

# Pump Tubing Selection Guide

Warrentle

ASTERFLEX

Accept No Substitutes— Use Only Masterflex and Ismatec Pump Tubing in Your Pumps!

1-800-637-3739 1-847-381-7050 Masterflex.com

### Why *Masterflex*® and *ISIMATEC*\* **Pump Tubing?**

### Accept No Substitutes—Use Only Masterflex and Ismatec Tubing in **Your Pumps!**

- Precision extruded to meet extremely tight tolerances
- Factory tested and optically inspected
- Formulated and validated to comply with regulatory standards and classifications including USP, EP, EU Food, FDA, NSF, and 3A
- 24 formulations to meet every application

To ensure accurate flow rates and long tubing life, use only Masterflex tubing in your pump tubing applications. Our tubing is your best choice because, unlike general-purpose commodity tubing, it is specifically designed and manufactured for use in demanding peristaltic pump applications.

## Pump Tubing for a Wide Range of Applications and Markets

- Pharmaceutical

- Food & beverage

- Biotech
- Chemical processing
- Education
  - Water treatment

- Medical research

- Environmental
- Laboratory - Printing

Industrial

- - Semiconductors

## **Your Complete Masterflex** Fluid Handling System

Masterflex pump systems consist of three components: pump head, tubing, and drive. You can match individual components to your specific application or select one of our convenient pump systems that can be ordered with a single catalog number:



### **Pump Selection Help** is Available Online

Use our convenient online resources (described at right) to help you select the perfect Masterflex tubing pump system for your applications!

# Certificate of Compliance

If you need documentation to prove that your specific Masterflex pump tubing complies with certain regulations or agency requirements, we can help. Simply request a FREE Certificate of Compliance at the time of your order.

## **Helpful Online Tools and Information**

## Masterflex.com—There When You Need It

In addition to full product specifications, images, ordering information, and real-time stock availability, Masterflex.com offers you the following features 24 hours a day:

## Single-Use Applications

- Interactive biopharmaceutical workflows
- informative articles
- Comprehensive range of Masterflex Single-Use products such as sampling bottles, flow sensors, and quick-disconnect fittings

#### Masterflex.com/singleuse

# **Testing C-Flex® or Silicone Tubing?**

Try Puri-Flex<sup>™</sup> tubing instead—it's our best tubing for your high-purity applications. Plus it offers lower spallation and longer pump life than silicone.

Masterflex.com/siloxane

### Technical Library

Our Technical Library gives you access to a wealth of helpful technical articles, application-based resources, selection guides, white papers, operating manuals, newsletters, and more!

Masterflex.com/techInfo

### Videos

Watch video tutorials on how to effectively use Masterflex tubing pumps.

Masterflex.com/Videos



### **Chemical Compatibility Database**

With our Masterflex Chemical Compatibility Database, you can verify the compatibility of your fluid with our unrivaled offering of tubing formulations.

Masterflex.com/MflexChem





# **CUSTOM CUT TUBING**

You tell us what tubing, how long, and how many pieces. We will take care of the rest! Masterflex.com/CCT

### Puri-Flex<sup>®</sup> Tubing

- Heat sealable and weldable
- Longest pump life when compared to silicone or many other TPE tubings
- Lowest spallation when compared to silicone or many other TPE tubings
   Ideal for sensitive cell work

### Puri-Prene<sup>™</sup> Tubing

- Long pump life; less drift over time for more accurate pumping
- Withstands repeated sterilization cycles but also suitable for single use

 Ideal for pharmaceutical, bioprocess, and critical process applications

#### Puri-Clear<sup>®</sup> LL Tubing

- Excellent chemical compatibility
- Optically clear to make fluid ID easier
- High elastic memory material handles viscous materials and holds a vacuum well
- Ideal for biologics, pharmaceuticals, and other aseptic industries

#### Platinum-Cured Silicone Tubing

#### - Slightly greater clarity

- Smooth surface; lower protein binding levels
- Fewer potential leachables
- Ideal for pharmaceutical and biotechnology use

#### Peroxide-Cured Silicone Tubing

- Greater physical compression capability
- Economical, longer tubing life
- Potential outgassing of peroxide products

				Application suitability†								
	Pump tubing formulation	Advantages	Meets classifications	Acids	Alkalies	Organic solvents	Pressure	Vacuum	Viscous fluids	Sterile fluids	Gas permeability	Sterilization
٢	Puri-Flex® Exclusive	Biocompatible. Heat sealable and weldable. Long pump life when compared to silicone or other TPE tubings. Low spallation when compared to silicone or some other TPE tubings. Very low protein binding. Cost effective. No halogens or phthalates. Translucent, clear to light white.	USP Class VI FDA 21 CFR 177.2600 and 177.1810 REACH (non-DEHP) compliant RoHS compliant ADCF compliant	G G N/R G Temperature range: Static: -50 to 135°C ( Dynamic (pumping): - (-22 to 212°F)						E	$\begin{array}{c} \text{CO}_2\text{: } 1200 \\ \text{H}_2\text{: } \\ \text{O}_2\text{: } 200 \\ \text{N}_2\text{: } 80 \end{array}$	Sterilize by EtO, autoclave up to 135°C (275°F), or gamma irradiation up to 4.5 Mrad.
٢	Puri-Prene™ Exclusive	Excellent biocompatibility; long pump life. Withstands repeated sterilization cycles. Nontoxic, nonhemolytic, extremely low permeability, Resists acids, bases, and oxidizing agents. Heat sealable, bondable, formable. Opaque, beige.	USP Class VI REACH (non-DEHP) compliant RoHS compliant ADCF compliant	Sta Dyr	tic: -5	N/R re rang 1 to 13 pumpi 2°F)	2°C (-			E	$\begin{array}{l} CO_2: 1200 \\ H_2: \\ O_2: 200 \\ N_2: 80 \end{array}$	Sterlize by EtO, autoclave, or gamma irradiation.
٢	Puri-Clear <sup>®</sup> LL Exclusive	Clear for easy flow monitoring. Broad chemical resistance. Nontoxic, nonaging, nonoxidizing. Low gas permeability. Smooth bore. High dielectric constant. Transparent, clear.	USP Class VI REACH (non-DEHP) compliant RoHS compliant ADCF compliant	Sta Dyr	tic: -4	N/R re rang 5 to 74 pumpi 04°F)	°C (–5			G	CO <sub>2</sub> : 560 H <sub>2</sub> : O <sub>2</sub> : 120 N <sub>2</sub> : 60	Sterlize by EtO, autoclave, or gamma irradiation.
C	Silicone (platinum-cured) Exclusive	Excellent biocompatibility. No leachable additives, DOP, or plasticiz- ers; phthalate and latex-free; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Weather, ozone, corona, and radiation resistant.	USP Class V Extractables (Exceeds Class VI Implant) European Pharmacopoeia (EP 3.1.9) FDA 21 CFR 177.2600; FDA 21 CFR 210 and 211; Exceeds 3A sanitary cGMPs; REACH (non-DEHP)			N/R re rang		G	F 146°E	E	CO <sub>2</sub> : 20,132 H <sub>2</sub> : 6579 O <sub>2</sub> : 7961 N <sub>2</sub> : 2763	Sterilize by EtO, autoclave, or gamma irradiation.
	Masmallex Pune	Minimal tendency to take a set. Translucent, clear to light amber.	compliant RoHS compliant ADCF compliant	Static: -50 to 230°C Dynamic (pumping): - (-40 to 212°F)								
	Silicone (peroxide-cured)	Excellent biocompatibility. No additives, plasticizers or DOP; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids.	USP Class VI European Pharmacopoeia (EP 3.1.9) FDA 21 CFR 177.2600 Exceeds 3A sanitary	N/R N/R		N/R	F	G	F	E	CO <sub>2</sub> : 20,132 H <sub>2</sub> : 6579	Sterilize by EtO or
	Masterflex roam	Weather, ozone, corona, and radiation resistant. Minimal tendency to take a set. Translucent, clear to light amber.	standards REACH (non-DEHP) compliant RoHS compliant ADCF compliant	Temperature range: Static: -50 to 230°C (-58 to 446°F) Dynamic (pumping): -40 to 100°C (-40 to 212°F)							0 <sub>2</sub> : 7961 N <sub>2</sub> : 2763	autoclave.
C	BioPharm Silicone (platinum-cured) Exclusive	Ultra-smooth inner surface minimizes particle entragment. Lower absorption; excellent biocompatibility; no leachable additive, DOP, or plasticizers. Very low extractables. Odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids.	USP Class VI European Pharmacopoeia (EP 3.1.9) FDA 21 CFR 177.2600 Exceeds 3A sanitary standards REACH (non-DEHP)			N/R re rang 0 to 23		G	F	E	CO <sub>2</sub> : 25,147 H <sub>2</sub> : O <sub>2</sub> : 4715 N <sub>2</sub> : 2284	Sterilize by EtO, autoclave, or gamma irradiation.
	Massiallex runne	Weather, ozone, corona, and radiation resistant. Translucent, clear to light amber. Similar to BioPharm Silicone, plus:	compliant RoHS compliant USP Class VI	Dyr	amic (	pumpii 212°F)						
	BioPharm Plus Silicone (platinum-cured) Exclusive	Longest life of any silicone pump tubing. Lower spallation than regular silicone. Enhanced pressure capability. Fungus-resistant.	European Pharmacopoeia (EP 3.1.9) FDA 21 CFR 177.2600 Exceeds 3A sanitary		N/R N/R N/R F G		FE		CO <sub>2</sub> : 25,147 H <sub>2</sub> : O <sub>2</sub> : 4715	Sterilize by EtO, autoclave, or		
L	Masterflex Putan	Fungus-resistant.	standards REACH (non-DEHP) compliant RoHS compliant	Temperature range: Static: -60 to 232°C (-75 to 450°F) Dynamic (pumping): -40 to 100°C (-40 to 212°F)							N <sub>2</sub> : 2284	gamma irradiation.

