



PERTEC®

High-Performance Sealing
Materials for Coffee Machines



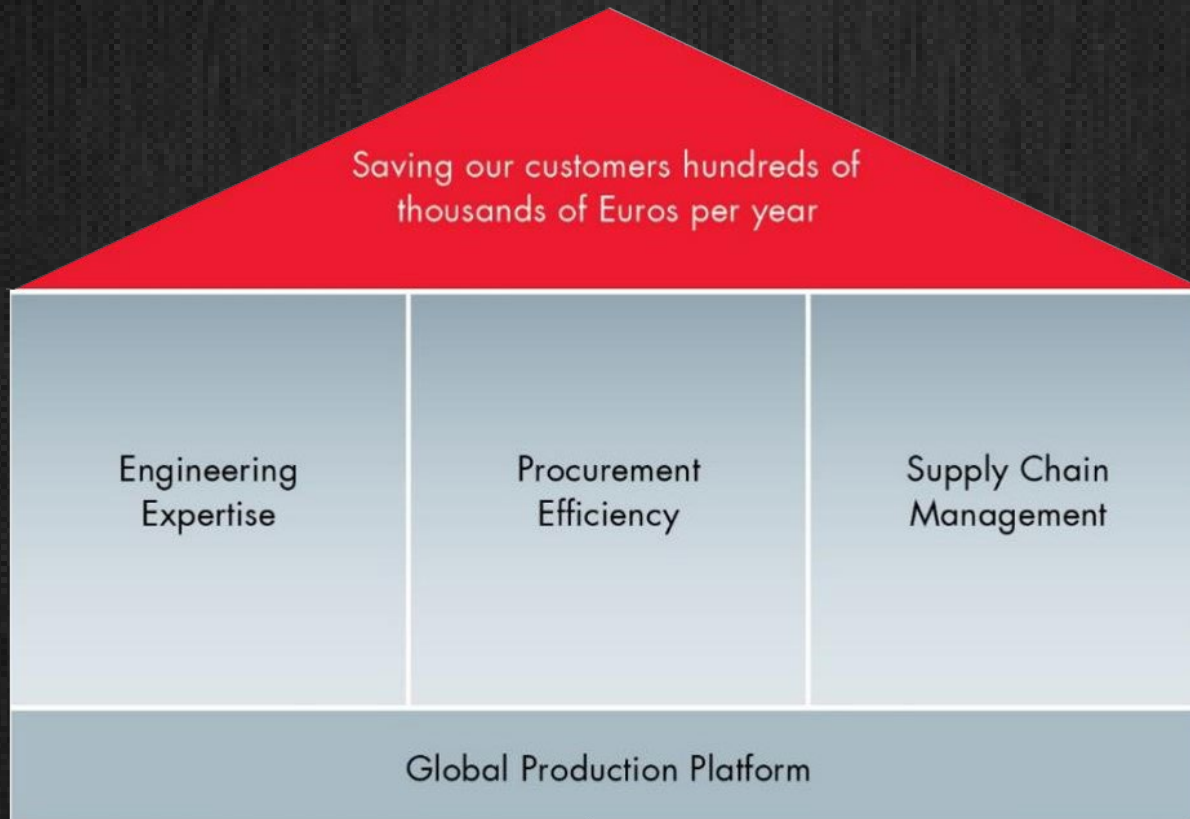
“Coffee is a lot more than just a drink; it’s something happening. Not as in hip, but like an event, a place to be, but not like a location, but like somewhere within yourself. It gives you time, but not actual hours or minutes, but a chance to be, like be yourself, and have a second cup.”

- Gertrude Stein

Introduction of Angst+Pfister

- Since its founding in 1920, the Angst+Pfister Group has grown from a small Swiss-based company into a globally operating enterprise.
- Being an engineering-led solutions provider with deep application knowledge across a variety of industries
- Offering identical products, price and quality across the globe
- Enhancing supply chain efficiency and global sourcing
- Providing three primary sales channels: Direct sales, certified partners and APSOparts® online shop

