

SMITH Gaskets

3" x 900# - Flange Insulating Kit, consists of RF (Type F) kit containing G10 retainer with SS316 core & SS316 spring energised PTFE seal, G10 Sleeves, G10 Insulating Washers & MSZP Locking Washers, to suit ASME B16.5 Flange Smith HP



Both SMITH Gaskets' Corrosion Control System LP & HP have been tested and scrutinized against some of the highest globally applied standards in sealing and flange insulation and we can confirm compliance to, but not limited to: MESC SPE85/300, MESC SPE 85/201, EN13555.

When ordering either of these products, you will need to specify the following information:

- Flange specification (ANSI/ASME, API, DIN or other).
- Nominal pipe size, pressure rating and bore size.
- Operating pressure.
- Maximum operating temperature (°C).
- Required seal material (PTFE, FKM/Viton® or other).
- Insulating sleeve material (MYLAR, GRE, NOMEX or other).
- Insulating washer material.
- Metal washer material (shall be ZPS unless specified otherwise).
- Metallic core material (for HP only).



SMITH Gaskets

CORROSION CONTROL SYSTEM

FLANGE INSULATING SETS



Gasket Retainer (GRE)

ASTM	TEST METHOD	U.O.M	G10	G11
D695	Compressive strength	MPa / psi	345 / 50,000	345 / 50,000
D149	Di-electric strength	V / mil	550	550
D638	Tensile strength	psi	50,000	41,000
D229	Water absorption	%	0.1	0.1
D732	Shear strength	psi	22,000	22,000
F36	Compressibility range	%	5-15	5-15
D256	Impact strength	ft-lb / in	12	10
D790	Flexural strength	psi	66,000	66,000
---	Chemical resistance	pH	0-14	0-14
---	Operating temperature	°C	Cryogenic - 150	Cryogenic - 180

Gasket Seal (Operating temperatures)

MATERIAL	OPERATING TEMPERATURE (°C)
*PTFE	Cryogenic to 274
*FKM Viton®	-29 to 200
Nitrile	-40 to 120
*PTFE (Spring)	Cryogenic to 274

*Gasket material is the limiting factor

Insulating leeves

ASTM	TEST METHOD	U.O.M	MYLAR	G10
D149	Di-electric strength	V / mil	4,000	550
D790	Flexural Strenght	psi	13,000	66,000
D229	Water absorption	%	0.22	0.1

Insulating Washers

Unless otherwise specified, insulating washers will be supplied in same material as Gasket Retainer.

