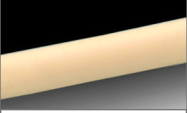
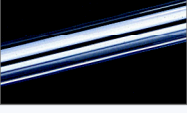


CATALYST™ Pump Tubing

Tubing formulations to meet the needs of your application

Catalyst high-precision peristaltic pump tubing is manufactured to exacting specifications to optimize accuracy, repeatability, and to provide enhanced tubing life. This tubing has been tested and quality assured to operate in Catalyst peristaltic pumps.

Pump tubing formulation	Advantages	Application suitability†							Gas permeability	Sterilization
		Acids	Alkalies	Organic solvents	Pressure	Vacuum	Viscous fluids	Sterile fluids		
Silicone (platinum-cured) 	Ultra-smooth inner surface minimizes particle entrapment. No leachable additives, DOP, or plasticizers; phthalate and latex-free; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Weather, ozone, corona, and radiation resistant. Translucent, clear to light amber.	N/R	N/R	N/R	F	G	F	E	CO ₂ : 25,147 H ₂ : — O ₂ : 4715 N ₂ : 2284	Sterilize by EtO, autoclave, or gamma radiation.
PharMed® BPT 	Great for tissue and cell work—nontoxic and nonhemolytic. Long service life (up to 10,000 hrs); reduces tubing costs and pump downtime. Opaque to UV and visible light to protect light-sensitive fluids. Low gas permeability. Opaque, beige	G	G	N/R	G	G	E	E	CO ₂ : 1200 H ₂ : — O ₂ : 200 N ₂ : 80	Sterilize by EtO, autoclave, or gamma radiation up to 2.5 Mrad.
Norprene® Food (A 60 F) 	Longest life, good flow consistency. Heat and ozone resistant. Good resistance to acids/alkalies. Heat sealable, nonaging, and nonoxidizing. High dielectric constant. Opaque, beige.	G	G	N/R	E	E	E	G	CO ₂ : 1200 H ₂ : — O ₂ : 200 N ₂ : 80	Sterilize by EtO, autoclave, or gamma irradiation.
Tygon® E-Food (B-44-4X) 	Bore is extremely smooth (better than most stainless steels) Nontoxic, will not affect taste or odor, and clear for CIP and flow verification. Excellent nonwetting properties permit flush cleaning and complete drainage. High dielectric constant. Transparent, clear.	G	G	N/R	G	G	E	F	CO ₂ : 270 H ₂ : 97 O ₂ : 60 N ₂ : 30	Sterilize by EtO or autoclave.

†E = Excellent, G = Good, F = Fair, P = Poor, N/R = not recommended

Tubing Coils for Catalyst FH10 Pumps

Tubing ID	0.19 mm ID	0.25 mm ID	0.89 mm ID	1.42 mm ID	2.06 mm ID	2.79 mm ID
Flow (mL/min) at 1.7 to 10 rpm	0.002 to 0.013	0.004 to 0.022	0.041 to 0.25	0.09 to 0.57	0.18 to 1.05	0.25 to 1.65
Flow (mL/min) at 13 to 80 rpm	0.017 to 0.10	0.03 to 0.18	0.33 to 2.0	0.75 to 4.5	1.4 to 8.5	1.8 to 11.0
Flow (mL/min) at 50 to 300 rpm	0.07 to 0.43	0.12 to 0.73	1.4 to 8.3	3.2 to 19	5.9 to 35.2	8.3 to 50
Silicone, platinum-cured (15 m/49.2 ft)	—	—	MK-97200-14	MK-97200-16	MK-97200-17	MK-97200-18
PharMed® BPT (30 m/98.4 ft)	—	MK-97200-33	MK-97200-34	MK-97200-36	MK-97200-37	MK-97200-38
Tygon® E-Food (30 m/98.4 ft)	MK-97200-72	MK-97200-73	MK-97200-74	MK-97200-76	MK-97200-77	MK-97200-78

Two-Stop Tubing Links for Catalyst FH15 and FH30 Pumps

Tubing ID	0.8 mm ID	1.6 mm ID	3.2 mm ID	4.8 mm ID
Flow (mL/min) with FH15	0.8 to 4.0	2.8 to 14	11 to 54	21 to 105
Flow (mL/min) with FH30	0.8 to 4.0	2.8 to 14	Not recommended	
Silicone, platinum-cured (6/pk)	MK-97100-12	MK-97100-13	MK-97100-16	MK-97100-17
PharMed® BPT (12/pk)	MK-97100-22	MK-97100-23	MK-97100-26	MK-97100-27
Norprene® Food (12/pk)	MK-97100-42	MK-97100-43	MK-97100-46	MK-97100-47
Tygon® E-Food (12/pk)	MK-97100-62	MK-97100-63	MK-97100-66	MK-97100-67

