

Premium Laboratory Equipment



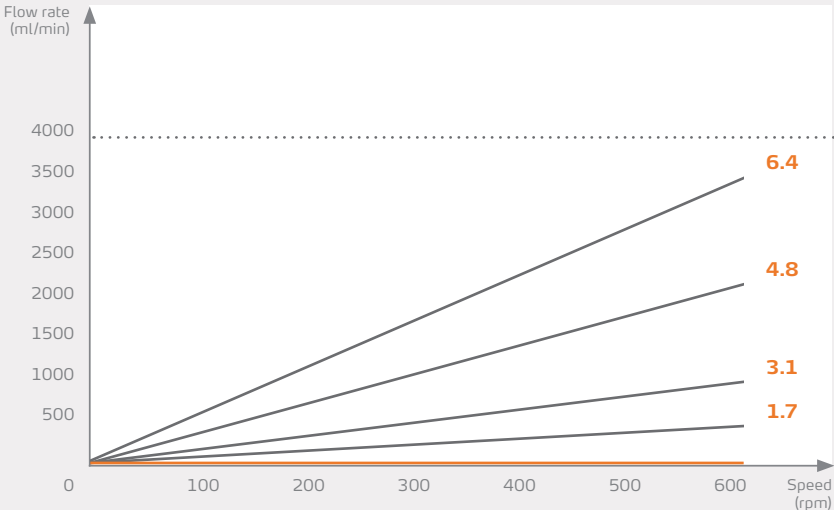
# Hei-FLOW

Pump head flow rates and tubing sizes

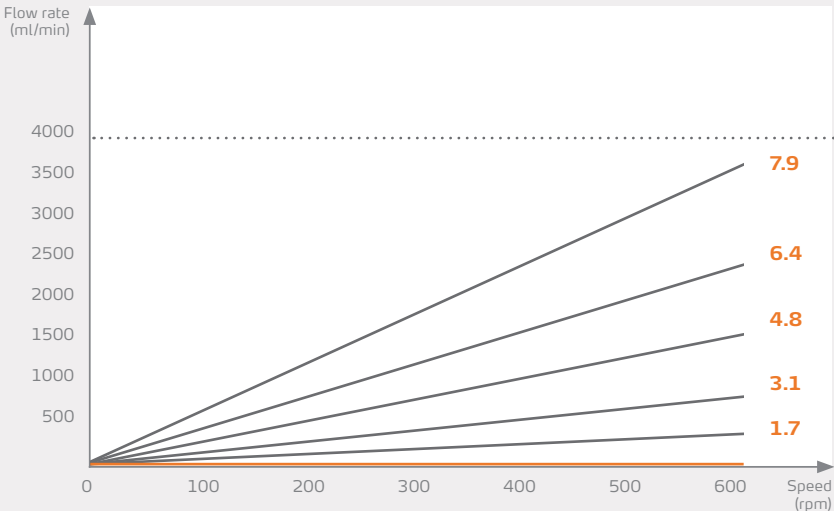
# Single-Channel Pump Heads

## Flow rate

### SP standard SP vario



### SP quick



## Tubing sizes and flow rates for Singel-Channel Pumps

Tubing sizes						
Inner diameter	(mm)	0.8	1.7	3.1	4.8	6.4
Outer diameter	(mm)	4	4.9	6.3	8	9.5
Wall thickness (wt)	(mm)	1.6	1.6	1.6	1.6	1.6
Max. pressure (continuous/ short time)	(bar)	0.7/1.7	0.7/1.7	0.7/1.7	0.5/1.5	0.5/1.5
Suction height	(mH <sub>2</sub> O)	8.8	8.8	8.8	8.8	6.7

