

APSOseal®

Seals for Prototyping



### **Lathe-cut seals – engineering services**

In the field of sealing technology, one often encounters custom fabrications. Angst+Pfister supplies custom-fabricated seals for emergencies or for rapid implementation of new product ideas – with top quality and lightning-fast delivery times. Our specialists provide you with advice on selecting the right seal from a technical and material composition standpoint. We then delegate the actual fabrication of the solution worked out with you to our production partners. Our services in the area of lathe-cut seals include:



- lathe-cut seals for custom applications;
- a large selection of high-grade materials and profiling tools in stock;
- delivery of seals up to 700 mm in diameter within 5 to 10 workdays;
- delivery of seals greater than 700 mm in diameter on request;
- customized seal kits.

### **Dependable logistics and quality management**

It takes a comprehensive logistics infrastructure to be able to supply the right products at the right time. Our logistics center functions fully automatically with electronic order tracking. Our international presence enables us to provide our customers with just-in-time delivery whenever and wherever they need it. And our ISO 9001:2000-certified complete quality assurance system enables you to greatly simplify your incoming goods inspection procedure. In addition, Angst+Pfister makes an important contribution to trouble-free production processes as well as end-product reliability and safety for you as our customer.



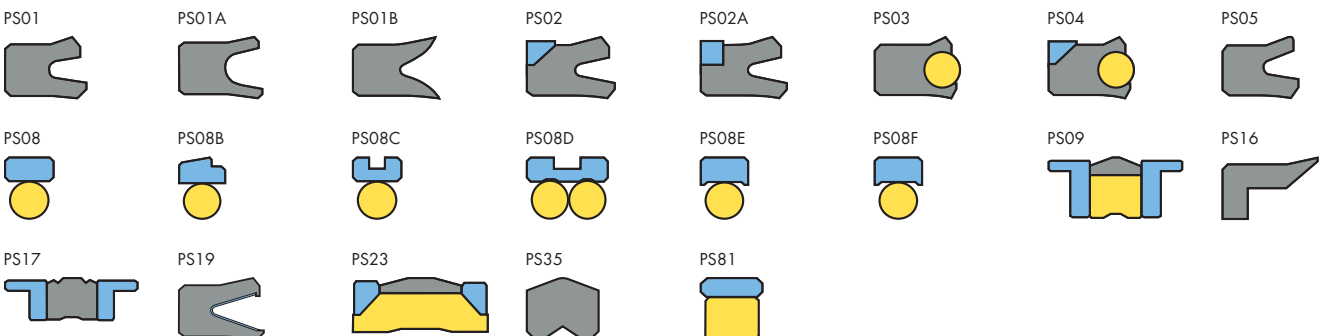
## O-rings, X-rings and flange seals

Material	Temperature [°C]							Pressure bars	Sliding speed m/sec	Profiles
	-300	-200	-100	0	+100	+200	+300			
NBR								160	-	OR, SCQ-ring
PUR								400	-	SCQ-ring, FL01A, FL02B
PUR								600	-	OR
EPDM								250	-	FL01A, FL02B
FKM								160	-	OR, SCQ-ring
FKM								250	-	FL01A, FL02B



