

The Guide to Optimal Flange Isolation Kit (FIK) Performance



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INTRODUCTION

Flange Isolation Kits (FIKs) are vital components in the pipeline industry, designed to provide both a reliable seal and electrical isolation to prevent corrosion. Proper selection, installation, and maintenance of these kits are crucial for ensuring the long-term reliability and efficiency of pipeline systems. This guide outlines the Top 10 Essentials for Optimal FIK Performance, offering comprehensive insights and practical recommendations to help you achieve superior results in your operations.

1. OPERATING AND DESIGN PRESSURE

Key Considerations:

Pressure levels play a fundamental role in determining the appropriate type of gasket for your application. For low-pressure pipelines ($\leq 600\#$), GRE-based gaskets are commonly used due to their suitability for these conditions. High-pressure pipelines ($>600\#$), however, require steel-core gaskets to prevent media permeation and withstand the elevated stresses associated with these applications. Selecting an incorrect gasket for the pressure environment can lead to failures, including media leaks and compromised electrical isolation.

Tips:

- Always confirm the operating and design pressures of your system before selecting a gasket.
- For high-pressure scenarios, opt for advanced gaskets such as VCS or Evolution, which are specifically engineered to handle increased stress levels and ensure optimal performance.

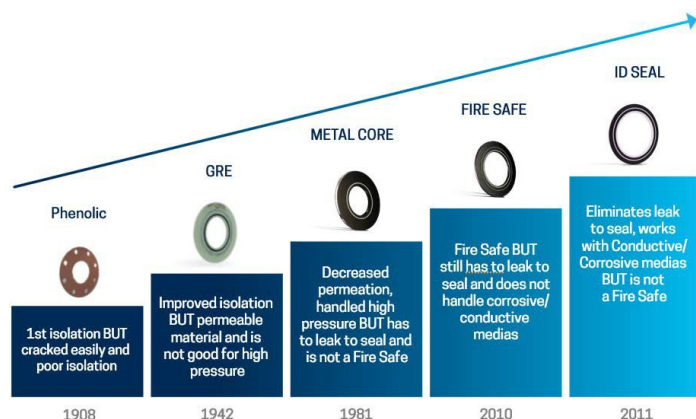


Fig. Step change improvements in isolation technology.

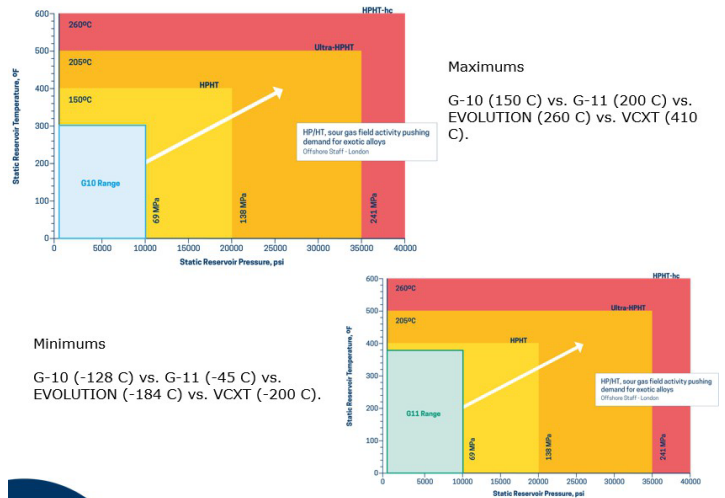
2. OPERATING AND DESIGN TEMPERATURE

Key Considerations:

Extreme temperatures, whether high or low, can significantly affect the performance of gasket materials. GRE materials have well-defined temperature thresholds (e.g., G-10: 150°C, G-11: 200°C). Advanced materials, such as Evolution and VCXT, are designed to handle a broader temperature range, making them ideal for applications with challenging thermal conditions.

Tips:

- Verify the maximum and minimum temperature tolerances for all gasket components, including the core and sealing elements.
- For pipelines carrying flammable media, use fire-safe gaskets to enhance safety in case of external fires.
- Steel core gaskets to prevent media permeation and withstand the elevated stresses associated with these applications. Selecting an incorrect gasket for the pressure environment can lead to failures, including media leaks and compromised



The chart illustrates how applications increasingly demand materials capable of withstanding higher temperatures, with standard GRE materials like G-10 rated up to 150°C and G-11 up to 200°C for elevated temperature requirements.

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3. PIPELINE MEDIA

Key Considerations:

Understanding the chemical composition of the media flowing through your pipeline is essential for selecting materials that will endure over time. Media such as steam, hydrogen sulfide, and amines can be particularly aggressive and require specialized materials, such as PTFE seals, to ensure compatibility and performance.

Tips:

- Consult chemical compatibility charts to confirm that all gasket materials, including the core and seals, are suited to the pipeline's media.
- For pipelines with highly challenging media, consider gaskets like Evolution or VCS-ID, which are designed to provide superior chemical resistance.



Images of isolation gaskets exposed to media and chemical attack.