Average flow rates in combination with pump head and pump drive											
SP quick		min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
Hei-FLOW Advantage o6/ Hei-FLOW Precision o6	(ml/min)	2	33	8	186	26	653	59	1,529	89	2,072
Hei-FLOW Value o6	(ml/min)	4	35	17	197	57	695	123	1,494	186	1,765
Hei-FLOW Advantage o1/ Hei-FLOW Precision o1	(ml/min)	0.38	9	2	40	5	126	12	233	17	409
Hei-FLOW Value o1	(ml/min)	0.83	9	3	41	11	134	25	292	36	413
SP standard/ SP vario				min.	max.	min.	max.	min.	max.	min.	max.
Hei-FLOW Advantage o6/ Hei-FLOW Precision o6	(ml/min)			11	257	43	1,017	105	2,549	167	4,056
Hei-FLOW Value o6	(ml/min)			22	249	93	1,037	228	2,613	364	4,151
Hei-FLOW Advantage o1/ Hei-FLOW Precision o1	(ml/min)			2	55	9	221	21	530	33	813
Hei-FLOW Value o1	(ml/min)			5	61	19	223	44	519	75	861

Tubing P/N (per meter)					
Silicone	525-33000-00	525-34000-00	525-36000-00	525-30027-00	525-30028-00
Viton®	525-53000-00	525-54000-00	525-56000-00	525-50027-00	525-50028-00
PharMed®	525-23000-00	525-24000-00	525-26000-00	525-20027-00	525-20028-00
Tygon® (standard)	525-63000-00	525-64000-00	525-66000-00	525-60027-00	525-60028-00
Tygon® (hydrocarbon)	525-73000-00	525-74000-00	525-76000-00	525-70027-00	525-70028-00
Tygon® 2001 (food)	525-83000-00	525-84000-00	525-86000-00	525-80027-00	525-80028-00

Tubing sizes				
Inner diameter	(mm)	4.8	6.4	7.9
Outer diameter	(mm)	9.8	11.3	12.9
Wall thickness (wt)	(mm)	2.5	2.5	2.5
Max. pressure (continuous/ short time)	(bar)	0.8/1.8	0.8 / 1.8	0.8 / 1.8
Suction height	(mH <sub>2</sub> O)	8.8	8.8	8.8

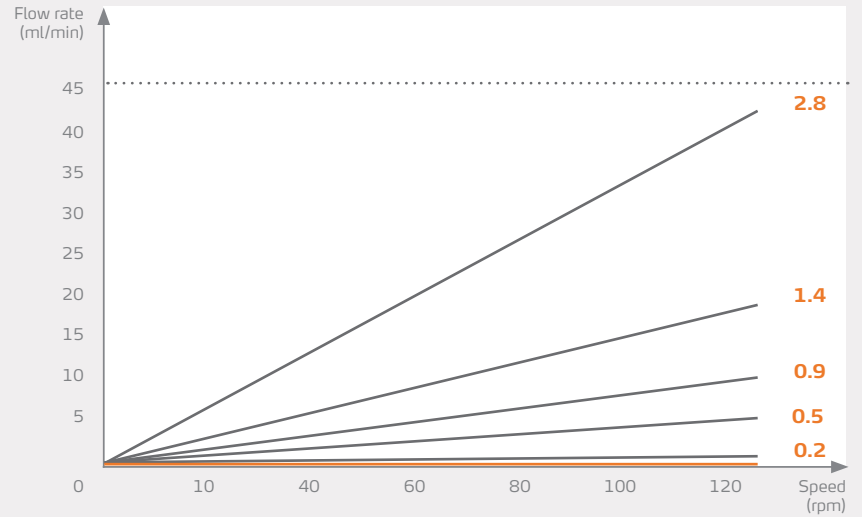
Average flow rates in combination with pump head and pump drive							
SP quick		min.	max.	min.	max.	min.	max.
Hei-FLOW Advantage o6/ Hei-FLOW Precision o6	(ml/min)	58	1,527	85	2,248	113	3,171
Hei-FLOW Value o6	(ml/min)	123	1,580	180	2,411	257	3,436
Hei-FLOW Advantage o1/ Hei-FLOW Precision o1	(ml/min)	12	299	18	435	25	630
Hei-FLOW Value o1	(ml/min)	26	299	38	454	50	636
SP standard/SP vario		min.	max.	min.	max.		
Hei-FLOW Advantage o6/ Hei-FLOW Precision o6	(ml/min)	92	2,390	139	3,821		
Hei-FLOW Value o6	(ml/min)	203	2,426	313	3,782		
Hei-FLOW Advantage o1/ Hei-FLOW Precision o1	(ml/min)	15	491	28	769		
Hei-FLOW Value o1	(ml/min)	42	493	68	773		