## Piston seals

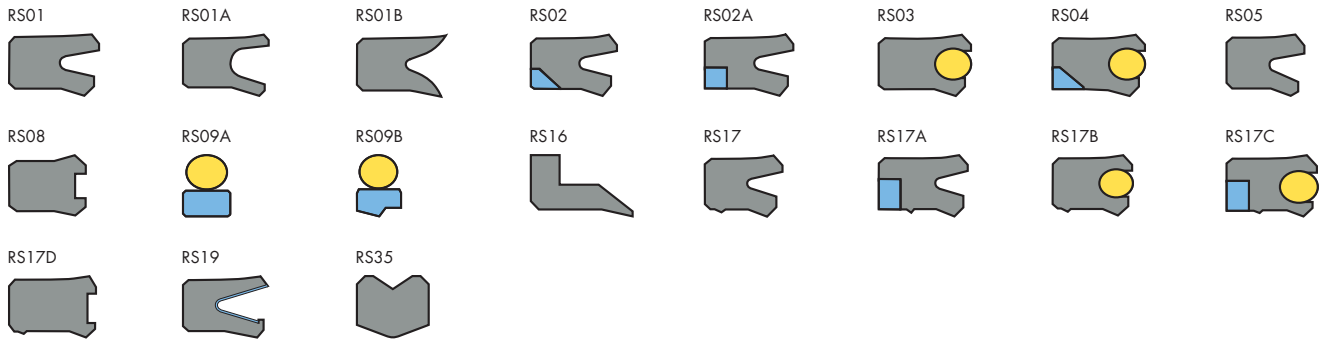
Material	Temperature [°C]							Pressure bars	Sliding speed m/sec	Profiles
	-300	-200	-100	0	+100	+200	+300			
NBR								25	1.0	PS01A, PS05
NBR								160	0.5	PS01, PS01B, PS16
NBR/POM								250	0.5	PS02, PS02A, PS17
PUR/NBR								400	1.0	PS03, PS08, PS08B, PS08E, PS08F, PS81
PUR/NBR/POM								400	0.5	PS09, PS23
PUR/POM								400	0.5	PS17
PUR/NBR								400	2.0	PS08C, PS08D
PUR/NBR								400	0.5	PS03
PUR/NBR/POM								700	0.5	PS04
PTFE-bronze/NBR								800	2.0	PS08C, PS08D
PTFE-Ekonol/NBR								800	2.0	PS08C, PS08D
PTFE-glass fibers/NBR								800	2.0	PS08C, PS08D
PTFE-carbon/NBR								800	2.0	PS08C, PS08D
PTFE-bronze/NBR								800	15.0	PS08, PS08B, PS08E, PS08F, PS81
PTFE-Ekonol/NBR								800	15.0	PS08, PS08B, PS08E, PS08F, PS81
PTFE-glass fibers/NBR								800	15.0	PS08, PS08B, PS08E, PS08F, PS81
PTFE-carbon/NBR								800	15.0	PS08, PS08B, PS08E, PS08F, PS81
PTFE/NBR								800	15.0	PS08, PS08B, PS08E, PS08F, PS81
PUR/POM								700	0.5	PS02, PS02A
PUR								25	1.0	PS01A
PUR								400	0.5	PS01, PS01B, PS35
FKM								25	1.0	PS01A
FKM								160	0.5	PS01, PS01B
FKM/PTFE-glass fibers								250	0.5	PS02, PS02A
PTFE-bronze/FKM								800	2.0	PS08C, PS08D
PTFE-Ekonol/FKM								800	2.0	PS08C, PS08D
PTFE-glass fibers/FKM								800	2.0	PS08C, PS08D
PTFE-carbon/FKM								800	2.0	PS08C, PS08D
PTFE/FKM								800	2.0	PS08C, PS08D
PTFE-bronze/FKM								800	15.0	PS08, PS08B, PS08E, PS08F, PS81
PTFE-Ekonol/FKM								800	15.0	PS08, PS08B, PS08E, PS08F, PS81
PTFE-glass fibers/FKM								800	15.0	PS08, PS08B, PS08E, PS08F, PS81
PTFE-carbon/FKM								800	15.0	PS08, PS08B, PS08E, PS08F, PS81
PTFE/FKM								800	15.0	PS08, PS08B, PS08E, PS08F, PS81
PTFE-glass fibers/1.4310								160	15.0	PS19



See overview of materials for exact temperature specifications.

