

# O-RINGS



O-rings are among the most commonly used seals across various applications due to their low cost and reliability. An O-ring is a round gasket with simple mounting requirements, designed to sit in a groove and be compressed between two or more parts. The compression during assembly creates a seal that prevents liquids or gasses from entering or escaping.

As a full-service manufacturer and distributor of quality O-rings, Allied Metrics specializes in hydraulic, oil, and pneumatic seals. We use revolutionary sealing innovations, world-class technology, and support to deliver O-rings and gaskets for various global applications.

## DESIGN

Allied Metrics offers two types of O-rings:

### STATIC

Static O-rings contain pressure or maintain a vacuum as the ring stays stationary.

### DYNAMIC

Dynamic o-rings are used in reciprocating or rotating applications, such as for pistons and cylinders or when a shaft moves inside a housing.

While there are simple functionality differences, the production materials need to be uniquely engineered to meet the demands of pressure, tolerance, and environmental conditions in which the O-ring will be fitted.

Regardless of the O-ring type, the five steps for designing an o-ring are the same.

1

Understand the application and choose a material with the properties and characteristics that will meet the application's demands.

2

Determine the environmental conditions it must endure. Temperature is one of the main concerns, as it can damage elasticity.

3

Determine the gasses or liquids the O-ring may come in contact with, as different materials are better for use with certain liquids and gasses

4

Identify the hardness required for the application. O-ring hardness varies from rubber band softness to hardened conveyors or shopping cart wheels.

5

Choose the cross-sectional (CS) dimensions of the O-ring to ensure a proper fit within the groove or gland size where the O-ring will sit.



# MATERIALS AND THEIR BENEFITS/CAPABILITIES

## HYDROGENATED NITRILE (HNBR)

Its wide temperature range (-40°F to 320°F) and high chemical resistance make HNBR ideal for applications requiring heat resistance and aggressive media. It is commonly used for gaskets and seals in the oil and gas industry because of its resistance to multiple oils, hydraulic fluids, dilute acids, fuels, bases, ozone, and more.

Do not use HNBR in environments with polar organic solvents, flames, and aromatic oils.

## ETHYLENE PROPYLENE (EPDM)

Having a temperature range of -55° F to 275°F, EPDM offers good flexibility at low temperatures and high heat resistance capabilities, with a temperature range of up to 300° F possible if combined with peroxide. Other EPDM characteristics include excellent chemical resistance and electrical insulation capabilities. Common applications for EPDM include hot and cold water systems, brake systems, continuous exposure to glycol-based fluids or steam, and UV and weathering exposure.

EPDM should not be used with hydrocarbon fluids or lubricating or mineral-based oils.

## CHLOROPRENE (NEOPRENE)

Chloroprene has a temperature range of -40° F to 250°F. Its strong mechanical properties and excellent resistance to ozone, heat, and abrasion make chloroprene ideal for refrigeration systems and applications with exposure to silicon oils or low-pressure oxygen.

Chloroprene should be avoided in applications using chlorinated hydrocarbons or mineral oils.

## SILICONE (VMQ)

Silicone is a versatile material with a temperature range of -85° F to 400° F. It easily withstands extreme temperatures and offers resistance to many oils, fungal growth, UV, ozone, chemicals, and solvents. Common applications for silicone O-rings include the medical and food and beverage industries.



Avoid use in applications with abrasive equipment or media.

## FLUOROCARBON (VITON, FKM)

With a temperature range of -15° F to 400°F, fluorocarbon is a high-performance rubber with good chemical resistance and excellent resistance to high temperatures. Common uses for fluorocarbon O-rings include applications with exposure to transmission fluid and blended gasoline.

Low-temperature applications should avoid fluorocarbon use.

## PERFLUOROELASTOMETER (FFKM)

With a temperature range of -15° F to 600°F, FFKM is suitable for many semiconductor, chemical, and vacuum applications, as these O-rings are best for environments with repeated exposure to highly corrosive fluids or various temperature changes.

Avoid applications using pre-fluorinated lubricants or fluorinated solvents.

## PTFE (TEFLON)

PTFE has a wide temperature range of -200° F to 500° F. It is ideal for applications involving abrasive environments or needing chemically resistant materials because of its ability to withstand most chemicals and low coefficient of friction.

PTFE is not ideal for use with compressed materials.



# NBR

NBR's temperature range of -40°F to 212°F makes it an ideal choice for cold and moderate-high temperatures. Its high resistance to wear makes NBR suitable for applications requiring excellent oil resistance.

Applications with high aromatic content fuels and hydrocarbons, chlorinated hydrocarbons, polar solvents, strong acids, glycol-based brake fluids, ozone, weather, and atmospheric aging should avoid NBR O-rings.