 $^{\dagger}\mathsf{E}=\mathsf{Excellent},\,\mathsf{G}=\mathsf{Good},\,\mathsf{F}=\mathsf{Fair},\,\mathsf{P}=\mathsf{Poor},\,\mathsf{N/R}=\mathsf{not}\;\mathsf{recommended},\,\mathsf{N/A}=\mathsf{not}\;\mathsf{available}$ 

# BioPharm Silicone Tubing (platinum-cured)

- Ultra-smooth inner surface minimizes particle entrapment
- Very low extractables, with documented biocompatibility for sensitive applications
- Ideal for lab, biotech, and pharmaceutical applications

#### **BioPharm Plus Silicone Tubing (platinum-cured)**

 All of the benefits of BioPharm silicone tubing, plus:

- Longest tubing life of any silicone pump tubing
- Lower spallation than regular silicone
- Enhanced pressure capability

#### **C-Flex® ULTRA Tubing**

- Combines biocompatibility of silicone with chemical resistance similar to Tygon
- Heat sealable, weldable, economical
- Longest pump life of any C-Flex formulation
- Lowest spallation and reduced residue

#### **C-Flex®** Tubing

- Combines biocompatibility of silicone with chemical resistance similar to Tygon
- Heat sealable, weldable, economical

#### PharMed<sup>®</sup> BPT Tubing

- Up to 10,000 hours of tubing life
- Resists ozone and UV radiation
- Noncytotoxic and nonhemolytic
- Ideal for tissue and cell culture
- Heat sealable and bondable

#### PharmaPure® Tubing

- Biocompatibility similar to PharMed BPT
- Long life under continuous pressure up to 40 psi (2.7 bar)
- Very low spallation and low extractables

#### Chem-Durance<sup>®</sup> Bio Tubing

- Excellent chemical resistance
- Excellent pumping life
- Low spallation
- USP Class VI specifications
- Masterflex exclusive

Pump tubing formulation				Ap	plicat	ion su	itabili	ty†			
	Advantages	Meets classifications	Acids	Alkalies	Organic solvents	Pressure	Vacuum	Viscous fluids	Sterile fluids	Gas permeability	Sterilization
C-Flex® ULTRA	Physical properties similar to silicone with chemical compatibility of Tygon <sup>®</sup> . Biocompatible. Heat sealable and weldable.	USP Class VI European Pharmacopoeia (EP 3.2.9) REACH (non-DEHP)	G	G	N/R	F	G	F	E	CO <sub>2</sub> : 2.1 H <sub>2</sub> : —	Sterilize by gamma irradiation or one cycle of autoclave
Masterflex PUMP	Longer pump life and lower spallation than C-Flex. Translucent.	compliant RoHS compliant ADCF compliant	Sta Dyr	tic: –4 iamic	re rang 5 to 12 (pumpi 212°F)	21°C (- ing): –4		250°F, 00°C	)	0 <sub>2</sub> : 1.1 N <sub>2</sub> : 3.4	at 121°C (250°F), 1 bar (15 psi) for 30 minutes.
C-Flex®	Physical properties similar to silicone with chemical compatibility of Tygon®. Inexpensive.	USP Class VI European Pharmacopoeia (EP 3.2.9) REACH (non-DEHP)	G G N/R F (					F	E	CO <sub>2</sub> : — H <sub>2</sub> : —	Sterilize by EtO, autoclave, or
MASTERILEX PUMP	Biocompatible. Heat sealable and weldable. Opaque, white.	Roompliant RoHS compliant ADCF compliant	Sta Dyr	tic: –4 iamic	re rang 5 to 12 (pumpi 212°F)	21°C (- ing): -4		250°F) 00°C	)	0 <sub>2</sub> : 150 N <sub>2</sub> : —	gamma irradiation.
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	USP Class VI European Pharmacopoeia (EP 3.2.9) FDA 21 CFR 177.2600	G	i G N/R		G	G	E	E	С0 <sub>2</sub> : 1200 Н <sub>2</sub> : —	Sterilize by EtO, autoclave, or
MASTERFLEX PUMP	protect light-sensitive fluids	REACH (non-DEHP) compliant RoHS compliant	Temperature range: Static: -51 to 132°C (-60 to 270°F) Dynamic (pumping): -20 to 100°C (-4 to 212°F)							0 <sub>2</sub> : 200 N <sub>2</sub> : 80	gamma irradiation up to 2.5 Mrad.
PharmaPure®	Nontoxic and nonhemolytic (similar to PharMed® BPT); biocompatible. Long life even under pressure; up to 1000 hours at 2.7 bar (40 ps).	USP Class VI FDA 21 CFR 177.2600 European Pharmacopoeia (FP 3.2.9)	G	G	N/R	N/R G		G E		CO <sub>2</sub> : 1200 H <sub>2</sub> : —	Sterilize by EtO, autoclave, or
MASTERILEX PUMP	Very low spallation—protects fluid purity. Low extractables. Low gas permeability. Opaque, off-white.	REACH (non-DEHP) compliant RoHS compliant	Temperature range: Static: -51 to 132°C (-60 to 270°F) Dynamic (pumping): -20 to 100°C (-4 to 212°F)							0 <sub>2</sub> : 200 N <sub>2</sub> : 80	gamma irradiation up to 2.5 Mrad.
Chem-Durance® Bio	Excellent chemical resistance. Excellent life and durability under pressure. Low spallation.	USP Class VI FDA 21 CFR 177.2600 REACH (non-DEHP)	E	E	G	E	E	E	E	CO <sub>2</sub> : 745 H <sub>2</sub> : —	Sterilize by EtO, autoclave, or
Exclusive Masterflex pump	Plasticizer-free inner liner. High dielectric constant. Excellent biocompatibility. Opaque, beige.	RoHS compliant	Sta Dyr	tic: –6	re rang 0 to 74 (pumpi 04°F)	i°C (−7				0 <sub>2</sub> : 200 N <sub>2</sub> : 80	gamma irradiation.
PTFE	Chemically inert. Excellent chemical resistance. Will not leach into or absorb out of fluid being pumped. Extremely low gas permeability.	USP Class VI REACH (non-DEHP) compliant RoHS compliant ADCF compliant		E	E	G	G	E	G	CO <sub>2</sub> : 6.8 H <sub>2</sub> : —	Sterilize by EtO or
	Extremely low gas permeability. Nontoxic. Virtually nonporous. Low coefficient of friction. Translucent, white.			Temperature range: Static: -240 to 260°C (-400 to 500°F) Dynamic (pumping): -40 to 150°C (-40 to 302°F)						02: N2: 1.0	Sterilize by EtO or autoclave.

<sup>†</sup>E = Excellent, G = Good, F = Fair, P = Poor, N/R = not recommended, N/A = not available

#### **PTFE Tubing**

- Chemically inert; best chemical resistance of any pump tubing
- Sold in molded pump tubing elements
- Use with PTFE tubing pump head

### Tygon<sup>®</sup> E-LFL Tubing

- Longest tubing life of all Tygon tubing formulations
- Broad chemical compatibility
- Low gas permeability
- Approved for pharmaceutical and biotechnology use

#### Tygon® E-Food Tubing

- Meets various food and sanitary
- regulations – Unaffected by common commercial sanitizers
- Nonwetting properties allow flushcleaning and complete drainage
- Smooth inner surface

#### **Tygon® E-Lab Tubing**

- Ideal for general transfer applications
   Economical
- Nontoxic, nonaging, and nonoxidizing

#### Versilon<sup>™</sup> 2001 Tubing (formerly Tygon<sup>®</sup> Chemical)

- Best chemical resistance of Tygon formulations
- Compatible with some organics
- Plasticizer-free

# Tygon® F-4040-A Fuel & Lubricant Tubing

- Ideal for transferring hydrocarbons, gasoline, kerosene, heating oils, cutting compounds, and glycolbased coolants
- Not for use with concentrated strong acids or alkalies

#### Versilon<sup>™</sup> A-60-N Tubing (formerly Norprene®)

- Up to 10,000 hours of tubing life
- Best choice for pressure/vacuum applications
- Resists heat, ozone, acids, and alkalies
- Heat sealable and bondable
- Nonaging, nonoxidizing

		1								1		
				A	oplicat	ion su	iitabil	ity†				
Pump tubing formulation	Advantages	Meets classifications	Acids	Alkalies	Organic solvents	Pressure	Vacuum	Viscous	Sterile fluids	Gas permeability	Sterilization	
ygon® E-LFL	Longest life of all Tygon® peristaltic tubing. Clear for easy flow monitoring. Broad chemical resistance. Nonaging, nonoxidizing.	USP Class VI European Pharmacopia (EP 3.2.9) EDA 21 CFR 175.300	G	G	N/R	G	G	E	G	CO <sub>2</sub> : 563 H <sub>2</sub> : —	Sterilize by EtO or	
Assessibles Public	Leve and normanitible	EU Food REACH (non-DEHP) compliant RoHS compliant ADCF compliant	Temperature range: Static: -46 to 74°C (-51 to 165°F) Dynamic (pumping): 0 to 40°C (32 to 104°F)							0₂: 124 N₂: 67	autoclave.	
<b>'ygon® E-Food</b> B-44-4X)	Designed especially for handling food products. Bore is extremely smooth (better than most stainless steels) Nontoxic, will not affect taste or odor,	FDA 21 CFR 175.300 EU Food NSF-51 REACH (non-DEHP)	G	G	N/R	G	G	E	F	C0₂: 270 H₀: 97	Sterilize by EtO or	
asualles etale	and clear for CIP and flow verification.	compliant RoHS compliant ADCF compliant Meets 3A sanitary standards	Temperature range: Static: -36 to 74°C (-32 to 165°F) Dynamic (pumping): 0 to 40°C (32 to 104°F)							02: 60 N2: 30	autoclave.	
<b>fygon® E-Lab</b> E-3603)	Inexpensive tubing for general laboratory applications. Clear for easy flow monitoring. Handles virtually all inorganic chemicals.	USP Class VI FDA 21 CFR 175.300 EU Food NSF-51	G G N/R G G E P					E	Ρ	CO₂: 360 H₀: 97	Sterilize by EtO or	
antialles coule	Nonaging, nonoxidizing. Low gas permeability. Good for viscous fluids. High dielectric constant. Transparent, clear.	REACH (non-DEHP) compliant RoHS compliant ADCF compliant	Sta Dyr	tic: –4	re rang 6 to 74 (pump 04°F)	i°C (–			)	0 <sub>2</sub> <sup>-</sup> : 80 N <sub>2</sub> : 40	autoclave.	
<b>/ersilon™ 2001</b> formerly Tygon Chemical)	Best chemical resistance of any Tygon® formulation. Compatible with many polar solvents. Plasticizer-free.	FDA 21 CFR 175.300 REACH (non-DEHP) compliant	E	E E G G			G	E	G	CO <sub>2</sub> : 114 H <sub>2</sub> : —	Sterilize by EtO, autoclave, or	
assessies public	Clear for easy flow monitoring. Low extractability. Low gas permeability. High dielectric constant. Transparent, clear.	ADCF compliant ADCF compliant		Temperature range: Static:77 to 57°C (-108 to 135°F) Dynamic (pumping): 0 to 40°C (32 to 104°F)					F)	02: 19 N2: 9	gamma irradiation.	
<b>Tygon® Fuel &amp;</b> L <b>ubricant</b> F-4040-A)	Specially formulated to transport hydrocarbons, petroleum products, and distillates. Suitable for gasoline, kerosene, heating oils, cutting fluids, and qlycol-based	REACH (non-DEHP)		G	N/R	G	G	G E		CO₂: 100 H₀: 97	Sterilization is not	
	colants. Minimum extractability. Low gas permeability. High dielectric constant. Transparent, yellow.	compliant RoHS compliant ADCF compliant		Temperature range: Static: -37 to 74°C (-35 to 165°F) Dynamic (pumping): 0 to 40°C (32 to 104°F)					0 <sub>2</sub> : 22 N <sub>2</sub> : 12	Sterilization is not recommended.		

