मानकः पथप्रदर्शकः

BUREAU OF INDIAN STANDARDS
NEW DELHI

# COMPENDIUM OF STANDARDS ON GASKETS AND PACKING

Prepared by :
MECHANICAL ENGINEERING DEPARTMENT

# TABLE OF CONTENTS

| | | | | |
|---|---|---|---|---|
| | | | Jointing Material — Specification | |
| | | **1.3 Testing and Classification of Cork Materials** | 1.3.1 IS/ISO 4708:2017 Composition Cork — Gasket Material — Test Methods | **5** |
| | | | 1.3.2 IS/ISO 4709:2017 Composition Cork — Gasket Material — Classification System, Requirements, Sampling, Packaging, and Marking | **5-6** |
| **2.** | **Gaskets and Jointing Materials** | **2.1 Non-Metallic Gaskets and Jointing** | 2.1.1 IS 2712:2024 Gaskets and Packings Compressed Asbestos Fibre Jointing — Specification | **7** |
| | | | 2.1.2 IS 5566:2024 Vegetable Fibre Base Jointing Material — Specification | **7** |
| | | | 2.1.3 IS 10008:2024 Beater Addition Jointings — Specification | **7** |
| | | | 2.1.4 IS 19606:2026 Non-Asbestos Beater Addition Jointing — Specification | **8** |
| | | **2.2 Rubber and PTFE (Polytetrafluoroethylene) Gaskets** | 2.2.1 IS 11149:2024 Rubber Gaskets — Specification | **8** |
| | | | 2.2.2 IS 16916:2018 Polytetrafluoroethylene (PTFE) Gasket Materials | **9** |
| | | **2.3 Metallic and Semi-Metallic Gaskets** | 2.3.1 IS 7719:2024 Metallic Spiral Wound Gaskets — Specification | **9** |

| | | | | |
|---|---|---|---|---|
| | | | 2.3.2 IS 10864:2024 Metal Jacketed Gaskets for Pipe Flanges and Heat Exchanger Flanges — Specification | **10** |
| | | | 2.3.3 IS 13257:1992 Ring Type Joint Gaskets and Grooves for Pipe Flanges — Specification | **10** |
| **3.** | **Gland Packings** | **3.1 Asbestos and Fibre Packings** | 3.1.1 IS 4687:2025 Gaskets and Packings — Gland Packings Asbestos — Specification | **11** |
| | | | 3.1.2 IS 5414:2024 Gaskets and Packings — Gland Packing Jute and Hemp — Specification | **11-12** |
| | | | 3.1.3 IS 9066:2024 Lubricated Cotton Gland Packings — Specification | **12** |
| | | | 3.1.4 IS 4688:2024 Proofed Cotton Duck Gland Packing — Specification | **12** |
| | | **3.2 Special Purpose Packings** | 3.2.1 IS 10330:2024 Formed Asbestos Packing Rings for High Pressure and High Temperature Valves — Specification | **13** |
| **4.** | **Seals and O-Rings** | **4.1 Rotary Shaft Lip Seals (Elastomeric)** | 4.1.1 IS/ISO 6194 (Part 1):2007 Rotary Shaft Lip — Type Seals Incorporating Elastomeric Sealing Elements (Part 1) Nominal Dimensions and Tolerances | **14** |
| | | | 4.1.2 IS/ISO 6194 (Part 2):2009 | |

| | | | | |
|---|---|---|---|---|
| | | | Rotary Shaft Lip — Type Seals Incorporating Elastomeric Sealing Elements (Part 2) Vocabulary | **14** |
| | | | 4.1.3 IS/ISO6194 (Part3):2009 Rotary Shaft Lip —Type Seals Incorporating Elastomeric Sealing Elements (Part 3) Storage, Handling and Installation | **14** |
| | | | 4.1.4 IS/ISO 6194 (Part 4):2009 Rotary Shaft Lip —Type Seals Incorporating Elastomeric Sealing Elements (Part 4) Performance Test Procedures | **15** |
| | | | 4.1.5 IS/ISO 6194 (Part 5):2008 Rotary Shaft Lip —Type Seals Incorporating Elastomeric Sealing Elements (Part 5) Identification of Visual Imperfections | **16** |
| | | **4.2 Rotary Shaft Seals (Thermoplastic)** | 4.2.1 IS 15545 (Part 1):2015 / (ISO 16589 (Part 1):2011) Rotary Shaft Lip —Type Seals Incorporating Thermoplastic Sealing Elements (Part 1) Nominal Dimensions and Tolerances | **16** |
| | | | 4.2.2 IS 15545 (Part 2):2021/ (ISO 16589 (Part 2):2011) | **17** |

| | | | | |
|---|---|---|---|---|
| | | | Rotary Shaft Lip — Type Seals Incorporating Thermoplastic Sealing Elements (Part 2) Vocabulary | |
| | | | 4.2.3 IS 15545 (Part 3):2015/ (ISO 16589 (Part 3):2011) Rotary Shaft Lip —Type Seals Incorporating Thermoplastic Sealing Elements (Part 3) Storage, Handling and Installation | **17** |
| | | | 4.2.4 IS 15545 (Part 4):2021/ (ISO 16589 (Part 4):2011) Rotary Shaft Lip — Type Seals Incorporating Thermoplastic Sealing Elements (Part 4) Performance Test Procedures | **17-18** |
| | | | 4.2.5 IS 15545 (Part 5):2017/ (ISO 16589 (Part 5):2011) Rotary Shaft Lip — Type Seals Incorporating Thermoplastic Sealing Elements (Part 5) Identification of Visual Imperfections | **18** |
| | | **4.3 O-Rings** | 4.3.1 IS 17891 (Part 1):2023/ (ISO 3601 (Part 1):2012) Fluid Power Systems — O-Rings (Part 1) Inside Diameters Cross-Sections Tolerances and Designation Codes | **18-19** |

