SÜDMO

SEAL TECHNOLOGY
THE P³ DIAPHRAGM

SÜDMO'S ADVANCED ASEPTIC SEAL TECHNOLOGY
THE P³ DIAPHRAGM

Südmo sets the industry standard with its P³ diaphragm seal material for use in a wide range of aseptic valves.

The P³ diaphragm's shape along with the material properties provide outstanding performance in terms of chemical and temperature resistance, as well as pressure and load cycle resilience compared to other options on the market, including metal bellows. The P³ diaphragm provides many advantages in various process areas and aseptic applications.

- **Extremely good chemical resistance**
- **Temperature resistance up to 150 °C (302 °F)**
- **Dynamic working pressure up to 10 bar (145 psi)**
- **High number of cycles > 300,000**

Already standard in the pharmaceutical industry, the use of aseptic production and packaging is growing rapidly in the beverage, food and dairy industries. Consumer trends toward natural chemical-free products, extended shelf life (ESL) options, and unique packaging that requires cold filling challenges production plants to process microbiological sensitive products.

Due to product liability processors must protect consumers from the risk of health-damaging germs and bacteria. This increases the procedural and economic optimization requirements that are imposed by the manufacturers on the suppliers of the respective components.

Challenges incude automated Cleaning in Place/Sterilization in Place (CIP/SIP), minimized cleaning times and cost-effective, simple and fast maintenance.

UTILIZATION OF THE P³ DIAPHRAGM

The P³ diaphragm is applied in the Südmo SVP Select Single Seat Valve series and the Aseptic Mix Proof Secure Valves.

In both valve types the advanced seal technology supports all performance areas of the proven Südmo valve technology, including Südmo's minimized maintenance requirements and easy service handling.

SVP Select Single Seat Valve Series

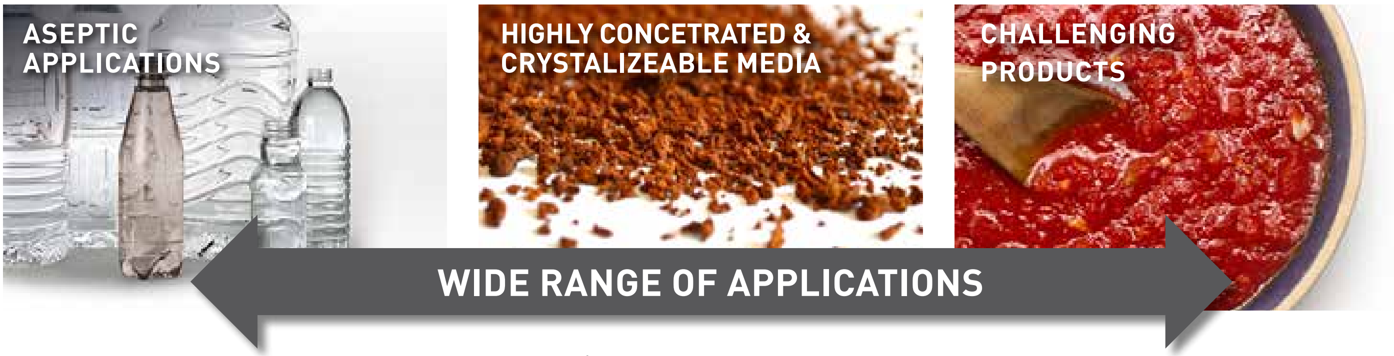
Aseptic Mix Proof Valve Secure

INSTALLATION AND PRINCIPLE OF OPERATION

Valve Position: CLOSED

Valve Position: OPEN

OPERATING RANGE AND FIELD OF APPLICATION



- Pasteurized area of dairies
- Cold aseptic filling (CAF)
- Pharmaceutical and biochemical facilities

- Lactose/milk sugar
- Instant coffee
- Abrasive media

- Low-acid products, fruit and vegetable purees and concentrates
- Fruit and confectionery bases, sauces, yogurt, cottage cheese; with / or diced fruit (peach, apricot, strawberry, pear, apple, tropical fruit)
- Diced tomatoes / tomato paste

