the flange surface. The surface stress on the gasket must never exceed the recommended maximum. For a given material the maximum permissible surface stress depends mainly on the temperature and the thickness. For example, thin materials withstand higher stresses depends, mainly on the temperature and the thickness.

THE RIGHT GASKET THICKNESS

Compressed non asbestos materials have a slight porosity, so gaskets should be as thin as possible. However, the selection of gasket thickness depends on

Depth of flange surface roughness.
Compressibility of the gasket.
Gasket surface stress at working pressure.

INMARCO GASKET ASSEMBLY GUIDELINES

Flanges: Should be even and parallel and also sufficiently rigid not to be destroyed by the bolt load.

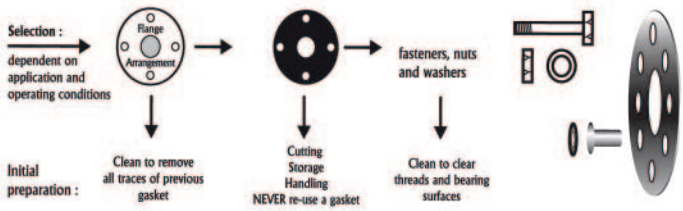
Flange Finish: Is important and concentric groove finish is ideal for high pressure. Spiral (gramophone record) groove finish gives a continuous path for leakage and is not recommended for gases. Flanges with flat surface finish are considered best.

Bolts: Should be tightened with a torque spanner, working at diametrically opposite nuts alternately. First turn all nuts to about half the recommended torque, then follow up to full assembly torque. It is important to follow up the bolts about 4 hours later or 1 hour after the gasket reaches its working temperature.

Pipelines: Undergo longitudinal thermal expansion which generates force that can crush the gasket. On the other hand, contraction of pipelines can reduce the gasket surface stress below

the minimum required for sealing. Pipe expansion and contraction must therefore be considered while designing the thickness of gasket.

INTRODUCTION TO GASKETING



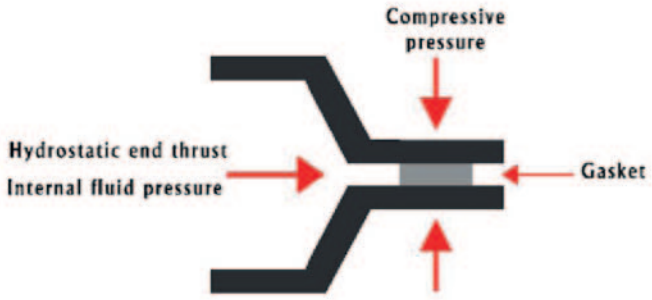
GASKET SELECTION AND INSTALLATION

Selection of the correct gasket type and proper installation are the key factors in avoiding blow outs. Incorrect gasket selection can lead to excessive relaxation, chemical attack, heat degradation or the gasket crushing under the available bolt load. All these factors can result in a loss of compressive load and create the potential for blow out. Specifications for gaskets in each service should be developed in consultation with the manufacturer.

Gasket selection is only part of the process in avoiding the problem. Proper installation is also necessary to ensure the gasket has sufficient load to create a seal and maintain the seal against the internal pressure. Since all gaskets relax to varying extents, especially at elevated temperature, knowing the potential amount of relaxation in the joint is essential in the preload selection.

Proper selection of gasket material and type for the application is of fundamental importance. This selection must ensure that the gasket seals effectively throughout all operating conditions that the application experiences including:

Temperature | Internal Pressure | Process Fluid | Compressive Load

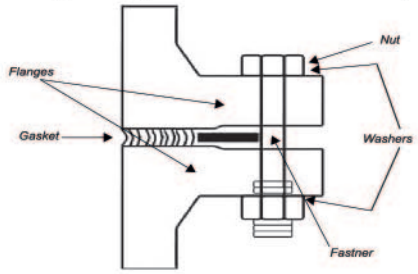


The gasket must be able to tolerate the temperature and internal pressures experienced during all phases of operation. It must also be chemically compatible with the process fluid and handle the compressive loads required for effective sealing without being crushed. In addition, the gasket must have the correct dimensions with thickness appropriate for the flange conditions and service. Once received from the manufacturer or supplier, the gasket must be stored and handled according to the requirement of the material to ensure that it is appropriate for installation.

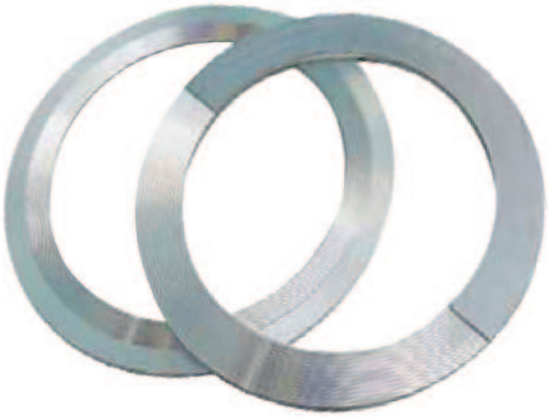
Only when all the components of the system are working together in harmony can the seal be expected to provide good performance over a reasonable lifetime. The integrity of a safe seal depends upon:

- **Selection of correct components appropriate for the application.**
- **Careful preparation, cleaning, installation and assembly.**
- **Correct bolt tightening and loading.**

The behavior of a flanged joint in service depends on whether or not the tension created in the fasteners will clamp the joint components together with a force great enough to resist failure of the seal, but small enough to avoid damage to the fasteners, joint components, gasket etc. The clamping load on the joint is created on assembly, as the nuts on the fasteners are tightened. This creates tension in the fastener (often referred to as preload). Although there may be some plastic deformation in the threads when a fastener is tightened normally, especially on the first tightening, most of the joint components respond elastically as the nuts are tightened. Effectively, the entire system operates as a spring, with the fasteners being stretched and the other joint components being compressed. Joints fail, not just gaskets! Low bolting torques, over-tight bolt loads, weak bolt materials, inadequate bolt/washer/nut lubrication, poor flange design or materials, poor gasket cutting or storage, improper installation practices, may each and all contribute to seal failure, even though the gasket material itself may be correctly specified!



CAMPROFILE GASKETS



INM001

Camprofile gaskets consist of a metal core (Generally Stainless Steel) with concentric grooves on either side with sealing materials. The sealing layers can be Graphite, PTFE depends on application. Camprofile can be used without sealing layers to provide an excellent seal but there is a risk of flange surface damage.

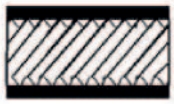
DUE TO WIDE SEATING STRESS RANGE OF THE CAMPROFILE GASKET MAKES IT:

- Highly suitable for varying temperature and pressure.
- Less sensitive to assembly faults (inaccurate bolt tensioning).
- Suitable for light and heavily constructed flanges.
- Depending on layer material camprofile gaskets are resistant to temperature up to 1000°C.
- Resistant to media pressures up to 250bar.

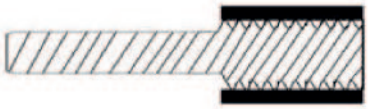
BENEFITS:

- When assembled the layer thickness of the sealing material is extremely small (0.5mm) thus reducing leaks, reject rates and environment pollution.
- The gasket will not damage the flange surface and can be easily removed.
- Reduces maintenance costs.
- Emergency sealing of damaged flanges by using 1mm thick sealing layers until the flange can be reworked.
- Excellent performance on fluctuating temperatures and pressures.
- Direct replacement for existing gaskets. No special flange is necessary.
- Eco friendly.

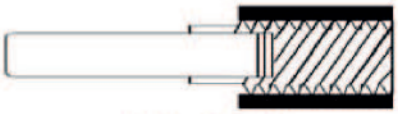
CAMPROFILE GASKET FOR FLANGE JOINTS



Without Ring



With Integral Ring



With Split Ring

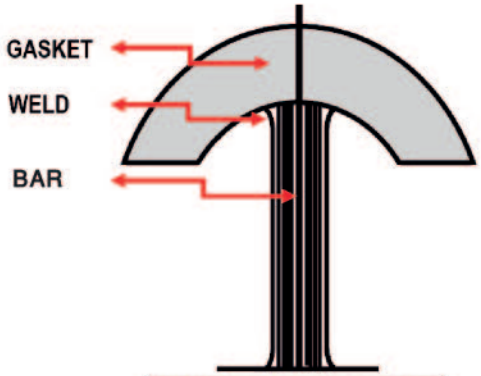
RECOMMENDED SEATING STRESS RANGE FOR RELIABLE AND EFFECTIVE PERFORMANCE								
Material	Temp. Deg. °C		Max. Operating Pressure (bar)	Gas Tightness	Application	Seating Stress		
	Min.	Max.				Min (N/mm²)	Optimum (N/mm²)	Max (N/mm²)
Graphite	-200	+550	250	Good	Aggressive Media	20	90	400
PTFE	-200	+250	100	Good	Aggressive Media	20	90	400
Silver	-200	+750	250	Good	Aggressive Media	125	240	450

HEAT EXCHANGER GASKET

Heat Exchanger Gasket is a term that has been given to gasket used in heat exchangers. The structure of the gasket or its type varies according to the operating conditions of the exchangers. The heat exchanger gaskets come in a broad specter of types including single or double jacketed, corrugated, plain metal, soft and many other. A large selection of different materials allows heat exchangers to operate at temperatures beyond the capabilities of most soft gasket materials.

ADVANTAGES

- Available in wide range of materials, since they are all custom made.
- Metal jacketed heat exchangers.
- The metal jacket provides mechanic strength to contain the filler and improves chemical resistance.
- Unique construction provides stability and ensures trouble-free handling and installation.



