



Tech-How Make the Difference!

*Fugitive Emission Safety
Applicable in Critical Lines
Corrosion & Leakage Protection*

Special Flange Insulation Set



STARTEC[®] 





STARTEC® High Performance Insulation

1. STARTEC® Special Benefits

- Reliable insulation sealing on significantly important industrial critical lines
- Stable services for fluctuated pressure, vibration and temperature cycling conditions
- Withstand in cathodic protection and galvanic corrosion in various piping system
- Safety protection from electrical corrosion in dissimilar metal flanges
- High strength of sealing retainer prevent damages from excess compression
- Usable for mismatched RTJ with Raised Face Flange connections
- Dedicate to Environmental Safety by reducing fugitive emission
- Electrical protection on UG (Under Ground) and AG (Above Ground) Installation

Standard

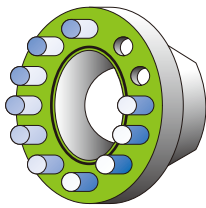
ASME
API
JIS/KS
DIN
Others

Available to install
various flange specification

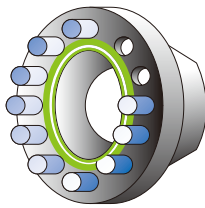
Application

H₂S, High Pressure
High pH and other
severe conditions

Gasket Type

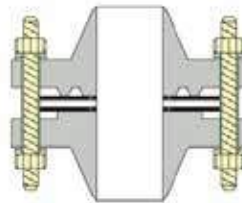


TYPE "E"
(FF TYPE)

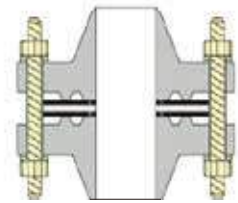


TYPE "F"
(FR TYPE)

Flange Installation



RTJ + RF



RTJ + RTJ

2. Customer Solution

- Engineering Design works for EPC & Project
- Non-Standard Supporting
- Large Diameter gasket, up to 1,500mm (OD)
- Technical Advice on value application
- Suggest for Problem Solution
- Available with Various Exotic Materials such as Duplex, Inconel etc



1 JIC9320-OFS Series
Optimized Fire Safety



2 JIC9320-OS Series
Optimum Sealing



3 JIC9230-ES Series
Spring Energized PTFE Seal



STARTEC® High Performance Insulation

3. ARAMCO APPROVAL



Saudi Aramco, the Saudi Arabian Oil Company, world most value, largest and global leading national petroleum and natural gas company in KSA, we're proudly Inform to clients that our flange insulation SET, STARTEC® has officially qualified on 9COM (6000000366), and certifying manufacturer ID10036961/ Plant ID30007592 with vendor approve on Feb 26, 2016.

JEIL E&S Co.,Ltd, continuous technical improvement with wide range of proven high quality sealing development will dedicate to complete fulfillment and support for client satisfactory.



ARAMCO Vendor Approval
Manufacturer ID: 10036961
Plant ID: 30007592

4. Major Clients



5. International Certificate



ISO9001/14001/18001



FIRE SAFETY API 6FB



Lloyd's Register



STARTEC® High Performance Insulation

A. Low Pressure Service Line

- ◎ **Service Temperature**
 - GRE(G-10) Retainer : Maximum 150 °C
 - GRE(G-11) Retainer : Maximum 200 °C
 - Phenolic Retainer : Maximum 175 °C
 - Sealing Element : Various Temperature as per material specification
- ◎ **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

Insulation Gasket (Code & Material)	Flange Mating	Remark
9210-ER Epoxy Plate with Rubber Seal	RF, FF RF&FF	Basic sealing Element by GRE Material
9220-PR Phenolic Plate with Rubber Seal		Basic Sealing Element by Phenolic Material
9230-ES Glass Reinforced Epoxy Plate with Rubber O-Ring / Spring Energized PTFE Seal		Dissimilar Sealing Element Excellent Sealing performance
9240-ER Glass Reinforced Epoxy Plate with Rectangular Seal		Rectangular Sealing Element

*Retainer & Sealing elements can be variable depend on application





STARTEC® High Performance Insulation

B. High Pressure Service Line

- ◎ **Service Temperature**
 - GRE(G-10) Retainer : Maximum 150°C
 - GRE(G-11) Retainer : Maximum 200°C
 - Metal Core : Various Temperature as per material specification
 - Sealing Element : Various Temperature as per material specification
 - ◎ **Service Class** : ASME 150~2500LB (9320-HP : Max. API 6BX 15000 psi)
 - ◎ **Maximum Size** : 1/2" ~ 24", up to 48" (Max O.D 1500mm)
- * Large sizes are available & required to discuss our sales team

Insulation Gasket (Code & Material)	Flange Mating	Remark
9310-OS Epoxy Faced Metal Core Plate with Rubber O-Ring	RF, FF, RTJ (RTJ dissimilar)	Optimize Sealing with Rubber O-ring
9320-OS Epoxy Faced Metal Core with Spring Energized PTFE Seal		Optimize Sealing with Spring Energized PTFE Seal
9320-OFS Epoxy Faced Metal Core with Fire Safety Double Seal	RF, FF, RTJ* (RTJ dissimilar)	Fire Safety Gasket (API 6FB)
9320-DOS Epoxy Faced Metal Core with Tandem Seal		Double Sealing Gasket
9320-HP Epoxy Faced Metal Core with High Pressure Double Seal	RTJ	High Pressure Gasket

* Ring Joint flange : above 4" NPS

* Metal Core Material: Basic SS316/316L (Super Duplex, Inconel Alloy are Available)

