ARIZONA
Sealing Devices, Inc.

Official O-Ring Handbook

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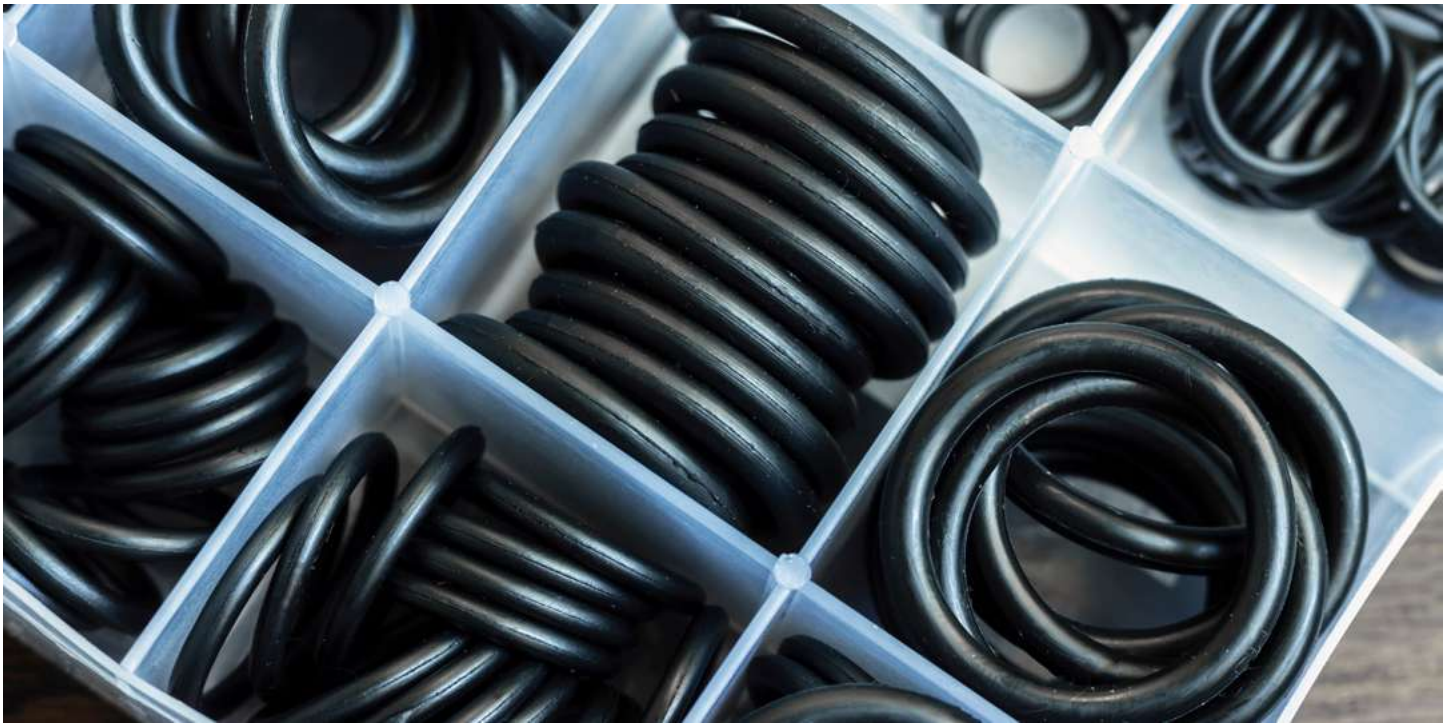
Arizona Sealing Devices, Inc. offers a broad range of O-ring design options, which include various sizes, shapes, and materials. With so many O-ring types available, it can be challenging to determine the right O-ring option for your application. To aid in your selection, we've put together this guide. Similar to the trusted Parker O-Ring Handbook, our selection guide will walk you through O-ring sizing guidelines, the properties of common O-ring elastomers, and other design parameters.

Why Use an O-Ring Selection Guide

Using an O-ring design guide provides necessary information in a quick, easy-to-read format. Users can avoid wasting time searching through hundreds of pages of information that may not apply to their needs. Instead, a quick cursory glance can supply the needed information in a fraction of the time.



How to Size An O-Ring

Determining the exact size O-ring you need can prove challenging but is necessary to ensure a proper fit. If an O-ring is too small, overstretching it to fit into place can compromise its integrity and lead to failure. When an O-ring is too large, it will fit loosely over the parts, causing pressurized liquids and gases to leak through the O-ring. Knowing how to adequately size an O-ring is critical in avoiding O-ring failure and preventing wasted time and money.

The easiest way to size an O-ring is to measure the cross-section (CS) and inside diameter (ID). When measuring the CS, it's best to use a micrometer or caliper. Calipers are also the most suitable choice for measuring smaller IDs; however, if the ID is over six inches, it may be better to use a Pi-tape or O-sizer.