MP10 WITH WELDED BAR

INM002

Gaskets with welded bars have eliminated greatest problems of conventional gaskets, which develop cracks in the radius. Metals or alloys are commercially available in sheets or rolls of 1000mm width.

The primary and secondary seals are continuous all around the gasket. The gasket has an excellent sealability, reducing leaks to the environment. The bars which seal between the heat exchanger passages are plasma or TIG welded with spot welds at each end. These welds are soft and small to avoid areas of increased resistance to seating.

MATERIALS FOR METALLIC JACKET		
MATERIAL	ASTM	DIN Material No.
Low Carbon Steel	Soft Iron	1.1003
Stainless Steel	AISI 304	1.4301
Stainless Steel	AISI 316	1.4401
Stainless Steel	AISI 321	1.4541
Stainless Steel	AISI 316 Ti	1.4571
Monel (NiCu30Fe)	B172, alloy 400	2.4360
Copper	Copper	2.0090
Brass	Brass Ms 63	2.0321
Aluminium	Aluminium 99.5	3.0255
Titanium	B348 Gr. 1	3.7025

Filler : Flexible Graphite, ceramic, Calendered sealing materials
Size : Gasket thick – 3.2mm
Gasket Width : 10, 13 and 16mm
Bar Width : 8, 10 and 13mm

GASKET ORDERING EXAMPLE

Gasket Style : (refer to TYPE 1 to 25), Shape drawing
Dimensions : OD (outer dia.), (inner dia.)
Materials : Metal or Metal Filler
Gasket Thickness :
Bar Width :
Radius and distance between bars or center line of bars

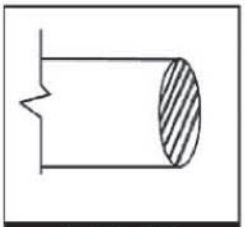
	Type 1		Type 10		Type 19
	Type 2		Type 11		Type 20
	Type 3		Type 12		Type 21
	Type 4		Type 13		Type 22
	Type 5		Type 14		Type 23
	Type 6		Type 15		Type 24
	Type 7		Type 16		Type 25
	Type 8		Type 17		
	Type 9		Type 18		

RING JOINT GASKET

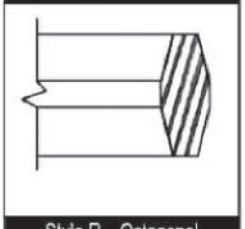
INM003

Ring joint gaskets are metallic sealing rings suitable for high pressure and high temperature applications and are fitted in ring groove type flanges. They are widely used in the Oil/Petrochemical industry and in valves and pipe work. Choice of material may be determined to suit higher temperatures and aggressive media. They comply with ASME B16.20 standards and API spec 6A. Ring type Joint Gaskets are designed to seal by "initial line contact" or wedging action between that mating flange and the gasket. By applying pressure on the seal interface through bolt force, the softer metal of the gasket flows into the micro fine structure of the harder flange material, creating a very tight and efficient seal.

STANDARD RING JOINTS TYPES

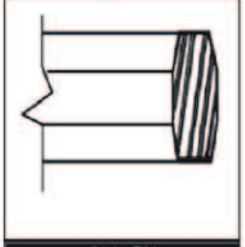


Style R – Oval



Style R – Octagonal

Style BX



Style RX

STYLE: R Oval : The contact face is oval shape. It provides a high reliability seal. These gaskets are manufactured in accordance to API 6A of ASME B16.20 to suit API613 and ASME/ANSI B16.5 flanges. Fits the round and flat bottom ring groove flange.

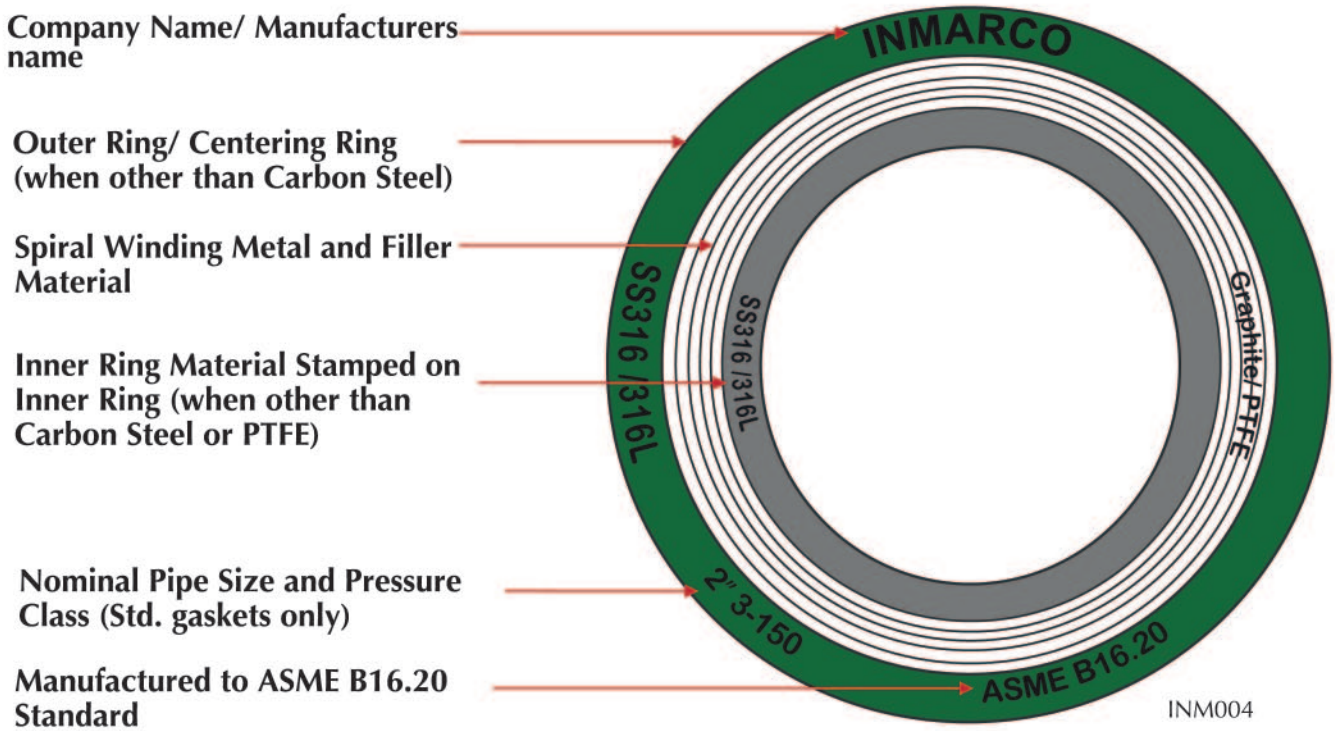
STYLE: R Octagonal : More accurate in dimensions and surface finish than oval type because it consists of straight surfaces only. A higher torque load is required to flow the gasket material into imperfections of the flange facings. These gaskets comply with API6A of ASME B16.20 to suit API 6B and ASME/ANSI B16.5 flanges. Fits only the modern flat bottom groove flange.

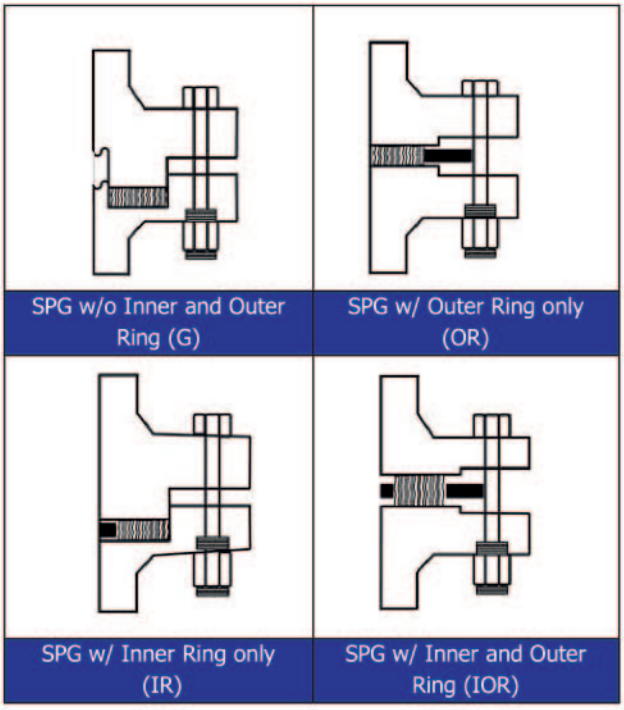
STYLE: BX : the BX type RTJ gaskets are manufactured in accordance with API 6A and are suitable for use in high pressure API 6BX flanges. The gaskets form a metal to metal seal on assembly and the efficiency improves as internal pressure increases. All BX sizes have a pressure relief hole to equalize pressure across sealing faces.

STYLE RX : The RX type RTJ gasket is manufactured in accordance to API 6A and ASME B16.20 to suit API 6B and ASME/ANSI B16.5 flanges. The RX is a pressure energized version of the R octagonal gasket and fits the R type flat bottomed groove. The RX has an increased height and utilizes the internal system pressure to energize and improve the seal as internal pressure increases. Some RX sizes have a pressure relief hole to equalize pressure on both sides of the sealing faces.

