

Chemical Resistance Properties of Tubing

The ratings on this chart are based on the results of laboratory tests. They reflect the relative capabilities of various Saint-Gobain Performance Plastics tubing formulations to withstand specific chemicals. NOTE: The ratings in the charts DO NOT reflect the extent to which extraction may occur, or the extent to which fluids may undergo any physical changes in properties or composition, as a result of coming into contact with the tubing. Saint-Gobain Performance Plastics makes no representation or warranty with respect to the susceptibility of any fluid to become contaminated or undergo changes in properties or composition as a result of possible extraction of tubing ingredients by the fluid to be transmitted. Certain corrosives that would be destructive to tubing with prolonged exposure can be satisfactorily handled for short periods of time if flushed with water after use. All ratings are based on room temperature (73°F). Chemical resistance will be adversely affected by elevated temperatures.

IMPORTANT: It is the user's responsibility to ensure the suitability and safety of Saint-Gobain Performance Plastics tubing for all intended uses, including establishing the compatibility of any fluid with the tubing through which it is transmitted. Laboratory, field or clinical tests must be conducted in accordance with applicable requirements in order to determine the safety and effectiveness for use of tubing in any particular application. If intended for medical use, it is the user's responsibility to ensure that the tubing to be used complies with all applicable medical regulatory requirements.

Chemical Resistance

Saint-Gobain Tubing Name	Tygon S3™ E-3603 & Tygon S3™ E-LFL all variations	Tygon® E-1000	PharMed® BPT (Regular & TAAT)	Tygon® 3355-L	Versilic® SPX-50	Tygon® 2475	Tygon® 2475 I.B.	Tygon® F-4040-A (TAAT)
Acetaldehyde	U	U	U	F	F	F	F	U
Acetate Solvents (general)	U	U	G	U	U	U	U	U
Acetic Acid, 10% in water	E	E	E	E	E	E	E	E
Acetic Acid, 50-60% in water	E	G	G	E	E	E	E	E
Acetic Acid, Glacial, 100%	F	U	G	U	U	E	E	U
Acetone	U	U	U	F	U	G	G	U
Acetonitrile	U	U	G	U	U	G	G	U
Acetyl Chloride	U	U	F	U	U	U	U	U
Acrylonitrile	U	U	G	U	U	G	G	U
Alcohols General	U	U	E	G	E	E	E	G
Aliphatic Hydrocarbons	U	U	U	U	U	U	U	G
Amines	U	U	F	U	U	U	U	U
Ammonia Gas	E	E	E	U	U	E	E	E
Ammonia, Anhydrous Liquid	G	G	E	U	U	G	G	G
Ammonium Hydroxide, 5-10% in water	E	E	E	U	U	E	E	G
Ammonium Hydroxide, 30% in water	E	E	E	U	U	E	E	F
Ammonium Salts	E	E	E	E	E	E	E	E
Ammonium Sulfate, 30% in water	E	E	E	E	E	E	E	E
Aniline	U	U	F	U	U	U	U	U
Aromatic Hydrocarbons	U	U	U	U	U	U	U	U
Benzaldehyde	U	U	U	F	F	F	F	U
Benzoic Acid	U	U	G	U	U	U	U	F
Benzyl Alcohol	U	U	E	E	E	E	E	U
Bleach Liquor, 22% in water	F	E	E	U	G	E	E	E
Boric Acid, 4% in water	E	E	E	E	G	E	E	E
Butadiene	E	E	E	E	E	G	G	E
Butyl Acetate	U	U	G	U	U	U	U	U
Butyl Alcohol	U	U	U	U	U	E	E	E

E=Excellent F-Fair G=Good U=Unsatisfactory

Chemical Resistance (continued)

Saint-Gobain Tubing Name	Tygon S3™ E-3603 & Tygon S3™ E-LFL all variations	Tygon® E-1000	PharMed® BPT (Regular & TAAT)	Tygon® 3355-L	Versilic® SPX-50	Tygon® 2475	Tygon® 2475 I.B.	Tygon® F-4040-A (TAAT)
Calcium Chloride, 30% in water	E	E	E	E	E	E	E	E
Calcium Salts	E	E	E	E	E	E	E	E
Carbon Tetrachloride	U	U	U	U	U	U	U	U
Castor Oil	U	U	F	E	E	G	G	E
Cellosolve Acetate	U	U	F	U	U	U	U	F
Chlorine, Dry Gas	E	F	F	U	U	F	F	E
Chlorine, Wet Gas	F	U	U	U	U	F	F	E
Chlorobenzene, Mono, Di, Tri	U	U	U	U	U	U	U	U
Chloroform	U	U	U	U	U	U	U	U
Citric Acid, 10-20% in water	E	E	E	E	E	E	E	E
Cresol (m, o, or p)	F	U	U	G	G	E	E	F
Cyclohexane	U	U	U	U	U	U	U	F
Cyclohexanone	U	U	U	U	U	F	F	U
Detergent Solutions	E	E	G	E	G	E	E	E
Diesel Fuel	U	U	U	U	U	U	U	G
Dimethylformamide	U	U	G	E	G	E	E	U
Dioxane	U	U	U	U	U	U	U	U
Ether	U	U	F	U	U	U	U	F
Ethyl Acetate	U	U	G	U	U	U	U	U
Ethyl Alcohol (Ethanol)	U	U	F	G	F	E	E	G
Ethylene Dichloride	U	U	F	U	U	U	U	U
Ethylene Glycol	E	E	E	E	E	E	E	E
Ethylene Oxide	E	F	E	E	F	E	E	E
Fatty Acids	U	U	F	G	F	F	F	G
Formaldehyde, 37% in water	U	U	U	F	F	F	F	U
Formic Acid, 40-50% in water	G	F	G	E	F	E	E	U
Formic Acid, 98% in water	F	F	G	E	F	E	E	U
Glucose, 50% in water	E	E	E	E	E	E	E	E