C. Extremely High Temp Service Line

- ◎ **Service Temperature**
 - Metal Core : Various Metallic Material Available
 - Sealing Element : Maximum 1000°C (STARPITE®)
- ◎ **Service Class** : ASME 150~2500LB

Insulation Gasket (Code & Material)	Flange Mating	Remark
JIC 3850-SE(HT) Kamprofile Core with STARPITE® Layer	RF, FF, RTJ (RTJ dissimilar)	High Temperature Gasket



STARTEC® High Performance Insulation

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 specification

◎ **Service Class** : ASME 150~600LB

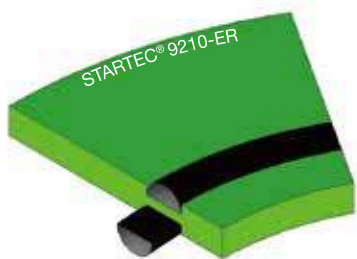
◎ **Maximum Size** : 1/2" ~ 24", up to 48" (Max O.D 1500mm)

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



A-1. JIC 9210-ER : Epoxy Plate with Rubber Seal

Cross Section



■ **Material**

- Retainer : Glass Reinforced Epoxy
- Seal Element : Rubber Seal

■ **Gasket Thickness** : Basic 4.0mm(4.0 ~ 8.0mm available)

■ **Advantages**

- Excellent sealing with unique semicircle structure
- Safety installation on low-pressure services
- Stable for leakage & low clamp and load
- Electrical insulation and protect the flange surface coating

A-2. JIC 9220-PR : Phenolic Plate with Rubber Seal

Cross Section



■ **Material**

- Retainer : Phenolic
- Seal Element : Rubber Seal

■ **Gasket Thickness** : Basic 4.0mm(4.0 ~ 8.0mm available)

■ **Advantages**

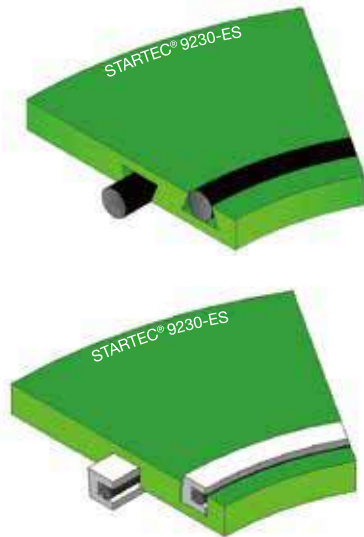
- Widely adapted to use Oil & Gas industry
- Positive sealing at low-pressure application
- Effective sealing in the direct bolt force load
- Line in the connection of dissimilar flange materials
- Electrical insulation and protect the flange surface coating



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A-3. JIC 9230-ES : Glass Reinforced Epoxy Plate with Rubber O-Ring/Spring Energized PTFE Seal

Cross Section



■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

A-4. JIC 9240-ER : Glass Reinforced Epoxy Plate with Rectangular Seal

Cross Section



■Material

- Retainer : Glass Reinforced Epoxy / Phenolic Resin
- Seal Element : Rectangular Rubber Seal

■Gasket Thickness : 3.2 mm(3.0 ~ 8.0mm available)

■Advantages

- Special structure for incline plane groove design
- Superior sealing performance on low seating stress
- Applicable on easily loose stress by vibration and hammering
- Line in the connection with dissimilar flange material
- Wide adapting on various environment & condition



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B. High Pressure Service Line

◎ **Service Temperature**

G-10 Retainer : Maximum 150°C

G-11 Retainer : Maximum 200°C

Sealing Element : Various Temperature as per material specification

◎ **Service Class** : ASME 150~2500LB (9320-HP : Max. API 6BX 15000 psi)

◎ **Maximum Size** : 1/2" ~ 24", up to 48" (Max O.D 1500mm)

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



B-1. JIC 9310-OS : Epoxy Faced Metal Core Plate with Rubber O-Ring

Cross Section



■ **Material**

- Retainer: Glass Reinforced Epoxy with Stainless steel core
- Seal Element : Rubber O-ring

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

■ **Application**

- Stable sealability and insulation performance on severe condition
- Easy installation and disassembly
- Line in the connection of dissimilar flange materials
- The section installed with Ring Joint Flange and Raise Face Flange
- Needed to protect the flange surface coating

B-2. JIC 9320-OS : Epoxy Faced Metal Core with Spring Energized PTFE Seal

Cross Section



■ **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**

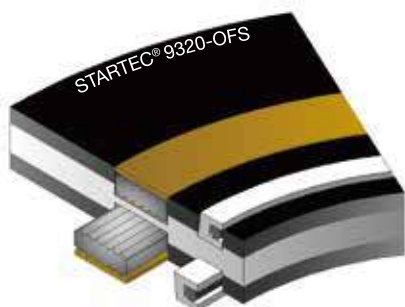
- Excellent solution for electrical protection & high pressure
- High Strength prevent damages from excess compression
- Can be installed RTJ with Raised Face Flange connections
- Applicable to protect the flange surface coating
- Environmental Safety by reducing fugitive emission
- Reliable sealability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



STARTEC® High Performance Insulation

B-3. JIC 9320-OFS : Epoxy Faced Metal Core with Fire Safety Double Seal

Cross Section



■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



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°C 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°C within 2 minutes and the average of the calorimeter shall reach 650°C within 15 minutes. The burn period shall last for 30 minutes. After the burn period the connection is air-cooled down to 100°C or less. After cooling down the flange is depressurized and the pressure is increased again to the test pressure and held for 5 minutes.

The maximum leak rate is 1 ml/inch per minute of mean gasket circumference.