RING JOINT GASKET

Spiral Wound gasket is a sealing element with or without outer guide rings/inner rings. The sealing element consist of spirally wound strip filled with different types of fillers like Graphite/PTFE/Ceramic etc., depending upon the nature and type of application. The picture below illustrates a typical arrangement of a spiral wound gasket. INMARCO manufactures different types of gaskets in different combinations and sizes of exotic materials like carbon steel, stainless steel, nickel and alloy steels. These gaskets are manufactured meeting the requirements of international specification such as ASME, DIN, JIS etc.



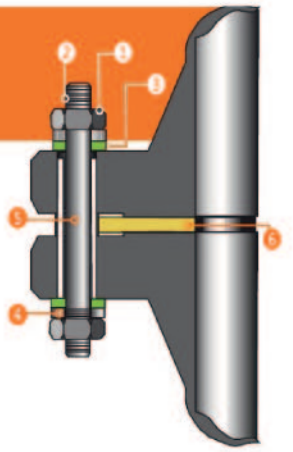


SPG (G) : Wide choice of material for metal strip and filler (Ceramic/Flexible Graphite/PTFE/Verdicarb (mica graphite). Suitable for high pressures and temperatures application. Recommended for flanges with tongue and groove.

SPG (IR) : Consist of solid metal inner ring. Suitable for high pressures and temperatures. Recommended for male and female flanges.

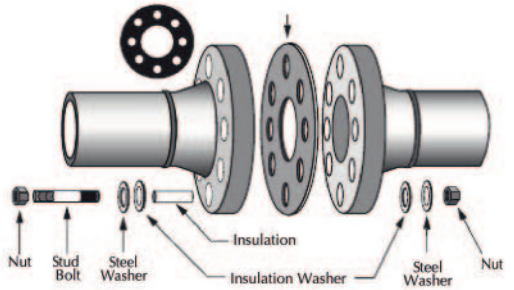
SPG (OR) : Solid metal outer ring used as centering device and compression stop. Recommended for raised face and flat face flanges.

SPG (IOR) : Consist of metal inner and outer rings. Suitable for high pressures and temperatures applications. Prevents turbulence and erosion damage to flange. Prevents turbulence and erosion damage to flange. Prevents damage for gasket bore and inner windings. Acts as a corrosion barrier. Recommended for raised face or flat face flanges.

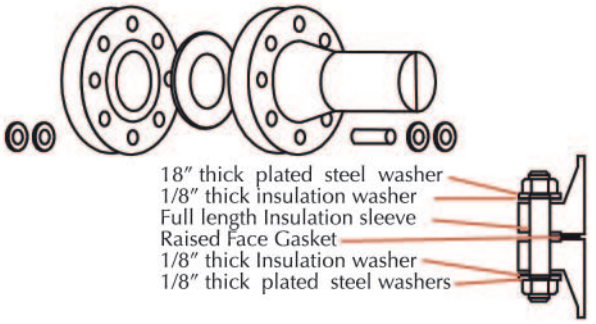


1. Nut
2. Stud Bolt
3. Insulation Washer
4. Steel Washer
5. Insulation Sleeve
6. Insulation Gasket

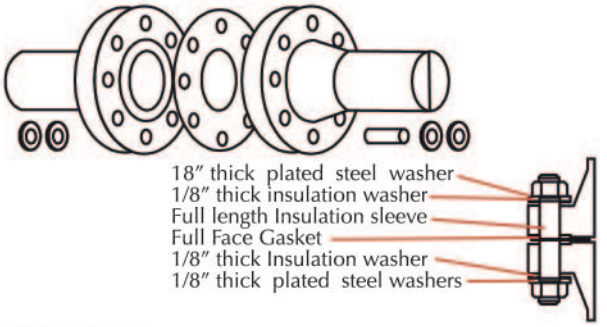
Insulation sets are used for pipeline flange corrosion protection and for complete electrical insulation protection where a seal is required between dissimilar flange materials. There are three standard styles available to suit raised face, full face and ring grooved flanges.



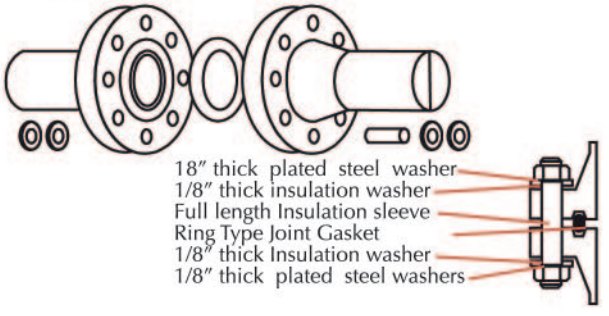
RAISED FACE TYPE



FULL FACE TYPE



R.T.J TYPE



A. Low Pressure Service Line

- **Service Temperature**
  - GRE(G-10) Retainer : Maximum 150℃
  - GRE(G-11) Retainer : Maximum 200℃
  - Phenolic Retainer : Maximum 175℃
  - Sealing Element : Various Temperature as per material specificat ion
- **Service Class** : ASME 150~600LB
- **Maximum Size** : 1/2" ~ 24", up to 48" (Max O.D 1500mm)

* Large sizes are available & required to discuss our sales team

A. JIC 9230-ES : Glass Reinforced Epoxy Plate with Rubber O-Ring/Spring Energized PTFE Seal

▣Material
- Retainer: Glass Reinforced Epoxy / Phenolic Resin
- Seal Element : Rubber Seal or Spring Energized PTFE Seal

▣**Gasket Thickness** : 3.2mm(3.0 ~ 8.0mm available)

▣Advantages
- Superior sealing for medium (150~600LB) lines
- Protection from low pressure, deformation and blowouts
- Excellent in minimizing outside fluid contamination and inflow
- Stable electrical flange insulation & corrosion concerns
- Reliable service conditions and guards against leakage

Cross Section

B. High Pressure Service Line

- **Service Temperature**
  - G-10 Retainer : Maximum 150℃
  - G-11 Retainer : Maximum 200℃
  - Sealing Element : Various Temperature as per material specification
- **Service Class** : ASME 150~2500LB (9320-HP : Max. API 6BX 15000 p
- **Maximum Size** :1/2" ~ 24", up to 48" (Max O.D 1500mm)

* Large sizes are available & required to discuss our sales team

GASKETS

B. JIC 9320-OS : Epoxy Faced Metal Core with Spring Energized PTFE Seal

▣Material
- Retainer : Glass Reinforced Epoxy with Stainless steel core
- Seal Element : Spring Energized PTFE Seal

▣**Gasket Thickness** : 6.6 mm(6.0 ~ 8.0mm available)

▣Advantages
- Excellent solution for electrical protection & high pressure
- High Strength prevent damages from excess compression
- Can be installed RTJ with Raised Face Flange connections
- Applicable to protect the flange surface coating
- Environmental Safety by reducing fugitive emission
- Reliable sealability on critical & severe condition

Cross Section

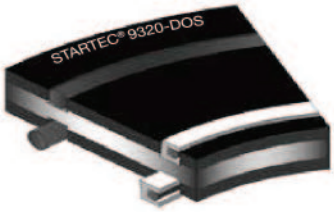
B. JIC 9320-DOS : Epoxy Faced Metal Core with Tandem Seal

▣Material
- Retainer : Glass Reinforced Epoxy with Stainless steel core
- First Seal : Spring Energized PTFE Seal
- Second Seal : Rubber O-ring

▣**Gasket Thickness** :Basic 6.6 mm(6.0 ~ 8.0mm available)

▣Application
- Stable sealability and insulation performance on severe condition
- Better compressive strength and heat resistance by using NEMA G11
- High strength of sealing retainer prevents damages from excess compression.
- Easy installation and disassembly

Cross Section



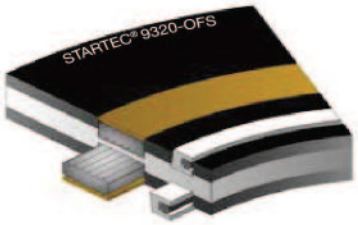
B. JIC 9320-OFS : Epoxy Faced Metal Core with Fire Safety Double Seal

▣Material
- Retainer : Glass Reinforced Epoxy with Stainless steel core
- First Seal: Spring Energized PTFE Seal
- Second Seal : Kammprofile with STARPITE® Layer

▣**Gasket Thickness** : 6.6 mm(6.0 ~ 8.0mm available)

▣Advantages
- High compressive strength & heat resistance by NEMA G-11
- Protection for electrical corrosion & dissimilar connection
- Reliable fire safety performance with special sealing structure
- Officially Certified API 6FB (Nr.30252301E/FH/26.11.13)
- Easy installation and disassembly
- Suitable clients in piping & LNG application

Cross Section



B. JIC 9320-HP : Epoxy Faced Metal Core with High Pressure Double Seal

▣Material
- Retainer: Glass Reinforced Epoxy with Stainless steel core
- Seal Element : Spring Energized PTFE Seal

▣**Gasket Thickness** : 6.6 mm(6.0 ~ 8.0mm available)

▣**Service Range** : API 6BX 15,000 psi Max

▣Advantages
- Specialized for high pressure of RTJ application
- Installed to applicable up to API 6BX 15,000psi
- High endurance & minimize binding stress
- Protection for electrical corrosion & dissimilar connection
- Stable sealability & performance on severe condition

Cross Section

API 6FB Fire Test

The Fire test according to API 6FB(dated December 2008) requires that any sealing end connection hold 30 minutes in a flame condition and then for a cool down period. After the assembly is cooled down to 100℃ or less the line is depressurized and then re-pressurized. During all facets of the test the gasket must not exceed an API proscribed leak rate.