How to Measure an O-Ring

Follow these steps to properly measure an O-ring:

1. Place the O-ring on a flat, level surface. Be sure to use a clean surface for more accurate results.
2. Measure the thickness of the O-ring to determine the CS.
3. Measure from one outer corner to the other to determine the OD.
4. Measure from one inner edge to the other to determine the ID.

Important: There will often be tolerance differences due to manufacturing limitations. For example, with an O-ring size of 0.105 with a tolerance of ±0.003', the cross-section can measure between 0.102' and 0.108'. It's best to consult with the O-ring manufacturer for specific tolerance variances related to the selected O-ring material.

O-Ring Styles

Although most O-rings take the same general form, they can be further categorized based on their cross-sectional shape:

ROUND O-RINGS

Standard O-ring shape with a round cross-section. This type of O-ring is highly versatile and seals against loss in any direction under minimal compressive force.

QUAD O-RINGS

A four-lobed design that facilitates twice as much sealing power as round O-rings under low compressive force.

SQUARE O-RINGS

A square cross-section, enabling them to create a tighter seal, even in the presence of surface defects.

O-Ring Materials

In addition to shape, the material used is one of the most important considerations when choosing the proper O-ring. Common O-ring materials include:

Buna/Nitrile
Buna/nitrile has high tensile strength and is both corrosion and abrasion-resistant. It is one of the most widely used O-ring materials.

Aflas
This material is resistant to chemicals and extreme temperatures, making it a popular choice for aerospace, oil, and general industrial uses.

Butyl
O-rings made from butyl are best suited for vacuum-sealing applications due to their exceptionally low permeability to gas leakage.

Ethylene Propylene
This material offers similar properties to butyl but provides enhanced chemical and ozone resistance.

Fluorocarbon (Viton®)
Fluorocarbon is one of the best all-around O-ring materials. It is commonly used in fuel-handling systems, engines, and high-exposure situations.

Fluorosilicone
This material is well-suited for aerospace fueling due to its exceptional temperature stability and fuel resistance. Fluorosilicone is also growing in popularity for use in static sealing applications.

Hydrogenated Nitrile
Hydrogenated nitrile features higher strength than standard nitrile while maintaining a high degree of corrosion and oil resistance.

Silicone Rubber
Silicone rubber is available in medical grades and offers great temperature resistance. This material is most suitable for static sealing in extreme temperatures.

Neoprene
Neoprene is strong and resistant to chemicals and extreme temperatures. While neoprene is a good all-around O-ring material, its most common use is in refrigerator sealing applications.

Polyurethane (Cast)
This material is well-known for its abrasion resistance, making it a good choice for high-wear applications..

Polyurethane (Millable):
Millable polyurethane shares similar properties to cast polyurethane but with a slightly lower tensile strength.

Kalrez
Kalrez offers exceptional resistance to volatile chemicals, making it a popular choice in chemical processing, paint, and oil and gas applications.

Standard O-Ring Sizes

O-rings are available in either standard (inch) or metric (mm) sizes. If the CS of your O-ring matches a standard AS586 size (0.70", 0.103", etc.), it is most likely a standard size. If it does not match, then you more than likely have a metric O-ring.

At Arizona Sealing Devices, Inc., we offer a wide selection of O-rings in a variety of sizes to meet the demands of numerous applications and industries.

O-Ring Design Guide

The size of an O-ring is defined by its ID, OD, and CS, where 2(CS) + ID = OD. Larger cross-sections can reduce the risk of leaks, whereas small cross-sections create more compact and cost-effective gaskets that exhibit decompression resistance.

Other key design factors to consider include:

Gland Type and Fill

An O-ring may fit into varying opening configurations, or gland types, and fill different portions of the opening (gland fill, noted as a percentage). This will depend on the application.

Compression Squeeze

Different levels of compressive pressure and varying applications will result in unique deformation levels, referred to as compression squeeze.

ID Stretch and OD Interference

Depending on the application, the OD's proportions and ID's range of stretch must often align with specific guidelines.

Extrusion Gap

Radial seal O-rings may inadvertently squeeze into a gap when pressure is applied if the design does not adequately account for this risk.

Official O-Ring Handbook by Arizona Sealing Devices

Arizona Sealing Devices is dedicated to providing top-quality products and services both on-time and on-budget, regardless of the size or complexity of the request. For every customer, we carefully analyze each of our products for its suitability for the intended application. This allows us to fully meet or exceed our customer's needs with the optimal product solution.

We offer O-rings in several designs to meet a range of customer needs. Our design options include various sizes, shapes, and industry compliances. To learn more about our selection of O-rings, take a look at our product catalog. For help determining the right O-ring for your application, contact us or request a quote today.

About Arizona Sealing Devices

Arizona Sealing Devices, Inc. is an ISO 9001:2015/AS9120B certified distributor of high-quality sealing products. Since our founding in 1989 as an O-ring supplier, we've since expanded our product offerings to encompass other sealing devices, such as caps, gaskets, plugs, and seal kits.

Contact Us

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