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Chemical Resistance (continued)

Saint-Gobain Tubing Name	Tygon S3™ E-3603 & Tygon S3™ E-LFL all variations							
	Tygon® E-1000	PharMed® BPT (Regular & TAAAT)	Tygon® 3355-L	Versilic® SPX-50	Tygon® 2475	Tygon® 2475 I.B.	Tygon® F-4040-A (TAAAT)	
Glycerol, (Glycerin)	E	E	E	E	E	E	E	E
Glycolic Acid, 70% in water	E	G	G	E	E	E	E	E
Hexane	U	U	U	U	U	U	U	G
Hydrobromic Acid, 20-50% in water	E	E	U	U	U	E	E	E
Hydrobromic Acid, 100% in water	F	E	U	U	U	E	E	U
Hydrochloric Acid, 10% in water	E	E	E	E	E	E	E	E
Hydrochloric Acid, 37% in water	F	F	G	U	U	E	E	U
Hydrofluoric Acid, 10% in water	E	E	U	U	U	E	E	E
Hydrofluoric Acid, 25% in water	F	E	U	U	U	E	E	U
Hydrofluoric Acid 40-48% in water	U	F	U	U	U	E	E	U
Hydrogen Peroxide, 3% in water	E	E	E	E	E	E	E	E
Hydrogen Peroxide, 10% in water	E	E	E	E	E	E	E	E
Hydrogen Peroxide, 30% in water	E	E	E	E	E	E	E	U
Hydrogen Peroxide, 90% in water	U	U	G	F	F	G	G	U
Hydroquinone, 7% in water	E	E	G	G	F	E	E	E
Iodine, 50 ppm in water	E	E	E	E	E	E	E	E
Isobutyl Alcohol	U	U	F	U	U	E	E	E
Isooctane	U	U	U	U	U	U	U	G
Isopropyl Acetate	U	U	G	U	U	U	U	U
Isopropyl Alcohol	U	U	F	U	U	E	E	E
Isopropyl Ether	U	U	F	U	U	U	U	F
Jet Fuel, JP8	U	U	U	U	U	U	U	G
Kerosene	U	U	U	U	U	U	U	G
Ketones	U	U	U	U	U	F	F	U
Lubricating Oils, Petroleum	U	U	U	G	G	U	U	E
Magnesium Sulfate, 25% in water	E	E	E	E	E	E	E	E
Methyl Ethyl Ketone	U	U	U	U	U	F	F	U
Methyl Isobutyl Ketone	U	U	U	U	U	F	F	U
Methylene Chloride	U	U	F	U	U	U	U	U
Mineral Oil	G	U	U	U	U	U	U	E
Motor Oil	U	U	U	U	U	U	U	E
Naphthalene	U	U	U	U	U	U	U	G
Nitric Acid, 10% in water	E	E	E	F	F	E	E	U
Nitric Acid, 35% in water	G	U	E	U	U	E	E	U
Nitric Acid, 68-71% in water	U	U	U	U	U	E	E	U
Nitrobenzene	U	U	U	U	U	U	U	U
Oxygen	E	E	E	E	E	E	E	E
Ozone, 300pphm	E	E	E	E	U	E	E	E

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Chemical Resistance (continued)