In the fire test a 6" Class 300 flange is pressurized with a test pressure of 75% of the API rated working pressure.The Test pressure is maintained during the burn and cool-down period. After 5 minutes a fire is established and the flame temperature is monitored. The average of the thermocouples must reach 760℃ within 2 minutes and the average of the calorimeter shall reach 650℃ within 15 minutes. The burn period shall last for 30 minutes. After the burn period the connection is air-cooled down to 100℃ or less. After cooling down the flange is depressurized and the pressure is increased again to the test pressure and held for 5 minutes.

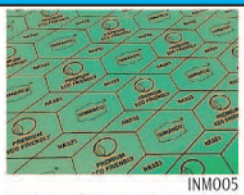
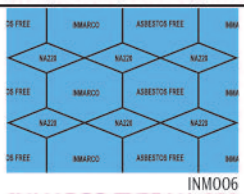
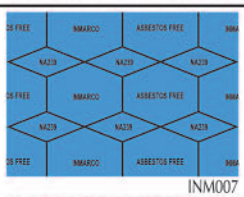
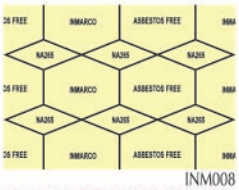
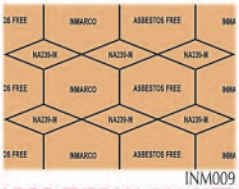
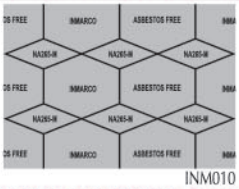
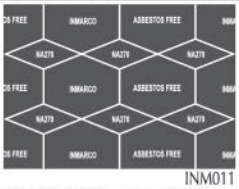
Bolt / Nut / Sleeve / Washer

		Insulation Resistance (Ω)	Max. Temp. °C	Thickness
Insulation Sleeve	Glass Reinforced EPOXY	Over 2.0×10^{13}	150	0.8T~1.0T
	Phenolic	$2.2\times10_{8}$	180	
	PTFE	Over 2.0×10^{13}	100	
	Mica	9.9×10^{10}	1000	
Insulation Washer	Glass Reinforced EPOXY	Over 2.0×10^{13}	150	3.0T
	Phenolic	2.2×10^{8}	180	
	Mica	9.9×10^{10}	1000	
Steel Washer	Carbon Steel	N/A	N/A	3.0T~5.0T
	Stainless Steel	N/A	N/A	

* Insulation Resistance(Ω)
  ASTM D257-07: Usage
  Voltage: 1000V,
  Capacity of Tester : 2.0 x 1013 Ω

* Steel Washer, Special Material can be available as customer's requirements.
* Stud Bolt are not included.

NON-ASBESTOS JOINTING SHEETS

Product Type	Description	Typical Applications
 INM005 **INMARCO TYPE NA-333**	Eco-friendly, innovative technology, solvent free construction. High quality heat resistant fiber (Aramid fiber) & excellent oil resistant synthetic rubber (NBR) are compouded and calendered into gasket sheet. It shows strong durability and superior low stress application safe from VOC (Volatile Organic Compounds)	Potable Water, Oils, Fuels, Salt Solution, Mild Acids and Alkalies, Gas line
 INM006 **INMARCO TYPE NA-220**	High quality heat resistant fiber (Aramid fiber) and excellent oil resistant synthetic rubber (NBR) are compounded and calendered into a gasket sheet for oil resistance required applications.	Water, Hot Water, Oils, Mild Acids & Alkalis.
 INM007 **INMARCO TYPE NA-239**	High quality Non Asbestos fiber (Aramid fiber) and excellent heat & oil resistant rubber are compounded and calendered into a gasket sheet with superior chemical resistance. Especially it shows a good sealing performance under hot oil, oil gas, etc.	Water, Alkali, Salt solution, Hot oil, Oil gas, Fuels below & Organic solvents.
 INM008 **INMARCO TYPE NA-265**	This Non Asbestos Sheet with carbon fillers provides superior chemical resistance and excellent heat resistance to use in steam and other high-temperature required lines. Suitable for a wide range of fluids like as fuel, lubricating, animal & vegetable oil, organic solvents, etc.	Lubricating oil, fuel, Animal oil, Organic solvents, Water, Hot water, Steam, Hot oil, Oil gas, Salt solution
 INM009 **INMARCO TYPE NA-239 METALLIC**	Is an excellent quality Non Asbestos gasket material with stainless steel wire-mesh inserted to be suitable for exhaust line under high temperature and high pressure (Aramid Fiber + NBR binder).	Suitable for Water, Alkali, Salt solution, Hot oil, Oil gas, Solvents. Not be used in Steam, Strong Acid, Alkali and Soluble chemicals.
 INM010 **INMARCO TYPE NA-265 METALLIC**	Is excellent quality Non Asbestos carbon fiber gasket material with stainless steel wire-mesh inserted to be suitable for exhaust line under high temperature and high pressure.	Suitable for water, Hot oil, Oil gas, Alkali, Salt Solutions, Solvents, Strong Acid, Alkali, Suitable chemicals, etc.
 INM011 **INMARCO TYPE NA-270**	Specially designed Non Asbestos Jointing Sheet developed by our R&D for over an unlimited range of critical application. This jointing sheet can be termed as UNIVERSAL Non Asbestos Jointing Sheet for extreme working condition. The exceptional formulation of this gasketing sheet with carbon fibre, Graphite & NBR binder helps solve various problems of the industries as far gasketing is concerned.	Suitable for all known fluid media at high temperature and preasure. Extremely flexible and resilient gasketing sheet.

Availability: (L X W) 1500 mm X 1500 mm, 1500 mm X 3000 mm, Thickness 1 mm - 3 mm.
Other sizes can be available, if required.

TECHNICAL SPECIFICATIONS

Properties	Density (g/cm³)	Tensile Strength Across Grain. N/mm²	Compresibility (%)	Recovery (%)	Fluid resistance after 5hrs. Immersion				Flexibility	Ignition Loss	Short-term Peak Temperature	Max. Continous Temperature	Short-term Peak Pressure
					ASTM #3 Oil (150 °C)		ASTM Fuel b (20-30 °C)						
					Thickness Increase (%)	Tensile Loss (%)	Thickness Increase (%)	Weight Increase (%)					
Test Method	-	ASTM F152	ASTM F36J		ASTM F146				ASTM F147	ASTM F495 850 °C x 30 min.	Degree Centigrade	Degree Centigrade	BAR
	1.9	10	10	75	4	-	7	10	No Crack	-	260	180	60
	1.6	10.8	11	53	6	26	5	13	No Crack	31	260	180	60
	1.7	11.8	10	53	4	17	5	8	No Crack	28	430	250	100
	1.8	13.7	9	58	5	23	4	9	No Crack	26	480	320	100
	1.7	17.7	9	53	5	21	3	11	No Crack	25	400		100
	1.8	17.7	10	57	4	16	3	6	No Crack	24	500	350	100
	1.7 - 2.0	15 - 20	9 - 12	50 - 60	8	-	8	8	No Crack	30	600	550	200

Note:

- The above test results are based on test carried out on 2.0mm thick. The values mentioned in the table are based on actual test carried out in our laboratory. The end user should carry out test independently to determine suitability of our material for their application. The gasket sheet should not be subjected to maximum temperature and pressure values simultaneously.
- Can also be supplied in ready cut gasket conforming to any international standard. Custom sizes possible

GASKETS

INGRAF GRAPHITE SHEETS

Product Type	Description	Typical Applications
 INM012 **INGRAF TYPE FG 320**	TYPE FG 320 is manufactured from exfoliated graphite. During the initial process of exfoliation of graphite, acid treatment is done but 100% of acids are washed out by the DM water. After this, the whole process of manufacturing flexible graphite gasket sheet is mechanical, without incorporation of any additives, oils or bonding material. TYPE FG 320 flexible pure graphite sheet is having carbon content 99% to 99.9%. These are extremely suitable for high temperature and high pressure application. These gaskets are highly resilient and as such easily adopts to irregularities of flange or surface to make perfect seal. Inmarco flexible pure graphite gaskets are suitable for metallic, glass, enamel flanges and are designed for trouble free change over which ultimately reduces maintenance cost. They are dimensionally stable under extreme pressure surge. These are also suitable for cryogenic services.	Any type of Pipe flanges, Valve bonnets & Heat exchangers.
 INM013 **INGRAF TYPE SSF 321**	TYPE SSF 321 sheet is manufactured from plain SS sheet sandwich between two layers of flexible pure graphite sheet. TYPE SSF 321 SS sheet insert graphite gaskets are suitable for metallic, glass, enamel flanges and are designed for trouble free change over which ultimately reduces maintenance cost. They are dimensionally stable under extreme pressure surge. These are also suitable for cryogenic services.	Any type of Pipe flanges, Valve bonnets & Heat exchangers.
 INM014 **INGRAF FG TYPE 320 SSW 322**	STYLE SSW 322 is manufactured from plain SS wire mesh sandwich between two layers of flexible pure graphite sheet. The whole process of manufacturing flexible graphite sheet with SS wire mesh is mechanical. STYLE SSW 322 SS wire mesh reinforced graphite gaskets are suitable for metallic, glass, enamel flanges and are designed for trouble free change over which ultimately reduces maintenance cost. They are dimensionally stable under extreme pressure surge. These are also suitable for cryogenic services.	Any type of Pipe flanges, Valve bonnets & Heat exchangers.
 INM015 **INGRAF FG TYPE SST 323**	TYPE SST 323 Flexible pure Graphite Tanged Gasket Sheet is manufactured from perforated tanged SS sheet sandwich between two layers of flexible pure graphite sheet. The whole process of manufacturing flexible pure graphite tanged gasket sheet is mechanical without incorporation of any additives or bonding materials. TYPE SST 323 the flexible pure graphite sheet is having 99% to 99.9% carbon. These are extremely suitable for high temperature and high pressure application. These gaskets are highly resilient and as such easily adopts to irregularities of flange or surface to make perfect seal. SS tanged gaskets are suitable for metallic, glass, enamel flanges and are designed for trouble free change over which ultimately reduces maintenance cost. They are dimensionally stable under extreme pressure surge. These are also suitable for cryogenic services.	Any type of Pipe flanges, Valve bonnets & Heat exchangers.