MARKET REQUIREMENTS - GROWING NEED FOR ASEPTIC VALVES AND PRODUCTION

- Increase product life and maximize product shelf-life

- Sterile products
- Microbiological durability

- Increase and stabilize product quality
- Avoid use of chemical preservatives
- Unflavored products

- Enable cold aseptic filling
- No subsequent sterilization of the package required

- Protect against production rejects and product recalls

COMPARISON OF P³ DIAPHRAGM VS. BELLOW TECHNOLOGY

ADVANTAGES OF P³ DIAPHRAGM TECHNOLOGY	LIMITATIONS OF BELLOWS
Flow from the side is possible and due to the form as a result the diaphragm have a very good flow characteristic. This characterisitc creates less turbulence and flow turbulence.	Undesirable flow conditions against the side produces a bad CV value and is not suitable for large chunky products. In addition there is a risk for a distortion of the bellow's corrugation resulting in failure of the bellows.
Excellent cleaning ability due to the membrane and body design.	**Poor cleaning ability** between the bellows corrugations and the dome leads to long cleaning times or uncleanable bellows.
Less sensitive to dynamic pressure shocks as the diaphragm is supported from behind. The unsupported space behind the diaphragm is minimized.	**Sensitive to pressure shocks** caused by the very large unpressurized space inside the metal bellows. Pressure shocks can cause the bellows to experience premature failure which compromises th valve function.
High number of load cycles provide a longer service life in the production area. Suitable for longer strokes to realize a maximized free cross section (gap) for bulky products e.g. pieces of fruit **without leading to a larger dome**.	**Low stroke movement and load changes** are due to design. With a required enlargement of the stroke the bellows have to be longer. More bellows corrugations lead to a **larger dome** inside and weakens the bellow itself.
Cost-effective, because only the diaphragm is replaced. Due to the design, Südmo valves are quick and easy to repair and maintain.	**High spare parts costs.** When replacement is necessary high-quality stainless steel parts, such as the valve seat or the upper socket, are disposed.
Unimpeded secure and easy leakage detection.	**Double-walled bellows will not provide secure leakage management.** There is a **risk of contamination** between the layers of the metal bellows.

The term aseptic, when applied to valve design, generally means to eliminate atmospheric contact with the product as made possible with a standard hygienic valve. Depending on system design and valve type, processors have become accustomed to performing maintenance at intervals as frequently as once a week to a maximum of about three months. This is in large part due to three variables - temperature, chemicals and pressure shocks. Metal bellows have traditionally been a standard option for aseptic valves. Made from either stainless steel with elastomer seat, or entirety Teflon®, bellows have many limitations.

TECHNICAL ADVANTAGES OF THE P³ DIAPHRAGM

DESIGN

- Very good flow CV's
- Easy cleaning
- Suitable for the use with large particulates (fruits, nuts)
- Dome free housing design
- Leak detection

RESISTANCE

- Extremely good chemical resistance
- Temperature stable material
- High temperature resistance

EXTREMELY GOOD CHEMICAL RESISTANCE
TEMPERATURE RESISTANCE UP TO 150 °C (302 °F)
DYNAMIC WORKING PRESSURE UP TO 10 BAR (145 PSI)
HIGH NUMBER OF CYCLES > 300,000

MATERIAL

- Homogeneous material
- No elastomer
- Plastic like PTFE (polytetrafluoroethylene)
- No cold flow
- Elasticity, elastic recovery
- Low adhesive coefficient

DURABILITY

- Good mechanical material properties
- Good dynamic and static pressure stability
- High number of switching cycles and load cycles