Tubing P/N (per meter)			
Silicone	525-35000-00	525-39000-00	525-32000-00
Viton®	525-55000-00	525-59000-00	525-52000-00
PharMed®	525-25000-00	525-29000-00	525-22000-00
Tygon® (standard)	525-65000-00	525-69000-00	525-62000-00
Tygon® (hydrocarbon)	525-75000-00	525-79000-00	525-72000-00
Tygon® 2001 (food)	525-85000-00	525-89000-00	-

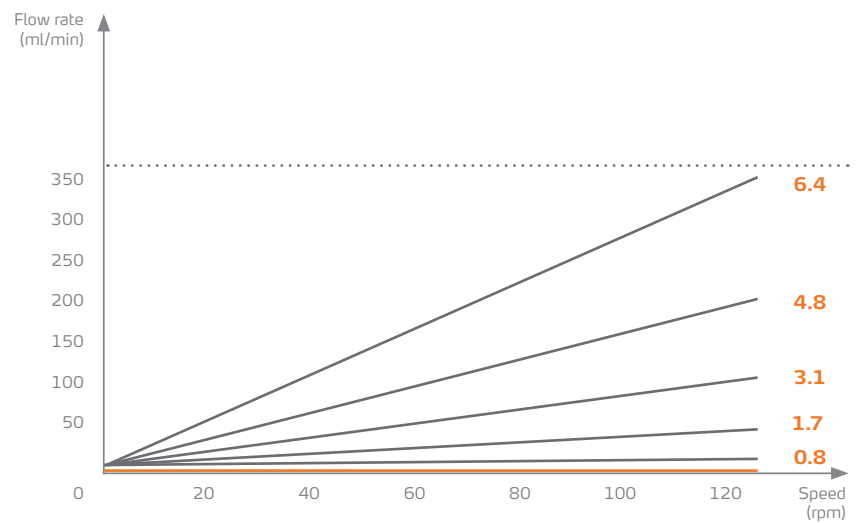
# Multi-Channel Pump Heads

Flow rates pertain to water

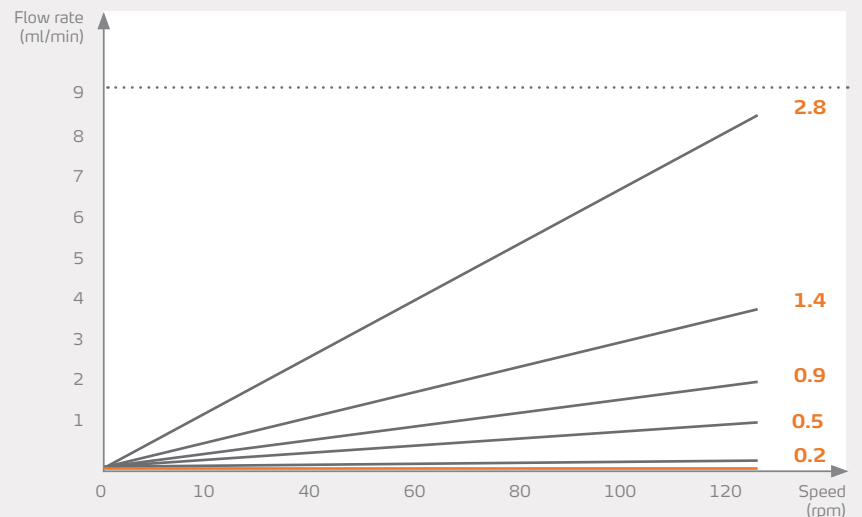
## Pump Head C 4



## Pump Head C 8



## Pump Head C 12



## Tubing sizes and flow rates for Multi-Channel Pumps

Tubing sizes		0.2	0.5	0.9	1.4	2.8
Inner diameter	(mm)	0.25	0.51	0.89	1.42	2.79
Outer diameter	(mm)	2.05	2.31	2.69	3.22	4.59
Wall thickness (wt)	(mm)	0.9	0.9	0.9	0.9	0.9
Max. pressure (continuous/short time)	(bar)	0.5 / 1.5	0.5 / 1.5	0.5 / 1.5	0.5 / 1.5	0.5 / 1.5
Suction height	(mH <sub>2</sub> O)	7	7	7	7	7

### Average flow rates in combination with cassette, pump head and pump drive

Hei-FLOW Advantage 01 / Hei-FLOW Precision 01		min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	max.*
Cassette small / pump head C 12	(ml/min)	0.005	0.11	0.01	0.54	0.03	1	0.10	3	0.29	9	12
Cassette small / pump head C 4	(ml/min)	0.02	0.49	0.08	2	0.24	6	0.60	14	2	36	4
Hei-FLOW Value 01		min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	
Cassette small / pump head C 12	(ml/min)	0.005	0.11	0.02	0.42	0.10	1	0.23	3	0.69	8	12
Cassette small / pump head C 4	(ml/min)	0.04	0.53	0.17	2	0.57	6	1	15	4	37	4

\* max. number of cassettes

### Tubing P/N

Silicone	Two-Stop Tubing for cassette small			525-30014-00	525-30015-00	525-30016-00
