



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 Acrylonitrile-butadiene elastomer	40–90		Mineral and vegetable oils and greases, alkalis, water, glycols, alcohols, saline solutions	×	×		
HNBR Hydrated NBR elastomer	40–90		Oils and fuels; excellent mechanical properties		×	*	
CR Chloroprene elastomer	20–90		Alkalis, alcohols, lubricants, glycols, ozone, coolants; only limited resistance to mineral oil and grease; resistant to aging and weathering	×	*	×	
VMQ Silicone elastomer	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 Fluorosilicone elastomer	30–80		Fuels, minerals and synthetic oils and greases; resistant to ozone and weathering		×	*	
FKM Fluoroelastomer	65–90		High temperatures, chemicals, oils, aliphatic hydrocarbons (fuels), non-flammable hydraulic fluids	×	×		
FFKM Perfluoroelastomer (Kalrez®)	60–90		Exceptional chemical resistance and thermal stability; longest service life with superior sealing reliability in critical applications				×
EPDM Ethylene-propylene-diene monomer elastomer	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	×	*	×	
FEP-encapsulated VMQ or FKM (FEP-O-SEAL®)	–		Combines the properties of elastomers (elasticity) and PTFE (chemical resistance)				×
PTFE Polytetrafluoroethylene	–		Hard and non-elastic for static sealing, for example in the manufacture of chemistry equipment				×
Metals			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

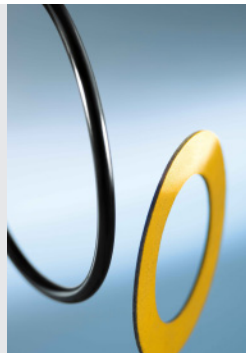
The Angst + Pfister Group is a leading international technical manufacturer and service provider for high-end industrial components. As a supply and solutions partner for engineering plastics, sealing, fluid handling, drive, and antivibration technology as well as

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



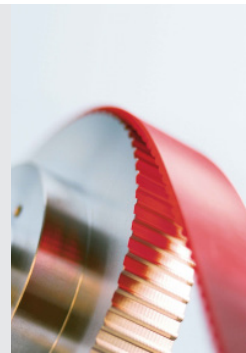
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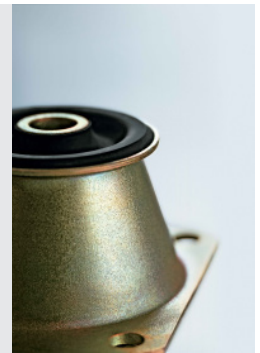
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Fluid Handling
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Antivibration
Technology

Switzerland

Angst + Pfister AG
Thurgauerstrasse 66, Postfach, CH-8052 Zürich
Phone +41 (0)44 306 61 11
www.angst-pfister.com, ch@angst-pfister.com

Angst + Pfister SA
Chemin de la Papeterie 1, CH-1290 Versoix
Phone +41 (0)22 979 28 00
www.angst-pfister.com, ch@angst-pfister.com

Germany

Angst + Pfister GmbH
Siemensstraße 5, DE-70736 Fellbach
Phone +49 (0)711 48 999 2-0
www.angst-pfister.com, de@angst-pfister.com

France

Angst + Pfister SAS
Immeuble DELTAPARC
93, avenue des Nations, FR-93420 Villepinte
Phone +33 (0)1 48 63 20 80
Fax +33 (0)1 48 63 26 90
www.angst-pfister.com, fr@angst-pfister.com

Austria

Angst + Pfister Ges.m.b.H.
Floridsdorfer Hauptstrasse 1/E, AT-1210 Wien
Phone +43 (0)1 258 46 01-0
Fax +43 (0)1 258 46 01-98
www.angst-pfister.com, at@angst-pfister.com

Italy

Angst + Pfister S.p.A.
Via Montefeltro 4, IT-20156 Milano
Phone +39 02 300 87.1
www.angst-pfister.com, it@angst-pfister.com

Netherlands

Angst + Pfister B.V.
Afrikaweg 40, NL-2713 AW Zoetermeer
Phone +31 (0)79 320 3700
Fax +31 (0)79 320 3799
www.angst-pfister.com, nl@angst-pfister.com

Belgium

Angst + Pfister N.V. S.A.
Bedrijventrum Waasland Industriepark-West 75
BE-9100 Sint-Niklaas
Phone +32 (0)3 778 0128
Fax +32 (0)3 777 8398
www.angst-pfister.com, be@angst-pfister.com

China

Angst + Pfister Trade (Shanghai) Co. Ltd.
Rm 1803-1805, West Tower,
Zhong Rong Hengrui Building
No. 560 Zhangyang Road, CN-Shanghai 200122
Phone +86 21 5169 5005
Fax +86 21 5835 8618
www.angst-pfister.com, cn@angst-pfister.com

Turkey

Angst Pfister Advanced Technical Solutions A.Ş.
Akçalar Sanayi Bölgesi Kale Cd., No: 10,
TR-16225 Nilüfer/Bursa
Phone +90 224 280 69 00
Fax +90 224 484 25 96
www.angst-pfister.com/ats, ats@angst-pfister.com

Poland

Angst + Pfister Sp. z o.o.
ul. Komorowicka 260, PL-43-346 Bielsko-Biala
Phone +48 33 443 29 70
Fax +48 33 443 29 71
www.angst-pfister.com, pl@angst-pfister.com



APSOparts®

the Online Shop of Angst + Pfister
www.apsoparts.com