COMMERCIAL BENEFITS OF THE P³ DIAPHRAGM

AREA	P³ DIAPHRAGM ADVANTAGE
Operation and Environment	Improved equipment efficiencies, better protection of downstream equipment, and minimized batch contamination due to the more reliable diaphragm. Shorter and easier cleaning cycles reduce the overall demand for media (water, caustic / acid concentrates).
Maintenance Costs	A longer diaphragm service life increases process run time and reduces labor and documentation costs for membrane replacement.
Spare Parts	Only the P³ diaphragm is replaced, which reduces spare parts and inventory carrying costs.
Cost Savings	**Based on the service life over several years you will see significant cost savings, improved product conditions, and longer process run times.**

CHEMICAL RESISTANCE CHART

Abietic Acid	A
Acetaldehyde	A
Acetamide	A
Acetic Acid (Crude, Glacial, Pure)	A
Acetic Anhydride	A
Acetone	A
Acetonitrile	A
Acetophenone	A
2-Acetylaminofluorene	A
Acetylene	A
Acrolein	A[1]
Acrylamide	A[1]
Acrylic Acid	A[1]
Acrylic Anhydride	A
Acrylonitrile	A[1]
Air	A
Allyl Acetate	A
Allyl Chloride	A
Allyl Methacrylate	A
Aluminum Chloride	A
Aluminum Fluoride	A
Aluminum Hydroxide (Solid)	A
Aluminum Nitrate	A
Aluminum Sulfate	A
Alums	A
4-Aminodiphenyl	A
Ammonia, Gas, 150° F and below	A
Gas, Above 150° F	A
Liquid, Anhydrous	A
Ammonium Chloride	A
Ammonium Hydroxide	A
Ammonium Nitrate	A
Ammonium Phosphate, Monobasic	A
Dibasic	A
Tribasic	A
Ammonium Sulfate	A

Amyl Acetate	A
Amyl Alcohol	A
Aniline, Aniline Oil	A
Aniline Dyes	A
o-Anisidine	A
Aqua Regia	A
Aroclors	A
Asphalt	A
Aviation Gasoline	A
Barium Chloride	A
Barium Hydroxide	A
Barium Sulfide	A
Baygon	A
Beer10	A
Benzaldehyde	A
Benzene, Benzol	A
Benzidine	A
Benzoic Acid	A
Benzonitrile	A
Benzotrichloride	A
Benzoyl Chloride	A
Benzyl Alcohol	A
Benzyl Chloride	A
Biphenyl	A
Bis(2-chloroethyl)ether	A
Bis(chloromethyl)ether	A
Bis(2-ethylhexyl)phthalate	A
Black Sulfate Liquor	A
Blast Furnace Gas	A
Bleach (Sodium Hyprochlorite)	A
Boiler Feed Water	A
Borax	A
Boric Acid	A
Brine (Sodium Chloride)	A
Bromine	A
Bromine Trifluoride	C

Bromoform	A
Bromomethane	A
Butadiene	A[1]
Butane	A
2-Butanone	A
Butyl Acetate	A
Butyl Alcohol, Butanol	A
n-Butyl Amine	A
tert-Butyl Amine	A
Butyl Methacrylate	A[1]
Butyric Acid	A
Calcium Bisulfite	A
Calcium Chloride	A
Calcium Cyanamide	A
Calcium Hydroxide	A
Calcium Hypochlorite	A
Calcium Nitrate	A
Calflo AF	A
Calflo FG	A
Calflo HTF	A
Calflo LT	A
Cane Sugar Liquors	A
Caprolactam	A
Captan	A
Carbaryl	A
Carbolic Acid, Phenol	A
Carbon Dioxide, Dry	A
Wet	A
Carbon Disulfide	A
Carbon Monoxide	A
Carbon Tetrachloride	A
Carbonic Acid	A
Carbonyl Sulfide	A
Castor Oil	A
Catechol	A