- | | |
|--------------------------------------|-----------------------|
| - Leak rate acceptance Criteria | : Max 1.0 ml/inch/min |
| - STARTEC® 9320-OFS Leak rate Result | : 0.2 ml/inch/min |



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B-4. JIC 9320-DOS : Epoxy Faced Metal Core with Tandem Seal

Cross Section



■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

B-5. JIC 9320-HP : Epoxy Faced Metal Core with High Pressure Double Seal

Cross Section



■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



STARTEC[®] High Performance Insulation

Gasket Retainer Material Physical Properties

ASTM	Test Method	G-10	G-11
D149	Dielectric Strength [Volts/mil]	619	704
D695	Compressive Strength [psi]	50,000	59,000
D229	Water Absorption [%]	0.10	0.09
D256	IZOD Impact Strength [ft-lbs/inch]	12.2	14.9
D638	Tensile Strength [psi]	50,000	60,000
D732	Shear Strength [psi]	22,480	25,500
	Temperature Range[°F]	Max 150 °C (Max 302 °F)	Max 200 °C (Max 392 °F)

* Above testing value is typical properties only

Seal Material Application Range

Code	General Characteristics	Temp, Range(°C)
PTFE	Polytetrafluoroethylene (Superior in heat, oil & chemical resistance)	-200 ~ 200
NR	Natural Rubber (Excellent mechanical properties)	-20 ~ 100
NBR	Acrylonitrile Butadiene Rubber (Excellent oil resistance)	-30 ~ 120
CR(Neoprene)	Chloroprene Rubber (Excellent weather, ozone, heat & flame resistance)	-30 ~ 120
EPDM	Ethylene Propylene Diene Monomer (Excellent ageing & ozone resistance)	-40 ~ 150
SL(Silicon)	Silicone Rubber (Excellent in heat, cold & chemical resistance)	-60 ~ 200
SBR	Styrene Butadiene Rubber (Excellent in ageing & abrasion resistance)	-20 ~ 100
FKM(Viton)	Fluoroelastomer (Superior in heat, oil & chemical resistance)	-20 ~ 200
IIR(Butyl)	Isobutylene Isoprene Rubber (Excellent ozone, weather, electricity resistance)	-40 ~ 120



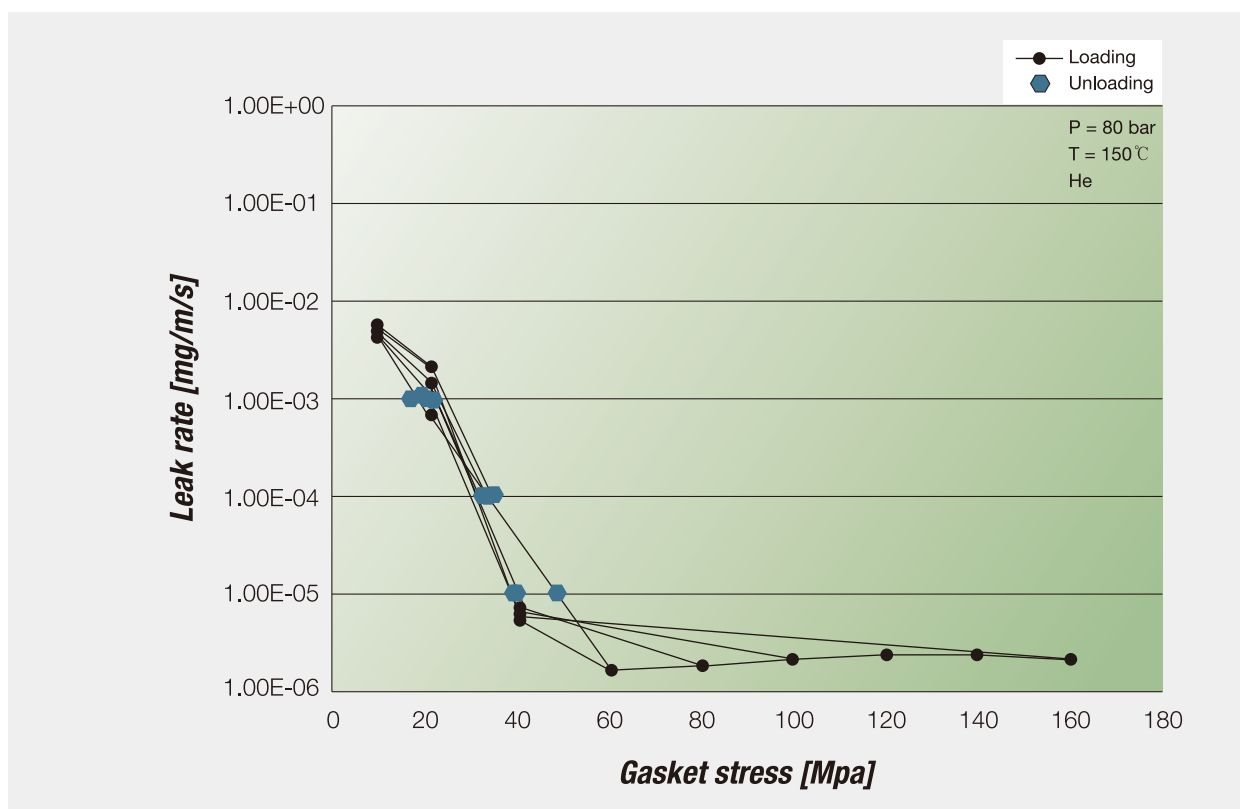
STARTEC[®] High Performance Insulation

Gasket Performance Data

Test	9230-ES(PTFE Seal)	9320-OS
Compression Test EN13555 at 150 °C	100 MPa Gasket Stress	200 MPa Gasket Stress
EN13555 Leakage Test 40 bar Helium at R.T Stress 5 MPa to 80MPa	1.0×10^{-3} mg/m/s Leakage rate	1.0×10^{-3} mg/m/s Leakage rate
Extreme Leakage Test 80 bar Helium at 150 °C Stress 10MPa to 160MPa	N/A	2.5×10^{-6} mg/m/s at 160MPa Leakage rate

* Above testing value is typical properties only

Leakage curve STARTEC[®] 9320-OS



Completed leakage test in accordance with EN13555, above chart prove that STARTEC 9320-OS performs stable and excellent sealability under high pressure of 80bar and 150 °C temp condition.