4. PROPER INSTALLATION TECHNIQUES

Key Considerations:

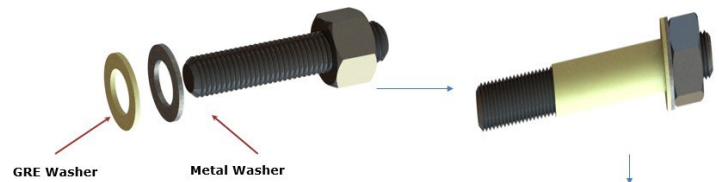
Improper installation is one of the leading causes of FIK failures. Ensuring correct torque values, alignment, and preparation is essential to achieving a reliable seal and maintaining electrical isolation.

Steps:

1. Clean flange surfaces thoroughly, removing all debris to ensure proper sealing and isolation.
2. Apply a non-metallic lubricant to studs and nuts to facilitate even torque application.
3. Tighten bolts in a star pattern, progressively increasing torque in increments to achieve the target value.

Tips:

- Always refer to the detailed installation instructions provided by GPT with each kit.
- For in-depth guidance, consider attending GPT's live installation training, which covers advanced techniques and best practices.



Ensure the metal washer faces the nut and the isolation washer faces the flange for proper installation subject to media and chemical attack.

GPT Isolation Gasket Installation Instructions - Torque values for ASME B16.5 and B16.47A Flanges - Click on the image below to download



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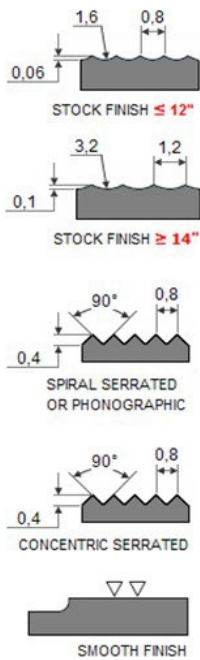
5. FLANGE CONDITION AND PREPARATION

Key Considerations:

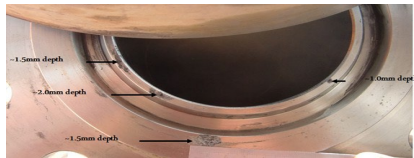
The condition of flange faces directly impacts the effectiveness of gasket seals. Flanges should adhere to ASME PCC-1 guidelines, which specify an ideal surface finish of 125-250 micro-inches. Damaged or contaminated flange surfaces can compromise the seal, leading to leaks and reduced system performance.

Tips:

- Inspect flange faces for scratches, pits, or debris prior to gasket installation.
- Ensure the flange surface finish provides adequate grip for the gasket's sealing element, enhancing performance and longevity.



The chart to the left shows the different types of flange surface finish. Images below show examples of flange defects and contamination.



6. PROPER SEALING SURFACES

Key Considerations:

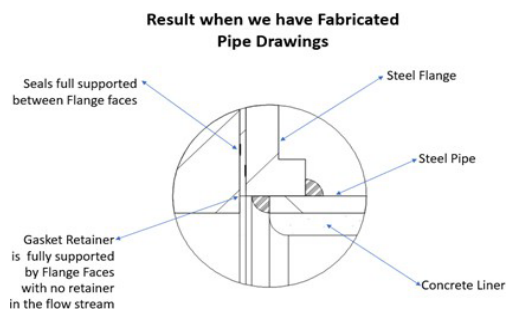
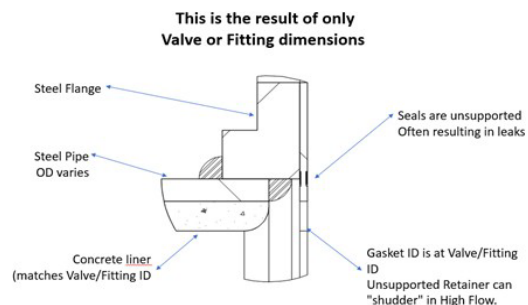
For a gasket to function effectively, its seals must land on appropriate surfaces. Challenges arise when sealing against non-standard surfaces such as rubber seats, concrete linings, or weld areas, which can undermine the sealing process.

Tips:

- When using valves with rubber seats, select gaskets with adjusted sealing elements to ensure compatibility.
- Always match gasket IDs to flange IDs to guarantee proper sealing alignment and avoid unnecessary turbulence or erosion.



concrete lined pipe



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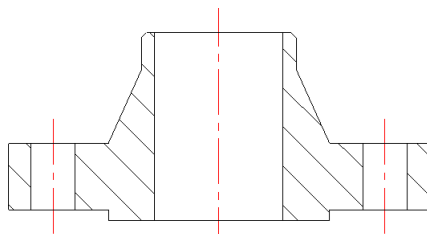
7. FLANGE TYPE

Key Considerations:

Different flange types, such as raised face (RF), flat face (FF), RTJ, and slip-on flanges, require specific gasket designs to ensure a proper fit and seal. Incorrect gasket selection for a flange type can lead to isolation failure or mechanical issues.

