Properties of Materials

Eldon James

Materials - General Information

NYLON **WHITE NYLON • BLACK NYLON** **NATURAL NYLON**

The invention of nylon in the early 30's, and its introduction in 1938, was truly a major breakthrough in polymer chemistry. No resin has yet been introduced that can begin to match the unique combination of properties that have made nylon the most versatile and broadly used plastic material. Nylon's use as an injection molding material has grown as new applications have emerged across many industries. This growth is driven by continued research and market development, which has led to a wide diversity of product lines.

Eldon James' nylon choice, is one of the three most proven nylon resins. It is a lubricated version of 6/6 Nylon made by the polymerization of hexamethylenediamine and adipic acid, which each contain six carbon atoms (6/6). Of the melt processable nylon homopolymers, the 6/6 nylon series exhibits the highest melting point and a superior dry-as-molded strength and stiffness. It possesses an outstanding balance of properties, combining: strength, moderate stiffness, high service temperature, and excellent toughness. It exhibits low coefficients-of-friction, has excellent resistance to abrasion, and it is particularly resistant to repeated impact. Nylon resists fuels, lubricants, and many chemicals; however, it is attacked by phenols, strong acids, and oxidizing agents. Acceptable sterilization methods include Ethylene Oxide or Autoclave. Visit the Technical Section of our Website @ eldonjames.com for more detail.

• NATURAL NYLON IS NSF Standard 61 & 51 Certified •
White and Black Nylon are not NSF Certified

NSF®
Certified to ANSI/NSF 61

GLASS-FILLED BLACK NYLON

The glass fibers provide a minimum average length in the finished part to achieve optimum mechanical properties. The glass is bonded to nylon through the use of certain coupling agents which have been developed to assure retention of physical properties under various environmental conditions. Glass-reinforced nylon is manufactured to give optimum strength combined with excellent injection molding performance. This is achieved by uniform dispersion of the glass fibers in the base nylon.

GLASS-FILLED BLACK NYLON - Offers these advantages over un-reinforced nylon:

- **Ford & GM approval**
- superior tensile strength (over 2 times greater than conventional nylon)
- greater stiffness (3 times greater)
- higher impact strength
- excellent fatigue endurance
- enhanced creep resistance
- excellent retention of tensile strength and stiffness at high temperatures
- better dimensional stability
- superior retention of physical properties when exposed to high temperatures, hot oils, greases, and lubricants
- low thermal expansion (similar to metals)

Materials - General Information

POLYVINYLIDENE FLUORIDE (PVDF)

PVDF has been used as a pipe liner in **chemical processing plants** since its introduction nearly 30 years ago. It has also been used extensively in the **paper and paper pulp industries**, where equipment is constantly exposed to high concentrations of Chlorine and Chlorine Dioxide. In these applications the permeation resistance of PVDF components far surpassed that of PTFE.

PVDF products are used extensively in **silicon microcircuit fabrication**. Processes in this industry commonly use **deionized water**, a fluid that is highly corrosive to steel. The deionized water is often sanitized through the injection of **ozone and exposure to UV light**, both of which can seriously degrade the integrity of materials less durable than PVDF.

Properties of PVDF:

• High thermal stability • High purity • Low permeability to most gases and liquids • High dielectric strength
• Resistance to most chemicals and solvents • Weather resistant-inert to UV radiation • Resistant to fungi
• Mechanical strength and toughness • Resistant to nuclear radiation • Low flame and smoke characteristics

• NATURAL PVDF (material without colorant) IS NSF Standard 61 & 51 Certified •
FDA USP Class VI

NSF
Certified to ANSI/NSF 61

POLYPROPYLENE

Polypropylene, like most of the polyolefins, is highly resistant to solvents and chemicals. Polypropylene has outstanding resistance to water and other inorganic environments. It resists most strong mineral acids and bases, but, like the other polyolefins, it is subject to attack by oxidizing agents.
Polypropylene has excellent resistance to environmental stress-cracking. Acceptable sterilization methods include Gamma Radiation and Ethylene Oxide, see sterilization chart for details.

FDA USP Class VI

HIGH DENSITY POLYETHYLENE (HDPE)

When used unmodified for the manufacture of food contact articles, HDPE will comply with FDA 21 CFR177.1520. HDPE also has various applications in medical products. It has excellent resistance to chemicals, excellent toughness, and has an aesthetically pleasing glossy white finish.