Core Competencies



Value Chain



Engineering Services

- Virtual design
- TCO studies
- Define norms & specifications

Fast Prototyping

- Customizations
- Pre-series tests
- Complete quality certificates

Global Production Platform

- Top producers, high flexibility
- Best price/quality countries

Supply Chain Management

- OTD reporting
- JIT/Kanban
- Frame contracts/rolling planning

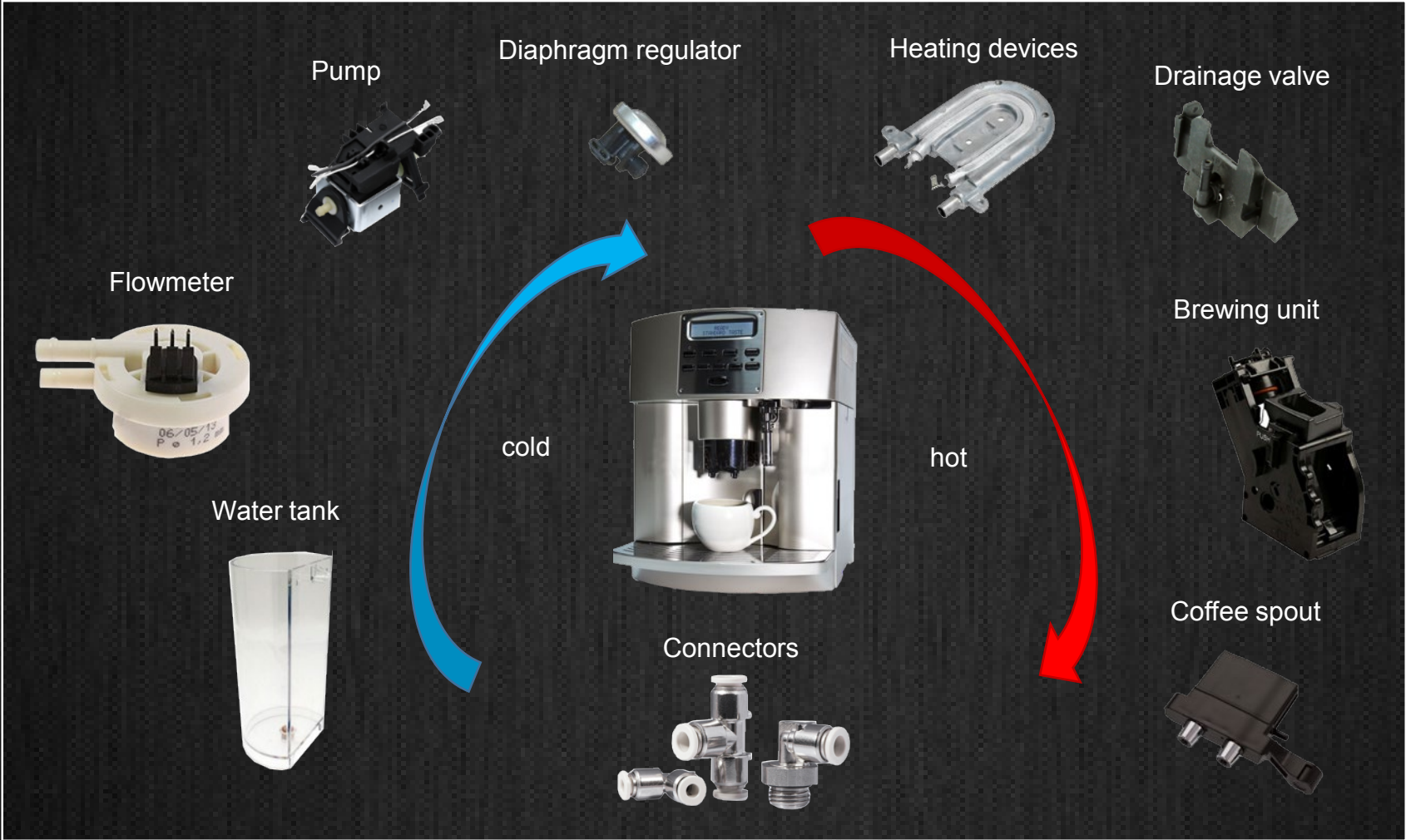
After Market Service

- Global support
- Spare parts
- Field service engineers

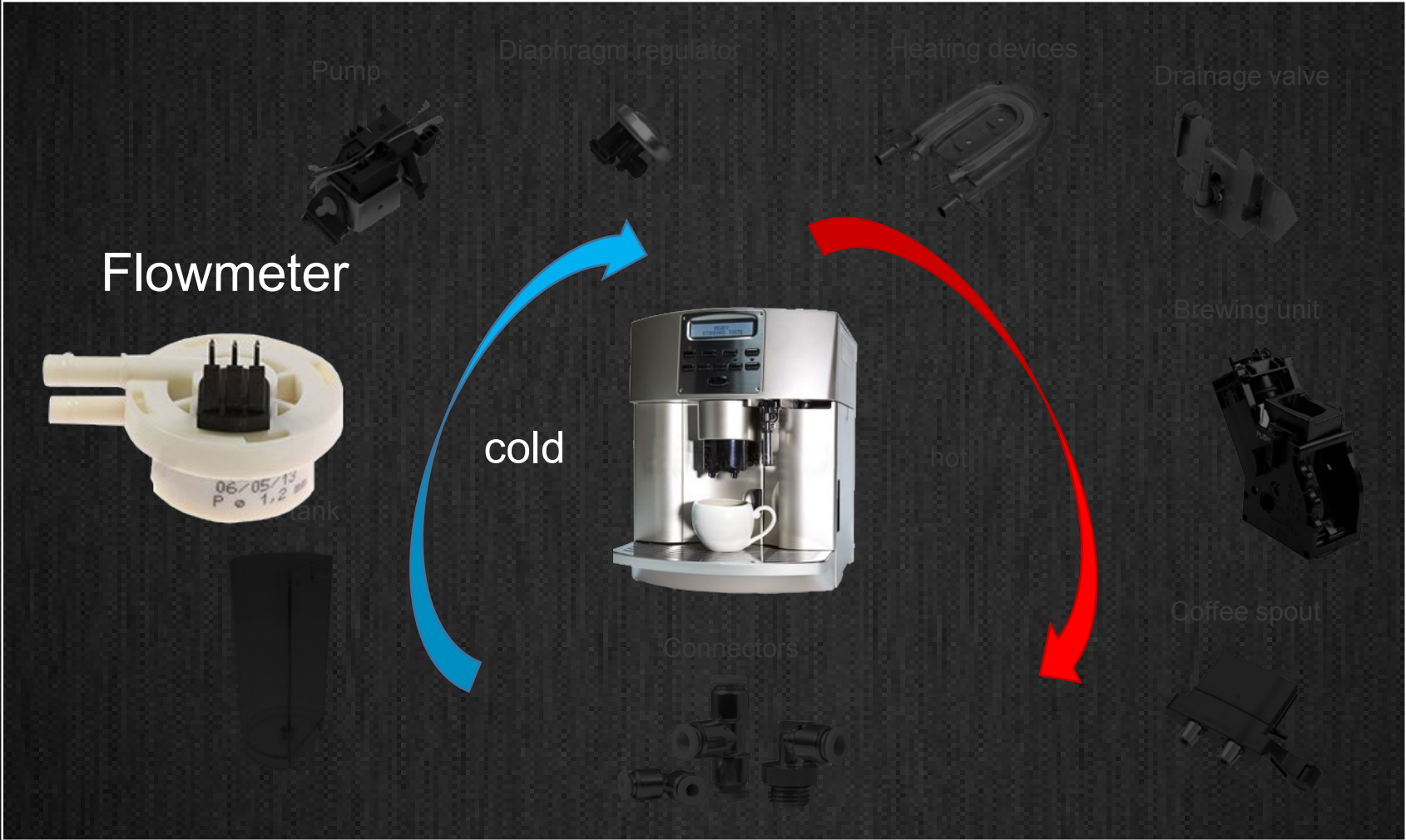
Success Stories of PERTEC® Sealing Materials for Coffee Machines