| | | | | |
|---|---|---|---|---|
| | | | 4.3.2 IS 17891 (Part 2):2023/ (ISO 3601 (Part 2):2025) Fluid Power Systems — O-Rings (Part 2) Housing Dimensions for General Applications | **19** |
| | | | 4.3.3 IS 17891 (Part 3):2023/ (ISO 3601 (Part 3):2005) Fluid Power Systems — O-Rings (Part 3) Quality Acceptance Criteria | **19** |
| | | | 4.3.4 IS 17891 (Part 4):2023/ (ISO 3601 (Part 4):2008) Fluid Power Systems — O-Rings (Part 4) Anti-Extrusion Rings Back-Up Rings | **19-20** |
| | | | 4.3.5 IS 17891 (Part 5):2023/ (ISO 3601 (Part 5):2015) Fluid Power Systems — O-Rings (Part 5) Specification of Elastomeric Materials for Industrial Applications | **20** |
| **5.** | **Testing Methods for Gaskets and Packings** | | 5.1 IS 6210:2024 Stress Relaxation of Gasket Material — Method of Test | **21** |
| | | | 5.2 IS 7714:1975 Method Of Sealability Test for Gasket Materials | **21-22** |
| | | | 5.3 IS 19599:2026 Gaskets and Packings — Oxidation of Expanded Graphite — Methods of Test | **22** |

| | | | |
|---|---|---|---|
| **6.** | **General and Terminology Standards** | 6.1 IS 19455:2026 Gaskets And Packings — Glossary of Terms | **22** |
| **7.** | **Insulation and Supporting Materials** | 7.1 IS 14539:1998 Insulation Mill Board — Specification | **23** |

# MED 30 - Gaskets And Packing

The Gaskets and Packings Sectional Committee under the Bureau of Indian Standards is responsible for the formulation, revision, and maintenance of Indian Standards related to gaskets, packings, seals, jointing materials, and associated sealing systems. These materials are widely used in industries such as thermal power plants, oil and gas processing, chemical and petrochemical plants, and other manufacturing sectors where leak-proof operation of fluids such as steam, gases, oils, and chemicals is essential for safe and efficient functioning.

While developing these standards, the committee considers various material and operational aspects such as material properties, temperature and pressure resistance, chemical compatibility, sealing performance, durability, and wear resistance. The standards also include requirements related to dimensions, classification, testing methods, installation practices, and performance evaluation of sealing materials. These provisions help engineers, manufacturers, and plant operators ensure proper selection, installation, and maintenance of gaskets and sealing systems in different industrial applications.

The committee also reviews international practices and technological advancements to ensure that Indian Standards remain aligned with modern requirements, including the use of non-asbestos and advanced sealing materials. By establishing clear technical guidelines and safety requirements, the standards developed under MED 30 contribute to improving reliability, preventing leakage, and enhancing the efficiency of industrial equipment such as pipelines, valves, pumps, boilers, and pressure vessels. This compendium provides a consolidated overview of the important standards developed under MED 30 and highlights their role in ensuring effective sealing and safe operation of industrial systems.

# Gaskets And Packing

## 1. Cork Materials

Cork materials are lightweight, flexible, and compressible, making them suitable for gasket and sealing applications. They can compress under pressure and return to their original shape, which helps in preventing leakage. They are mainly used in low and medium pressure systems. To improve strength, cork is often combined with rubber or cellulose. Properties like density, moisture, and particle size are important for good performance, and the standards define their requirements and testing methods.

**Fig. 1 A typical picture of Cork Materials**

## 1.1 Raw Cork Materials:

### 1.1.1 IS/ISO 1997:2018 Granulated Cork and Cork Powder Classification — Properties and Packing (First Revision)

This standard specifies the classification, properties, and packing requirements for granulated cork and cork powder before pressing. It provides guidelines for grading materials based on characteristics such as particle size and physical condition to ensure uniform quality and consistency. The standard also includes packing requirements for proper handling, storage, and transportation. Overall, it helps maintain reliable quality and suitability of cork materials for further industrial processing and manufacturing applications.

### 1.1.2 IS/ISO 2030:2018 Granulated Cork — Size Analysis by Mechanical Sieving (First Revision)

This standard specifies the method for determining the granule size distribution of granulated cork by mechanical sieving. It provides a standardized procedure for separating cork granules into different size fractions to evaluate particle size consistency and grading. The test helps in quality control, material classification, and ensuring suitability of granulated cork for manufacturing and further industrial applications.

### 1.1.3 IS/ISO 2031:2015 Granulated Cork — Determination of Apparent Bulk Density

This standard specifies the method for determining the apparent bulk density of granulated cork. Bulk density indicates how much mass of cork is present in a given volume, which affects its compressibility and sealing performance. The standard helps ensure that the cork material has consistent density, leading to reliable quality and performance in gasket and sealing applications.