• NATURAL HDPE IS NSF Standard 61 & 51 Certified •

NSF
Certified to ANSI/NSF 61

316L STAINLESS STEEL

316L is a molybdenum-bearing austentic stainless steel which offers a high stress-to-rupture and tensile strength in elevated temperature environments. It is more resistant to corrosion than type Type 304 and It is also more resistant to pitting. Molybdenum-containing stainless steels are used in the manufacture of certain food and pharmaceutical products where minimizing metallic contamination is desirable. Fittings produced with the 316L alloy perform well in harsh physical environments, maintaining their strength and impact resistance under a wide range of temperatures; however, molybdenum-bearing stainless steel is less resistant than other types of stainless steel to highly oxidizing acids, such a nitric acid. The material has wide application in the dairy industry and is accepted by the Dairy and Food Industries Supply Association-Sanitary Standards Committee. It is approved for preparation and storage of foods by the National sanitation Foundation and is used extensively in the brewery, beverage, and bio-processing industries.

Typical Properties of Materials

Property	ASTM Test Method	Kynar	Polypro- pylene	Nylon	Glass filled Nylon	High Density Polyethylene	316L Stainless Steel
TENSILE STRENGTH AT BREAK, PSI	D638	5,400	——	12,000	27,000	1,600	70,000 (ASTM-A240)
ELONGATION AT BREAK %	D638	100-400	375	300	3	320	40 (ASTM-A240)
TENSILE YIELD STRENGTH, PSI	D638	6,500	4,400	12,000	——	3,000	25,000 (ASTM-A240)
FEXURAL MODULUS, KPSI	D790	360	170	410	1,300	138	——
ROCKWELL HARDNESS (R SCALE)	D785	——	R180-102	R121	——	——	——
ROCKWELL HARDNESS (M SCALE)	——	——	M79	——	M101	——	——
SHORE HARDNESS (D SCALE)	D2240	D76-80	——	——	——	——	——
COEF. OF LINEAR THER-MAL EXPANSION, 10-5 IN/IN/°F	D696	7.6	——	4	1.3	——	——
DEFLECTION TEMP. UNDER FLEXURAL LOAD, °F @ 264 PSI	D648	244	——	194	480	——	——
DEFLECTION TEMP. UNDER FLEXURAL LOAD, °F @ 66 PSI	D648	——	190	455	——	——	——
WATER ABSORPTION, %, 24 HOURS	D570	0.015	0	1.2	0.7	——	——
IZOD IMPACT, (NOTCHED), FT-LB/IN	D256	3.1	0.5	1	2.2	0.9	——

Data for Nylon and Glass-Filled Nylon is for dry, as-molded with approximately 0.2% water content.

Absence of entry indicates data not available or not applicable.

**** Disclaimer:** The data presented in this publication is for reference only. It was compiled primarily from outside sources provided by feedstock materials suppliers and resin manufacturers, and is offered to our customers as a means of comparing the characteristics of resins and materials used by Eldon James Corp. at the time of publication. The particular conditions of your use and application of our products are beyond our control. Thus, it is imperative that you test our products in your specific application to determine their ultimate suitability. All information is provided without implied or expressed warranty or guarantee by Eldon James Corp, or the resin and feedstock manufacturers. Eldon James Corp. assumes no liability with respect to the accuracy or completeness of the information contained herein and none of the information provided constitutes a recommendation or endorsement of any kind by the Eldon James Corp.

Chemical Resistance of Resin Materials

A = Excellent (No Effect) • C = Fair (Moderate Effect) • 1 = Satisfactory to 72° F (22°C)
B = Good (Minor Effect) • D = Poor (Severe Effect) • 2 = Satisfactory to 120° F (48° C)