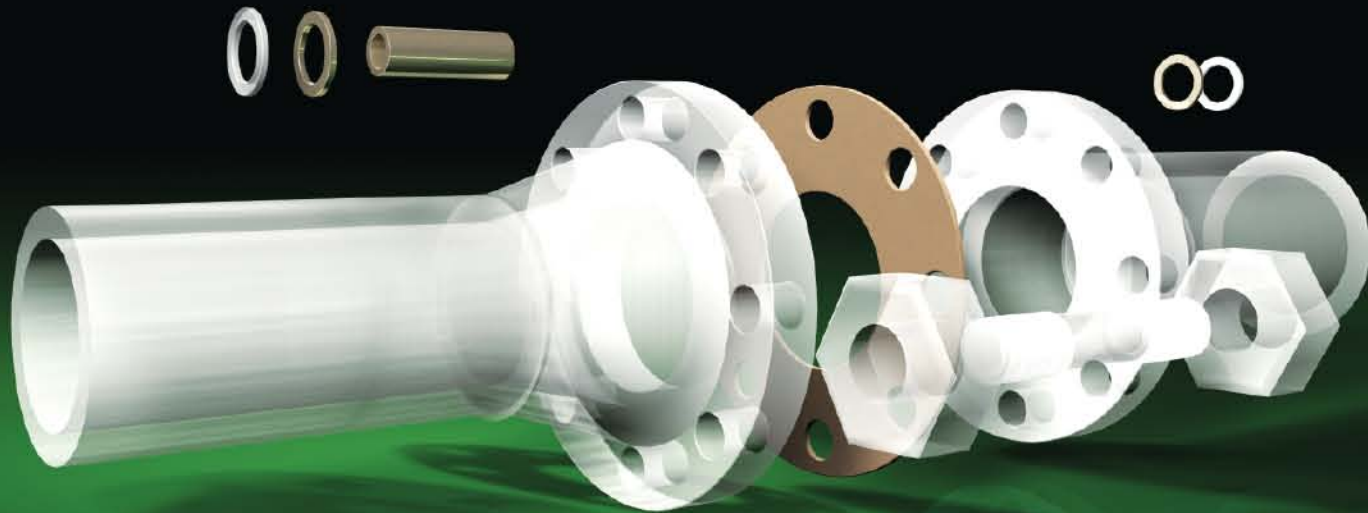
CORROSION CONTROL SYSTEM

Your complete solution for flange isolation

The SMITH Gaskets range of products also includes a wide range of Flange Insulation Sets. The sets come in various shapes, sizes and material combinations to meet with our customers' specific needs in different operating conditions. We call this product line, SMITH Gaskets' **Corrosion Control System**.

Flange Insulation Sets are used in flange applications where electrical isolation and galvanic corrosion resistance are required. The sets are used as an insulator between dissimilar metal flanges to decrease the possibility of creating a galvanic cell which would result in accelerated corrosion of the flanges and pipework. These sets also serve an additional purpose of electrically isolating sections of pipe work, preventing the flow of electrostatic charge along the pipeline, thereby reducing the chance of sparking in hazardous service.

The Flange Insulation Set usually consists of a single insulating gasket together with a set of two insulating washers, two steel washers and a full length insulating bolt sleeve, per bolt used in the flange assembly.



Type "E" Gaskets

Outside diameter of this gasket type extends up to the external diameter of the (Full Face) flange. This gasket has bolt holes matching those of the flange. This helps to automatically align and center the gasket and gives optimum protection against foreign particles which can short out the flange, thereby overcoming the cathodic protection provided by the insulation set.

Type "F" Gaskets

This type of gasket fits within the bolt circle of the flange. External diameter of the (Raised Face) gasket extends up to the inside diameter of the bolt hole circle. The bolts assist in the accurate alignment of the gasket.

Type "D" Gaskets

This type of gasket is made in the shape of a RTJ Gasket. Used only in low pressure applications where two mating RTJ Flanges are bolted together. However, our Corrosion Control System HP gaskets are the best alternative in high-pressure/high-torque applications.

CORROSION CONTROL SYSTEM HP

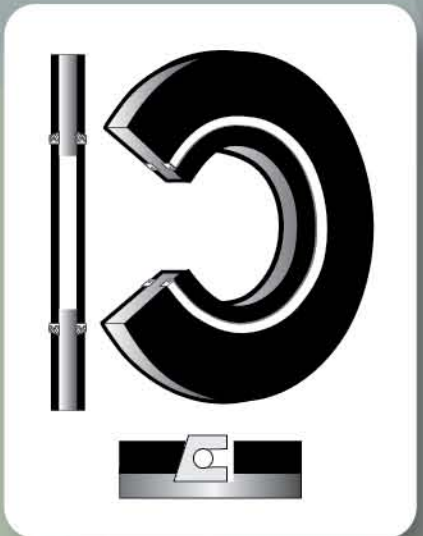
Corrosion Control System HP gaskets have been specially designed for critical services to withstand corrosive environments. Apart from the excellent sealing characteristics and superior dielectric properties, the 'HP' is ideal for general sealing applications.

This gasket is suitable for Raised Face, Full Face and RTJ flanges in all pressure classes.

The 'HP' gasket consists of a NEMA LI-1 compliant GRE insulating laminate, which is permanently bonded to the stainless steel gasket core. This is combined with a helical coil spring energized PTFE seal placed in a specially machined groove on each face of the gasket. The energized action of the PTFE seal helps to eliminate costly leaks and fugitive emissions during thermal cycling and eliminates the potential of media 'weeping' which is typical of laminated materials. Other material combinations are also available such as special alloy cores and O-ring seals.

Applications & Benefits:

- Insulation between dissimilar metal flanges to prevent galvanic corrosion.
- Steel core with laminate of a high strength GRE provides the strength of a full metal gasket but eliminates metal-to-metal contact for full joint isolation.
- Ideal for RTJ flange to Raised Face flange connections. The placement of the seal is on the inside of the RTJ groove to ensure both faces are effectively sealed.
- Eliminates fluid trap corrosion between two RTJ flanges. This is especially beneficial where high CO₂, H₂S and other aggressive media are present.
- Reduces turbulence and flow-induced erosion between RTJ flanges due to matching gasket internal diameter with flange bore.
- Protects against coating impingement on coated flange faces.
- Seal groove is machined through to the steel core which eliminates the potential of media weeping (leak) between the bonded layers of the gasket laminates.



