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API 6A-1189  
API 17D-0077

# Ring Gasket - A Comprehensive Guide (Functions, Uses, Types, Standards, etc.)

Ring gaskets are essential in various industries and crucial in creating reliable seals for pipelines, flanges, and other connections. Used extensively to prevent fluid and gas leaks, ring gaskets find applications in industries from oil and gas to chemical processing. Delve into this thorough guide covering the functions, types, materials, standards, and applications of ring gaskets, and discover best practices for installation and maintenance.

## Table of Contents

1. What is a Ring Gasket ?
2. Functions of Ring Joint Gasket
3. Where are Ring Joint Gaskets Used?
4. Materials Used in Ring Gaskets
5. Types of RTJ Gaskets
6. Thickness and Dimensions of RTJ Gaskets
7. Specific Standards for Ring Gaskets
8. Installation and Maintenance of Ring Gaskets



## What is a Ring Gasket?

A ring gasket, known as a ring joint (RTJ) gasket, is a mechanical seal to prevent leakage between flanges or other connecting surfaces. These gaskets are circular in shape and have a hollow center, resembling a ring. It is a metallic ring with a specific geometric cross-section placed within the flange faces. This type of gasket is widely used in multiple industries to create a reliable and robust seal in high-pressure and high-temperature applications.

# Functions of Ring Joint Gasket

The primary function of a ring joint gasket is to provide a tight, secure, and leak-proof seal in applications where conventional gaskets may fail to withstand extreme conditions. The RTJ gasket achieves this by forming a metal-to-metal seal between the flange faces under high compressive loads. This design ensures stability and resilience, making ring joint gaskets suitable for demanding environments.

## Where are Ring Joint Gaskets Used?

Ring joint gaskets find application in industries where sealing integrity is crucial, especially in high-pressure and high-temperature environments. Several typical applications include:



### 01 Oil and Gas Industry

- Employed in pipelines, wellheads, and various equipment in oil and gas exploration and production.

### 02 Chemical Processing

- Used in chemical plants to seal flanges in corrosive chemical processes.

### 03 Power Generation

- Applied in power plants to seal joints in boilers, turbines, and heat exchangers.

### 04 Petrochemical Industry

- Utilized in refineries and petrochemical facilities for sealing connections in critical applications.



# Materials Used in Ring Gaskets

The effectiveness of a ring gasket largely depends on the materials chosen for its construction. The diverse range of applications and conditions in which ring gaskets are used necessitates careful consideration of the materials to ensure optimal performance. Here's a detailed exploration of the materials commonly employed in ring gaskets:

## Metallic Materials

### a. Stainless Steel

Stainless steel is preferred for ring gaskets due to its excellent corrosion resistance and lasting durability. This makes it especially fitting for situations with potential exposure to moisture, chemicals, or elevated temperatures.

### b. Carbon Steel

Known for its strength and cost-effectiveness, it is often used in ring gaskets for applications with moderate temperature and pressure requirements.

### c. Alloys

Various alloys, such as nickel or titanium, enhance strength and resist specific corrosive environments. Inconel and Monel, for example, are frequently utilized in industries where corrosion resistance is paramount.

### d. Soft Iron

Soft iron is chosen for its malleability and excellent sealing properties. It is commonly used in low-pressure applications where its ability to conform to flange irregularities is advantageous.

### e. Duplex or Super Duplex

Soft iron is chosen for its malleability and excellent sealing properties. It is commonly used in low-pressure applications where its ability to conform to flange irregularities is advantageous.

## Types of RTJ Gaskets

Various types of RTJ gaskets cater to specific needs and conditions. Here's a comprehensive exploration of some common types:

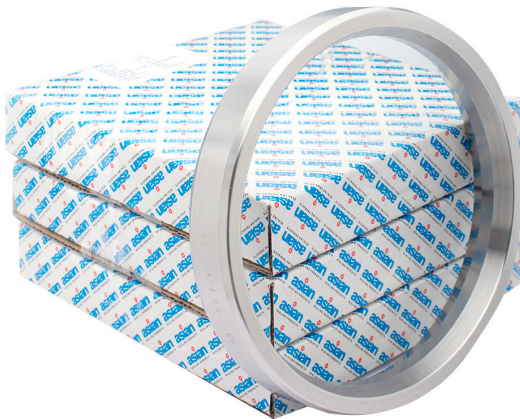
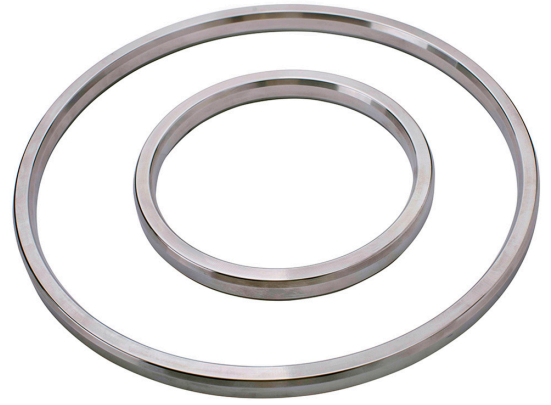
### Oval Ring Type Joint Gaskets

- Oval-shaped cross-section.
- Provides effective sealing in applications with high pressure and temperature variations.
- Appropriate for a variety of industries, including oil and gas.



