

# FLANGE KITS

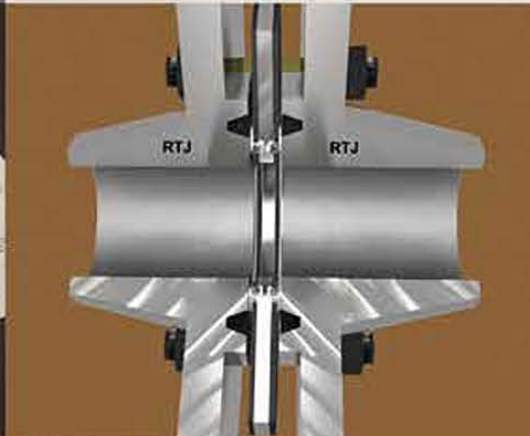
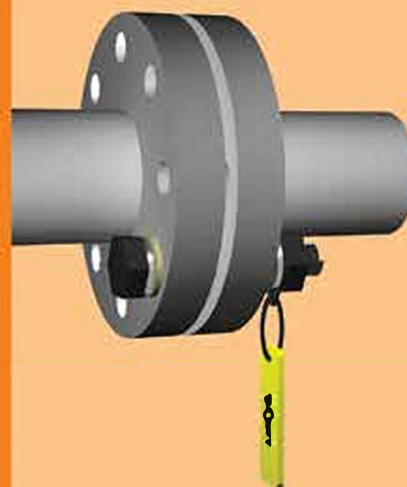
sealing/isolation gaskets



## ISOTEK™ SEALING/ ISOLATION GASKETS FLANGE KITS

Engineered Sealing Solutions  
for Flanged Pipe Connections

Energy · Offshore · Fire Safe  
Water · Wastewater



# LAMONS®

Sealing Global - Servicing Local

# FLANGE KITS

sealing/isolation gaskets



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24/02 2020

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## Description of Icons

Lamons icons have been developed to visually identify the industry, applications, performance/value, engineering benefits and innovative design features for Lamons branded sealing and isolation gaskets. Please refer to the adjacent icons and descriptions. Throughout the manual, these icons will appear to assist with product selection for your application needs.



Energy Applications



Water and Wastewater Applications



Basic Performance. An economical solution for sealing/isolating applications. Routine maintenance suggested.



Value added performance. Enhanced sealing/isolating features for a more durable solution.



Engineered performance. Optimized sealing/isolating characteristics for high performance and longevity in critical applications.



An engineered product with advantageous sealing/isolating features.



The X-Factor for critical sealing/isolating applications.



A fire safe gasket (API 6FB 3rd Edition) engineered for extreme, high reliability sealing and electrical isolation critical service applications.

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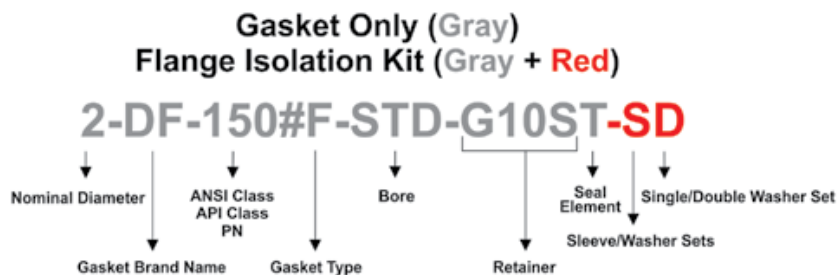
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## How to Order - General Guidelines

Pipe Size (NPS)	Lamons Gasket	Pressure Class (ANSI, API, PN)	Gasket Type	Bore	Retainer/Core	Seal	Sleeve/Washer Single (S) or Double (D)
ANSI = 1/2" - 48" API = 1-13/16" - 26-3/4" DN = 15mm - 1200mm	DF	ANSI (#) = 150-2500 API (K) = 2-15 PN = 20-420	E, F	STD - 00	G10S, G11S, G10I6, G11I6, G10I8, G11I8, G10SD, G11SD, G10UD, G11UD	T,N,V	E, V, S, T, XX (See page 19 for Sleeve/Washer Descriptions)
ANSI = 1/2" - 120" API = 1-13/16" - 26-3/4" DN = 15mm - 3000mm	IG	ANSI (#) = 150-1500 API (K) = 2-5 PN = 20-250	E, F	STD - 00	PH, G10, G11	T, N, S, V, E	E, V, S, T, XX (See page 19)
ANSI = 1/2" - 24" API = 1-13/16" - 21-1/4" DN = 15mm - 600mm	IM	ANSI (#) 150-300 API (K) = 2-3 PN = 20-50	E	STD, 40, 80	PH	F	E (See page 19)
ANSI = 1/2" - 48" API = 1-13/16" - 26-3/4" DN = 15mm - 1200mm	DFS	ANSI (#) 150-2500 API (K) = 2-15 PN = 20-420	E, F	STD - 00	G10S6, G11S6, G10I6, G11I6, G10I8, G11I8, G10SD, G11SD, G10UD, G11UD	KMT	F, TF (See Page 19)
ANSI = 1/2" - 24" API = 1-13/16" - 21-1/4" DN = 15mm - 600mm	DRG	ANSI (#) 150- 2500 API (K) 2-15 PN = 20-420	F, S	STD-00	S6, I6, I8, SD, UD	K24	Consult Factory

For nominal pipe sizes over 24", identify as Series A or B flange type. For applications not listed in general guidelines, consult factory.

**Bore/Pipe SCH Note:** For pipe sizes 10" and under, STD and SCH 40 have the same dimensions.



Lamons has simplified ordering for the end user, distributor and manufacturer. The Ordering Code Description for a product is the same as the Part Number.

### Ordering Example 1.

DEFENDER™ (Flange Isolation Kit):

**2-DF900#F-STD-G10ST-SD**

2" DEFENDER™ (Stainless Steel Core Retainer with Teflon Seal), 900 ANSI, Gasket Type "F", Schedule 40, G10 Sleeves, G10 and Steel ZP Double Washers.

### Ordering Example 2.

ISOGUARD™ (Gasket Only):

**12-IG150#E-STD-G10E**

12" ISOGUARD™, 150 ANSI, Gasket Type "E", Schedule 40, G10 Retainer with EPDM Seal.

### Ordering Example 3.

DEFENDER™ Rescue Gasket

**4.0-DRG-300#F-STD-S6K24**

4" DEFENDER Rescue Gasket, 300ANSI, Gasket Type "F", Standard Bore, S316 Metal Core, K24 Seals

### Ordering Example 4.

Sleeve and Washer Set Only:

**6-150#-SD**

6", 150ANSI, Standard, Double Washer Set

### Retainer/Core Description

PH = Phenolic

G10 = G10 Retainer

G11 = G11 Retainer

G10S = G10 Isolating Material/SS Core

G11S = G11 Isolating Material/SS Core

G10S6 = G10 Retainer/Kammpro S316

G11S6 = G11 Retainer/Kammpro S316

G10I6 = G10 Retainer/Kammpro Inconel 625

G11I6 = G11 Retainer/Kammpro Inconel 625

G10I8 = G10 Retainer/Kammpro Inconel 825

G11I8 = G11 Retainer/Kammpro Inconel 825

G10SD = G10 Retainer/Kammpro Super Duplex 2507

G11SD = G11 Retainer/Kammpro Super Duplex 2507

G10UD = G10 Retainer/Kammpro Duplex 2505

G11UD = G11 Retainer/Kammpro Duplex 2505

S or S6 = 316 Stainless Steel

I6 = Inconel 625

I8 = Inconel 825

SD = Kammpro Super Duplex 2507

UD = Kammpro Duplex 2505

### Seal Element Description

T = Teflon, N = Nitrile, V = Viton, E = EPDM, S = Silicone,

F = Rubber Feed, KMT = Kammpro Mic/BTFE

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## Lamons (IGT) Intelligent Gasket Tagging Technology

### What's in your flange?

A question that occurs on a regular basis in the field among installers, engineers and onsite inspectors. Lamons is now offering IGT (Intelligent Gasket Tagging) using RFID technology. Radio-frequency identification (RFID) is wireless technology using electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. Lamons IGT will be using UHF technology to enable users to read tags from a distance of 25 feet (860-960MHz) using a handheld RFID reader, which is an advantage in a refinery environment. The tags also include a printed QR code which may be read by a smart phone with a QR code reader app.

### Applications

- ISOTEK products - IsoGuard™, Defender™, Defender™ FS & Defender™ RG Sealing/Isolation Gaskets.

### Features

- Available for ISOTEK products using smart phone QR reader or handheld RFID reader.
- Know what's in your flange, prior to opening for maintenance. No more measuring flanges in the field.
- Installers can verify torque for routine maintenance.
- Onsite inspectors can verify correct specified product was used, after installation.
- Screen shot information and email to Lamons engineering to assist with purchasing or trouble shooting.
- Intrinsically safe.



### ISOTEK Standard Information Programmed In Each Tag

- Lamons Company Name
- Order Number
- Line Number
- Month and year of Manufacture
- Part Number
- Suggested Torque Value
- End users, operators and distributors have the ability to have Lamons IGT customized, written with specific information they see fit for their application limited to 48 characters. The Lamons name, the order number, line number and date comes standard and is not customizable. Consult with Lamons engineering for additional information.

NOTE: IGT must be requested upon ISOTEK product order placement.

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### Basic Installation

1. Insert UV resistant tie wrap through IGT Tag and Retainer Washer. Engage tie wrap to desired length.
2. Select the most convenient flange side and bolt location to install tag for easy access in future.
3. Place IGT Washer between 1/8" thick retainer steel back-up washer and nut. Proceed with provided installation instructions.

### IGT "C" Washer has been engineered for easy installation.

- Rectangular washer cut-out is oversized to allow zip tie to pass through easily.
- Can be installed between steel back-up washer and nut.
- Is sized to snap-on or thread-on to pre-existing applications.
- Can easily be removed if threaded or tightened between washers.

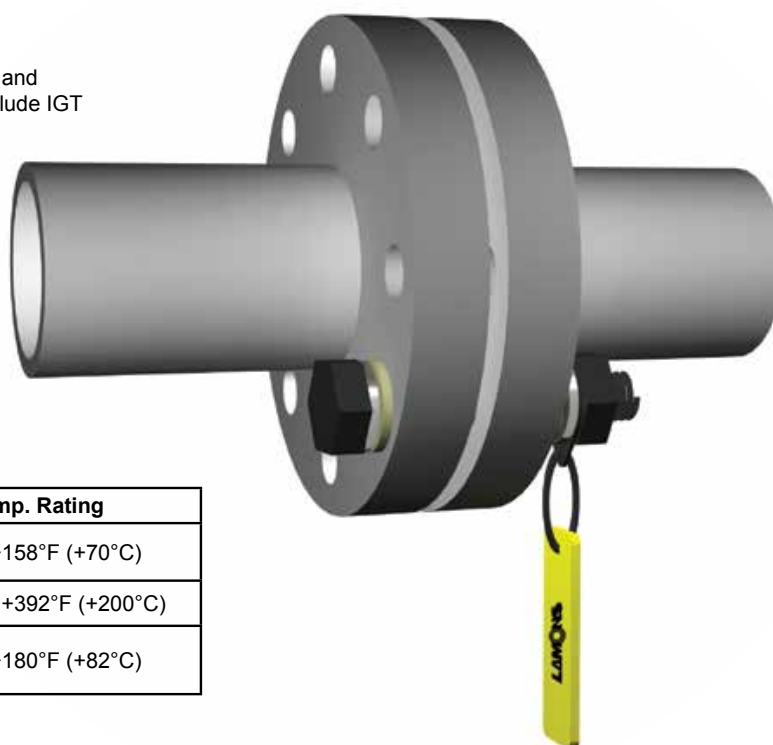


### Specification

Update current sealing/isolation gasket and flange isolation kits specifications to include IGT tags.