### 1.1.4 IS/ISO 2067:2019 Granulated Cork, Broken Cork and Crushed Cork — Sampling for the Determination of Moisture Content (First Revision)

This standard specifies the method for sampling cork materials such as granulated, broken, and crushed cork to determine their moisture content. It provides guidelines on how to collect representative samples so that test results are accurate and reliable. Proper sampling ensures correct evaluation of moisture, which is important for maintaining quality, durability, and performance of cork materials in sealing applications.

### 1.1.5 IS/ISO 2190:2016 Granulated Cork — Determination of Moisture Content

This standard specifies the reference method for determining the moisture content of granulated cork. It provides a standardized procedure for accurate moisture measurement to support quality control, material consistency, and storage suitability. Alternative factory test methods may be used if properly correlated with the

reference method. Proper control of moisture content helps ensure reliable performance of granulated cork in industrial applications.

**Fig. 1.1 A typical picture of Raw Material of Cork**

## 1.2 Finished Cork Products:

### 1.2.1 IS 4253 (Part 1):2008 Cork Composition Sheets — Specification (Part 1) Plain Cork Sheets (Second Revision)

This standard specifies the requirements and methods of test for plain single-layer cork composition sheets used in systems involving petroleum fuels, lubricating oils, automotive applications, and general industrial purposes. It provides guidelines for material properties, dimensional quality, and performance testing to ensure reliable service under operating conditions. The standard does not apply to cork composition sheets intended for use in the food industry. Overall, it helps ensure consistent quality and dependable performance of plain cork sheets used in sealing and gasket applications.

### 1.2.2 IS 4253 (Part 2):2008 Cork Composition Sheets — Specification (Part 2) Cork and Rubber (Second Revision)

This standard specifies the requirements for cork composition sheets used for gaskets, manufactured by compounding granulated cork with natural or synthetic rubber. It covers material properties, classification, and quality requirements to ensure suitable sealing performance in industrial applications. The standard classifies the sheets into three types and three grades based on resistance to oil and petrol: Type A is non-oil resistant, Type B has good oil resistance, and Type C has

very good resistance to oils and petrol. Overall, it helps ensure consistent quality and reliable performance of cork-rubber gasket sheets under different service conditions.

### 1.2.3 IS 5569:2024 Cork and Cellulose Base Jointing Material — Specification (First Revision)

This standard specifies the requirements for compressible sheet jointing materials made from a mixture of cork granules and cellulosic fibres, from which gaskets can be cut or stamped. It covers material properties and quality requirements to ensure suitability for sealing applications under service conditions. The standard also supports consistent manufacturing quality and reliable gasket performance. Overall, it helps ensure dependable sealing performance of cork and cellulose based jointing materials used in industrial equipment and piping systems.

**Fig. 1.2 A typical picture of Finished product of cork materials**

## 1.3 Testing and Classification of Cork Materials:

### 1.3.1 IS/ISO 4708:2017 Composition Cork — Gasket Material — Test Methods

This standard specifies the test methods for determining the characteristics of composition cork, agglomerated cork, and rubber-cork materials used as gaskets in the mechanical industry. It covers evaluation of important properties such as thickness, apparent density, tensile strength, compressibility, recovery, flexibility, resistance to boiling water, and behavior in fluids. The standard provides standardized testing procedures to assess material quality, performance, and suitability for sealing applications. Overall, it helps ensure consistent quality and

reliable service performance of cork-based gasket materials used in industrial equipment.

### 1.3.2 IS/ISO 4709:2017 Composition Cork — Gasket Material — Classification System, Requirements, Sampling, Packaging, and Marking

This standard specifies a classification system for composition cork intended for use as gasket materials in the mechanical industry. It provides a structured method for specifying and describing relevant material properties to assist in selecting suitable materials according to specified requirements. The standard also covers requirements for sampling, packaging, marking, and identification to support quality control and uniformity. Since not all properties affecting gasket performance are included, it is primarily intended for material selection rather than complete performance evaluation.

**Fig. 1.3 A typical picture of Testing of Cork Materials**

## 2. Gaskets and Jointing Materials

Gaskets and jointing materials are used to prevent leakage between two mating surfaces such as flanges, valves, and equipment joints. They play an important role in maintaining pressure, temperature, and fluid containment in industrial systems. Depending on operating conditions, different types of materials such as non-metallic, rubber, PTFE, metallic, and semi-metallic gaskets are used. The following standards specify the requirements, properties, and performance criteria for various gasket and jointing materials.

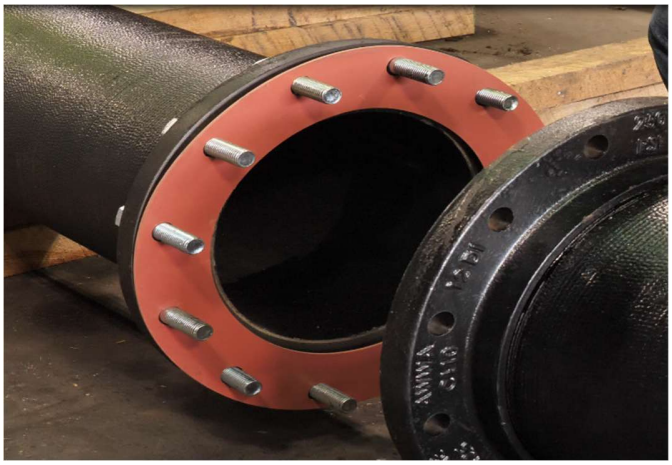

**Fig. 2 A typical picture of Gaskets and Jointing Materials**

## 2.1 Non-Metallic Gaskets and Jointing:

### 2.1.1 IS 2712:2024 Gaskets and Packings — Compressed Asbestos Fibre Jointing — Specification (Fourth Revision)

This standard specifies the general requirements and test methods for compressed asbestos fibre jointing sheets used for gaskets and packings. These materials are suitable for service with water, steam, oils, acids, alkalies, and other chemicals. It covers quality and performance characteristics to ensure reliable sealing under various operating conditions. Reinforced compressed asbestos fibre jointing sheets are not covered under this standard, though they may be supplied by agreement between purchaser and manufacturer for specific applications. Overall, it helps ensure consistent quality and dependable sealing performance of asbestos fibre jointing materials.