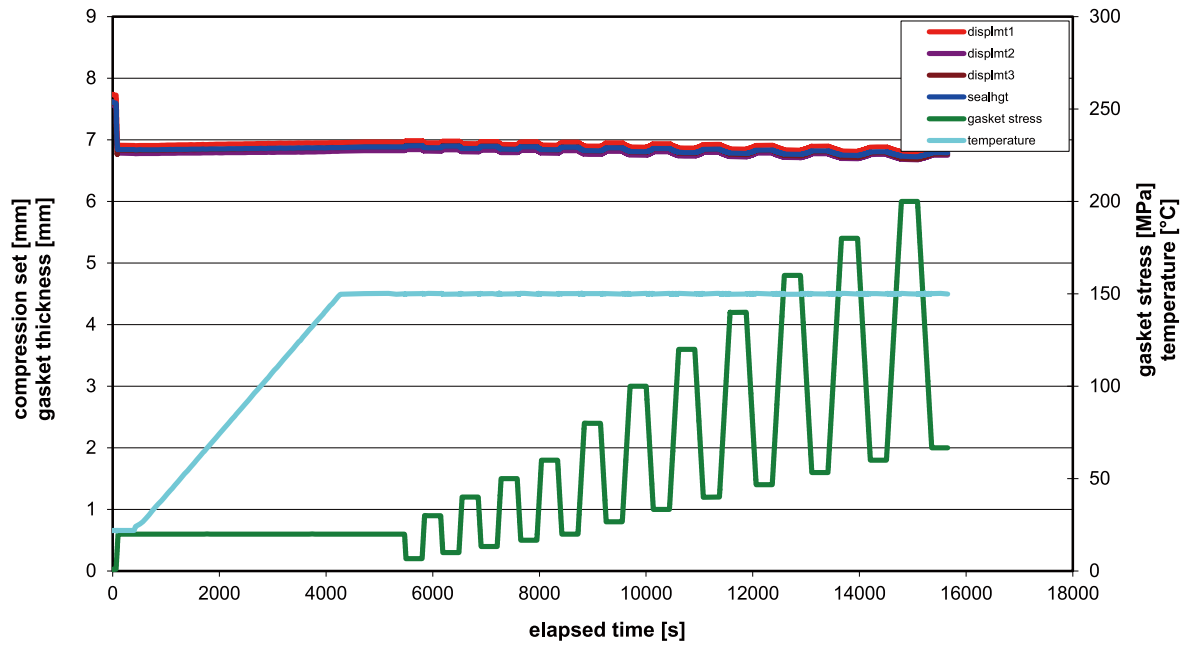


EN 13555 LEAKAGE Curve - 9320-OS

Test condition : EN 13555 at 150 °C

Seating stress : 10 MPa to 200 MPa

Course of test
STARTEC® 9320-OS Creep Compression Test



Gasket stress MPa	Modulus of elasticity MPa	Gasket thickness mm
20	4,575	6.88
30	4,849	6.87
40	5,417	6.86
50	5,612	6.85
60	6,156	6.84
80	7,326	6.82
100	8,501	6.81
120	10,101	6.79
140	11,173	6.78
160	12,594	6.76
180	13,291	6.74
200	14,254	6.73

* Above testing value is typical properties only



STARTEC[®] *High Performance Insulation*

JEIL E&S R&D Center

Expanded State of the Art R&D Center in 2014

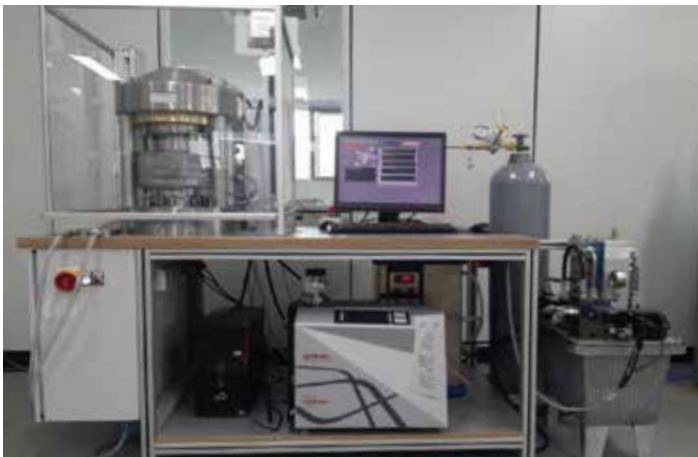
Brand New Development & Perform Various Gasket & Parameter Test



JEIL E&S R&D Center

Performance Test Equipment

Gasket Multi tester
Gas Leakage Tester
Compressibility & Recovery Tester
Tensile Strength Tester
Steam Cycle Tester
Electric hydraulic pump
Recovery Tester
Compression Tester
Hydraulic Torque Machine & Wrench