	Extension tube (per meter)			525-30024-00	525-30025-00	525-30026-00
Viton®	Two-Stop Tubing for cassette small			525-50014-00	525-50015-00	525-50016-00
	Extension tube (per meter)			525-50024-00	525-50025-00	525-50026-00
PharMed®	Two-Stop Tubing for cassette small	525-20012-00	525-20013-00	525-20014-00	525-20015-00	525-20016-00
	Extension tube (per meter)	525-20022-00	525-20023-00	525-20024-00	525-20025-00	525-20026-00
Tygon® (standard)	Two-Stop Tubing for cassette small	525-60012-00	525-60013-00	525-60014-00	525-60015-00	525-60016-00
	Extension tube (per meter)	525-60022-00	525-60023-00	525-60024-00	525-60025-00	525-60026-00
Fittings for extension tubes (PTFE)		526-22000-00	526-22000-00	526-22000-00	526-22000-00	526-22000-00

Tubing sizes		0.8	1.7	3.1	4.8	6.4
Inner diameter	(mm)	0.8	1.7	3.1	4.8	6.4
Outer diameter	(mm)	4	4.9	6.3	8	9.5
Wall thickness (wt)	(mm)	1.6	1.6	1.6	1.6	1.6
Max. pressure (continuous/short time)	(bar)	0.7 / 1.7	0.7 / 1.7	0.7 / 1.7	0.7 / 1.7	0.5 / 1.5
Suction height	(mH <sub>2</sub> O)	8.8	8.8	8.8	8.8	6.7

### Average flow rates in combination with cassette, pump head and pump drive

Hei-FLOW Advantage 01 / Hei-FLOW Precision 01		min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	
Cassette medium / pump head C 8	(ml/min)	0.24	7	1	26						8	
Cassette large / pump head C 8	(ml/min)			1	27	4	90	8	192	11	329	4
Hei-FLOW Value 01		min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	
Cassette medium / pump head C 8	(ml/min)	0.55	6.97	2.17	27						8	
Cassette large / pump head C 8	(ml/min)			2	27	7	85	18	246	26	364	4