 $^{\dagger}$ E = Excellent, G = Good, F = Fair, P = Poor, N/R = not recommended, N/A = not available

#### Sterilization

Ethylene oxide (EtO): Coil tubing loosely in nonlinting cloth or sterilization paper. Follow the sterilization equipment manufacturer's directions as to gas type, concentration, times, and temperatures; maintain humidity within the prescribed limits, generally between 30 to 65%.

Standard gravity autoclave: Coil tubing loosely in nonlinting cloth or sterilizing paper, and place in a clean, open tray for 30 minutes at 121°C (250°F) at 1 kg/cm² (15 psi); air dry at max 66°C (150°F) for 2 to 2½ hours until clear.

#### Tygon® A-60-F Food & Beverage Tubing (formerly Norprene® Food)

- Ideal for high-temperature food and beverage applications
- Similar characteristics as Versilon<sup>™</sup> 2001 tubing
- Meets FDA and NSF standards

#### GORE<sup>®</sup> STA-PURE<sup>®</sup> Pump Tubing – Series PCS

 Unique composite of expanded PTFE and platinum-cured silicone

- Stable flow rates achievable up to 100 psig\*
- No raw materials of animal origin

#### GORE<sup>®</sup> STA-PURE<sup>®</sup> Pump Tubing – Series PFL

- Unique composite of expanded PTFE and platinum-cured perfluoroelastomer
- Greater chemical resistance than Series PCS
- Stable flow rates achievable up to 60 psig\*
- No raw materials of animal origin

#### Viton<sup>®</sup> FDA-Compliant Tubing

- Excellent chemical resistance
- Resists corrosives, solvents, and oils at elevated temperatures

#### Solva<sup>™</sup> Tubing

- Resists embrittlement and swelling due to hydrocarbon exposure
- Specially formulated to transport hydrocarbons, petroleum products, and distillates
- Ideal for fuels and industrial lubricants such as gasoline, kerosene, heating oils, cutting compounds, and glycol-based coolants
- \*Actual performance depends on the specific system in which the tubing is used and may vary depending on the pump and its integration into the system.

				Ap	oplicat	ion su	itabili	ty†				
Pump tubing formulation	Advantages	Meets classifications	Acids	Alkalies	Organic solvents	Pressure	Vacuum	Viscous fluids	Sterile fluids	Gas permeability	Sterilization	
Versilon <sup>™</sup> A-60-N (formerly Norprene)	Best choice for vacuum/pressure applications. Offers longest pump tubing life. Heat, ambient ozone resistant. Good resistance to acids/alkalies. Black color hides dirt and dust.	NSF-51 REACH (non-DEHP)	G	G	N/R	E	E	E	N/R	CO <sub>2</sub> : 1200 H <sub>2</sub> : —	Sterilize by EtO, autoclave, or	
Masterflex' PUMP	Heat sealable, nonaging, and nonoxidizing. High dielectric constant. High-pressure version available. Opaque, black.	compliant RoHS compliant	Temperature range: Static: -51 to 132°C (-60 to 270°F) Dynamic (pumping): -20 to 100°C (-4 to 212°F)							0 <sub>2</sub> : 200 N <sub>2</sub> : 80	gamma irradiation.	
<b>Tygon<sup>®</sup> A-60-F</b> (formerly Norprene Food)	Similar to Norprene <sup>®</sup> but with FDA approval. Excellent for food/dairy applications. Longest life, good flow consistency. Heat and ozone resistant.	FDA 21 CFR 177.2600 NSF-51 REACH (non-DEHP)	G	G G N/R		E E		E G		CO <sub>2</sub> : 1200 H <sub>2</sub> : —	Sterilize by EtO,	
MASTERFLEX PUMP	Good resistance to acids/alkalies. Heat sealable, nonaging, and nonoxidizing. High dielectric constant. Opaque, beige.	compliant RoHS compliant	Sta Dyr	tic: –5	re rang 1 to 13 (pumpi 12°F)	2°C (-				0 <sub>2</sub> : 200 N <sub>2</sub> : 80	autoclave, or gamma irradiation.	
GORE® STA-PURE®, Series PCS	Unique composite structure adds strength and flex durability Greater security against rupture up to 100 psig*	USP Class VI USP <87> USP Physicochemical Tests Compliant with restricted	N/R	N/R	N/R	E	G	G	E		Sterilize by autoclave	
	Consistent flow rate over long duration of use Withstands rigors of CIP/SIP processing	substances per REACH and RoHS No raw materials of animal origin	Temperature range: Contact Masterflex								or SIP (steam in place).	
GORE® STA-PURE®, Series PFL	Unique composite structure adds strength and flex durability Greater chemical resistance than	USP Class VI USP <87> USP Physicochemical Tests Compliant with restricted	E E E E G G		G	E		Sterilize by autoclave				
	Series PCS Stable flow rates achievable to 60 psig* Withstands rigors of CIP/SIP processing	substances per REACH and RoHS No raw materials of animal origin	Temperature range: Contact Masterflex							_	or SIP (steam in place).	
Viton® FDA-Compliant	Perfect for food and lab applications where FDA compliance is required. Excellent chemical resistance.	FDA 21 CFR 177.2600	E	E	Variable-test before using	G	G	G	F	CO <sub>2</sub> : 76 to 79 H <sub>2</sub> : —	Sterilization is not	
Masterflex' pump	Resistant to corrosives, solvents, and oils at elevated temperatures. Low gas permeability. Opaque, black.	ADCF compliant	Sta Dyr	tic: –3	re rang 2 to 20 (pumpi )2°F)	)5°C (-				O <sub>2</sub> : 13 to 15 N <sub>2</sub> : 4.3	recommended.	
Solva™ Exclusive	Resists most hydrocarbons, embrittlement, and swelling. Thermoplastic, PVC-based material with plasticizer, firm (stiff) material. Ozone- and UV-resistant, minimal	Compliant with restricted substances per REACH		G	N/R	G	G	E	F	CO <sub>2</sub> : 100 H <sub>2</sub> : 97	N/A	
Erone	extractability. Low gas permeability. High dielectric constant. Transparent, yellow.	and RoHS No raw materials of animal origin		Temperature range: Static:37 to 74°C (35 to 165°F) Dynamic (pumping): 0 to 40°C (32 to 104°F)						0 <sub>2</sub> : 22 N <sub>2</sub> : 12	N/A	

<sup>†</sup>E = Excellent, G = Good, F = Fair, P = Poor, N/R = not recommended, N/A = not available

### **ISMATEC**<sup>®</sup> Pump Tubing

- Color-coded stops provide easy identification
- Precision extruded to tight tolerances for high repeatability, accuracy and reproducibility
- Extension tubing can be connected with barbed fittings or by splicing
- Flared ends are available
- How to Order: Choose a tubing material to determine the catalog number prefix, then find your desired tube ID to determine the suffix. Combine the two for a complete catalog number (e.g. 96518-10).

				Ismatec size	09		10	12	14	18	22	24	26	28	30
				Tube ID (mm)	0.13		0.19	0.25	0.38	0.51	0.64	0.76	0.89	1.02	1.14
Tubing		Length	Qty/pk	Color ID*	0/BK		0/R	0/B	0/G	0/Y	0/W	BK/BK	0/0	W/W	R/R
•	2-stop	40.6 cm (16")	12	96518-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
Puri-Flex®	3-stop	40.6 cm (16")	12	96519-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	15.2 m (50 ft)	1	96418-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
	2-stop	40.6 cm (16")	12	05635-XX	—		_	-12	-14	-18	-22	-24	-26	-28	-30
Puri-Prene™	3-stop	40.6 cm (16")	12	05636-XX	_		_	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	15.2 m (50 ft)	1	05367-XX	_		_	-12	-14	-18	-22	-24	-26	-28	-30
	2-stop	40.6 cm (16")	12	95663-XX	-09		-10	-12	-14	-18	-22	-24	-26	-28	-30
	3-stop	40.6 cm (16")	12	95625-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
Puri-Clear <sup>®</sup> LL	Extension	15.2 m (50 ft)	1	95679-XX	-09		-10	-12	-14	-18	-22	-24	-26	-28	-30
	Flared, 2-stop	40.6 cm (16")	12	97616-XX	-09		-10	-12	-14	-18	-22	-24	-26	-28	-30
	Flared, 3-stop	40.6 cm (16")	12	97617-XX	_		-10	-12	-14	-18	_	_	-26	-28	-30
	2-stop	40.6 cm (16")	6	95402-XX	_		_	_	_	_	-22	-24	-26	-28	-30
Silicone	3-stop	40.6 cm (16")	6	95403-XX	_		_	_	_	_	-22	-24	-26	-28	-30
(platinum-cured)	Extension	15.2 m (50 ft)	1	95412-XX	_		_	_	_	_	-22	-24	-26	-28	-30
	2-stop	40.6 cm (16")	6	07616-XX	_		_	-12	-14	-18	-22	-24	-26	-28	-30
Silicone	3-stop	40.6 cm (16")	6	07624-XX	_		_	_	_	-18	-22	-24	-26	-28	-30
(peroxide-cured)	Extension	15.2 m (50 ft)	1	07625-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
C-Flex®	Extension	15.2 m (50 ft)	1	95718-XX	_		-10	-12	_	-18	_	_	-26	_	-30
	2-stop	40.6 cm (16")	12	95723-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
PharMed <sup>®</sup> BPT	3-stop	40.6 cm (16")	12	95714-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	30.4 m (100 ft)	1	95809-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
PharMed® BPT,	2-stop	40.6 cm (16")	6	95692-XX	_		_	-12		-18		_	-26	-28	_
Autoclavable	3-stop	40.6 cm (16")	6	95693-XX	_		_	-12	_	-18	_	_	-26	-28	_
	2-stop	40.6 cm (16")	6	96327-XX	_		_		-14	-18	_	-24	-26		-30
Chem-Durance®	3-stop	40.6 cm (16")	6	96328-XX	_		_	_	-14	-18	_	-24	-26	_	-30
Bio	Extension	30.4 m (100 ft)	1	96329-XX	_		_	_	-14	-18	_	-24	-26	_	-30
	2-stop	40.6 cm (16")	12	96449-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
Tygon <sup>®</sup> E-LFL	3-stop	40.6 cm (16")	12	96450-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
199011 2 212	Extension	30.4 m (100 ft)	1	06449-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
	2-stop	40.6 cm (16")	12	96457-XX	_		-10	-12		-18			-26		-30
Tygon <sup>®</sup> E-Food	3-stop	40.6 cm (16")	12	96458-XX	_			-12		-18			-26		-30
(B-44-4X)	Extension	30.4 m (100 ft)	1	06457-XX	_		-10	-12		-18	_	_	-26	_	-30
	2-stop	40.6 cm (16")	12	96460-XX	-09		-10	-12	-14	-18	-22	-24	-26	-28	-30
Tygon <sup>®</sup> E-Lab	3-stop	40.6 cm (16")	12	96461-XX	-09		-10	-12	-14	-18	-22	-24	-26	-28	-30
(E-3603)	Extension	30.4 m (100 ft)	1	06460-XX	-09		-10	-12	-14	-18	-22	-24	-26	-28	-30
Vereilen™ 2004	2-stop	40.6 cm (16")	6	96465-XX	-03		-10	-12	-14		-22	-24	-20	-28	-30
Versilon <sup>™</sup> 2001 (formerly Tygon	3-stop	40.6 cm (16")	6	96466-XX	_		_	_	-14		-22			-28	_
Chemical)	Extension	10.1 m (33 ft)	1	96467-XX	_		_	_	-14		-22		_	-28	_
,	2-stop	30.5 cm (12")	12	97628-XX			_	_	-14	-18	-22	-24	-26	-28	-30
Viton®	3-stop	30.5 cm (12")	12	97629-XX						-18	-22	-24	-20	-28	-30
FDA-Compliant	Extension	15.2 m (50 ft)	1	97629-XX 97632-XX	_					-18	-22	-24	-20	-20	-30
	2-stop	40.6 cm (16")	12	97632-XX 95606-XX	_		-10	-12	-14	-18	-22	-24	-20	-28	-30
	· ·	40.6 cm (16")	12	95605-XX	_		-10	-12	-14	-18	-22	-24	-20	-28	-30
Cohro™	3-stop Extension	· · · · ·	12	95605-XX 95712-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30
Solva™		15.2 m (50 ft)	12				-10	-12	-14	-	-22	-24	-26	-28	-30
	Flared, 2-stop	40.6 cm (16")		95598-XX						-18		-		-	
	Flared, 3-stop	40.6 cm (16")	12	95599-XX	_		-10	-12	-14	-18	-22	-24	-26	-28	-30

