

Urethane

Formulated of copolymers of ether or ester based urethanes, this material is used in a wide application of seals, wipers, back-up rings, cushions, bumpers, and a myriad of other uses. Highly resistant to oil swell, ozone, oxidation and abrasion, it also has excellent cut resistance. Highly resilient, urethanes also have high tensile strength and elongation properties. Urethanes remain an excellent choice in hydraulic systems using petroleum based fluids. Most urethane seals remain flexible and efficient in temperatures ranging from -65° F to +200° F with some able to withstand intermittent temperatures up to +300° F.

Nitrile

The most common nitrile copolymer blend is the compound known as Buna-N. Possessing very good resistance to petroleum based hydraulic oils, Buna-N also works well with fuels such as diesel or gasoline. Nitrile seals have a good resistance to compression set, but their flexibility suffers somewhat in the lower temperature range. Seals made from this material have a low resistance to ozone and must be stored carefully in most environments. Working temperatures are -40° to +240° F.

PTFE

Most PTFE seals, in order to retain their toughness and flexibility, are fortified with short glass fiber, bronze flashes, carbon, graphite, or a combination of these fillers. Because of a lack of resilience (memory) in PTFE, an energizer is most often employed to obtain the desired fit. Benefits are chemical inertness, high heat resistance, low temperature flexibility, low running friction, and non-adhesive characteristics. Temperatures to +500° F are obtainable but are often reduced by the filler or energizer employed.

Fluorocarbon

Fluorocarbon combines high temperature resistance with excellent chemical resistance. Excellent for use with alcohol and aromatic fuels and highly resistant to ultraviolet light and ozone. This material is not recommended for use in low temperatures or in aircraft hydraulic fluids. Temperature range is -20° to +400° F.

Ethylene-Propylene

Ethylene-Propylene can be used for sealing phosphate ester hydraulic fluids such as Skydrol. Not suitable for petroleum based fluids, Ethylene-Propylene is highly effective for use with steam, acetone, dilute acids and alkalis. Specially compounded Ethylene-Propylene can be made suitable for automobile brake systems. Temperature range from -20° to +300° F.

Silicone

Silicone is an elastomer made from silicon, oxygen, hydrogen, and carbon. The key use of this material is in static seals employed in a wide (-75° F to +450° F) range of temperatures. Silicone has a high resistance to dry heat, ultraviolet light and ozone. This material is not recommended for dynamic situations due to poor abrasion resistance and high friction characteristics.

Glossary of Terms

Bearing/Wear Rings: Soft metal or plastic rings placed in grooves on the piston or in the head to prevent contact between hard metal surfaces.

Durometer: A generic term referring to the instrument and the scale used to measure the relative hardness of various elastomers. The lower the durometer reading, the softer the material.

Dynamic Seal: A sealing device used between mating surfaces that have relative motion.

Elastomer: A rubber-like material having the capacity for large deformation and rapid, complete recovery from the deforming force.

Gland: A groove or open area machined into the head or piston that houses the sealing device.

Static Seal: A sealing device used between mating surfaces that have no relative motion.

Wiper/Scraper: A device placed in the head of a cylinder for the purpose of excluding foreign matter from the inside of the cylinder.



FLUID COMPATIBILITY TABLE

These are general guidelines only and users must conduct their own functional tests to determine the suitability of any compound for their particular application.