APSOseal® components for coffee machines

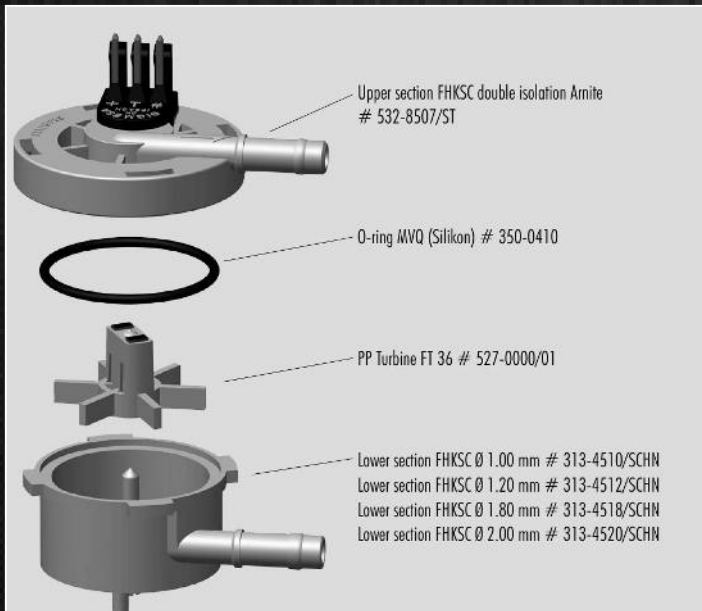


APSOseal® components for coffee machines



APSOseal[®] components for coffee machines

Flow sensors are a critical part as they measure the quantity of water for a cup of coffee, which varies according to the type of coffee being prepared.



The O-ring has to perfectly seal the two plastic parts in an open groove.

The media is cold water with very low pressure.

Angst+Pfister Success Story: A Multi-Dimensional Approach

1) Product Dimension

O-Ring in **PERTEC**® UP VMQ 70.501-01

Fulfills approvals from the drinking water, food & beverage industry including PAH class 1.



2) Special Packaging

The O-Rings is specially packaged in air filled bags to prevent **deformation** during transportation.



3) Added services – micro talc layer

Micro talc prevents the O-Rings from sticking together and allows them to slide properly through the assembly line.



Customer Benefits

ONE SOLUTION which fulfills all needed food and drinking water approvals even the Chinese GB 4806.11. So the customer can sell the same product all over the world, **instead of having specific versions for the specific homologations / countries.**



ELIMINATION OF ONE PROCESS = COST SAVINGS

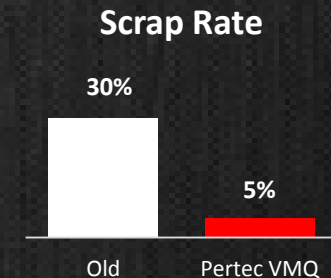
Micro talc powdering done by Angst+Pfister. Previously, the customer had to do this himself, which now saves him further costs.



MINIMAL SCRAP RATE = SAVING ON TWO HEAD COUNTS FOR MANUAL CONTROLS

Scrap rate on the assembly line **reduced from 20-30% to less than 5%.**

Because of the very low scrap rate on the assembly line, they need just one person for two assembly lines instead of one person per assembly line. As they have four assembly lines they can save two head counts.



Angst+Pfister Recommended Materials

1. Choice

PERTEC[®] UP VMQ 70.501-01

- Fulfill PAH class 1 which is not possible with EPDM
- Fulfill almost all food regulations all over the world
- Good mechanical properties
- Best price performance ratio