### Tubing P/N (per meter):

Silicone	525-33000-00	525-34000-00	525-36000-00	525-30027-00	525-30028-00
Viton®	525-53000-00	525-54000-00	525-56000-00	525-50027-00	525-50028-00
PharMed®	525-23000-00	525-24000-00	525-26000-00	525-20027-00	525-20028-00
Tygon® (standard)	525-63000-00	525-64000-00	525-66000-00	525-60027-00	525-60028-00
Tygon® (hydrocarbon)	525-73000-00	525-74000-00	525-76000-00	525-70027-00	525-70028-00
Tygon® 2001 (food)	525-83000-00	525-84000-00	525-86000-00	525-80027-00	525-80028-00

Flow rates pertain to Tygon® (standard) tubing and water

# Tubes

## Tubing Options



	<b>Tygon® standard</b>	<b>Tygon® 2001 for food</b>	<b>Tygon® for hydrocarbons</b>
<b>Application</b>	For standard applications	Food industry, wellsuited to products with high fat content	Especially for hydrocarbons, mineral oil products and distillates
<b>Features</b>	<ul style="list-style-type: none"> <li>Non-toxic, non-oxidizing</li> <li>Good resistance to acids, bases and inorganic media</li> <li>Very low gas permeability, good performance life</li> </ul>	<ul style="list-style-type: none"> <li>Extremely chemical-resistant, e. g. appropriate for the use of polar solvents</li> <li>Plasticizer- and oil-free</li> <li>Superior flex life in peristaltic pumps</li> <li>Translucent to aid visual inspection</li> <li>Outstanding flexibility</li> </ul>	<ul style="list-style-type: none"> <li>Ideal for petrol, kerosene, heating oil, cutting solutions and coolants on a glycol base</li> <li>Resistant to ozone and UV</li> </ul>
<b>Material</b>	Thermoplastic soft PVC, transparent	Thermoplastic tube, transparent	Thermoplastic soft PVC, translucent yellow
<b>Complies with the standards</b>	FDA (21 CFR 177.2601) and GLP	USP Class VI, FDA (21 CFR 177.2600) and GLP	GLP conform
<b>Temperature range</b>	-50 to +75 °C	-78 °C to +71 °C	-40 to +75 °C
<b>Sterilization</b>	Can be autoclaved for 30 min at 1 bar and 120 °C (material may change color) or with ethylene oxide	Can be autoclaved for 30 min at 1 bar, sterilized by irradiation or with ethylene oxide	Sterilization is not recommended
<b>Restriction</b>	Segregation of plasticizers is possible	-	Not suitable for concentrated acids, lyes, food and pharmaceuticals



	<b>PharMed®</b>	<b>Silicone</b>	<b>Viton®</b>
<b>Application</b>	Ideal for medical, lab and research uses	Platinum-coated silicone hose for use in pharmaceuticals and biology	Excellent acid resistance at high temperatures
<b>Features</b>	<ul style="list-style-type: none"> <li>High fatigue strength under repeated reversed bending stresses</li> <li>Non-toxic, biocompatible</li> <li>Very low gas permeability</li> <li>Well suited to acids and bases</li> </ul>	<ul style="list-style-type: none"> <li>Extremely smooth interior prevents bacterial growth</li> <li>Biocompatible, minimal adsorption and absorption</li> <li>Best flow properties, high temperature stability</li> <li>Absolutely inert, softener-free</li> </ul>	<ul style="list-style-type: none"> <li>Low gas permeability</li> <li>Resistant to solvents and corrosives at high temperatures</li> </ul>
<b>Material</b>	Thermoplastic elastomer on a polypropylene base with plasticizers, excellent tensile strength, opaque	Polydimethylsiloxane with siliceous earth and silicone additives, excellent resistance to initial pressure, translucent white	Fluorocarbon rubber, thermoformed Viton B (67 % fluorinated), opaque black
<b>Complies with the standards</b>	USP Class VI, GLP, USP and Ph. Eur.	USP Class VI, meets GLP and NSF	GLP conform
<b>Temperature range</b>	-51 to +135 °C	-80 to +200 °C	-30 to +205 °C
<b>Sterilization</b>	Can be autoclaved or sterilized with ethylene oxide or sterilized by irradiation	Can be autoclaved for 30 min at 1 bar or sterilized by irradiation	16 hours at +250 °C with hot air circulation recommended
<b>Restriction</b>	Additives may migrate	Not suitable for concentrated solvents, oils, acids or dilute caustic soda, relatively high permeability to gas	Limited performance life