Caustic Soda	A[11]
Cetane (Hexadecane)	A
China Wood Oil	A
Chloramben	A
Chlorazotic Acid (Aqua Regia)	A
Chlordane	A
Chlorinated Solvents, Dry	A
Wet	A
Chlorine, Dry	A
Wet	A
Chlorine Dioxide	A
Chlorine Trifluoride	C
Chloroacetic Acid	A
2-Chloroacetophenone	A
Chloroazotic Acid (Aqua Regia)	A
Chlorobenzene	A
Chlorobenzilate	A
Chloroethane	A
Chloroethylene	A
Chloroform	A
Chloromethyl Methyl Ether	A
Chloronitrous Acid (Aqua Regia)	A
Chloroprene	A
Chlorosulfonic Acid	A
Chrome Plating Solutions	A
Chromic Acid	A
Chromic Anhydride	A
Chromium Trioxide	A
Citric Acid	A
Coke Oven Gas	A
Copper Chloride	A
Copper Sulfate	A
Corn Oil10	A
Cotton Seed Oil10	A
Creosote	A
Cresols, Cresylic Acid	A

Crotonic Acid	A
Crude Oil	A
Cumene	A
Cyclohexane	A
Cyclohexanone	A
2,4-D, Salts and Esters	A
Detergent Solutions	A
Diazomethane	A
Dibenzofuran	A
Dibenzylether	A
1,2-Dibromo-3-chloropropane	A
Dibromoethane	A
Dibutyl Phthalate	A
Dibutyl Sebacate	A
o-Dichlorobenzene	A
1,4-Dichlorobenzene	A
3,3-Dichlorobenzidene	A
Dichloroethane (1,1 or 1,2)	A
1,1-Dichloroethylene	A[1]
Dichloroethyl Ether	A
Dichloromethane	A
1,2-Dichloropropane	A
1,3-Dichloropropene	A
Dichlorvos	A
Diesel Oil	A
Diethanolamine	A
N,N-Diethylaniline	A
Diethyl Carbonate	A
Diethyl Sulfate	A
3,3-Dimethoxybenzidene	A
Dimethylaminoazobenzene	A
N,N-Dimethyl Aniline	A
3,3-Dimethylbenzidine	A
Dimethyl Carbamoyl Chloride	A
Dimethyl Ether	A
Dimethylformamide	A

Dimethyl Hydrazine, Unsymmetrical	A
Dimethyl Phthalate	A
Dimethyl Sulfate	A
4,6-Dinitro-o-Cresol and Salts	A
2,4-Dinitrophenol	A
2,4-Dinitrotoluene	A
Dioxane	A
1,2-Diphenylhydrazine	A
Diphyl DT	A
Dowfrost	A
Dowfrost HD	A
Dowtherm 4000	A
Dowtherm A	A
Dowtherm E	A
Dowtherm G	A
Dowtherm HT	A
Dowtherm J	A
Dowtherm Q	A
Dowtherm SR-1	A
Epichlorohydrin	A
1,2-Epoxybutane	A
Ethane	A
Ethers	A
Ethyl Acetate	A
Ethyl Acrylate	A[1]
Ethyl Alcohol10	A
Ethylbenzene	A
Ethyl Carbamate	A
Ethyl Cellulose	A
Ethyl Chloride	A
Ethyl Ether	A
Ethyl Hexoate	A
Ethylene	A
Ethylene Bromide	A
Ethylene Dibromide	A
Ethylene Dichloride	A

Ethylene Glycol	A
Ethyleneimine	A
Ethylene Oxide	A1
Ethylene Thiourea	A
Ethylidine Chloride	A
Ferric Chloride	A
Ferric Phosphate	A
Ferric Sulfate	A
Fluorine, Gas	C
Fluorine, Liquid	C
Fluorine Dioxide	C
Formaldehyde	A
Formic Acid	A
Fuel Oil	A
Fuel Oil, Acid	A
Furfural	A
Gasoline, Refined	A
Sour	A
Gelatin	A
Glucose	A
Glue, Protein Base	A
Glycerine, Glycerol	A
Glycol	A
Grain Alcohol10	A
Grease, Petroleum Base	A
Green Sulfate Liquor	A
Heptachlor	A
Heptane	A
Hexachlorobenzene	A
Hexachlorobutadiene	A
Hexachlorocyclopentadiene	A
Hexachloroethane	A
Hexadecane	A
Hexamethylene Diisocyanate	A
Hexamethylphosphoramide	A
Hexane	A