\*Color ID key: B = blue, BK = black, G = green, GY = gray, O = orange, P = purple, R = red, W = white, Y = yellow



### **ISMATEC**<sup>®</sup> Pump Tubing

- Color-coded stops provide easy identification
- Precision extruded to tight tolerances for high repeatability, accuracy and reproducibility
- Extension tubing can be connected with barbed fittings or by splicing
- Flared ends are available
- **How to Order:** Choose a tubing material to determine the catalog number prefix, then find your desired tube ID to determine the suffix. Combine the two for a complete catalog number (e.g. 96518-10).

				Ismatec size	32	34	36	38	40	42	44	48	49
				Tube ID (mm)	1.3	1.42	1.52	1.65	1.85	2.06	2.29	2.79	3.17
Tubing		Length	Qty/pk	Color ID*	GY/GY	Y/Y	Y/B	B/B	G/G	P/P	P/BK	P/W	BK/W
	2-stop	40.6 cm (16")	12	96518-XX	-32	-34	-36	-38	_	-42	-44	-48	_
Puri-Flex <sup>®</sup>	3-stop	40.6 cm (16")	12	96519-XX	-32	-34	-36	-38	_	-42	-44	-48	_
	Extension	15.2 m (50 ft)	1	96418-XX	-32	-34	-36	-38	_	-42	-44	-48	_
	2-stop	40.6 cm (16")	12	05635-XX	-32	-34	-36	-38	-40	-42	-44	-48	_
Puri-Prene™	3-stop	40.6 cm (16")	12	05636-XX	-32	-34	-36	-38	-40	-42	-44	-48	_
	Extension	15.2 m (50 ft)	1	05367-XX	-32	-34	-36	-38	-40	-42	-44	-48	<b>—</b>
	2-stop	40.6 cm (16")	12	95663-XX	-32	-34	-36	-38	-40	-42	-44	-48	-49
	3-stop	40.6 cm (16")	12	95625-XX	-32	-34	-36	-38	-40	-42	-44	_	_
Puri-Clear <sup>®</sup> LL	Extension	15.2 m (50 ft)	1	95679-XX	-32	-34	-36	-38	-40	-42	-44	_	_
	Flared, 2-stop	40.6 cm (16")	12	97616-XX	_	_	_	_	_	_	_	_	_
	Flared, 3-stop	40.6 cm (16")	12	97617-XX	_	_	_	_	_	_	_	_	_
	2-stop	40.6 cm (16")	6	95402-XX	-32	-34	-36	-38	-40	-42	-44	-48	_
Silicone	3-stop	40.6 cm (16")	6	95403-XX	-32	-34	-36	-38	-40	-42	-44	-48	_
(platinum-cured)	Extension	15.2 m (50 ft)	1	95412-XX	-32	-34	-36	-38	-40	-42	-44	-48	_
	2-stop	40.6 cm (16")	6	07616-XX	-32	-34	-36	-38	-40	-42	-44	-48	-
Silicone	3-stop	40.6 cm (16")	6	07624-XX	-32	-34	-36	-38	-40	-42	-44	-48	<b>—</b>
(peroxide-cured)	Extension	15.2 m (50 ft)	1	07625-XX	-32	-34	-36	-38	-40	-42	-44	-48	_
C-Flex®	Extension	15.2 m (50 ft)	1	95718-XX		-34	_	_	_	-42	_	-48	_
	2-stop	40.6 cm (16")	12	95723-XX	-32	-34	-36	-38	-40	-42	-44	-48	- 1
PharMed <sup>®</sup> BPT	3-stop	40.6 cm (16")	12	95714-XX	-32	-34	-36	-38	-40	-42	-44	-48	
	Extension	30.4 m (100 ft)	1	95809-XX	-32	-34	-36	-38	-40	-42	-44	-48	
PharMed <sup>®</sup> BPT,	2-stop	40.6 cm (16")	6	95692-XX	-32	_	-36	_	_	-42	_	-48	_
Autoclavable	3-stop	40.6 cm (16")	6	95693-XX	-32	_	-36	_	_	-42	_	-48	
	2-stop	40.6 cm (16")	6	96327-XX	_	-34	-36	—	_	-42	—	-48	- 1
Chem-Durance <sup>®</sup> Bio	3-stop	40.6 cm (16")	6	96328-XX		-34	-36	_	_	-42	_	-48	
	Extension	30.4 m (100 ft)	1	96329-XX		-34	-36	_	_	-42	_	-48	
	2-stop	40.6 cm (16")	12	96449-XX		-34	-36	_	-40	-42	_	-48	_
Tygon <sup>®</sup> E-LFL	3-stop	40.6 cm (16")	12	96450-XX		-34	-36	_	-40	-42	_	-48	
.,	Extension	30.4 m (100 ft)	1	06449-XX		-34	-36	_	-40	-42	_	-48	_
	2-stop	40.6 cm (16")	12	96457-XX	-	-34	_	—	_	-42	—	-48	_
Tygon <sup>®</sup> E-Food	3-stop	40.6 cm (16")	12	96458-XX		-34	_	_	_	-42	_	-48	_
(B-44-4X)	Extension	30.4 m (100 ft)	1	06457-XX		-34	_	_	_	-42	_	-48	<b>—</b>
	2-stop	40.6 cm (16")	12	96460-XX	-32	-34	-36	-38	-40	-42	-44	-48	-49
Tygon® E-Lab (E-3603)	3-stop	40.6 cm (16")	12	96461-XX	-32	-34	-36	-38	-40	-42	-44	-48	-49
<b>33 •</b> • • ( • • • • ,	Extension	30.4 m (100 ft)	1	06460-XX	-32	-34	-36	-38	-40	-42	-44	-48	-49
	2-stop	40.6 cm (16")	6	96465-XX		_	-36	_	_	-42	_	-48	_
Versilon <sup>™</sup> 2001 (for-	3-stop	40.6 cm (16")	6	96466-XX		_	-36	_	_	-42	_	-48	<b>—</b>
merly Tygon Chemical)	Extension	10.1 m (33 ft)	1	96467-XX	_	_	-36	_	_	-42	_	-48	<b>—</b>
	2-stop	30.5 cm (12")	12	97628-XX	-32	-34	-36	-38	-40	-42	-44	-48	<b>—</b>
Viton® FDA-Compliant	3-stop	30.5 cm (12")	12	97629-XX	-32	-34	-36	-38	-40	-42	-44	-48	<b>—</b>
	Extension	15.2 m (50 ft)	1	97632-XX	-32	-34	-36	-38	-40	-42	-44	-48	<b>—</b>
	2-stop	40.6 cm (16")	12	95606-XX	-32	-34	-36	-38	-40	-42	-44	-48	-
	3-stop	40.6 cm (16")	12	95605-XX	-32	-34	-36	-38	-40	-42	-44	-48	
Solva™	Extension	15.2 m (50 ft)	1	95712-XX	-32	-34	-36	-38	-40	-42	-44	-48	_
	Flared, 2-stop	40.6 cm (16")	12	95598-XX		_	_	_	_			_	<u> </u>
	Flared, 3-stop	40.6 cm (16")	12	95599-XX		_	_	_	_	_	_	_	<u> </u>

\*Color ID key: B = blue, BK = black, G = green, GY = gray, O = orange, P = purple, R = red, W = white, Y = yellow

- L/S pump tubing is manufactured to extremely close tolerances that match our L/S pump heads, ensuring accurate, repeatable flow and long tubing life
- L/S Precision pump tubing Pump tubing • cross sections L/S 13 Inside diameter (nominal) 0.8 mm (0.03") 1.6 r Hose barb size 1.6 mm (1/16") 1.6 Flow range (approximate)<sup>†</sup> 0.2 0.06 to 36 mL/min with 1 to 600 rpm drive Maximum pressure<sup>‡</sup> 2.7 bar (40 psig) Maximum vacuum<sup>‡</sup> 660 mm Hg (26" Hg) Suction lift<sup>‡</sup> 8.8 m H<sub>2</sub>O (29 ft H<sub>2</sub>O)

