

KUKIL INNTOT ISOLATION KITS



KUKIL INNTOT CO., LTD.

WORLD-CHANGING TECHNOLOGICAL INNOVATION

INNOVATION FOR
THE TOP OF THE TECHNOLOGY

GLOBAL SEALING SUPPLIER

Established in 1982, KUKIL INNTOT has grown to a competitive sealing supplier based on the management strategies of 'Self-sustaining Innovative Company' and 'Global Market Expansion'.

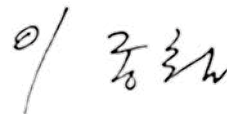
We have carried out the daring investment to facilities and product research since the mid 1980s, aiming at the localization of sealing products that had been totally imported. As a result, the company has grown to the leading manufacturer of sealing products in Korea by realizing the goal of the localization of sealing products.

After the localization of sealing products, we have focused on developing the overseas markets since the mid 1990s with the aim of entering the global markets by breaking from the existing idea of the domestic sealing industry, which was recognized as only the domestic industry. We currently supply a wide range of various products to the construction of super-sized refinery and petrochemical facilities of ARAMCO in Saudi Arabia and 5 countries of GCC (Kuwait, UAE, Qatar, Oman and Bahrain), and annually record the export performance of more than US\$5 million to 21 countries including U.S.A. and Europe.

KUKIL INNTOT releases every year new products which meet our customers' need to present the customized smart solution deviating from the existing service provision ways without complacency, and pushes ahead with new business in various fields in order to secure sustainable growth engines.

KUKIL INNTOT will uphold firmly the corporate vision of "Self-perpetuating Innovative Company" based on the strong driving force and accumulated management know-how.

President



KUKIL INNTOT of management philosophy

Today's Practice to Achieve the Vision of Management Philosophy



Future-oriented Management

Tomorrow never comes to companies that live today like yesterday.
KUKIL INNTOT constantly makes its utmost effort to develop technology for better future.



Management of Human Respect

Human beings are the largest motive power for business development.
KUKIL INNTOT wants to become a company that can achieve the self-realization of human resources based on the creativity and autonomy.



Customer-oriented Management

KUKIL INNTOT thinks that customers are the major part of a company.
We will always listen to our customers' opinions and will act with the attitude of learning from them to be the company that always affords our customers the best satisfaction.

VISION

INNOVATION FOR THE TOP OF THE TECHNOLOG

Technology innovation for the best. An innovative company with autonomy in the era of infinite competition of the 21st century



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Safe Handling & Storage of Insulating Gasket

1. When handling all the products, they should be managed to prevent damage or deterioration of the product surface, tag extinction or the deformation of shape or dimensions.
2. When handling the product, two or three persons should deal with them safely depending on the weight and size.
3. Do not throw the product or give it a shock.
4. Product package paper should not be removed from the product until use, and do not damage the product when removing the package.
5. Store the product in a dry and ventilated room, away from the source of heat, direct sunlight and chemicals.
6. The optimal storage conditions are the temperature of 4~27°C and the relative humidity of 40%~75% in a room without a window and dust that may scratch the product surface, and where chemicals are not stored.
7. The product should be stored horizontally to prevent bending.
8. The product should be stored without putting heavy objects to prevent damage to it.

Our recommendation ensures the performance of the product for a long period, and reduces waste costs due to poor storage conditions.

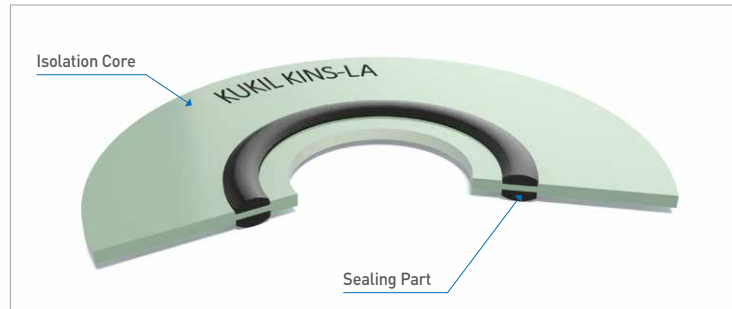
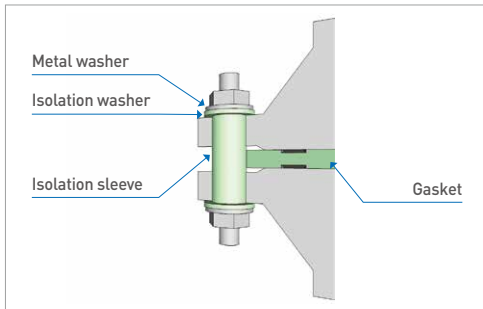
We recommend to follow the above mentioned material handling instructions.

ISOLATION GASKET SUMMARY

	01 KINS-LA	02 KINS-SA	03 KINS-HA	04 KINS-HAFS	05 HIFLEX-HIFS
					
Max Temperature	200°C	200°C	200°C	200°C	260°C
Max Pressure	Vacuum ~ 50bar	Vacuum ~ 50bar	Vacuum ~ 700bar	Vacuum ~ 700bar	Vacuum ~ 100bar
Size	Up to 1500	Up to 1500	Up to 1200	Up to 1200	Up to 1000
Vacuum	○	○	○	○	○
Vibration	○	○	○	○	○
Low stress	○	○	○	—	—
Fire Safety	—	—	—	○	—
Aramco 9 com No.	—	○	○	○	—
Shell TAT85/300	—	○	○	○	○

- Isolation for preventing galvanic corrosion caused by the contact of different materials.
- Isolation sleeve and washer are used for preventing flange's corrosion when general bolt/nut is used in flange made from special material.
- Isolation for connecting different type of flanges. (RTJ flange to RF flange)
- Withstand corrosive environments including high concentrations of CO₂, H₂S, produced water, etc.
- Prevents erosion caused by turbulent flow at flange connections.
- Prevents flanges faces from media-induced corrosion and flow induced erosion.
- Prevents leakage in vibration and vacuum between flanges.
- Seals and insulated at all pressures up through ASME 2500 class and API 10000 psi service.
- Withstands severe service conditions including large bending moments, vibration, temperature and pressure cycling.
- Outstanding isolation properties for cathodic protection.
- Pressure-activated seals provide high confidence sealing and eliminate costly leaks.
- Gasket is sized to the bore to protect flange faces from media-induced corrosion and flow-induced erosion.
- Prevents turbulent flow at flange connections.
- Easy installation, make up and removal.

LA-TYPE



COMPONENT MATERIALS

Gasket material	Sealing material	Sleeve material	Isolation washer material	Metal washer material
· Epoxy nema g-3	· Rubber	· Epoxy nema g-10	· Epoxy nema g-3	· Carbon steel with
· Epoxy nema g-10	· PTFE	· Epoxy nema g-11	· Epoxy nema g-10	· Zinc coating
· Epoxy nema g-11	· Non asbestos sheet	· PTFE	· Epoxy nema g-11	· Stainless steel
· Phenolic		· Mica	· Mica	
		· Mylar		

FEATURE

KINS-LA Type is the basic insulating gasket with the semi-circular rubber for sealing in the groove of glass reinforced epoxy, and can be used at high voltage as the risk of breakage is low due to its stable structure, and all the parts consist of insulating materials.

Appropriate rubber sealing material can be applied depending on the type of fluid, and it is recommended to apply it to the line which requires the absolute insulation performance for low temperature and low pressure service, or fastened with low bolt torque.