## Octagonal Ring Type Joint Gaskets

- Characterized by an octagonal cross-section.
- Offers enhanced sealing performance compared to oval gaskets.
- Widely used in critical applications where a superior seal is required.



## RX Type Ring Type Joint Gaskets

- Modified octagonal shape with a flat bottom.
- Commonly used in wellhead and Christmas tree applications in the oil and gas industry.
- Ideal for sealing in high-pressure environments.

## BX Type Ring Type Joint Gaskets

- Pressure-energized design.
- Provides improved sealing at high pressures.
- Suitable for critical oil and gas industry applications, including API 6A applications.



## SRX Type Ring Type Joint Gaskets

- An advanced version with a specially designed profile for improved performance.
- Suitable for high-pressure and high-temperature environments.
- Commonly used in demanding oil and gas applications.

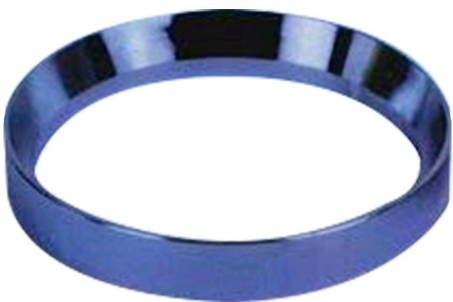


## Ring Joint Gaskets Blind Gaskets

- Used to blank off or seal the end of a pipe or valve.
- Commonly employed during maintenance or testing procedures.
- Available in different gasket materials to suit various applications as per the need.

## Ring Joint Gaskets Pressure Energized Gaskets

- Designed to enhance the sealing under higher pressures.
- Utilizes the pressure within the system to increase the sealing force.
- It is ideal for applications with fluctuating pressure conditions. various applications as per the need.



## Bridgeman Gaskets

- Designed for use in high-pressure and high-temperature applications.
- Named after the Bridgeman effect, which increases sealing effectiveness at higher pressures.

## Delta Gaskets

- Features a triangular or "delta" shape.
- Suitable for applications where enhanced sealing performance is required.





## Lens Ring Gaskets

- Resembles a lens shape with a rounded profile.
- Provides a reliable seal in high-pressure and high-temperature environments.

## Kammprofile Gaskets

- Combines the benefits of a serrated metal core with a soft sealing material.
- Offers excellent resilience and adaptability to flange irregularities.
- Suitable for various industries, including chemical and petrochemical.



## Dimensions of RTJ Gasket

Ring gaskets come in various dimensions to accommodate flange configurations, pressure classes, and application requirements. Selecting the right dimensions ensures a proper and effective seal. Here's an in-depth look at the

## Dimensions of Ring Gaskets

The dimensions of ring gaskets are specified to match the flange they will be used with. These dimensions are typically categorized based on flange sizes and pressure classes. Below are the typical dimensions

### Nominal Pipe Size (NPS)

- Refers to the pipe size for which the gasket is intended.
- Sizes that are common include 1/2", 3/4", 1", 2", and so on.

### Outer Diameter (OD)

- The gasket's outer diameter matches the flange's inner diameter.

### Inner Diameter (ID)

- The inner diameter of the gasket corresponds to the outside diameter of the pipe.

### Flange Class or Pressure Class

- Specify the pressure rating of the flange.
- Standard pressure classes include 150, 300, 600, 900, and 1500.





## Specific Standards for Ring Gaskets

Several standards govern ring joint gaskets' design, manufacturing, and use. Notable standards include

### 1. API 6A

- Established for wellhead and Christmas tree equipment.
- Outlines requirements for ring joint gaskets used in API 6A applications.
- Specifies materials, dimensions, and testing procedures for gaskets.

### 2. ME B16.20

- Covers metallic gaskets for pipe flanges.
- Provides specifications for dimensions, tolerances, and materials for metallic gaskets.
- Includes requirements for identification and marking.

### 3. API 17D:

- Focuses on subsea wellhead and Christmas tree equipment,
- Specifies requirements for ring joint gaskets used in subsea applications.
- Provides guidelines for material selection and performance testing.

## Installation of Ring Gaskets

### 1. Surface Preparation

- Start by ensuring the flange faces are clean, smooth, and free from debris or imperfections.
- Remove residual material from previous gaskets, such as old fragments or adhesives.

### 2. Gasket Placement

- Place the ring gasket carefully on the flange face, ensuring proper alignment.
- Verify that the gasket size matches the flange dimensions
- Check material suitability for the application.

### 3. Bolt Insertion

- Insert bolts through the holes in the flange, ensuring proper alignment with the gasket.
- Tighten the bolts by hand initially, ensuring they are evenly distributed around the flange. Check material suitability for the application.

## 4. Torqueing

- Gradually and evenly tighten the bolts in a crisscross or star pattern.
- Follow the manufacturer's recommended torque values for the specific gasket material and flange size.

## 5. Check for Uniform Compression

- Confirm that the gasket compresses uniformly across its entire surface.
- Uneven compression can lead to leaks and compromised sealing.

## 6. Final Inspection

- Conduct a final inspection to ensure all components are correctly installed.
- Check for any visible irregularities and make necessary adjustments.

Ring joint gaskets play a crucial role in ensuring the integrity of seals in demanding industrial applications. Understanding their functions, applications, types, and adherence to specific standards is vital for selecting the right gasket for a given situation. The robust nature of ring joint gaskets makes them indispensable in industries where sealing reliability is paramount, contributing to various processes' overall safety and efficiency.





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