Alternatives

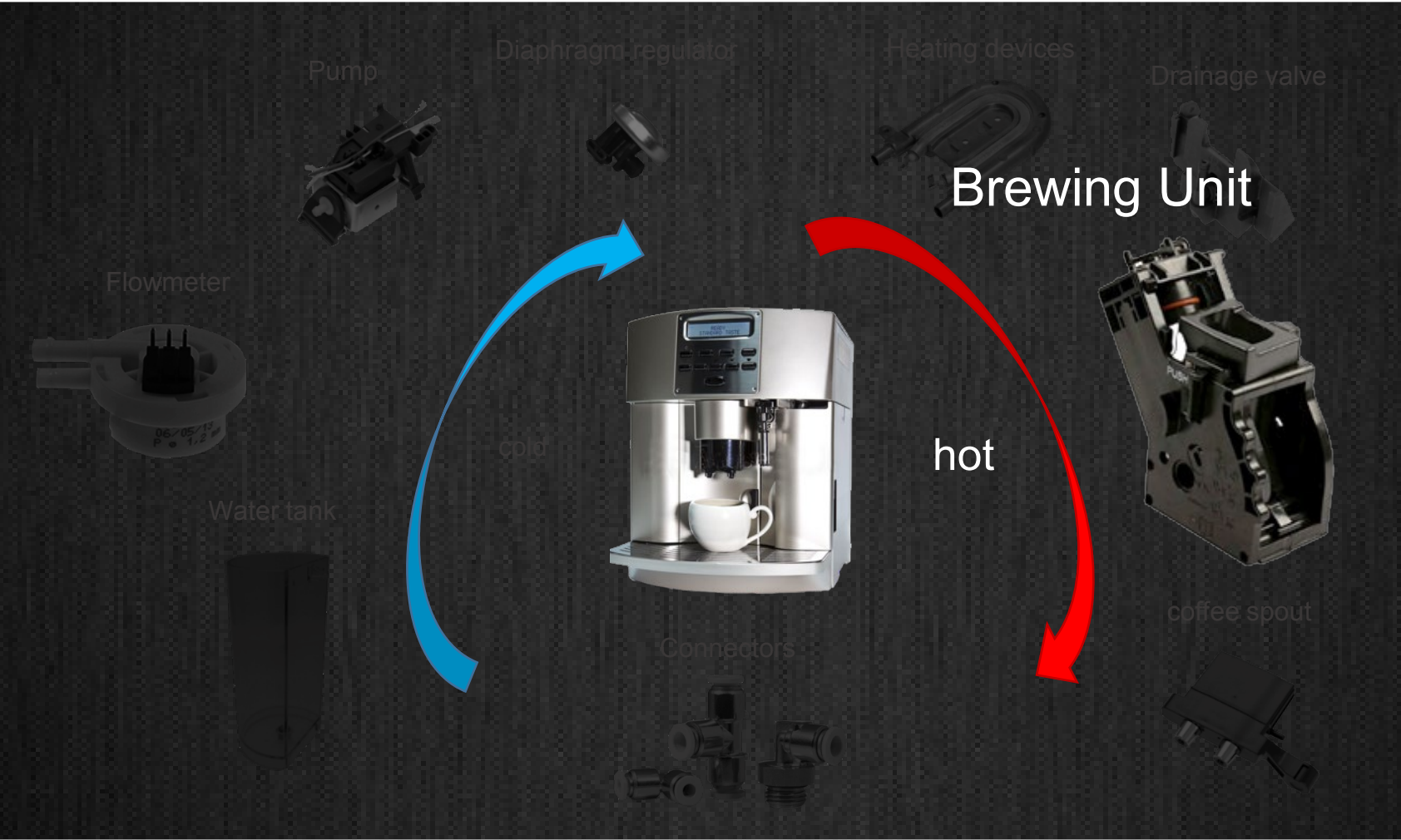
HITEC[®] EPDM 70.10-02

- Fulfill only PAH class 3
- Fulfill most food regulations all over the world
- Good mechanical properties
- Equal price level like **PERTEC**[®] UP VMQ

HITEC[®] NBR 70.10-02

- Fulfill only PAH class 2
- Fulfill some food regulations
- Good mechanical properties
- Equal price level as **PERTEC**[®] UP VMQ

APSOseal® components for coffee machines



Application Description

The Brewing Unit is the heart of the coffee machine. This is the place where plain water is transformed into the perfect blend of body, aroma and flavor that distinguishes good coffee. The process takes place as the water is pressed through the coffee powder.



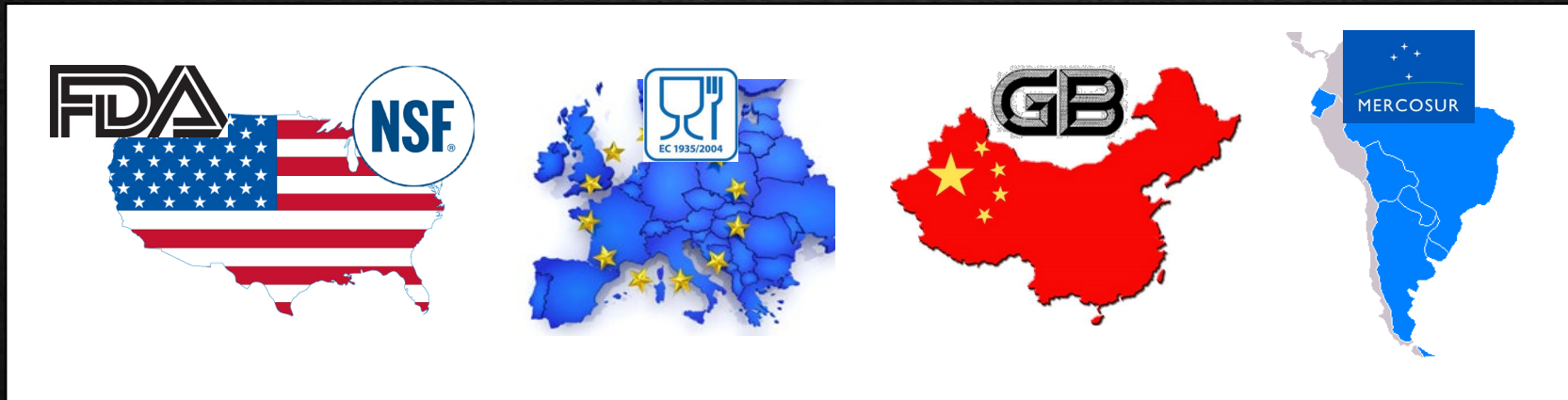
The O-ring has to **perfectly seal the piston by a stroke movement with low friction and long life cycle.**

The media is hot water and coffee with a pressure of around 20 bar.