Application	Availability	Service	Gasket Factor
· Sea Water	Gasket Size :	Max Temperature :	Rubber [m: 0.5 / y: 0 psi]
· Vibration	Up to 1,500mm (Non Shim)	200°C	PTFE [m: 0 / y: 7,500 psi]
· Low stress	Up to 2,000mm (Shim)	Max. Pressure :	Non asbestos sheet
· Isolation at high voltage	Gasket Thickness :	600# [=50bar]	[m:2 / y:1,600 psi]
· Different materials	4mm		

Apply to the Flange, ASME / DIN/JIS Raised Face & Full Face

PHYSICAL PROPERTIES

ASTM	Test Method	Unit	Epoxy Glass NEMA G-10	Epoxy Glass NEMA G-11
D149	Dielectric Strength	KV/mm	24.1~31.5	24
D695	Min. Compressive Strength	psi	50,000	50,000
D570	Water Absorption	%	0.01	0.01
D257	Min. Flexural Strength	psi	65,000	57,700
D638	Min. Tensile Strength	psi	50,000	41,000
Temperature Range		°C	-129 ~150	-46 ~200

CHEMICAL RESISTANCE TABLE FOR KINS-LA SEALING ELEMENTS

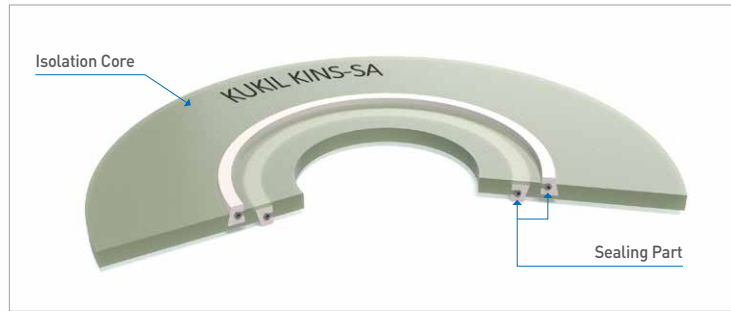
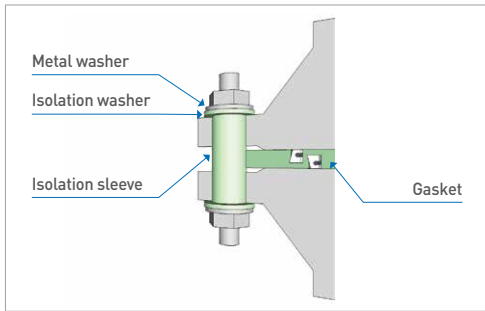
Medium	NBR	EPDM	CR	Viton	PTFE
Minimum temperature	-40°C	-50°C	-40°C	-40°C	-100°C
Maximum temperature	120°C	150°C	120°C	250°C	150°C
Acetone		•			•
Ammonia, Gas, Cold	•	•	•		•
Ammonia, Gas, Hot					•
Ammonia, Liquid (Anhydrous)		•	•		•
Benzene				•	•
Bleach Liquor		•		•	•
Butane	•		•	•	•
Butylene				•	•
Carbolic Acid (Phenol)				•	•
Carbon Dioxide	•	•	•	•	•
Carbonic Acid		•	•	•	•
Caustic Soda (Sodium Hydroxide)		•	•		•
Chloric Acid		•	•		•
Crude Oil				•	•
Diesel Oil	•			•	•
Drinking Water	•	•		•	•
Ethanol		•	•		•
Ethylene					•
Fuel Oil, #6				•	•
Fuel Oil, 1, and 2	•			•	•
Gasoline	•			•	•
Hydrogen Gas, Cold	•	•	•	•	•
Hydrogen Gas, Hot	•	•	•	•	•
Hydrogen Sulfide, Dry, Cold	•	•	•		•
Hydrogen Sulfide, Dry, Hot		•			•
Hydrogen Sulfide, Wet, Cold		•	•		•
Hydrogen Sulfide, Wet, Hot		•			•
Jet Fuel A				•	•
Methanol		•	•		•
Mineral Oils	•			•	•
Naptha				•	•
Natural Gas	•		•	•	•
Nitrogen	•	•	•	•	•
Olefins				•	•
Oxygen, 150°C					•
Oxygen, 200°C					•
Oxygen, Cold		•	•	•	•
Oxygen, Liquid					•
Paraffins	•			•	•
Pentane	•		•	•	•
Phenol				•	•
Propane	•			•	•
Propylene				•	•
Sea (Salt) Water	•	•		•	•
Sewage	•	•		•	•
Sour Crude Oil				•	•
Sour Natural Gas				•	•
Steam Below 120°C		•			•
Steam, 200°C					•
Styrene (Monomer)					•
Sulfur		•	•	•	•
Sulfur (Molten)				•	•
Toluene				•	•
Water	•	•			•
White Liquor	•	•	•	•	•
White Oil	•			•	•



Precautions for Handling

- ▶ The above material properties and recommended applications are only for reference guide, and may vary depending on various conditions in the real environment.
- ▶ Actually applicable heat-resisting temperature can be vary greatly depending on the operation time and the environment of contact medium.
- ▶ When storing the materials, please be careful to keep rubber from deterioration due to the ambient environments such as direct sunlight, temperature and etc.

SA-TYPE



COMPONENT MATERIALS

Gasket material	Sealing material	Sleeve material	Isolation washer material	Metal washer material
<ul style="list-style-type: none"> · Epoxy nema g-3 · Epoxy nema g-10 · Epoxy nema g-11 · Phenolic 	<ul style="list-style-type: none"> · PTFE with Stainless steel Spring · Energized 	<ul style="list-style-type: none"> · Epoxy nema g-10 · Epoxy nema g-11 · PTFE · Mica · Mylar 	<ul style="list-style-type: none"> · Epoxy nema g-3 · Epoxy nema g-10 · Epoxy nema g-11 · Mica 	<ul style="list-style-type: none"> · Carbon steel with Zinc coating · Stainless steel

FEATURE

KINS-SA Type is the product where PTFE with Spring Energizing Sealing is applied in the grooves of Glass Reinforced Epoxy, which is a gasket plate with its own elasticity and can be applied to Class 600 as well, and it is available to produce very thin gaskets.

It can be used for most of fluids, and we recommend it for the line in which thin gaskets are to be installed in low temperature and high pressure service.

Application	Availability	Service	Gasket Factor
<ul style="list-style-type: none"> · Sea Water · Vibration · Low stress · Isolation at high voltage · Different materials 	<p>Gasket Size : Up to 1,500mm (Non Shim) Up to 2,000mm (Shim)</p> <p>Gasket Thickness : 3.2mm</p>	<p>Max Temperature : 200℃</p> <p>Max. Pressure : 600# [=50bar]</p>	<p>m : 0 y : 7,500 psi</p>

Apply to the Flange, ASME / DIN / JIS Raised Face & Full Face

PHYSICAL PROPERTIES

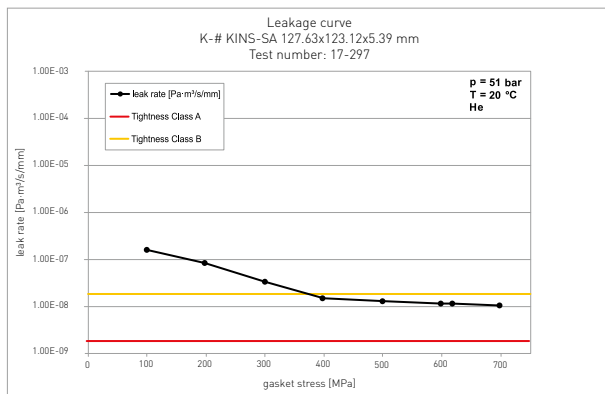
ASTM	Test Method	Unit	Epoxy Glass NEMA G-10	Epoxy Glass NEMA G-11	
D149	Dielectric Strength	KV/mm	24.1~31.5	24	<ul style="list-style-type: none"> · MESG 85/300 Shell TAT Certification · MESG 85/201 Satisfaction · Approved ARAMCO (9COM NO) · Equivalent Gasket : GPT PGE Type
D695	Min. Compressive Strength	psi	50,000	50,000	
D570	Water Absorption	%	0.01	0.01	
D257	Min. Flexural Strength	psi	65,000	57,700	
D638	Min. Tensile Strength	psi	50,000	41,000	
Temperature Range		℃	-129 ~150	-46 ~200	

MESC 85/300 Shell TAT Certification



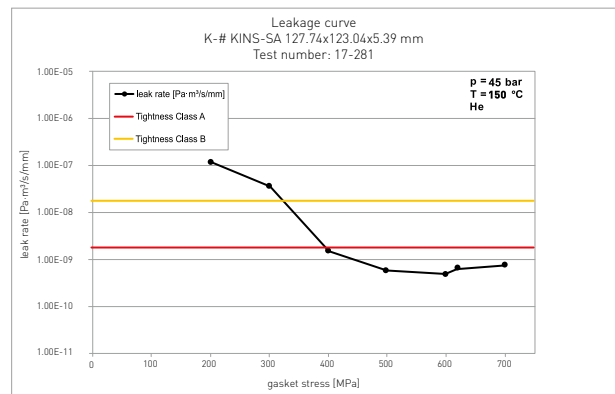
GOAL OF INVESTIGATION

The goal of the investigation was the determination of the following gasket characteristics according to the Shell Specification MESC SPE 85/300 (dated February 2016; Procedure and Technical Specification for Type Acceptance Testing (TAT) of Gaskets) The Shell Specification MESC SPE 85/300 describes several testing procedures for the evaluation of the gasket compressibility and the tightness characteristics of the gasket material at ambient and elevated temperature.