**** Please read the disclaimer note at the bottom of page 3 (Typical Properties of Materials)**

Chemical	Nylon	Polyprop.	PVDF
Acetaldehyde	A	A1	D
Acetamide	A	A1	C
Acetate Solvent	A	B1	A
Acetic Acid 20%	D	A	A
Acetic Acid, 80%	D	A	C
Acetic Acid, Glacial	B	A1	A1
Acetic Anhydride	A1	B1	B1
Acetone	A	A	D
Acetyl Chloride (dry)	B	D	A2
Acetylene	A	A1	A
Acrylonitrile	A1	A1	A1
Adipic Acid	–	B2	A2
Alcohols: Amyl	A1	B1	A
Benzyl	B1	A	A
Butyl	D	A	A
Diacetone	A	B2	A1
Ethyl	A1	A	–
Isobutyl	A1	A1	–
Isopropyl	D	A2	–
Methyl	B1	A2	A
Octyl	A	–	–
Propyl	D	A	A2
Aluminum Chloride	B1	A	A
Aluminum Chloride 20%	D	A	A
Aluminum Fluoride	A1	A	A
Aluminum Hydroxide	A1	A	A
Aluminum Nitrate	A1	A2	A2
Aluminum Potassium Sulfate 10%	D	A	B
Aluminum Potassium Sulfate 100%	D	A	–
Aluminum Sulfate	A2	A	A
Alums	A	A	–
Amines	D	B2	–
Ammonia 10%	A	A2	A
Ammonia Nitrate	D	A	A
Ammonia, anhydrous	A1	A	A
Ammonia, liquid	B1	A2	A
Ammonium Acetate	A	A	–
Ammonium Bifluoride	–	A	A
Ammonium Carbonate	A1	A	A
Ammonium Chloride	B	A	A
Ammonium Hydroxide	A	A	A
Ammonium Nitrate	A1	A	A
Ammonium Persulfate	D	A	A1

Chemical	Nylon	Polyprop.	PVDF
Ammonium Phosphate, Dibasic	C1	A	A
Ammonium Phosphate, Monobasic	B	A	–
Ammonium Phosphate, Tribasic	B	A	–
Ammonium Sulfate	A1	A	A
Ammonium Sulfite	A1	A2	–
Amyl Acetate	B2	B1	A2
Amyl Alcohol	A1	B1	A
Amyl Chloride	C1	D	A
Aniline	A2	A1	A1
Antimony Trichloride	D	A	A
Arochlor 1248	A1	D	–
Arsenic Acid	C1	A	A
Arsenic Salts	A	–	–
Asphalt	A	B1	A
Barium Carbonate	A1	A	A
Barium Chloride	A	A	A
Barium Cyanide	A1	D	–
Barium Hydroxide	A1	B	A
Barium Nitrate	A1	A	–
Barium Sulfate	A1	B1	A
Barium Sulfide	A1	B	A
Beer	A1	A1	A
Beet Sugar Liquid	A	A1	A
Benzaldehyde	A1	D	A2
Benzene	A1	D	A2
Benzoic Acid	D	B1	A
Benzol	D	B	A
Benzyl Chloride	A2	C1	–
Bleaching Liquors	C	A1	–
Boric Acid	B	A	A
Bromine	D	D	A
Butadiene	C1	C	A
Butane	A2	A1	A
Butanol (Butyl Alcohol)	B1	A1	A
Butyl Amine	A2	B1	A1
Butyl Ether	A2	D	A1
Butyl Phthalate	A2	B2	B1
Butylacetate	A	B1	B2
Butylene	B1	–	A
Butyric Acid	C1	B1	A
Calcuim Bisulfide	A	A	A
Calcium Bisulfite	A2	A	A
Calcium Carbonate	A	A	A

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Chemical	Nylon	Polyprop.	PDVF
Calcium Chlorate	–	–	A
Calcium Chloride	A1	A2	A
Calcium Hydroxide	A2	A2	A2
Calcium Hypochlorite	D	A1	A
Calcium Nitrate	A1	A2	A2
Calcium Oxide	B	A	A
Calcium Sulfate	D	A	A
Calgon	A	A	–
Carbolic Acid (Phenol)	D	B	A1
Carbon Bisulfide	A	D	–
Carbon Dioxide (dry)	A1	A2	A
Carbon Dioxide (wet)	A1	A2	A
Carbon Disulfide	B1	D	B2
Carbon Monoxide	A1	A	B
Carbon Tetrachloride	D	D	A2
Carbon Tetrachloride (dry)	–	D	A2
Carbon Tetrachloride (wet)	–	D	A2
Carbonated Water	A	B	–
Carbonic Acid	A1	A	A
Chlorine Water	C1	D	B
Chlorine, Anhydrous Liquid	D	D	A1
Chlorine (dry)	D	D	A
Chloroacetic Acid	D	C1	A1
Chlorobenzene (Mono)	D	C1	A1
Chlorobromomethane	C	A	–
Chloroform	A	C1	A
Chromic Acid 5%	D	D	A
Chromic Acid 10%	D	D	A
Chromic Acid 30%	D	D	A2
Chromic Acid 50%	D	D	A2
Citric Acid	A1	A	A
Clorox® (Bleach)	A	D	A
Coffee	A	A	–
Copper Chloride	D	A	A
Copper Cyanide	D	A	A
Copper Nitrate	D	A	A
Copper Sulfate 5%	D	A	A
Copper Sulfate >5%	D	A	A
Cream	A	A	–
Cresols	D	D	A2
Cresylic Acid	D	A1	B1
Cupric Acid	D	A2	–
Cyclohexane	A	D	A

