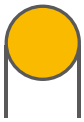
O-rings



Our O-rings are distinguished according to design and type: PTFE O-rings, FEP-coated O-rings and elastomer O-rings.

PTFE O-rings

Main PTFE O-ring applications are in the food and chemical industry, in pharmaceutical and also medical engineering as static seals in flange connections, lids, etc. Owing to their good chemical resistance, they are compatible with most liquids and chemicals. Exceptions are fluid alkali metals and some fluorine compounds. Moreover, they are physiologically safe and can be sterilized.

Further advantages are the broad temperature application range from about –200 °C to +260 °C and the non-stick-slip behavior. Since they are manufactured through machining, all dimensions up to a diameter of about 1,000 mm can be produced.

Operating range

Pressure	≤ 150 bar
Temperature	– 200 °C to +210 °C

Operating media

Universal use (except in molten alkali metals and fluorine compounds)

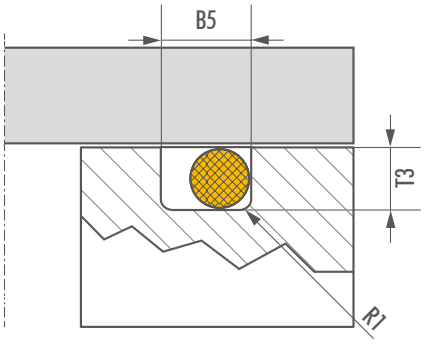
Materials	Typical characteristics	Operating conditions
CCN-01 (PTFE pure)	Low gas permeability, universal chemical resistance, good reverse bending strength	Standard material, food environments
CCN-02 (PTFE modified)	Very low gas permeability, universal chemical resistance	For high requirements on gas tightness and surface quality
Conductive PTFE	Electrostatic dissipative	Where ATEX applies (ex-areas)

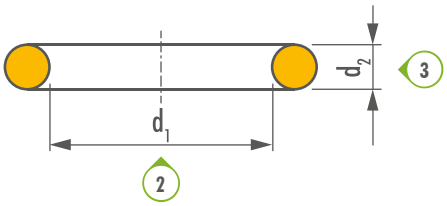
Design information

The stretching and compressing of PTFE O-rings is only limitedly possible. Due to their low elasticity, the dimensions of PTFE O-rings are selected in the same nominal size as the sealing surface. They should be installed only into easily accessible, split grooves.

Recommendations for axial and static installation

O-ring cross section d2	Groove dimensions		
	Groove width W5 +0.1	Groove depth D3 + 0.05	Radius R1
1.50	1.70	1.30	0.20
1.60	1.80	1.40	0.30
1.78 1.80	2.00	1.60	0.40
2.00	2.20	1.80	0.50
2.40	2.60	2.15	0.50
2.50	2.80	2.25	0.50
2.62 2.65	2.90	2.35	0.60
3.00	3.30	2.70	0.80
3.10	3.40	2.80	0.80
3.53 3.55	3.90	3.15	1.00
4.00	4.40	3.60	1.00
5.00	5.50	4.50	1.00
5.30 5.33	5.90	4.80	1.20
5.70	6.30	5.10	1.20
6.00	6.60	5.60	1.20
7.00	7.70	6.30	1.50
8.00	8.80	7.20	1.50
8.40	9.20	7.55	2.00





To place a quick order for the correct product, please use the order information system below.

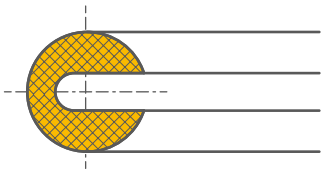
SYSTEM: Type (1) Inner diameter d1 (2) x Cross section d2 (3) » Material (4)

EXAMPLE: PTFE O-ring (1) 45 (2) x 3.55 (3) PTFE pure (4)

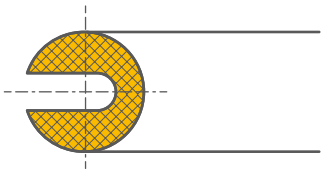
Slotted PTFE O-rings

PTFE O-rings are harder than elastomer O-rings and therefore require higher contact pressures. This can be avoided to some extent by using slotted ring designs.