Note:
- **Chemical Properties: Carbon Content 99%-99.9%, Sulphur Content Less Than 500 ppm, Chloride Content Less Than 30 Ppm, Ash Content Less Than 1%**
- **Availability: (L X W) 1500 mm X 1500 mm, 1000 mm X 1000 mm, Thickness 0.5 - 6 mm.**
- **Metalic insertion posible > 1.0mm thikness.**

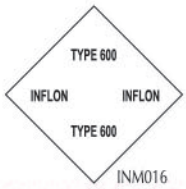
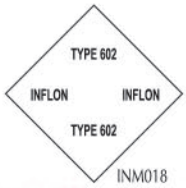
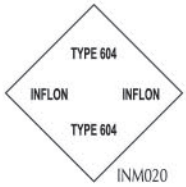
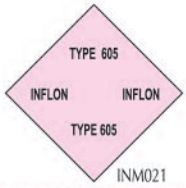
TECHNICAL SPECIFICATIONS

Properties	DENSITY (g/cm³)	pH	Compresibility (%)	Recovery (%)	"m" factor (3mm thk)	"y" factor (psi)	Creep Relaxation %	Sealability		Ignition Loss		Permeability Nitrogen, cc/min.	Temperature			Pressure	Thickness of Reinforcement
Test Method	-		ASTM F36				ASTM F38	Fuel A, mL/hr	Nitrogen, mL/hr	@ 454 °C	@ 650 °C	DIN 3535 - gas	Degree Centigrade			BAR	mm
													In Reducing	In Oxidizing	In Steam		
	1.1	0-14	35-40	15-18	2.5	4500	5	0.5	2.0	1	8	0.4	-200-3315	600	650	Vacuum 28Hg to 300	
	1.1 - 1.4	0-14	35-40	15-18	2.8	4700	5	0.5	2.0	1	8	0.4	-200-3315	600	650	Vacuum 28Hg to 300	0.05-0.1
	1.1 - 1.4	0-14	35-40	15-18	2.5	4500	5	0.5	2.0	1	8	0.4	-200-3315	600	650	Vacuum 28Hg to 300	0.05-0.1
	1.1 - 1.4	0-14	35-40	15-18	2.8	4700	5	0.5	2.0	1	8	0.4	-200-3315	600	650	Vacuum 28Hg to 300	0.05-0.1

Note:

- The above test results are based on test carried out on 2.0mm thick. The values mentioned in the table are based on actual test carried out in our laboratory. The end user should carry out test independently to determine suitability of our material for their application. The gasket sheet should not be subjected to maximum temperature and pressure values simultaneously.
- Can also be supplied in ready cut gasket conforming to any international standard. Custom sizes possible.

INFLON VIRGIN PTFE SHEETS

Product Type	Description	Properties
 INM016 **INFLON VIRGIN TYPE 600**	TYPE 600 is a pure form of PTFE available in various types such as skived sheets, moulded sheets, rods, tubes, rings and custom moulded components. 100% virgin PTFE has excellent inertness to most chemicals. PTFE is not inflammable and highly stable at normal operating temperature of 250°C. It has low friction and high release properties. Easy to machine cut or mould. It has good electrical insulation properties.	*Excellent chemical resistance. *Excellent flexural properties. *Outstanding electrical properties.
 INM017 **INFLON GRAPHITE FILLED TYPE 601**	TYPE 601 is a Virgin PTFE with 15% Graphite. It has excellent wear properties and specially used in dynamic applications. Its crystalline graphite sacrifices itself to facilitate lubrication.	*Excellent chemical resistance. *Excellent flexural properties. *Outstanding electrical properties.
 INM018 **INFLON GLASS FILLED TYPE 602**	TYPE 602 is a Virgin PTFE with 15% Glass Filler enhances the properties of Virgin PTFE like creep resistance, enhanced chemical stability & wear resistance.	*High compressive strength. *Better wear resistance. *Excellent chemical resistance.
 INM019 **INFLON CARBON FILLED TYPE 603**	TYPE 603 is a Virgin PTFE with either 25% Carbon Filler enhances the creep resistance, hardness and thermal conductivity. They have exceptionally high wear and tear properties and also helps in lubrication when combined with graphite.	*High compressive strength. *Better wear resistance. *Better thermal conductivity.
 INM020 **INFLON BRONZE FILLED TYPE 604**	TYPE 604 is a Virgin PTFE with 40% bronze. This alloy is used in certain percentage as a filler to enhance the properties like thermal conductivity of PTFE, creep resistance and to facilitate lubrication.	*High compressive strength. *Very low cold flow. *Good thermal conductivity. *Excellent wear resistance.
 INM021 **INFLON MODIFIED TYPE 605**	TYPE 605 is an advanced material with improved creep resistance used in chemical process industries. Due to improved creep resistance this material has increased stiffness even at elevated temperatures. The modified PTFE components can be used for higher pressure conditions. Modified PTFE allows better high voltage insulation giving new opportunity to improve performance particularly in electrical applications. The vessel linings, tubings, sealing materials, expansion joints, made out of modified PTFE have more life & less/near zero leakage due this enhanced permeation resistance.	*Excellent Creep resistance. *High Stiffness at elevated temperatures. *Good Electrical insulation properties.

PTFE is chemically inert & unaffected by all known chemicals except molten or dissolved alkali metals. Sodium, Potassium, Rubidium,Cesium, Francium, & fluoride gas certain fluorine compounds & complexes at elevated temperatures. Filled PTFE has interior chemtical resistance depending upon the particular Filler.

Material Availability:
Size: 1000mm x 1000mm / 1500mm x 1500mm
Thickness: 0.5, 0.8, 1.0, 1.5, 2.0, 2.5, 3.0mm
Other sheets sizes and thickness available upon request.

Caution: The presence of filler generally causes following negative features in compound:
Reduction in tensile strength & break elongation. Reduction in volume & surface resistivity.
Diffuculty in process & fabrication. Lower chemical resistance depending upon types of filter.
Reduction in coefficient of linear thermal expansion

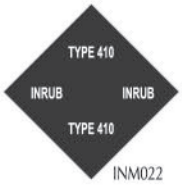
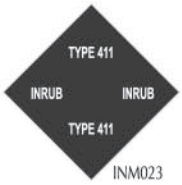
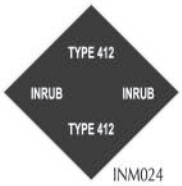
TECHNICAL SPECIFICATION

Properties	Density (g/cm³)	Tensile Strength % kgf/cm²	Elongation @ Break %	Compressive Strength kgf/cm²	Compressive Modulus kgf/cm²	Hardness Shore D	Continuous Service Temp. @ Atmospheric Pressure C	Thermal Conductivity 10^{-4} cal cm S °C	Linear Thermal Expansion (Max.) %				Di-electric Strenght Kv/mm	Volume Resistivity ohm cm	Surface Resistivity ohm	Water Absorption (Max.)	Permeability
Test Method	ASTM D 792	ASTM D 638	ASTM D 638	ASTM D 695	ASTM D 695	ASTM D 2240	ASTM D 648	ASTM D 5930	ASTM D 696				ASTM D 149	ASTM D 257	ASTM D 258	ASTM D 540	ASTM D 543
										30-150 °C	30-200 °C	30-250 °C					
	2.1 - 2.2	210-375	250-400	40-50	3500-4000	52-58	-252 to +260	6	Axial	1.5	2.4	3.4	22-24	$>10^{18}$	$>10^{15}$	0	0.01
									Radial	1.5	2.3	3.6					
										30-150 °C	30-200 °C	30-250 °C					
	2.10 - 2.16	150 - 200	150 - 250	65-75	7500-8000	58-63	-250 to +260	14	Axial	1.3	2.0	3.0	1 - 2	$>10^{3}$	$>10^{6}$	0	0.01
									Radial	1.0	1.8	2.2					
										30-150 °C	30-200 °C	30-250 °C					
	2.15-2.22	180-260	225-325	65-75	5500-6000	55-63	-250 to +260	8	Axial	1.5	2.3	3.3	15-16	$>10^{3}$	$>10^{6}$	0.015	0.01
									Radial	1.0	1.8	2.2					
										30-150 °C	30-200 °C	30-250 °C					
	2.0-2.14	125-200	125-200	75-85	8000-8400	60 - 65	-250 to +260	13	Axial	1.2	1.9	2.7	1-2	$>10^{4}$	$>10^{7}$	0	0.01
									Radial	1.0	1.5	2.4					
										30-150 °C	30-200 °C	30-250 °C					
	3.0 - 3.2	125-300	225 - 325	85-100	8000-8500	63-68	-250 to +260	17	Axial	1.15	1.85	2.55	Conductive	$>10^{7}$	$>10^{9}$	0	0.01
									Radial	0.95	1.55	2.25					
										30-150 °C	30-200 °C	30-250 °C					
	2.15-2.20	300-325	400-450	45-55	4000-4500	58-63	-250 to +260	6	Axial	1.5	2.4	3.4	30-35	$>10^{20}$	$>10^{18}$	0	0.01
									Radial	1.5	2.3	3.6					