Hexone	A
Hydraulic Oil, Mineral	A
Synthetic	A
Hydrazine	A
Hydrobromic Acid	A
Hydrochloric Acid	A
Hydrocyanic Acid	A
Hydrofluoric Acid, up to Anhydrous, 150° F & below	A
Less than 65%, Above 150° F	A
65% to Anhydrous, Above 150° F	A
Anhydrous	A
Hydrofluorosilicic Acid	A
Hydrofluosilicic Acid	A
Hydrogen	A
Hydrogen Bromide	A
Hydrogen Fluoride	A
Hydrogen Peroxide, 10%	A
10-90%	A
Hydrogen Sulfide, Dry or Wet	A
Hydroquinone	A
Iodine Pentafluoride	–
Iodomethane	A
Isobutane	A
Isooctane	A
Isophorone	A
Isopropyl Alcohol	A
Jet Fuels (JP Types)	A
Kerosene	A
Lacquer Solvents	A
Lacquers	A
Lactic Acid, 150° F and below	A
Above 150° F	A
Lime Saltpeter (Calcium Nitrates)	A
Lindane	A
Linseed Oil	A
Lithium Bromide	A

Key:
A = Suitable
B = Depends on operating conditions
C = Unsuitable
– = No data or insufficient evidence

CHEMICAL RESISTANCE CHART

Chemical	Rating
Lithium, Elemental	C
Lubricating Oils, Mineral or Petroleum Types	A
Refined	A
Sour	A
Lye	A[11]
Magnesium Chloride	A
Magnesium Hydroxide	A
Magnesium Sulfate	A
Maleic Acid	A
Maleic Anhydride	A
Mercuric Chloride	A
Mercury	A
Methane	A
Methanol, Methyl Alcohol	A
Methoxychlor	A
Methylacrylic Acid	A
Methyl Alcohol	A
2-Methylaziridine	A
Methyl Bromide	A
Methyl Chloride	A
Methyl Chloroform	A
4,4 Methylene Bis(2-chloroaniline)	A
Methylene Chloride	A
4,4-Methylene Dianiline	A
Methylene Diphenyldiisocyanate	A
Methyl Ethyl Ketone	A
Methyl Hydrazine	A
Methyl Iodide	A
Methyl Isobutyl Ketone (MIBK)	A
Methyl Isocyanate	A
Methyl Methacrylate	A
N-Methyl-2-Pyrrolidone	A
Methyl Tert. Butyl Ether (MTBE)	A
Milk10	A
Mineral Oils	A
Mobiltherm 600	A
Mobiltherm 603	A
Mobiltherm 605	A
Mobiltherm Light	A
Molten Alkali Metals	C
Monomethylamine	A
MultiTherm 100	A
MultiTherm 503	A
MultiTherm IG-2	A
MultiTherm PG-1	A
Muriatic Acid	A
Naphtha	A
Naphthalene	A
Naphthols	A
Natural Gas	A
Nickel Chloride	A
Nickel Sulfate	A
Nitric Acid, Less than 30%	A
Above 30%	A
Crude	A
Red Fuming	A
Nitrobenzene	A
4-Nitrobiphenyl	A
2-Nitro-Butanol	A
Nitrocalcite (Calcium Nitrate)	A
Nitrogen	A
Nitrogen Tetroxide	A
Nitrohydrochloric Acid (Aqua Regia)	A
Nitromethane	A
2-Nitro-2-Methyl Propanol	A
Nitromuriatic Acid (Aqua Regia)	A
4-Nitrophenol	A
2-Nitropropane	A
N-Nitrosodimethylamine	A
N-Nitroso-N-Methylurea	A
N-Nitrosomorpholine	A
Norge Niter (Calcium Nitrate)	A
Norwegian Saltpeter (Calcium Nitrate)	A
N-Octadecyl Alcohol	A
Octane	A
Oil, Petroleum	A
Oils, Animal and Vegetable10	A
Oleic Acid	A
Oleum	A
Orthodichlorobenzene	A
Oxalic Acid	A
Oxygen, Gas	
Ozone	A
Palmitic Acid	A
Paraffin	A
Paratherm HE	A
Paratherm NF	A
Parathion	A
Paraxylene	A
Pentachloronitrobenzene	A
Pentachlorophenol	A
Pentane	A
Perchloric Acid	A
Perchloroethylene	A
Petroleum Oils, Crude	A
Refined	A
Phenol	A
p-Phenylenediamine	A
Phosgene	A
Phosphate Esters	A
Phosphine	A
Phosphoric Acid, Crude	A
Pure, Less than 45%	A
Pure, Above 45%, 150° F and below	A
Pure, Above 45%, Above 150° F	A
Phosphorus, Elemental	A
Phosphorus Pentachloride	A
Phthalic Acid	A
Phthalic Anhydride	A
Picric Acid, Molten	–
Water Solution	A
Pinene	A
Piperidine	A
Polyacrylonitrile	A
