

The following is general information for materials that are commonly used in ASCO Scientific solenoid valves. This information is not intended as a specific recommendation; factors beyond our control could affect valve operation or material properties of the components used in ASCO Scientific's valves may be different than the general material properties listed below.

## Elastomers

### **NBR (nitrile, Buna-n)**

NBR has excellent compatibility for most air, water and light oil applications. The standard compound is suitable for service in petroleum oils, air, water, mild acids, acetylene, kerosene, lime solutions, liquified petroleum gases and turpentine. Not recommended for highly aromatic gasolines or acids. It has a useful temperature range of -4°F to 185°F (-20°C to 85°C).

### **FKM (fluorocarbon elastomer, Viton<sup>1</sup>)**

FKM has a rather wide range of chemical compatibility. It is a fluorocarbon elastomer, which was primarily developed for handling hydrocarbons such as jet fuels, gasolines, and solvents that normally caused detrimental swelling to NBR. FKM is not suitable for ketones, halogenated hydrocarbons or freon. FKM has a high temperature range similar to EPDM, but has the advantage of being somewhat more resistant to "dry heat". It has a useful temperature range of 0°F to 350°F (-18°C to 177°C).

### **EPDM, EPR (ethylene propylene)**

Ethylene propylene is suitable for applications above the NBR temperature range, such as handling hot water and steam. It has a wide range of fluid compatibility and its useful temperature range is -10°F to 300°F (-23°C to 149°C). Ethylene propylene is not compatible with petroleum based fluids.

### **FFKM (perfluoroelastomer, Kalrez<sup>1</sup>)**

FFKM has virtually universal chemical resistance. It is extremely resistant to swelling, a cause of most seal failures. Because of the elasticity (soft seal) associated with FFKM, a virtually unsurpassed seal is created. FFKM will retain elasticity even after long term exposure to temperatures up to 600°F (316°C).

### **VMQ (silicone)**

Known as the only elastomer, which under certain conditions, can be utilized for both high and low temperature. Also handles hydrogen peroxide and some acids. VMQ is not suitable for steam service. Fluorosilicone compounds are noted to have better fuel resistance.

## Plastics

### **POM (acetal, Celcon<sup>2</sup>)**

Acetal resin type thermoplastics, which are extremely rigid but not brittle. They provide good toughness, tensile strength, stiffness and long life. They are odorless, tasteless, non-toxic and resistant to most solvents.

### **PBT (Valox<sup>3</sup>)**

PBT is a crystalline thermoplastic polyester with excellent chemical resistance. It has outstanding dimensional stability with high heat resistance and low moisture absorption. PBT also has a high surface gloss with an inherent lubricity.

### **PPS (polyphenylene sulfide, Ryton<sup>4</sup>)**

This resin has outstanding chemical resistance and no known solvents below 200°C. It has low friction, good wear resistance and high tensile strength.

### **PSU (polysulfone)**

Known as one of the most heat resistant thermoplastics. It has excellent chemical resistance when used for inorganic acids, alkalies and aliphatic hydrocarbons.

### **PEI (polyetherimide, Ultem<sup>3</sup>)**

This resin has good heat deflection characteristics. Good chemical resistance to non-oxidizing acids and polar solvents. Questionable usage on alkaline solutions.

### **PEEK (polyetheretherketone)**

High performance thermoplastic that has a continuous working temperature of 250°C. It has an excellent resistance to a wide variety of chemicals and solvents. PEEK has excellent flexural, tensile, and impact properties combined with outstanding fatigue resistance.

### **PTFE (Teflon<sup>1</sup>)**

PTFE is virtually unattacked by any fluid. It has a very wide temperature range. PTFE is not easily fabricated and is known to have objectionable "cold flow" characteristics, which may contribute to objectionable leakage, particularly on gases.

### **ETFE (ethylene tetrafluoroethylene, Tefzel<sup>1</sup>)**

ETFE is a fluoropolymer resin with a chemical resistance similar to PTFE. It is a more rugged material than PTFE making it more suitable for valve bodies with threaded ports.

### **CTFE (chlorotrifluoroethylene, Kel-f<sup>5</sup>)**

Thermoplastic known for its excellent chemical resistance. It has near-zero absorption rate and a low coefficient of thermal expansion. This polymer structure can be used in temperatures ranging from -240°C to 200°C. It is nonflammable and liquid oxygen compatible.

### **Notes:**

1. Dupont Co. trademark
2. Celanese Plastics Co. trademark
3. GE Plastics trademark
4. Phillips 66 trademark
5. Daikin Industries trademark