<sup>†</sup>Determined under the following conditions: 0 psi at inlet, 0.5 psi at outlet;

vater temperature at 22°C (7		naitions	: u psi a	t met, t	.5 psi a	t outiet;		for firm tubing	mance varies d	epenaing on tu	bing formulatio	n-values snov	vn are
				L/S Pi	ımp Hea	ad Comj	patibility						
				/~	6	~	STORES STORES						
	C.S.	PLI .	60%) (40%)	Leon Loon	Willing Color	Stice net	on its of the second						
Tubing	250		1 4 4 A A A A A A A A A A A A A A A A A	45	AND S	ti ze	5 / i <sup>105</sup> /	L/S 13 <sup>††</sup>	L/S 14 <sup>++</sup>	L/S 16	L/S 25	L/S 17	L/S 18
Puri-Flex® 7.6 m (25 ft)/pk	1	1	1	1	1	1		96419-13	96419-14	96419-16	96419-25	96419-17	96419-18
Silicone (platinum-cured) 7.6 m (25 ft)/pk	1	✓	1	1	1	✓	1	96410-13	96410-14	96410-16	96410-25	96410-17	96410-18
Silicone (peroxide-cured) 7.6 m (25 ft)/pk	1	1	✓	✓	✓	✓	✓	96400-13	96400-14	96400-16	96400-25	96400-17	96400-18
<b>BioPharm silicone</b> (platinum-cured) 7.6 m (25 ft)/pk	<	1	1	1	1		1	96420-13	96420-14	96420-16	96420-25	96420-17	96420-18
BioPharm Plus silicone (platinum-cured) 7.6 m (25 ft)/pk	✓	1	1	1	1		1	96440-13	96440-14	96440-16	96440-25	96440-17	96440-18
<b>C-Flex® ULTRA</b> 7.6 m (25 ft)/pk	$\checkmark$	✓	✓	✓	✓	✓	1	_	06434-14	06434-16	06434-25	06434-17	06434-18
<b>C-Flex®</b> 7.6 m (25 ft)/pk	1	1	1	1	1	1	✓	06424-13	06424-14	06424-16	06424-25	06424-17	06424-18
PharMed <sup>®</sup> BPT 7.6 m (25 ft)/pk	1	1	$\checkmark$	$\checkmark$	$\checkmark$	1	1	06508-13	06508-14	06508-16	06508-25	06508-17	06508-18
PharMed <sup>®</sup> BPT High-Pressure 7.6 m (25 ft)/pk	✓	✓	✓	1	1	✓	✓	_	05664-14	05664-16	_	_	_
PharmaPure® 7.6 m (25 ft)/pk		1	$\checkmark$			1	1	06435-13	06435-14	06435-16	06435-25	06435-17	06435-18
Chem-Durance® Bio 15.2 m (50 ft)/pk		1	1			1	1	06442-13	06442-14	06442-16	06442-25	06442-17	06442-18
<b>Tygon® E-LFL</b> 7.6 m (25 ft)/pk	<	1	1	1	$\checkmark$	1	1	06440-13	06440-14	06440-16	06440-25	06440-17	06440-18
<b>Tygon® E-Food (B-44-4X)</b> 15.2 m (50 ft)/pk	<b>\</b>	1	1	1	1		1	06418-13	06418-14	06418-16	06418-25	06418-17	06418-18
<b>Tygon® E-Lab (E-3603)</b> 15.2 m (50 ft)/pk	$\checkmark$	1	1	1	<		1	06509-13	06509-14	06509-16	06509-25	06509-17	06509-18
Versilon™ 2001 15.2 m (50 ft)/pk		1	1					06475-13	06475-14	06475-16	06475-25	06475-17	06475-18
<b>Tygon<sup>®</sup> Fuel &amp; Lubricant</b> (F-4040-A) 15.2 m (50 ft)/pk	✓	✓	1	✓	1		<b>√</b>	06401-13	06401-14	06401-16	06401-25	06401-17	06401-18
Versilon™ (A-60-N) 15.2 m (50 ft)/pk	✓	1	1	1	<ul> <li>Image: A start of the start of</li></ul>			06404-13	06404-14	06404-16	06404-25	06404-17	06404-18
<b>Tygon® (A-60-F)</b> 15.2 m (50 ft)/pk	$\checkmark$	1	$\checkmark$	1	<		✓	06402-13	06402-14	06402-16	06402-25	06402-17	06402-18
<b>GORE® STA-PURE®, PCS</b> 30.5 cm (12")/pk	1	1	1			1	1	-	96211-14	96211-16	96211-25	96211-17	96211-18
GORE® STA-PURE®, PFL 30.5 cm (12")/pk	$\checkmark$	✓	$\checkmark$			✓	✓	-	96212-14	96212-16	96212-25	96212-17	96212-18
Viton <sup>®</sup> FDA-Compliant 7.6 m (25 ft)/pk	1	1	1	1	1		1	96412-13	96412-14	96412-16	96412-25	96412-17	96412-18

- Our pump tubing is factory-tested and optically inspected to provide the best performance from your peristaltic pump

0	Ο	0	0	0
L/S 14	L/S 16	L/S 25	L/S 17	L/S 18
mm (0.06")	3.1 mm (0.12")	4.8 mm (0.19")	6.4 mm (0.25")	7.9 mm (0.31")
6 mm (1⁄16")	3.2 mm (1/8")	4.8 mm (3/16")	6.4 mm (1/4")	9.5 mm (¾")
.21 to 130 mL/min	0.8 to 480 mL/min	1.7 to 1000 mL/min	2.8 to 1700 mL/min	3.8 to 2300 mL/min
	2.7 bar (40 psig)	2 .4 bar (35 psig)	1.4 bar (20 psig)	1.0 bar (15 psig)
	660 mm H	lg (26" Hg)	510 mm H	lg (20" Hg)

8.8 m H<sub>2</sub>O (29 ft H<sub>2</sub>O)

<sup>‡</sup>Actual performance varies depending on tubing formulation—values shown are

6.7 m H<sub>2</sub>O (22 ft H<sub>2</sub>O)

<sup>††</sup>Sizes L/S 13 and L/S 14 are not compatible with Cytoflow pump head or thin-wall version of the High-Performance pump head.

# Masterflex® L/S® High-Performance

 Our High-Performance Precision pump tubing features a thicker wall compared to our Precision pump tubing

	L/S High-Performance	Precision pump tubing	
Pump tubing cross sections	<b>D</b> L/S 15	<b>O</b> L/S 24	
Inside diameter (nominal)	4.8 mm (0.19")	6.4 mm (0.25")	
Hose barb size	4.8 mm (3/16")	6.4 mm (1/4")	
Flow range (approximate) <sup>†</sup> with 1 to 600 rpm drive Value in () obtained with High-Performance pump head	1.7 to 1000 mL/min (1.8 to 1100 mL/min)	2.8 to 1700 mL/min (3.0 to 1800 mL/min)	
Maximum pressure <sup>‡</sup>	2.7 bar	(40 psig)	
Maximum vacuum <sup>‡</sup>	660 mm H	lg (26" Hg)	
Suction lift <sup>‡</sup>	8.8 m H <sub>2</sub> O	(29 ft H <sub>2</sub> 0)	

L/S Pump Head Compatibility

 $^{\dagger}Determined under the following conditions: 0 psi at inlet, 0.5 psi at outlet; water temperature at 22°C (72°F).$ 

### **Precision Pump Tubing**

 Ideal choice for applications involving pressure, suction lift, viscous fluids, or long tubing life

Ο	Ο
L/S 35	L/S 36
7.9 mm (0.31")	9.7 mm (0.38")
9.5 mm (¾")	9.5 mm (¾")
3.8 to 2300 mL/min (4.3 to 2600 mL/min)	4.8 to 2900 mL/min (5.8 to 3400 mL/min)
2.4 bar (35 psig)	1.4 bar (20 psig)
660 mm Hg (26" Hg)	610 mm Hg (24" Hg)
8.8 m H <sub>2</sub> O (29 ft H <sub>2</sub> O)	8.3 m H <sub>2</sub> O (27 ft H <sub>2</sub> O)

 $\ensuremath{^+\!Actual}$  performance varies depending on tubing formulation—values shown are for firm tubing.

			_/3 Fullij /						
	S. S	Carlo Carlo	@.050.	took,	High Card 3	ор Справля странование и с По странование и странование			
Tubing	~ ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Lege S	42	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	in de	L/S 15	L/S 24	L/S 35	L/S 36
Puri-Flex® 7.6 m (25 ft)/pk	1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	96419-15	96419-24	96419-35	96419-36
Silicone (platinum-cured) 7.6 m (25 ft)/pk	✓	✓	✓	✓	✓	96410-15	96410-24	96410-35	96410-36
Silicone (peroxide-cured) 7.6 m (25 ft)/pk	✓	✓	✓	✓	✓	96400-15	96400-24	96400-35	96400-36
<b>BioPharm silicone</b> (platinum-cured) 7.6 m (25 ft)/pk	✓	✓	✓	✓	✓	96420-15	96420-24	96420-35	96420-36
<b>BioPharm Plus silicone</b> (platinum-cured) 7.6 m (25 ft)/pk	✓	✓	✓	✓	✓	96440-15	96440-24	96440-35	96440-36
<b>C-Flex® ULTRA</b> 7.6 m (25 ft)/pk	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	06434-15	06434-24	06434-35	06434-36
<b>C-Flex®</b> 7.6 m (25 ft)/pk	1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	06424-15	06424-24	06424-35	06424-36
PharMed® BPT 7.6 m (25 ft)/pk	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	06508-15	06508-24	06508-35	06508-36
PharMed® BPT High-Pressure 7.6 m (25 ft)/pk	1	$\checkmark$	$\checkmark$	✓	$\checkmark$	05664-15	05664-24	_	_
PharmaPure® 7.6 m (25 ft)/pk		$\checkmark$	$\checkmark$			06435-15	06435-24	_	_
Chem-Durance <sup>®</sup> Bio 15.2 m (50 ft)/pk		$\checkmark$	$\checkmark$			06442-15	06442-24	06442-35	06442-36
<b>Tygon® E-LFL</b> 7.6 m (25 ft)/pk	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	06440-15	06440-24	06440-35	06440-36
<b>Tygon® E-Food (B-44-4X)</b> 15.2 m (50 ft)/pk		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	06418-15	06418-24	06418-35	06418-36
<b>Tygon® E-Lab (E-3603)</b> 15.2 m (50 ft)/pk	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	06509-15	06509-24	06509-35	06509-36
<b>Versilon™ 2001</b> 15.2 m (50 ft)/pk		$\checkmark$	$\checkmark$			06475-15	06475-24	_	_
Tygon <sup>®</sup> Fuel & Lubricant (F-4040-A) 15.2 m (50 ft)/pk	✓	✓	$\checkmark$	✓	✓	06401-15	06401-24	06401-35	06401-36
<b>Versilon™ (A-60-N)</b> 15.2 m (50 ft)/pk	1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	06404-15	06404-24	06404-35	06404-36
<b>Tygon® (A-60-F)</b> 15.2 m (50 ft)/pk	1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	06402-15	06402-24	06402-35	06402-36
GORE® STA-PURE®, PCS 35.6 cm (14")/pk	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	96211-15	96211-24	96211-35	96211-36
GORE® STA-PURE®, PFL 35.6 cm (14")/pk	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	96212-15	96212-24	96212-35	96212-36
Viton <sup>®</sup> FDA-Compliant 7.6 m (25 ft)/pk	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	96412-15	96412-24	96412-35	96412-36

# Masterflex® I/P® Precision and

- I/P pump tubing is manufactured to extremely close tolerances that match our I/P pump heads, ensuring accurate, repeatable flow and long tubing life
- Our tubing is factory-tested and optically inspected to provide the best performance from your peristaltic pump

## **High-Performance Precision Pump Tubing**

 Our High-Performance Precision pump tubing features a thicker wall compared to our Precision pump tubing, making it the best choice for applications involving pressure, suction lift, viscous fluids, or long tubing life