Polychlorinated Biphenyls	A
Potash, Potassium Carbonate	A
Potassium Acetate	A
Potassium Bichromate	A
Potassium Chromate, Red	A
Potassium Cyanide	A
Potassium Dichromate	A
Potassium, Elemental	C
Potassium Hydroxide	A[11]
Potassium Nitrate	A
Potassium Permanganate	A
Potassium Sulfate	A
Producer Gas	A
Propane	A
1,3-Propane Sultone	A
Beta-Propiolactone	A
Propionaldehyde	A
Propoxur (Baygon)	A
Propyl Nitrate	A
Propylene	A
Propylene Dichloride	A
Propylene Oxide	A
1,2-Propylenimine	A
Prussic Acid, Hydrocyanic Acid	A
Pyridine	A
Quinoline	A
Quinone	A
Refrigerants	
10	A
11	A
12	A
13	A
13B1	A
21	A
22	A
23	A
31	A
32	A
112	A
113	A
114	A
114B2	A
115	A
123	A
124	A
125	A
134a	A
141b	A
142b	A
143a	A
152a	A
218	A
290	A
500	A
502	A
503	A
C316	A
C318	A
HP62	A
HP80	A
HP81	A
Salt Water	A
Saltpeter, Potassium Nitrate	A
2,4-D Salts and Esters	A
Sewage	A
Silver Nitrate	A
Skydrols	A
Soap Solutions	A
Soda Ash, Sodium Carbonate	A
Sodium Bicarbonate, Baking Soda	A
Sodium Bisulfate (Dry)	A
Sodium Bisulfite	A
Sodium Chlorate	A
Sodium Chloride	A
Sodium Cyanide	A
Sodium, Elemental	C
Sodium Hydroxide	A[11]
Sodium Hypochlorite	A
Sodium Metaborate Peroxyhydrate	A
Sodium Metaphosphate	A
Sodium Nitrate	A
Sodium Perborate	A
Sodium Peroxide	A
Sodium Phosphate, Monobasic	A
Dibasic	A
Tribasic	A
Sodium Silicate	A
Sodium Sulfate	A
Sodium Sulfide	A
Sodium Superoxide	A
Sodium Thiosulfate, “Hypo”	A
Soybean Oil10	A
Stannic Chloride	A
Steam, Saturated	A
Superheated	–
Stearic Acid	A
Stoddard Solvent	A
Styrene	A[1]
Styrene Oxide	A
Sulfur Chloride	A
Sulfur Dioxide	A
Sulfur, Molten	A
Sulfur Trioxide, Dry	A
Wet	A
Sulfuric Acid, 10%, 150° F and below	A
10%, Above 150° F	A
10-75%, 500° F and below	A
75-98%, 150° F and below	A
75-98%, 150° F to 500° F	A
Sulfuric Acid, Fuming	A
Sulfurous Acid	A
Syltherm 800	A
Syltherm XLT	A
Tannic Acid	A
Tar	A
Tartaric Acid	A
2,3,7,8-TCDB-p-Dioxin	A
Tertiary Butyl Amine	A
Tetrabromoethane	A
Tetrachlorethane	A
Tetrachloroethylene	A
Tetrahydrofuran, THF	A
Therminol 44	A
Therminol 55	A
Therminol 59	A
Therminol 60	A
Therminol 66	A
Therminol 75	A
Therminol D12	A
Therminol LT	A
Therminol VP-1	A
Therminol XP	A
Thionyl Chloride	A
Titanium Sulfate	A
Titanium Tetrachloride	A
Toluene	A
2,4-Toluenediamine	A
2,4-Toluenediisocyanate	A
Toluene Sulfonic Acid	A
o-Toluidine	A
Toxaphine	A
Transformer Oil (Mineral Type)	A
Transmission Fluid A	A
Trichloroacetic Acid	A
1,2,4- Trichlorobenzene	A
1,1,2-Trichloroethane	A
Trichloroethylene	A
2,4,5-Trichlorophenol	A
2,4,6-Trichlorophenol	A
Tricresylphosphate	A
Triethanolamine	A
Triethyl Aluminum	A
Triethylamine	A
Trifluralin	A
2,2,4-Trimethylpentane	A
Tung Oil	A
Turpentine	A
UCON Heat Transfer Fluid 500	A
UCON Process Fluid WS	A
Varnish	A
Vinegar10	A
Vinyl Acetate	A[1]
Vinyl Bromide	A[1]
Vinyl Chloride	A[1]
Vinylidene Chloride	A[1]
Vinyl Methacrylate	A
Water, Acid Mine, with Oxidizing Salt	A
No Oxidizing Salts	A
Water, Distilled	A
Return Condensate	A
Seawater	A
Tap	A
Whiskey and Wines10	A
Wood Alcohol	A
Xceltherm 550	A
Xceltherm 600	A
Xceltherm MK1	A
Xceltyherm XT	A
Xylene	A
Zinc Chloride	A
Zinc Sulfate	A