Customer Challenge – Main Drivers

REGULATORY: one sealing homologated for all markets

- Leading producers of industrial coffee machines sell their machines all over the world and for this reasons they need all food approvals.
- Needed approvals from the drinking water, food & beverage industry including PAH class 1: FDA, NSF 51, EC 1935, GB 4806.11 and GMC 28/99



Customer Challenge – Main Drivers

TECHNICAL: Increase useful life up to 40'000 cycles

- The **sealing element is the core piece in the brewing unit** because of the dynamic use by abrasive coffee powder and hot water. If the sealing element does not work perfectly, coffee will be of a markedly inferior quality – or there will be no coffee at all.
- With standard O-rings a **guarantee of 10'000 cycles is given** and then the O-Ring must be replaced – **high cost of maintenance**. In the picture below you see the totally destroyed VMQ O-Ring after 10'000 cycles.

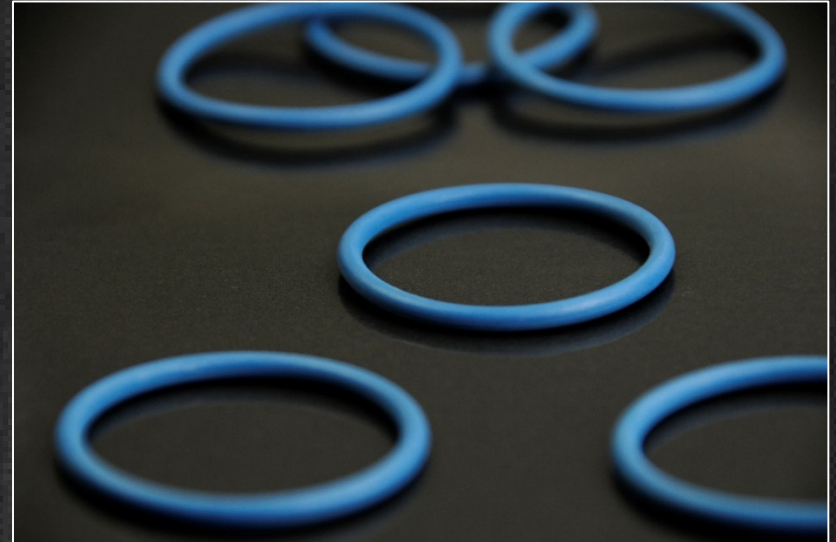


Angst+Pfister Success Story: The Perfect Material

Product Dimension

O-Ring in **PERTEC®** CIP FKM 75.501-04 because of:

- fulfilling **approvals** for **food & beverage** industry including PAH class 1
- the good mechanical properties
- very good hot water and steam resistance
- low friction coefficient for the dynamic application
- **long life cycle >40'000 coffees**



Allows the brewing unit to deliver the perfect blend of aroma, body and flavor every time... during 40.000 cycles

Angst+Pfister Recommended Materials

1. Choice

PERTEC® CIP FKM 75.501-04

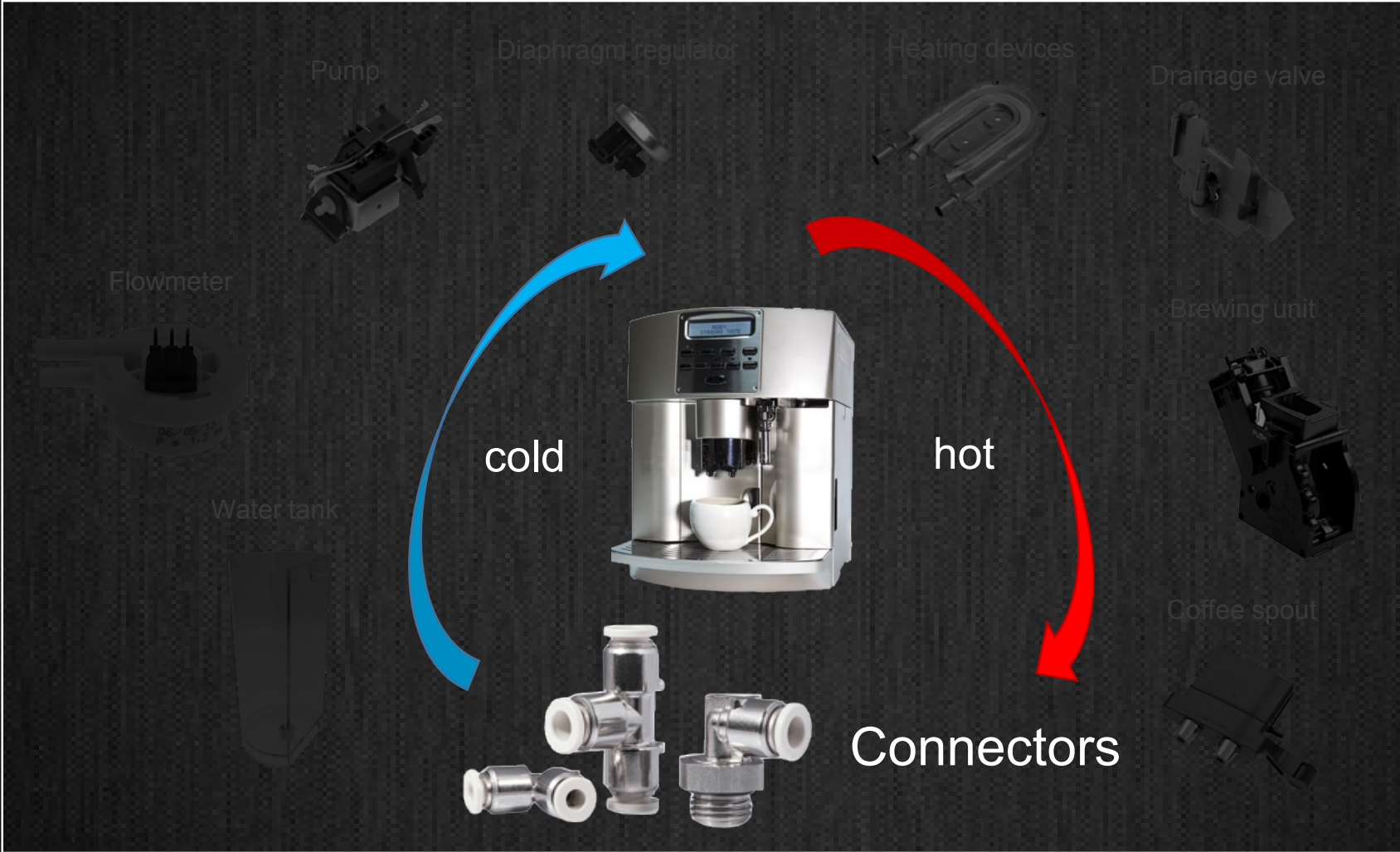
- Fulfill PAH class 1
- Fulfill all food regulations all over the world
- Low friction due to “nanoPTFE”
- Long life cycle
- Good mechanical properties
- Good chemical resistance