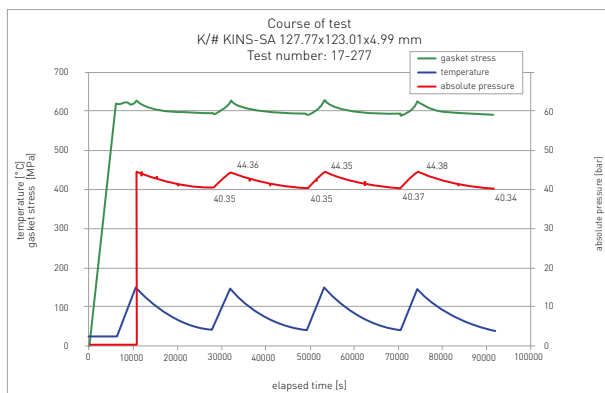
1. Shellleakagetest (RT) according MESC SPE 85/300 - 3.3.2

Test pressure	51bar
Shell required gasket stress level	620Mpa
Leakage rate	1.11E-08 Pa·m³/s/mm



2. Shellleakagetest (150°C) according MESC SPE 85/300 - 3.3.2

Test pressure	45bar
Shell required gasket stress level	620Mpa
Leakage rate	6.40E-10 Pa·m³/s/mm



3. Shell cycle test at 150 °C according MESC SPE 85/300 - 3.3.5

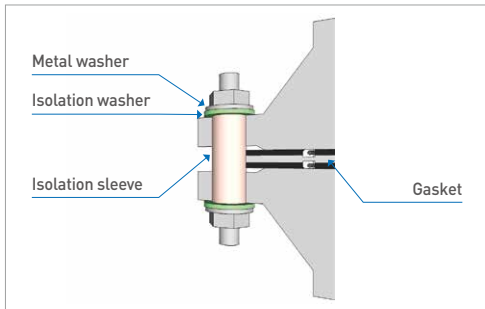
Test pressure	45bar
Shell required gasket stress level	620Mpa
Pressure drop in last cycle	< 0.1 bar



4. HOB1 - MESC SPE 85/300 - 3.3.6

Test pressure	180bar
Shell required gasket stress level	301Mpa
Temperature	150 °C

HA TYPE



COMPONENT MATERIALS

Gasket material	Sealing material	Sleeve material	Isolation washer material	Metal washer material
<ul style="list-style-type: none"> Epoxy with Metal Core (Epoxy Plate : Epoxy Nema g-10 , g-11) (Metal Core : Standard Stainless Steel 316L and Alloy, Duplex, etc.) 	<ul style="list-style-type: none"> PTFE with Stainless steel Spring Energized PTFE with Duplex Stainless steel Spring Energized PTFE with Hastelloy C276 Spring Energized 	<ul style="list-style-type: none"> Epoxy nema g-3 Epoxy nema g-10 Epoxy nema g-11 PTFE Mica Mylar 	<ul style="list-style-type: none"> Epoxy nema g-3 Epoxy nema g-10 Epoxy nema g-11 Mica 	<ul style="list-style-type: none"> Carbon steel with Zinc coating Stainless steel

FEATURE

KINS-HA Type is the product in which PTFE with energizing sealing is applied in the grooves of glass reinforced by epoxy coated on both sides of a metal plate. It has its own elasticity, and can be applied to Class 2500 as well by the reinforcement of a metal plate, and it is possible to apply it to different flange types. It can be used for most of fluids, and we recommend to apply it to the line with RTJ & API flange in extra-high voltage service.

Application	Availability	Service	Gasket Factor
High Pressure	Gasket Size :	Max Temperature :	m : 0
Different type of flanges	Up to 1,200mm (Non Shim)	200℃	y : 7,500 psi
RTJ & API Flange	Gasket Thickness :	Max. Pressure :	
Isolation at high voltage	7mm	10,000# [=700bar]	
Different materials			

Apply to the Flange, ASME / DIN / JIS / RTJ / API Raised Face & Full Face

PHYSICAL PROPERTIES

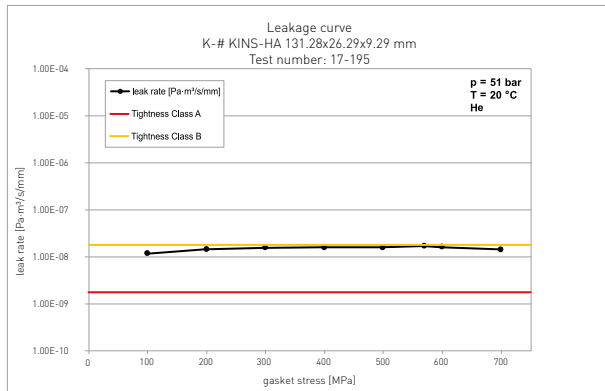
ASTM	Test Method	Unit	Epoxy Glass NEMA G-10	Epoxy Glass NEMA G-11	
D149	Dielectric Strength	KV/mm	24.1~31.5	24	<ul style="list-style-type: none"> MESC 85/300 Shell TAT Certification MESC 85/201 Satisfaction Approved ARAMCO (9COM NO) Equivalent Gasket : GPT VCS Type
D695	Min. Compressive Strength	psi	50,000	50,000	
D570	Water Absorption	%	0.01	0.01	
D257	Min. Flexural Strength	psi	65,000	57,700	
D638	Min. Tensile Strength	psi	50,000	41,000	
Temperature Range		℃	-129 ~150	-46 ~200	

MESC 85/300 Shell TAT Certification



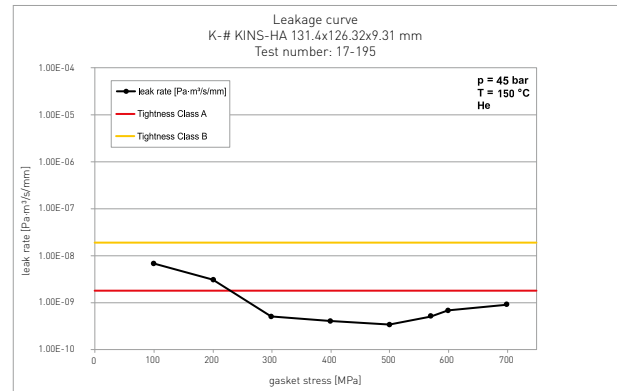
GOAL OF INVESTIGATION

The goal of the investigation was the determination of the following gasket characteristics according to the Shell Specification MESC SPE 85/300 (dated February 2016: Procedure and Technical Specification for Type Acceptance Testing (TAT) of Gaskets). The Shell Specification MESC SPE 85/300 describes several testing procedures for the evaluation of the gasket compressibility and the tightness characteristics of the gasket material at ambient and elevated temperature. In this project, 10 different tests were performed in respect of the Shell approval:



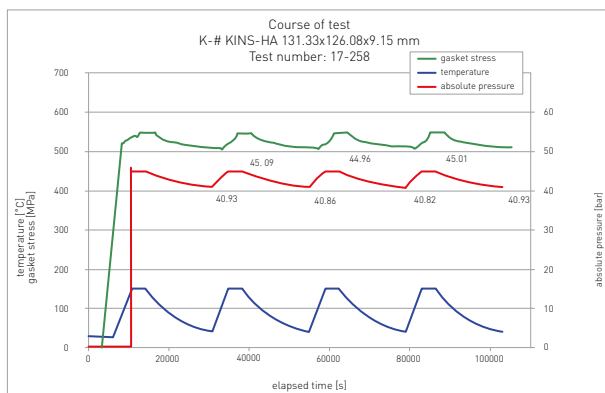
1. Shellleakagetest (RT) according MESC SPE 85/300 - 3.3.2