### Intelligent Tagging

Each gasket or flange isolation kit to be packaged with intelligent Gasket Tags (IGT). Tags are to include part number, order number, manufacturing date and torque value. IGT tags to be written (coded) for smart phones OR readers.



### Material Property Information

ISOTEK Item	Atmospheric Temp. Rating
IGT	-40°F (-40°C) to +158°F (+70°C)
GRE Tag Washer	-100°F (-73°C) to +392°F (+200°C)
Tie Wraps	-40°F (-40°C) to +180°F (+82°C)

NOTE: All items are U.V. resistant



### ISOTEK IGT Components

The following will be kitted in a bag when IGT tagging is requested:

Item	Quantity
IGT Tag	1
Tie Wraps - 12"	2
IGT Washer	1

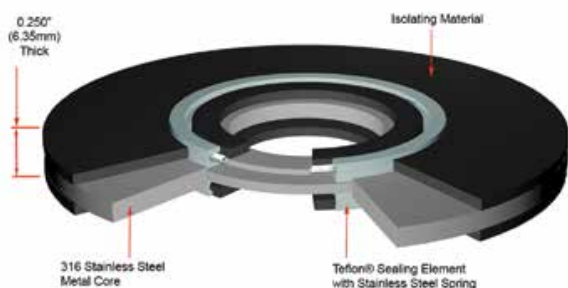
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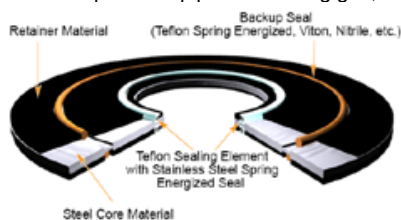
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## DEFENDER™ Sealing/Isolating Gaskets and Flange Isolation Kits



The DEFENDER™ sealing/isolating gasket system is designed for critical/extreme applications. Manufactured with a 316 stainless steel core retainer and laminated on both sides with high strength laminates, the DEFENDER™ gasket is resistant to deforming under load and is used when electrical isolation and corrosion control are required on pipes containing gas, natural gas, oil and other hydrocarbon based medias up to 392°F (200°C).

Available for flat face, raised face and ring type joint flanges from 1/2" to 48" (including corresponding API and DN diameters), ANSI 150-2500#, API 2-15K and PN20-PN420, the DEFENDER™ gasket is an engineered solution for trouble-free operation that eliminates costly leaks and provides a solution for fugitive emissions. Manufactured with an innovative industry first Press-n-Lock™ "Glue-Less Seal & Groove Technology" that combines a press-in, pressure activated and spring energized seal with a unique groove that retains the seal element without the use of glue on key contact surfaces! The Press-n-Lock™ feature provides a higher confidence in sealing.



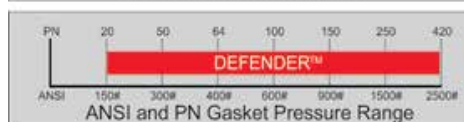
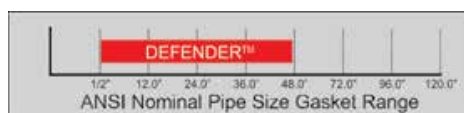
The DEFENDER™ Tandem Sealing/Isolation Gaskets utilizes Tandem Seal Configuration (two seals per gasket face) for subsea and API 10K-15K applications. The backup Viton O-ring Seals are bidirectional and can thus stop external pressure from the sea water while the Spring Energized PTFE main seal stops the internal pipe pressure.

### Applications

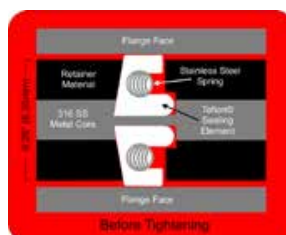
- DEFENDER™ gaskets were engineered for extreme, high reliability sealing and electrical isolation critical service applications.
- High Pressure Flanges: Up To 2500#, API 15K or PN420.
- Critical/Extreme Service
- High pH Service.
- H<sub>2</sub>S/CO<sub>2</sub> Service.
- Locations where end users prefer an integral seal element.

### General Features

- Seals/isolates pressure ratings through ANSI 2500#, API 15K and PN420 service.
- Spring energized seal element.
- Press-n-Lock™ "Glue-Less Seal Groove Technology".
- Inconel and Super Duplex Steel Cores available upon request.

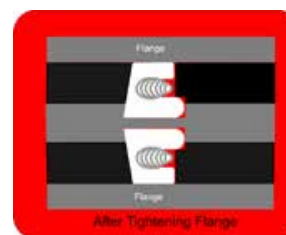


For applications outside ranges shown, consult factory.



### Before Tightening

The flange face makes initial contact with the sealing element which protrudes above the gasket retainer surface (isolation material) laminated on both sides of the stainless steel core.



### After Tightening Flange

contained within the stainless steel core to provide superior sealing strength for critical/extreme sealing applications. The spring prevents over-compression of the Teflon® seal thereby allowing the pressure of the media within the pipe to activate the seal.

G10 or G11, laminated on both sides, provides the dielectric strength needed to isolate the flanged application and has the compressive strength to easily withstand high bolt loads.

### After Tightening

The Spring Energized, Pressure Activated Sealing System is initiated. The base of the Teflon® seal is



### Type "E" Gasket

Fits over the bolt holes and extends to the O.D. of the flange to assist contractors as the bolt holes automatically center the gasket. Provides excellent protection against shorting out of the corrosion mitigation hardware.



### Type "F" Gasket

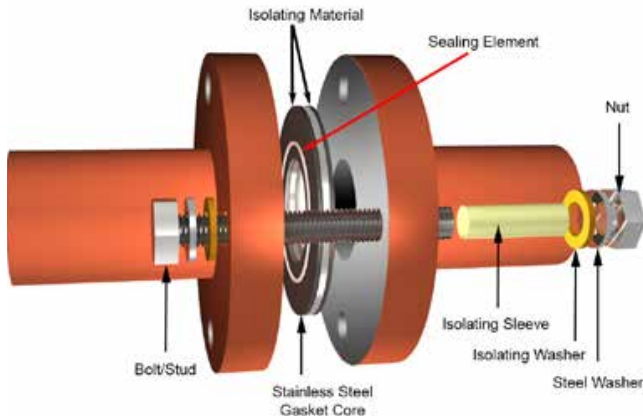
Fits within the bolt hole circle of the flange and extends to the I.D. of the bolt circle providing good protection against shorting out of the corrosion mitigation hardware.

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### Facts

- Proven design based on the industry leader.
- Enhanced with innovative engineered features.
- Tested to Shell Certification Standards.
- Industry First! The Press-n-Lock™ “glueless seal & groove technology, an engineered design, has significant sealing advantages versus other brands.”
- Made in the U.S.A.

### DF Retainer Material (G10S, G11S)

- 1/4" (.250") total thickness
- Metal Core .120" thick - 316SS
- Laminate .065" per side

### DFT Retainer Material (G10S, G11S)

- 0.314" total thickness.
- Metal Core 0.250" thick - 316SS.
- Laminate 0.032" per side.

### Gasket/Retainer Material Specifications

ASTM	TEST METHOD	G10	G11
D149	Dielectric Strength Volts/Mil Short Time	750-800	550
D695	Compressive Strength (psi)	65,000	63,000
D570	Water Absorption (%)	0.05	0.10
D790	Flexural Strength (psi)	65,000	60,000
D256	IZOD Impact Strength (Ft-Lbs/Inch)	14.00	12.00
D638	Tensile Strength (psi)	50,000	42,000
D732	Shear Strength (psi)	21,000	21,000
D952	Bond Strength (lb)	2,600	2,200
	Temperature - Operating	Cryogenic -238°F (-150°C) to +302°F (+150°C)	-100°F (-73°C) to +392°F (+200°C)

**Note:** Operating Temperature for Gaskets and Flange Isolation Kits is based off the Gasket Retainer Temperature. Seal element temperature does not dictate the min. and max. gasket operating temperature.

### Seal Element Materials

- PTFE (Teflon®) Spring Energized. Spring is Stainless Steel
- Nitrile
- Viton®

### Sealing Element Material Specifications

Sealing Element	Temperature - Operating
Teflon® (PTFE)	Cryogenic to +525°F (+274°C)
Nitrile	-40°F (-40°C) to +250°F (+121°C)
Viton®	-20°F (-29°C) to +392°F to (+200°C)

### Industries (Oil, Gas)

Production Fields, Petroleum Marketing Facilities, LNG/SNG Systems, Pipeline and Distribution Piping, Refineries.

### DEFENDER™ Flange Isolation Kits

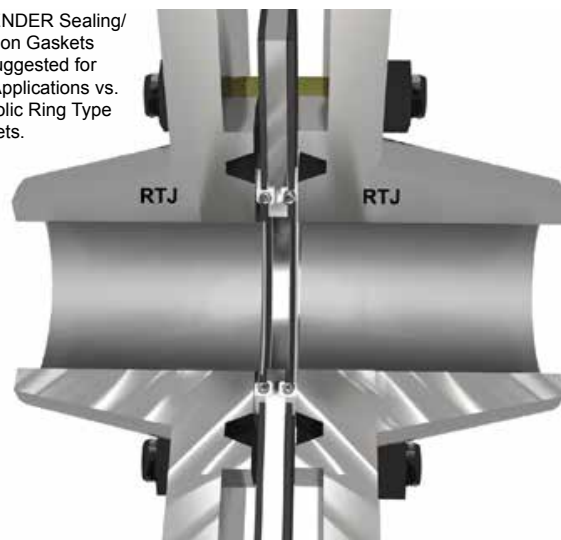
For a flange isolation kit, sleeves and washers are needed. Generally, 95% of steel core gasket flange isolation kits (DEFENDER™ Kits) are sold with G10 sleeves and G10 double washer sets.

### Suggested Sleeve/Washer Set

SD = Standard (G10 Sleeves, Steel ZP Washers and G10 Washers) - Double Washer Set.



DEFENDER Sealing/ Isolation Gaskets are suggested for RTJ Applications vs. Phenolic Ring Type Gaskets.



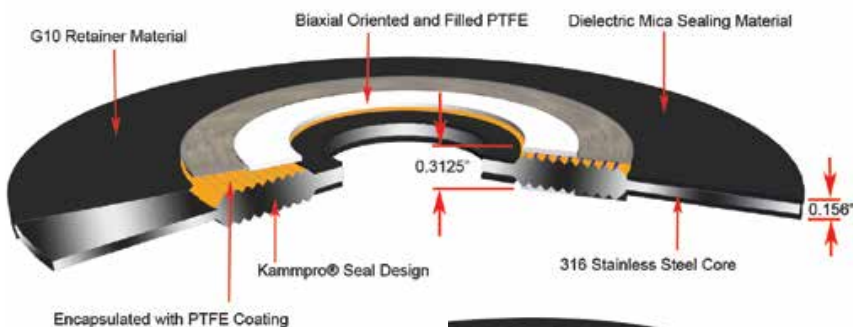
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## DEFENDER™ FS Sealing/Isolating Gaskets and Flange Isolation Kits



The DEFENDER FS™ sealing/isolating gasket is designed to withstand the rigorous API standard 6FB (Third Edition) test and therefore provides a solution for those who want to electrically isolate their flange while also requiring protection against the introduction of fire in and around the flange.