TEMES fl.ai-1 Gasket Multi Tester

Available Gasket parameter & Performance

DIN 28090
DIN 52913
DIN 3535
EN 13555
VDI 2440
Non Specified Test mode



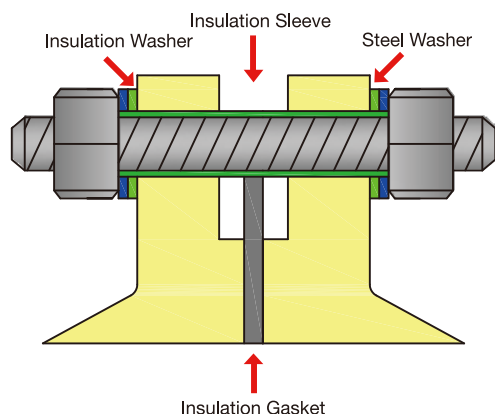
JEIL E&S Training & Promotion Center



STARTEC[®] High Performance Insulation

Insulation Set & Parts

Insulation Double Washer Set



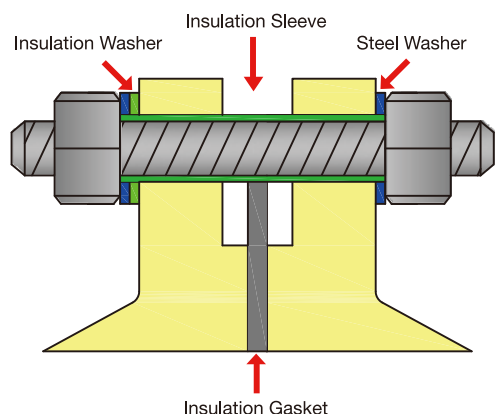
● Application

Steel Washer : 2ea per bolt
Insulation Washer : 2ea per bolt
Full Length Insulation Sleeve : 1ea per bolt

1. Standard Insulation Kit Composition

- Complete insulation for flange protection
- Additional usage protection for possible straighten of nuts & bolts
- Zinc Plate C/S, Galvanized, Stainless Steel
- Fit with standard flange bolt facing

Insulation Single Washer Set



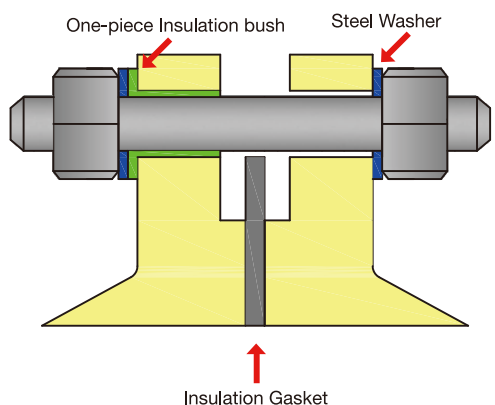
● Application

Steel Washer : 2ea per bolt
Insulation Washer : 1ea per bolt
Half Length Insulation Sleeve : 1ea per bolt

1. Economical Double Washer Composition

- Single Washer applicable on buried purpose in CP (Cathodic Protection) system
- Fit with standard flange bolt facing

One-piece Insulation bush Set



● Application

Steel Washer : 2ea per bolt
Half Length one-piece Insulation bush :
2ea per bolt(or 1ea available)

1. One-piece Insulation Bush Composition

- Specially fabricated to suitable on standard bolt hole
- Can be replaced with minimum length for urgent usage
- Easy installation & assembly



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Insulation Set Insulation Washer materials

ASTM	Test Method	G-3	G-10	G-11	G-10CR	MICA
		Glass phenolic Laminate	Glass Reinforced Epoxy (GRE)		GRE for Cryogenic	-
D149	Dielectric Strength [Volts/mil]	600	558	734	670	508
D695	Compressive Strength [psi]	76,000	50,000	60,000	65,000	-
D229	Water Absorption [%]	2.00	0.06	0.08	0.10	-
	Temperature Range [°F]	Max 347	Max 302	Max 392	-454 ~ 275	Max 1,832
	Temperature Range [°C]	Max 175	Max 150	Max 200	-270 ~ 135	Max 1,000

* Above testing value is typical properties only

Insulation Set Insulation Sleeve materials

ASTM	Test Method	G-3	G-10	G-11	MICA
		Glass phenolic Laminate	Glass Reinforced Epoxy (GRE)		-
D149	Dielectric Strength [Volts/mil]	600	558	734	508
D695	Compressive Strength [psi]	76,000	50,000	60,000	-
D229	Water Absorption [%]	2.00	0.06	0.08	-
D790	Flexural Strength [psi]	1,800,000	-	-	-
	Temperature Range [°F]	Max 347	Max 302	Max 392	Max 1,832
	Temperature Range [°C]	Max 175	Max 150	Max 200	Max 1,000

* Cryogenic Service Line : PCTFE sleeve available(-270 °C ~ 135 °C)

* NOMEX sleeve material available

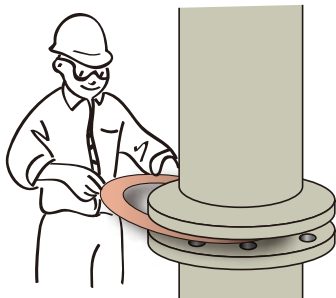
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STARTEC[®] High Performance Insulation