Test pressure	51bar
Shell required gasket stress level	570Mpa
Leakage rate	1.71E-08 Pa·m³/s/mm



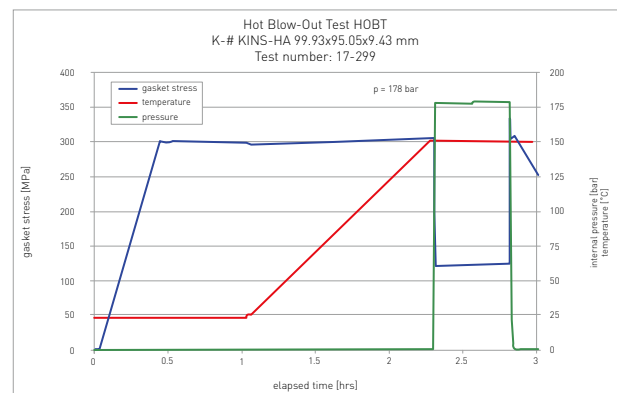
2. Shellleakagetest (150°C) according MESC SPE 85/300 - 3.3.2

Test pressure	51bar
Shell required gasket stress level	570Mpa
Leakage rate	4.95E-10 Pa·m³/s/mm



3. Shell cycle test at 150 °C according MESC SPE 85/300 - 3.3.5

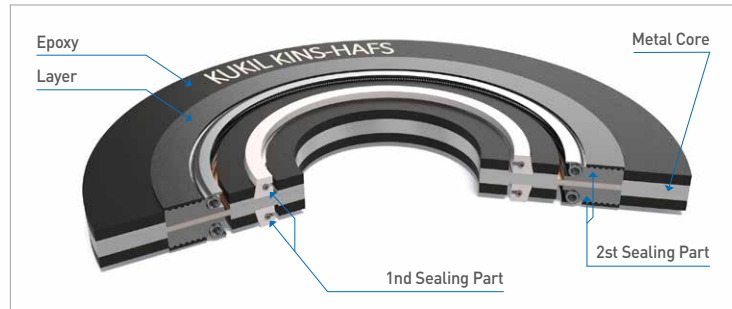
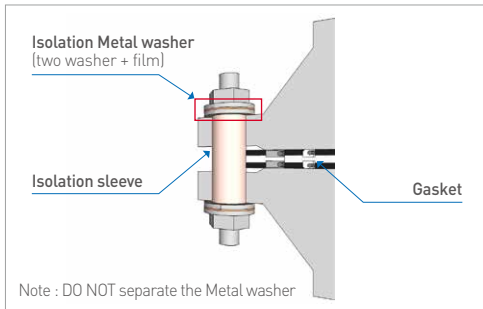
Test pressure	45bar
Shell required gasket stress level	617Mpa
Pressure drop in last cycle	< 0.1 bar



4. HOB1 - MESC SPE 85/300 - 3.3.6

Test pressure	180bar
Shell required gasket stress level	302.1Mpa
Temperature	150 °C

HAFS TYPE



COMPONENT MATERIALS

Gasket material	Sealing material	Sleeve material	Isolation Metal washer material
<ul style="list-style-type: none"> · Epoxy with Metal Core (Epoxy Plate : Epoxy nema g-10 , g-11) (Metal Core : Standard Stainless Steel 316L and Inconel , Duplex, etc.) 	<ul style="list-style-type: none"> · First Sealing : PTFE with Steel Spring Energized · Second Sealing : Metal Core with Steel Spring and Isolation Film 	<ul style="list-style-type: none"> · Epoxy nema g-3 · Epoxy nema g-10 · Epoxy nema g-11 · PTFE · Mica · Mylar 	<ul style="list-style-type: none"> · HAFS Washer [Carbon steel with Zinc coating with Isolation Film] · Carbon steel with Zinc coating with Mica

FEATURE

HAFS Type is the product with excellent restoring force and fire resistance, in which PTFE with Energizing Sealing + Special Second Sealing are applied in the grooves of Glass Reinforced Epoxy coated on both sides of a metal plate. It has the same advantages as KINS-HA, and in addition, the product has passed the Fire Safety test to ensure safety in the event of a fire. It can be used for most of fluids, and KINS-HAFS Type should be applied to the line where Fire Safety certified products must be used.

Application	Availability	Service	Gasket Factor
<ul style="list-style-type: none"> · High prerassure · Fire hazard line · Isolation at high voltage · Different materials 	<p>Gasket Size : Up to 1,200mm</p> <p>Gasket Thickness : 7mm</p>	<p>Max Temperature : 200°C</p> <p>Max. Pressure : 10,000# [=700bar]</p>	<p>m : 0</p> <p>y : 7,500 psi</p>

Apply to the Flange, ASME / DIN / JIS Raised Face & Full Face

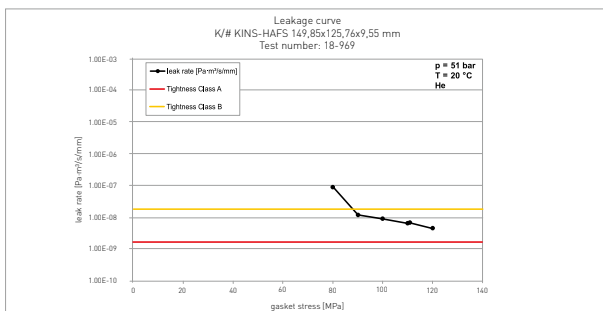
PHYSICAL PROPERTIES

ASTM	Test Method	Unit	Epoxy Glass NEMA G-10	Epoxy Glass NEMA G-11	
D149	Dielectric Strength	KV/mm	24.1~31.5	24	<ul style="list-style-type: none"> · MESG 85/300 Shell TAT Certification · MESG 85/201 Satisfaction · API 6FB Fire Certification · Approved ARAMCO (9COM NO) · Equivalent Gasket : GPT VCFS Type
D695	Min. Compressive Strength	psi	50,000	50,000	
D570	Water Absorption	%	0.01	0.01	
D257	Min. Flexural Strength	psi	65,000	57,700	
D638	Min. Tensile Strength	psi	50,000	41,000	
Temperature Range		°C	-129 ~150	-46 ~200	

MESC 85/300 Shell TAT Certification

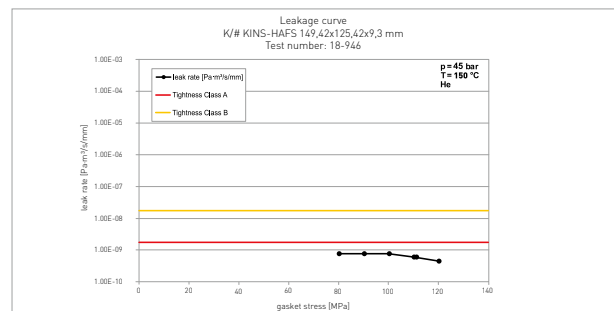
GOAL OF INVESTIGATION

The goal of the investigation was the qualification of the gasket material K/# KINS HAFS in accordance to the Shell Specification MESC SPE 85/300 (dated February 2016: Procedure and Technical Specification for Type Acceptance Testing (TAT) of Gaskets). The Shell Specification MESC SPE 85/300 describes several testing procedures for the evaluation of the gasket compressibility and the tightness characteristics of the gasket material at ambient and elevated temperature.