Chemical	Nylon	Polyprop.	PVDF
Detergents	A1	A	A
Diacetone Alcohol	A1	A1	D
Dichlorobenzene	D	C1	A
Dichloroethane	A1	D	A
Diesel Fuel	A	A1	A
Diethyl Ether	A1	A1	A1
Diethylamine	A	A1	D
Diethylene Glycol	A1	A2	A
Dimethyl Aniline	A	D	A1
Dimethyl Formamide	A	A	D
Diphenyl Oxide	–	D	B2
Epsom Salts (Magnesium Sulfate)	A1	A	A
Ethane	D	D	A
Ethanol	A1	A	–
Ethanolamine	A	D	C1
Ether	A	D	B1
Ethyl Acetate	A2	A1	D
Ethyl Benzoate	–	B1	D
Ethyl Chloride	A1	D	A
Ethyl Ether	A1	D	A2
Ethylene Bromide	–	D	A
Ethylene Chloride	A	C1	A
Ethylene Chlorohydrin	D	D	A
Ethylene Diamine	D	–	B
Ethylene Dichloride	A1	D	A
Ethylene Glycol	A	A	A
Ethylene Oxide	A1	D	A
Fatty Acids	A1	A	A
Ferric Chloride	A	A	A
Ferric Nitrate	A1	A	A
Ferric Sulfate	A1	A	A
Ferrous Chloride	D	A	A
Ferrous Sulfate	D	A	A
Fluoboric Acid	D	A	A1
Fluorine	D	D	A1
Fluosilicic Acid	D	A	A1
Formaldehyde 40%	A	A	A
Formaldehyde 100%	D	C	A
Formic Acid	D	A1	A
Freon® 11	D	A	A
Freon® 12	A1	A2	A
Freon® 22	B	B	A
Freon® 113	–	D	B

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Chemical	Nylon	Polyprop.	PVDF
Freon® TF	D	D	B
Fuel Oils	A1	A	B
Furfural	B	D	B2
Gallic Acid	A	A	A1
Gasoline (high-aromatic)	A	A	A
Gasoline, leaded, ref.	A2	B	A
Gasoline, unleaded	A2	C1	A
Gelatin	A1	A	A
Glucose	A	A	A
Glue, P.V.A	A1	–	–
Glycerin	A1	A	A
Glycolic Acid	–	A	B
Grease	–	–	A
Heptane	A	C2	A
Hexane	B	B1	A
Honey	A	A	A
Hydrazine	–	C	A
Hydrobromic Acid 20%	D	A2	A
Hydrobromic Acid 100%	D	C1	A
Hydrochloric Acid 20%	D	B2	A
Hydrochloric Acid 37%	D	C	A
Hydrochloric Acid 100%	D	B1	A
Hydrochloric Acid, Dry Gas	A1	B	A
Hydrocyanic Acid	B	A	A
Hydrofluoric Acid 20%	C1	A2	A
Hydrofluoric Acid 50%	D	A2	A
Hydrofluoric Acid 75%	D	C1	A
Hydrofluoric Acid 100%	D	C1	A
Hydrofluosilicic Acid 20%	D	A	A
Hydrofluosilicic Acid 100%	D	A	A1
Hydrogen Gas	A2	A	A
Hydrogen Peroxide 10%	C1	A	A
Hydrogen Peroxide 30%	D	B1	A
Hydrogen Peroxide 50%	D	B1	A1
Hydrogen Peroxide 100%	D	B1	A1
Hydrogen Sulfide (aqua)	C1	A1	A
Hydrogen Sulfide (dry)	C1	A1	A
Hydroquinone	D	A	–
Ink C	–	A	–
Iodine	A	C	A
Iodine (in alcohol)	C	–	A2
Isooctane	A1	A2	A2
Isopropyl Acetate	B1	B1	D
Isopropyl Ether	A1	B	D
Isotane	D	D	A
Jet Fuel (JP3, JP4. JP5)	C	A1	B
Kerosene	A	B	A
Ketones	A2	C	C1
Lacquer Thinner	A1	D	–
Lacquer	A1	D	D
Lactic Acid	B	B	B1
Lard	A1	B1	A
Latex	A1	A2	A
Lead Acetate	A	A1	A
Lead Nitrate	–	A2	A2
Lead Sulfamate	B1	A2	A
Ligroin	D	A2	A
Lime	A1	–	A
Linoleic Acid	–	B1	A2
Lithium Chloride	–	A2	A2
Lubricants	A1	A1	A
Lye: KOH Potassium Hydroxide	C	A	A
Lye: NaOH Sodium Hydroxide	A	A	D
Lye: Ca(OH)2 Calcium Hydroxide	A2	A2	A2
Magnesium Bisulfate	A1	A2	–
Magnesium Carbonate	–	A	A
Magnesium Chloride	A1	A2	A
Magnesium Hydroxide	B1	A	A
Magnesium Nitrate	A1	A	A
Magnesium Sulfate (Epsom Salts)	A1	A	A
Maleic Acid	A	A	A
Maleic Anhydride	–	D	A
Malic Acid	A	A1	A
Manganese Sulfate	A2	–	A2
Melamine	A	A	–
Mercuric Chloride (dilute)	D	B	A
Mercuric Cyanide	A2	B	A
Mercurous Nitrate	–	A	A
Mercury	A	B	A
Methane	A	A	A
Methanol (Methyl Alcohol)	B1	A2	A
Methyl Acetate	A2	D	B1
Methyl Acetone	A	–	D
Methyl Alcohol 10%	B1	A2	A
Methyl Bromide	B1	C	A
Methyl Butyl Ketone	D	D	D