The objective of the test is to monitor the total leakage for the duration of the burn/cool-down cycle and during re-pressurization. Leakage was determined by the total water level drop through a visual sight gauge during the burn/cool-down cycles, by manually catching the water in a calibrated container during re-pressurization.

The results concluded that the Defender FS Gasket was able to maintain its fire safe characteristics throughout the entirety of the test. During the 30 minute burn and 30 minute cool down period, the measured leakage was 0 ml/min versus the allowable rate of 22.765 ml/min. The leakage rate during the re-pressurization cycle was 5 ml/min versus the allowable rate of 22.765 ml/min.

Based on years of technological experience, the DEFENDER FS™ sealing/isolating gasket not only meets but exceeds the pressure-containing capabilities in standard 6FB (Third Edition) as outlined by API.

### General Features

- Tested and Certified to API 6FB (Third Edition).
- Two integral robust sealing elements for sealing and isolating in an engineered Fire Safe design.
- Serves as a sealing/isolation for Fire Safe Applications.
- Incorporates industry proven Kammpro® sealing technology.
- Patent Pending Design.
- Inconel and Super Duplex Steel Cores available upon request.

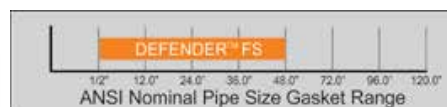
### Applications

DEFENDER FS gaskets were engineered for Fire Safe, extreme, high reliability sealing and electrical isolation critical service applications

- High Pressure Flanges: 2500#, API 15K or PN420.
- Critical/Extreme service
- High Ph service.
- H<sub>2</sub>S/CO<sub>2</sub> service.
- Locations where end users prefer an integral seal element and when highly volatile fluids are present.

### Sizes

- 1/2" through 48" diameter.
- Available as "E" or "F" Type Gaskets.

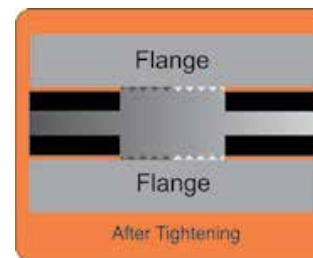


For applications outside ranges shown, consult factory.



### Before Tightening

The flange face makes initial contact with the sealing elements which protrude above the gasket retainer surface (isolation material) laminated on both sides of the stainless steel core.



### After Tightening

The sealing elements are compressed into the serrations of the stainless steel retainer.

### Type "E" Gasket

Fits over the bolt holes and extends to the O.D. of the flange to assist contractors as the bolt holes automatically center the gasket. Provides excellent protection against shorting out of the corrosion mitigation hardware.



### Type "F" Gasket

Fits within the bolt hole circle of the flange and extends to the I.D. of the bolt circle providing good protection against shorting out of the corrosion mitigation hardware.



Protect your investment with Fire Safe products at critical applications where Fire is at high risk. The DEFENDER FS is a Fire Safe product that allows a work force at production facilities and Offshore platforms extra time to prevent devastation and harm. Seconds count when valves and flanged applications need to be shut down in emergency situations.

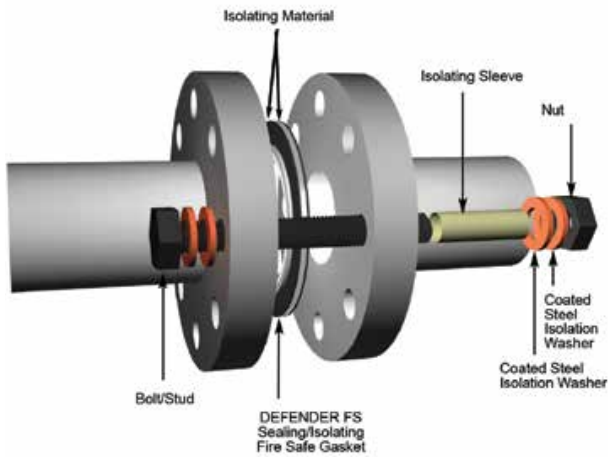


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### Gasket/Retainer Material Specifications Retainer Material (G10S6, G11S6)

- 0.3125" (7.94mm) total thickness
- Metal Core .1/4" (.250"- 6.35mm) thick - 316SS
- Laminate .032" (0.812mm) per side

**Note:** Consider G10S Material for applications of Nominal Pipe Size 12-inch and larger and ANSI pressure class 600# and higher.

ASTM	TEST METHOD	G10	G11
D149	Dielectric Strength Volts/Mil Short Time	750-800	550
D695	Compressive Strength (psi)	65,000	63,000
D570	Water Absorption (%)	0.05	0.10
D790	Flexural Strength (psi)	65,000	60,000
D256	IZOD Impact Strength (Ft-Lbs/Inch)	14.00	12.00
D638	Tensile Strength (psi)	50,000	42,000
D732	Shear Strength (psi)	21,000	21,000
D952	Bond Strength (lb)	2,600	2,200
	Temperature - Operating	Cryogenic -238°F (-150°C) to +302°F (+150°C)	-100°F (-73°C) to +392°F (+200°C)

NOTE: Operating Temperature for Gaskets and Flange Isolation Kits is based off the Gasket Retainer Temperature. Seal element temperature does not dictate the Min. and max. gasket operating temperature. Performance suitability and material compatibility shall be determined by the user. The DEFENDER FS is an engineered fire safe gasket that has passed API 6FB fire test (Third Edition). No other claims regarding suitability/compatibility for a particular application or performance in a fire are made.

### Seal Element Materials

Sealing Element	Temperature - Operating
Mica (Hi-Temp)	+1,832°F. (+1,000°C.)
Biaxial Oriented PTFE	-450°F (-268°C) to +500°F (+260°C)
Kamprofile PTFE Coating	-58°F (-50°C) to +350°F to (+176°C)

### Industries (Oil, Gas, Offshore)

Production Fields, Petroleum Marketing Facilities, LNG/SNG Systems, Pipeline and Distribution Piping, Refineries, Tank Farms, Offshore platforms.

### DEFENDER FS Flange Isolation Kits

For a flange isolation kit, sleeves and washers are needed. Generally, 95% of steel core flange isolation kits are sold with G10 sleeves and Coated Steel Isolation Washers.

### Suggested Sleeve and Washer Set



FD = G10 Sleeves, Steel HC Washers and Steel HC Washers - Double Washer Set



TFD = Nomex Sleeves, Steel HC Washers and Steel HC Washers - Double Washer Set

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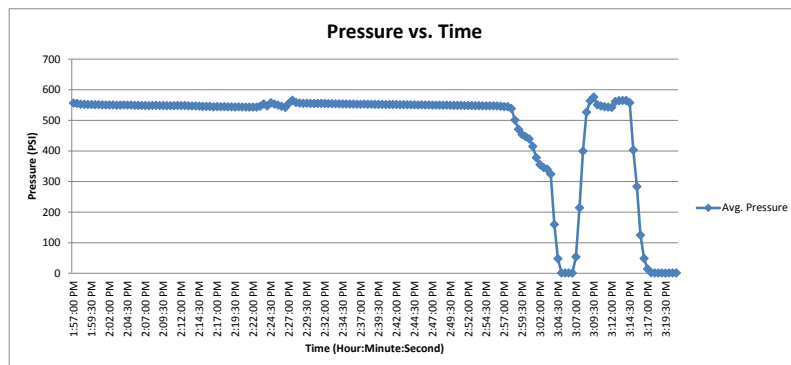
## DEFENDER™ FS Sealing/Isolating Gaskets and Flange Isolation Kits



Lamons of Houston, TX requested that United Valve Inc. of Houston, Texas test and evaluate the Lamons 6" #300 Class Defender FS Gasket's pressure containing capabilities the API standard 6FB(Third Edition, Nov. 1998, Non bending, On shore or Open Offshore Fire Test). The test involved of affixing the gasket between two flanges and fitting the flanges to United's test setup. The gasket was then subject to burn cycle at an average flame temperature between 1400°F and 1800°F for 30 minutes while maintaining 555 psi. Upon completion of the burn, the pressure was then held during a 30 minute cool down to a temperature below 212°F. The gasket was depressurized and then pressurized back to 555psi and held for an additional 5 min.

The objective of the test was to monitor the total leakage during the duration of the burn/cool down cycle, along with the repressurization cycle with accordance to API 6FB standards.

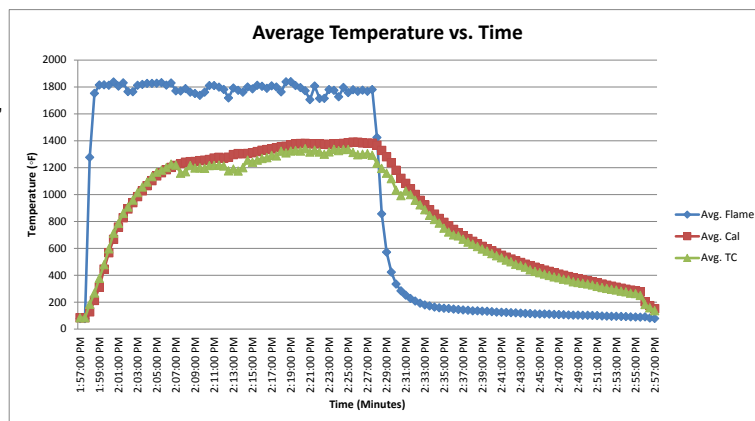
Leakage was determined by the total water level drop through a visual sight gauge during the burn/cool down cycles, and then by manually catching the water in a calibrated container during the repressurization cycle.



### Test Procedure:

Below is a summary of the test setup and protocol performed during the gasket fire test with accordance to API 6FB, Third Edition Non Bending, On shore or Open Offshore Fire Test.

1. Install the Defender FS gasket between two CS flanges.
2. Bolt the flanges together using the supplied B7 Studs, 2H Nuts, Dielectric Sleeves, and Coated Steel Washers
3. Apply non conductive PTFE lubricant to studs/bolts and torque to 225 ft. lbs.
4. Thread NPT pipe fittings into flanges and affix the flange package in the test setup.
5. Connect all pressure and temperature monitoring equipment in their correct positions. This consists of 2 flame thermocouples, 3 thermocouples and 3 calorimeter cubes spaced 120° apart around the circumference of the flange (respectively), and a 4th calorimeter/thermocouple cube placed furthest away from the flame sources.
6. Hydrotest the assembly to 555 psi to check all fittings/ connections for leaks prior to testing.
7. Confirm pressure and ignite the burners under the flange assembly and start the burn cycle clock.
8. Per the test protocol, the average temperature of the flame thermocouples must reach 1400°F within 2 minutes of ignition, and maintain an average temperature between 1400°F and 1800°F with no reading less than 1300°F until the average calorimeter temperature reaches 1200°F.
9. The average temperature between the 4 calorimeter cubes must reach 1200°F within 15 minutes of the burner ignition.
10. Conduct the burn cycle for at least 30 minutes.