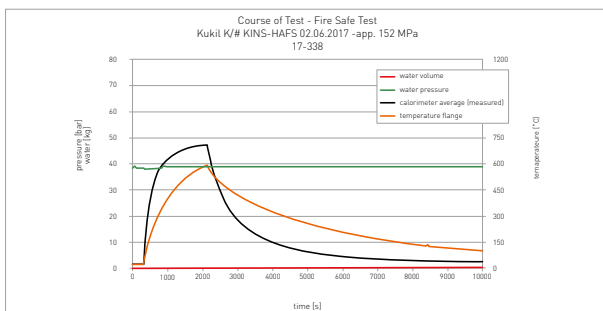
1. Shellleakagetest (RT) according MESC SPE 85/300 - 3.3.2

Test pressure	51bar
Shell required gasket stress level	111Mpa
Leakage rate	6.84E-09 Pa·m³/s/mm



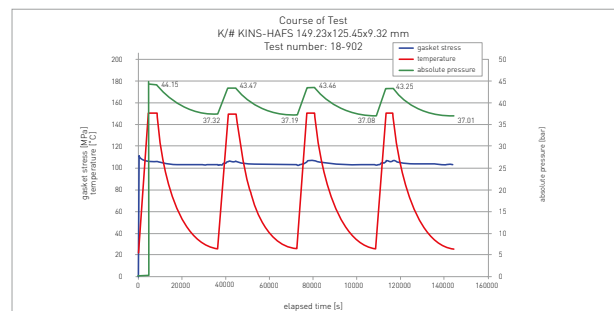
2. Shellleakagetest (150°C) according MESC SPE 85/300 - 3.3.2

Test pressure	45bar
Shell required gasket stress level	111Mpa
Leakage rate	6.00E-10 Pa·m³/s/mm



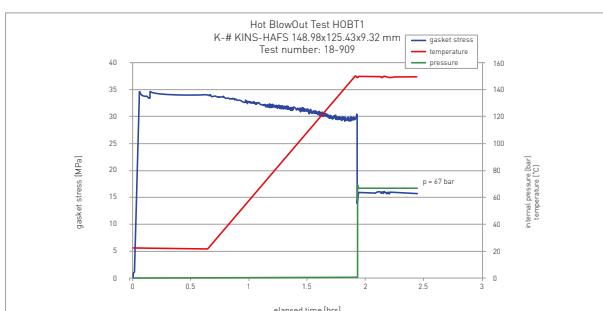
3. Fire Test API 6FB

Test pressure	38bar
Gasket stress	151.90Mpa
Leakage rate	0.01 ml / inch / min



4. Shell cycle test (150°C) according MESC SPE 85/300 - 3.3.5

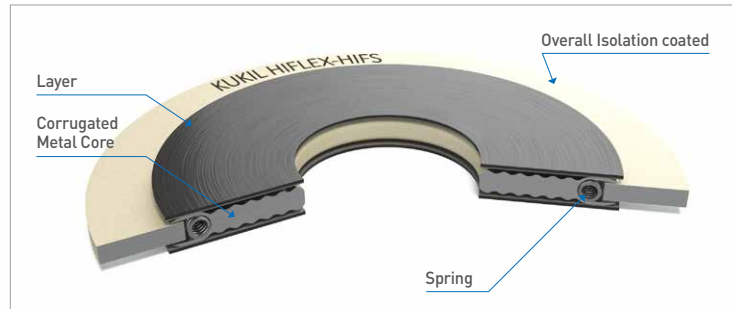
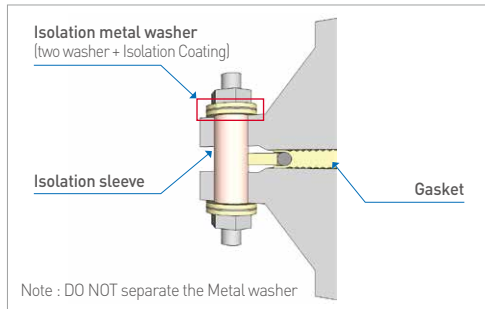
Test pressure	45bar
Shell required gasket stress level	111Mpa
Pressure drop in last cycle	< 0.3 bar



5. HOB1 - MESC SPE 85/300 - 3.3.6

Test pressure	67.5bar
Shell required gasket stress level	34.5Mpa
Temperature	150°C

HIFS TYPE



COMPONENT MATERIALS

Gasket material	Sleeve material	Isolation metal washer material
<ul style="list-style-type: none"> · Metal Core & Spring with Special Isolation coating (Metal Core & Spring : Standard Stainless Steel 316L and Alloy, Duplex, etc.) 	<ul style="list-style-type: none"> · Epoxy nema g-3 · Epoxy nema g-10 · Epoxy nema g-11 · PTFE · Mica · Mylar 	<ul style="list-style-type: none"> · HIFS Washer [Steel with Isolation Coating] · Carbon steel with Zinc coating with mica

FEATURE

HIFLEX-HIFS Gasket is a product with the special insulation coating on the front of a metal core, and has the excellent restoration rate by inserting a spring inside. It can be applied to a higher temperature comparing with the conventional epoxy-based insulating gasket, and has the excellent insulation and sealing performance at high temperature due to the special insulation coating. It is applicable to a wide range of temperature from low to high temperatures, and shows the outstanding performance even at temperature changes.

Application	Availability	Service	Gasket Factor
<ul style="list-style-type: none"> · High temperature · Isolation at high voltage · Different materials 	<p>Gasket Size : Up to 1,000mm</p> <p>Gasket Thickness : 5mm</p>	<p>Max Temperature : 260℃</p> <p>Max. Pressure : 1500# [=100bar]</p>	<p>m : 3.75</p> <p>y : 7,600 psi</p>

Apply to the Flange, ASME / DIN / JIS Raised Face & Full Face

PHYSICAL PROPERTIES

Standard	Test Method	Unit	Result
ASTM D257	Insulation Resistance	MΩ	3.6 x 10 ⁵
KS M ISO 2409	Cross-cut	Grade	1
KS M ISO 1518-1	Scratch Resistance	-	No defects

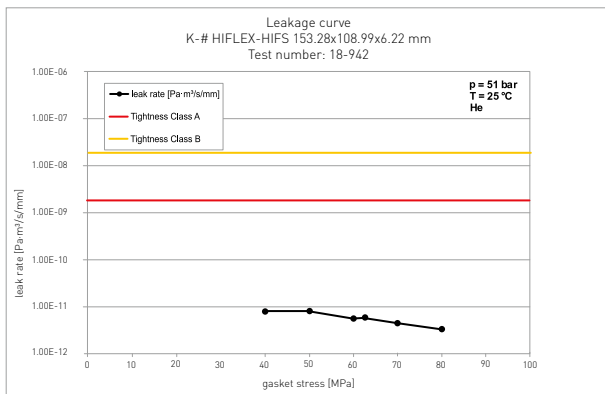
MESC 85/300 Shell TAT Certification

MESC 85/300 Shell TAT Certification



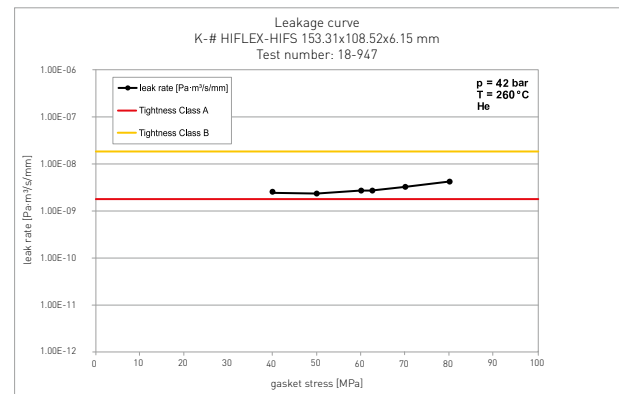
GOAL OF INVESTIGATION

The goal of the investigation was the qualification of the gasket material K/# HIFLEX-HIFS in accordance to the Shell Specification MESC SPE 85/300 (dated February 2016: Procedure and Technical Specification for Type Acceptance Testing (TAT) of Gaskets). The Shell Specification MESC SPE 85/300 describes several testing procedures for the evaluation of the gasket compressibility and the tightness characteristics of the gasket material at ambient and elevated temperature.