Installation Procedure for ISO-KIT

A. Install gasket



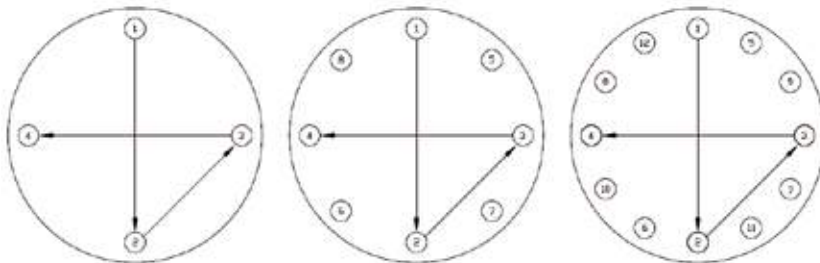
- Step1. Ensure gasket is the specified size and material
- Step2. Examine the gasket to ensure it is free of defects
- Step3. Carefully insert the gasket between the flanges
- Step4. Make sure the gasket is centered between the flanges
- Step5. Bring flanges together, ensuring the gasket isn't pinched or damaged

B. Install and tighten fasteners

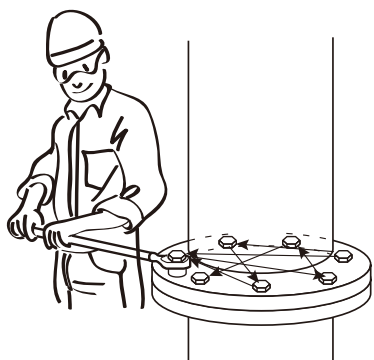
Always use proper tools
calibrated torque wrench or other controlled tensioning device

Consult your gasket manufacturer
for guidance on torque specifications

Always torque in a cross bolt tightening pattern



C. Tighten the nuts in multiple steps



- Step 1** tighten all nuts initially by hand
(larger bolts may require a small hand wrench)
- Step 2** torque each nut to ~30% of full torque
- Step 3** torque each nut to ~60% of full torque
- Step 4** torque each nut to full torque, again still using the cross bolt tightening pattern (larger diameter flanges may require additional tightening passes)
- Step 5** apply at least one final full torque to all nuts in a clock wise direction until all torque is uniform (larger diameter flanges may require additional passes)



STARTEC® High Performance Insulation

Torque Table for STARTEC®

Applicable Standard : ASME B16.5, ASME B16.47 Series A Flange(Raised Face / Flat Face)

(unit : ft.lbs)

Torque Table for STARTEC® 9210/9220/9230/9320 Series												
NPS	150LB		300LB		600LB		900LB		1500LB		2500LB	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1/2	26	47	26	47	26	47	95	173	76	156	76	156
3/4	26	47	53	96	53	96	95	173	76	156	76	156
1	26	47	53	96	53	96	154	282	123	254	123	249
1-1/4	32	47	63	96	53	96	154	282	123	254	185	381
1-1/2	32	47	95	173	95	173	231	424	185	381	275	573
2	63	96	63	96	63	96	184	282	154	254	185	381
2-1/2	85	96	114	173	114	173	277	424	231	381	275	573
3	95	96	114	173	114	173	184	282	343	573	389	819
4	85	96	114	173	184	282	412	637	487	819	707	1,502
5	114	173	114	173	277	424	584	910	883	1,502	1,162	2,493
6	133	173	114	173	277	424	412	637	666	1,128	1,778	3,835
8	171	173	184	282	412	637	799	1,254	1,144	1,956	1,778	3,835
10	184	282	277	424	584	910	799	1,254	1,810	3,120	3,597	7,826
12	215	282	412	637	584	910	799	1,254	2,223	3,835	4,848	10,589
14	277	424	412	637	799	1,254	1,060	1,669	3,227	5,601	-	-
16	277	424	584	910	1,060	1,669	1,373	2,173	4,497	7,826	-	-
18	412	637	584	910	1,373	2,173	2,172	3,467	6,061	10,589	-	-
20	412	637	584	910	1,373	2,173	2,667	4,262	7,950	13,916	-	-
24	584	910	1,060	1,669	2,172	3,467	5,396	7,826	12,834	22,555	-	-
26	681	910	1,373	2,173	2,172	3,467	4,848	11,765	-	-	-	-
28	681	910	1,373	2,173	2,667	4,262	6,360	15,463	-	-	-	-
30	681	910	1,742	2,770	2,667	4,262	6,360	15,463	-	-	-	-
32	1,060	1,669	2,172	3,467	3,873	6,223	8,212	20,020	-	-	-	-
34	1,060	1,669	2,172	3,467	3,873	6,223	10,328	25,210	-	-	-	-
36	1,060	1,669	2,667	4,262	5,396	6,956	10,328	25,210	-	-	-	-
38	1,060	1,669	1,060	1,669	3,873	6,223	10,328	25,210	-	-	-	-
40	1,060	1,669	1,373	2,173	3,873	6,223	10,328	25,210	-	-	-	-
42	1,236	1,669	1,373	2,173	5,396	6,956	10,328	25,210	-	-	-	-
44	1,236	1,669	1,742	2,770	5,396	6,956	12,710	31,091	-	-	-	-
46	1,236	1,669	2,172	3,467	5,396	6,956	15,592	38,174	-	-	-	-
48	1,236	1,669	2,172	3,467	7,273	11,765	15,592	38,174	-	-	-	-

*Remark

1. ASME B16.5 Flange : NPS 1/2" to 24"
2. ASME B16.47 Flange : NPS 26" to 48"(Series A : MSS SP-44 Flange)



STARTEC[®] High Performance Insulation

Torque Table for STARTEC[®]

Applicable Standard : JIS B 2220(KS B1503) Flange (Raised Face / Flat Face)

(unit : kgf.cm)

