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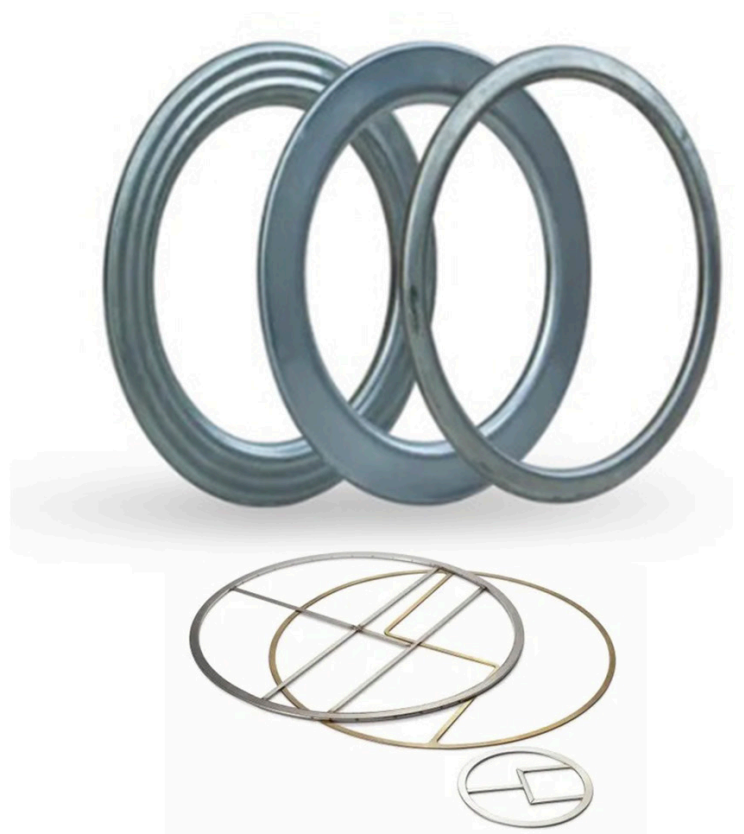
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# Metal Jacketed Gasket: Complete Guide

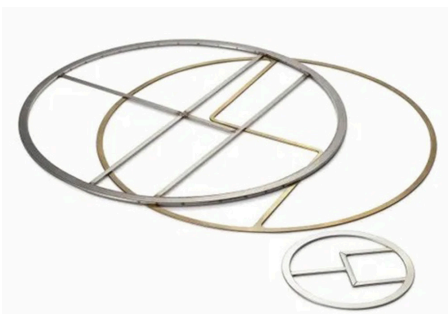
Achieving a reliable and effective seal is critical in industrial applications where high pressures, extreme temperatures, and corrosive environments are common. Metal jacketed gaskets are crucial in maintaining leak-free connections between flange joints, making them indispensable in various industries. This comprehensive guide aims to provide an in-depth understanding of metal jacketed gaskets, covering their construction, types, applications, advantages, and considerations for proper selection and installation.

## Table of Contents

1. What is a Metal Jacketed Gasket?
2. Applications of Metal Jacketed Gasket
3. Functions of Metal Jacketed Gasket
4. Metal Jacketed Types
5. Metal Jacketed Gasket Materials
6. Selection Criteria for Metal Jacketed Gasket
7. Metal Jacketed Gasket Installation



## What is a Metal Jacketed Gasket?



Metal jacketed gaskets are specialized sealing elements designed to provide a robust and resilient seal in difficult operating conditions. A Metal Jacketed Gasket is distinguished by its metallic exterior casing and a compressed fiber filler, which can be metallic or non-metallic. The filler material provides flexibility, while the metal jacket protects the filler by resisting pressure, temperature fluctuations, and corrosion.

# Applications of Metal Jacketed Gasket

Metal jacketed gaskets find widespread applications across various industries due to their ability to provide reliable sealing in demanding conditions. Some applications include:

## Petrochemical Industry

- Metal jacketed gaskets find frequent applications in the petrochemical industry, providing reliable sealing for flange connections in pipelines, reactors, and various equipment. These gaskets boast sturdy construction, making them adept at enduring elevated pressures, temperatures, and exposure to corrosive substances.

