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Spiral Wound Gasket

A Complete Guide [Properties, Applications, Types, Dimensions and Installation Process]

Spiral wound gaskets play a crucial role in sealing applications across various industries, providing a reliable and effective solution for preventing leaks in pipelines and equipment. In this complete guide, we will delve into the intricacies of spiral wound gaskets, exploring their definition, properties, manufacturing standards, components, types, fillers, dimensions, and installation processes.

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What is a Spiral Wound Gasket?

A spiral wound gasket is an industrial sealing device that prevents leaks between two mating flanges under varying temperature and pressure conditions. It combines metal (commonly stainless steel or other alloys) and filler materials (such as graphite or PTFE) wound circularly, creating a resilient and versatile sealing solution, making it suitable for use in pipelines, heat exchangers, and other equipment where a secure and leak-free seal is essential.

Properties and Applications

Spiral wound gaskets are distinguished by their distinct design and possess properties that make them indispensable in various industrial applications. These gaskets are meticulously engineered, combining a metallic winding, typically composed of stainless steel, with a filler material such as graphite or PTFE. This amalgamation results in a gasket with exceptional resilience, enabling it to withstand extreme temperatures, pressures, and fluctuations, making it a reliable choice for sealing applications. The metal winding imparts strength and stability, while the filler material contributes sealing properties, ensuring effective performance in demanding environments. These gaskets find extensive use in sectors such as petrochemicals, oil and gas, pharmaceuticals, and power generation, where they are employed to create a secure seal between flanges in pipelines, heat exchangers, and various critical equipment. The versatility and durability of spiral wound gaskets make them a preferred solution for applications where maintaining a leak-free seal is paramount to operational integrity.

Manufacturing Tolerances and Standards



Manufacturing tolerances and adherence to industry standards are critical aspects ensuring the reliability and performance of spiral wound gaskets. These gaskets must meet stringent criteria set forth by reputable organizations to guarantee their compatibility and effectiveness in diverse industrial applications.

The American Society of Mechanical Engineers (ASME) plays a pivotal role in establishing standards for spiral wound gaskets. ASME's B16.20 standard outlines dimensions, tolerances, materials, and marking requirements for metallic gaskets, including spiral wound variants. Compliance with ASME standards ensures consistency and interchangeability, enabling seamless integration into various piping systems.

Moreover, the American Petroleum Institute (API) standards contribute significantly to the manufacturing processes of spiral wound gaskets. API standards, such as API 601, delineate the requirements for metallic gaskets used in the petroleum and natural gas industries. Adhering to API standards ensures that spiral wound gaskets meet the rigorous demands of the oil and gas sector, maintaining integrity under challenging conditions.

By incorporating the specifications outlined by ASME, and API, manufacturers can produce gaskets that meet the industry's stringent requirements and provide end-users with a reliable and consistent sealing element for critical applications. For a more comprehensive understanding of industry standards about spiral wound gaskets, explore the in-depth guide for detailed knowledge and information.

Components of Spiral Wound Gasket

The main components of a spiral wound gasket include:

Metallic Winding: The metal strip is wound in a circular pattern, providing strength and resilience to the gasket. Stainless steel is often used for this component due to its corrosion resistance and durability.

Filler Material: The filler material is wound along with the metal strip and is crucial for providing sealing properties. Common filler materials include graphite, suitable for high-temperature applications, and PTFE (polytetrafluoroethylene), which offers chemical resistance.

Outer Ring: Some spiral wound gaskets have an outer ring, which provides alignment, reinforcement, stability, and protection to the gasket. The outer ring is typically made of the same material as the metallic winding.

Inner Ring: Prevents fluid flow through the gasket, enhancing its sealing properties.



Spiral Wound Gasket Types

Spiral wound gaskets come in various types, each designed to address specific sealing requirements in different industrial applications. Here is an overview of some standard spiral wound gasket types:

CGI (Spiral Wound Metallic Gasket with Inner and Outer Rings):

SIO gaskets feature inner and outer rings crafted from carbon steel, stainless steel, and other metals. This dual-ring construction enhances stability and provides effective sealing applications with varying temperature and pressure conditions.



GI (Spiral Wound Metallic Gasket with Inner Rings)

SIR gaskets typically feature inner rings made of stainless steel. This configuration enhances the gasket's resilience and makes it well-suited for corrosion resistance and durability applications.