R = Recommended
 M = Marginal
 U = Unsatisfactory
 X = Insufficient Data

Fluid	Nitrile	SBR	EPDM	Neoprene	Polyacrylate	Urethane	Silicone	Fluoroelastomer
Acetaldehyde	U	U	R	U	U	U	R	U
Acetamide	R	U	R	R	U	U	M	U
Acetic Acid	M	M	R	R	U	U	R	U
Acetone	U	M	R	M	U	U	M	U
Acetophenone	U	U	R	U	U	U	U	U
Acetylene	R	R	R	R	X	X	R	R
Ammonia	R	R	R	R	U	X	R	U
Ammonium Hydroxide	R	R	R	R	U	U	R	R
Amyl Acetate	U	U	M	U	U	U	U	U
Anderol L-774	M	U	U	U	R	U	U	R
Aniline	U	U	R	U	U	U	U	M
Ansul Ether	M	U	M	U	U	R	U	U
Antifreeze	R	R	R	R	U	U	R	R
Aroclors	M	U	R	U	U	X	M	R
Askarel	R	U	U	U	U	U	U	R
ASTM #1	R	U	U	R	R	R	R	R
ASTM #3	R	U	U	U	R	R	U	R
ASTM Fuel A	R	U	U	R	R	R	U	R
ASTM Fuel B	R	U	U	U	U	R	U	R
ASTM Fuel C	R	U	U	U	U	R	U	R
ASTM Fuel D	M	U	U	U	U	R	U	R
Auto Transmission Fluid	R	U	U	M	R	R	M	R
Beer	R	R	R	R	U	U	R	R
Benzaldehyde	U	U	R	U	U	U	U	U
Benzene	U	U	U	U	U	U	U	R
Benzine	R	U	U	R	R	R	U	R
Benzoic Acid	U	U	U	U	U	U	U	R
Benzophenone	U	U	R	X	U	U	U	R
Benzyl Alcohol	U	U	U	R	U	U	X	R
Bleach	R	R	R	R	U	U	U	R
Borax	R	R	R	U	R	R	R	R
Boric Acid	R	R	R	R	U	R	R	R
* Brake Fluid (non-Petroleum)	U	R	R	R	U	U	R	U
Bromine	U	U	U	U	U	U	U	R
Bromobenzene	U	U	U	U	U	U	U	R
Bunker Oil	R	U	U	U	R	R	U	R
Butane	R	M	U	R	R	U	U	R
Butter	R	U	M	R	R	R	R	R
Butyl Acetate	U	U	U	U	U	U	U	U
Butyl Alcohol	R	R	R	R	U	U	R	R
Butyl Amine	M	U	U	U	U	U	R	U
Butyl Carbitol	U	U	R	M	U	X	U	M
Butyl Cellosolve	M	U	R	M	U	U	R	U
Butyraldehyde	U	U	R	U	U	U	U	U
Carbitol	R	R	R	R	U	U	R	R

Fluid	Nitrile	SBR	EPDM	Neoprene	Polyacrylate	Urethane	Silicone	Fluoroelastomer
Carbitol Acetate	U	U	U	U	U	U	U	R
Carbon Disulfide	U	U	U	U	U	X	U	R
Carbon Tetrachloride	R	U	U	U	U	U	U	R
Carbonic Acid	R	R	R	R	R	R	R	R
Castor Oil	R	R	R	R	R	R	R	R
Cellosolve	U	R	U	U	U	U	U	U
Chassis Grease	R	U	U	M	R	X	U	R
Chloracetic Acid	U	U	R	U	U	U	X	U
Chloracetone	U	U	R	M	X	X	U	R
Chlordane	R	U	U	M	X	X	U	R
Chlorine	U	U	R	U	U	U	X	R
Chlorobenzol	U	U	U	U	U	U	U	R
Chloroform	U	U	U	U	U	U	U	R
Chlorosulfonic Acid	U	U	U	U	U	U	U	U
Chrome Plating Solution	U	U	R	U	U	U	R	R
Chromic Acid	U	U	X	U	X	X	M	R
Citric Acid	R	R	R	R	X	X	R	R
Cod Liver Oil	R	U	U	R	R	U	R	R
Coffee	R	R	R	R	U	U	R	R
Corn Oil	R	U	U	U	R	U	R	R
Creosote	R	U	U	R	R	M	U	R
Creoste Oil	R	U	U	M	X	X	M	R
Creosylic Acid	U	U	U	U	U	U	U	R
Crude Oil	R	U	U	U	R	X	U	R
Cyclohexane	R	U	U	M	R	R	U	R
Cyclohexanol	R	U	U	R	X	X	U	R
Decalin	U	U	U	U	U	U	U	R
Denatured Alcohol	R	R	R	R	U	U	R	R
Diacetone	U	U	R	U	U	U	U	U
Dibutyl Amine	U	U	U	M	U	U	U	U
Dibutyl Phthalate	U	U	R	U	U	X	X	M
Dichloro Aniline	U	U	U	U	U	U	U	M
Dichloro Butane	R	U	U	U	U	U	U	R
Diesel Oil	R	U	U	M	U	U	U	R
Diethyl Benzene	M	U	U	U	X	X	X	R
Diethylamine	R	R	R	R	U	M	R	U
Diethylene Glycol	R	R	R	R	U	U	R	R
Dimethyl Ether	U	U	U	M	M	R	U	U
Dimethyl Formamide	U	X	R	X	X	X	R	U
Dimethyl Phthalate	U	U	R	U	U	X	X	R
Dimethyl Terephthalate	U	U	U	U	U	U	U	R
Dioctyl Phthalate	U	U	R	U	U	U	M	R
Dioxane	U	U	R	U	U	U	U	U
Diphenyl	U	U	U	U	U	U	U	R
Dow Corning 550	R	R	R	R	R	R	R	R

