



**Angst+Pfister**

APSOseal®

O-Rings



## O-rings for all applications from a single supplier



Thanks to their simple geometry and high sealing effectiveness, O-rings have established themselves as preferred sealing elements in all branches of industry for more than a century now. Angst+Pfister's wide assortment of O-rings covers the full spectrum of standard applications while presenting an excellent price-performance proposition. In addition, Angst+Pfister also supplies optimum sealing solutions even for highly specialized deployment areas. Angst+Pfister is constantly expanding its O-ring assortment in its successful mission to address increasingly demanding specifications with regard to media and temperature resistance.

### **Solution-minded engineering support and consulting**

The Angst+Pfister Group, drawing on its 90 years of experience in sealing technology, has made it its mission to provide customers with skilled and solution-minded advisory support. Our experienced application engineers assist customers in

- defining the right material,
- optimally designing the groove, and
- optimizing assembly.



For out-of-the-ordinary applications, the specialists at Angst+Pfister develop customized solutions. If needed, they can specify and produce materials precisely tailored to the application at hand or, where appropriate, can also propose alternative solutions to customers.

### **Reliable logistics and quality management**

Our state-of-the-art logistics center is the linchpin of Angst+Pfister's logistical services. At the roughly 18,000-square-meter logistics center, 120,000 different stock-keeping units are warehoused and a daily order volume encompassing more than 1,500 separate items is reliably processed and shipped. Excellent C-parts management coupled with a world-spanning procurement network guarantees high product availability – even for custom items – with fast delivery times. With just-in-time, kanban, supply management and other logistics concepts, Angst+Pfister enables customers to synchronize their incoming parts shipments to precisely match their production rhythm and to thus minimize inventory carrying costs. Our ISO 9001:2008-certified complete quality assurance system additionally enables customers to greatly simplify their incoming goods inspection procedures. EDI integration or purchasing via Angst+Pfister's APSOparts® online shop give you an additional means of optimizing your logistics costs.



### **Comprehensive O-ring assortment creates advantages for customers**

Our standard assortment of O-rings encompassing well beyond 10,000 different dimensions in four quality grades and a wide range of materials already covers most application requirements. This, coupled with our ability to procure custom-fabricated O-rings, makes Angst+Pfister the ideal partner to help you consolidate your supplier base or to optimize your inventory carrying costs while ensuring maximum supply security and quality.

## O-rings in four quality grades – the right solution for every application

**NORMATEC® O-rings**

Good industrial-grade quality at advantageous prices. Black and green O-rings in NBR Shore A 70 and 80 as well as in FKM Shore A 75 are available under Angst + Pfister's proprietary NORMATEC® brand.

**HITEC® O-rings**

Premium-quality O-rings, available with approval and conformity certifications. The HITEC® brand offers you a variety of materials and dimensions to choose from.

**High Performance O-rings**

For the most demanding specifications for sealing effectiveness, even under elevated or even extraordinary chemical and thermal influences. With their special materials and material combinations, high-performance O-rings stand out for their exceptional resistance properties.

**Precision O-rings**

O-rings can be custom-designed to exactly meet individual customer requirements with regard to dimensions, material, color and even pricing.

Material designation	Hardness	Temperature range	Resistances/main properties	Angst + Pfister lines			
				NORMATEC®	HITEC®	High-performance	Precision O-rings
	Shore A	-300 -200 -100 0 +100 +200 +300					
NBR <b>Acrylonitrile-butadiene elastomer</b>	40–90		Mineral and vegetable oils and greases, alkalis, water, glycols, alcohols, saline solutions	×	×		
HNBR <b>Hydrated NBR elastomer</b>	40–90		Oils and fuels; excellent mechanical properties		×	*	
CR <b>Chloroprene elastomer</b>	20–90		Alkalis, alcohols, lubricants, glycols, ozone, coolants; only limited resistance to mineral oil and grease; resistant to aging and weathering	×	*	×	
VMQ <b>Silicone elastomer</b>	30–80		Broad temperature range, animal and vegetable oils and greases, water, diluted saline solutions; not for silicone oil and grease; resistant to ozone and weathering	×	×		
FVMQ <b>Fluorosilicone elastomer</b>	30–80		Fuels, minerals and synthetic oils and greases; resistant to ozone and weathering		×	*	
FKM <b>Fluoroelastomer</b>	65–90		High temperatures, chemicals, oils, aliphatic hydrocarbons (fuels), non-flammable hydraulic fluids	×	×		
FFKM <b>Perfluoroelastomer (Kalrez®)</b>	60–90		Exceptional chemical resistance and thermal stability; longest service life with superior sealing reliability in critical applications				×
EPDM <b>Ethylene-propylene-diene monomer elastomer</b>	30–90		Hot water and steam, glycol-based brake fluids, many organic and inorganic acids and bases; not suitable for mineral oils and greases; good resistance to aging and weathering	×	*	×	
<b>FEP-encapsulated VMQ or FKM (FEP-O-SEAL®)</b>	–		Combines the properties of elastomers (elasticity) and PTFE (chemical resistance)				×
PTFE <b>Polytetrafluoroethylene</b>	–		Hard and non-elastic for static sealing, for example in the manufacture of chemistry equipment				×
<b>Metals</b>			High pressures and temperatures, aggressive media; employable only for static sealing				×

\* Depends greatly on the material compound.