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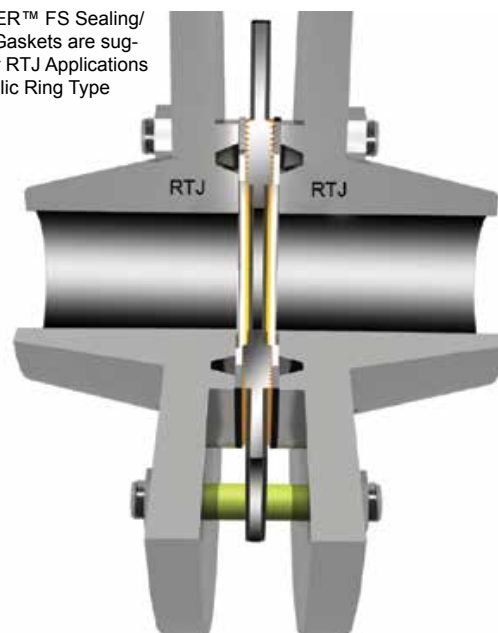
11. Upon completion of the burn cycle, cool the valve below 212°F.
12. Depressurize the system.
13. Re-pressurize the system to 555 psi and hold for 5 minutes.
14. Determine the allowable leakage rates:  
 $AL = SD \times 3.41 = 7.25 \times 3.41 = 22.765 \text{ in.}$   
 Where: AL= Allowable Leakage  
 SD= Mean Gasket Seal Diameter
15. Compare the actual leakage rates vs. the allowable rate.



VARIABLE	DATA RECORDED
Average System Pressure	550.59 psi
Average Flame Temperature	1722.72°F.
Time to reach flame temperature of 1400°F.	1 minute, 30 seconds
Average Calorimeter Temperature	1329.4°F.
Time to reach average calorimeter temp. of 1200°F.	10 minutes, 30 seconds
Total Burn Time	30 minutes
Total Cool Down Time	30 minutes
Total Repressurization Hold Time	5 minutes
Average System Pressure during Repressurization	556.71 psi



DEFENDER™ FS Sealing/Isolation Gaskets are suggested for RTJ Applications vs. Phenolic Ring Type Gaskets.



# FLANGE KITS

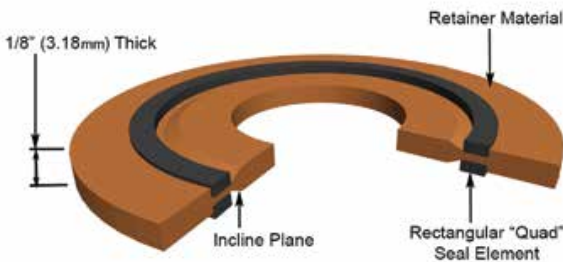
## sealing/isolation gaskets



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# ISOGUARD™

## Sealing/Isolating Gaskets and Flange Isolation Kits



The ISOGUARD™ sealing/isolating gasket system is designed for general applications where electrical flange isolation and corrosion control are required on pipes containing water/waste-water, gas, natural gas, oil and other hydrocarbon based medias up to 302°F(150°C). Available for flat face, raised face and ring type joint flanges from 1/2" to 120" (and corresponding API and DN diameters), ANSI 150-1500#, API 2-5K and PN 20-250, the ISOGUARD™ gasket is an engineered value added solution for trouble free operation. The ISOGUARD™ sealing/isolating gasket system consists of a retainer with an incline-plane seal groove geometry designed to optimize each seal's elastic memory, in conjunction with a proven rectangular sealing element ("Quad" ring). This design guarantees low bolt load requirements and high sealing reliability. ISOGUARD™ systems are available with a variety of retainers and seal elements.

### Applications

- ISOGUARD™ gaskets are engineered to provide high reliability sealing and electrical isolation for a wide variety of applications.
- High Pressure Flanges: Up To 1500#, API 5K and PN 250.
- Applications where end users prefer an integral seal element.
- For ANSI 2500#, API 10K and PN 420 applications, please consult factory.

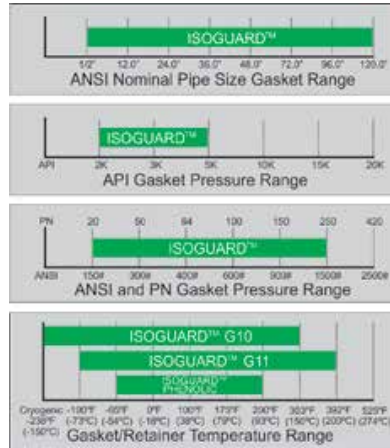
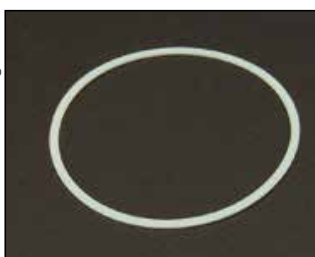
### General Features

- Self Energizing Seal.
- Incline-plane groove geometry.
- Low bolt load required.

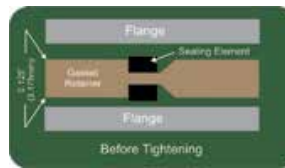


### A Fresh Look at Sealing - Design Features

A Fresh Look at Sealing - Design Feature: A non-spliced (one-piece) Teflon® seal element, available from 1/2" to 24". Combining this seal with the incline-plane groove design is a first for this generation of gasket technology; an excellent choice for engineers and end users wanting increased seal integrity.



For applications outside ranges shown, consult factory.



### Before Tightening

The flange face makes initial/light contact with the gasket retainer surface (isolation material) and the sealing element protrudes just above the gasket retainer surface.



### After Tightening

Rectangular Sealing Element "Quad Seal" in conjunction with the incline plane provides a self-energized seal. The small gap between seal element and retainer illustrates how the incline

plane allows the seal material to move in a direction other than point loading the gasket web (small area of retainer between the two seals). This movement prevents cracking and breaking of the gasket retainer under high loads.

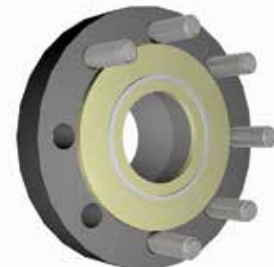
Furthermore, the incline plane groove provides the seal with greater elastic memory, thereby helping maintain an effective seal even when bolt load may relax over a period of time.



### Type "E" Gasket

Fits over the bolt holes and extends to the O.D. of the flange to assist contractors as the bolt holes automatically center the gasket. Provides excellent protection against shorting out of the corrosion mitigation hardware.

FIK "101" - 50% = Percentage of Type "E" ISOGUARD™ gaskets that are manufactured and specified for use on applications.



### Type "F" Gasket

Fits within the bolt hole circle of the flange and extends to the I.D. of the bolt circle providing good protection against shorting out of the corrosion mitigation hardware.

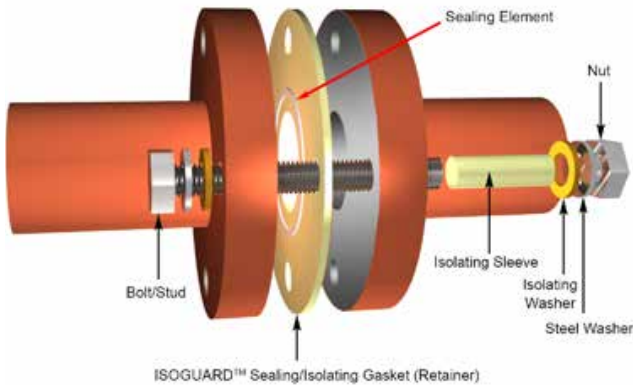
FIK "101" - 50% = Percentage of Type "F" ISOGUARD™ gaskets that are manufactured and specified for use on applications.

# FLANGE KITS

sealing/isolation gaskets



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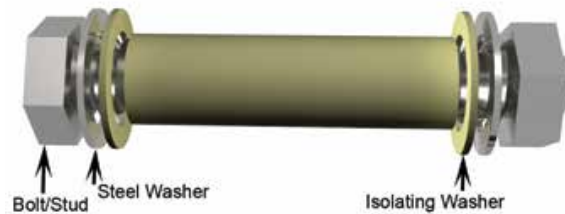
### Facts

- Based on an industry proven design.
- Enhanced with innovative engineered features.
- Cycled tested at 10,000psi at ambient temperature
- Made in the U.S.A.
- Tested to Shell Certification Standards.
- WRAS Approved
- DNV-GL Approved

### ISO GUARD™ Flange Isolation Kits

For a flange isolation kit, sleeves and washers are needed. Generally, 95% of ISO GUARD™ gasket flange isolation kits are sold with G10 sleeves and G10 double washer sets, when specified with a G10 retainer gasket.

### Suggested Sleeve/Washer Sets



SD = Standard (G10 Sleeves, Steel ZP Washers and G10 Washers) - Double Washer Set.

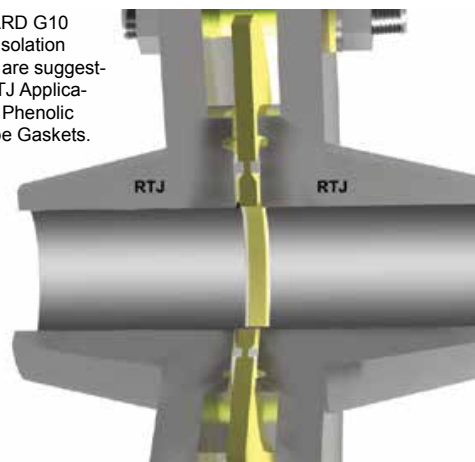
**NOTE:** Use with G10 Gasket Material



ED = Economy (Mylar Sleeves, Steel ZP Washers and Phenolic Washers) - Double Washer Set.

**NOTE:** Use with Phenolic Gasket Material

ISO GUARD G10 Sealing/Isolation Gaskets are suggested for RTJ Applications vs. Phenolic Ring Type Gaskets.



### Retainer Materials

- G10, G11, Phenolic
- Retainer Thickness 1/8" (0.125") (3.18mm)

**Note:** Consider G10 Material for the following applications. Nominal Pipe Sizes of 12-inch and larger or ANSI pressure class 600# and higher.

### Gasket/Retainer Material Specifications

ASTM	TEST METHOD	G7	G10	G11	Phenolic
D149	Dielectric Strength Volts/Mil Short Time	350-400	750-800	550	500
D695	Compressive Strength (psi)	40,000	65,000	63,000	25,000
D570	Water Absorption (%)	0.07	0.05	0.10	1.60
D790	Flexural Strength (psi)	27,000	65,000	60,000	22,500
D256	IZOD Impact Strength (Ft-Lbs/ Inch)	14.00	14.00	12.00	1.20
D638	Tensile Strength (psi)	25,000	50,000	42,000	20,000
D732	Shear Strength (psi)	20,000	21,000	21,000	10,000
D952	Bond Strength (lb)*	600	2,600	2,200	1,500
	Temperature - Operating	Cryo- genic to +450°F (+232°C)	Cryogenic -238°F (-150°C) to 302°F (+150°C)	-100°F (-73°C) to 392°F (200°C)	-65°F (-54°C) to +220°F (+104°C)

**Note:** Operating Temperature for Gaskets and Flange Isolation Kits is based off the Gasket Retainer Temperature. Seal element temperature does not dictate the min. and max. gasket operating temperature.