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Chemical	Nylon	Polyprop.	PVDF
Methyl Cellosolve	C	B	A
Methyl Chloride	B1	D	A
Methyl Dichloride	C	D	D
Methyl Ethyl Ketone	A1	B	D
Methyl Isobutyl Ketone	B2	A	D
Methyl Isopropyl Ketone	A	–	–
Methylamine	–	A2	C
Methylene Chloride	C1	B1	B1
Mineral Spirits	A	B	–
Molasses	A1	B	B1
Monochloroacetic Acid	D	–	B1
Monoehanolamine	A	B	C
Morpholine	A2	B2	B1
Motor Oil	A2	A1	B
Naphtha	A	B	A
Naphthalene	A1	B	A2
Natural Gas	–	A	–
Nickel Chloride	C1	A	A
Nickel Nitrate	A1	A2	A2
Nickel Sulfate	A1	A	A
Nitrating Acid (≤1% Acid)	–	C	–
Nitrating Acid (≤15% H2SO4)	–	C	–
Nitrating Acid (>15% H2SO4)	–	C	–
Nitrating Acid (<15% HNO3)	–	C	–
Nitric Acid (5-10%)	D	A	A1
Nitric Acid (20%	D	A2	A
Nitric Acid (50%)	D	B	A1
Nitrobenzene	B1	B1	A1
Nitromethane	B1	B2	A2
Nitrous Acid	–	A	B
Nitrous Oxide	C	D	D
Oils: Aniline	A	A	A
Bone	–	A	A
Castor	A	A	A
Cinnamon	–	D	–
Citric	A	A	A
Coconut	–	A1	A
Cod Liver	–	A1	A
Corn	A	A2	A
Cottonseed	B	A	A
Diesel Fuel (20, 30, 40, 50)	A	A1	A
Fuel (1, 2, 3, 5A, 5B, 6)	A	B	B
Hydraulic (Petro)	A1	D	A

Chemical	Nylon	Polyprop.	PVDF
Hydraulic (Synthetic)	A1	D	A
Linseed	A1	A	A
Mineral	A	A	A
Olive	A1	A	–
Orange	–	A	A
Pine	A	B	A
Sosin	A1	A2	A
Sesame Seed	–	A	A
Silicone	A1	A	A
Soybean	A	A1	A
Transformer	A1	B	A
Turbine	A	B1	A
Oleic Acid	A	B1	A
Oleum 25%	D	D	C1
Oleum 100%	D	D	D
Oxalic Acid (cold)	B2	A2	B
Ozone	D	B	A
Palmitic Acid	A	B1	A2
Paraffin	A1	A1	A
Pentane	A1	D	A
Perchloric Acid	D	C	A
Perchloroethylene	C1	D	A
Petrolatum	D	D	A
Petroleum	A1	B1	A
Phenol (10%)	D	B1	A
Phenol (Carbolic Acid)	D	B	A1
Phosphoric Acid (≤40%)	B1	A2	B
Phosphoric Acid (≥40%)	B1	A2	B
Phosphoric Acid (crude)	B1	B2	A
Phosphoric Acid (molten)	–	D	D
Phosphoric Acid Anhydride	–	A	D
Phosphorus	–	A	A1
Photographic Developer	–	A	–
Photographic Solutions	A1	A2	B2
Phthalic Acid	B1	A	A2
Phthalic Anhydride	–	D	A
Picric Acid	C1	B1	A1
Plating Solutions			
Antimony Plating 130°F	D	A	A
Arsenic Plating 110°F	A	A	A
Brass Plating:			
Regular Brass Bath 100°F	A	A	B
High-Speed Brass Bath 110°F	A	A	B