FLUID COMPATIBILITY TABLE

* Requires special formulation of EPDM

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Fluid	Nitrile	SBR	EPDM	Neoprene	Polyacrylate	Urethane	Silicone	Fluoroelastomer
Dow Gard	R	R	R	R	M	M	R	R
Dowtherm A & E	U	U	U	U	U	U	U	R
Elco 28	R	U	U	M	R	R	R	R
Epoxy Resins	X	X	R	R	X	X	X	U
Ethane	R	U	U	R	R	M	U	R
Ethanol	R	R	R	R	U	R	R	R
Ethanolamine	R	R	R	R	U	M	R	U
Ethyl Acetate	U	U	R	U	U	U	R	U
Ethyl Benzene	U	U	U	U	U	U	U	R
Ethyl Cellulose	R	R	R	R	U	R	R	U
Ethyl Chloride	R	R	R	R	M	R	U	R
Ethyl Ether	M	U	M	U	U	R	U	U
Ethyl Formate	U	U	R	R	X	X	X	R
Ethyl Hexanol	M	R	R	R	X	X	X	R
Ethyl Mercaptan	U	U	X	M	X	X	M	R
Ethylene Chloride	U	U	U	U	U	U	U	R
Ethylene Oxide	U	U	R	U	U	U	U	U
Formaldehyde	M	M	R	M	U	U	R	U
Formic Acid	M	R	R	R	X	X	M	U
Freon 12	R	R	R	R	X	R	U	R
Fuel Oil	R	U	U	R	R	U	U	R
Furfuryl Alcohol	U	U	R	U	U	U	U	X
Furan	U	U	X	U	U	X	X	X
Furfural	U	U	R	U	U	X	U	U
Fyrquel	U	U	R	U	U	U	R	R
Gallic Acid	R	R	R	R	U	I	X	R
Gasoline	R	U	U	R	R	R	U	R
Gelatin	R	R	R	R	U	U	R	R
Glucose	R	R	R	R	X	U	R	R
Glycerine	R	R	R	R	U	U	R	R
Heptane	R	U	U	R	R	R	U	R
Hexaldehyde	U	U	R	R	X	X	R	U
Hexane	R	U	U	R	R	R	U	R
Hexanol	R	R	M	R	U	U	R	R
Home Heating Oil	R	U	U	M	R	R	R	R
Hydrazine	R	R	R	R	X	X	R	X
Hydrochloride Acid	R	M	R	R	M	U	U	R
Hydrocyanic Acid	R	R	R	R	U	X	M	R
Hydrogen Peroxide	R	R	R	R	U	X	R	R
Hydrogen Sulfide	U	U	R	R	U	X	M	U
Hydroquinone	M	U	U	U	U	X	X	R
Hypoid Gear Lube	R	U	U	M	R	R	M	R
Iodine	R	R	R	U	X	X	X	R
Iso Octane	R	U	U	R	R	R	U	R
Iso Phorone	U	U	R	U	U	U	U	U
Isocyanate	X	X	X	X	X	X	X	R
Isopar	R	X	U	R	R	R	U	R
Isopropanol	R	R	R	R	U	U	R	R
Isopropyl Acetate	U	U	R	U	U	U	U	U
JP-4(MIL-J-5624)	R	U	U	U	R	R	U	R