Torque Table for STARTEC [®] 9210/9220/9230/9320 Series										
NPS	5K		10K		16K		20K		30K	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
10A	175	385	306	612	306	612	306	612	777	1,243
15A	175	385	306	612	306	612	306	612	777	1,243
20A	175	419	306	612	306	612	306	612	777	1,243
25A	210	419	932	1,553	932	1,398	932	1,553	777	1,398
32A	367	612	932	1,553	932	1,398	932	1,553	777	1,398
40A	367	612	932	1,553	932	1,398	932	1,553	1,820	2,731
50A	367	612	932	1,553	932	1,398	932	1,553	777	1,398
65A	551	735	1,087	1,864	932	1,398	932	1,553	1,820	2,731
80A	932	1,553	932	1,553	1,820	2,731	1,820	2,731	1,820	2,731
90A	932	1,553	932	1,553	1,820	3,034	1,820	2,731	2,512	3,350
100A	932	1,553	932	1,553	1,820	2,731	1,820	2,731	2,512	3,350
125A	932	1,553	1,820	3,034	2,512	3,769	2,512	3,769	2,512	3,350
150A	932	1,553	1,820	3,034	2,512	3,769	2,512	3,769	3,145	4,718
175A	1,820	3,034	1,820	3,034	-	-	-	-	-	-
200A	1,820	3,034	1,820	3,034	2,512	3,769	2,512	3,769	3,145	4,718
225A	1,820	3,034	1,820	3,034	-	-	-	-	-	-
250A	1,820	3,034	2,512	3,769	3,145	4,718	3,145	4,718	6,309	9,464
300A	1,820	3,034	2,931	3,769	3,145	4,718	3,145	4,718	6,309	9,464
350A	2,512	3,769	2,512	3,769	6,309	9,464	6,309	9,464	6,309	9,464
400A	2,512	3,769	3,145	5,242	6,309	9,464	6,309	9,464	11,097	16,645
450A	2,931	3,769	3,145	5,242	6,309	9,464	6,309	9,464	-	-
500A	2,931	3,769	3,145	5,242	6,309	9,464	6,309	9,464	-	-
550A	3,670	5,242	6,309	10,516	11,097	16,645	11,097	16,645	-	-
600A	3,670	5,242	6,309	10,516	11,097	16,645	11,097	16,645	-	-
650A	3,670	5,242	6,309	10,516	11,097	16,645	22,443	37,405	-	-
700A	3,670	5,242	6,309	10,516	14,493	19,324	22,443	37,405	-	-



STARTEC® High Performance Insulation

Gasket Dimension Table : STARTEC® Series

ASME B16.5 : 2013 - NPS 1/2" ~ 24"

ASME B16.47 : 2006 – NPS 26" ~ 48" (Series A)

NPS	Gasket ID	Gasket OD					
		150LB	300LB	600LB	900LB	1500LB	2500LB
1/2"	12.7	44.4	50.8	50.8	60.4	60.4	66.7
3/4"	19.1	54.0	63.6	63.6	66.7	66.7	73.0
1"	25.4	63.5	69.9	69.9	76.2	76.2	82.6
1-1/2"	31.8	73.0	79.4	79.4	85.7	85.7	101.6
1-1/4"	38.1	82.5	92.1	92.1	95.2	95.2	114.3
2"	52.5	101.7	108.0	108.0	139.7	139.7	142.8
2-1/2"	62.7	120.7	127.0	127.0	161.9	161.9	165.1
3"	77.9	133.4	146.1	146.1	165.1	171.5	193.7
3-1/2"	90.1	158.8	162.0	158.8	-	-	-
4"	102.3	171.5	177.8	190.5	203.3	206.4	231.7
5"	128.2	193.7	212.8	238.1	244.5	250.8	276.2
6"	155.0	219.1	247.7	263.5	285.8	279.4	314.3
8"	202.7	276.3	304.8	317.5	355.6	349.3	384.2
10"	254.5	336.6	358.8	396.9	431.8	431.8	473.1
12"	304.8	406.4	419.1	454.1	495.3	517.5	546.1
14"	336.6	447.7	482.7	488.9	517.5	574.7	-
16"	387.4	511.2	536.6	561.9	571.6	638.1	-
18"	438.2	546.2	593.7	609.6	635.0	701.7	-
20"	489.0	603.3	650.9	679.5	695.3	752.4	-
24"	590.6	714.4	771.5	787.4	835.0	898.5	-
26"	641.4	771.5	831.9	863.6	879.5	-	-
28"	692.2	828.7	895.4	911.2	943.0	-	-
30"	743.0	879.5	949.4	968.4	1006.4	-	-
32"	793.8	936.6	1003.3	1019.2	1070.0	-	-
34"	844.6	987.4	1054.1	1070.0	1133.5	-	-
36"	895.4	1044.5	1114.4	1127.1	1196.9	-	-
38"	946.2	1108.1	1050.9	1101.7	1196.9	-	-
40"	997.0	1158.9	1111.3	1152.5	1247.7	-	-
42"	1047.8	1216.0	1162.1	1216.0	1298.5	-	-
44"	1098.6	1273.1	1216.0	1266.8	1365.3	-	-
46"	1149.4	1323.9	1270.0	1323.9	1431.9	-	-
48"	1200.2	1381.1	1320.8	1387.5	1482.7	-	-