Alternative

PERTEC® UP VMQ 70.501-01

- Fulfill PAH class 1
- Fulfill almost all food regulations all over the world
- Good mechanical properties but not as good as CIP FKM
- Good chemical resistance but not as good as CIP FKM
- Best price performance ratio

APSOseal® components for coffee machines



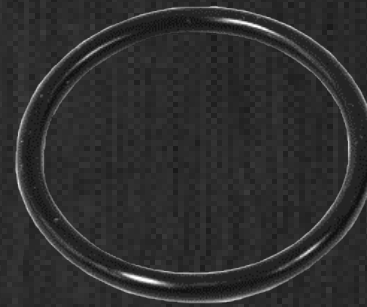
Application description

The customer is a **producer of connectors and valves for different industries as well as for coffee machines.**

As they supply to many different industries like:

- Food and Packaging machines
- Food processing industries
- Industrial Coffee machines
- Chemical industry
- Fluid technology and pneumatic
- Laser technology
- Measure and inspection industry

They are looking for one material that is covering all requirements for the different industries, like chemical resistance, steam resistance, temperature resistance and approvals for food.



The O-ring is used as a static sealing elements in cold and hot water with pressure up to 20 bars.

Customer Challenge – Main Drivers

REGULATORY: one sealing homologated for all markets

- Customer is a producer of connectors and valves for different industries as well as for coffee machines.
- They have to find a new material for millions of O-rings per year.
- Needed approvals from the drinking water, food & beverage industry including PAH class 1:
FDA, NSF 51, EC 1935, GB 4806.11 and GMC 28/99



Customer Challenge – Main Drivers

TECHNICAL: 1 material for 1'000 applications

- Today they use the same O-Ring in NBR, HNBR, EPDM, VMQ and FKM. This generates a lot of additional costs in logistics, handling, billing of materials and partially low quantities.
- With the new material they can easily handle all requests concerning the supply of connectors and valves with just 1 material nonchalantly, as this material has broad chemical and steam resistance, high temperature resistance and fulfills most of the food regulations.

Pharma



Chemical



Food & Beverage



Medical



Drinking water

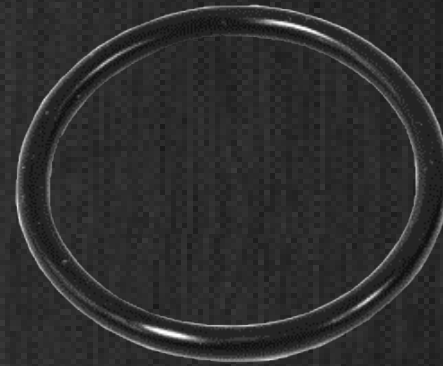


Angst+Pfister solution:

Product Dimension

O-Ring in **PERTEC**® UP FKM 70.501-07 because of:

- the needed **approvals** for **food & beverage** industry including PAH class 1
- the good mechanical properties
- very good hot water and steam resistance
- broad chemical resistance



Angst+Pfister recommended materials

1. Choice

PERTEC® UP FKM 70.501-07

- Fulfill PAH class 1
- Fulfill almost all food regulations all over the world
- High temperature resistance
- Good mechanical properties
- Broad chemical resistance
- Good hot water and steam resistance

Alternative

None or 5 different materials regarding each application

Overview of Angst+Pfister Elastomer Compounds for Coffee Machines

PERTEC® Elastomer Compounds – high performance and the best choice for demanding new solutions

Performance	Material	Properties	Approvals *
Highest purity under extreme conditions	PERTEC® UP FKM 70.501-07 Fluorine elastomer, peroxide cross-linked approx. 70 Shore A, black	<ul style="list-style-type: none"> compliant with a wide range of approvals very good chemical resistance high temperature resistance up to +200°C 	ADI free, BfR, EC 1935, FDA, GB 4806.11, LFGB, NSF 51 PAH Class 1, SR, UBA, W270
Elasticity for highest stress requirements	PERTEC® UP VMQ 70.501-01 Silicone elastomer, peroxide cross-linked approx. 70 Shore A, transparent	<ul style="list-style-type: none"> compliant with a wide range of approvals very good chemical resistance large temperature range of -60°C – +200°C 	3-A, ADI free, BfR, DVGW EN549, EC 1935, FDA, French Arrete, GB 4806.11, GMC, KTW, LFGB, NSF 51, PAH Class 1, SR, USP Class VI, W270
Highest chemical resistance for CIP/SIP and low friction	PERTEC® CIP FKM 75.501-04 Fluorine elastomer, peroxide cross-linked approx. 75 Shore A, blue	<ul style="list-style-type: none"> suitable for many «Cleaning in Place» (CIP) and «Sterilization in Place» (SIP) applications temperature resistance up to +200°C broad chemical resistance 	3-A, BfR, EC 1935, FDA, GB 4806.11, LFGB, NSF 51, PAH Class 1, SR, USP Class VI