### Sealing Element Material Specifications

#### Seal Element Materials

- Teflon®, Nitrile, Silicone, Viton®, EPDM

Sealing Element	Temperature - Operating
Teflon® (PTFE)	Cryogenic to +525°F (+274°C)
Nitrile	-40°F (-40°C) to +250°F (+121°C)
Silicone	-75°F (-115°C) to +392°F (+200°C)
Viton®	-20°F (-29°C) to +392°F (+200°C)
EPDM	-65°F (-54°C) to +250°F (+121°C)

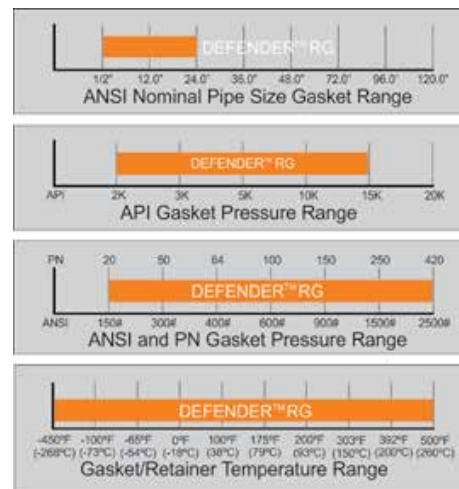
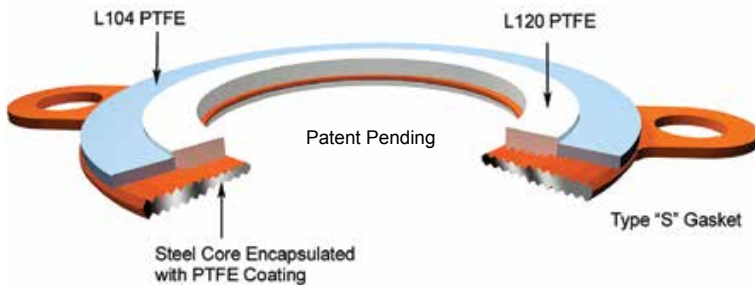
# FLANGE KITS

sealing/isolation gaskets



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## DEFENDER™ RG Sealing Gasket



For applications outside ranges shown, consult factory.

All piping gaskets are designed to operate at their optimum on flange faces that are clean, free from scratches and indentations, flat, not distorted and have a gramophone surface finish between 125µ.ins to 250µ.ins. (3.2µ.M to 6.3µ.M).

Flange faces which have been subjected to crevice type corrosion attack at, or around, the inner portion of the flange sealing faces can occur over a period of time. In many field applications, the flange surface condition cannot be assessed until the bolted connection has been decommissioned and an inspection has determined the suitability of the flanges to accept the same type of gasket that was initially installed.

Depending on the extent of the flange face damage, the corroded surface may have extended onto the surface where gasket sealing element is seated and simply installing another gasket offers no guarantee the connection will remain tight and leak-free once the flange is commissioned back into service.

**An assessment as to the suitability of the flange surfaces has to be made in real-time with several options available:**

- Rebuild and machine the flange surface to a suitable condition.
- Rebuild and repair the flange using an epoxy based composite material.
- Replace the damaged flanges.
- Use the same gasket and "hope for the best".

**The Defender™ RG Sealing Gasket has been designed to offer a tight and high integrity sealing solution for use on flange faces that have been subjected to erosion, corrosion, chemical attack and abrasion without having to modify or re-work the flange faces.**

### General Features

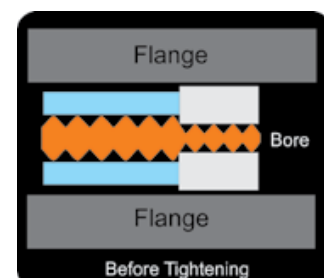
- Can seal corroded flange faces without costly and time consuming flange rehabilitation.
- Uses proven technology to solve specialized sealing problems.
- No special tools or installation techniques required.
- Twin-bolt location tabs allow for easy installation.
- For flange isolation, contact factory.
- S316 core is standard. Other steel core options are available upon request.

### Applications

- May be used for above ground or subsea applications.
- High Pressure Flanges: 2500#, API 15K or PN420.

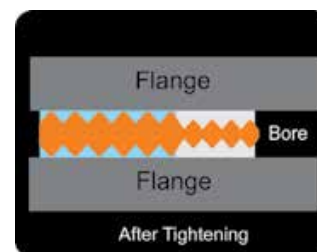
### Sizes

- 1/2" through 24" diameter.
- Available as "F" or "S" Type Gaskets.



### Before Tightening

The flange face makes initial contact with the sealing elements which protrude above the gasket steel core.



### After Tightening

The sealing elements are compressed into the serrations of the stainless steel retainer.

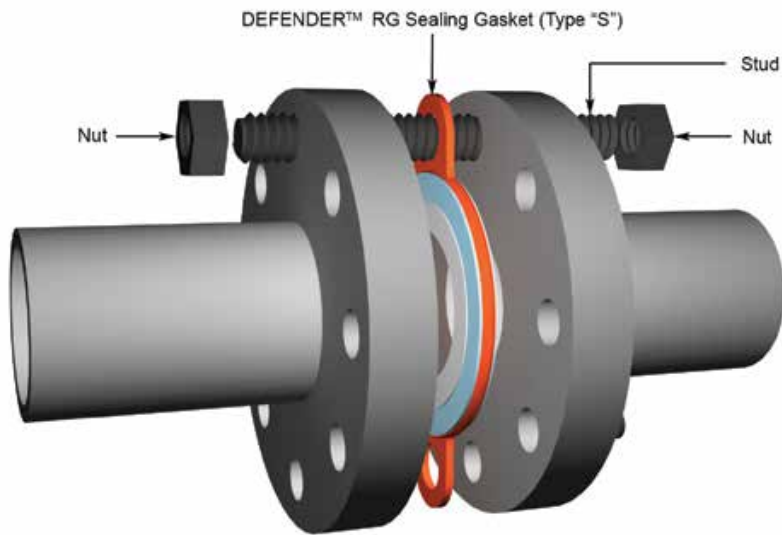
Use DEFENDER RG Sealing technology for corroded/damaged flanges where proper sealing/isolation technology was not used. The DEFENDER RG Kammpro and L120 PTFE sealing technology compensates for damaged flange faces to achieve a seal.

# FLANGE KITS

sealing/isolation gaskets



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### Gasket Material Specifications

#### Retainer Material (Steel Encapsulated with PTFE Coating)

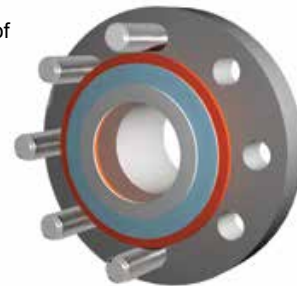
- 0.182" (4.623mm) total thickness.
- Steel core = 1/8" (0.125")

### Seal Element Material Specifications

ASTM	TEST METHOD	L104	L120
F36	Compression	35%	55%
F36	Recovery	45%	15%
F152	Tensile Strength	1885 psi (13 MPa)	3190 psi (22 MPa)
F37	Liquid Leakage	<0.25 mL/hr	<0.1 mL/hr
F38	Creep Relaxation	31%	17%
	Density	87 lbs/ft <sup>3</sup> (1.4 g/cc)	59 lbs/ft <sup>3</sup> (0.95 g/cc)
	Gas Leakage - BS7531	<0.01 mL/min.	<0.03 mL/min
F149	Dielectric Strength	15 kV/mm	
	Temperature - Operating	-450°F (-268°C) to +500°F (+260°C)	-450°F (-268°C) to +500°F (+260°C)

### Type "F" Gasket

Fits within the bolt hole circle of the flange and extends to the I.D. of the bolt circle. Seals damaged and corroded flange faces and provides excellent protection against shorting out of the corrosion mitigation hardware.



### Type "S" Gasket (Integrated Alignment Holes-Subsea)

Fits over Bolt Holes at 12 and 6 O'Clock to assist installation for subsea applications, as only having the two integrated plugs makes it easier to automatically center gasket for installation. Seals damaged and corroded flange faces and provides excellent protection against shorting out of the corrosion mitigation hardware.



# FLANGE KITS

sealing/isolation gaskets



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## ISOMATE™ Sealing/Isolating Gaskets and Flange Isolation Kits



The ISOMATE™ sealing/isolating gasket is designed for basic applications where electrical flange isolation and corrosion control are required on pipes containing water/wastewater, gas, natural gas, oil and other hydrocarbon based medias up to 175°F(79°C). Available for flat face and raised face joint flanges from 1/2" to 24", ANSI 150-300#, PN 20-50, the ISOMATE™ gasket is an economical solution for basic performance. The ISOMATE™ sealing/isolating gasket consists of a phenolic retainer faced on both sides with nitrile rubber material.

### Features

- Sealing and Isolating Gasket
- Type E or F Gaskets

### Applications

ISOMATE™ gaskets are designed to provide reliable sealing and electrical isolation for a wide variety of basic applications.

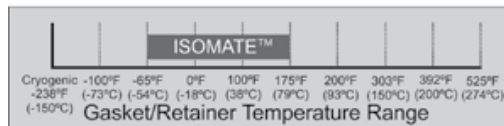
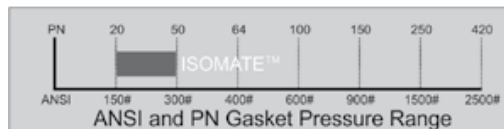
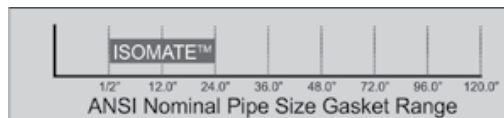
The industry has improved sealing technology in retainer type gaskets with engineered seal elements and groove designs. DEFENDER™ and ISOGUARD™ sealing systems should be reviewed, specified and used when a long-term maintenance-free solution is necessary.



Rubber faced flat gaskets have limitations, use Packaged ED sleeve and washer sets. If the application borders on technical limitations consider ISOGUARD™ G10 Flange Isolation Kits with packaged sleeve/washer set SD.



ED = Economy (Mylar Sleeves, Steel ZP Washers and Phenolic Washers) - Double Washer Set.



For applications outside ranges shown, consult factory.

### Retainer Materials

- Phenolic
- Retainer Thickness 1/8" (0.125") (3.18mm)

### Gasket/Retainer Material Specifications

ASTM	TEST METHOD	Rubber Faced Phenolic
D149	Dielectric Strength Volts/Mil Short Time	500
D695	Compressive Strength (psi)	25,000
D570	Water Absorption (%)	1.60
D790	Flexural Strength (psi)	22,500
D256	IZOD Impact Strength (Ft-Lbs/Inch)	1.20
D638	Tensile Strength (psi)	20,000
D732	Shear Strength (psi)	10,000
D952	Bond Strength (lb)*	1,500
	Temperature - Operating	-65°F (-54°C) to +175°F (+79°C)

**Note:** Operating Temperature for Gaskets and Flange Isolation Kits is based off the Gasket Retainer Temperature. Seal element temperature does not dictate the min. and max. gasket operating temperature.

### Seal Material

- Nitrile

### Sealing Element Material Specification

Sealing Material	Temperature - Operating
Nitrile	-40°F (-40°C) to +250°F (+121°C)



# FLANGE KITS

sealing/isolation gaskets



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### Description

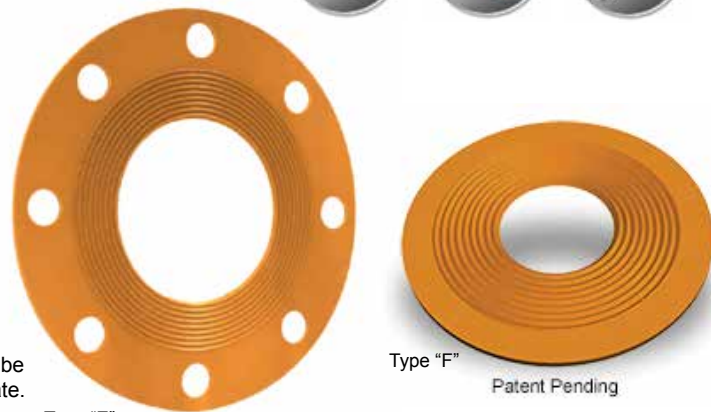
Matrix CPG® is a superior performance biaxially orientated PTFE gasket material with a unique Corrugation Profile. The material has been specially formulated to accept this corrugated effect.