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Chemical	Nylon	Polyprop.	PVDF
Bronze Plating:			
Cu-Cd Bronze Bath R.T.	A	A	A
Cu-Sn Bronze Bath 160°F	A	A	A
Cu-Zn Bronze Bath 100°F	A	A	A
Cadmium Plating:			
Cyanide Bath 90°F	A	A	A
Fluoborate Bath 100°F	D	A	A
Chromium Plating:			
Barrel Chrome Bath 95°F	D	A	C
Black Chrome Bath 115°F	D	A	C
Chromic-Sulfuric Bath 130°F	D	A	C
Fluoride Bath 130°F	D	A	C
Copper Plating (Cyanide):			
Copper Strike Bath 120°F	A	A	B
High-Speed Bath 180°F	A	A	A
Rochelle Salt Bath 150°F	A	A	A
Copper Plating (Acid):			
Copper Fluoborate Bath 120°F	D	A	A
Copper Sulfate Bath R.T.	D	A	A
Copper Plating (Misc.):			
Copper Pyrophosphate	A	A	A
Copper (Electroless)	A	A	A
Gold Plating:			
Acid 75°F	A	A	–
Cyanide 150°F	A	A	–
Neutral 75°F	A	A	–
Indium Sulfamate Plating R.T.	D	A	–
Iron Plating:			
Ferrous Am Sulfate Bath 150°F	D	A	–
Ferrous Sulfate Bath 150°F	D	A	–
Fluoborate Bath 145°F	D	A	–
Sulfamate 140°F	D	A	–
Sulfate-Chloride Bath 160°F	D	A	–
Lead Fluoborate Plating	D	A	–
Nickel Plating:			
Fluoborate 100-170°F	D	A	–
High-Chloride 130-160°F	D	A	–
Sulfamate 100-140°F	A	A	–
Watts Type 115-160°F	A	A	–
Rhodium Plating 120°F	D	A	–
Silver Plating 80-120°F	A	A	–
Tin-Fluoborate Plating 100°F	D	A	–
Tin-Lead Plating 100°F	D	A	–

Chemical	Nylon	Polyprop.	PVDF
Zinc Plating:			
Acid Chloride 140°F	D	A	–
Acid Fluoborate Bath R.T.	D	A	–
Acid Sulfate Bath 150°F	D	A	–
Alkaline Cyanide Bath R.T.	A	A	–
Potash (Potassium Carbonate)	A	A	A
Potassium Bicarbonate	A1	A	B
Potassium Bromide	A1	A	A
Potassium Chlorate	C1	A	A
Potassium Chloride	A1	A	A
Potassium Chromate	B	A	B
Potassium Cyanide Solutions	A1	A	A
Potassium Dichromate	B1	A	A
Potassium Ferricyanide	B1	A2	A2
Potassium Ferrocyanide	B1	A	A
Potassium Hydroxide (Coustic potash)	C1	A	A
Potassium Hypochlorite	B1	–	A1
Potassium Iodide	A1	A2	A2
Potassium Nitrate	B1	A	A
Potassium Permanganate	D	A1	A
Potassium Sulfate	A1	A	A
Potassium Sulfide	A	A	A
Propane (liquefied)	A1	A	A
Propylene Glycol	A	A2	–
Pyridine	C1	A2	D
Pyrogallic Acid	–	A	A
Resorcinal	D	A2	–
Rosins	A1	A2	–
Salad Dressings	A	A	–
Salicylic Acid	A1	A1	A
Salt Brine (NaCl saturated)	A	A	A
Sea Water	A2	A	A
Shellac (Bleached)	A1	A	–
Shellac (Orange)	A1	A	–
Silicone	A1	A	A
Silver Nitrate	A1	A1	A
Soap Solutions	A1	A	A1
Sodium Acetate	B1	A	A
Sodium Benzoate	B1	A2	A2
Sodium Bicarbonate	A	A	A
Sodium Bisulfate	A1	A	A
Sodium Bisulfide	C1	A	A