Tubing Coils for Catalyst FH100, FH100X, FH100D, and FH100DX Pumps

Description	1.6 mm (thin-wall) tubing for FH100 and FH100D pumps						2.4 mm (thick-wall) tubing for FH100X and FH100DX pumps			
Inner diameter	0.8 mm	1.6 mm	3.2 mm	4.8 mm	6.4 mm	8.0 mm	4.8 mm	6.4 mm	8 mm	9.5 mm
Hose barb size	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"	3/16"	1/4"	5/16"	3/8"
Flow (mL/min)	0.5 to 40	2.0 to 150	6.5 to 550	16 to 1200	24 to 2000	36 to 3000	14 to 1200	24 to 2000	36 to 3000	48 to 4000
Length/pk	15 m (49.2 ft)	15 m (49.2 ft)	15 m (49.2 ft)	15 m (49.2 ft)	15 m (49.2 ft)	15 m (49.2 ft)	15 m (49.2 ft)	15 m (49.2 ft)	15 m (49.2 ft)	15 m (49.2 ft)
Silicone, platinum-cured	—	MK-97000-71	MK-97000-72	MK-97000-73	MK-97000-74	MK-97000-75	MK-97000-76	MK-97000-77	MK-97000-78	MK-97000-79
PharMed® BPT	MK-97000-20	MK-97000-21	MK-97000-22	MK-97000-23	MK-97000-24	MK-97000-25	—	—	—	—
Norprene® Food	—	MK-97000-41	MK-97000-42	MK-97000-43	MK-97000-44	MK-97000-45	—	—	—	—
Tygon® E-Food	—	MK-97000-61	MK-97000-62	MK-97000-63	MK-97000-64	MK-97000-65	—	MK-97000-67	MK-97000-68	MK-97000-69

Two-Stop Tubing Links for Catalyst FH100M Pumps—for small cartridges

With pump model	Number of rollers	Flow rates (mL/min) for indicated pump model and tubing ID					
		0.19 mm ID	0.25 mm ID	0.89 mm ID	1.42 mm ID	2.06 mm ID	2.79 mm ID
FH100M 4/8	8	0.013 to 0.60	0.018 to 0.91	0.18 to 9.1	0.04 to 20.0	0.88 to 44.0	1.38 to 67.0
FH100M 8/4	4	0.02 to 0.85	0.03 to 1.0	0.26 to 13.0	0.53 to 26.0	1.14 to 57.0	2.06 to 100.0
FH100M 12/8	8	0.002 to 0.11	0.004 to 0.20	0.03 to 1.9	0.07 to 4.3	0.14 to 8.6	0.25 to 14.0
Silicone, platinum-cured (6/pk)		MK-97200-02	MK-97200-03	MK-97200-04	MK-97200-06	MK-97200-07	MK-97200-08
PharMed® BPT (12/pk)		MK-97200-22	MK-97200-23	MK-97200-24	MK-97200-26	MK-97200-27	MK-97200-28
Tygon® E-Food (12/pk)		MK-97200-62	MK-97200-63	MK-97200-64	MK-97200-66	MK-97200-67	MK-97200-68

Two-Stop Tubing Links for Catalyst FH100M Pumps—for large cartridges

With pump model	Number of rollers	Flow rates (mL/min) for indicated pump model and tubing ID				
		0.8 mm ID	1.6 mm ID	3.2 mm ID	4.8 mm ID	6.4 mm ID
FH100M 4/6	6	0.21 to 10.0	0.6 to 30.0	2.2 to 110	4.0 to 200	5.6 to 280
FH100M 8/3	3	0.22 to 11.0	0.84 to 42.0	3.2 to 160	6.8 to 340	10.6 to 530
FH100M 12/6	6	0.033 to 1.9	0.012 to 6.6	0.35 to 20.0	0.70 to 40.0	0.98 to 56.0
Silicone, platinum-cured (6/pk)		MK-97100-12	MK-97100-13	MK-97100-16	MK-97100-17	MK-97100-18
PharMed® BPT (12/pk)		MK-97100-22	MK-97100-23	MK-97100-26	MK-97100-27	MK-97100-28
Norprene® Food (12/pk)		MK-97100-42	MK-97100-43	MK-97100-46	MK-97100-47	MK-97100-48
Tygon® E-Food (12/pk)		MK-97100-62	MK-97100-63	MK-97100-66	MK-97100-67	MK-97100-68