## NORMATEC® O-rings



The NORMATEC® line encompasses good industrial-grade O-rings that meet standard specifications.

NORMATEC® O-rings are high-quality sealing elements specially conceived for high-volume applications. Our powerful network of efficient state-of-the-art manufacturers in Europe and Asia results in a very good price-performance proposition for our customers.

Depending on O-ring grade and dimension, multiple manufacturers are authorized to produce NORMATEC® O-rings in accordance with Angst + Pfister product specifications.

### Advantages of employing NORMATEC® O-rings:

- Designed for the medium performance category.
- Ideal for high-volume applications.
- Very extensive supply range of standard O-rings made of FKM and NBR.
- Deliverable in a variety of special materials.
- Wide range of available molds for special dimensions.
- Tolerances and surfaces are spot checked in accordance with a random sampling schedule pursuant to DIN ISO 2859 AQL 2.5, test level III.
- Packaged in black plastic envelopes for protection against harmful light.
- Attractive price-performance proposition.

Elastomer designation	Hardness	Color	Compression Set		TR10 (low temperature retraction)
			DIN ISO 815	ASTM D 395B	ASTM 1329
	Shore A				
NBR, NT 70.11	70	black	22 h/+100 °C: < 12	70 h/+100 °C: <20	-20
NBR, NT 80.11	80	black	22 h/+100 °C: < 15	70 h/+100 °C: <25	-18
NBR, NT 60.11 *	60	black	22 h/+100 °C: < 15	70 h/+100 °C: <25	-25
NBR, NT 90.11 *	90	black	22 h/+100 °C: < 12	70 h/+100 °C: <18	-30
FKM, NT 80.7/75	75	black	24 h/+200 °C: < 10	70 h/+200 °C: <18	-17
FKM, NT 80.7/75	75	green	24 h/+200 °C: < 10	70 h/+200 °C: <18	-17
VMQ, NT 70.6 *	70	red	24 h/+120 °C: < 15	24 h/+150 °C: <20	-40
EPDM, NT 70.3 *	70	black	24 h/+120 °C: < 10	24 h/+150 °C: <19	-40
CR, NT 70.5 *	70	black	22 h/+100 °C: < 40		-35

\* Special Normatec® material available on request



### Application examples

Left: Herbicide sprayer – leak-tight thanks to NORMATEC® O-rings.

Right: O-rings can also be found in electrical equipment such as drills.

## HITEC® O-rings



The HITEC® brand name stands for O-rings that satisfy very high demands and meet required approval and conformity specifications for drinking-water, pharmaceutical, food-grade and gas applications.

### ZTen compelling arguments in favor of HITEC® O-rings from Angst+Pfister:

- One clearly defined manufacturer per elastomer material.
- Precise specification and data sheets for each elastomer compound.
- Use of proven high-quality raw materials from reputable manufacturers.
- Separate production tools for each material guarantee clean surfaces and tight tolerances.
- Consistently high-grade elastomer quality is guaranteed: tolerances and surfaces are spot checked in accordance with a random sampling schedule pursuant to DIN ISO 2859 AQL 1.5, test level II.
- Product traceability is guaranteed.
- HITEC® O-rings are supplied in black plastic envelopes to protect them from the effects of light.
- Extensive warehouse inventory of standard sizes in a variety of materials.
- Special materials such as CR, SBR, HNBR, ACM and FVMQ as well as materials customized for specific deployment purposes can also be supplied.
- All relevant approval and clearance requirements are met.

Approvals/conformities	EPDM	NBR	FKM	VMQ	Material
DIN EN 681-1 certification for water supply and drainage	×				EPDM 75.5/KW75F
DVGW W 534 certification for water supply	×				EPDM 75.5/KW75F
DVGW W 270 certification according to work sheet on microbiological growth on materials for drinking water applications in Germany	×	×			EPDM 75.5/KW75F, NBR 70.5/P5F (70.10-02)
KTW certification for drinking water in Germany	×	×			EPDM 75.5/KW75F, NBR 70.5/P5F
WRAS certification for drinking water in the UK	×	×			EPDM 75.5/KW75F, NBR 70.5/P5F
NSF 61 certification for drinking water in the USA	×	×			EPDM 75.5/KW75F, NBR 70.5/P5F
ACS certification for drinking water in France	×	×			EPDM 75.5/KW75F, NBR 70.5/P5F
AWQC certification for drinking water in Australia and New Zealand	×				EPDM 75.5/KW75F
ÖVGW certification for drinking water in Austria	×				EPDM 75.5/KW75F
KIWA certification for drinking water in the Netherlands	×				EPDM 75.5/KW75F
BfR conformity for food in Germany	×				EPDM 75.5/KW75F
NSF 51 certification for food in the USA	×				EPDM 75.5/KW75F
FDA conformity for pharmaceuticals and food in the USA	×	×	×	×	EPDM 75.5/KW75F, NBR 70.5/P5F, FKM 75.5/VA75F, VMQ 80.5/SIL80F
USP Class VI certification United States Pharmacopeia	×				EPDM 75.5/KW75F
DVGW DIN EN 549 certification for use in gas applications		×		×	NBR 60.5/P60, NBR 70.5/P5F, VMQ 80.5/SIL80F



### Application examples

Left: Drinking-water-approved HITEC® O-rings for single-handle mixing faucets.  
Right: Pressure-reducing valve for the medical technology industry.