### 2.1.2 IS 5566:2024 Vegetable Fibre Base Jointing Material — Specification (First Revision)

This standard specifies the requirements for compressible vegetable fibre base jointing materials supplied in sheet form, from which gaskets can be cut or stamped. It covers material quality and performance requirements to ensure suitability for sealing applications under service conditions. The standard helps ensure consistent quality, compressibility, and reliable performance of vegetable fibre based jointing sheets used for gasket manufacturing in industrial equipment and piping systems.

### 2.1.3 IS 10008:2024 Beater Addition Jointings — Specification (Second Revision)

This standard specifies the requirements for asbestos fibre jointing sheets manufactured by the beater process. It covers material quality and performance requirements to ensure suitability for sealing applications under service conditions. Such jointing sheets are commonly used for cylinder head gaskets and similar industrial gasket applications. Overall, it helps ensure consistent quality, durability, and reliable sealing performance of beater addition jointing materials.

### 2.1.4 IS 19606:2026 Non-Asbestos Beater Addition Jointing — Specification

This standard specifies the requirements for non-asbestos fibre jointing sheets manufactured by the beater process. It covers material quality and performance requirements to ensure suitability for sealing applications under service conditions. These sheets are intended as safer alternatives to asbestos-based jointing materials and are used in gasket manufacturing for various industrial applications. Overall, it helps ensure consistent quality, durability, and reliable sealing performance of non-asbestos beater addition jointing materials.

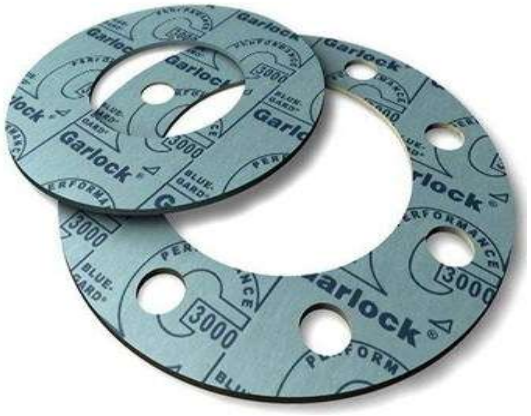


**Fig. 2.1 A typical picture of Non-Metallic Gaskets and Jointing**

## 2.2 Rubber and PTFE (Polytetrafluoroethylene) Gaskets:

### 2.2.1 IS 11149:2024 Rubber Gaskets — Specification (First Revision)

This standard specifies the requirements for different types of rubber gaskets, including their characteristics and intended applications. It classifies rubber gaskets into two sections: Section I covers five types of solid rubber gaskets for various

applications, each divided into classes based on different hardness ranges, while Section II covers foam rubber gaskets made from different materials for various uses. The standard supports proper material selection, quality control, and reliable sealing performance of rubber gaskets used in industrial and commercial applications.

### 2.2.2 IS 16916:2018 Polytetrafluoroethylene (PTFE) Gasket Materials

This standard specifies the general requirements and test methods for polytetrafluoroethylene (PTFE) sheets and strips (tapes) used as gasket materials for sheet-cut gaskets and fabricated gaskets. It covers material quality and performance characteristics to ensure suitability for sealing applications under various service conditions. The standard helps ensure consistent quality, chemical resistance, durability, and reliable sealing performance of PTFE gasket materials used in industrial equipment and piping systems.

**Fig. 2.2 A typical picture of Rubber and PTFE (Polytetrafluoroethylene) Gaskets**

## 2.3 Metallic and Semi-Metallic Gaskets:

### 2.3.1 IS 7719:2024 Metallic Spiral Wound Gaskets — Specification (Second Revision)

This standard specifies the material, construction, dimensions, tolerances, test methods, and general requirements for metallic spiral wound gaskets with outer rings and inner rings used with steel flanges having flat face and raised face surfaces. It identifies gaskets based on nominal pipe size and flange pressure class rating,

covering specified flange size ranges. These gaskets are designed to provide reliable sealing under pressure and temperature variations in industrial service. Overall, the standard helps ensure proper fitment, consistent quality, and dependable sealing performance in piping, boilers, and pressure vessel flange connections.

### 2.3.2 IS 10864:2024 Metal Jacketed Gaskets for Pipe Flanges and Heat Exchanger Flanges — Specification (Second Revision)

This standard specifies the requirements for metal jacketed gaskets used in pipe flanges and heat exchanger flanges. It covers the design, materials, construction, shape, dimensions, tolerances, and identification marking of these gaskets. Metal jacketed gaskets are intended to provide dependable sealing performance under demanding service conditions. Overall, the standard helps ensure proper fitment, consistent quality, and reliable operation of flange joints in piping systems and heat exchangers.