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Pump Tubing Compatability Charts

Ratings

- A: No effect; little noticeable change
B: Minor effect; slight corrosion or discoloration
C: Moderate effect; not recommended for continuous use; softening, loss of strength, swelling and/or shrinkage
D: Severe effect; not recommended for use; severe softening, swelling and/or shrinkage
—: No data available

Tubing formulations

- PN: PharMed® BPT, Norprene® Food
S: Silicone (platinum-cured)
T: Tygon® E-Food

Fluid	Tubing formulation		
	PN	S	T
Acetaldehyde	D	B	D
Acetate LMW	A	—	D
Acetic acid <5%	A	A	A
Acetic acid >5%	A	A	B
Acetic anhydride	A	C	D
Acetone	D	C	D
Acetonitrile	B	—	D
Acetyl bromide	C	—	D
Acetyl chloride	C	C	D
Air	A	A	A
Aliphatic hydrocarbons	D	—	D
Aluminum chloride	A	B	A
Aluminum sulfate	A	A	A
Alums	A	A	A
Ammonia, gas / liquid	A	C	B
Ammonium acetate	A	—	A
Ammonium carbonate	A	C	A
Ammonium chloride	A	C	A
Ammonium hydroxide	A	A	B
Ammonium nitrate	A	C	A
Ammonium phosphate	A	A	A
Ammonium sulfate	A	A	A
Amyl acetate	B	D	D
Amyl alcohol	D	D	D
Amyl chloride	C	D	D
Aniline	C	D	D
Aniline hydrochloride	C	D	D
Aqua regia (80% HCl, 20% H)	D	D	D
Aromatic hydrocarbons	D	—	D
Arsenic salts	A	—	A
Barium salts	A	A	A
Benzaldehyde	D	B	D
Benzenesulfonic acid	D	D	D
Bleaching liquors	A	B	A
Boric acid	A	A	A
Bromine	D	D	D
Butane	A	D	A
Butanol (butyl alcohol)	D	B	D
Butyl acetate	B	D	D
Butyric acid	B	D	D
Calcium oxide	A	A	A
Calcium salts	A	B	A
Carbon bisulfide	D	D	D
Carbon dioxide	A	B	A
Carbon tetrachloride	D	D	D
Chlorine, dry	C	D	A
Chlorine, wet	D	D	C
Chloroacetic acid	B	—	A

Fluid	Tubing formulation		
	PN	S	T
Chlorobenzene	D	D	D
Chlorobromomethane	B	D	D
Chloroform	C	D	D
Chlorosulfonic acid	D	D	D
Chromic acid, 30%	A	C	C
Chromium salts	A	—	A
Copper salts	A	A	A
Cresol	D	D	B
Cyclohexane	D	D	D
Cyclohexanone	D	D	D
Diacetone alcohol	A	B	D
Dimethyl formamide	B	B	D
Dimethyl Sulfoxide (DMSO)	A	—	—
Essential oils	D	C	D
Ethanol (ethyl alcohol)	C	A	D
Ether	C	D	D
Ethyl acetate	B	B	D
Ethyl bromide	D	D	D
Ethyl chloride	C	D	D
Ethylamine	D	C	D
Ethylene chlorohydrin	A	C	D
Ethylene dichloride	C	D	D
Ethylene glycol	A	A	A
Ethylene oxide	A	D	A
Fatty acids	C	C	B
Ferric chloride	A	B	A
Ferric sulfate	A	B	A
Ferrous chloride	A	C	A
Ferrous sulfate	A	C	A
Fluoboric acid	D	A	C
Fluoroborate salts	A	—	A
Fluosilicic acid	C	D	A
Formaldehyde	D	B	D
Formic acid, 25%	A	B	B
Refrigerant	D	—	D
Gasoline, high-aromatic	D	D	D
Gasoline, nonaromatic	D	D	D
Glucose	A	A	A
Glue, P.V.A.	A	A	A
Glycerin	A	A	A
Hydriodic acid	D	—	A
Hydrobromic acid, 30%	D	D	B
Hydrochloric acid (dil)	A	D	A
Hydrochloric acid (med)	B	D	C
Hydrochloric acid (conc)	—	D	C
Hydrocyanic acid	A	C	A
Hydrocyanic acid, gas, 10%	A	C	A
Hydrofluoric acid, 50%	D	D	C