Note:

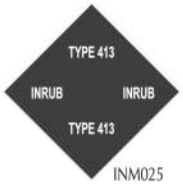
- The above test results are based on test carried out on 2.0mm thick. The values mentioned in the table are based on actual test carried out in our laboratory. The end user should carry out test independently to determine suitability of our material for their application. (The gasket sheet should not be subjected to maximum temperature and pressure values simultaneously).
- Can also be supplied in ready cut gasket conforming to any international standard. Custom sizes possible

INRUB RUBBER SHEETS

Product Type	Description	Properties
 INM022 **NATURAL RUBBER SHEET (NR/SBR) TYPE 410**	Natural Rubber widely used where many types of acids and bases, except those types are highly oxidizing are present. SBR has similar resistance to solvents and chemicals as natural rubber and it can be successfully bonded to a wide range of materials. **General Recommendation:** *Ozone-Mild *Solvent-N/A *Concentration Dilute Acid and Base-Fair *Oil-N/A	**Properties / Test Method / Unit / Values** Density / ASTM D 297 / g/cm³ / 1.45±0.05 Hardness / ASTM D 2240 / Shore A / 70±5 Tensile Strength / ASTM D 412 / Kg/cm² (min) / 50 Elongation @ Break / ASTM D 412 / % (min) / 300 Abrasion Loss / ASTM D 5963 / mm³ / 300 Compression Set (70°C/22h) / ASTM D 395 / % / 32 Tear Strength / ASTM D 624 / Kg/cm / 23 Temperature Range / / °C / -20 to +80
 INM023 **NEOPRENE RUBBER SHEET TYPE 411**	TYPE 411 is a polymer chloroprene and is available in many varieties. Neoprene is known for its resistance to oil, gasoline, sunlight, ozone and oxidation. **General Recommendation:** *Ozone-Mild *Solvent-N/A *Concentration Acid and Base-N/A *Oil-Fair	**Properties / Test Method / Unit / Values** Density / ASTM D 297 / g/cm³ / 1.45±0.05 Hardness / ASTM D 2240-97 / Shore A / 65±5 Tensile Strength / ASTM D 412-98a / Kg/cm² (min) / 50 Elongation @ Break / ASTM D 412-98a / % (min) / 300 Abrasion Loss / ASTM D 5963 / mm³ / 300 Compression Set (70°C/22h) / ASTM D 395-98 / % / 32 Tear Strength / ASTM D 624 / Kg/cm / 23 Temperature Range / / °C / -30 to +120
 INM024 **EPDM RUBBER SHEET TYPE 412**	TYPE 412 are used extensively in outdoor applications. They will withstand the abuse of all types of weather including sunlight, ozone and oxidants and they exhibit excellent resistance to animal and vegetable oils, water steam, oxygenated solvents (acetone, methyl ethyl ketone and other ketones). **General Recommendation:** *Ozone-Good *Solvent-N/A *Concentration Acid and Base-Fair *Oil-N/A *Dilute Acid and Base-Good	**Properties / Test Method / Unit / Values** Density / ASTM D 297 / g/cm³ / 1.55±0.07 Hardness / ASTM D 2240-97 / Shore A / 65±5 Tensile Strength / ASTM D 412-98a / Kg/cm² (min) / 55 Elongation @ Break / ASTM D 412-98a / % (min) / 310 Abrasion Loss / ASTM D 5963 / mm³ / 310 Compression Set (70°C/22h) / ASTM D 395-98 / % / 34 Tear Strength / ASTM D 624 / Kg/cm / 26 Temperature Range / / °C / -35 to +100

Material Availability:
Size: 1200mm x 10000mm / 1500mm x 10000mm
Thickness: 1.0 - 10mm

INRUB RUBBER SHEETS

Product Type	Description	Properties
 INM025 **NITRILE (NBR) RUBBER SHEET TYPE 413**	TYPE 413 is a copolymer of butadiene and acrylonitrile and is recommended when excellent resistance to petroleum oils and gasoline is required. Nitrile's resistance to the more aromatic distillates of petroleum is better than neoprene. **General Recommendation:** *Ozone-Poor *Dilute Acid and Base-Good *Concentration Acid and Base-Fair *Solvent-N/A *Oil-Mild	
 INM026 **VITON RUBBER SHEET TYPE 414**	TYPE 414 is one of the toughest, most versatile materials ever developed. It deliveres reliable protection against leaks long after ordinary rubber seals have failed. Viton provides excellent resistance to compression set at high temperatures which accounts for its ability to maintain sealing force and remain tough and elastic even after long exposure. **General Recommendation:** *Good ozone resistance, good oil resistance and excellent weather resistance.	
 INM027 **SILICON RUBBER SHEET TYPE 415**	TYPE 415 is a semi organic synthetic. Its structure consists of a chain of silicon and oxygen atoms rather than carbon and hydrogen atoms, as in the case with other types of rubber. Silicon's are very stable at low and high temperatures. **General Recommendation:** *Good weather resistance, good ozone resistance, good water resistance and not suitable for acids.	

Properties	Test Method	Unit	Values
Density	ASTM D 297	g/cm³	1.45±0.05
Hardness	ASTM D 2240-97	Shore A	65±5
Tensile Strength	ASTM D 412-98a	Psi	50
Elongation @ Break	ASTM D 412-98a	% (min)	300
Abrasion Loss	ASTM D 5963	mm³	300
Compression Set (70°C/22h)	ASTM D 395-98	%	32
Tear Strength	ASTM D 624	Kg/cm	23
Temperature Range		°C	-30 to +110

Properties	Test Method	Unit	Values
Density	ASTM D 297	g/cm³	1.97
Hardness	ASTM D 2240-97	Shore A	75±5
Tensile Strength	ASTM D 412-98a	Psi (min)	1145
Elongation @ Break	ASTM D 412-98a	% (min)	310
Compression Set (70°C/22h)	ASTM D 395-98	% (max)	50
Aging Test (70°C/168h)	ASTM D 573-99		
Hardness Change	ASTM D2240-97	Shore A	±5
Tensile Strength Change	ASTM D 412-98a	% (max)	-5
Elongation @ Break Change	ASTM D 412-98a	% (max)	-15

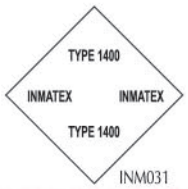
Properties	Test Method	Unit	Values
Density	ASTM D 297	g/cm³	1.20
Hardness	ASTM D 2240-97	Shore A	70±5
Tensile Strength	ASTM D 412-98a	Psi (min)	1000
Elongation @ Break	ASTM D 412-98a	% (min)	250
Compression Set (70°C/22h)	ASTM D 395-98	% (max)	20
Aging Test (70°C/168h)	ASTM D 573-99		
Hardness Change	ASTM D2240-97	Shore A	±5
Tensile Strength Change	ASTM D 412-98a	% (max)	-10
Elongation @ Break Change	ASTM D 412-98a	% (max)	-15

Material Availability:
Size: 1200mm x 10000mm / 1500mm x 10000mm
Thickness: 1.0 - 10mm

OTHER GASKETING MATERIALS

Product Type	Description	Properties

INMARCO INMATEX™ TYPE 1400



INM031

TYPE 1400 is designed to be soft, flexible & resilient enabling compressibility & conformance to flange sealing surface. Resistant to creep, hot and cold flow. High sealing ability with minimum torque. Easy installation and less downtime. Excellent permeation and emission resistant. Withstands compressive loads of over 1650 bars.

Typical Applications:
Ideal for fragile glass, FRP, Ceramic, Plastic flanges & Lined pipe joints. Flanges involving all kinds of chemical fluids & gaseous mediums. Graphite flanges in HCL, PVC & Nuclear plants.

PROPERTIES	VALUES
Material	100% PTFE (Polytetrafluoroethylene) Ultra high molecular weight fine resin without binders & fillers
Process	Highly expanded
Color	White
Thickness Tolerance	+/-0.010"
Temperature Range	-267.77°C to +315.55°C
Pressure Range	Full vacuum to 3000PSI
Chemical Compatibility Range	pH range 0 ~ 14
Specific Gravity (ASTM D 792)	0.80 +/-0.10
ASTM Testing	Yes
Sealability (ASTM F-37-B	
Fuel A (isooctane)	0.02 ml/hr
Fuel B (nitrogen) @ 60 psig	NA
Compressibility (ASTM F-36)	66%
Recovery (ASTM F-36	12%
Creep Relaxation (ASTM F-38)	38%
Tensile Strength (ASTM F-152)	2106 PSI
Matrix Tensile	5455 PSI
Elongation (ASTM F-152)	169.9%
Tensile @ break point	2632 PSI
FSA Testing	Yes
FSA high pressure steam test	Yes
(275°C) @ 860 PSI for 561 hrs.	Pass (.49% Loss)
Hot Compression Test (300°C)	Yes
Hot Loss	70.9%
Hot Creep	17.5%

HIGH TEMPERATURE GASKET SHEET TYPE HTG 1100

INM032

TYPE HTG 1100 is a high temperature gasket, an insulation material base on Ceramic Fibres which stands out for its high temperature limit and low heat conductivity. Type HTG 1100 is best suited for steel works, glass industries, industrial furnace, foundries, electrical equipment and boiler industry.

Typical Applications:
Steel works, Foundries, Furnace and boiler construction.