## Oil and Gas Industry

- In the oil and gas industry, metal-jacketed gaskets are vital during exploration, production, and refining. They are utilized in crucial zones like wellheads, pipelines, and processing equipment, ensuring effective sealing in environments characterized by exposure to hydrocarbons, high pressures, and extreme temperatures.

## Chemical Processing Plants

- Chemical manufacturing facilities utilize metal jacketed gaskets to seal flanges in reactors, vessels, and pipelines. The gaskets' resistance to chemical corrosion and ability to maintain a secure seal in aggressive chemical environments make them indispensable in these applications.

## Power Generation

- Metal jacketed gaskets are crucial in power generation facilities, sealing flanges in boilers, turbines, and heat exchangers. Their resistance to high temperatures and pressures is vital to ensuring the integrity of the power generation process.

## Shipbuilding and Maritime Applications

- Metal jacketed gaskets are used to construct marine vessels to seal flanges in piping systems, ensuring watertight and corrosion-resistant connections. The gaskets' durability is particularly valuable in the challenging marine environment.

## Aerospace Industry

- In aerospace applications, where stringent requirements for reliability and safety exist, metal jacketed gaskets may be used in critical systems that require high-performance sealing, such as fuel and hydraulic systems.

## Food and Pharmaceutical Processing

- In industries that place a high value on cleanliness and hygiene, such as food and pharmaceutical processing, metal-jacketed gaskets can ensure leak-free connections in equipment like reactors, mixers, and piping systems.

# Functions of Metal Jacketed Gasket

Metal jacketed gaskets serve several critical functions in industrial applications, providing reliable sealing solutions in challenging environments. The key functions of metal jacketed gaskets include

## 01 Sealing Integrity

- The primary function of a metal jacketed gasket is to create a tight and effective seal between flange connections. By combining a metallic outer shell and a compressed fiber filler, the gasket can conform to irregularities in the flange surfaces, preventing fluid or gas leakage.

## 02 Pressure Resistance

- Metal jacketed gaskets are designed to withstand high-pressure levels within the sealed system. The metal jacket provides structural integrity, ensuring the gasket maintains its shape and sealing capabilities even under substantial pressure.

## 03 Temperature Resistance

- These gaskets are suitable for applications involving extreme temperatures. The metal jacket protects the gasket from thermal stress, preventing deformation and maintaining sealing performance in high- and low-temperature environments.

## 04 Corrosion Resistance

- The metallic materials for the outer jacket ensure corrosion resistance, making metal jacketed gaskets suitable for use in corrosive environments. This is especially important in industries where exposure to aggressive chemicals is common.

## 05 Chemical Compatibility

- Metal jacketed gaskets are selected based on the compatibility of their filler material with the chemicals or fluids present in the system. This ensures that the gasket remains stable and resilient in the presence of various substances.

## 06 Durability and Longevity

- The robust construction of metal jacketed gaskets contributes to their durability and longevity. These gaskets are engineered to withstand the rigors of industrial operations, providing a reliable sealing solution over an extended period.

## 07 Conformability

- The compressed fiber filler inside the metal jacket allows the gasket to conform to the surface irregularities of flanges, creating a tight and effective seal. This conformability is crucial for preventing leaks, even in applications where flange surfaces may not be perfectly smooth

## 08 Versatility

- Metal jacketed gaskets are versatile and can be used in various applications across various industries. Their adaptability to different operating conditions makes them a preferred choice in environments with diverse sealing requirements.

## 09 Enhanced Strength

- The metal jacket provides additional strength to the gasket, making it suitable for applications where higher bolt loads are necessary. This enhanced strength contributes to the gasket's ability to withstand extreme pressures.

## 10 Maintaining Flange Integrity

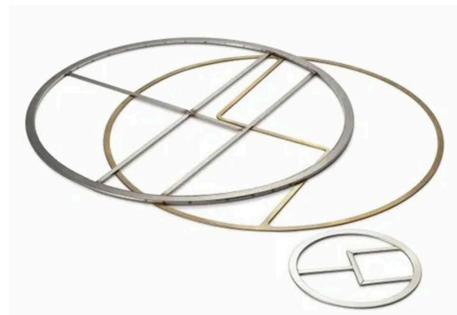
- Metal jacketed gaskets help distribute bolt loads evenly across flange surfaces, ensuring the flanges remain intact and securely connected. This function is critical for preventing flange deformation and maintaining the integrity of the joint.