### 2.3.3 IS 13257:1992 Ring Type Joint Gaskets and Grooves for Pipe Flanges — Specification

This standard specifies the requirements for ring type joint gaskets and grooves used for pipe flanges. It covers various types of ring joint gaskets and groove designs, including materials, dimensions, and tolerances. The standard helps ensure proper fitment, dimensional accuracy, pressure-tight sealing, and interchangeability of gasket and flange groove combinations. Overall, it supports reliable performance of high-pressure flange joints in piping systems.

**Fig. 2.3 A typical picture of Metallic and Semi-Metallic Gaskets**

## 3. Gland Packing

Gland packings are used to prevent leakage along moving parts such as pump shafts and valve stems. They are placed inside a stuffing box and compressed to form a seal while allowing controlled movement of the shaft. These packings must provide good sealing, flexibility, wear resistance, and thermal stability. Different materials are used depending on pressure, temperature, and type of fluid.

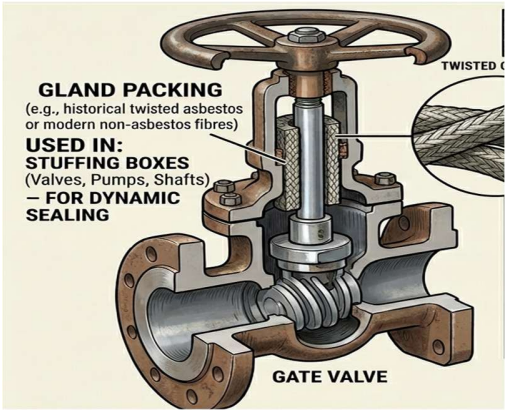


**Fig. 3 A typical picture of Gland Packings**

## 3.1 Asbestos and Fibre Packings:

### 3.1.1 IS 4687:2025 Gaskets and Packings — Gland Packings Asbestos — Specification (Third Revision)

This standard specifies the requirements for asbestos gland packings used to contain gases, fluids, and slurries under different temperatures and pressures. It covers material quality and performance requirements to ensure reliable sealing in dynamic and static sealing applications. The standard applies to packings supplied in round or square sections and excludes use in the food industry. Overall, it helps ensure consistent quality, durability, and dependable sealing performance of asbestos gland packings used in industrial equipment.

### 3.1.2 IS 5414:2024 Gaskets and Packings — Gland Packing Jute and Hemp — Specification (Second Revision)

This standard specifies the requirements for gland packings made from jute, hemp, and flax intended for use in general water services, medium and heavy-duty hydraulic cylinders, reciprocating pumps, stern glands, rods, and valve steam

applications. It covers packings suitable for hot and cold-water service up to specified pressures and for fuel oil service under defined pressure conditions. The standard helps ensure proper material quality, durability, and reliable sealing performance in industrial and mechanical equipment. Overall, it supports dependable operation of jute and hemp gland packings in various service applications.

### 3.1.3 IS 9066:2024 Lubricated Cotton Gland Packings — Specification (First Revision)

This standard specifies the requirements and test methods for lubricated cotton gland packings containing a mineral hydrocarbon lubricant. These packings are suitable for use in high-speed or low-speed centrifugal pumps, sludge pumps, and water pumps with a temperature limit of 65 °C. It covers material quality and performance requirements to ensure reliable sealing under operating conditions. The standard excludes use of these packings in the food industry. Overall, it helps ensure consistent quality, durability, and dependable sealing performance of lubricated cotton gland packings used in pumping equipment.

### 3.1.4 IS 4688:2024 Proofed Cotton Duck Gland Packing — Specification (First Revision)

This standard specifies the requirements and test methods for proofed cotton duck gland packings used for hydraulic services. It covers material quality and performance requirements to ensure suitability for sealing applications under hydraulic operating conditions. Proofing treatment helps improve durability and service performance of the packing material. Overall, the standard helps ensure consistent quality and reliable sealing performance of proofed cotton duck gland packings used in industrial and mechanical equipment.

**Fig. 3.1 A typical picture of Asbestos and Fiber Packings**

## 3.2 Special Purpose Packings:

### 3.2.1 IS 10330:2024 Formed Asbestos Packing Rings for High Pressure and High Temperature Valves — Specification

This standard specifies the dimensional, constructional, functional, and quality requirements for metal wire reinforced formed asbestos packing rings used in high-pressure and high-temperature valves. These packing rings are intended to contain non-toxic gases, fluids, slurries, and similar media under different temperature and pressure conditions. It covers material quality and performance requirements to ensure reliable sealing in valve applications. The standard excludes use of these packings in the food industry. Overall, it helps ensure consistent quality, durability, and dependable sealing performance of formed asbestos packing rings used in industrial valves.

# 4. Seals and O-Rings

Seals and O-rings are used to prevent leakage of fluids in mechanical systems such as pumps, motors, and rotating shafts. They are important for maintaining pressure, preventing contamination, and ensuring efficient operation. These components are designed to work under different conditions such as rotation, pressure, temperature, and chemical exposure, and their performance depends on material, design, and installation practices.

**Fig. 4A typical picture of Seals and O-Rings**

## 4.1 Rotary Shaft Lip Seals (Elastomeric):

### 4.1.1 IS/ISO 6194 (Part 1):2007 Rotary Shaft Lip — Type Seals Incorporating Elastomeric Sealing Elements (Part 1) Nominal Dimensions and Tolerances

This standard specifies the nominal dimensions and tolerances for rotary shaft lip type seals incorporating elastomeric sealing elements. These seals are generally suitable for use under low-pressure operating conditions. It covers seal types and examples, along with dimensional requirements for seals, shafts, and housings to ensure proper fitment and sealing performance. The standard also provides a dimensional identification code for correct selection and interchangeability. Overall, it helps ensure consistent quality, reliable sealing, and standardized application of rotary shaft lip seals in mechanical equipment.