Key: **A** = Suitable
B = Depends on operating conditions
C = Unsuitable
– = No data or insufficient evidence

P³ DIAPHRAGM CHARACTERISTICS

PHYSICAL PROPERTIES	
Compression	20 - 25%
Resetting	45 - 50%
Creep Relaxation	35 %
Tension	31 N/mm² (4500 psi)
Ultimate Elongation	320 %
Specific Gravity	2.14
Gas Permeability	5 x 10^{-7}
Flex Endurance	17.6 mio. cycles

The data referred are determined in accordance with ASTM guidelines ASTM F36, F152, D1708, D792, D2176

MATERIAL PROPERTIES	
Color	Clear, translucent
Composition	PTFE
Temperature continuous	up to +150 °C (302 °F) *
Pressure	up to 10 bar (145 psi) *
Flammability	Will not burn
Bacterial Growth	Will not support
Meets Specification	FDA Regulation 21CFR177.1550, 3A Standard, NSF 61 Standard, USP Class VI Chapter 87 & 88, USP Part 31, 281 and 661, TSE free, EG1935/2004

* The data refer to the operating limits of the valve technology and are dependent on the type and size.

HANDLING THE P³ DIAPHRAGM

AREA	NOTE
Storage	Store flat in a cool, dry area. Store away from incidental exposure to all types of radiation. Following extended storage, carefully inspect the material for damage.
Cleaning	If exposed to grease, oil, or solvents in liquid or vapor form, clean before installing.
Handling	Do not fold or bend.

PENTAIR

PENTAIR SÜDMO GMBH
INDUSTRIESTRASSE 7, 73469 RIESBÜRG, GERMANY WWW.SUEDMO.DE