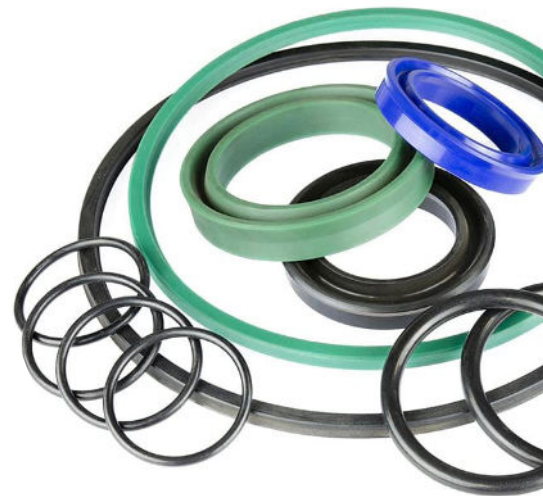
# POLYACRYLATE (ACM)

A temperature range of -22°F to 302°F makes ACM more heat, oil, and chemical resistant than NBR. Even at high temperatures, it provides good resistance to mineral oil, oxygen, and ozone. Applications for polyacrylate include automotive transmissions, vibration and damping requirements, and those requiring resistance to heat and oils.

ACM shouldn't be used for applications with aromatics and chlorinated hydrocarbons, glycol-based brake fluid, acids, hot water, steam, alkalis, and amines.

# FLUOROSILICONE RUBBER (FVMQ)

FVMQ performs well in high and low-temperature environments, ranging from -70°F to 400°F. It offers excellent resistance to petroleum oils, silicone fluids, and hydrocarbon fuels and can withstand UV and ozone exposure. Ideal applications include static sealing applications in machines, engines, and other mechanical systems, such as in the aerospace industry.



FVMQ should be avoided in environments exposed to aldehydes, amines, ketones, and non-petroleum-based brake fluids.

## CARBOXYLATED NITRILE (XNBR)

XNBR offers a temperature range of -4°F to 212°F with excellent tear and abrasion resistance and resistance to many liquids, oils, and solutions. Common applications for XNBR O-rings include rod wipers, seals, reciprocating applications, and those with exposure to water and petroleum.

Avoid using XNBR for applications with ketones, glycol-based brake fluid, strong acids, ethylene ester, and aromatic or chlorinated hydrocarbons.



## BUTYL RUBBER (IIR)

IIR has a temperature range of -58°F to 212°F, low resilience, low gas permeability, and ozone, heat, alkalis, weathering, and dilute acids resistance. Typical applications include shock absorption, vibration damping, and high-pressure or vacuum sealing.

IIR O-rings are not ideal for use with petroleum or mineral-based fluids.

## STYRENE-BUTADIENE RUBBER (SBR)

With a temperature range of -13°F to 212°F, SBR offers high tensile strength, great impact strength, good resilience, and abrasion resistance. SBR O-rings are commonly used for static sealing applications and automotive parts.

Avoid applications with chemicals, high heat, and other abrasive materials.

## POLYURETHANE (AU, EU)

AU, EU's temperature range is -40°F to 176°F. Its wear, oil, solvent, and fuel resistance; high elasticity; and high tensile strength make polyurethane O-rings ideal for hydraulic systems, reciprocating applications, and use in the mechanical industry.

Polyurethane o-rings shouldn't be used with acids, esters, alcohols, alkalis, ethers, ketones, glycols, hot water, and steam.

## EPICHLOROHYDRIN (CO, ECO, GECO)

Epichlorohydrin offers low-temperature flexibilities with a range of -40°F to 212°F. The automotive industry commonly uses epichlorohydrin for fuel and LPG systems because of its higher temperature resistance, good dynamic properties, good weatherability, and resistance to fuels, oils, and common solvents.

Epichlorohydrin O-rings should be avoided with aldehydes, chlorinated and aromatic hydrocarbons, esters and ketones, and brake fluid applications.



# COMMON APPLICATIONS

Some common O-ring types used across the top industries we serve include:



**Industrial Hydraulics & Pneumatics:**  
HNBR, AU, EU



**Fluid Power & Motion Control:**  
Viton, FKM



**Food & Dairy:**  
VMQ



**Oil & Gas:**  
Viton, FKM, HNBR



**Semiconductor:**  
FFKM



**Pharmaceutical:**  
VMQ



**Aerospace:**  
FVMQ



**Marine:**  
HNBR, XNBR



**Medical:**  
VMQ



**Off-Highway:**  
ACM, EPDM



**Optical:**  
EDPM

**And Many More!**

## TRUST ALLIED METRICS FOR QUALITY O-RINGS

Allied Metrics is the top choice for manufacturers seeking quality sealing solutions. As a trusted O-ring manufacturer, we offer O-ring sizes and materials for applications across different industries. [Contact us](#) to learn more about our capabilities or [request a quote](#) to incorporate our quality O-rings into your next project.

# ABOUT ALLIED METRIC

Allied Metrics is a full service manufacturer and distributor of quality hydraulic seals, oil seals and pneumatic seals.

We specialize in metric hydraulic seals, oil seals and pneumatic seals. Our products include o-rings, oil seals, metric o-rings, silicone o-rings, rubber o-rings, metric hydraulic seals, piston seals, rod seals, hydraulic cylinder seals, metric seals, wipers and more!

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