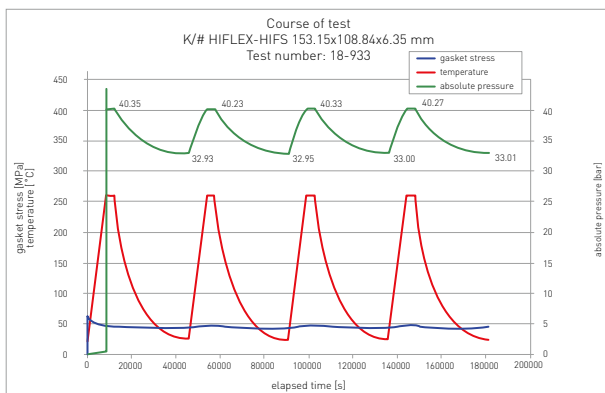
1. Shellleakagetest (RT) according MESC SPE 85/300 - 3.3.2

Test pressure	51bar
Shell required gasket stress level	62.5mpa
Leakage rate	5.57E-12 Pa·m³/s/mm



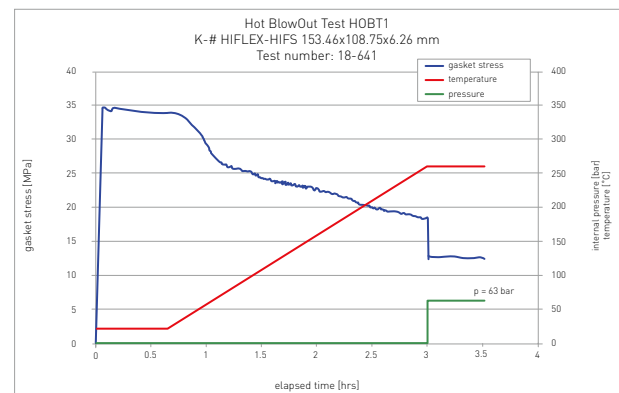
2. Shellleakagetest (260°C) according MESC SPE 85/300 - 3.3.2

Test pressure	51bar
Gasket stress level	62.5Mpa
Leakage rate	2.63E-09 Pa·m³/s/mm



3. Shell cycle test (260°C) according MESC SPE 85/300 - 3.3.5

Test pressure	41.9bar
Initial gasket stress level	62.5mpa
Pressure drop in last cycle	< 0.1 bar



4. HOB T1 - MESC SPE 85/300 - 3.3.6

Test pressure	62.9bar
Gasket stress level	34.5Mpa
Temperature	260°C

Special Features of HIFLEX-HIFS Technology

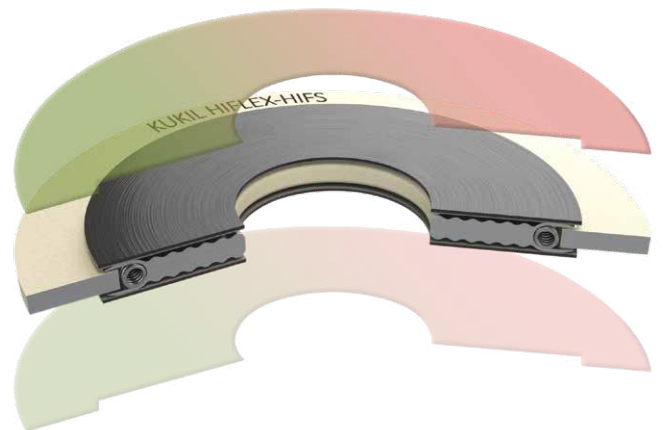
Development Background of HIFLEX-HIFS

Conventional insulating gaskets are those manufactured based on epoxy plates, and they are generally used in various products with their excellent insulation and sealing properties. Recently, however, there has been lots of inquiries for insulating gaskets that can be used under the conditions of the temperature of 200°C or higher, and we have undertaken the development of new insulating gaskets to meet the request of our customers.

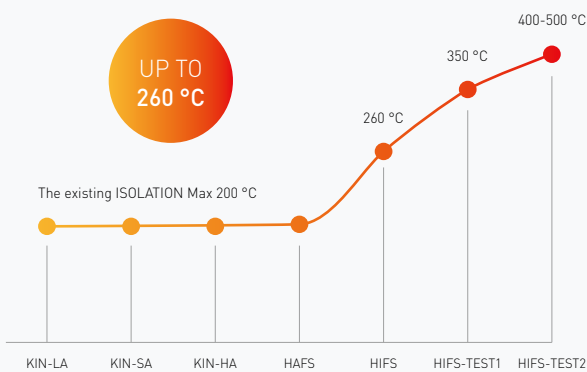
KUKIL INNTOT has secured the technology through lots of self-test, design modification and performance certification by international authorized institutes for three years, completed the development of the new insulating gasket of HIFS-HIFS that can exhibit the insulation performance at 260°C, and it has a plan to develop constantly the technology for the gaskets of the next generation, which can maintain the performance at the temperature higher than 300°C.

Feature of coating

As for the insulating HIFS GASKET for high temperature, the core coating technology is to secure more excellent insulation performance than previous products by adding special coating developed by our company. The self-developed coating technology has not only the excellent insulation performance but also excellent wear resistance and corrosion resistance, and maintains the performance without breaking coating even at high torque pressure.



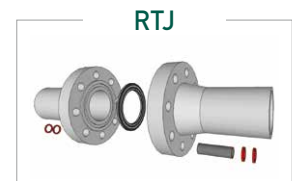
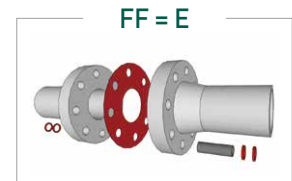
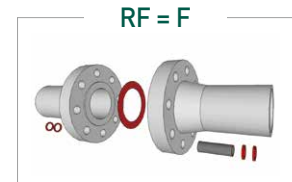
KUKIL's technology development direction



HIFS Gasket has been tested for three years by repeating lots of tests, raising temperature step by step. In March 2019, we requested MESC 85/300 test to Amtec, an authorized certification test institute in Germany, for the verification of performance, and confirmed that the developed HIFLEX-HIFS exhibits the outstanding performance at 260°C.

Now we are developing gaskets that can be used at 300°C, 350°C and up to 500°C to withstand higher temperature pressure.

ISOLATION KIT COMPONENT



► Sleeve Physical Properties

ASTM	Test Method	Unit	G-10	G-11	Mica	Mylar
D149	Dielectric Strength	KV/mm	24.1~31.5	24	20	24
D695	Min. Compressive Strength	PSI	50,000	50,000	-	-
D570	Water Absorption	%	0.01	0.01	1.13	0.8
D257	Min. Flexural Strength	PSI	65,000	57,700	-	13,000
D638	Min. Tensile Strength	PSI	50,000	41,000	-	-
Temperature Range		°C	-129~150	-46~200	-30~800	-30~150

► Isolation Washer Physical Properties

ASTM	Test Method	Unit	G-10	G-11	Mica	HAFS Washer	HIFS Washer
D149	Dielectric Strength	KV/mm	24.1~31.5	24	20	-	-
D695	Min. Compressive Strength	PSI	50,000	50,000	-	-	-
D570	Water Absorption	%	0.01	0.01	1.13	-	-
D257	Min. Flexural Strength	PSI	65,000	57,700	-	-	-
D638	Min. Tensile Strength	PSI	50,000	41,000	-	-	-
D257	isolation Resistance	MΩ	4.2×10^8	7.8×10^7	3.9×10^3	1.1×10^6	5.7×10^3
Temperature Range		°C	-129~150	-46~200	-30~800	-129~260	-129~400

► HAFS & HIFS washer is designed to use for high temperature line.

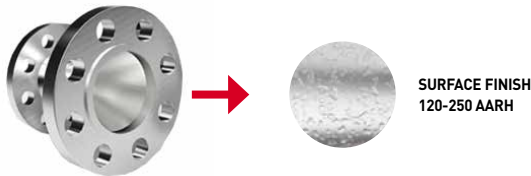
INSTALLATION INSTRUCTIONS

KUKIL INNTOT Installation instructions

(Including : KINS-HA, KINS-HAFS, KINS-LA, KINS-SA, HIFLEX-HIFS)

KUKIL INNTOT installation instructions have been modified to fit the guidelines of ASME PCC-1. It is recommended by KUKIL INNTOT that field technicians be familiar with this standard.

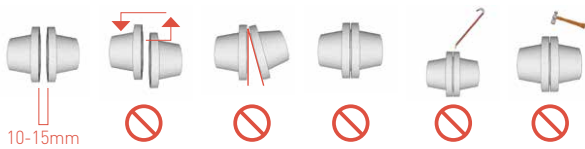
1. The isolation kit found in the package shall conform to the information listed on the package label.
2. Mating flange faces shall be examined and care should be taken to ensure that the sealing surfaces are free of scratches, pitting, rust, gouges, oil and debris. Flange face surface finish shall be within the range of 125-250 µin.