Fluid	Tubing formulation		
	PN	S	T
Hydrofluoric acid, 75%	—	D	D
Hydrogen peroxide (dil)	A	A	A
Hydrogen peroxide, 90%	B	B	D
Hypochlorous acid	A	D	A
Iodine solutions	A	C	A
Iodoform	—	—	—
Kerosene	D	D	D
Ketones	D	—	D
Lacquer solvents	B	D	D
Lactic acid, 3-10%	A	A	A
Lead acetate	A	D	A
Linseed oil	C	A	D
Lithium hydroxide	B	D	A
Magnesium chloride	A	A	A
Magnesium sulfate	A	A	A
Malic acid	A	B	A
Manganese salts	A	B	A
Mercury salts	A	—	A
Methane	A	D	A
Methanol (methyl alcohol)	A	A	C
Methyl chloride	C	D	D
Methyl ethyl ketone (MEK)	D	D	D
Mixed acid (40% H ₂ SO ₄ , 15% HNO ₃)	B	—	B
Molybdenum disulfide	—	—	—
Monoethanolamine	C	B	D
Naphtha	D	D	D
Natural gas	A	A	A
Nickel salts	A	A	A
Nitric acid (dil)	A	B	A
Nitric acid (med)	A	C	C
Nitric acid (conc)	D	D	D
Nitrobenzene	D	D	D
Nitrogen oxides	A	D	A
Nitrous acid	A	—	A
Oils, animal	C	B	D
Oils, mineral	D	B	C
Oils, vegetable	C	B	D
Oleic acid	C	D	D
Oxalic acid, cold	B	B	C
Oxygen, gas	A	B	A
Palmitic acid, 100% in ether	C	D	D
Perchloric acid	A	D	C
Perchloroethylene	C	D	D
Phenol (carbolic acid)	A	D	B
Phosphoric acid, 50%	A	C	C
Phthalic acid	A	B	D
Plating solutions	A	D	A
Polyglycol	B	A	A

Fluid	Tubing formulation		
	PN	S	T
Potassium carbonate	A	—	A
Potassium chlorate	B	B	B
Potassium hydroxide (med)	A	B	B
Potassium hydroxide (conc)	A	C	D
Potassium iodide	A	—	A
Propanol (propyl alcohol)	C	A	D
Pyridine	C	D	D
Silicone fluids	A	C	B
Silicone oils	C	C	B
Silver nitrate	A	A	A
Soap solutions	B	A	A
Sodium bicarbonate	A	A	A
Sodium bisulfate	A	—	A
Sodium bisulfite	A	A	A
Sodium borate	A	A	A
Sodium carbonate	A	A	A
Sodium chlorate	A	C	A
Sodium chloride	A	A	A
Sodium ferrocyanide	A	—	B
Sodium hydrosulfite	B	—	A
Sodium hydroxide (dil)	A	A	A
Sodium hydroxide, 25%	A	B	C
Sodium hydroxide (conc)	—	—	C
Sodium hypochlorite, <5%	A	B	A
Sodium hypochlorite, >5%	A	B	A
Sodium nitrate	A	D	A
Sodium silicate	A	A	A
Sodium sulfide	A	A	A
Sodium sulfite	A	A	A
Steam, up to 40 psi	C	A	D
Stearic acid	C	B	A
Styrene	D	D	D
Sulfuric acid (dil)	A	D	A
Sulfuric acid (med)	A	D	A
Sulfuric acid (conc)	D	D	D
Sulfurous acid	A	D	A
Tannic acid	B	B	C
Tanning liquors	A	—	A
Tartaric acid	A	A	A
Tin salts	A	B	A
Toluene (toluol)	D	D	D
Trichloroacetic acid	B	D	A
Trichloroethylene	D	D	D
Trisodium phosphate	A	—	A
Turpentine	D	D	D
Urea	A	B	A
Uric acid	A	—	A
Water, fresh	A	B	A
Water, salt	A	A	A
Xylene	D	D	D
Zinc chloride	A	A	A

⚠ Caution

The ratings in the charts do not reflect the extent to which extraction or leaching 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 wetted materials. It is the user's responsibility to test and ensure the suitability of wetted materials for all intended users, including establishing the compatibility of any fluid with the material through which it is coming into contact.

⚠ Warning

The information in these tables has been supplied to Cole-Parmer by the tubing manufacturers and is to be used **ONLY** as a guide to select your tubing. Always test fluids and tubing before use. Cole-Parmer does not warrant (neither express or implied) that the information in these tables is accurate or complete or that any material is suitable for any purpose.

⚠ Danger

Even if tubing passes the immersion test, variations in temperature, pressure, or concentration may cause tubing failure.

SERIOUS INJURY MAY RESULT.

Use suitable guards and/or personal protection when pumping chemicals.