Tips:

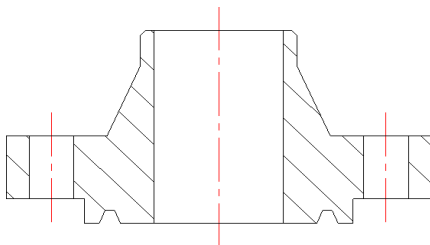
- For RF flanges, use Type F gaskets; for FF flanges, use Type E gaskets to match the surface area.
- Provide detailed information about flange types to the gasket manufacturer to ensure precise sizing and compatibility.



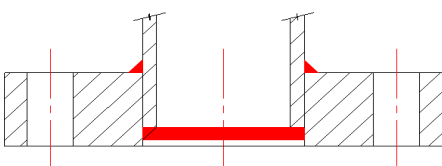
Raised Face Flange



Flat Face Flange



RTJ Flange



Slip-On Flange

8. PIPE SCHEDULE AND FLANGE ID

Key Considerations:

The inside diameter (ID) of the gasket must align perfectly with the pipe bore to ensure optimal flow conditions and a secure seal. Misalignment can cause turbulence, media buildup, or electrical bridging, which compromises pipeline performance.

Tips:

- Determine whether the flange is weld-neck or slip-on before calculating the gasket ID.
- For non-standard configurations, provide all relevant dimensions to the gasket manufacturer to avoid errors.

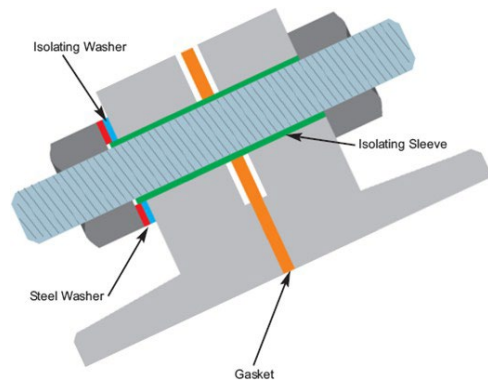
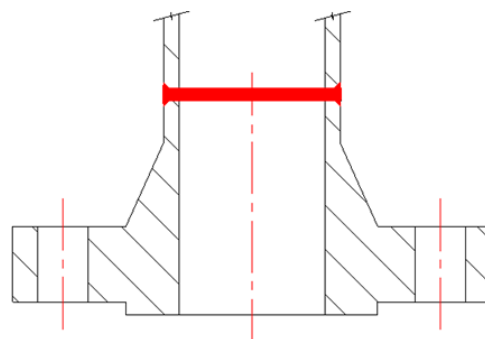


Illustration of a flange with the components of a flange isolation kit.



Weld Neck Flanges - ID based on Pipe Schedule/Pipe Wall Thickness

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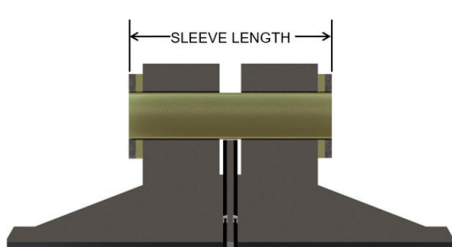
9. FLANGE CONFIGURATION FOR SLEEVE LENGTH

Key Considerations:

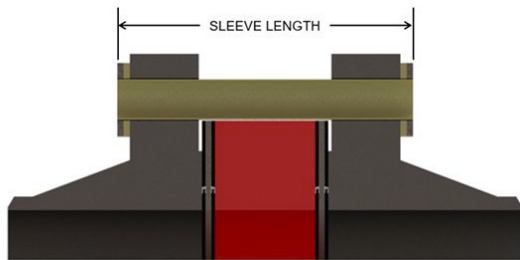
Accurate sleeve length is critical for maintaining isolation and preventing mechanical stress on the flange assembly. Sleeves that are too short or too long can result in isolation failure or sleeve damage.

Tips:

- Include details about additional components, such as valves or actuators, that might affect sleeve length calculations.
- Verify that sleeves extend precisely from nut to nut within the assembly to ensure proper fit and function.



The proper sleeve length is designed to fit exactly through the washers on each side, extending to the nut both ways.



In this case, sleeve length would be calculated the same as described before, but now we must account for the valve thickness for example, as well as the additional gasket thickness

10. TYPE OF BOLTS OR STUDS

Key Considerations:

The choice of bolts or studs significantly impacts the performance of FIKs. Shoulder bolts, for instance, are incompatible as their unthreaded sections can interfere with the sleeves, causing isolation issues.

Tips:

- Use ASTM A193 B7 studs for reliable torque application and optimal performance.
- Avoid combining coated and lubricated studs, as this can compromise electrical isolation.



Use studs with two hex head nuts for flange isolation kits to ensure accurate torque and proper isolation. Avoid shoulder bolts, as their unthreaded sections prevent sleeves from fitting, rendering the kit ineffective.

CONCLUSION

By adhering to these ten essential practices, you can maximize the performance and reliability of your Flange Isolation Kits, ensuring effective corrosion prevention and long-term operational success. For personalized assistance or advanced training, contact GPT Industries. Access exclusive resources to further enhance your knowledge and capabilities.



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