Fluid	Nitrile	SBR	EPDM	Neoprene	Polyacrylate	Urethane	Silicone	Fluoroelastomer
JP-4(MIL-J-5624)	R	U	U	U	R	R	U	R
Kerosene	R	U	U	R	R	R	U	R
Lacquers	U	U	U	U	U	U	U	U
Lactic Acid	R	R	R	R	U	X	X	R
Lard	R	U	R	R	R	R	R	R
Linoleic Acid	R	U	U	R	X	X	R	R
Linseed Oil	R	U	M	M	R	X	R	R
Lye Solutions	R	R	R	R	U	U	R	R
Malathion	R	U	U	X	X	X	U	R
Maleic Acid	U	U	U	U	U	X	X	R
Mercury	R	R	R	R	X	X	X	R
Meter-Cresol	U	U	U	R	U	U	U	R
Methacrylic Acid	U	U	R	R	U	U	U	M
Methane	R	U	U	R	R	M	U	R
Methanol	R	R	R	R	U	U	U	U
Methyl Acetate	U	U	R	R	U	U	U	U
Methyl Cellosolve	M	U	R	R	U	U	U	M
Methyl Ether Ketone	U	U	R	U	U	U	U	U
Methyl Mercaptan	X	X	R	X	X	X	X	X
Methylene Chloride	U	U	U	U	U	U	U	R
Milk	R	R	R	R	U	U	R	R
Mineral Oil	R	U	M	R	R	R	R	R
Mineral Spirits	R	U	U	U	R	R	U	R
Monovinyl Acetylene	R	R	R	R	X	X	R	R
Mustard	X	R	R	X	X	X	R	R
Naphtha	R	U	U	U	R	R	U	R
Naphthalene	U	U	U	U	X	X	U	R
Naphthenic Acid	R	U	U	U	X	X	U	R
Natural Gas	R	R	U	R	R	R	R	R
Neatsfoot Oil	R	U	R	U	R	R	R	R
Nitric Acid	U	M	R	U	U	U	U	M
Nitrobenzene	U	U	U	U	U	U	U	R
Nitropropane	U	U	R	U	U	U	U	U
Octane	R	U	U	U	U	U	U	R
Octanol	R	R	R	R	U	U	R	R
Oleic Acid	M	U	U	M	X	X	U	R
Oleum	R	U	U	M	X	X	U	R
Oronite 8200	R	U	U	R	X	R	U	R
Oxalic Acid	R	R	R	R	R	X	X	R
Peanut Oil	R	U	M	M	R	X	R	R
Pentane	R	M	U	R	R	U	U	R
Perchlorethylene	R	U	U	U	U	U	U	R
Petroleum Ether	U	U	U	U	U	U	U	R
Phenol	U	U	U	U	U	U	U	R
Phenylhydrazine	U	M	U	U	U	X	X	R
Phosphoric Acid	R	R	R	R	M	U	R	R
Pine Oil	R	U	U	U	U	X	X	R
Potassium Hydroxide	R	R	R	R	U	U	M	U
Propane	R	U	U	R	R	M	U	R
Propanol	R	R	R	R	U	U	R	R

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Fluid	Nitrile	SBR	EPDM	Neoprene	Polyacrylate	Urethane	Silicone	Fluoroelastomer
Propyl Acetate	U	U	R	U	U	U	U	U
Pydraul	U	U	R	U	U	U	U	R
Pyranol	R	U	U	R	R	R	U	R
Pyridine	U	R	U	U	U	X	U	U
Rapeseed Oil	R	U	R	R	R	R	U	R
Resurcinol	X	R	R	X	X	X	X	X
SAE 10W30	R	U	U	M	R	R	R	R
Seawater	R	R	R	R	U	U	R	X
Silicone Grease	R	R	R	R	R	R	R	R
Silver Nitrate	R	R	R	R	R	R	R	R
Skelly Solvent	R	U	U	U	X	X	X	R
Skydrol	U	U	R	U	U	U	U	R
Skydrol 500	U	U	R	U	U	U	U	R
Sodium Hydroxide	R	R	R	R	U	R	R	R
Sovasol	R	U	U	R	R	R	U	R
Soy Bean Oil	R	U	M	M	R	X	R	R
Stearic Acid	R	R	R	R	R	U	U	R
Stoddard Solvent	R	U	U	R	R	R	U	R
Sucrose	R	R	R	R	U	U	R	R
Sulfuric Acid	R	R	R	R	R	U	U	R

Fluid	Nitrile	SBR	EPDM	Neoprene	Polyacrylate	Urethane	Silicone	Fluoroelastomer
Tall Oil	R	U	U	M	R	U	X	R
Tannic Acid	R	R	R	R	U	X	R	R
Tar	R	U	U	M	U	X	R	R
Tartaric Acid	R	R	R	R	X	X	R	R
Tetrachloro Ethane	U	U	U	U	U	U	U	R
Tetralin	U	U	U	U	U	U	U	R
Tidewater Oil	R	U	U	R	R	R	R	R
Toluene	U	U	U	U	U	U	U	R
Trichloro Ethylene	M	U	U	U	U	U	U	R
Triethanol Amine	M	R	R	R	U	U	X	U
Turbine Oil	R	U	U	U	R	R	U	R
Turpentine	R	U	U	U	R	U	U	R
UCDN 50HB280X	R	R	R	R	X	X	R	R
Univis J-43	R	U	U	R	R	R	U	R
Varnish	R	U	U	U	U	M	U	R
Vinegar	R	R	R	R	U	U	R	R
Water	R	R	R	R	U	U	R	R
Wheat Germ Oil	R	U	U	M	R	R	R	R
Whiskey & Wine	R	R	R	R	U	U	R	R
Wood Oil	R	U	U	R	X	M	U	R



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FLUID COMPATIBILITY TABLE