# Metal Jacketed Gasket Types

Metal jacketed gaskets come in various types, each designed to suit specific applications and requirements. Let's explore the key types of metal jacketed gaskets:

## Double Jacketed Gaskets

- Double-jacketed gaskets feature two metal layers with a soft filler material sandwiched in between. This design enhances the gasket's strength and resilience, making it suitable for additional pressure resistance and durability applications.



## Types of double-jacketed gaskets

### 01 Double Jacketed Gasket with Both Contact Surfaces Covered

- The metal jacket covers both contact surfaces in this type of double-jacketed gasket. This design ensures that the metal jacket protects the entire sealing face of the gasket. The filler material is enclosed between two metal layers, providing enhanced strength, durability, and resistance to environmental factors.

## 02 DoubleDouble Shell Gasket with Two Reversed Wrap-Round Shells

- The double shell gasket comprises two reversed wrap-around shells encapsulating the soft filler material. The wrap-around shells protect the gasket, shielding the filler material from external elements. This design enhances the gasket's ability to withstand high pressures, temperature variations, and corrosive environments.

## 03 Exchanger Gaskets (Double Jacketed)

- Exchanger gaskets, a subtype of double-jacketed gaskets, are specifically designed for use in heat exchangers. These gaskets provide a reliable seal in the often challenging conditions of heat exchange applications, where temperature variations and pressure fluctuations are common.

## 04 Double Jacketed Corrugated Gaskets

- This type of gasket combines the features of double-jacketed gaskets with a corrugated design. The corrugations enhance the gasket's ability to conform to flange irregularities, improving its sealing performance. These gaskets are often used in applications requiring flexibility and effective sealing under varying conditions.

## 05 Corrugated Metal Gaskets (CMG)

- Corrugated metallic gaskets, sometimes called CMGs, are designed with a corrugated metal core. This groove allows the gasket to adapt to flange surfaces, providing an effective seal. CMGs are known for maintaining a seal under high pressure and temperature cycling.

## 06 Single Jacketed Gaskets

- Single jacketed gaskets consist of a single layer of metal enclosing a soft filler material. While they may not offer the same level of strength as double-jacketed gaskets, they are still suitable for applications where moderate pressure resistance is sufficient. Single-jacketed gaskets are often chosen for their cost-effectiveness.

# Types of single jacketed gaskets

## 01 One Contact Surface Covered

- The metal jacket covers just one contact surface in this jacketed gasket. It wraps around the soft filler material on one side, offering protection and reinforcement for the gasket. This design is apt for situations where there's a specific requirement for coverage on one side, allowing direct contact with the flange on the other side.

## 02 Overlapped Single Jacketed Type with Filler Enclosed on Inside and outside Diameter and on Contact Surfaces:

- This type of jacketed gasket features a single metal jacket that overlaps the inside and outside diameters of the gasket, covering the contact surfaces. The filler material is enclosed within the metal jacket, providing a complete seal around the gasket's perimeter and on the contact surfaces. The overlap design enhances the gasket's stability and ensures a secure seal even in applications with variations in flange conditions.the other side.

# Metal Jacketed Gasket Materials

Choosing materials for metal jacketed gaskets is crucial to ensure compatibility with the operating conditions and the media being sealed. Here are some common materials used for the construction of metal jacketed gaskets

## 01 Metal Jacket Materials

- a. **Stainless Steel:** Renowned for its corrosion resistance and durability, stainless steel is ideal for applications in corrosive environments.
- b. **Carbon Steel:** Carbon steel jackets are chosen for their strength and cost-effectiveness in situations with limited corrosive exposure.
- c. **Other Alloys:** Depending on specific needs, alloys like Monel, Inconel, or Hastelloy may enhance corrosion resistance and withstand extreme temperatures.