### 4.1.2 IS/ISO 6194 (Part 2):2009 Rotary Shaft Lip — Type Seals Incorporating Elastomeric Sealing Elements (Part 2) Vocabulary

This standard establishes the vocabulary for rotary shaft lip type seals incorporating elastomeric sealing elements. It defines the appropriate terms and definitions used for these seals, while also applying relevant terminology from ISO 5598. These seals are generally suitable for use under low-pressure operating conditions. The standard is complementary to ISO 16589, which covers seals incorporating thermoplastic sealing elements. Overall, it helps ensure uniform terminology, clear technical communication, and consistent understanding in the design, manufacture, and application of rotary shaft lip seals.

### 4.1.3 IS/ISO 6194 (Part 3):2009 Rotary Shaft Lip — Type Seals Incorporating Elastomeric Sealing Elements (Part 3) Storage, Handling and Installation

This standard provides requirements and guidance for the storage, handling, and installation of rotary shaft lip type seals incorporating elastomeric sealing elements. It aims to ensure proper practices are followed to avoid damage during storage and installation and to maintain seal performance in service. The standard highlights potential hazards and recommends ways to prevent them. Overall, it helps ensure safe handling, correct installation, and reliable performance of rotary shaft lip seals.

### 4.1.4 IS/ISO 6194 (Part 4):2009 Rotary Shaft Lip — Type Seals Incorporating Elastomeric Sealing Elements (Part 4) Performance Test Procedures

This standard specifies the general performance test procedures for rotary shaft lip type seals incorporating elastomeric sealing elements. It defines test requirements used to evaluate the performance and suitability of these seals, particularly for low-pressure applications. The procedures may be used for qualification purposes to ensure that the seals meet specified functional requirements. Overall, it helps verify the quality, reliability, and performance consistency of rotary shaft lip seals under controlled test conditions.

### 4.1.5 IS/ISO 6194 (Part 5):2008 Rotary Shaft Lip — Type Seals Incorporating Elastomeric Sealing Elements (Part 5) Identification of Visual Imperfections

This standard defines and classifies typical visual surface imperfections in rotary shaft lip seals incorporating elastomeric sealing elements that may affect seal function. It provides guidance to identify and assess these imperfections to support communication between manufacturers and purchasers regarding their significance in different applications. These seals are generally intended for low-pressure conditions. Overall, the standard helps ensure clear identification of visual defects and consistent quality understanding of rotary shaft lip seals.

**Fig. 4.1 A typical picture of Rotary Shaft Lip Seals**

## 4.2 Rotary Shaft Seals (Thermoplastic):

### 4.2.1 IS 15545 (Part 1):2015/ ISO 16589 (Part 1):2011 Rotary Shaft Lip — Type Seals Incorporating Thermoplastic Sealing Elements (Part 1) Nominal Dimensions and Tolerances

This standard specifies the nominal dimensions and tolerances for rotary shaft lip type seals incorporating thermoplastic sealing elements such as PTFE. These seals are generally suitable for low-pressure applications. It covers seal types and examples, along with dimensional requirements for seals, shafts, and housings to ensure proper fitment, interchangeability, and effective sealing performance. The standard also provides a dimensional identification code for correct selection and standardized application. It is complementary to ISO 6194, which covers seals with elastomeric sealing elements. Overall, it helps ensure reliable sealing performance and consistent dimensional control of thermoplastic rotary shaft lip seals.

### 4.2.2 IS 15545 (Part 2):2021/ ISO 16589 (Part 2):2011 Rotary Shaft Lip — Type Seals Incorporating Thermoplastic Sealing Elements (Part 2) Vocabulary

This standard establishes the vocabulary for rotary shaft lip type seals incorporating thermoplastic sealing elements such as PTFE. It defines the appropriate terms and terminology used for these seals to support clear technical communication among designers, manufacturers, inspectors, and users. These seals are generally suitable for low-pressure applications. The standard is complementary to ISO 6194, which covers seals incorporating elastomeric sealing elements. Overall, it helps ensure uniform terminology and consistent understanding in the design, manufacture, and application of thermoplastic rotary shaft lip seals.

### 4.2.3 IS 15545 (Part 3):2015/ ISO 16589 (Part 3):2011 Rotary Shaft Lip — Type Seals Incorporating Thermoplastic Sealing Elements (Part 3) Storage, Handling and Installation

This standard provides guidance for the storage, handling, and installation of rotary shaft lip type seals incorporating thermoplastic sealing elements such as PTFE. It is intended to ensure proper practices are followed to avoid damage and maintain seal performance during service. The standard highlights potential hazards during storage, handling, and installation, and recommends methods to prevent them. These seals are generally suitable for low-pressure applications. It is complementary to ISO 6194, which covers seals incorporating elastomeric sealing elements. Overall, it helps ensure safe handling, correct installation, and reliable performance of thermoplastic rotary shaft lip seals.