Availability:
Size: L X W 1000mm x 1000mm, 1040mm x 1040mm
Thickness: 1-8 (mm)

Description	Test Method	Unit	Value
Binder			Organic
Colour			White with honeycomb
Temperature limit		°C	1100
Tolerance in thickness		%	±10
Density	DIN 28 090-2	g/cm³	0.91
Tensile Strength	DIN 52 910		
Longitudinal		N/mm²	4
Transverse		N/mm²	2
Compressibility	ASTM F 36 K	%	≤25
Recovery	ASTM F 36 K	%	≥30
Loss on ignition	DIN 52 911	%	17
Decrease in thickness	1h/800°C	%	≤2.5
Shrinkage by surface	1h/800°C		
Longitudinal		%	≤2
Transverse		%	≤2
Heat conduct @ 400°C average		W/m*K	0.11

DIMENSIONAL DATA OF SPIRAL WOUND GASKETS TO SUIT ANSI STANDARD FLANGES AS PER ASME B16 20

NPS (inches)	Class 150 (mm)	Class 300 (mm)	Class 600 (mm)
½"	48 x 32 x 19 x 14	54 x 32 x 19 x 14	54 x 32 x 19 x 14
¾"	57 x40 x 25 x 21	67 x 40 x 25 x 21	67 x 40 x 25 x 21
1.0"	67 x 48 x 32 x 27	73 x 48 x 32 x 27	73 x 48 x 32 x 27
1 ¼"	76 x 60 x 48 x 38	83 x 60 x 48 x 38	83 x 60 x 48 x 38
1 ½"	86 x 70 x 54 x 44	95 x 70 x 54 x 44	95 x 70 x 54 x 44
2.0"	105 x 86 x 70 x 56	111 x 86 x 70 x 56	111 x 86 x 70 x 56
2 ½"	124 x 99 x 83 x 67	130 x 99 x 83 x 67	130 x 99 x 83 x 67
3.0"	137 x 121 x 102 x 81	149 x 121 x 102 x 81	149 x 121 x 102 x 79
4.0"	175 x 149 x 127 x 106	181 x 149 x 127 x 106	194 x 149 x 121 x 103
5.0"	197 x 178 x 156 x 132	216 x 178 x 156 x 132	241 x 178 x 148 x 128
6.0"	222 x 210 x 183 x 157	251 x 210 x 183 x 157	267 x 210 x 175 x 155
8.0"	279 x 264 x 233 x 216	308 x 264 x 233 x 216	321 x 264 x 226 x 206
10.0"	340 x 318 x 287 x 268	362 x 318 x 287 x 268	400 x 318 x 275 x 255
12.0"	410 x 375 x 340 x 318	422 x 375 x 340 x 318	457 x 375 x 327 x 307
14.0"	451 x 406 x 372 x 349	486 x 406 x 372 x 349	492 x 406 x 362 x 343
16.0"	514 x 464 x 422 x 400	540 x 464 x 422 x 400	565 x 464 x 413 x 390
18.0"	549 x 527 x 475 x 449	597 x 527 x 475 x 449	613 x 527 x 470 x 438
20.0"	607 x 578 x 526 x 500	654 x 578 x 526 x 500	683 x 578 x 521 x 489
24.0"	718 x 686 x 629 x 603	775 x 686 x 629 x 603	791 x 686 x 629 x 591

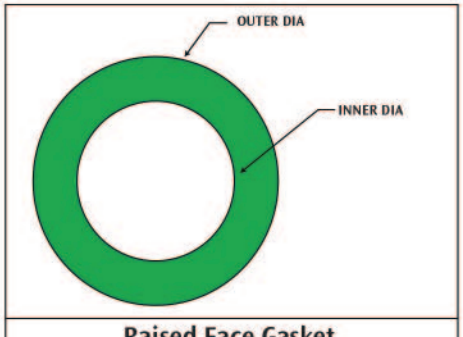
NPS (inches)	Class 900 (mm)	Class 1500 (mm)	Class 2500 (mm)
½"	64 x 32 x 19 x14	64 x 32 x 19 x14	70 x 32 x 19 x 14
¾"	70 x 40 x 25 x 21	70 x 40 x 25 x 21	76 x 40 x 25 x 21
1.0"	80 x 48 x 32 x 27	80 x 48 x 32 x 27	86 x 48 x 32 x 27
1 ¼"	89 x 60 x 40 x 33	89 x 60 x 40 x 33	105 x 60 x 40 x 33
1 ½"	99 x 70 x 48 x 41	99 x 70 x 48 x 41	118 x 70 x 48 x 41
2.0"	143 x 86 x 59 x 52	143 x 86 x 59 x 52	146 x 86 x 59 x 52
2 ½"	165 x 99 x 70 x 64	165 x 99 x 70 x 64	168 x 99 x 70 x 64
3.0"	168 x 121 x 95 x 79	175 x 121 x 92 x 79	197 x 121 x 92 x 79
4.0"	207 x 149 x 121 x 103	210 x 149 x 118 x 98	235 x 149 x 118 x 98
5.0"	248 x 178 x 148 x 128	254 x 178 x 143 x 124	279 x 178 x 143 x 124
6.0"	289 x 210 x 175 x 155	283 x 210 x 171 x 147	318 x 210 x 171 x 147
8.0"	359 x 257 x 222 x 197	353 x 257 x 216 x 197	387 x 257 x 216 x 197
10.0"	435 x 311 x 276 x 246	435 x 311 x 267 x 246	476 x 311 x 270 x 246
12.0"	499 x 368 x 324 x 292	521 x 368 x 324 x 292	549 x 368 x 318 x 292
14.0"	521 x 400 x 356 x 321	578 x 400 x 362 x 321	eg. (1/2" Class 150#) 48.0mm (Outer Ring OD) 32.0mm (Gasket OD) 19.0mm (Gasket ID) 14.0mm (Inner Ring ID)
16.0"	575 x 457 x 413 x 375	641 x 457 x 406 x 368	
18.0"	638 x 521 x 464 x 425	705 x 521 x 464 x 425	
20.0"	699 x 572 x 521 x 483	756 x 572 x 512 x 476	
24.0"	838 x 679 x 629 x 591	902 x 679 x 616 x 578	