## 02 Filler Materials

- a. **Graphite:** Graphite is frequently utilized in metal jacketed gaskets, providing outstanding thermal conductivity, flexibility, and chemical resistance—ideal for high-temperature applications
- b. **PTFE (Polytetrafluoroethylene):** PTFE, celebrated for its chemical resistance and low friction properties, finds application in scenarios demanding a non-reactive and non-stick surface.
- c. **Asbestos-Free Materials:** To adhere to environmental and health standards, contemporary metal jacketed gaskets opt for non-asbestos fillers like aramid fibers, fiberglass, or other synthetics, achieving a harmonious blend of flexibility and resilience.
- d. **Elastomers:** Elastomeric materials such as rubber or silicone may be used as filler materials for applications requiring enhanced elasticity. These materials provide a good seal and suit applications with moderate temperatures.

## 03 Combination Materials

- a. **Composite Gaskets:** Some metal jacketed gaskets use a combination of materials to capitalize on the strengths of each. For instance, a gasket may have a stainless steel jacket with a graphite and PTFE composite filler to offer corrosion resistance and effective sealing properties.

## 04. Coating Materials

- a. **Anti-Stick Coatings:** In specific applications, metal jacketed gaskets may be coated with anti-stick materials such as Teflon or other non-stick coatings. This helps prevent gasket adhesion to flange surfaces during installation or removal.



## Selection Criteria for Metal Jacketed Gasket

Selecting a suitable metal jacketed gasket ensures a reliable and effective seal in industrial applications. Various factors must be considered during the selection process to match the gasket's characteristics with the application's requirements. Here are key criteria to guide the selection of metal jacketed gaskets:

### Operating Conditions

- **Temperature Range:** Consider the temperature extremes the gasket will encounter. Different materials have varying temperature resistances, so choosing a gasket that can withstand the anticipated temperature fluctuations is essential.
- **Pressure Requirements:** Determine the pressure levels within the system. Metal jacketed gaskets are designed to resist high pressures, but the choice of materials and construction details should align with the specific pressure conditions.

### Media Compatibility

- **Chemical Compatibility:** Evaluate the chemical composition of the fluids or gases the gasket will contact. Select a gasket with materials that resist corrosion and chemical attack from the media.
- **Media Type:** Consider whether the gasket will be exposed to aggressive or abrasive media. Different filler materials are suited to other media types, ensuring compatibility and long-term effectiveness.

### Flange Surface Conditions

- **Surface Finish:** Ensure that the flange surfaces are adequately finished. A smooth and flat flange surface contributes to better sealing performance. Consider using gaskets that can accommodate slight surface irregularities.
- **Flange Material:** The flange material should be compatible with the gasket material to prevent galvanic corrosion. Matching the gasket and flange materials helps maintain the integrity of the joint.

### Application-Specific Considerations

- **Flexibility Requirements:** In applications where flange surfaces are not perfectly flat, or flexibility is crucial, consider gaskets with features such as grooves. Corrugated metal gaskets provide enhanced flexibility and conformability.
- **Bolt Load Requirements:** Determine the available bolt load for the joint. Different gasket designs and materials may require specific bolt loads for optimal sealing performance.

## Industry Standards

- Conformance to Standards: Verify that the selected gaskets meet industry standards and specifications. Compliance with norms ensures the gaskets are manufactured to consistent quality and performance criteria.

By carefully evaluating these selection criteria, engineers and maintenance professionals can choose the most suitable metal jacketed gasket for their specific application, ensuring optimal performance, longevity, and safety.

## Metal Jacketed Gasket Installation

Installing metal jacketed gaskets ensures a reliable and effective seal in industrial applications. Here's a guide for the installation of metal jacketed gaskets:

### 1. Surface Preparation

- Ensure that flange surfaces are clean, smooth, and free from debris, rust, or old gasket material. Proper surface preparation is crucial for achieving an effective seal.

### 2. Gasket Inspection

- Thoroughly examine the metal jacketed gasket for any signs of damage, like dents, scratches, or deformities. Verify that the gasket meets the specific size and type requirements.

### 3. Bolt Lubrication

- Lubricate bolt threads and nuts with an appropriate lubricant to achieve proper torque during tightening. This helps prevent galling and ensures uniform bolt loading.