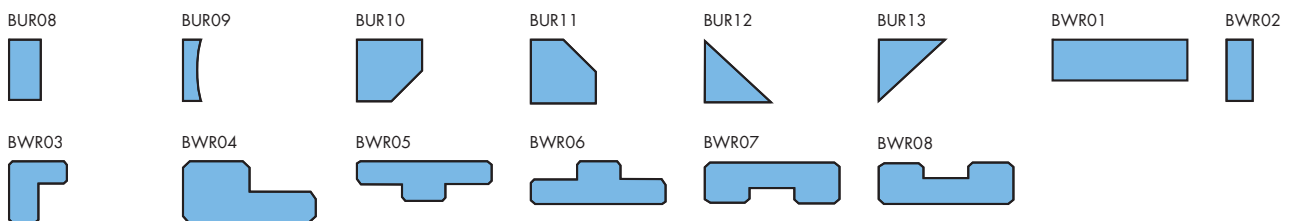
## Rod seals

Material	Temperature [°C]							Pres- sure bars	Sliding speed m/sec	Profiles
	-300	-200	-100	0	+100	+200	+300			
FKM								160	0.5	RS01, RS01B
FKM								25	1.0	RS01A
FKM/PTFE-glass fibers								250	0.5	RS02, RS02A
NBR								160	0.3	RS17D, RS08
NBR								160	0.5	RS01, RS01B, RS16
NBR								25	1.0	RS01A, RS05
NBR/POM								250	0.5	RS02, RS02A
PTFE-bronze/NBR								800	15.0	RS09A, RS09B
PTFE-bronze/FKM								800	15.0	RS09A, RS09B
PTFE-Ekonol/NBR								800	15.0	RS09A, RS09B
PTFE-Ekonol/NBR								800	15.0	RS09A, RS09B
PTFE-glass fibers/NBR								800	15.0	RS09A, RS09B
PTFE-glass fibers/FKM								800	15.0	RS09A, RS09B
PTFE-glass fibers								160	15.0	RS09A, RS09B
PTFE-carbon								800	15.0	RS09A, RS09B
PTFE-carbon								800	15.0	RS09A, RS09B
PTFE								800	15.0	RS09A, RS09B
PTFE								800	15.0	RS09A, RS09B
PUR								400	0.3	RS17D, RS08
PUR								400	0.5	RS01, RS01B, RS17, RS35
PUR								25	1.0	RS01A, RS05
PUR/NBR								400	0.5	RS17B, RS03
PUR/NBR								400	1.0	RS09A, RS09B
PUR/NBR/POM								700	0.5	RS17C, RS04
PUR/POM								700	0.5	RS17A, RS02, RS02A



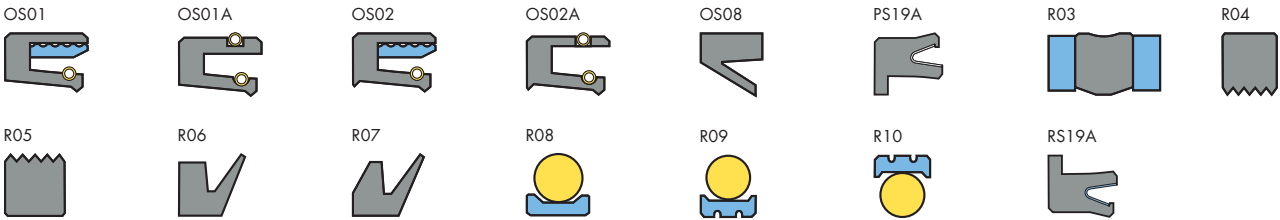
## Backup rings and guide rings

Material	Temperature [°C]							Pres- sure bars	Sliding speed m/sec	Profiles
	-300	-200	-100	0	+100	+200	+300			
POM								-	-	BUR08, BUR09, BUR10, BUR11, BUR12, BUR13
POM								-	4.0	BWR01, BWR02, BWR03, BWR04, BWR05, BWR06, BWR07, BWR08
PUR								-	-	BUR08, BUR09, BUR10, BUR11, BUR12, BUR13
PTFE								-	-	BUR08, BUR09, BUR10, BUR11, BUR12, BUR13
PTFE-glass fibers								-	4.0	BWR01, BWR02, BWR03, BWR04, BWR05, BWR06, BWR07, BWR08