### Applications

Matrix CPG® is ideal for glass lined, plastic and FRP flanges where high gasket stress are not possible.

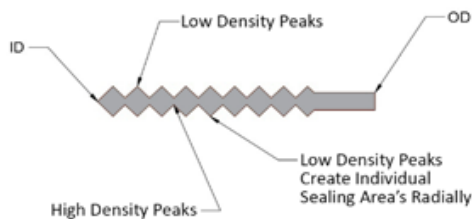
### Features

- Matrix CPG® has been designed to achieve low leakage at minimal load. The high and low density points across the sealing area allow varying loads to be applied radially but achieve a consistently low leak rate.
- Excellent chemical resistance.
- Made in the U.S.A.
- Gasket Type: Full Face and Raised Face available.



Type "F"  
Patent Pending

Type "E"



### Approvals

Complies with the requirements of FDA21 CFR 177.1550. Test information is available for: HOBT, ROTT, EN 13555

### Operating Limitations

Minimum Temperature: -450°F (-268°C).  
Maximum Temperature: +500°F (+260°C).  
Maximum Pressure: 1235 psi (85 Bar).

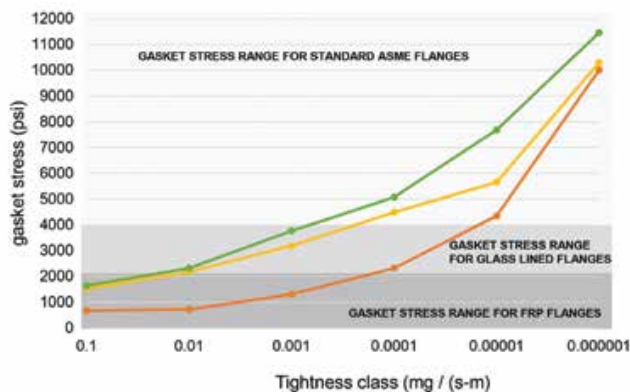
### Matrix CPG® Size Range:

Thickness: 1/8 in or 3.0mm.  
Pressure Class Range: ASME 150lb thru 300 lb.  
Nominal Pipe Size 1/2 in thru 24 in.  
Non-standard sizes available on request.

### Creep Relaxation (EN 13555)

Test Temp. Tp	Initial Gasket Stress Qi (MPa)	Stiffness C (kN/mm)	Remaining Gasket Stress Qr (MPa)	Relaxation Factor PQR (Tp)	Qsmax (MPa)
25°C	220	500	213	0.97	>220
175°C	220	500	180.1	0.82	>220
225°C	220	500	179.5	0.82	>220

### Tightness vs Gasket Stress



### Typical Physical Properties (ASTM)

F36 Compression	30%
F36 Recovery	50%
Density	1.5 g/cc
F149 Dielectric Strength	16 kV/mm



21 CFR Part 11

# FLANGE KITS

sealing/isolation gaskets



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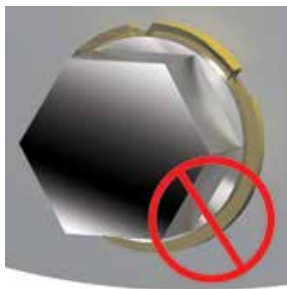
## Sleeve and Washer Sets

Lamons sleeve and washers sets, when combined with our sealing/isolation gaskets, complete a Flange Isolation Kit. For a successful flange isolation kit, it's critical to use the appropriate material for your application. Compressive strength, flexural strength, and cut through resistance are key material physical properties that should not be overlooked.

### Washer Design Specifications:

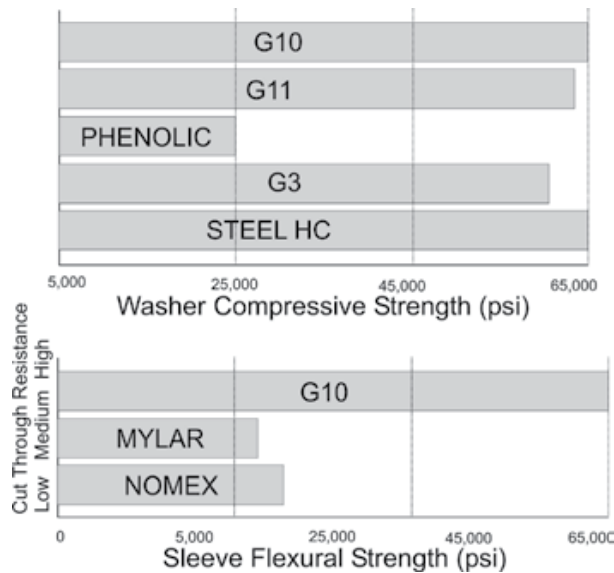
Available for bolt sizes = 1/2" (12.7mm) to 2 3/4" (69.85mm)

- Steel and Isolation Washers are designed with the same O.D. and I.D.
- Steel and Isolating washers are 1/8" (3.18mm) thick.
- Steel and Isolating washers are designed to fit over isolating sleeve material.



Steel back-up washers need to be supplied with the same O.D. and I.D. as the isolation washer. This graphic illustrates a steel back-up washer and phenolic isolation washer with different O.D and I.D. sizing. The compressive load from the steel back-up washer is not equally distributed over

the phenolic washer, causing the phenolic washer to crack. If this occurs, the gasket may not receive proper load and electrical isolation will most likely be lost.



### Single Washer Set (per bolt/stud)

- (1) ea. 1/8" {0.125"} (3.18mm) thick Steel ZP Washers
- (1) ea. 1/8" {0.125"} (3.18mm) thick Isolating Washer
- (1) ea. Isolating Sleeve



### Double Washer Set (per bolt/stud)

- (2) ea. 1/8" {0.125"} (3.18mm) thick Steel ZP Washers
- (2) ea. 1/8" {0.125"} (3.18mm) thick Isolating Washers
- (1) ea. Isolating Sleeve

"FIK 101": Generally, single washer sets are used for buried applications and may be used to allow the Cathodic Protection (CP) current to reach the nuts and bolts/studs. If desired, the nuts on the opposite side of the cathodically protected flange may be included as part of a Cathodic Protection System.

"FIK 101": Generally, double washer sets are used for applications, where added protection is needed against the possibility of "shorting out" the nuts and bolts. For complete electrical isolation, double washer sets isolate the nuts and bolts from both flanges.

# FLANGE KITS

sealing/isolation gaskets



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## Sleeve and Washer Sets



### Lamons Sleeves - Material Physical Property Specifications

ASTM	Test Method	Mylar	G10	Nomex
D149	Dielectric Strength Volts/Mil Short Time	4,000	750-800	600
D570	Water Absorption (%)	0.80	0.05	7.00
D790	Flexural Strength (psi)	13,000	65,000	18,000
	Cut Through Resistance	Low	High	Low
	Temperature - Operating	-75°F (-59°C) to 302°F (150°C)	Cryogenic to +302°F(+150°C)	-65°F (-54°C) to +450°F (+232°C)

### Lamons Washers - Material Physical Property Specifications

ASTM	Test Method	G10	G11	Phenolic	Steel (HC)	G3
D149	Dielectric Strength Volts/Mil Short Time	750-800	550	500	800	500
D695	Compressive Strength (psi)	65,000	63,000	25,000	65,000	55,000
D570	Water Absorption (%)	0.05	0.10	1.60	N/A	1.00
	Temperature - Operating	Cryogenic to +302°F (+150°C)	-100°F (73°C) to +392°F (+200°C)	-65°F (-54°C) to +220°F (+104°C)	Cryogenic to +356°F (+180°C)	-100°F (-73°C) to +392°F (+200°C)

#### Isolating Washers (G10, G11, Phenolic, G3, Steel HC)

Lamons isolating washers are designed/manufactured to have positive isolation characteristics and provide excellent compressive strength.

#### Steel Washers/HC Washers

HC - Hardened 1050 steel with proprietary isolation coating has excellent dielectric properties and withstands UV. It's also abrasion resistant and will not break under compressive loads. They combine the technical features of steel into an isolating washer.

#### Steel Back-Up Washers/ZP Washers

ZP - Zinc Plated 1050 carbon steel washers are used as our standard steel back-up washer when kitted with retainer washers and isolating sleeve material. **Note:** 304 stainless steel available for special order.

#### Sleeve Design Specifications:

- Sleeves are designed to fit over standard bolts and studs for flanges.
- Wall Thickness = 1/32" {0.031"} (0.79mm)
- Wall Thickness Tolerance = 0.015" (0.380mm)
- Available for bolt sizes = 1/2" {0.5"} (12.7mm) to 2-3/4" (69.85mm)
- Sleeve length is designed to pass completely through the isolating washer and halfway through the steel washer for cathodic protection and isolation.

#### Isolating Sleeves (G10, Mylar, Nomex®)

Lamons isolating sleeves are designed/manufactured to fit over standard size flange fasteners (bolts/studs) with standard size bolt holes.

#### Bulk Sleeve and Washer Material

Lamons will provide washers in bulk quantities of 100. Sleeve material may also be purchased in bulk and is shipped and supplied in the lengths shown in the chart. **Note:** It is suggested that bulk sleeve material be cut in a controlled environment. If cutting in the field, installers should be well versed in determining appropriate sleeve length and have experience with cutting.



HC washer with ZP steel back-up washer bolted to washer test block. Megger isolation test unit confirms full 200G Ohm isolation at 1000V.



Sleeve Material	Length
G-10	4 Feet
Mylar	6 Feet
Nomex®	6 Feet

# FLANGE KITS

sealing/isolation gaskets



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## Sleeve and Washer Sets



Lamons Standard Packaged Sleeve/Washer Sets. These sets have been selected from specification use and what the industry has installed on a consistent basis over the years for flange isolation and cathodic protection. Single/Double choice is indicated after Packaged Set choice: **S = Single D = Double**



**E = Economy**  
Mylar Sleeves, Steel ZP Washers and Phenolic Washers (Double Washer Set Shown, Single Washer Sets Also Available)



**V = Value**  
Mylar Sleeves, Steel ZP Washers and G10 Washers (Double Washer Set Shown, Single Washer Sets Also Available)



**S = Standard**  
G10 Sleeves, Steel ZP Washers and G10 Washers (Double Washer Set Shown, Single Washer Sets Also Available)



**Model F = Fire**  
G10 Sleeves, Steel HC Washers and Steel HC Washers (Double Washer Set Shown, Single Washer Sets Also Available)



**T = High Temperature**  
Nomex Sleeves, Steel ZP Washers and G3 Washers (Double Washer Set Shown, Single Washer Sets Also Available)



**Model TF = High Temperature Fire**  
Nomex Sleeves, Steel HC Washers and Steel HC Washers (Double Washer Set Shown, Single Washer Sets Also Available)

For more sleeve and washer set combinations, visit [www.lamons.com](http://www.lamons.com)

**XX = Customer Specified**  
Customer Specified Sleeve and Washer Materials

## Cut-Through Resistance



Cut Through Resistance and Flexural Strength is critical in selecting sleeve material for your flange isolation kit application. As nominal pipe size increases, as well as ANSI or API class, the fasteners (bolts/studs) increase in size and torque is generally higher. Larger and heavier stud bolts with higher torque loads can more easily cut through material during installation. This is more likely to occur if flanges and bolt holes are not in perfect alignment.