### 4. Gasket Placement

- Carefully place the metal jacketed gasket on the clean and prepared flange surface. Ensure that the gasket is centered and aligned with the flange bolt holes.

### 5. Alignment of Flanges

- Align the flanges carefully to avoid damaging the gasket during the installation process. Misalignment can lead to uneven compression and compromise the seal.

### 6. Bolt Installation

- Insert bolts through the bolt holes, ensuring they pass through the gasket and the flange. Hand-tighten the nuts initially to hold the gasket in place.

### 7. Tightening Procedure

- Follow the tightening sequence recommended by the gasket manufacturer. Tighten the bolts gradually and uniformly in a crisscross pattern to ensure even gasket compression.

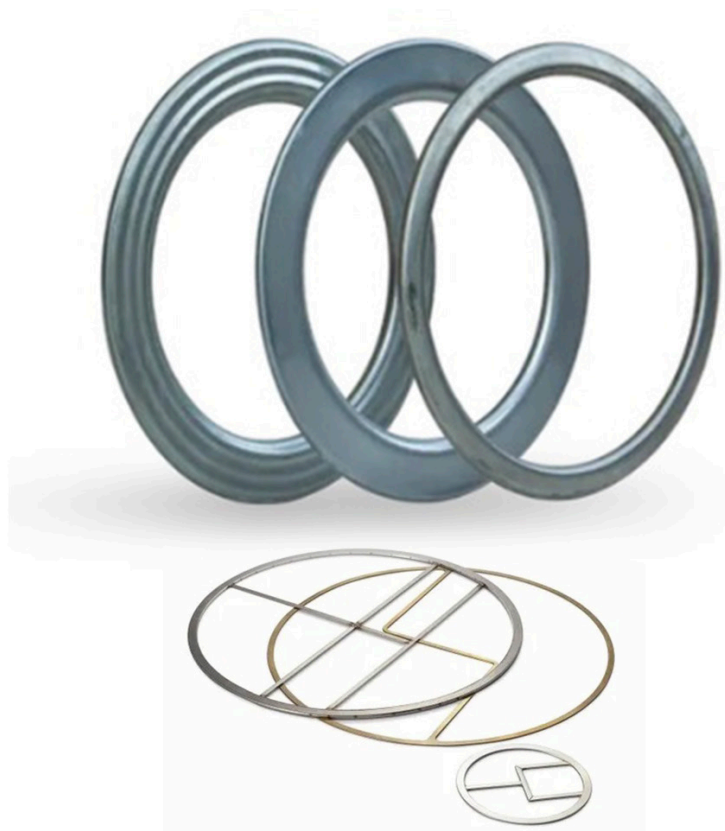
## 8. Torque Specifications

- To achieve the specified torque values, use a calibrated torque wrench. The correct torque specifications should follow the manufacturer's guidelines, as over- or under-tightening can affect the gasket's performance.

## 9. Safety Measures

- During the installation process, follow all safety protocols. Use appropriate personal protective equipment and follow industry-specific safety guidelines.

Metal jacketed gaskets are critical in ensuring leak-free connections in demanding industrial environments. Their robust construction and ability to withstand high pressures and temperatures make them a go-to choice for sealing applications in various industries. When selecting and installing metal jacketed gaskets, carefully considering material compatibility, surface finish, and proper installation procedures is essential to maximize their effectiveness and longevity. With the right choice and installation, metal jacketed gaskets contribute significantly to the reliability and efficiency of industrial processes.





**Registered Office**

**ASIAN SEALING PRODUCTS PVT. LTD.**

A3(2), SIPCOT INDUSTRIAL PARK,  
PILLAIPAKKAM, SRIPERUMBUDUR -602105

TAMIL NADU, INDIA

PHONE: +91 75400 75400

Email: [info@asiansealing.in](mailto:info@asiansealing.in)

**Our Distributor in USA**

**HTX Products LLC**

333-A Northpark Central Drive

Houston, Texas 77073, USA

PHONE: +1(281)571-7005

EMAIL: [sales@htxproducts.com](mailto:sales@htxproducts.com)

[www.htxproducts.com](http://www.htxproducts.com)