Chemical Resistance of Resin Materials

A = Excellent (No Effect) • C = Fair (Moderate Effect) • 1 = Satisfactory to 72° F (22°C)
B = Good (Minor Effect) • D = Poor (Severe Effect) • 2 = Satisfactory to 120° F (48° C)

**** Please read the disclaimer note at the bottom of page 3 (Typical Properties of Materials)**

Chemical	Nylon	Polyprop.	PVDF
Sodium Borate (Borax)	A	B	A
Sodium Bromide	B1	–	A2
Sodium Carbonate	B1	A	A
Sodium Chlorate	D	A	A
Sodium Chloride	A1	A	A
Sodium Chromate	C	–	A
Sodium Cyanide	A1	A	A
Sodium Ferrocyanide	–	A	A
Sodium Fluoride	B	A	A
Sodium Hydrosulfite	A	–	–
Sodium Hydroxide (20%)	A	A	A
Sodium Hydroxide (50%)	A	A	D
Sodium Hydroxide (80%)	C	A	D
Sodium Hypochlorite (100%)	D	B	A
Sodium Hypochlorite (<20%)	D	A	A
Sodium Metaphosphate	A1	A1	A
Sodium Metasilicate	–	A	–
Sodium Nitrate	A1	A	A
Sodium Perborate	B1	A	–
Sodium Peroxide	A1	B	A
Sodium Polyphosphate	A1	A	A
Sodium Silicate	A1	A	A
Sodium Sulfate	A	A	A
Sodium Sulfide	A1	A	A
Sodium Sulfite	D	A2	A
Sodium Tetraborate	A	–	–
Sodium Thiosulfate (hypo)	B	A2	–
Sorghum	A	–	–
Stannic Chloride	B1	A	A
Stannous Chloride	C1	A	A
Starch	A1	A2	–
Stearic Acid	A2	A2	A
Stoddard Solvent	A	C	A
Styrene	A1	–	–
Sugar (Liquids)	A1	A	–
Sulfate (Liquors)	B1	A	A
Sulfur Chloride	A1	C1	A1
Sulfur Dioxide	C1	A1	A
Sulfur Dioxide (dry	B1	A1	A
Sulfur Trioxide (dry)	A1	D	C1
Sulfuric Acid (<10%)	C1	A2	A
Sulfuric Acid (10-75%)	D	A1	A

Chemical	Nylon	Polyprop.	PVDF
Sulfuric Acid (75-100%)	D	C1	A
Sulfuric Acid (cold concentrated)	D	A2	A
Sulfuric Acid (hot concentrated)	D	D	C
Sulfurous Acid	D	A	A
Tallow	A1	A2	–
Tannic Acid	C1	A	B
Tanning Liquors	A1	A1	–
Tartaric Acid	B2	A	B
Tetrachloroethane	C1	C	A
Tetrachloroethylene	A1	D	–
Tetrahydrofuran	A	C2	B1
Tin Salts	–	A	A
Toluene (Toluol)	A1	C1	A1
Tomato Juice	A1	A	A
Trichloroacetic Acid	C	A	B
Trichloroethane	C1	C	A
Trichloroethylene	C1	C1	B
Tricresylphosphate	A2	A1	D
Triethylamine	A1	D	A2
Trisodium Phosphate	A	A	A
Turpentine	B	D	A
Urea	A	A	A
Uric Acid	A	–	–
Urine	B	A	A
Varnish	A	A	–
Vinegar	A	A	B
Vinyl Acetate	–	B1	A2
Vinyl Chloride	A1	–	B1
Water, Deionized	A1	A2	A2
Water, Acid, Mine	A	A	A
Water, Distilled	A1	A	A
Water, Fresh	A1	A	A
Water, Salt	A2	A	A
Weed Killers	A	–	–
Whiskey & Wines	A1	A	A
White Liquor (Pulp Mill)	A1	A1	A1
White Water (Paper Mill)	A	A	–
Xylene	A2	B	A
Zinc Chloride	A	A	A
Zinc Hydrosulfite	A	–	–
Zinc Sulfate	A	A	A

Chemical Resistance of 316L Stainless Steel

A = Excellent (No Effect)
B = Good (Minor Effect)
C = Fair (Moderate Effect)
D = Poor (Severe Effect)

