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VACUUBRAND®

Uncompromising chemistry design for diaphragm pumps



Table for chemistry compatibility

	PTFE	ETFE/ ECTFE	FFKM
Acid amides Dimethylformamide (DMF), Acetamide, Formamide	++	++	++
Acids, dilute or weak Acetic acid, Carbonic acid, Butyric acid	++	++	++
Acids, strong or concentrated Hydrochloric acid, Sulfuric acid, Nitric acid, Trifluoroacetic acid (TFA)	++	++	++
Alcohols, aliphatic Methanol, Ethanol, Butanol	++	++	++
Aldehydes Formaldehyde, Ethanal, Hexanal	++	++	++
Amines N-Methyl-2-pyrrolidone (NMP), Triethylamine	++	++	+
Bases Sodium hydroxide, Potassium hydroxide, Ammonia	++	++	++
Esters Ethyl acetate, Butyl formate, Amyl butyrate	++	++	++
Ethers Diethyl ether, Tetrahydrofurane, Dioxane	++	++	++
Hydrocarbons, aliphatic Pentane, Hexane, Heptane	++	++	++
Hydrocarbons, aromatic Benzene, Toluene, Xylene	++	++	++
Hydrocarbons, halogenated Methyl chloride, Chloroform, Ethylene chloride	++	++	++
Ketones Acetone, Cyclohexanone	++	++*	++
Oxidizing acids, oxidizing agents Ozone, Hydrogen peroxide, Chlorine	++	+	++
Sulfoxides Dimethyl sulfoxide (DMSO)	++	++	++

PTFE Polytetrafluorethylene

Well-proven PTFE sandwich diaphragms for increased reliability and extended service life.

ETFE Ethylene-Tetrafluorethylene

Head cover and clamping disc are made of thick walled molded ETFE with metal core for unsurpassed long-term performance.

ECTFE Ethylene-Chlortrifluorethylene

Valve connectors are made of ECTFE for an optimum of thermal, mechanical and chemical resistance.

FFKM Perfluorelastomer

Inlet and outlet flapper valves are made of FFKM or PTFE for both highest leakage tightness and best chemical resistance.

Internal tubing and fittings made of PTFE/ETFE/ECTFE compounds .

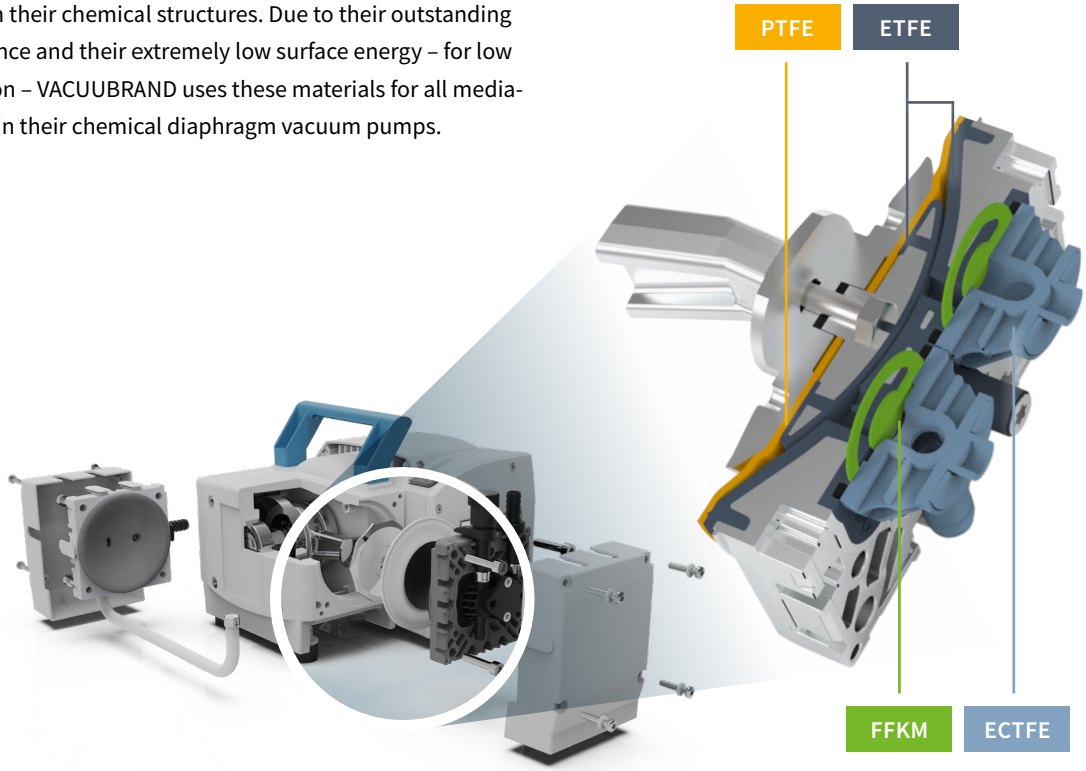
++ excellent chemical resistance
\+ good to limited chemical resistance
\- poor chemical resistance
* for some solvents '+'

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VACUUBRAND does not warrant the accuracy of these data.
Due to the variety of possible influencing factors, they can serve only as a guide.
No legal claims may be derived from user reliance on these data.

Uncompromising chemistry design for diaphgram pumps

Fluoropolymers and perfluoro elastomers are materials containing fluorine atoms in their chemical structures. Due to their outstanding chemical resistance and their extremely low surface energy – for low material adhesion – VACUUBRAND uses these materials for all media-contacted parts in their chemical diaphragm vacuum pumps.



PTFE

One of the most distinguishing properties of PTFE is its outstanding chemical resistance, except for some extreme conditions such as molten alkali metals or elemental fluorine. Basically PTFE is not soluble in any organic solvents. Even aggressive acids such as aqua regia cannot attack PTFE. The reason for this is a particularly strong bond between the carbon and the fluorine atoms and the shielding of carbon atoms by the surrounding fluorine atoms.

ETFE

Ethylene tetrafluoroethylene (ETFE) is a thermoplastic fluoropolymer and can be processed using molding techniques. Injection-molding around inserts (stability cores) results in dense nonporous surfaces not achievable with parts machined from sintered PTFE. It has excellent mechanical properties, very good chemical resistance (similar to PTFE), high tensile strength, high flexibility, excellent impact strength, moderate stiffness, good abrasion resistance, and high cutting resistance. ETFE that has been modified by carbon fiber reinforcement is tougher and stiffer and has higher tensile strength than PTFE, PFA or FEP.

FFKM

Perfluoroelastomers contain fully fluorinated polymer chains and hence offer the ultimate performance of elastomers when considering heat and chemical resistance. FFKM parts resist over 1,800 different chemicals, while offering the high temperature stability of PTFE. The longterm, proven performance of FFKM means less frequent valve changes, repairs and in-spections, increasing process and equipment uptime for greater productivity and yield. FFKM also helps to prevent process contamination in pharmaceutical, food and semiconductor applications.

ECTFE

Ethylene chlorotrifluoroethylene is prepared by the copolymerization of ethylene and chlorotrifluoroethylene (CTFE). While it still has excellent chemical resistance, the strength, wear resistance and creep resistance of ECTFE are significantly greater than that of PTFE. ECTFE is the most abrasion-resistant and highest tensile strength fluoropolymer available. Reinforcement by carbon fiber enhances its mechanical and thermal properties.