	I/P I	Precisio	on pun	np tubing			1	/P High-Per	formance Precision	n pump tubing		
Pump tubing cross sections		U/P 26							270			/P 89
Inside diameter (nominal)	6.4 r	nm (0.2	25")	9.5 mm (0.37	(") 12.7	mm (0.5")		9.5 mm	n (0.37")	12.7 mm (0.5")		mm (0.62")
Hose barb size (nominal)	-	mm (1/		9.5 mm (3/8"		mm (1/2")			m (¾")	12.7 mm (1/2")		3 mm (5%")
Flow range (approximate) <sup>†</sup>			.01 to	,	<i>,</i>	to 13 LPM			0 8 LPM	0.02 to 17 LPM		to 19 LPM
with 1 to 650 rpm drive				1.1 GPM)		to 3.5 GPM)			2.1 GPM)	(0.005 to 4.5 GPM)	(0.007	to 5.0 GPM)
Maximum pressure <sup>‡</sup>		2.	.7 bar (	40 psi)	1.4 b	ar (20 psi)		2.7 bar	· (40 psi)	2.4 bar (35 psi)	1.4 b	ar (20 psi)
Maximum vacuum <sup>†</sup>				g (26" Hg)		n Hg (20" Hg)			660 mm (Hg 2	•,		n Hg (24" Hg)
Suction lift <sup>†</sup>				29 ft H <sub>2</sub> O)		20 (23 ft H20)			8.8 m H <sub>2</sub> O (29	,		20 (27 ft H20)
<sup>†</sup> Determined under the follow water temperature at 22°C (7	2°F).					Compatibility		or firm tubing	g	Iding on tubing formul	ation—values sh	own are
	Charles and the second		Che Cosol®	Mon	-			High Denot				
Tubing	c, Stor	45	CN CN	/ I/P 26	I/P 73	I/P 82		£ 6.	Length	I/P 70	I/P 88	I/P 89
Puri-Flex® 7.6 m (25 ft)/pk	$\checkmark$	$\checkmark$	1	96419-26	96419-73	96419-82		$\checkmark$	3.0 m (10 ft)/pk	96419-70	96419-88	96419-89
Silicone (platinum-cured) 7.6 m (25 ft)/pk	✓	✓	✓	96410-26	96410-73	96410-82		$\checkmark$	3.0 m (10 ft)/pk	96510-70	96510-88	96510-89
Silicone (peroxide-cured) 7.6 m (25 ft)/pk	1	1	1	96400-26	96400-73	96400-82			_	_	—	_
<b>BioPharm silicone</b> (platinum-cured) 7.6 m (25 ft)/pk	✓	✓	✓	96420-26	96420-73	96420-82		✓	3.0 m (10 ft)/pk	96421-70	96421-88	96421-89
<b>BioPharm Plus silicone</b> (platinum-cured) 7.6 m (25 ft)/pk	✓	1	1	96440-26	96440-73	96440-82		✓	3.0 m (10 ft)/pk	96441-70	96441-88	96441-89
C-Flex <sup>®</sup> ULTRA 7.6 m (25 ft)/pk	$\checkmark$	$\checkmark$	1	06434-26	06434-73	06434-82		$\checkmark$				_
<b>C-Flex®</b> 7.6 m (25 ft)/pk	✓	1	1	06424-26	06424-73	06424-82		$\checkmark$	3.0 m (10 ft)/pk	06424-70	06424-88	06424-89
PharMed <sup>®</sup> BPT 7.6 m (25 ft)/pk	$\checkmark$	✓	1	06508-26	06508-73	06508-82		$\checkmark$	7.6 m (25 ft)/pk	06508-70	06508-88	_
PharmaPure® 7.6 m (25 ft)/pk		<b>\</b>	✓	06435-26	06435-73	06435-82			_		_	—
Chem-Durance <sup>®</sup> Bio 15.2 m (50 ft)/pk Tygon <sup>®</sup> E-LFL		<b>√</b>	<b>√</b>	06442-26	06442-73	06442-82			15.2 m (50 ft)/p	k 06442-70	06442-88	06442-89
7.6 m (25 ft)/pk	✓ ✓		<b>\</b>	06440-26	06440-73	06440-82			7.6 m (25 ft)/pk		06440-88	06440-89
15.2 m (50 ft)/pk Tygon <sup>®</sup> E-Lab (E-3603)	✓ ✓		<b>√</b>	06418-26	06418-73	06418-82			15.2 m (50 ft)/p		06418-88	06418-89
15.2 m (50 ft)/pk Versilon™ 2001	✓			06509-26	06509-73 06475-73	06509-82		<b>√</b>	15.2 m (50 ft)/p	k 06509-70	06509-88	06509-89
15.2 m (50 ft)/pk Tygon® Fuel & Lubricant	1			00473-20								
(F-4040-A) 15.2 m (50 ft)/pk Versilon™ (A-60-N)	✓ ✓	<b>√</b>	<b>√</b>	_	06401-73	06401-82		-	—	_	_	_
15.2 m (50 ft)/pk	<b>√</b>			06404-26	06404-73	06404-82			7.6 m (25 ft)/pk		06404-88	06404-89
15.2 m (50 ft)/pk	✓ ✓	✓ ✓		06402-26	06402-73	06402-82			7.6 m (25 ft)/pk		06402-88	06402-89
61 cm (24")/pk Series PFL	✓ ✓	✓ ✓	✓ ✓	96211-26 96212-26	96211-73 96212-73	96211-82 96212-82			61.0 cm (24")/p 61.0 cm (24")/p		96211-88 96212-88	96211-89 96212-89
61 cm (24")/pk	✓	<b>v</b>	✓	50212-20	30212-13	30212-02		$\checkmark$	01.0 011 (24 )/p	· _	30212-00	30212-03
Viton <sup>®</sup> FDA-Compliant 7.6 m (25 ft)/pk	$\checkmark$	$\checkmark$	1	96412-26	96412-73	_			—	_	—	—

# **Spooled Pump Tubing**

- Eliminate waste by cutting the exact length to fit your application
- Cost-effective, efficient, and convenient
- Always have enough tubing on hand
- Save space and shipping costs

#### L/S Spooled Pump Tubing

Size	Platinum-cu (96410, 965	red silicone 510-series)		ired silicone -series)	PharMed® BPT (06508-series)		
	m (ft)	Cat. no.	m (ft)	Cat. no.	m (ft)	Cat. no.	
L/S 13	152.4 (500)	96403-13	76.2 (250)	96407-13	_	—	
L/S 14	152.4 (500)	96403-14	76.2 (250)	96407-14	152.4 (500)	95687-14	
L/S 16	152.4 (500)	96403-16	76.2 (250)	96407-16	152.4 (500)	95687-16	
L/S 25	152.4 (500)	96403-25	76.2 (250)	96407-25	—	—	
L/S 17	152.4 (500)	96403-17	76.2 (250)	96407-17	152.4 (500)	95687-17	
L/S 18	121.9 (400)	96403-18	61.0 (200)	96407-18	121.9 (400)	95687-18	
L/S 15	121.9 (400)	96403-15	76.2 (250)	96407-15	121.9 (400)	95687-15	
L/S 24	91.4 (300)	96403-24	61.0 (200)	96407-24	91.4 (300)	95687-24	
L/S 35	91.4 (300)	96403-35	_	—	91.4 (300)	95687-35	
L/S 36	30.5 (100)	96403-36	—	_	30.5 (100)	95687-36	

96403-15

#### I/P Spooled Pump Tubing

I/P 26	61.0 (200)	96403-26	_	_	61.0 (200)	_
I/P 73	45.7 (150)	96403-73	45.7 (150)	96402-73	45.7 (150)	95687-73
I/P 82	30.5 (100)	96403-82	30.5 (100)	96402-82	30.5 (100)	95687-82
I/P 88	—	_	_	_	_	_
I/P 89	—	_	_	_	_	_

#### L/S Spooled Pump Tubing

Size		1 silicone 121-series)	C-Flex <sup>®</sup> (06424-series)				
	m (ft)	Cat. no.	m (ft)	Cat. no.			
L/S 13	—	—	121.9 (400)	06427-13			
L/S 14	121.9 (400)	96423-14	121.9 (400)	06427-14			
L/S 16	121.9 (400)	96423-16	121.9 (400)	06427-16			
L/S 25	121.9 (400)	96423-25	121.9 (400)	06427-25			
L/S 17	121.9 (400)	96423-17	121.9 (400)	06427-17			
L/S 18	121.9 (400)	96423-18	121.9 (400)	06427-18			
L/S 15	121.9 (400)	96423-15	121.9 (400)	06427-15			
L/S 24	121.9 (400)	96423-24	121.9 (400)	06427-24			
L/S 35	_	_	121.9 (400)	06427-35			
L/S 36	_		121.9 (400)	06427-36			

#### I/P Spooled Pump Tubing

I/P 26	121.9 (400)	96423-26	121.9 (400)	06427-26
I/P 73	30.5 (100)	96423-73	30.5 (100)	06427-73
I/P 82	—	_	30.5 (100)	06427-82
I/P 88	30.5 (100)	96423-88	_	—
I/P 89	30.5 (100)	96423-89	_	_

# CUSTOM CUT TUBING Masterflex.com/CCT

# **Bulk-Packed Pump Tubing**

- Tubing coils are individually bagged and sealed to prevent contamination
- Save on shipping costs and reduce storage space
- Up to 20 sealed bags of tubing (depending on tubing size) in each case

### Order above right





Size	Number of 7.6-m (25-ft) bags per box	Platinum-cured silicone (96410-series)	C-Flex® (06424-series)
	bugo per box	Cat. no.	Cat. no.
L/S 13	20	96404-13	06436-13
L/S 14	20	96404-14	06436-14
L/S 16	20	96404-16	_
L/S 25	20	96404-25	06436-25
L/S 17	20	96404-17	06436-17
L/S 18	10	96404-18	_
L/S 15	20	96404-15	06436-15
L/S 24	20	96404-24	06436-24
L/S 35	10	96404-35	06436-35
L/S 36	10	96404-36	06436-36

#### I/P Bulk-Packed Pump Tubing

		· · · · · · · · · · · · · · · · · · ·	
I/P 26	10	96404-26	06436-26
I/P 73	10	96404-73	06436-73
I/P 82	10	96404-82	06436-82

# Sanitary Pump Tubing Assemblies

- Meets stringent demands of biotechnology, pharmaceutical, and the food, beverage, and dairy processing industries
- Smooth, pre-molded tubing ends allow quick connection to an adapter or to another length of sanitary tubing
- Connectors help maintain cleanliness and purity of your fluids
- FREE Certificate of resin or elastomer Compliance is available upon request