STARTEC[®] High Performance Insulation

Gasket Dimension Table : STARTEC[®] Series

JIS B2220 : 2004

NPS	Gasket ID	Gasket OD				
		5K	10K	16K	20K	30K
10	18.0	43.0	50.0	50.0	50.0	56.0
15	22.0	48.0	55.0	55.0	55.0	61.0
20	28.0	53.0	60.0	60.0	60.0	66.0
25	35.0	63.0	71.0	71.0	71.0	76.0
32	43.0	75.0	81.0	81.0	81.0	86.0
40	49.0	80.0	86.0	86.0	86.0	97.0
50	61.0	90.0	101.0	101.0	101.0	111.0
65	77.0	115.0	121.0	121.0	121.0	137.0
80	90.0	126.0	131.0	137.0	137.0	147.0
90	102.0	136.0	141.0	147.0	147.0	160.0
100	115.0	146.0	156.0	162.0	162.0	170.0
125	141.0	181.0	187.0	200.0	200.0	205.0
150	167.0	211.0	217.0	235.0	235.0	248.0
175	192.0	237.0	242.0	-	-	-
200	218.0	257.0	267.0	280.0	280.0	293.0
225	244.0	282.0	287.0	-	-	-
250	270.0	322.0	330.0	353.0	353.0	357.0
300	321.0	367.0	375.0	403.0	403.0	417.0
350	359.0	410.0	420.0	447.0	447.0	462.0
400	410.0	470.0	483.0	507.0	507.0	521.0
450	460.0	530.0	538.0	572.0	572.0	-
500	513.0	580.0	593.0	627.0	627.0	-
550	564.0	638.0	647.0	681.0	681.0	-
600	615.0	688.0	697.0	731.0	731.0	-
650	667.0	743.0	747.0	-	-	-
700	718.0	793.0	807.0	-	-	-
750	770.0	847.0	867.0	-	-	-
800	820.0	897.0	917.0	-	-	-
850	872.0	947.0	967.0	-	-	-
900	923.0	997.0	1017.0	-	-	-
1000	1025.0	1097.0	1121.0	-	-	-
1100	1130.0	1207.0	1231.0	-	-	-
1200	1230.0	1317.0	1341.0	-	-	-
1350	1385.0	1472.0	1495.0	-	-	-
1500	1540.0	1627.0	1655.0	-	-	-

* Below 6" design availability for 9320-DOS & 9320OFS are required to discuss with JEIL's Tech Team



STARTEC[®] High Performance Insulation

Gasket Dimension Table : STARTEC[®] Series

EN 1092-1 : 2007

NPS	Gasket ID	Gasket OD					NPS	Gasket ID	Gasket OD
		PN 6	PN 10	PN 16	PN 25	PN 40			PN 63
DN10	18	49	46	46	46	46	DN10	18	56
DN15	22	54	51	51	51	51	DN15	21	61
DN20	27	64	61	61	61	61	DN20	25	72
DN25	34	74	71	71	71	71	DN25	30	82
DN32	43	86	82	82	82	82	DN32	41	88
DN40	49	96	92	92	92	92	DN40	47	103
DN50	61	111	107	107	107	107	DN50	59	113
DN65	77	131	127	127	127	127	DN65	73	138
DN80	89	142	142	142	142	142	DN80	86	148
DN100	115	162	162	162	168	168	DN100	110	174
DN125	141	192	192	192	194	194	DN125	135	210
DN150	169	222	218	218	224	224	DN150	163	247
DN200	220	277	273	273	284	290	DN200	210	309
DN250	273	332	328	329	340	352	DN250	264	364
DN300	324	378	378	384	400	417	DN300	314	424
DN350	356	438	438	444	457	474	DN350	360	486
DN400	407	493	489	495	514	546	DN400	415	543
DN450	458	543	539	555	564	571	DN450	-	-
DN500	508	598	594	617	624	628	DN500	-	-
DN600	610	699	695	734	731	747	DN600	-	-
DN700	712	814	810	804	833	-	DN700	-	-
DN800	813	920	917	911	942	-	DN800	-	-
DN900	915	1020	1017	1011	1042	-	DN900	-	-
DN1000	1016	1130	1124	1128	1154	-	DN1000	-	-
DN1200	1220	1347	1341	1342	-	-	DN1200	-	-
DN1400	1420	1554	1548	1542	-	-	DN1400	-	-
DN1600	1620	1784	1772	1764	-	-	DN1600	-	-
DN1800	1820	1981	1972	1964	-	-	DN1800	-	-
DN2000	2020	2188	2182	2168	-	-	DN2000	-	-

* The Insulation Set is not applicable under the condition of PN6, DN25



STARTEC[®] *High Performance Insulation*

Various Industrial Application

- ◎ Importance of Safety Construction
Highly Care for Safety in Plant Expansion,
New Project Construction, Leakage Protection etc
- ◎ Industrial Facilities Re-Building
Old Plant Maintenance, Piping Facilities Shut Down, MRO Caring
in Oil & Gas, processing systems
- ◎ Rapid Growth of Emerging Off Shore & Shipbuilding
High Technology Sealing Demand in Off Shore/Emerging Market
LNG, lading, liquefaction, regasification and processing
- ◎ Module Process & Total Solution
Production Efficiency, New Technical Solution Providing
Necessary to prevent loss, damage etc



Solution for Value Usage

- ✓ Unnecessary of High Bolting Stress & Reducing the Stress on Installation
- ✓ Stable Usage in Vibration, Hammering or Other Similar Sudden Looses
- ✓ Low Thermal Expansion & Deformation, Changes
- ✓ High Compressive Retainer Considerably Reduce the Effect of Elastic Interaction
- ✓ Suitable on Leakage, Blowouts & Usage Concerns
- ✓ Maintenance Cost Saving, Flange Damage Protection & In-Time Support
- ✓ International Satisfaction & Independent Total Solution

Flange Insulation Set Evolution!!

1890's

1950's

From 2013



Safety Sealing



Corrosion Protection



Critical Service



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