Use or specify G10 sleeve material as a standard for all applications. Or consider G10 sleeves for applications of Nominal Pipe Size 12" and larger and ANSI pressure class 600# and higher.

The above graphic shows an example of a Mylar Sleeve being shredded; the bolt threads are cutting through the sleeve while misalignment is cracking the sleeve. Electrical isolation can be lost if your sleeve material does not have excellent cut through resistance. Isolation tests will fail and installation costs will increase significantly.

# FLANGE KITS

sealing/isolation gaskets



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## Sleeve and Washer Sets



### Full Length Sleeve



A full length sleeve passes entirely through both flanges, the sealing/isolation gasket both isolation washers, and half way through the steel back-up washers on each side.

Tolerance = +/- 0.062"

**Note:** When using mis-matched flanges or flanges with different widths take precise measurements and account for the additional length needed to pass through washer set configuration. If you are unsure of proper length please consult the factory engineering support.

### Bolt/Stud Diameters-Length



Bolts/Studs with smooth shank portions should not have a greater diameter than the maximum diameter of the threads. If this is the case, the sleeve may not fit over the shank portion. The adjacent graphic shows a smooth shank sized to the same diameter as the threads, for a successful installation.

When working with Flange Isolation Kits, the bolt length would be standard length + 0.75". This accommodates for gasket thickness and the use of double washer sets.

### Tighten your flange isolation kit application with Lamons Fasteners.

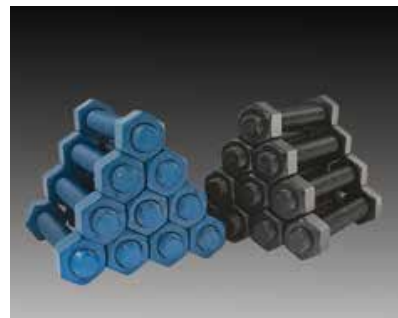
Lamons manufactures a wide variety of bolts, nuts and studs. Complete your installation and purchasing efforts with a worldwide quality manufacturer. <http://www.lamons.com/products/fasteners.php>



Torque Verification: SPC4 Intelligent Fasteners allow installer to confirm torque for installation and routine maintenance.



Lamons marks fasteners with traceability markings, heat lot numbers.

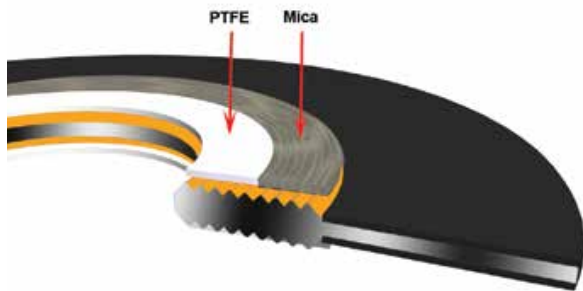


## Installation Techniques and Guidelines for Gaskets and Flange Isolation Kits

Effective: 2/15/13

### Pre-Installation

- Wear appropriate safety equipment (Eye wear, steel toe boots, gloves)
- Have appropriate tools. (Torque wrenches, drift pins, & **non-conductive** lubricant)
- Confirm Lamons Product Label matches flange type and size for installation.
- Inspect Flanges:
  - Flange faces shall be free of oil, grease, pits, gouges, rust & debris. Surface finish shall be no greater than 250 RMS.
  - Refinish flange faces if corrective measures do not meet above requirements.
  - Flange bolt hole spot facings shall be clean and free of burrs.
- Bolts/Studs & Nuts: Make sure they are clean and you have the proper quantity.



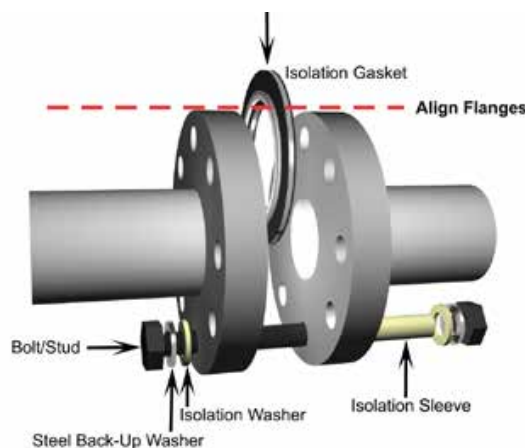
**DO NOT REMOVE PTFE AND MICA SEAL ELEMENT MATERIAL FROM DFS GASKET KAMMPROFILE GROOVES.**

### Installation

1. Open boxed gasket kit and confirm that component parts are as specified: this includes gasket/flange size, pressure class, and bore.
2. Apply **non-conductive** lubricant to all threads and flange side of nuts.
3. Isolation Components: (if Gasket ONLY application skip to step 4)
  - Slide isolation sleeve over all bolts.
  - Complete one side of each assembly by attaching a nut (if needed) and ONE STEEL or HC Steel Washer against the nut followed by ONE ISOLATION retainer washer or HC Steel Washer.

- Check each assembly to ensure that ISOLATION retainer washer or HC Steel Washer is set to land against the flange and STEEL or HC Steel Washer is against the nut.
  - NOTE: HC Steel Washers are used for DFS Fire Safe Applications or when specified by user.
4. Align flanges & flanged bolt holes so they are concentric and parallel.
    - For horizontal installations, install the sleeve/washer assemblies, from Step 3, into the bottom half of the flange.
    - For vertical installations, pick either half of the flange, and install sleeve/washer assemblies from Step 3.
    - Do NOT force or cram sleeved bolt assemblies. If force is needed, recheck alignment to ensure sleeve damage has not occurred.

5. Gasket Installation:



**ALWAYS WEAR SAFETY EQUIPMENT: HARD HAT, SAFETY GOGGLES, GLOVES AND OTHER APPROPRIATE ATTIRE.**

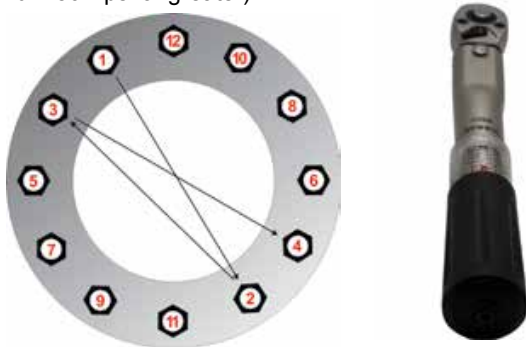
## Installation Techniques and Guidelines for Gaskets and Flange Isolation Kits

- **TYPE F GASKET:** Carefully install the gasket and let it rest against the sleeves (or bolts if gasket only) that you installed in Step 4. The gasket is designed to be centered when resting on the bolt assemblies. Take every precaution to guard against damaging sealing element. Visually note seal element contacts flange face.
- **TYPE E GASKET:** Carefully install gasket bolt holes over bolt assemblies; this will automatically center gasket. Take every precaution to guard against damaging sealing element. Visually note seal element contacts flange face.
- Complete gasket installation by installing remaining bolts/sleeve assemblies as well as the opposing side of isolation and steel washers (if a double washer set was ordered).

### Other Considerations:

1. **Galling:** If serious galling or damage to isolating washers exists replace with high strength washers. (Minimum 50K psi or greater).

CROSS TIGHTENING = EVEN PRESSURE



2. Some end users specify 1/4" larger bolt holes than bolt diameters on one flange only to allow for easier alignment in the field. In worst cases, the isolating washer can be as much as 1/4" off-center of the oversize bolt hole, resulting in a substantially reduced flange bearing area for the isolating washer. With flange assemblies of this type, **each** isolating washer should be sandwiched between two steel back-up washers for additional support.

- Unparallel flanges can cause numerous problems including:
  - a. Uneven loading of gasket which can cause leaking and/or damage to gasket retainer.
  - b. Mis-torqued flanged joint because torque is used to align flanges rather than clamp flanges.

3. If isolating both sides of a flanged assembly, isolating bolt sleeve lengths must be sized to compensate for additional washers.

### Tightening Flange

1. All tightening steps should be done with a torque wrench or with a stud tension measuring device.
2. Pull flanges together by initially cross tightening bolts (pattern above) ONLY until flange to gasket contact has been made.
3. Check for a flange segment that may show separation between gasket and flange by using a laser, flashlight, or feeler gauge. If one exists, the flanges are **not parallel**.
4. Directly 180° degrees opposite widest part of indicated separation/gap, loosen nuts, even if only finger tight. Return to segment with gap and tighten until both flanges are in contact with gasket retainer.
5. Re-tighten loosened nuts and proceed with torquing of the bolts according to above diagram to 10-15% of specified torque. (Note: Diagram shows 24 bolt holes, the same basic procedure should be used with flanges having more or less bolts)
6. Repeat torque sequence increasing to 50% of torque.
7. Repeat tightening to final torque value.
  - 7A. Optional – it is good practice to make a final check of each bolt for proper torque, especially on large diameter piping systems.

### ISOMATE™ Note:

ISOMATE™ gaskets are made of compressible dielectric material and if tightened cold, "hot flow" of the gasket material may occur under operating conditions resulting in loss of bolt load. It is advisable to re-tighten bolts after operating temperature has been reached – preferably at zero line pressure and ambient temperature. Under no circumstances should the system be allowed to return to operating temperature after the initial cycling to ambient temperature without checking and re-tightening bolts where needed.

**DO NOT USE LUBRICANT,  
GREASE OR ADHESIVES ON  
EITHER THE GASKET OR  
FLANGE FACES**

# FLANGE KITS

sealing/isolation gaskets



CODE  
24/02 2020

## Torque Values for DEFENDER™, ISOGUARD™ and ISOMATE™ Sealing Gaskets/Flange Isolation Kits

### ANSI 150# Flanges

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.5	40
3/4	4	0.5	40
1	4	0.5	40
1-1/4	4	0.5	40
1-1/2	4	0.5	50
2	4	0.625	80
2-1/2	4	0.625	90
3	4	0.625	110
3-1/2	8	0.625	90
4	8	0.625	100
5	8	0.75	120
6	8	0.75	130
8	8	0.75	130
10	12	0.875	225
12	12	0.875	225
14	12	1.0	320
16	16	1.0	320
18	16	1.125	450
20	20	1.125	450
22	20	1.25	460
24	20	1.25	650
26-A	24	1.25	650
28-A	28	1.25	650
30-A	28	1.25	650
32-A	28	1.5	1000
34-A	32	1.5	1000
36-A	32	1.5	1100
38-A	32	1.5	1100
40-A	36	1.5	1100
42-A	36	1.5	1150

**Working Pressure = 285 psi**  
**Hydro Test Pressure = 455 psi**

### ANSI 300# Flanges

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.50	80
3/4	4	0.625	80
1	4	0.625	80
1-1/4	4	0.625	80
1-1/2	4	0.75	110
2	8	0.625	110
2-1/2	8	0.75	150
3	8	0.75	150
3-1/2	8	0.75	160
4	8	0.75	180
5	8	0.75	190
6	12	0.75	170
8	12	0.875	265
10	16	1.0	320
12	16	1.125	450
14	20	1.125	475
16	20	1.25	650
18	24	1.25	650
20	24	1.25	675
22	24	1.5	1125
24	24	1.5	1200
26-A	28	1.625	1400
28-A	28	1.625	1500
30-A	28	1.75	1700
32-A	28	1.875	2000
34-A	28	1.875	2250
36-A	32	2.0	2300
38-A	32	1.5	2300
40-A	32	1.625	2400
42-A	32	1.625	2400