<b>Use with</b>	<b>Tygon® standard</b>	<b>Tygon® 2001 for food</b>	<b>Tygon® for hydrocarbons</b>	<b>PharMed®</b>	<b>Silicone</b>	<b>Viton®</b>
<b>Acids</b>	good	excellent	good	good	conditional	excellent
<b>Lyes</b>	good	excellent	good	good	conditional	excellent
<b>Solvents</b>	unsuitable	good	conditional	unsuitable	unsuitable	varies, tests recommended
<b>Pressure</b>	good	good	good	good	satisfactory	good
<b>Vacuum</b>	good	good	good	excellent	good	good
<b>Viscous media</b>	excellent	good	excellent	good	satisfactory	good
<b>Sterile media</b>	conditional	good	conditional	excellent	excellent	satisfactory

# Tubing Resistance

Chemical	P	S	T	TU	TK	V
<b>A</b> Acetaldehyde	D	C	D	D	D	D
Acetic acid, 10 % in W.	A	A	A	A	A	-
Acetic acid, 100 %	B	D	D	D	-	-
Acetic anhydride	A	A	D	D	A	D
Acetone	D	C	D	D	C	D
Acetonitrile	C	D	D	D	B	D
Acetyl bromide	C	D	D	D	C	-
Acetyl chloride	C	D	D	D	C	A
Aliphatic hydrocarbons	D	D	D	B	D	-
Aluminum chloride, 53 % in W.	A	A	A	A	A	A
Aluminum sulfate, 50 % in W.	A	A	A	A	A	A
Alums	A	A	A	A	A	-
Ammonia, gas and liquid	A	D	B	B	B	D
Ammonium acetate, 45 % in W.	A	A	A	A	A	-
Ammonium carbonate, 20 % in W.	A	A	A	A	A	A
Ammonium chloride	A	C	A	A	A	A
Ammonium hydroxide, 30 % in W.	A	D	A	C	A	B
Ammonium nitrate	A	C	A	A	A	-
Ammonium phosphate	A	A	A	A	A	-
Ammonium sulfate	B	A	A	A	A	D
Amyl acetate	B	D	D	D	D	A
Amyl alcohol	D	D	D	A	A	A
Amyl chloride	C	D	D	D	D	-
Aniline	C	D	D	D	D	D
Aniline hydrochloride	C	D	D	D	D	B
Aqua regia (80 % HCl, 20 % HNO <sub>3</sub> )	D	D	D	D	A	-
Aromatic hydrocarbons	A	D	D	D	D	-
Arsenic salts	A	A	A	A	A	-
<b>B</b> Barium salts	A	A	A	A	A	-
Benzaldehyde	D	C	D	D	C	D
Benzene	D	D	D	D	-	-
Benzenesulfonic acid	D	D	D	D	D	A
Boric acid, 4 % in W.	A	A	A	A	A	A
Bromine	D	D	D	D	D	A
Butane	A	A	A	A	B	A
Butanol (butyl alcohol)	D	B	D	A	A	A
Butyl acetate	B	D	D	D	D	-
Butyric acid	B	D	D	C	D	D
<b>C</b> Calcium oxide	A	A	A	A	A	-
Carbon bisulfide	D	D	D	D	D	-
Carbon tetrachloride	D	D	D	D	D	A