HITEC® Elastomer Compounds – readily available as part of our standard assortment

Our standard for high requirements	HITEC® VMQ 70.10-01 Silicone elastomer, peroxide cross-linked approx. 70 Shore A, red-brown	<ul style="list-style-type: none"> broad chemical resistance high temperature range from -50°C – +200°C O-rings in many sizes available from stock 	ADI free, DVGW EN549 + VP406, EC 1935, FDA, GB 4806.11
With more than 20 approvals for many applications and available as standard	HITEC® EPDM 70.10-02 EPDM elastomer, peroxide cross-linked approx. 75 Shore A, black	<ul style="list-style-type: none"> suitable for many CIP/SIP applications specially for food and drinking water applications many approvals O-rings in many sizes available from stock 	3-A, ACS, ADI free, AS/NZS, BfR, DVGW EN681 + W270 + W534, EC 1935, FDA, GB 4806.11, KIWA, NSF 51 + 61, ÖNORM, UBA, USP Class VI, WRAS
Good price-performance ratio with many approvals by low requirements	HITEC® NBR 70.10-02 NBR elastomer, sulphur cross-linked approx. 75 Shore A, black	<ul style="list-style-type: none"> very good resistance against oil and grease many approvals suitable for food and drinking water applications O-rings in many sizes available from stock 	ACS, ADI free, CLP, DVGW EN549 + VP406 + W270, EC 1935, FDA, NSF 61, ÖNORM, UBA, WRAS

* For more details please request the technical data sheet of our compounds.

Angst+Pfister is also a Supplier for other Coffee Machine Components



APSOseal®
Sealing Technology



APSOdrive®
Drive Technology



APSOvib®
Antivibration Technology



APSOplast®
Engineering Plastics
Technology



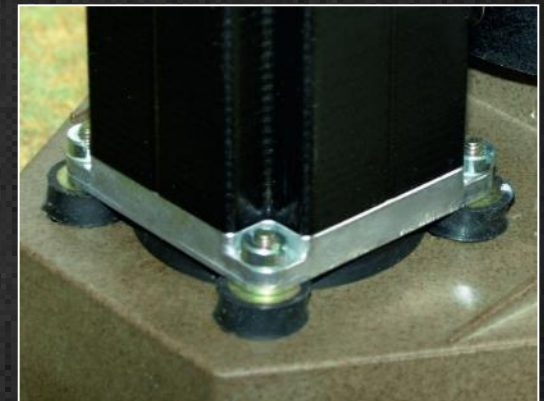
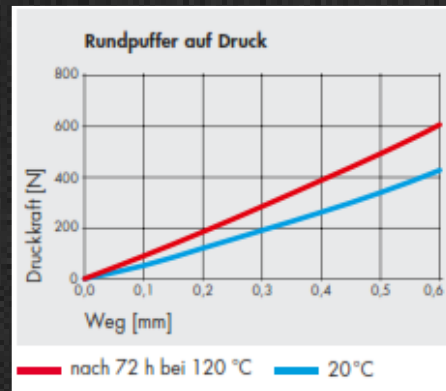
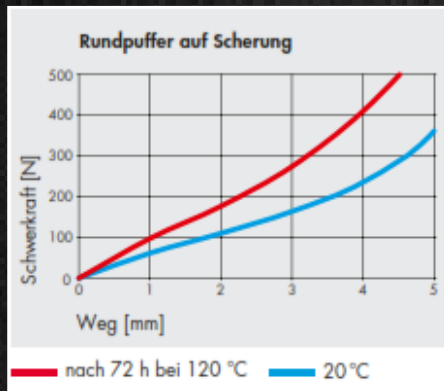
APSOfluid®
Fluid Handling Technology

- Over 100'000 standard items in stock with highest availability
- Over 200'000 custom made components for our international customers centrally managed

Customer: Coffee machine manufacturer

Reference: APSOvib® Antivibration Technology

Untroubled coffee pleasure thanks to buffers



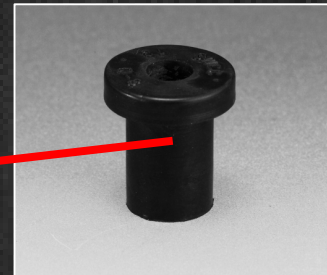
Cylindrical buffer - customized product

- **Challenge:** High temperature demands and chemical influences within the coffee machine; special weight and vibration conditions.
- **Solution by Angst+Pfister:** APSOvib® buffers on the basis of EPDM and CR. Exact and customized adjustment of the buffers and identification of the ideal spring characteristics.
- **Added value for customer:** Quality control, effectiveness of the buffers is tested in specifically developed testing procedures.

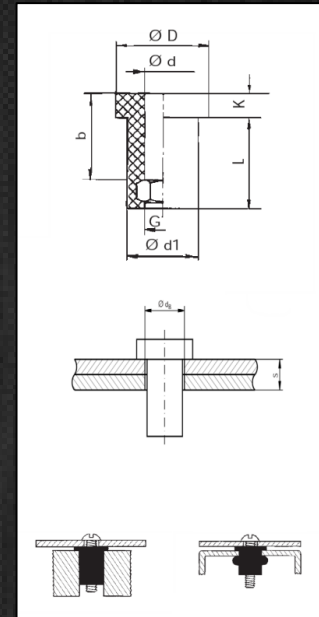
Customer: Assembly and insulation of coffee machines