**Working Pressure = 740 psi**  
**Hydro Test Pressure = 1135 psi**

### ANSI 400# Flanges

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.50	80
3/4	4	0.625	80
1	4	0.625	80
1-1/4	4	0.625	110
1-1/2	4	0.75	110
2	8	0.625	110
2-1/2	8	0.75	150
3	8	0.75	150
3-1/2	8	0.875	180
4	8	0.875	180
5	8	0.875	220
6	12	0.875	220
8	12	1.0	320
10	16	1.125	450
12	16	1.25	650
14	20	1.25	650
16	20	1.375	820
18	24	1.375	820
20	24	1.5	1100
22	24	1.625	1425
24	24	1.75	1775
26-A	28	1.75	1750
28-A	28	1.875	2200
30-A	28	2.0	2300
32-A	28	2.0	2300
34-A	28	2.0	2350
36-A	32	2.0	2350
38-A,B	32	1.75	4800
40-A,B	32	1.875	5200
42-A,B	32	1.875	5500

**Working Pressure = 990 psi**  
**Hydro Test Pressure = 1510 psi**

AAG does not take responsibility for any of these torque values. They're theoretical values. These bolt torque values are intended for use as guidelines only and are based on ideal conditions, perfect flanges, flange alignment and new well lubricated bolts/nuts according to the National Boiler Code, installed in accordance with the proper tools and installation guide. Torque values are based on using weld-neck flanges and lubricated stud bolts with a 0.16 friction factor.

**NOTE:** NPS = Nominal Pipe Size, A = Series A Flange, B = Series B Flange



# FLANGE KITS

sealing/isolation gaskets



CODE  
24/02 2020

## Torque Values for DEFENDER™, ISOGUARD™ and ISOMATE™ Sealing Gaskets/Flange Isolation Kits

### ANSI 600# Flanges

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.50	80
3/4	4	0.625	80
1	4	0.625	80
1-1/4	4	0.625	110
1-1/2	4	0.75	110
2	8	0.625	120
2-1/2	8	0.75	150
3	8	0.75	175
3-1/2	8	0.875	200
4	8	0.875	225
5	8	1.0	350
6	12	1.0	325
8	12	1.125	450
10	16	1.25	650
12	20	1.25	675
14	20	1.375	820
16	20	1.5	1125
18	20	1.625	1430
20	24	1.625	1400
22	24	1.75	1775
24	24	1.875	2230
26-A	28	1.875	2200
28-A	28	2.0	2300
30-A	28	2.0	2360
32-A	28	2.0	3900
34-A	28	2.75	3950
36-A	28	2.5	5500
38-A,B	28	2.25	7000
40-A,B	32	2.25	7200
42-A,B	28	2.50	7400

Working Pressure = 1480 psi  
Hydro Test Pressure = 2245 psi

**ACTUAL TORQUE VALUES TO BE DETERMINED BY USER!  
ALWAYS WEAR SAFETY EQUIPMENT!**



### ANSI 900# Flanges

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.75	110
3/4	4	0.75	110
1	4	0.875	110
1-1/4	4	0.875	170
1-1/2	4	1.0	240
2	8	0.875	170
2-1/2	8	1.0	240
3	8	0.875	225
4	8	1.125	450
5	8	1.25	650
6	12	1.125	455
8	12	1.375	825
10	16	1.375	850
12	20	1.375	870
14	20	1.5	1125
16	20	1.625	1430
18	20	1.875	2230
20	20	2.0	2300
24	20	2.5	5500
26-A	20	2.75	7400
28-A	20	3.0	8400
30-A	20	3.0	9500
32-A	20	3.25	10500
34-A	20	3.5	12400
36-A	20	3.5	13800

Working Pressure = 2220 psi  
Hydro Test Pressure = 3355 psi



### ANSI 1500# Flanges

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.75	110
3/4	4	0.75	110
1	4	0.875	110
1-1/4	4	0.875	170
1-1/2	4	1.0	250
2	8	0.875	170
2-1/2	8	1.0	250
3	8	1.125	375
4	8	1.25	650
5	8	1.5	1000
6	12	1.375	825
8	12	1.625	1400
10	12	1.875	2100
12	16	2.0	2300
14	16	2.25	3400
16	16	2.5	4300
18	16	2.75	6200
20	16	3.0	7800
24	16	3.5	13000

Working Pressure = 3705 psi  
Hydro Test Pressure = 5585 psi

### ANSI 2500# Flanges

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.75	175
3/4	4	0.75	175
1	4	0.875	175
1-1/4	4	1.0	300
1-1/2	4	1.125	400
2	8	1.0	300
2-1/2	8	1.125	400
3	8	1.25	600
4	8	1.5	650
5	8	1.75	1500
6	8	2.0	2300
8	12	2.0	2400
10	12	2.5	4900
12	12	2.75	7900

Working Pressure = 6170 psi  
Hydro Test Pressure = 9280 psi

**NOTE:** NPS = Nominal Pipe Size  
A = Series A Flange  
B = Series B Flange

# FLANGE KITS

sealing/isolation gaskets



CODE  
24/02 2020

## Torque Values for DEFENDER™ FS Sealing Gaskets/Flange Isolation Kits



### ASME B16.5 Flanges 150#

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.5	28
3/4	4	0.5	30
1	4	0.5	28
1-1/4	4	0.5	34
1-1/2	4	0.5	45
2	4	0.625	89
2-1/2	4	0.625	121
3	4	0.625	134
3-1/2	8	0.625	107
4	8	0.625	134
5	8	0.75	208
6	8	0.75	241
8	8	0.75	241
10	12	0.875	369
12	12	0.875	390
14	12	1.0	570
16	16	1.0	570
18	16	1.125	835
20	20	1.125	731
22	20	1.25	460
24	20	1.25	987

### ASME B16.5 Flanges 600#

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.50	28
3/4	4	0.625	57
1	4	0.625	57
1-1/4	4	0.625	57
1-1/2	4	0.75	103
2	8	0.625	57
2-1/2	8	0.75	103
3	8	0.75	115
3-1/2	8	0.875	119
4	8	0.875	192
5	8	0.875	297
6	12	1.0	192
8	12	1.125	417
10	16	1.25	526
12	20	1.25	526
14	20	1.375	720
16	20	1.5	955
18	20	1.625	1238
20	24	1.625	1238
24	24	1.875	1958

### ASME B16.5 Flanges 1500#

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.75	103
3/4	4	0.75	103
1	4	0.875	166
1-1/4	4	0.875	166
1-1/2	4	1.0	250
2	8	0.875	166
2-1/2	8	1.0	250
3	8	1.125	371
4	8	1.25	526
5	8	1.5	955
6	12	1.375	720
8	12	1.625	1238
10	12	1.875	1958
12	16	2.0	2404
14	16	2.25	3490
16	16	2.5	4863
18	16	2.75	6555
20	16	3.0	8601
24	16	3.5	11879

### ASME B16.5 Flanges 300#

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.50	28
3/4	4	0.625	57
1	4	0.625	57
1-1/4	4	0.625	57
1-1/2	4	0.75	103
2	8	0.625	57
2-1/2	8	0.75	103
3	8	0.75	115
3-1/2	8	0.75	119
4	8	0.75	164
5	8	0.75	221
6	12	0.75	192
8	12	0.875	322
10	16	1.0	343
12	16	1.125	464
14	20	1.125	406
16	20	1.25	592
18	24	1.25	642
20	24	1.25	674
24	24	1.50	1015

### ASME B16.5 Flanges 900#

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.75	103
3/4	4	0.75	103
1	4	0.875	166
1-1/4	4	0.875	166
1-1/2	4	1.0	250
2	8	0.875	166
2-1/2	8	1.0	250
3	8	0.875	166
4	8	1.125	371
5	8	1.25	526
6	12	1.125	371
8	12	1.375	720
10	16	1.375	720
12	20	1.375	720
14	20	1.5	955
16	20	1.625	1238
18	20	1.875	1958
20	20	2.0	2404
24	20	2.5	4863

### ASME B16.5 Flanges 2500#

NPS (Inches)	Qty. Bolts	Bolt Dia.	Rec. Torque (Ft.Lbs.)
1/2	4	0.750	103
3/4	4	0.750	103
1	4	0.875	175
1-1/4	4	1.0	300
1-1/2	4	1.125	400
2	8	1.0	300
2-1/2	8	1.125	400
3	8	1.25	600
4	8	1.50	650
5	8	1.75	1500
6	8	2.0	2300
8	12	2.0	2400
10	12	2.5	4900
12	12	2.75	7900

**For larger nominal pipe sizes, check website or consult factory.**  
**NOTE:** NPS = Nominal Pipe Size

# FLANGE KITS

sealing/isolation gaskets



CODE  
24/02 2020

## Suggested Media

Listed here are the most common media applications for flanged pipelines. For media (contents of the pipeline) not mentioned in the provided chart, please consult factory or a local authorized Lamons distributor.

Note: The adjacent chart includes information which is intended for general use and as a guideline only. Performance for any specific application should be determined by user. Material selection is at the risk of the user. Consult with a specialist, engineer or the factory for specific applications.

Please keep in mind that variation in temperature, pressure, media concentration, mixtures and added inhibitors may preclude suggested use.



Selection Criteria	DEFENDER™ Series	ISOGUARD™ Sealing /Isolating Gasket	ISOMATE™ Sealing /Isolating Gasket	MATRIX CPG
<b>Energy Industry</b>				
Ethanol	X	X		X
Ethylene	X	X		X
Fuel Oil	X	X		X
Gas, Natural	X	X	X	X
Gas, Sour	X	X		X
Gasoline	X	X	X	X
Crude Oil	X	X	X	X
Propane	X	X	X	X
Nitrogen	X	X	X	X
Butane	X	X		X
Diesel	X	X		X
Methane	X	X		X
Hydrocarbons	X	X		X
Hydrogen Sulfide (H <sub>2</sub> S)	X	X		X
Carbon Dioxide (CO <sub>2</sub> Mix)	X	X		X
<b>Water Industry</b>				
Sewage		X		X
Spent Liquor		X		X
Water (hot)		X		X
Water (potable)		X	X	X
Water (sea)		X	X	X
Water		X		



"FIK 101" For flange faces greater than 250 micro inches, consult factory.

Flange Type	DEFENDER™ Series	ISOGUARD™	ISOMATE™	MATRIX CPG
FF = Full Face	X	X	X	X
RF = Raised Face	X	X	X	X
RTJ	X	X		
FRP				X
S = Slip-on	X	X	X	X
Other	Contact Factory	Contact Factory	Contact Factory	Contact Factory

## Warranty

Goods sold are warranted to be free from defect in material and workmanship, but this express warranty is in lieu of and excludes all other warranties. Defective goods may be returned to Seller after inspection by Seller and upon receipt or definite instruction from Seller. Goods so returned and found to be defective will be replaced or repaired without charge, but Seller shall not be liable for loss or damage directly or indirectly arising from the use

of the goods or from any other cause; Seller's liability being expressly limited to the replacement or repair of defective goods. Every claim on account of defective goods, short count, or for any other cause, shall be deemed waived by Purchaser, unless made in writing within thirty (30) days from the receipt of goods to which such claims relate.