### 4.2.4 IS 15545 (Part 4):2021/ ISO 16589 (Part 4):2011 Rotary Shaft Lip — Type Seals Incorporating Thermoplastic Sealing Elements (Part 4) Performance Test Procedures

This standard specifies general performance test procedures for rotary shaft lip type seals incorporating thermoplastic sealing elements such as PTFE. It covers tests used for seal qualification purposes, including material quality control, dynamic testing, and supplementary low-temperature testing requirements. These seals are generally suitable for low-pressure applications. Overall, the standard helps ensure reliable

performance, quality verification, and consistent evaluation of thermoplastic rotary shaft lip seals under standardized test conditions.

### 4.2.5 IS 15545 (Part 5):2017/ ISO 16589 (Part 5):2011 Rotary Shaft Lip — Type Seals Incorporating Thermoplastic Sealing Elements (Part 5) Identification of Visual Imperfections

This standard defines and classifies typical visual surface imperfections in rotary shaft lip type seals incorporating thermoplastic sealing elements such as PTFE that may affect seal function. It provides guidance for identifying these imperfections and supports discussions between manufacturers and purchasers regarding their significance in different applications. These seals are generally suitable for low-pressure conditions. The standard is complementary to ISO 6194, which covers seals incorporating elastomeric sealing elements. Overall, it helps ensure consistent understanding, quality evaluation, and communication regarding visual imperfections in thermoplastic rotary shaft lip seals.

**Fig. 4.2 A typical picture of Rotary Shaft Seals (Thermoplastic)**

## 4.3 O-Rings:

### 4.3.1 IS 17891 (Part 1):2023/ ISO 3601 (Part 1):2012 Fluid Power Systems — O-Rings (Part 1) Inside Diameters Cross-Sections Tolerances and Designation Codes

This standard specifies the inside diameters, cross-sections, tolerances, and designation codes for O-rings used in fluid power systems for general industrial and aerospace applications. It provides standardized dimensional requirements to ensure proper fitment, interchangeability, and reliable sealing performance in components

using pressurized liquids or gases. The specified dimensions and tolerances are suitable for elastomeric materials, subject to appropriate manufacturing tooling. Overall, the standard helps ensure consistency, leakage prevention, and effective sealing in hydraulic and pneumatic equipment.

### 4.3.2 IS 17891 (Part 2):2023/ ISO 3601 (Part 2):2016 Fluid Power Systems — O-Rings (Part 2) Housing Dimensions for General Applications

This standard specifies the housing dimensions for O-rings used in fluid power systems for general industrial hydraulic and pneumatic applications. It covers groove and cavity dimensions for Class A O-rings for general use and Class B O-rings for selected metric hardware such as cylinder bores and piston rods, with or without anti-extrusion (back-up) rings. The standard aligns O-ring sizes, tolerances, and designation codes with ISO 3601-1 and includes different design approaches based on either O-ring size selection or fixed hardware dimensions. It also provides guidance for aerospace application housings in an annex. Overall, it helps ensure proper O-ring fitment, effective sealing performance, leakage prevention, and interchangeability in fluid power equipment.

### 4.3.3 IS 17891 (Part 3):2023/ ISO 3601 (Part 3):2005 Fluid Power Systems — O-Rings (Part 3) Quality Acceptance Criteria

This standard specifies the quality acceptance criteria for O-rings used in fluid power systems whose dimensions are standardized in related ISO standards. It defines and classifies surface imperfections on O-rings and specifies the maximum acceptable limits for such defects to ensure product quality and sealing reliability. The standard is applicable to O-rings used in general fluid systems as well as aerospace applications. Overall, it helps ensure consistent quality, proper inspection, and dependable sealing performance of O-rings used in hydraulic and pneumatic equipment.

### 4.3.4 IS 17891 (Part 4):2023/ ISO 3601 (Part 4):2008 Fluid Power Systems — O-Rings (Part 4) Anti-Extrusion Rings Back-Up Rings

This standard specifies the dimensions and tolerances for anti-extrusion rings, also known as back-up rings, used with O-rings in fluid power systems. These rings are intended to prevent extrusion of O-rings between metal parts under high-pressure

conditions. It covers five types of back-up rings: spiral type, angle cut type, solid type, angle cut concave type, and solid concave type. The rings are designed for use with selected O-ring sizes specified in related standards and corresponding housing dimensions. Overall, the standard helps ensure proper fitment, improved sealing reliability, and longer service life of O-ring sealing systems in hydraulic and pneumatic applications.

### 4.3.5 IS 17891 (Part 5):2023/ ISO 3601 (Part 5):2015 Fluid Power Systems — O-Rings (Part 5) Specification of Elastomeric Materials for Industrial Applications

This standard specifies the material requirements for selected standard elastomeric materials (rubber) used for O-rings in general industrial applications. It evaluates the suitability of commonly used rubber compounds for use in fluid power systems and indicates their ability to meet requirements associated with hydraulic and pneumatic components. The standard covers only materials in universal usage, while allowing other compounds by agreement between the user and supplier. It also recognizes that required physical properties and test methods should be mutually agreed upon between equipment manufacturers, users, and O-ring suppliers. Overall, it helps ensure proper material selection, compatibility, and reliable sealing performance of O-rings in industrial service.

**Fig. 4.3 A typical picture of O-Rings**

## 5. Testing Methods for Gaskets and Packing

Testing methods are essential to evaluate the performance, reliability, and durability of gasket and packing materials under different operating conditions. These tests help in assessing properties such as sealing ability, mechanical stability, and resistance to temperature and environmental effects. Proper testing ensures that the materials can perform effectively in actual service conditions, preventing leakage and equipment failure.