Reference: APSOvib® Antivibration Technology

Assembly and insulation of coffee machines



Fixation of the milk pump

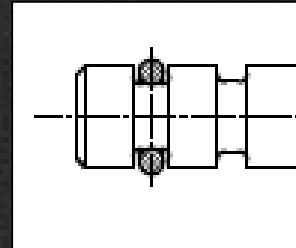
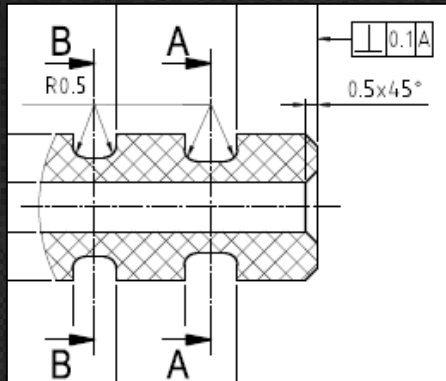


- **Challenge:** A single element that combines sound insulation together with simple and safe assembly.
- **Solution of Angst+Pfister:** APSOvib® FLEX-LOC, can be installed simply and securely with just one screw.
- **Added Value for customer:** Simple and safe assembly, standard item, availability, good price to performance ratio.

Customer: Leading coffee machines manufacturer

Reference: APSOfuid® Fluid Handling Technology

FDA compliant PTFE hose (and O-rings)



- **Challenge:** Close tolerances, high quality requirements, constant deliveries on time, organisation of supply chain (manufacturer of PTFE hose, machining, assembling with O-rings).
- **Solution by Angst+Pfister:** APSOfuid® machined FLEXILON (PTFE) Hose, assembled with APSOseal® O-rings.
- **Added value for customer:** Cost and supplier reduction – one supplier for finished part, supply chain competences.

Customer: Leading coffee machines manufacturer

Reference: APSOfuid® Fluid Handling Technology

FDA compliant PTFE hose

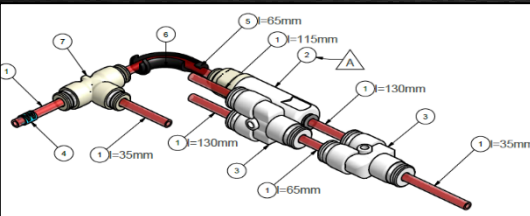


- **Challenge:** A partner for all needs regarding plastic tubes, molded tubes and hoses conforming to the newest EG guidelines 10/2011, out- and inside-Ø calibrated plastic tubes.
- **Solution by Angst+Pfister:** Evaluation of future-oriented base materials for the production of plastic tubes, with production in process monitored manufacturing plant.
- **Added value for customer:** Competitive advantage thanks to material certificates (FDA, EG 10/2011), reduction of assembly time due to 100% dimensional accuracy.

Customer: Leading coffee machines manufacturer

Reference: APSOfuid® Fluid Handling Technology

FLEXILON® PFA tube

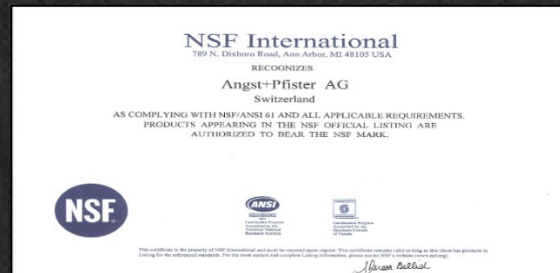


- **Challenge:** Improve resistance temperature and pressure, fulfill new market conformities.
- **Solution of Angst+Pfister:** FLEXILON® PFA tube (conform according FDA, EC regulation 10/2011), supply of complete assemblies .
- **Added Value for customer:** Very economical, high quality product.

Customer: Manufacturer of coffee machines

Reference: APSOplast® Engineering Plastics Technology

PTFE N100 : NSF / ANSI 61



- **Challenge:** Supply PTFE with special approval.
- **Solution of Angst+Pfister:** Customized solution with NSF certified APSOplast® PTFE N100.
- **Added Value for customer:** Delivery of product which fulfills high requirements.

Norms and Regulations

3-A Sanitary Standard Number 18-03 Class I

ADI free

BfR XV (Silicone)

D.M. 21/03/1973

DPR 777/82

DVGW EN 549 D2/H3

DVGW W 270

EC 1935/2004 article 3

FDA - CFR 21 - 177.2600 food a) - f)

French Arrete 25.11.92 No 293

GB 4806.1-2016

GB 9685-2016

GB 4806.11-2016

GMC/RES. N° 28/99

KIWA NSF/ANSI 51 formulation

KTW Guideline cold water (23 °C) and hot water (85 °C)

LFGB § 30/31

PAH Category 1 (AfPS GS 2014:01)

PAHs requirements according Regulation (EU) No 1272/2013

Phthalate free

SR 817.023.21

USP Class VI Ch. <87> (in vitro) and Ch. <88> (in vivo) 121°C



Providing Customer Support around the World

Switzerland

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

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

France

Angst + Pfister SAS
Immeuble Deltaparc
93 Avenue des Nations
ZAC Paris Nord II
FR-93420 Villepinte
Phone +33 (0)1 48 63 20 80
fr@angst-pfister.com

Germany

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

Italy

Angst + Pfister S.p.A.
Via Montefeltro 4
IT-20156 Milano
Phone +39 02 300871
it@angst-pfister.com

Netherlands

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

Belgium

Angst + Pfister N.V. S.A.
Bedrijvent centrum Waasland,
Industriepark-West 75
BE-9100 Sint-Niklaas
Phone +32 (0)3 778 0128
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
cn@angst-pfister.com

Turkey

Angst Pfister Advanced Technical Solutions A.Ş.
Akçalar Sanayi Bölgesi Kale Cd., No: 10
TR-16225 Nilüfer/Bursa
Telefon +90 224 280 69 00
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
pl@angst-pfister.com