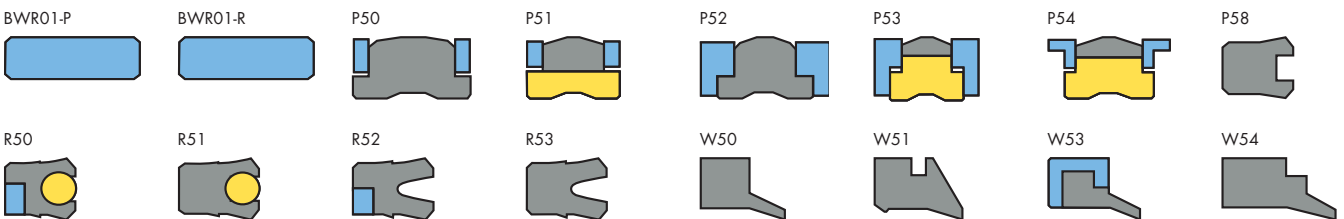
## Rotary seals

Material	Temperature [°C]							Pres- sure bars	Sliding speed m/sec	Profiles
	-300	-200	-100	0	+100	+200	+300			
NBR								-	10.0	OS08
NBR								100	0.2	R04, R05
NBR/POM								0.5	10.0	OS01, OS02
NBR/POM								250.0	0.2	R03
PTFE-bronze/NBR								350.0	2.0	R08, R09, R10
PTFE-ekonol/NBR								350.0	2.0	R08, R09, R10
PTFE-bronze/NBR								350.0	2.0	R08, R09, R10
PTFE-carbon/NBR								350.0	2.0	R08, R09, R10
PTFE/NBR								350.0	2.0	R08, R09, R10
PUR/POM								0.5	5.0	OS01, OS02
PUR								400.0	0.2	R03
PUR								160.0	0.2	R04, R05
FKM								-	25.0	R06, R07
FKM/PTFE-glass fibers								0.5	15.0	OS01, OS02
PTFE-bronze/FKM								350.0	2.0	R08, R09, R10
PTFE-ekonol/FKM								350.0	2.0	R08, R09, R10
PTFE-glass fibers/FKM								350.0	2.0	R08, R09, R10
PTFE-carbon/FKM								350.0	2.0	R08, R09, R10
PTFE/FKM								350.0	2.0	R08, R09, R10
PTFE-glass fibers								0.5	15.0	OS01A, OS02A
PTFE								0.5	15.0	OS01A, OS02A
PTFE-glass fibers								150.0	2.0	RS19A, PS19B
NBR								-	25.0	R06, R07
FKM								-	10.0	OS08



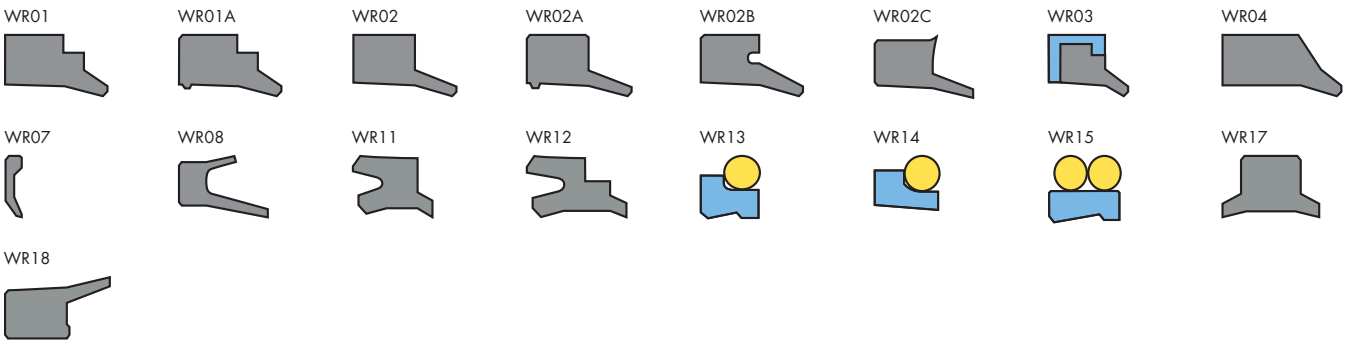
## Mining seals

Material	Temperature [°C]							Pres- sure bars	Sliding speed m/sec	Profiles
	-300	-200	-100	0	+100	+200	+300			
PUR/NBR								400	0.5	R51
PUR/NBR/POM								400	0.5	P51, P54
PUR/NBR/POM								700	0.5	P53, R50
PUR								-	2.0	W54, W51, W50
PUR								400	-	P58
PUR								400	0.5	R53
PUR/POM								-	2.0	W53
PUR/POM								400	0.1	P50
PUR/POM								700	0.5	P52, R52
POM								-	4.0	BWR01-P
PTFE								-	4.0	BWR01-R