CORROSION CONTROL SYSTEM LP

The Corrosion Control System LP gasket has similar properties to the 'HP' but is designed as a non-critical application gasket for low-medium pressure applications. This type of gasket is recommended for use in Raised Face (RF) and Full Face (FF) flanges ASME rated CL150 – CL600.

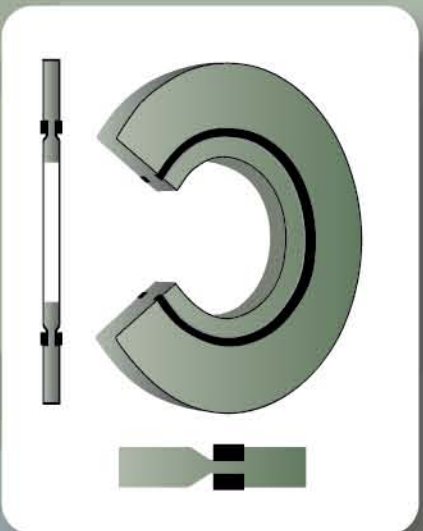
The 'LP' gasket provides excellent isolation and the specially designed integrated PTFE sealing element makes for effective energized sealing in dynamic conditions.

'LP' gasket retainers are based on high quality GRE laminates which have excellent dielectric strength, very good mechanical properties and sealing characteristics. This 'LP' design can easily replace unreliable, failure prone phenolic based gaskets. These gaskets are available in two models to suit; Raised Face and Full Face flanges, and also available in all flange configurations such as ASME, DIN, JIS, ISO etc.

The design of the integrated PTFE seal in the 'LP' differs from the 'HP' in that it does not have a helical coil spring and is instead self/pressure-energized. The PTFE sealing element is nestled within a specially designed groove allowing the seal to compress under load but to maintain optimal elastic memory for a higher level of recovery. PTFE is the standard seal option however other seal materials such as FKM and Nitrile are available on request.

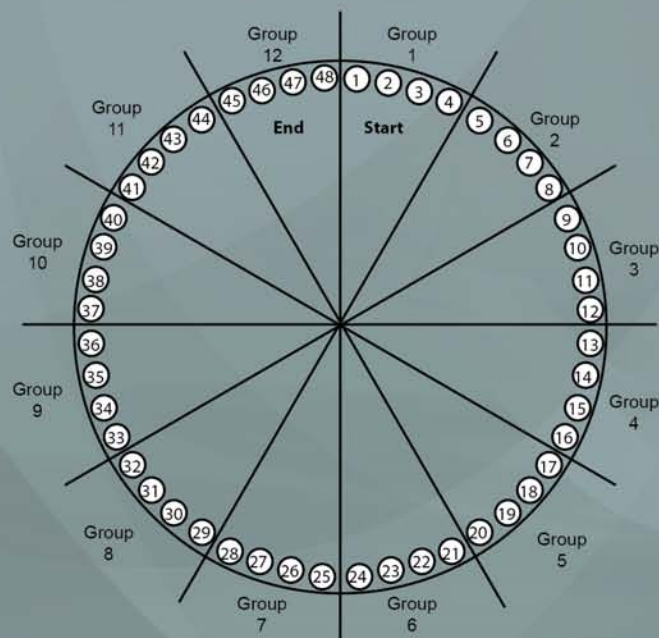
Applications & Benefits:

- Insulation between dissimilar metal flanges to prevent galvanic corrosion.
- High strength laminates reduce the risk of failure due to over-torquing the flange connections.
- Energized seal eliminates chances of media 'weeping'.
- Long life and maintenance-free design.
- Can provide reliable sealing at lower seating stress / bolt loads.
- Combination of GRE and PTFE materials provide excellent resistance against most flow media such as oils, water, gases, and other hydrocarbon based media.