Sealing Surface

► Clean up contaminants ► Check flange damage accordance with ASME PCC-1

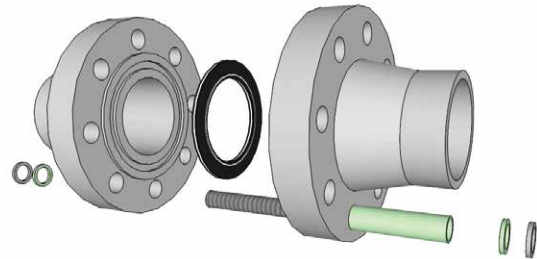
3. Use the provided isolation sleeves to check the alignment of the two flanges for concentricity and parallelism and adjust accordingly. The isolation sleeves should freely slide all the way through the two opposing bolt holes once the flanges are properly aligned. Do not force the sleeves through the bolt holes.
4. Ensure that the gap between the two flange faces prior to installation is at least 1.5 times the total thickness of the gasket. Flange separating device shall be used if necessary.



Install sleeves and washers on bottom half of flange for easy alignment and insert of gasket

5. Ensure all nuts and bolts are free of rust, gouges and debris prior to assembly.
6. Apply a Non-Metallic based bolt lubricant liberally to the nut contact faces and to the threads on one end of the bolts 1/2" past where the nut will come to rest after tightening.
(This is not necessary if PTFE coated studs and nuts are being used.)
7. Thread one lubricated nut onto the lubricated section of each stud.

8. Install one steel washer and one isolation washers (Install two steel washer & special coating if applicable), so that the steel washer is in contact with the nut. isolation washer will not be located against the nut. Slide isolation sleeve over the stud and through the two washers.
9. Insert the stud assemblies into the bolt holes around the lower half of the bolt pattern. The stud assembly should slide freely through the opposing flange bolt holes. If the assembly does not slide freely recheck flange alignment before continuing.



10. Lubricate the exposed stud threads using a non-metallic based lubricant and install the washers as per instructions in step 8. All isolation washers be against the flange.
11. Thread the lubricated nuts onto the studs, ensuring total thread engagement between the nut and stud.
12. Inspect the condition of the sealing elements. Seals will be fully seated to the base of its respective groove. Clean the sealing faces of the gasket with a soft clean cloth, free from any oil and debris.
13. Insert the gasket between the flanges and check that the seals are secure in the seal grooves. Gasket will be resting on the isolation sleeves.
14. Remove any flange spreading devices used in step 4 at this time. Install the remaining stud assemblies repeating steps 6-11.
15. Bolting. (Please refer to Bolt Torque Method as below)
16. Using the isolation test instructions test the flange assembly for electrical isolation.
17. Pressure test assembly. For safety reasons it is best to initiate your test pressures much lower than those normally encountered by your system. Work your pressure up to acceptable limits by stepping pressure 10% per pressure increments.

Bolt Torque Method

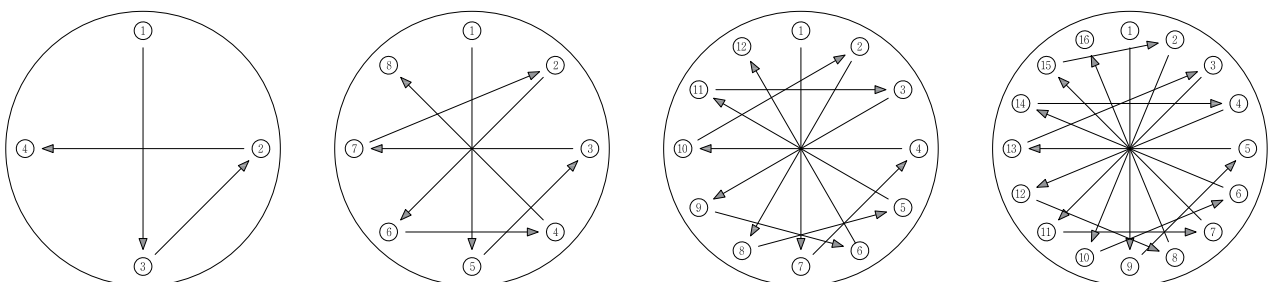
1. Select the correct bolt torque for the appropriate nominal pipe size and flange pressure class from the torque tables provided.
2. Hand tighten each stud
3. Snug each bolt to 15N.m(10ft-lb) to 30N.m(20ft-lb) (not to exceed 20% of Target Torque)
4. Tighten to 30% of target torque value
(Check Flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.)
5. Tighten to 70% of target torque value
(Check Flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.)
6. Tighten to 100% of target torque value
(Check Flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.)
7. Continue tightening the bolts, but on a circular clockwise pattern until no further nut rotation occurs at the Tighten to 100% of target torque value. For indicator bolting, tighten bolts until the indicator rod retraction readings for all bolts are within the specified range.
8. Time permitting, wait a minimum of 4 hr and repeat Round 4; this will restore the short-term creep relaxation/embedment losses. If the flange is subjected to a subsequent test pressure higher than its rating, it may be desirable to repeat this round after the test is completed.

※ Bolt Torque method using multiple tools
Please see ASME PCC-1 Guidelines for Pressure Boundary bolted Flange Joint Assembly.

Legacy Cross-Pattern Tightening Sequence and Bolt Numbering System

No. of Bolts	Sequentially Clockwise Sequence
4	1-3-2-4
8	1-5-3-7-2-6-4-8
12	1-7-4-10-2-8-5-11-3-9-6-12
16	1-9-5-13-3-11-7-15-2-10-6-14-4-12-8-16
20	1-11-6-16-3-13-8-18-5-15-10-20-2-12-7-17-4-14-9-19
24	1-13-7-19-4-16-10-22-2-14-8-20-5-17-11-23-3-15-9-21-6-18-12-24
28	1-15-8-22-4-18-11-25-6-20-13-27-2-16-9-23-5-19-12-26-7-21-14-28-3-17-10-24
32	1-17-9-25-5-21-13-29-3-19-11-27-7-23-15-31-2-18-15-21-2-18-10-26-6-22-14-30-4-20-12-28-8-24-16-32
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40	1-2-3-4-21-22-23-24-13-14-15-16-33-34-35-36-5-6-7-8-25-26-27-28-17-18-19-20-37-38-39-40-9-10-11-12-29-30-31-32

► Typical numbering sequences for flanges with 4,8 and 12,16 bolt holes, showing tightening sequence taken from chart above



ISOLATION GASKET KIT TORQUE TABLE

▶ Torque Table [Unit : ft-lb]

NPS	150#		300#		600#		900#		1500#		2500#	
	Recommend (ft-lb)	Max (ft-lb)	Recommend (ft-lb)	Max (ft-lb)	Recommend (ft-lb)	Max (ft-lb)	Recommend (ft-lb)	Max (ft-lb)	Recommend (ft-lb)	Max (ft-lb)	Recommend (ft-lb)	Max (ft-lb)
1/2	40	65	40	65	40	65	145	230	145	230	145	230
3/4	40	65	85	130	85	130	145	230	145	230	145	230
1	40	65	85	130	85	130	245	385	245	385	245	385
1 1/4	40	65	85	130	85	130	245	385	245	385	350	550
1 1/2	40	65	145	230	145	230	350	550	350	550	525	825
2	85	130	85	130	85	130	245	385	245	385	350	550
2 1/2	85	130	145	230	145	230	350	550	350	550	525	825
3	85	130	145	230	145	230	245	385	525	825	735	1,155
3 1/2	85	130	145	230	245	385	N/A	N/A	N/A	N/A	N/A	N/A
4	85	130	145	230	245	385	525	825	735	1,155	1,260	1,980
5	145	230	145	230	350	550	735	1,155	1,260	1,980	2,065	3,245
6	145	230	145	230	350	550	525	825	980	1,540	3,150	4,950
8	145	230	245	385	525	825	980	1,540	1,645	2,585	3,150	4,950
10	245	385	350	550	735	1,155	980	1,540	2,555	4,015	6,300	9,900
12	245	385	525	825	735	1,155	980	1,540	3,150	4,950	8,400	13,200
14	350	550	525	825	980	1,540	1,260	1,980	4,550	7,150	N/A	N/A
16	350	550	735	1,155	1,260	1,980	1,645	2,585	6,300	9,900	N/A	N/A
18	525	825	735	1,155	1,645	2,585	2,555	4,015	8,400	13,200	N/A	N/A
20	525	825	735	1,155	1,645	2,585	3,150	4,950	10,990	17,270	N/A	N/A
24	735	1,155	1,260	1,980	2,555	4,015	6,300	9,900	17,710	27,830	N/A	N/A