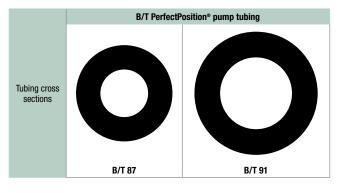


96112-24

0	Platinum-cu (96410, 965		PharMed® BPT (06508-series)			
Size	1.5 m (5 ft )	3 m (10 ft)	1.5 m (5 ft)	3 m (10 ft)		
	Cat. no.	Cat. no.	Cat. no.	Cat. no.		
L/S Prec	ision sanitary pump	o tubing				
L/S 13	96100-13	96101-13	96112-13	96113-13		
L/S 14	96100-14	96101-14	96112-14	96113-14		
L/S 16	96100-16	96101-16	96112-16	96113-16		
L/S 25	96100-25	96101-25	96112-25	96113-25		
L/S 17	96100-17	96101-17	96112-17	96113-17		
L/S 18	96100-18	96101-18	96112-18	96113-18		
L/S High-Performance Precision sanitary pump tubing						
L/S 15	96100-15	96101-15	96112-15	96113-15		
L/S 24	96100-24	96101-24	96112-24	96113-24		
L/S 35	_	—	96112-35	96113-35		
L/S 36	—	—	96112-36	96113-36		
I/P Preci	sion sanitary pump	tubing				
I/P 26	96100-26	96101-26	96112-26	96113-26		
I/P 73	96100-73	96101-73	96112-73	96113-73		
I/P 82	96100-82	96101-82	96112-82	96113-82		
I/P High-	-Performance Preci	sion sanitary pump	tubing			
I/P 70	—	—	96112-70	96113-70		
I/P 88	_	—	96112-88	96113-88		

# **PerfectPosition® Pump Tubing** for 77110- and 77111-Series B/T® Rapid-Load® Pump Heads

- Ensure optimal performance from your Masterflex pump
- PerfectPosition tubing retention marks indicate the exact placement of tubing in the pump head to provide the best performance and life of the tubing
- Custom extruded to fit 77110-series and 77111-series Masterflex B/T pumps and pump heads
- Engineered for long life in peristaltic pump applications



Pump tubing size	PerfectPosition <sup>®</sup> pump tubing					
Fullip tubing size	B/T 87	B/T 91				
Inside diameter (nominal)	12.7 mm (0.5")	19.0 mm (0.75")				
Hose barb size	12.7 mm (1/2")	19.0 mm (¾")				
Flow range (approximate) <sup>†</sup>	0.65 to 18.9 LPM	1.4 to 42 LPM				
with 12 to 321 rpm drive	(0.16 to 5.0 GPM)	(0.3 to 11.1 GPM)				
Maximum pressure‡	2.4 bar (35 psi)	2.06 bar (30 psi)				
Maximum vacuum‡	660 mm H	lg (26" Hg)				
Suction lift <sup>‡</sup>	8.8 m H <sub>2</sub> O (29 ft H <sub>2</sub> O)					

<sup>†</sup>Determined under the following conditions: 0 psi at inlet, 0.5 psi at outlet; water temperature at (22°C) 72°F . <sup>‡</sup>Actual performance varies depending on tubing formulation—values shown are for firm tubing.

Pump tubing formu	lation	B/T PerfectPosition pump tubing			
	lation	B/T 87	B/T 91		
Puri-Flex <sup>®</sup>	3.0 m (10 ft) per pack	96419-87	96419-91		
Silicone (platinum-cured)	3.0 m (10 ft) per pack	96510-87	96510-91		
Silicone (peroxide-cured)	3.0 m (10 ft) per pack	96400-87	96400-91		
BioPharm Plus silicone (platinum-cured)3.0 m (1 per particular)		96445-87	96445-91		
C-Flex®	3.0 m (10 ft) per pack	06424-87	06424-91		
PharMed® BPT	3.0 m (10 ft) per pack	06507-87	06507-91		
PharmaPure <sup>®</sup>	3.0 m (10 ft) per pack	06437-87	06437-91		
Chem-Durance <sup>®</sup> Bio	3.0 m (10 ft) per pack	06443-87	06443-91		
Tygon <sup>®</sup> E-LFL	3.0 m (10 ft) per pack	06440-87	06440-91		
Tygon <sup>®</sup> E-Food (B-44-4X)	3.0 m (10 ft) per pack	06418-87	06418-91		
GORE <sup>®</sup> STA-PURE <sup>®</sup> , Series PCS	68.6 cm (27") per pack	96211-87	96211-91		
Tygon® (A-60-F)	3.0 m (10 ft) per pack	06399-87	06399-91		

### **Chemical Compatibility Charts**

Determine the right tubing formulation for your application using the chemical compatibility tables on pages 26–27. These tables are for use with all Masterflex and Ismatec tubing sizes. All ratings in the tables indicate tubing condition after exposure to the chemical at 21°C (70°F). As every application for our tubing is different and may be outside of our testing parameters, we still recommend using the Masterflex tubing test kit to determine the tubing's specific compatibility to your purposes.

# **Ratings & Materials Legend**

#### 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: Puri-Flex<sup>®</sup>, Puri-Prene<sup>™</sup>, PharMed<sup>®</sup> BPT, High-Pressure PharMed<sup>®</sup> BPT, PharmaPure<sup>®</sup>, Versilon<sup>™</sup> A-60-N, Tygon<sup>®</sup> A-60-F
- CF: C-Flex® ULTRA and C-Flex®
- S: Silicone (platinum-/peroxide-cured), BioPharm, BioPharm Plus, GORE® STA-PURE® Pump Tubing – Series PCS
- T: Puri-Clear<sup>®</sup> LL, Tygon<sup>®</sup> E-LFL, Tygon<sup>®</sup> E-Food, Tygon<sup>®</sup> E-Lab
- TU: Tygon® Fuel & Lubricant, Solva
- TC: Versilon<sup>™</sup> 2001
- CD: Chem-Durance® Bio
- PFL: GORE® STA-PURE® Pump Tubing Series PFL
- V: Viton®
- FP: Polytetrafluoroethylene (PTFE)

# **Technical Info**

#### **Tubing Test Procedure**

- 1. Measure and weigh a sample of tubing.
- 2. Immerse the sample in the fluid for 72 hours in a closed vessel.
- Dry sample, then measure and weigh it. Inspect carefully for signs of deterioration such as swelling, embrittlement, cracking, softness, or change of size or weight.
- If there is no sign of deterioration, test a sample in pump under the conditions of your application.

Note: PharmaPure<sup>®</sup> and Chem-Durance<sup>®</sup> Bio tubing formulations have different inner and outer materials and require modified testing methods. Contact your Masterflex office or dealer for chemical testing instructions.

# **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.

# **A**Warning

The information in these tables has been supplied to Masterflex by the tubing manufacturers and is to be used **ONLY** as a guide to select your tubing. Test fluids and tubing using the tubing test procedure above. Masterflex 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.

# A 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.

### Masterflex® and Ismatec® Chemical Compatibility

Fluid					ing fo			I		
	PN D	CF A	S B	T D	TU D	TC D	CD C	PFL A	V D	FP A
Acetaldehyde Acetate LMW	A	A		D	D	C	D	A 		A
Acetic acid <5%	A	A	A	AB	A	B	A	A		A
Acetic acid >5% Acetic anhydride	A	B	C A	D	D	B	A	A	B D	A
Acetone	D	C	С	D	D	C	B	Α	D	A
Acetonitrile Acetyl bromide	B C	A		D	D	B C	B		D	A
Acetyl chloride	C	A	C	D	D	С	D	A	A	A
Air Aliphatic hydrocarbons	A	A D	A	A D	AB	A	A	A	A	A†
Aluminum chloride	A	A	В	A	A	A	A	_	Α	Α
Aluminum sulfate Alums	A	A	A	A	A	A	A		A A	A
Ammonia, gas / liquid	A	Α	C	В	В	В	В	_	D	Α
Ammonium acetate Ammonium carbonate	A	A		A	A	A	A	A	D	A
Ammonium chloride	A	A	С	A	A	A	A	A	A	Α
Ammonium hydroxide Ammonium nitrate	A	A	A C	B	CA	A	A	A	B A	A
Ammonium phosphate	A	A	A	A	A	A	A	A	Α	Α
Ammonium sulfate Amyl acetate	AB	A	A	A D	A	A D	A	AB	A D	A
Amyl alcohol	D	D	D	D	A	A	A	A	Α	Α
Amyl chloride Aniline	C C	D B	D	D D	D	D	D		A B	A
Aniline hydrochloride	C	B	D	D	D	D	D	A	B	A
Aqua regia	D	_	D	D	D	A	A		В	Α
(80% HCl, 20% H) Aromatic hydrocarbons	D	D	_	D	D	D	D	_	Α	
Arsenic salts	A		_	A	A	A	A		D	-
Barium salts Benzaldehyde	A D	A D	A B	A D	A D	A C	A C	A	A D	AA
Benzenesulfonic acid	D	A	D	D	D	D	D	A	Α	Α
Bleaching liquors Boric acid	A	B	B	A	A	A	A	A	A	A
Bromine	D	Α	D	D	D	D	D		Α	Α
Butane Butanel (buth/ alashal)	AD	D B	D B	A D	A	B	B	B	A A	A
Butanol (butyl alcohol) Butyl acetate	B	D	D	D	D	D	D	B	D	A
Butyric acid	В	Α	D	D	C	D	D	Α	В	Α
Calcium oxide Calcium salts	A	A	AB	A	A	A	A	A	A A	A
Carbon bisulfide	D	D	D	D	D	D	D	_	—	A.
Carbon dioxide Carbon tetrachloride	A	AB	B	A D	A	A	A	A B	A A	A <sup>†</sup> A
Chlorine, dry	C	A	D	Α	A	C	С	-	A	A <sup>†</sup>
Chlorine, wet	DB	A	D	CA	A	CA	CA	 B	B D	A
Chloroacetic acid Chlorobenzene	D	D		D	D	D	D	A	A	B
Chlorobromomethane	B	D	D	D	D	-	D	-	A	A
Chloroform Chlorosulfonic acid	C D	D	D	D	D	D	D	B	A D	A
Chromic acid, 30%	A	Α	C	С	С	В	В	_	Ă	A
Chromium salts Copper salts	A	A		A	A	A	A		A	
Cresol	D	D	D	В	С	A	A	Α	Α	A
Cyclohexane Cyclohexanone	D	D	D	D	C	D C	D C	В	A D	A
Diacetone alcohol	A	A	B	D	D	A	A	A	D	A
Dimethyl formamide	B	В	В	D	D	A	A	A	D	A
Dimethyl Sulfoxide (DMSO) Essential oils	A	В	C	D	c				_	<u>A</u>
Ethanol (ethyl alcohol)	C	В	A	D	В	A	A	Α	Α	Α
Ether Ethyl acetate	C B	D	DB	D	C D	D	D	B	D D	A
Ethyl bromide	D	A	D	D	D	С	D		Α	Α
Ethyl chloride Ethylamine	CD	A	D C	D	D	DB	DB	 B	A D	A
Ethylene chlorohydrin	A	A	С	D	В	A	A		Α	A
Ethylene dichloride Ethylene glycol	CA	A B	D	D A	DA	D A	DA	B	A A	A
Ethylene oxide	A	A	D	A	A	A	A	В	D	Α
Fatty acids	C	B	C	B	B	C	C	Α	A	A
Ferric chloride Ferric sulfate	A	A	B	A	A	A	A	A	A A	AA
Ferrous chloride	A	Α	С	Α	Α	Α	Α	-	Α	Α
Ferrous sulfate Fluoboric acid	A D	A	C A	A C	AD	A	A	A	<u>A</u>	A
Fluoroborate salts	A	Α	—	A	Α	Α	Α	—	—	—
Fluosilicic acid Formaldehyde	C D	A	D B	A	A	A C	A C		A D	AA
Formic acid, 25%	A	Α	B	В	С	A	A	Α	D	Α
Freon <sup>®</sup> TMS	D D	C D		D D	DB	A	A	D B	A	A B
Gasoline, high-aromatic Gasoline, nonaromatic	D	D	D	D	B	D	D	B	A	A
Glucose	A	Α	A	Α	A	Ă	A	Ă	Α	A
Glue, P.V.A. Glycerin	A	AB	A	A	A	— A	A		A	A
Hydriodic acid	D	Α	-	Α	A	A	A	_	Α	
Hydrobromic acid, 30%	D	A	D	B	A	A	A		A	A
Hydrochloric acid (dil) Hydrochloric acid (med)	B	A	D D	A C	A D	A	A	A	A A	AA
Hydrochloric acid (conc)		В	D	C	D	Α	A	Α	Α	Α
Hydrocyanic acid Hydrocyanic acid, gas, 10%	A	A	C C	A	A	A	A	A	A A	A
Hydrofluoric acid, 50%	D	A	D	C	D	A	A	D	D	A