Chemical	P	S	T	TU	TK	V
Chlorine, wet	D	D	B	B	C	B
Chloroacetic acid, 20 % in W.	B	A	A	D	A	D
Chlorobenzene	D	D	D	D	C	A
Chloroform	D	D	D	D	C	A
Chlorobromomethane	B	D	D	D	-	A
Chromic acid, 20 % in W.	A	D	B	C	B	A
Chromic acid, 50 % in W.	C	D	C	D	-	-
Copper salts	A	A	A	A	A	-
Cyclohexane	D	D	D	C	D	A
Cyclohexanone	D	D	D	D	C	D
Chlorosulfonic acid	D	D	D	D	D	D
<b>D</b> Diesel	D	D	D	B	-	-
Dimethyl formamide	B	B	D	D	A	D
<b>E</b> Ethanol (ethyl alcohol)	A	B	D	B	A	A
Ether	C	D	D	C	D	-
Ethyl acetate	B	D	D	D	D	D
Ethyl bromide	D	D	D	D	C	-
Ethyl chloride	C	D	D	D	D	A
Ethylamine	D	C	D	D	B	-
Ethylene chlorhydrin	A	B	D	B	A	A
Ethylene dichloride	C	D	D	D	D	B
Ethylene glycol	A	A	A	A	A	A
Ethylene oxide	A	D	A	A	A	D
<b>F</b> Fatty acids	C	B	B	C	C	C
Ferric chloride 40 % in W.	A	A	A	A	A	B
Ferric sulfate 5 % in W.	A	A	A	A	A	A
Ferrous chloride 43 % in W.	A	A	A	A	A	-
Ferrous sulfate 5 % in W.	A	A	A	A	A	-
Fluoboric acid, 10 % in W.	D	D	A	A	A	-
Fluoroborate salts	A	-	A	A	A	-
Fluosilicic acid	C	B	D	B	A	-
Formaldehyde, 37 % in W.	D	C	D	D	C	D
Formic acid, 25 % in W.	A	A	A	C	A	D
Freon 11	A	A	A	A	-	-
Fruit juice	A	A	A	A	A	A
<b>G</b> Gasoline, high-aromatic	D	D	D	B	D	A
Gasoline, non-aromatic	D	D	D	B	D	A
Glycerin	A	A	A	A	A	A
<b>H</b> Hydrobromic acid, 20 – 50 %	D	D	A	A	A	A
Hydrochloric acid, 10 % in W.	A	D	A	A	A	A
Hydrochloric acid, 37 % in W.	B	D	A	D	A	B