G (Spiral Wound Metallic Gasket Lacking a Centering Ring)

SWR gaskets do not have a centering ring. They are often used in applications where a centering device is unnecessary, providing a simple yet effective solution for sealing between flanges.

CG (Spiral Wound Gasket with Centering Ring)

The SOR gasket features a centering ring, providing improved alignment during installation. This type of gasket is commonly used in applications where precise alignment is crucial for effective sealing.



Common Filler Materials Used

Filler materials play a crucial role in the performance of spiral wound gaskets, determining their sealing properties, resilience, and compatibility with specific operating conditions. The choice of filler material depends on the particular application and working conditions. Some common filler materials used in spiral wound gaskets include

Graphite:

Properties: Graphite is a versatile filler material known for its excellent thermal conductivity, chemical resistance, and ability to withstand high temperatures. It provides effective sealing in applications involving intense heat and corrosive environments.

Applications: Graphite-filled spiral wound gaskets are widely used in industries such as petrochemicals, refining, and power generation, where elevated temperatures and aggressive chemicals are common.

PTFE (Polytetrafluoroethylene)

Properties: PTFE, commonly known as Teflon, exhibits exceptional chemical resistance, low friction, and excellent electrical insulation properties. It is stable over a wide temperature range.

Properties: PTFE-filled spiral wound gaskets are suitable for applications involving aggressive chemicals, acids, and caustic substances. They find use in the pharmaceutical, chemical, and food processing industries.

Mica

Properties: Mica possesses good thermal stability, electrical insulation properties, and chemical resistance. It is resistant to high temperatures.

Applications: Mica-filled spiral wound gaskets are suitable for applications involving extreme temperatures, making them valuable in power generation and metallurgy industries.

The selection of a specific filler material depends on factors such as temperature, pressure, chemical exposure, and the particular demands of the application.



Spiral Wound Gasket Specifications/Dimensions

Spiral wound gaskets are available in standard dimensions to fit different flange sizes and pressure ratings. Typical specifications include diameter, thickness, and inner/outer ring dimensions. Depending on the application requirements, spiral wound gasket thickness can vary from 3.2 mm (1/8 inch) to 6.4 mm (1/4 inch) or even greater. Thicker gaskets are often chosen for applications involving higher pressure and temperature conditions, where the gasket needs to withstand more extreme forces without compromising the seal. However, customizations can be made to meet specific requirements, such as non-standard flange dimensions or unique applications. Manufacturers often offer customization services to provide gaskets that precisely fit the intended application.

Installation Process

Installing spiral wound gaskets is critical to ensuring their effective performance and maintaining a leak-free seal in industrial applications. Proper installation involves steps that, when followed meticulously, contribute to the gasket's integrity and longevity. Here's a step-by-step installation guide:

Surface Preparation: Begin by thoroughly cleaning the flange surfaces that will come into contact with the gasket. Remove any residue, rust, or debris to ensure a smooth and even sealing surface.

Inspection: Carefully inspect the flange faces and the gasket for any damage, irregularities, or foreign particles. Replace any damaged components to avoid compromising the seal.

Alignment: Proper alignment of the flanges is crucial for the effective functioning of the spiral wound gasket. Ensure that the flanges are correctly aligned before placing the gasket between them.

Gasket Placement: Position the spiral wound gasket onto the clean and aligned flange faces. If present, ensure that the outer ring of the gasket is centered correctly.

Torquing: Gradually and uniformly torque the bolts in a crisscross pattern using a torque wrench. For torque values, consult the manufacturer's specifications or industry standards. This step is crucial for achieving the proper compression of the gasket.

Final Inspection: After torquing, perform a final inspection to ensure the gasket is evenly compressed, and the flanges remain appropriately aligned. Check for any visible signs of leakage.

Post-Installation Checks: Monitor the gasket's performance over time and under operational conditions. Periodic checks help identify potential issues and allow for timely maintenance or replacement.



Following the manufacturer's guidelines and recommended procedures during installation is essential. By implementing these best practices, industries can maximize the effectiveness of spiral wound gaskets, contributing to the overall integrity of their piping systems and equipment.

In conclusion, spiral wound gaskets represent a reliable sealing solution for critical applications across diverse industries. Understanding their construction, types, fillers, and installation processes is crucial for selecting the right gasket for specific operating conditions. By adhering to industry standards and best practices, engineers and professionals can ensure spiral wound gaskets' optimal performance and longevity in various industrial settings.



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