### Charts (See Legend on page 25)

Fluid		07		1 <u> </u>	ing fo		r —			
Hydrofluoric acid, 75%	PN	CF A	S D	T D	TU D	TC	CD C	PFL D	V D	FP A
Hydrogen peroxide (dil)	A	A	Α	A	Α	Α	A	Α	Α	A
Hydrogen peroxide, 90% Hypochlorous acid	B	D	B	D	D	B	B	A	A	A
lodine solutions	Â	ĉ	C	Â	Â	Â	Â	_	Α	Â
lodoform Kerosene		_	-	-	_		D	_	C	_
Kerosene Ketones	D	D B	D	D	B D	D C	D C	A	A	A
Lacquer solvents	В	D	D	D	D	D	D	A	D	A
Lactic acid, 3–10% Lead acetate	A	A	A	A	A A	A	A	A	A D	A
Linseed oil	ĉ	D	A	D	Ă	B	B	A	A	Â
Lithium hydroxide	B	A	D	A	A	-	B	-	C	A
Magnesium chloride Magnesium sulfate	A	A	A	A	A A	A	A	A	A	A
Malic acid	A	A	B	A	A	A	A	A	A	A
Manganese salts Mercury salts	A	A	В	A	A A	A	A	-	A	A
Methane	A	D		A	A	A	A		A	A
Methanol (methyl alcohol)	A	_	Α	C	С	A	A	A	В	A
Methyl chloride Methyl ethyl ketone (MEK)	C D	A	D	D	D	D C	D C	B	B D	A
Mixed acid (40% H <sub>2</sub> SO <sub>4</sub> ,	В		U	B	D	0	A		U	A
15% HNO3)	D D	A	_	D D	U	_	A	_	_	A
Molybdenum disulfide Monoethanolamine	C	B	В	D	D	D	D	_	A D	A
Naphtha	D	D	D	D	В	D	D	B	A	B
Natural gas Nickel salts	A	D	A	A	A	A	A	B	A	A <sup>†</sup>
Nitric acid (dil)	A	Â	В	A	D	A	A	A	В	A
Nitric acid (med) Nitric acid (conc)	A D		C	C	D	A	A	A	A	A
Nitrobenzene	D	D	D	D	D	D	D	A	B	A
Nitrogen oxides	A	A	D	A	Α	A	A	—	D	A
Nitrous acid Oils. animal	A C	AB	В	AD	C B	AB	AB		A	A
Oils, mineral	D	В	В	С	Α	D	D	_	Α	A
Oils, vegetable Oleic acid	C C	B	B D	D	A B	B D	BC	A	A B	A
Oxalic acid, cold	B	Â	B	C	D	A	Ă	A	A	A
Oxygen, gas	A	Α	В	A	A	A	A	A	В	A†
Palmitic acid, 100% in ether Perchloric acid	CA	A	D	D C	B D	C A	C A	A	A	A
Perchloroethylene	C	В	D	D	D	D	D	В	Α	Α
Phenol (carbolic acid)	A	DA	D C	B C	C A	A	A	A	A	A
Phosphoric acid, 50% Phthalic acid	A	D	B	D	A	A	A		B	A
Plating solutions	A	A	D	A	D	A	A	-	Α	A
Polyglycol Potassium carbonate	B	B	A	A	A		B		A	_
Potassium chlorate	B	A	В	В	Α	_	A	A	Α	Α
Potassium hydroxide (med)	A	A	B C	B	D		A	B	D	A
Potassium hydroxide (conc) Potassium iodide	A	A		A	A	A	A	D	A	A
Propanol (propyl alcohol)	C		A	D	A	A	A	A	A	A
Pyridine Silicone fluids	C	AB	D C	DB	D	CB	CA	A	D	A
Silicone oils	С	В	С	В	A	В	A		Α	A
Silver nitrate Soap solutions	AB	A	A	A	A A	A	A	A	A	A
Sodium bicarbonate	A	Â	A	A	A	A	A	Â	A	A
Sodium bisulfate	A	A	-	A	A	Α	A	A	A	A
Sodium bisulfite Sodium borate	A	A	A	A	A	_	A	A	A	A
Sodium carbonate	A	A	A	A	A	A	A	Α	A	A
Sodium chlorate Sodium chloride	A	A	C A	A	A A	A	A	A	A	A
Sodium ferrocyanide	A	A	_	B	B	_	A	_	A	A
Sodium hydrosulfite Sodium hydroxide (dil)	B	A		A	A D		A			A
Sodium hydroxide, 25%	A	В	B	C	D	A	A	- A	A	A
Sodium hydroxide (conc)	-	C	-	C	D	A	A	-	Α	A
Sodium hypochlorite, <5% Sodium hypochlorite, >5%	A	A	B	A	A	A	A	A	A	A
Sodium nitrate	A	A	D	A	Α	Â	A	A	Α	A
Sodium silicate Sodium sulfide	A	A	A	A	A	— A	A	A	A	A
Sodium sulfite	A	A	A	A	Α	A	A	A	Α	A
Steam, up to 40 psi	C		Α	D	D	_	D	A	B	A†
Stearic acid Styrene	C D	A	B	A	B D	C D	CD	A	A	A
Sulfuric acid (dil)		A	D	A	Α	A	A	Â	Α	A
	A		D	AD	B D	A D	A	c	A	A
Sulfuric acid (med)	A	A				U U		, v		
Sulfuric acid (med) Sulfuric acid (conc) Sulfurous acid	A D A	A A	D D	A	Ā	A	A	_	В	A
Sulfuric acid (med) Sulfuric acid (conc) Sulfurous acid Tannic acid	A D A B	A A A	D	A C	D	Α	A	-	A	Α
Sulfuric acid (med) Sulfuric acid (conc) Sulfurous acid Tannic acid Tanning liquors	A D A	A A	D D	A					<u>A</u>	
Sulfuric acid (med) Sulfuric acid (conc) Sulfurous acid Tannic acid Tannic acid Tantaric acid Tin salts	A D A B A A A	A A B A A	D D B A B	A C A A A	D A A A	A A A	A A A		A A	A A A
Sulfuric acid (med) Sulfuric acid (conc) Sulfurous acid Tannic acid Tannic acid Tantaric acid Tin salts Toluene (toluol)	A D A B A A A D	A A B A A D	D D A A D	A C A A D	D A A D	A A A D	A A A D	  	A A A	A A A A
Sulfuric acid (med) Sulfuric acid (conc) Sulfurous acid Tannic acid Tannic acid Tantaric acid Tin salts	A D A B A A A	A A B A A	D D B A B	A C A A A	D A A A	A A A	A A A	-	A A	A A A
Sulfuric acid (med) Sulfurcis acid Tannic acid Tannic acid Tannicg liquors Tartaric acid Tin salts Toluene (foluol) Trichloroacetic acid Trichloroethylene Trisodium pikosphate	A D A B A A D B D A	A A B A D A D A	D D A A D D D	A C A A D A D A	D A A D D D A	A A A D A D A	A A A D A D A	A B	A A A C A A	A A A A A A A
Sulfuric acid (med) Sulfurcis acid (conc) Sulfurcus acid Tanning liquors Tartaric acid Tin salts Toluene (toluol) Trichloroacetic acid Trichloroacetic acid Trisodium phosphate Turpentine	A D A B A A D B D A D D	A A B A D A D A D A D	D D A D D D D D D	A C A A D A D A D A D	D A A D D D A B	A A D A D A D A D	A A D A D A D A D	A B A	A A A C A	A A A A A A A A
Sulfuric acid (med) Sulfurcis acid Tannic acid Tannic acid Tannic fliquors Tartaric acid Tin salts Toluene (foluol) Trichloroacetic acid Trichloroethylene Trisodium phosphate Turpentine Urea Urea	A D A B A A D B D A D A A A	A A B A D A D A D A A D A A A	D D A A D D D D B B	A C A A D A D A D A D A A A	D A A D D D A B A C	A A D A D A D A A A	A A D A D A D A A A	A B A A	A A A C A A A A A	A A A A A A A A A A
Sulfuric acid (med) Sulfuric acid (conc) Sulfurica acid Tannica acid Tanarica acid Tin salts Toluene (toluol) Trichloroacetic acid Trichloroacetic acid Trichloroacetic acid Urichoroacetic acid Uricacid Water, fresh	A D A B A A D B D A D A A A A A	A A B A D A D A D A A D A A A A A	D D A A D D D D B B B	A C A A D A D A A D A A A A A	D A A D D D A B A C A	A A D A D A D A A A A A	A A D A D A D A A A A	A B A A A A	A A A C A A A A A	A A A A A A A A A A A A
Sulfuric acid (med) Sulfurcis acid Tannic acid Tannic acid Tannic fliquors Tartaric acid Tin salts Toluene (foluol) Trichloroacetic acid Trichloroethylene Trisodium phosphate Turpentine Urea Urea	A D A B A A D B D A D A A A	A A B A D A D A D A A D A A A	D D A A D D D D B B	A C A A D A D A D A D A A A	D A A D D D A B A C	A A D A D A D A A A	A A D A D A D A A A	A B A A	A A A C A A A A A	A A A A A A A A A A

<sup>†</sup>Do not use the L/S<sup>®</sup> PTFE-tubing pump head with gases due to excessive heat buildup.



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