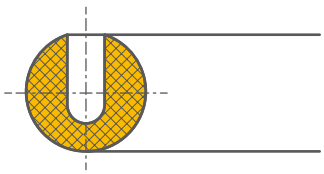
The O-ring must always be mounted in such a way that the medium pressure spreads the recess apart.



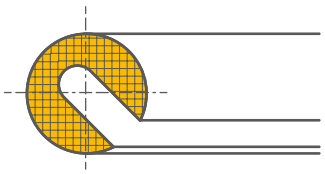
Type I - axial recess inside



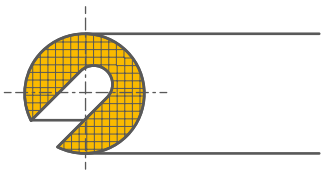
Type O - axial recess outside



Type M - radial recess

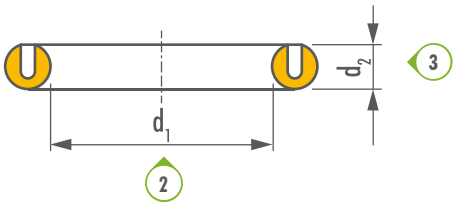


Type SA - recess 45°
offset inside



Type SA - recess 45°
offset outside

Design information > see solid PTFE O-rings



To place a quick order for the correct product, please use the order information system below.

SYSTEM: Type (1) Inner diameter d1 x (2) Cross section d2 » (3) Material (4)

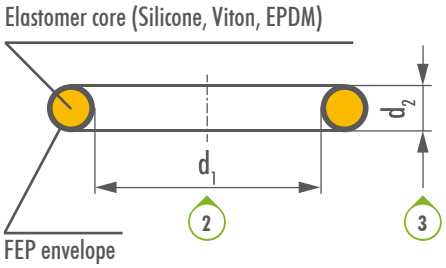
EXAMPLE: PTFE O-ring (1) Type M 55 x (2) 5.33 (3) PTFE pure (4)

FEP-coated O-rings

Depending on the operating temperature range and the medium, FEP-coated O-rings have an elastic core made of either FKM or VMQ. The high chemical resistance of the FEP-coating protects the core material from the effects of the medium that is in use. (For a materials overview please refer to the last page of this data sheet.)

Our O-rings are ideal for applications involving high chemical and thermal stresses, at the same time having the elastic properties of commercially available elastomers. Mounting must be done with utmost care because the expansion and compression capabilities of FEP are limited. They become more flexible when heated up to about 80 °C to 100 °C in hot water or oil.

Operating range	
Temperature	– 55 °C to + 200 °C (dependent on core material)



To place a quick order for the correct product, please use the order information system below.

SYSTEM: Designation (1) » Inner diameter d1 (2) x Cross section d2 (3) » Material (4)

EXAMPLE: O-Ring (1) 55 (2) x 5.33 (3) Silicone core, FEP-coated (4)

Elastomer O-rings

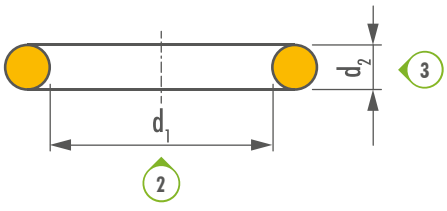
An elastomer O-ring is a universal seal with several advantages. This type of seal excels through its high sealing efficiency and small mounting space together with low screw tightening torque. It is predominantly used in static applications. The elastomer O-ring is only limitedly suitable as a dynamic seal or for linear and rotary motions.

Elastomeric O-rings are ideally suited for use in high pressure and high thermal stress applications. They show low frictional wear and have a long service life. These seals are inexpensive and available in many ranges of shore hardness and for a wide range of media.

Stick-slip effects may occur if not lubricated sufficiently. Material adhesion in addition to gap extrusion are possible risks when a machine is idle for a longer period of time.