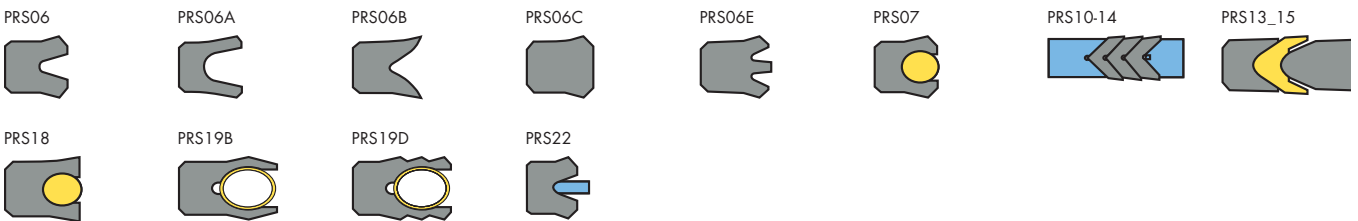
## Wiper/scrapper rings

Material	Temperature [°C]							Pres- sure bars	Sliding speed m/sec	Profiles
	-300	-200	-100	0	+100	+200	+300			
NBR								-	4.0	WR -01 -01A -02 -02A -02B -02C -04 -11 -12 -18 -17
NBR/POM								-	4.0	WR03
PTFE-bronze/NBR								-	15.0	W13, WR14, WR15
PTFE-Ekonol/NBR								-	15.0	W13, WR14, WR15
PTFE-glass fibers/NBR								-	15.0	W13, WR14, WR15
PTFE-carbon/NBR								-	15.0	W13, WR14, WR15
POM/NBR								-	4.0	WR07, WR08
PUR								-	4.0	WR -01 -01A -02 -02A -02B -02C -04 -07 -08 -11 -12 -18 -17
PUR/POM								-	4.0	WR03
FKM								-	4.0	WR -01 -01A -02 -02A -02B -02C -04 -11 -12 -18 -17
FKM/PTFE-glass fibers								-	4.0	WR03
PTFE-bronze/FKM								-	15.0	W13, WR14, WR15
PTFE-Ekonol/FKM								-	15.0	W13, WR14, WR15
PTFE-glass fibers/FKM								-	15.0	W13, WR14, WR15
PTFE-carbon/FKM								-	15.0	W13, WR14, WR15
PTFE/FKM								-	15.0	W13, WR14, WR15



## Symmetrical seals

Material	Temperature [°C]							Pres- sure bars	Sliding speed m/sec	Profiles
	-300	-200	-100	0	+100	+200	+300			
NBR								160	0.5	PRS06, PRS06A, PRS06B, PRS06C, PRS06E
NBR/POM								160	0.5	PRS22
NBR/POM								250	0.5	PRS13_15, PRS10_14
PUR/NBR								400	0.5	PRS07, PRS18
PUR								400	0.5	PRS06, PRS06A, PRS06B, PRS06C, PRS06E
PUR/POM								400	0.5	PRS22
PUR/POM								500	0.5	PRS13_15, PRS10-14
FKM/PTFE-glass fibers								160	0.5	PRS22
FKM/PTFE-glass fibers								250	0.5	PRS13_15, PRS10-14
PTFE-glass fibers/1.4310								150	2.0	PRS19B, PRS19D



See overview of materials for exact temperature specifications.