# Tubing Resistance

Chemical	P	S	T	TU	TK	V
Hydrocyanic acid	A	A	A	A	A	A
Hydrofluoric acid, 10 % in W.	D	D	C	A	A	B
Hydrofluoric acid, 50 %	D	D	D	D	A	A
Hydrogen peroxide, 10 % in W.	A	A	A	A	A	A
Hydrogen peroxide, 90 % in W.	B	C	D	D	B	-
Hydroiodic acid	B	B	A	A	A	-
Hypochlorous acid, 25 % in W	A	A	A	A	A	A
<b>I</b> Iodine solutions	A	C	A	A	A	-
<b>K</b> Ketones	D	D	D	D	C	-
<b>L</b> Lactic acid, 10 % in W.	A	A	A	A	A	-
Lactic acid, 85 % in W.	B	D	D	D	-	-
Lead acetate, 35 % in W.	A	A	A	A	A	-
<b>M</b> Manganese salts	A	A	A	A	A	-
Magnesium chloride, 35 % in W.	A	A	A	A	A	A
Magnesium sulfate, 25 % in W.	A	A	A	A	A	-
Mercury salts	A	A	A	A	A	-
Methane	A	-	A	A	A	A
Methanol	A	B	D	B	A	D
Methyl Ethyl Ketone	D	D	D	D	C	D
Monoethanolamine	C	D	D	D	D	D
<b>N</b> Naphtha	D	D	D	D	D	A
Nickel salts	A	A	A	A	A	-
Nitric acid, 10 % in W.	A	C	A	D	A	A
Nitric acid, 35 % in W.	A	D	A	D	A	A
Nitric acid, 68 – 71 % in W.	D	D	D	D	D	-
Nitrobenzene	D	D	D	D	C	-
Nitrous acid, 10 % in W.	A	B	A	C	A	-
<b>O</b> Oils, animal	C	A	D	A	B	-
Oils, mineral	D	D	C	A	D	A
Oleic acid	C	B	D	B	D	B
<b>P</b> Perchloric acid, 67 % in W.	A	D	C	D	A	A
Perchloroethylene	C	D	D	D	D	A
Phenol, 91 % in W.	A	D	D	C	A	-
Phosphoric acid 25 % in W.	A	D	A	A	A	A
Phthalic acid, 9 % in Alc.	A	B	D	C	B	-
Potassium carbonate, 55 % in W.	A	A	A	A	A	-
Potassium cyanide, 33 % in W.	A	A	A	A	-	-
Potassium hydroxide, <10 % in W.	A	A	A	D	-	B
Potassium iodide, 56 % in W.	A	A	A	A	A	-
Propanol (propyl alcohol)	C	A	D	D	A	B
Pyridine	C	D	D	D	C	D

Chemical	P	S	T	TU	TK	V
<b>S</b> Silicone oils	C	D	B	A	B	A
Silver nitrate, 55 % in W.	A	A	A	A	A	A
Soap solutions	B	A	A	A	A	A
Sodium bicarbonate, 7 % in W.	A	A	A	A	A	A
Sodium bisulfate	A	-	A	A	A	-
Sodium borate	A	A	A	A	A	A
Sodium carbonate	A	A	A	A	A	B
Sodium ferrocyanide	A	A	A	D	-	-
Sodium hydrosulfite	A	-	A	A	A	-
Sodium hydroxide, 10 – 15 % in W.	A	A	A	D	A	B
Sodium hydroxide, 30 – 40 % in W.	A	C	C	D	A	B
Sodium nitrate, 3.5 % in W.	A	A	A	A	A	-
Sodium sulfate, 3.6 % in W.	A	A	A	A	-	A
Sodium sulfide, 13 % in W.	A	A	A	A	A	-
Stearic acid, 5 % in Alc.	C	D	D	B	B	-
Sulfuric acid, 10 % in W.	A	A	A	B	A	A
Sulfuric acid, 30 % in W.	A	B	A	B	A	A
Sulfuric acid, 95 – 98 % in W.	D	D	D	D	C	A
Sulfurous acid	A	A	A	A	A	A
<b>T</b> Tannic acid, 75 % in W.	B	A	B	D	A	-
Tartaric acid, 56 % in W.	A	A	A	A	A	A
Tin salts	A	A	A	A	A	-
Toluene (toluol)	D	D	D	D	C	A
Trichloroacetic acid, 90 % in W.	B	D	A	D	A	C
Trichlorethylene	C	D	D	D	C	A
Trisodium phosphate	A	A	A	A	A	A
Turpentine	D	D	D	B	A	A
<b>U</b> Urea, 20 % in W.	A	A	A	A	A	-
Uric acid	A	A	A	C	A	-
<b>X</b> Xylene	D	D	D	D	C	B
<b>Z</b> Zinc chloride, 80 % in W.	A	A	A	A	A	A

## Tubing:

P = PharMed®  
 S = Silicone  
 T = Tygon® standard  
 TU = Tygon® for hydrocarbons  
 TK = Tygon® 2001 for food  
 V = Viton®

## Resistance:

**A** = excellent  
**B** = good  
**C** = conditional  
**D** = unsuitable  
 - = not tested

## Please note:

All information provided here is not guaranteed to be correct.  
 Recommended testing of tubing prior to application use.