## High-performance O-rings



The O-Rings in our high-performance line meet the most demanding specifications for sealing effectiveness and stand out for their exceptional chemical and thermal resistance properties.

### **Kalrez® perfluoroelastomer O-rings**

Kalrez® O-rings possess unique operational properties that are unmatched by any other elastomer material. Kalrez® synthetic rubber in its various compounds combines the elasticity and sealing power of a genuine elastomer with the chemical resistance of PTFE. Kalrez® O-rings are resistant against practically all chemicals and can be deployed in continuous operation at temperatures up to +327 °C or for brief periods at temperatures up to +350 °C. Kalrez® O-rings compliant with FDA or USP VI requirements are also available.

As an authorized distributor of DuPont Performance Polymers, Angst + Pfister stocks a huge assortment of Kalrez® O-rings and has direct access to special-sized Kalrez® O-rings. Where conventional materials fail, Kalrez® perfluoroelastomers (FFKM) provide the least expensive and most reliable long-term solution from a total cost standpoint.

### **FEP-O-SEAL®**

FEP-O-SEAL® O-rings feature the ideal combination of two materials: their core made of elastic silicone or FKM provides natural resilience while their FEP sheath guarantees resistance against chemicals. FEP-O-SEAL® O-rings can be deployed at temperatures ranging from -60 °C to +200 °C, are pressure-resistant and guarantee low compression set coupled with much lower tendency to cold flow compared to PTFE.

### **PTFE-O-rings**

For sealing of static joints such as flange connections in the manufacture of chemistry equipment, non-elastic PTFE O-rings are the first choice for universal robust sealing against aggressive fluids.

### **Metal O-rings and C-rings**

Media at temperatures from -270 °C to +980 °C and at pressures from high vacuum to 6,800 bars can only be perfectly sealed by using metal seals, if need be with a surface coating.

Kalrez® is a registered trademark of DuPont Performance Polymers.



### **Application examples**

Left: FEP-O-SEAL® as a gasket seal for a centrifuge container.  
Right: Kalrez® seal in dual component applicator gun.



## Precision O-rings



Special procurements or modifications based on the different quality grades of our standard O-ring assortment enable us to supply customized precision O-rings for project-specific solutions:

### Non-standard dimensions

Angst+Pfister has access to a vast range of molds, which enables us to supply even out-of-the-ordinary O-ring sizes and dimensions in a timely manner.

### Special materials

On request, Angst+Pfister can procure special materials or custom-developed materials designed, for example, for explosive decompression (ED) or solar thermal applications.

### Surface refinement

Surface refinements serve to facilitate ease of assembly or to enable (partial) dynamic deployment of O-rings, which normally are predominantly used for static sealing applications. Surface coatings or treatments can come into consideration to reduce friction or to improve separation. In addition, O-rings can be coated with PTFE in any color to make materials clearly identifiable during assembly. The selection of coating media available includes PTFE (usually transparent), polysiloxane (long-lasting), (micro)talcum and silicone. In addition to that, MOLYKOTE® treatment, halogenation or plasma cleaning can be applied.

### Special types

- **Lathe-cut O-rings** – for special dimensions or small unit volumes.
- **Round cord rings** – vulcanized, deliverable at short notice in all dimensions.
- **APSO-ring™ XL** – large-dimension O-rings with a very high standard of quality with regard to surface finish and tolerances.
- **X-rings** – four-lip seal as an alternative to O-rings.
- **Backup rings** – to prevent extrusion of the O-ring into the clearance gap.



### Application examples

Left: Pigging valves for the food industry.  
Right: Precision O-rings for the watch industry.

## Services from Angst + Pfister Group

### Angst + Pfister – Your supply and solutions partner

The Angst + Pfister Group is a leading international technical manufacturer and service provider for high-end industrial components. As a supply and solutions partner for engineering plastics, sealing, fluid handling, drive, and antivibration technology as well as

sensors, Angst + Pfister combines efficient logistics concept with comprehensive product application engineering services. Besides providing customer-specific parts, the Group offers a product range consisting of approximately 100,000 standard items.

### Our core product divisions



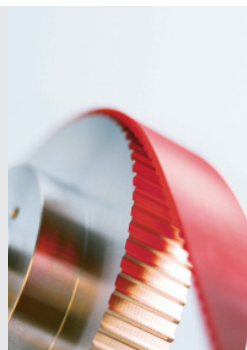
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