Acetic Acid	A
Acetone	A
Air	A
Ammonia	A
Benzene	B
Carbon Dioxide	A
Chlorine Water	C
Ethanol	A
Ethylene Glycol	A
Gasoline, Unleaded	A
Hydrochloric Acid	D
Hydrofluoric Acid	B
Isopropyl Alcohol	B
Methyl Ethyl Ketone(MEK)	A
Methanol	A
Oxygen	A
Ozone	A
Steam	A
Sulfuric Acid	B
Toluene	A
Trichloroethylene	B
Water, Fresh	A

Disinfectant and Sterilization Methods of 316L Stainless Steel

Formalin	Excellent
Isopropyl Alcohol	Excellent
Ethyl Alcohol	Excellent
Ethylene Oxide	Excellent
Autoclave	Excellent
E-Beam	Excellent
Gamma	Excellent
Dry Heat	Excellent

Stainless Steel Barb Details

Use with Hose ID	EJ Barb #	Thru Hole ID	Barb Diameter
1/8"	2	.100"	.215"
3/16"	3	.127"	.260"
1/4"	4	.167"	.314"
5/16"	5	.217"	.372"
3/8"	6	.312"	.498"
1/2"	8	.400"	.619"
5/8"	10	.495"	.743"
3/4"	12	.667"	.956"

Data presented is for reference only. Customer applications and conditions of use are beyond our control, therefore it is imperative that customers test Eldon James products in their specific application to determine suitability. All information is provided without implied or expressed warranty or guarantee and none of the information provided constitutes a recommendation or endorsement of any kind by Eldon James Corporation.

Sterilization Stability of Resin Materials

MATERIAL	GAMMA RADIATION	ETHYLENE OXIDE	AUTOCLAVE
KYNAR	Highly compatible, but will discolor to a brownish hue. Physical properties typically improve	Excellent	Excellent
POLYCARBONATE	Compatible to 10 MRad dose with little loss of physical properties. Will discolor to light yellow-green hue.	Highly compatible with 1005 EtO; may stress crack if in EtO/CFC mix, due to moulding stresses.	Not recommended. May craze or crack due to moulding stresses.
RADIATION STABLE POLYCARBONATE	Excellent up to 10 MRad dose-with little loss of physical prpoerties. Light viole hue turns clear upon sterilization.	Highly compatible. Withstands normal EtO sterilization conditions, but multiple exposures can reduce tensile elongation properties.	Not recommended
POLYPROPYLENE	Excellent up to commonly used sterilization doses (approximately 6 MRad)	Fair; may stress crack in EtO/CFC mix due to moulding stresses.	Poor. Parts may distort due to low heat deflection temperature
NYLON, AND GLASS FILLED NYLON	Physically compatible with commonly used sterilization doses, but may discolor to a brownish hue.	Very good. Some susceptibility to oxidizing agents.	Very good. Components may swell slightly due to water absorbtion
ABS	Compatible to 10 MRad dose with some loss of impact strength, but increased tensile strength. Some discoloration to slight brownish hue	Excellent retention of properties for at least 5 sterilization cycles.	Poor. Parts may distort due to low heat deflection temperature
POLYURETHANE (TUBING)	Excellent. Some discoloration may occur, but reverses over time. No significant effect on physical properties	Excellent. No noticeable effect on physical properties	Not recommended. Hydrolysis of polyurethane may create aromatic impurities
POLYETHYLENE (TUBING)	Excellent. Tensile strength increases and modulus of elasticity decreases due to cross -linking of polymer	Excellent	Not Recommended. Tubing may distort at common autoclave temperatures
KYNAR TUBING	Highly compatible, but will discolor to a brownish hue. Physical properties typically improve	Excellent	Excellent

**** Disclaimer:** The data presented in this publication is for reference only. It was compiled primarily from outside sources provided by feedstock materials suppliers and resin manufacturers, and is offered to our customers as a means of comparing the characteristics of resins and materials used by Eldon James Corp. at the time of publication. The particular conditions of your use and application of our products are beyond our control. Thus, it is imperative that you test our products in your specific application to determine their ultimate suitability. All information is provided without implied or expressed warranty or guarantee by Eldon James Corp, or the resin and feedstock manufacturers. Eldon James Corp. assumes no liability with respect to the accuracy or completeness of the information contained herein and none of the information provided constitutes a recommendation or endorsement of any kind by the Eldon James Corp.