Flange Size	Bolt Torque Values [ft-lb]					
	Class 150	Class 300	Class 600	Class 900	Class 1500	Class 2500
1/2	40	40	40	130	130	130
3/4	40	75	75	130	130	130
1	40	75	75	205	205	205
1 1/4	40	75	75	205	205	305
1 1/2	40	130	130	305	305	445
2	75	75	75	205	195	305
2 1/2	75	130	130	305	305	445
3	80	130	130	205	445	625
3 1/2	75	130	205	-	-	-
4	75	130	205	445	625	1120
5	130	130	205	625	1120	1825
6	130	130	305	445	850	2775
8	130	205	445	850	1445	2775
10	205	305	625	850	2265	5555
12	205	445	625	850	2775	7460
14	305	445	850	1120	4005	-
16	305	625	1120	1445	5555	-
18	445	625	1445	2265	7460	-
20	445	625	1445	2775	9760	-
22	625	1120	1825	-	-	-
24	625	1120	2265	5555	15690	-

Fig. 4 48-Bolt Flange Bolt Grouping Example



Group	Bolts
1	1-2-3-4
2	5-6-7-8
3	9-10-11-12
4	13-14-15-16
5	17-18-19-20
6	21-22-23-24
7	25-26-27-28
8	29-30-31-32
9	33-34-35-36
10	37-38-39-40
11	41-42-43-44
12	45-46-47-48

Tightening sequence for 12 Groups:

1-7-4-10 ↙

2-8-5-11 ↘

3-9-6-12

(The 12-group sequence is the same as a 12-bolt sequence; see Fig 3.)

SMITH Gaskets

FLANGE INSULATING SET INSTALLATION GUIDELINES & BOLT TORQUE REQUIREMENTS

Smith Corrosion Control System LP & HP

SIGS

Smith International Gulf Services

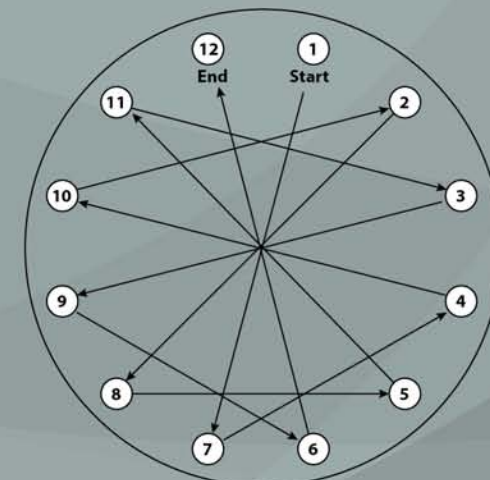
GASKET INSTALLATION INSTRUCTIONS

- Examine the gasket contact surfaces of both mating joint flanges for compliance with recommended surface finish of 125 – 250 μ in (3.2 – 64 μ m) and for damage to surface finish such as scratches, nicks, gouges, and burrs. Indications running radially across the facing are of particular concern.
- Check all fasteners, washers and gaskets are free from defects and damages.
- Align flanges properly, flange face shall be parallel and bolt holes coaxially coincided.
- Ensure the gap between the two flanges faces prior to installation is at least 10mm.
- Apply bolt lubricant to the bolt, nut and face of the nut to be tightened.
- Assemble the Insulating washer & Steel washer at the end you are inserting the bolt. Insert the bolt into the insulating sleeve for complete assembly.
- Insert the stud assembly in to the bolt holes around the lower half of the bolt patterns without force (which may damage the sleeves). Verify the flange alignment if sleeves not sliding freely.
- Assemble the Insulating washer & Steel washer on the opposite end and thread the lubricated nut on to the bolt/stud.
- Inspect the gasket face and clean the sealing face with soft clean cloth to clear the oil, dust or any other impurities.
- Insert the gasket between the two flanges and check the seals are secure in the grooves, gasket will be resting on the insulating sleeves showing proper alignment with the flange bore.
- Bolt torque method using single tool described below, Below procedure was extracted from ASME PCC-1 specification recommended for the proper bolt tightening in the flange assembly.
 - Hand tighten, then "snug up" to 15 Nm (10 ft-lb) to 30 Nm (20 ft-lb) (not to exceed 20% of Target Torque). Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.
 - Tighten to 20% to 30% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening/loosening before proceeding.
 - Tighten to 50% to 70% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening/loosening before proceeding.
 - Tighten to 100% of Target Torque (see section 12). Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening/loosening before proceeding.
 - Continue tightening the bolts, but on a circular clockwise pattern until no further nut rotation occurs at the Round 3 Target Torque value. For indicator bolting, tighten bolts until the indicator rod retraction readings for all bolts are within the specified range.
 - Time permitting, wait a minimum of 4 hr and repeat Round 4; this will restore the short-term creep relaxation/ embedment losses. If the flange is subjected to a subsequent test pressure higher than its rating, it may be desirable to repeat this round after the test is completed.