▶ Torque Table [Unit : N-m]

NPS	150#		300#		600#		900#		1500#		2500#	
	Recommend (N-m)	Max (N-m)	Recommend (N-m)	Max (N-m)	Recommend (N-m)	Max (N-m)	Recommend (N-m)	Max (N-m)	Recommend (N-m)	Max (N-m)	Recommend (N-m)	Max (N-m)
1/2	54	88	54	88	54	88	197	312	197	312	197	312
3/4	54	88	115	176	115	176	197	312	197	312	197	312
1	54	88	115	176	115	176	332	522	332	522	332	522
1 1/4	54	88	115	176	115	176	332	522	332	522	475	746
1 1/2	54	88	197	312	197	312	475	746	475	746	712	1,119
2	115	176	115	176	115	176	332	522	332	522	475	746
2 1/2	115	176	197	312	197	312	475	746	475	746	712	1,119
3	115	176	197	312	197	312	332	522	712	1,119	997	1,566
3 1/2	115	176	197	312	332	522	N/A	N/A	N/A	N/A	N/A	N/A
4	115	176	197	312	332	522	712	1,119	997	1,566	1,708	2,685
5	197	312	197	312	475	746	997	1,566	1,708	2,685	2,800	4,400
6	197	312	197	312	475	746	712	1,119	1,329	2,088	4,271	6,711
8	197	312	332	522	712	1,119	1,329	2,088	2,230	3,875	4,271	6,711
10	332	522	475	746	997	1,566	1,329	2,088	3,464	5,444	8,542	13,423
12	332	522	712	1,119	997	1,566	1,329	2,088	4,271	6,711	11,389	17,897
14	475	746	712	1,119	1,329	2,088	1,708	2,685	6,169	9,694	N/A	N/A
16	475	746	997	1,566	1,708	2,685	2,230	3,505	8,542	13,423	N/A	N/A
18	712	1,119	997	1,566	2,230	3,505	3,464	5,444	11,389	17,897	N/A	N/A
20	712	1,119	997	1,566	2,230	3,505	4,271	6,711	14,900	23,415	N/A	N/A
24	997	1,566	1,708	2,685	3,464	5,444	8,542	13,423	24,012	37,732	N/A	N/A

▶ 1ft.lb = 1.355818N.m = 13.8255kgf.cm

KUKIL INNTOT leaping into the world

As a specialized manufacturer of sealing, which supplies sealing product to all over the world and provides the perfect solution for the issue of leakage, KUKIL INNTOT provides the professional technical review and solutions to aged lines and those with difficult use conditions.

We are responsible for customers' assets, time and safety by preventing unexpected shut down as well as directly solving problem.

KUKIL aims to grow together with its customers through the constant quality control and technology development, and it is a specialized sealing manufacturer to become a global leading company in the field of sealing products.

CLIENT LIST

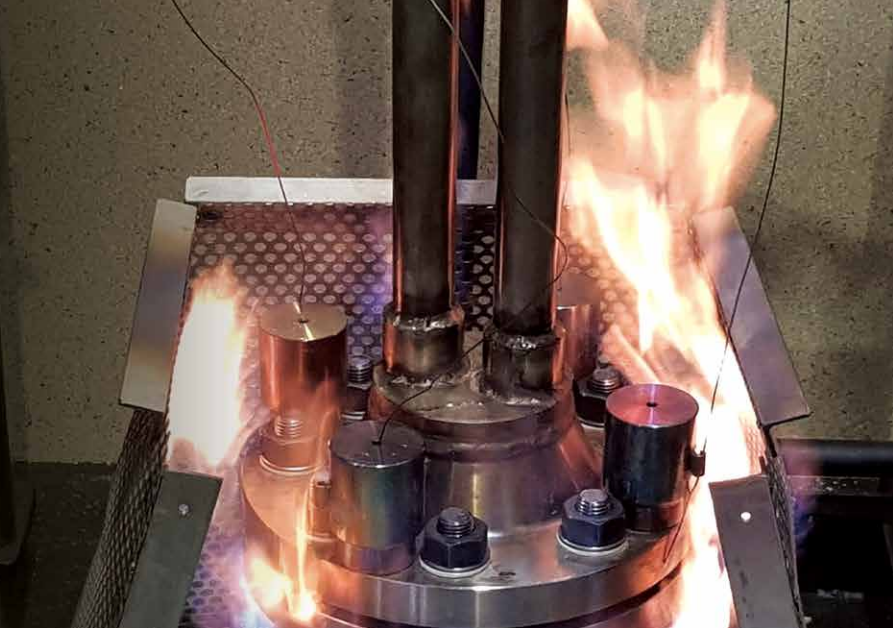
Domestic

Overseas

CONSTANT TECHNICAL DEVELOPMENT



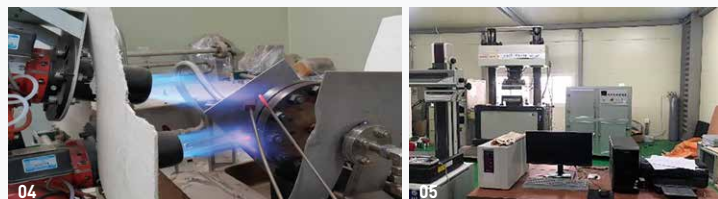
It is the era that the revolution of technology develops the industry.

KUKIL INNTOT has developed a number of products such as gaskets, couplings, construction materials and so forth under the CEO's philosophy of INNTOT (INNnovation for the Top Of the Technology), currently possessing 204 patents, and it is continuously striving to promote technologies.

The R&D center was established to lead the national technological innovation and contribute to the industrial development by carrying out comprehensively gasket related research and development, test evaluation and national technological support projects based on the endless challenge and innovation.

The R&D center succeeded in developing HIFLEX Gasket, a core product of the development, by securing a variety of R&D opportunities through the mutual cooperation of industry-academy-government. And the product has been used in oil refinery, chemicals, shipbuilding (LNG) and nuclear power plant at home and abroad to prevent fire and explosion accidents as well as mortality event, and provided the safety solution for industry. The company received IR52 (Jang Yong-sil Award) from the Ministry of Science and Technology in 2019 for its technological prowess.

We invest heavily in the field of R&D to become an innovative company with self-perpetuation in the era of infinite competition for a company with the top turnover in the same field, and will take the lead in transforming Korea into a real gasket exporting country through our continuous research and development based on our unique technology and experiences.



01 Winning the IR52 Jang Youg-shil award Program which is the Korea's most prestigious new product invention award ceremony

02 Thermal Cycle Test M/C

03 Laboratory

04 Fire test M/C

05 UTM TEST M/C

Build Up Together!

Makes Feel Safety A Trust-First Company

KUKIL INNTOT

KUKIL INNTOT has been solving the problems caused by leakage in various industrial fields that cannot be solved at home and abroad, and now secure the right solution and know-how for that. Based on this, we also possess technology to offer solutions for other areas beyond sealing. Going forward, KUKIL INNTOT will communicate with customers for their problems and will continue to research and develop so as to suggest solution to all kinds of problem.



			
C IS O9001:2015	ISO14001:2015		OHSAS 18001 2007
Certificate No. 31200	Certificate No. 46260		Certificate No. 46259

KUKIL INNTOT CO., LTD.



Head Office.

17, Tapgeol-gil, Ungchon-Myeon, Ulju-Gun, Ulsan, Korea

Tel +82 52 228 7500 Fax +82 52 268 5578

Overseas Direct

Tel +82 52 228 7563 Fax +82 52 228 7530

Seoul Office

R3208, Hyundai 41 Tower, Mok 1(il)-dong Yangcheon-gu, Seoul, Korea

Tel +82 2 2635 1380 Fax +82 2 2635 1382

www.kukil.co.kr

CONTACT US