## Overview of materials

Material designation	Chemical designation	Color	Operating temperature °C	Hardness Shore A	Compliance certification	Resistant against											Sealing element				
						FDA	Mineral oils	Acidic oils and gases	Amines	Compressed air	Water and steam	Hydrolysis	High temperatures	Diluted acids and alkalis	Aggressive media	U-rings	Wiper/scrapper rings	Backup rings	Guide rings with pretensioning	Spring-loaded sealing element	Backup and guide elements
<b>Elastomers</b>																					
PUR	Polyurethane	blue	-30 to +90	D 57 ±2	x				x	x							x	x			
NBR	Acrylonitrile-butadiene rubber	white	-22 to +100	A 85 ±3	x	x			x	x							x	x			
NBR	Acrylonitrile-butadiene rubber	black	-25 to +100	A 85 ±5		x			x	x							x	x			
NBR	Acrylonitrile-butadiene rubber	black	-25 to +100	A 95 ±5		x			x	x							x	x			
PUR	Polyurethane	white	-30 to +100	A 95 ±2	x					x							x	x			
EPDM ①	Ethylene-propylene-diene rubber	white	-50 to +100	A 85 ±3	x					x			x				x	x			
PUR	Polyurethane	red	-30 to +105	A 95 ±2		x			x	x							x	x			
PUR	Polyurethane	green	-30 to +105	A 95 ±2		x			x	x							x	x			
PUR	Polyurethane	blue	-30 to +105	A 95 ±2	x	x			x	x							x	x			
PUR ②	Polyurethane	gray	-30 to +105	A 95 ±2		x			x	x							x	x			
EPDM ①	Ethylene-propylene-diene rubber	black	-50 to +130	A 85 ±5						x			x				x	x			
H-NBR ③	Acrylonitrile-butadiene rubber	black	-25 to +150	A 85 ±5		x			x				x				x	x			
FKM	Fluorinated elastomer	brown	-20 to +210	A 85 ±5									x				x	x			
FKM	Fluorinated elastomer	brown	-20 to +210	A 85 ±5	x								x				x	x			
FKM	Fluorinated elastomer	black	-25 to +210	A 85 ±5									x				x	x			
<b>Thermoplastics</b>																					
POM	Polyoxymethylene	white	-60 to +100																x		
PA	Polyamide	natural	-30 to +105																	x	
Silicone ④	Polyorganosiloxane	blue	-55 to +180	A 85 ±3	x																
Aflas ⑤	-	black	-15 to +180	A 85 ±5					x	x			x				x	x			
Silicone ④	Polyorganosiloxane	red	-55 to +210	A 85 ±5	x																
Pure PTFE ⑥	Polytetrafluorethylene	white	-200 to +260	D 51-60															x	x	x
PTFE/glass fibers ⑥	Polytetrafluorethylene	gray	-200 to +260	D 55-64															x	x	x
PTFE/bronze	Polytetrafluorethylene	bronze	-200 to +260	D 62-67															x	x	x
PTFE/carbon	Polytetrafluorethylene	black	-200 to +260	D 62-67															x	x	x
PTFE	Polytetrafluorethylene	turquoise	-200 to +260	D 59															x	x	x
PTFE/Ekonol ⑦	Polytetrafluorethylene	beige	-200 to +260	D 53-66																	x

① not resistant to mineral oils

② MoS<sub>2</sub>

③ hydrogenated

④ only limited suitability for dynamic applications

⑤ good electrical insulation properties

⑥ low friction, suitable for contact with food, excellent chemical resistance

⑦ Ekonol for the food- and beverage-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



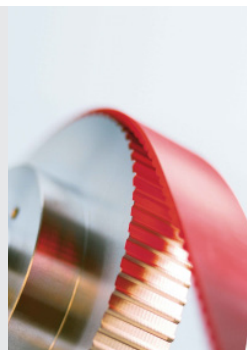
APSOplast®  
Engineering Plastics  
Technology



APSOseal®  
Sealing  
Technology



APSOfluid®  
Fluid Handling  
Technology



APSOdrive®  
Drive  
Technology



APSOvib®  
Antivibration  
Technology

#### Switzerland

Angst + Pfister AG  
Thurgauerstrasse 66, Postfach, CH-8052 Zürich  
Phone +41 (0)44 306 61 11  
[www.angst-pfister.com](http://www.angst-pfister.com), [ch@angst-pfister.com](mailto: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](http://www.angst-pfister.com), [ch@angst-pfister.com](mailto: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](http://www.angst-pfister.com), [de@angst-pfister.com](mailto: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](http://www.angst-pfister.com), [fr@angst-pfister.com](mailto: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](http://www.angst-pfister.com), [at@angst-pfister.com](mailto: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](http://www.angst-pfister.com), [it@angst-pfister.com](mailto: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](http://www.angst-pfister.com), [nl@angst-pfister.com](mailto: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](http://www.angst-pfister.com), [be@angst-pfister.com](mailto: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](http://www.angst-pfister.com), [cn@angst-pfister.com](mailto: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](http://www.angst-pfister.com/ats), [ats@angst-pfister.com](mailto: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](http://www.angst-pfister.com), [pl@angst-pfister.com](mailto:pl@angst-pfister.com)



**APSOparts®**

the Online Shop of Angst + Pfister  
[www.apsoparts.com](http://www.apsoparts.com)