Smith Gaskets does not take responsibilities of any of these torque values, they are theoretical values. These bolt torque values are intended for use as guideline only and are based on ideal condition, perfect flanges, flange alignment & new well lubricated bolts and nuts, installed in accordance with guidelines of ASME –PCC-1-2010. Torque values are based on using weld neck flanges with a 0.16 friction factor and considered minimum seating stress of 7500PSI.

No. of Bolts	Sequentially Clockwise Sequence
4	1-3-2-4
8	1-5-3-7 → 2-6-4-8
12	1-7-4-10 → 2-8-5-11 → 3-9-6-12
16	1-9-5-13 → 3-11-7-15 → 2-10-6-14 → 4-12-8-16
20	1-11-6-16 → 3-13-8-18 → 5-15-10-20 → 2-12-7-17 → 4-14-9-19
24	1-13-7-19 → 4-16-10-22 → 2-14-8-20 → 5-17-11-23 → 3-15-9-21 → 6-18-12-24
28	1-15-8-22 → 4-18-11-25 → 6-20-13-27 → 2-16-9-23 → 5-19-12-26 → 7-21-14-28 → 3-17-10-24
32	1-17-9-25 → 5-21-13-29 → 3-19-11-27 → 7-23-15-31 → 2-18-10-26 → 6-22-14-30 → 4-20-12-28 → 8-24-16-32
36	1-2-3 → 19-20-21 → 10-11-12 → 28-29-30 → 4-5-6 → 22-23-24 → 13-14-15 → 31-32-33 → 7-8-9 25-26-27 → 16-17-18 → 34-35-36
40	1-2-3-4 → 21-22-23-24 → 13-14-15-16 → 33-34-35-36 → 5-6-7-8 → 25-26-27-28 → 17-18-19-20 → 37-38-39-40 → 9-10-11-12 → 29-30-31-32
44	1-2-3-4 → 25-26-27-28 → 13-14-15-16 → 37-38-39-40 → 5-6-7-8 → 29-30-31-32 → 17-18-19-20 → 41-42-43-44 → 9-10-11-12 → 33-34-35-36 → 21-22-23-24
48	1-2-3-4 → 25-26-27-28 → 13-14-15-16 → 37-38-39-40 → 5-6-7-8 → 29-30-31-32 → 17-18-19-20 → 41-42-43-44 → 9-10-11-12 → 33-34-35-36 → 21-22-23-24 → 45-46-47-48
52	1-2-3-4 → 29-30-31-32 → 13-14-15-16 → 41-42-43-44 → 5-6-7-8 → 33-34-35-36 → 17-18-19-20 → 45-46-47-48 → 21-22-23-24 → 49-50-51-52 → 25-26-27-28 → 9-10-11-12 → 37-38-39-40
56	1-2-3-4 → 29-30-31-32 → 13-14-15-16 → 41-42-43-44 → 21-22-23-24 → 49-50-51-52 → 9-10-11-12 → 37-38-39-40 → 25-26-27-28 → 53-54-55-56 → 17-18-19-20 → 45-46-47-48 → 5-6-7-8 → 33-34-35-36
60	1-2-3-4 → 29-30-31-32 → 45-46-47-48 → 13-14-15-16 → 5-6-7-8 → 37-38-39-40 → 21-22-23-24 → 53-54-55-56 → 9-10-11-12 → 33-34-35-36 → 49-50-51-52 → 17-18-19-20 → 41-42-43-44 → 57-58-59-60 → 25-26-27-28
64	1-2-3-4 → 33-34-35-36 → 17-18-19-20 → 49-50-51-52 → 9-10-11-12 → 41-42-43-44 → 25-26-27-28 → 57-58-59-60 → 5-6-7-8 → 37-38-39-40 → 21-22-23-24 → 53-54-55-56 → 13-14-15-16 → 45-46-47-48 → 29-30-31-32 → 61-62-63-64
68	1-2-3-4 → 37-38-39-40 → 21-22-23-24 → 53-54-55-56 → 9-10-11-12 → 45-46-47-48 → 29-30-31-32 → 61-62-63-64 → 17-18-19-20 → 57-58-59-60 → 33-34-35-36 → 5-6-7-8 → 41-42-43-44 → 13-14-15-16 → 49-50-51-52 → 25-26-27-28 → 65-66-67-68

3 Example Legacy Pattern 12-Bolt Tightening Sequence



Tightening sequence for 12 bolts (Round 1 through Round 3):

1-7-4-10 → 2-8-5-11 → 3-9-6-12