Saint-Gobain Tubing Name	Tygon S3™ E-3603 & Tygon S3™ E-LFL all variations							
	Tygon® E-1000	PharMed® BPT (Regular & TAAAT)	Tygon® 3355-L	Versilic® SPX-50	Tygon® 2475	Tygon® 2475 I.B.	Tygon® F-4040-A (TAAAT)	
Paraffins	U	U	U	U	U	U	U	G
Perchloric Acid, 67% in water	U	U	E	U	U	E	E	U
Phenol, 5-10% in water	G	F	E	E	U	E	E	E
Phenol, 91% in water	F	U	E	G	U	E	E	F
Phosphoric Acid, <10% in water	E	E	E	F	U	E	E	E
Phosphoric Acid, 25% in water	E	E	E	U	U	E	E	E
Phosphoric Acid, 85% in water	F	E	E	U	U	E	E	U
Phthalic Acid, 9% in alcohol	U	U	E	G	F	E	E	F
Phthalic Anhydride, 9% in alcohol	U	U	E	E	F	E	E	U
Potassium Dichromate, 5% in water	E	E	E	E	E	E	E	E
Potassium Hydroxide, <10% in water	E	U	E	E	G	E	E	U
Potassium Salts	E	E	E	E	E	E	E	E
Propyl Alcohol (Propanol)	U	U	F	U	U	E	E	E
Pyridine	U	U	F	U	U	F	F	U
Soap Solutions	E	F	G	E	F	E	E	E
Sodium Acetate, 55% in water	E	E	E	U	E	E	E	E
Sodium Bicarbonate, 7% in water	E	E	E	E	E	E	E	E
Sodium Carbonate, 7% in water	E	E	E	E	E	E	E	E
Sodium Chlorate, 45% in water	E	E	E	E	E	E	E	E
Sodium Chloride, 20% in water	E	E	E	E	E	E	E	E
Sodium Hydroxide, 10-15% in water	E	U	E	E	G	E	E	U
Sodium Hydroxide, 30-40% in water	G	U	E	E	G	E	E	U
Sodium Nitrate, 3.5% in water	E	E	E	E	E	E	E	E
Sodium Salts	E	E	E	E	E	E	E	E
Sodium Sulfate, 5% in water	E	E	E	E	E	E	E	E
Sulfuric Acid, 10% in water	E	E	E	E	E	E	E	E
Sulfuric Acid, 30% in water	E	E	E	G	G	E	E	G
Sulfuric Acid, 95-98% in water	U	U	U	U	U	E	E	U
Tetrahydrofuran	U	U	U	U	U	U	U	U
Toluene	U	U	U	U	U	U	U	U
Trichloroethane	U	U	F	U	U	U	U	U
Trichloroethylene	U	U	U	U	U	U	U	U
Trichloropropane	U	U	F	U	U	U	U	F
Urea 20% in water	E	E	E	E	G	E	E	E
Vinegar	E	E	E	E	E	E	E	E
Water, Deionized	E	E	E	E	E	E	E	E
Water, Distilled	E	E	E	E	E	E	E	E
Xylene	U	U	U	U	U	U	U	U

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Physical Properties and Sterilization Guidelines for Saint-Gobain Tubing

Typical Physical Properties of Tygon® and Other Saint-Gobain Performance Plastics Tubing

Saint-Gobain Tubing Name	Durometer Hardness Shore A, 15	Color	Max. Recommended Operating Temperature	Low Temperature Flexibility	Tensile Strength psi (M Pa)
			°F (°C)	°F (°C)	
Tygon S3™ E-3603	56	Clear	165 (74)	-67 (-55)	1,750 (12.1)
Tygon S3™ E-3603 Vacuum	56	Clear	165 (74)	-67 (-55)	1,750 (12.1)
Tygon S3™ E-LFL	56	Clear	165 (74)	-67 (-55)	1,800 (12.4)
Tygon® E-1000	40	Clear	125 (52)	not tested	1,075 (7.4)
PharMed® BPT	64	Cream	275 (135)	-40 (-40)	1,000 (6.9)
Tygon® 3355-L	55	Translucent	400 (204)	not tested	900 (6.2)
Versilic® SPX-50	50	Translucent	350 (177)	not tested	1,500 (10.3)
Tygon® 2475	72	Clear	125 (52)	-94 (-70)	2,000 (13.8)
Tygon® 2475 I.B.	72	Clear (with inner braid)	125 (52)	-94 (-70)	2,000 (13.8)
Tygon S3™ E-3603 TAAT	56	Clear	165 (74)	-67 (-55)	1,750 (12.1)
Tygon® F-4040-A TAAT	57	Translucent Yellow	165 (74)	not tested	1,820 (12.5)
Tygon S3™ E-LFL TAAT	56	Clear	165 (74)	-67 (-55)	1,800 (12.4)
PharMed® BPT TAAT	64	Cream	275 (135)	-40 (-40)	1,000 (6.9)

Sterilization Chart

Saint-Gobain Tubing Name	Sterilization Method Supported		
	Autoclave ¹	Gas ²	Radiation ³
Tygon S3™ E-3603	yes	yes	no
Tygon S3™ E-3603 Vacuum	yes	yes	no
Tygon S3™ E-LFL	yes	yes	no
Tygon® E-1000	no	yes	no
PharMed® BPT	yes	yes	yes (up to 5 MRad)
Tygon® 3355-L	yes	yes	gamma only
Versilic® SPX-50	yes	yes	yes
Tygon® 2475	no	yes	yes
Tygon® 2475 I.B.	no	yes	yes
Tygon S3™ E-3603 TAAT	not tested	not tested	not tested
Tygon® F-4040-A TAAT	not tested	not tested	not tested
Tygon S3™ E-LFL TAAT	not tested	not tested	not tested
PharMed® BPT TAAT	not tested	not tested	not tested

¹ Steam 30 minutes at 15 psi at 250°F (121°C)

² Ethylene Oxide

³ Gamma and E-Beam up to 2.5 MRad