Standard O-ring cross sections d_2

Standard / Guideline	Cross sections, O-ring cross section diameter (d_2) in mm							
German standard metric DIN 3771	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
		5.00	5.50	6.00	7.00	8.00	10.00	12.00
International standard ISO 3601-1	1.80	2.65	3.55	5.30	7.00			
Swedish standard SMS 1586	1.60	2.40	3.00	5.70	8.40			
French standard NFT47-501	1.90	2.70	3.60	5.33	6.99			
Japanese standard JIS B 2401	1.90	2.40	3.10	3.50	5.70	8.40		
American standard AS 568 A British standard BS 1806	1.78	2.62	3.53	5.33	6.99			
American standard AS 568 A series 990	1.02	1.42	1.63	1.83	1.98			
	2.08	2.20	2.46	2.95	3.00			
Special dimensions: O-rings according to customer specification	More cross sections upon request.							



To place a quick order for the correct product, please use the order information system below.

SYSTEM: Designation (1) » Inner diameter d1 (2) x Cross section d2 (3) » Material (4)

EXAMPLE: O-ring (1) 55 (2) x 5.33 (3) NBR 70 (4)

Overview of O-ring materials

Standard materials

ISO 1629 designation	Basic elastomer	Trade name	Properties
NBR	Nitrile butadiene rubber	Chemigum®, BunaN®, Nipol N®, Krynac®, Paracryl®, Perbunan N®, Hycar®, Elaprim®	**– 25° to + 100° C** A synthetic rubber with excellent resistance to fuels, oils, hydraulic oils, lubricants and other aliphatic hydrocarbons. Good physical properties, such as high wear resistance and stability, and good temperature resistance.
EPDM	Ethylene propylene diene rubber	Buna AP®, Dutral®, Epcar®, Keltan®, Nordel®, Royalene®, Vistalon®	**– 40° to + 140° C** Very good ozone, aging and weather resistance, also resistant to hot water and steam. Compared to other synthetic rubbers its cold temperature resistance is good. Swells strongly in aliphatic, aromatic and chlorinated hydrocarbons.
VMQ	Methyl vinyl silicone rubber	Silopren®	**– 50° to + 210° C** Very good temperature resistance. Oil resistance is similar to that of NBR though the same good physical and mechanical properties are not achieved. Not suited for continuous operation in hot water or steam.
FKM	Fluorocarbon rubber	Viton®, Fluorel®, Technoflon®	**– 20° to + 200° C** Very good resistance to influences from mineral oils, aliphatic and aromatic hydrocarbons and also chlorinated hydrocarbons, concentrated and diluted acids, and weak bases. High mechanical properties, very low gas permeability and also outstanding aging resistance, very good compression set resistance.

Special materials (selection)

ISO 1629 designation	Basic elastomer	Trade name	Characteristics
FEPM	Tetrafluoroethylene propylene rubber	Aflas®	**– 30° to + 200° C** Peroxidized TFE elastomer, high resistance to a multitude of specific media and chemicals, e.g hot water, steam, acids, bases, ammonia, bleachers, acid gases (H_2S) and oils as well as amines, alloyed motor and gear oils, brake fluids and oxidizing media.
FFKM	Perfluor rubber	Kalrez®, ZALAK®, PAROFLUOR®, CHEMRAZ®, SIMRIZ®	**– 15° to + 270° C** Perfluorinated elastomers combine the properties of elastomers and the almost universal chemical and temperature resistance of PTFE. The use of this extremely expensive material is economical only in exceptional cases.
FVMQ	Fluorosilicone rubber	FSE®, Silastic®, Sylon®	**– 45° to + 175° C** Better resistance to oils, fuels and solvents than MVQ (especially to aromatic and chlorinated hydrocarbons and alcohol). Use in high requirement applications (broad temperature range and concurrent exposure to aggressive media), e.g. seals in automotive fuel systems, aerospace applications and also the chemical industry.
HNBR	Hydrogenated nitrile butadiene rubber	Therban®, Zetpol®	**– 15° to + 150° C** High mechanical stability, improved abrasion resistance and low compression resistance. Resistance to media is similar to NBR with simultaneous improved resistance to steam.