RING JOINT GASKET R TYPE DIMENSIONAL DATA AS PER ASME B16.20 (Dimensions are in inches)										
			Oval			Octagonal				
Ring No.	Nominal Size	Class	Pitch Dia.	Width	Height	Pitch Dia.	Width	Height	Width of Flat	Radius
R-11	½"	300, 600	1.344	0.250	0.440	1.344	0.250	0.380	0.170	0.06
R-12	½"	900, 1500	1.563	0.313	0.560	1.563	0.313	0.500	0.206	0.06
R-13	¾"	300, 600	1.688	0.313	0.560	1.688	0.313	0.500	0.206	0.06
R-13	½"	2500	1.688	0.313	0.560	1.688	0.313	0.500	0.206	0.06
R-14	¾"	900, 1500	1.750	0.313	0.560	1.750	0.313	0.500	0.206	0.06
R-15	1.0"	150	1.875	0.313	0.560	1.875	0.313	0.500	0.206	0.06
R-16	1.0"	300, 600, 900, 1500	2.000	0.313	0.560	2.000	0.313	0.500	0.206	0.06
R-16	¾"	2500	2.000	0.313	0.560	2.000	0.313	0.500	0.206	0.06
R-17	1 ¼"	150	2.250	0.313	0.560	2.250	0.313	0.500	0.206	0.06
R-18	1 ¼"	300, 600, 900, 1500	2.375	0.313	0.560	2.375	0.313	0.500	0.206	0.06
R-18	1.0"	2500	2.375	0.313	0.560	2.375	0.313	0.500	0.206	0.06
R-19	1 ½"	150	2.563	0.313	0.560	2.563	0.313	0.500	0.206	0.06
R-20	1 ½"	300, 600, 900, 1500	2.688	0.313	0.560	2.688	0.313	0.500	0.206	0.06
R-21	1 ¼"	2500	2.844	0.438	0.560	2.844	0.438	0.630	0.305	0.06
R-22	2.0"	150	3.250	0.313	0.560	3.250	0.313	0.500	0.206	0.06
R-23	2.0"	300, 600	3.250	0.438	0.560	3.250	0.438	0.630	0.305	0.06
R-23	1 ½"	2500	3.250	0.438	0.690	3.250	0.438	0.630	0.305	0.06
R-24	2.0"	900, 1500	3.750	0.438	0.690	3.750	0.438	0.630	0.305	0.06
R-25	2 ½"	150	4.000	0.313	0.560	4.000	0.313	0.500	0.206	0.06
R-26	2 ½"	300, 600	4.000	0.438	0.690	4.000	0.438	0.630	0.305	0.06
R-26	2.0"	2500	4.000	0.438	0.690	4.000	0.438	0.630	0.305	0.06
R-27	2 ½"	900, 1500	4.250	0.438	0.690	4.250	0.438	0.630	0.305	0.06
R-28	2 ½"	2500	4.375	0.500	0.750	4.375	0.500	0.690	0.341	0.06
R-29	3.0"	150	4.500	0.313	0.560	4.500	0.313	0.500	0.206	0.06
R-30	3.0" (1)***	300	4.625	0.438	0.690	4.625	0.438	0.630	0.305	0.06
R-31	3.0"	300, 600, 900	4.875	0.438	0.690	4.875	0.438	0.630	0.305	0.06
R-32	3.0"	2500	5.000	0.500	0.750	5.000	0.500	0.690	0.341	0.06
R-33	3 ½"	150	5.188	0.313	0.560	5.188	0.313	0.500	0.206	0.06
R-34	3 ½"	300, 600	5.188	0.438	0.690	5.188	0.438	0.630	0.305	0.06
R-35	3.0"	1500	5.375	0.438	0.690	5.375	0.438	0.630	0.305	0.06
R-36	4.0"	150	5.878	0.313	0.560	5.878	0.313	0.500	0.206	0.06
R-37	4.0"	300, 600, 900	5.878	0.438	0.690	5.878	0.438	0.630	0.305	0.06
R-38	4.0"	2500	6.188	0.625	0.880	6.188	0.625	0.810	0.341	0.06
R-39	4.0"	1500	6.375	0.438	0.690	6.375	0.438	0.630	0.305	0.06
R-40	5.0"	150	6.750	0.313	0.560	6.750	0.313	0.500	0.206	0.06
R-41	5.0"	300, 600, 900	7.125	0.438	0.690	7.125	0.438	0.630	0.305	0.06
R-42	5.0"	2500	7.500	0.750	0.750	7.500	0.750	0.940	0.485	0.06
R-43	6.0"	150	7.625	0.313	0.560	7.625	0.313	0.500	0.206	0.06
R-44	5.0"	1500	7.625	0.438	0.690	7.625	0.438	0.630	0.305	0.06
R-45	6.0"	300, 600, 900	8.313	0.438	0.690	8.313	0.438	0.630	0.305	0.06
R-46	6.0"	1500	8.313	0.500	0.750	8.313	0.500	0.690	0.341	0.06
R-47	6.0"	2500	9.000	0.750	1.000	9.000	0.750	0.940	0.485	0.06
R-48	8.0"	150	9.750	0.313	0.560	9.750	0.313	0.500	0.206	0.06
R-49	8.0"	300, 600, 900	10.625	0.438	0.690	10.625	0.438	0.630	0.305	0.06
R-50	8.0"	1500	10.625	0.625	0.880	10.625	0.625	0.810	0.413	0.06
R-51	8.0"	2500	11.000	0.875	1.130	11.000	0.875	1.060	0.583	0.06
R-52	10.0"	150	12.000	0.313	0.560	12.000	0.313	0.500	0.206	0.06
R-53	10.0"	300, 600, 900	12.750	0.438	0.690	12.750	0.438	0.630	0.305	0.06
R-54	10.0"	1500	12.750	0.625	0.880	12.750	0.625	0.880	0.413	0.06
R-55	10.0"	2500	13.500	1.125	1.440	13.500	1.125	1.380	0.780	0.06
R-56	12.0"	1500	15.000	0.313	0.560	15.000	0.313	0.500	0.206	0.06
R-57	12.0"	300, 600, 900	15.000	0.438	0.690	15.000	0.438	0.630	0.305	0.06
R-58	12.0"	1500	15.000	0.875	1.130	15.000	0.875	1.060	0.583	0.06
R-59	14.0"	150	15.625	0.313	0.560	15.625	0.313	0.500	0.206	0.06
R-60	12.0"	2500	16.000	1.250	1.560	16.000	1.250	1.500	0.879	0.09
R-61	14.0"	300, 600	16.500	0.438	0.690	16.500	0.438	0.630	0.305	0.06
R-62	14.0"	900	16.500	0.625	0.880	16.500	0.625	0.810	0.413	0.06
R-63	14.0"	1500	16.500	1.000	1.310	16.500	1.000	1.250	0.681	0.09
R-64	16.0"	150	17.875	0.313	1.560	17.875	0.313	0.500	0.206	0.06
R-65	16.0"	300, 600	18.500	0.438	0.690	18.500	0.438	0.630	0.305	0.06
R-66	16.0"	900	18.500	0.625	0.880	18.500	0.625	0.810	0.413	0.06
R-67	16.0"	1500	18.500	1.125	1.440	18.500	1.125	1.380	0.780	0.09
R-68	18.0"	150	20.375	0.313	1.560	20.375	0.313	0.500	0.206	0.06
R-69	18.0"	300, 600	21.000	0.438	0.690	21.000	0.438	0.630	0.305	0.06
R-70	18.0"	900	21.000	0.750	1.000	21.000	0.750	0.940	0.485	0.06
R-71	18.0"	1500	21.000	1.125	1.440	21.000	1.125	1.380	0.780	0.09
R-72	20.0"	150	22.000	0.313	1.560	22.000	0.313	0.500	0.206	0.06
R-73	20.0"	300, 600	23.000	0.500	0.750	23.000	0.500	0.690	0.341	0.06
R-74	20.0"	900	23.000	0.750	1.000	23.000	0.750	0.940	0.485	0.06
R-75	20.0"	1500	23.000	1.250	1.560	23.000	1.250	1.500	0.879	0.09
R-76	24.0"	150	26.500	0.313	0.560	26.500	0.313	0.500	0.206	0.06
R-77	24.0"	300, 600	27.250	0.625	0.880	27.250	0.625	0.810	0.413	0.06
R-78	24.0"	900	27.250	1.000	1.131	27.250	1.00	1.250	0.681	0.09
R-79	24.0"	1500	27.250	1.375	1.750	27.250	1.375	1.630	0.977	0.09

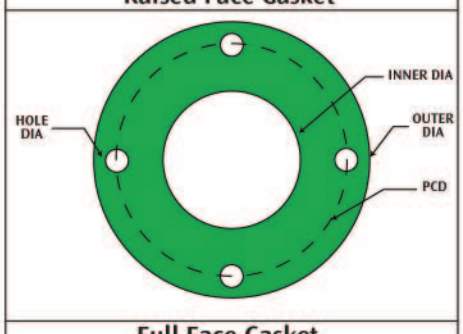
*** R -30 for Lapped Joint Only

STANDARD DIMENSIONS FOR RASIED FACE AND FULL FACE FLANGES AS PER EN 1514-1 ASME B16.21 (ASME B16.5)

NPS	RAISED FACE			FULL FACE											
	OD x ID (mm)			Class 150#				Class 300#				Class 600#			
	Class 150#	Class 300#	Class 600#	OD x ID (mm)	No. of Bolts	Hole Dia (mm)	Bolt PCD (mm)	OD x ID (mm)	No. of Bolts	Hole Dia (mm)	Bolt PCD (mm)	OD x ID (mm)	No. of Bolts	Hole Dia (mm)	Bolt PCD (mm)
½"	48 x 21	54 x 21	54 x 21	89 x 21	4	16	60	95 x 21	4	16	67	95 x 21	4	16	67
¾"	57 x 27	67 x 27	67 x 27	89 x 21	4	16	70	117 x 27	4	19	83	117 x 27	4	19	83
1"	67 x 33	73 x 33	73 x 33	108 x 33	4	16	79	124 x 33	4	19	89	124 x 33	4	19	89
1 ½"	76 x 42	83 x 42	83 x 42	117 x 42	4	16	89	133 x 42	4	19	98	133 x 42	4	19	98
1 ¼"	86 x 48	95 x 48	95 x 48	127 x 48	4	16	98	156 x 48	4	22	114	156 x 48	4	22	114
2"	105 x 60	111 x 60	111 x 60	152 x 60	4	19	121	165 x 60	8	19	127	165 x 60	8	19	127
2 ½"	124 x 73	130 x 73	130 x 73	178 x 73	4	19	140	191 x 73	8	22	149	191 x 73	8	22	149
3"	137 x 89	149 x 89	149 x 89	191 x 89	4	19	152	210 x 89	8	22	168	210 x 89	8	22	168
3 ½"	162 x 102	165 x 102	165 x 102	216 x 102	8	19	178	229 x 102	8	22	184	229 x 102	8	25	184
4"	175 x 114	181 x 114	194 x 114	229 x 114	8	19	191	254 x 114	8	22	200	273 x 114	8	25	216
5"	197 x 141	216 x 141	241 x 141	254 x 141	8	22	216	279 x 141	8	22	235	330 x 141	8	29	267
6"	222 x 168	251 x 168	267 x 168	279 x 168	8	22	241	914 x 610	12	22	270	356 x 168	12	29	292
8"	279 x 219	308 x 219	321 x 219	343 x 219	8	25	298	381 x 219	12	29	330	419 x 219	12	32	349
10"	340 x 273	362 x 273	400 x 273	406 x 273	12	25	362	445 x 273	16	29	387	508 x 273	16	35	432
12"	410 x 324	422 x 324	457 x 324	483 x 324	12	29	432	521 x 324	16	25	451	559 x 324	20	35	489
14"	451 x 356	486 x 356	492 x 356	533 x 356	12	29	476	584 x 356	20	32	514	603 x 356	20	38	527
16"	514 x 406	540 x 406	565 x 406	579 x 406	16	32	540	648 x 406	20	35	572	686 x 406	20	41	603
18"	549 x 457	597 x 457	613 x 457	635 x 457	16	32	578	711 x 457	24	35	629	743 x 457	20	44	654
20"	606 x 508	654 x 508	683 x 508	699 x 508	20	32	635	775 x 508	24	35	686	813 x 508	24	44	724
24"	718 x 610	775 x 610	791 x 610	813 x 610	20	35	749	914 x 610	24	41	813	940 x 610	24	51	838



Raised Face Gasket



Full Face Gasket

TOLERANCES

(mm)	Up to 600	Over 600
ID	±0.4	+0
		-3.2
OD	±0.4	+0
		-3.2

The above data is complied carefully. However, Inmarco does not accept responsibility for any error in the above data, cutomer should re-confirm above from his own source.

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