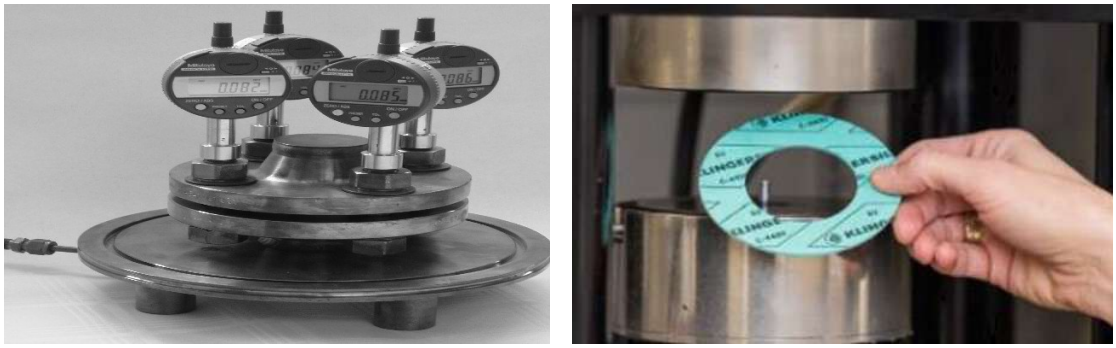

**Fig. 5 A typical picture of Testing Methods for Gaskets and Packings**

### 5.1 IS 6210:2024 Stress Relaxation of Gasket Material — Method of Test (Second Revision)

This standard specifies the method for determining the stress relaxation behavior of gasket materials. When a gasket is compressed between two surfaces, it initially exerts a sealing force, but over time this force may reduce due to material relaxation. This test measures how much load or stress decreases over a period under constant compression. It is important for evaluating the long-term sealing performance of gasket materials, especially in applications involving high temperature and continuous loading. The standard includes procedures for sample preparation, test conditions, and measurement of load reduction.

### 5.2 IS 7714:1975 Method of Sealability Test for Gasket Materials

This standard specifies the method for evaluating the liquid sealability properties of gasket materials. It provides a test procedure to determine how effectively a gasket material can prevent leakage of liquids under specified pressure and test conditions. The test helps assess the ability of the material to maintain a tight seal during service.

Overall, the standard supports material selection, quality control, and reliable liquid-tight sealing performance in gasket applications.

### 5.3 IS 19599:2026 Gaskets and Packings — Oxidation of Expanded Graphite — Methods of Test

This standard specifies test methods for determining the oxidation percentage of expanded graphite used in gaskets and packings. It evaluates the resistance of expanded graphite materials in high-temperature environments where oxidation can cause material degradation and loss of sealing performance. The standard provides two methods: Method A for general screening and Method B for more accurate and repeatable testing using sophisticated equipment. Overall, it helps assess thermal stability, supports material selection, and ensures reliable performance of graphite sealing materials in high-temperature service.

## 6. General and Terminology Standards

### 6.1 IS 19455:2026 Gasket and Packing — Glossary of Terms

This standard provides a comprehensive glossary of terms related to gaskets and packings, including definitions for materials, components, properties, and performance characteristics. It helps in creating a uniform technical language across design, manufacturing, testing, and maintenance activities. By standardizing terminology, it reduces confusion and ensures that all stakeholders have a clear and consistent understanding of specifications and requirements. This is especially important when dealing with multiple standards and complex sealing systems.

# 7. Insulation and Supporting Materials

## 7.1 IS 14539:1998 Insulation Mill Board — Specification

This standard specifies the requirements for insulation mill board, which is used for thermal insulation and as a supporting material in industrial applications. It defines properties such as thickness, density, mechanical strength, and heat resistance. The material is commonly used in boilers, furnaces, and high-temperature equipment to reduce heat loss and protect surrounding components. It can also be used as a backing or support layer for gaskets, improving sealing performance and durability. The standard includes provisions for testing, quality control, and performance requirements to ensure reliable use in thermal systems.

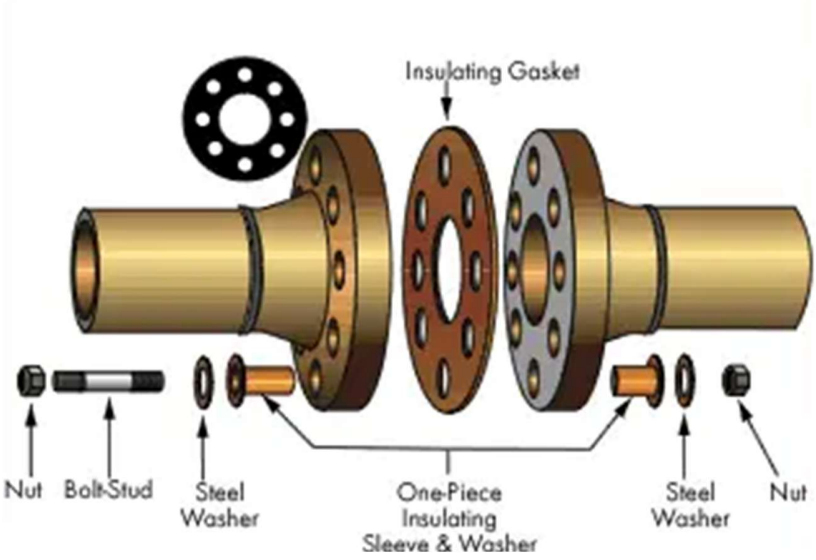


**Fig. 7 A typical picture of Insulation and Supporting Materials**