

Masterflex® Pump Tubing Formulation Descriptions

Silicone Tubing

While silicone tubing formulations share many characteristics, there are some basic differences.

BioPharm and BioPharm Plus Silicone Tubing (platinum-cured)

- Ultra-smooth inner surface minimizes particle entrapment
- Very low extractables, with documented biocompatibility for sensitive applications
- Longest tubing life of any silicone pump tubing (BioPharm Plus)

- Lower spallation than regular silicone (BioPharm Plus)

Platinum-Cured Silicone Tubing

- Slightly greater clarity
- Smooth surface; lower protein binding levels
- Fewer potential leachables

Peroxide-Cured Silicone Tubing

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

Puri-Flex™ Tubing **NEW**

- Heat sealable and weldable
- Longest pump life when compared to silicone or C-FLEX tubing
- Lowest spallation when compared to silicone or C-FLEX tubing

C-FLEX® Tubing

- Combines biocompatibility of silicone with chemical resistance similar to Tygon®
- Very low protein binding
- Heat sealable, weldable, economical

To sterilize all silicone tubing:

High-speed instrument (flash) autoclave: Place tubing on nonlinting cloth or sterilizing paper in a clean, open tray for 10 minutes at 132°C (270°F) at 2 kg/cm² (30 psi).

Standard gravity autoclave: Wrap tubing 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).

Prevacuum high-temperature autoclave: Wrap tubing in nonlinting cloth or sterilizing paper and place in a clean, open tray for normal cycle of 30 to 35 minutes at 121°C (250°F).

Gamma radiation: 2.5 Mrad.

MASTERFLEX® Exclusive

Pump tubing formulation	Silicone (platinum-cured)	Silicone (peroxide-cured)	BioPharm Silicone and BioPharm Plus Silicone (platinum-cured)	Puri-Flex™	C-FLEX®	
Series number	96410 and 96510	96400 and 96406	96420 and 96421 96440, 96441, & 96444	96419 NEW	06424	
Advantages	Excellent biocompatibility. No leachable additives, DOP, or plasticizers; phthalate and latex-free; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Extremely good over a wide temperature range. Weather, ozone, corona, and radiation resistant. Minimal tendency to take a set.	Excellent biocompatibility. No additives, plasticizers or DOP; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Extremely good at low temperatures. Weather, ozone, corona, and radiation resistant. Minimal tendency to take a set.	Longest life of any silicone pump tubing. (BioPharm Plus) Lower spallation than regular silicone. (BioPharm Plus) Ultra-smooth inner surface minimizes particle entrapment. Lower absorption; excellent biocompatibility; no leachable additive, DOP, or plasticizers. Very low extractables. Tasteless, odorless and nontoxic, fungus-resistant.	Biocompatible. Heat sealable and weldable. Longest pump life when compared to silicone or C-FLEX tubings. Lowest spallation when compared to silicone or C-FLEX tubings. Very low protein binding. Cost effective. No halogens or phthalates.	Physical properties similar to silicone with chemical compatibility of Tygon®. Very low protein binding. Inexpensive. Biocompatible. Heat sealable and weldable.	
Limitations	Do not use with concentrated acids and bases, organic solvents, or oils. Relatively high gas permeability.	Do not use with concentrated acids and bases, organic solvents, or oils. Relatively high gas permeability.	Do not use with concentrated solvents, oils, or acids. Relatively high gas permeability.	Do not use with concentrated solvents, oils, or acids. Moderate temperature range.	Not recommended for use with oils. Moderate pumping life.	
Application suitability:						
Acids	Not recommended	Not recommended	Not recommended	Good	Good	
Alkalies	Not recommended	Not recommended	Not recommended	Good	Good	
Organic solvents	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	
Pressure	Fair	Fair	Fair	Good	Fair	
Vacuum	Good	Good	Good	Good	Good	
Viscous fluids	Fair	Fair	Fair	Excellent	Fair	
Sterile fluids	Excellent	Excellent	Excellent	Excellent	Excellent	
Physical characteristics and composition	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material; flexible. Translucent, clear to light amber.	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material. Translucent, clear to light amber.	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material. Translucent, clear to light amber.	Thermoplastic elastomers. Excellent tensile and tear strength. Translucent, clear to light white.	Thermoplastic elastomer. Styrene-ethylene-butylene modified block copolymer with silicone oil. Excellent tensile and tear strength. Soft material. Opaque, white.	
Temperature range	Static	-58 to 446°F (-50 to 230°C)	-58 to 446°F (-50 to 230°C)	-75 to 450°F (-60 to 232°C)	-58 to 275°F (-50 to 135°C)	-100 to 275°F (-73 to 135°C)
	Dynamic (pumping)	-40 to 212°F (-40 to 100°C)	-40 to 212°F (-40 to 100°C)	-40 to 212°F (-40 to 100°C)	-22 to 212°F (-30 to 100°C)	-40 to 212°F (-40 to 100°C)
Meets classifications	USP Class V Extractables Exceeds Class VI Implant FDA 21 CFR 177.2600 Exceeds 3A Sanitary cGMPs (FDA 21 CFR 210 and 211). European Pharmacopoeia (EP)	USP Class VI FDA 21 CFR 177.2600 Exceeds 3A sanitary standards European Pharmacopoeia (EP)	USP Class VI FDA 21 CFR 177.2600 Exceeds 3A sanitary standards European Pharmacopoeia (EP)	USP Class VI FDA 21 CFR 177.2600 and 177.1810 RoHs Compliant REACH Compliant ADCF Compliant	USP Class VI FDA 21 CFR 177.1810 European Pharmacopoeia (EP)	
Gas permeability cc x mm (cm ² x sec x cm Hg) x 10 ⁻¹⁰	CO ₂ : 20,132 H ₂ : 6579 O ₂ : 7961 N ₂ : 2763	CO ₂ : 20,132 H ₂ : 6579 O ₂ : 7961 N ₂ : 2763	CO ₂ : 25,147 H ₂ : — O ₂ : 4715 N ₂ : 2284	CO ₂ : 1200 H ₂ : — O ₂ : 200 N ₂ : 80	CO ₂ : — H ₂ : — O ₂ : 150 N ₂ : —	
Cleaning/sterilization	Clean with hot water/soap solution; use a non-oily soap such as Ivory®, not synthetic detergent or oil-based soap as they may be absorbed by the tubing and into the fluid. Rinse well with distilled water. Ethylene oxide (ETO) sterilization is not recommended—sufficient data is not available about complete outgassing of residual ETO and other ETO products.	Clean with isopropyl alcohol or hot water/soap solution; use a non-oily soap such as Ivory®, not synthetic detergent or oil-based soap as they may be absorbed by the tubing and into the fluid. Rinse thoroughly with distilled water. May use ETO. Autoclavable.	Sterilize by ETO, autoclave, or gamma radiation up to 2.5 Mrad. To autoclave: coil loosely in nonlinting cloth or paper; autoclave at 250°F (121°C), 1 bar (15 psi) for 30 minutes.	Sterilize by ETO, autoclave up to 275°F (135°C), gamma irradiation up to 4.5 Mrad (45 kGy). To autoclave: coil loosely in nonlinting cloth or paper; autoclave from 250°F (121°C) to 275°F (135°C).	Sterilize by ETO, autoclave, or gamma radiation.	