



Masterflex® Tubing Formulations

 **Cole-Parmer®**
scientific experts

Distributed by:

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Platinum-Cured Silicone Tubing



- Specifications:

- Biocompatible
- Moderate lifetime
- Moderate spallation
- Moderate pressure
- Moderate gas permeability
- Translucent
- Dynamic temperature range: -40 to 100°C (-40 to 212°F)
- USP Class V Extractables, USP class VI, FDA 21 CFR 177.2600, FDA 21 CFR 221 and 211, REACH, RoHS, ADCF
- Sterilization: autoclave, gamma, EtO

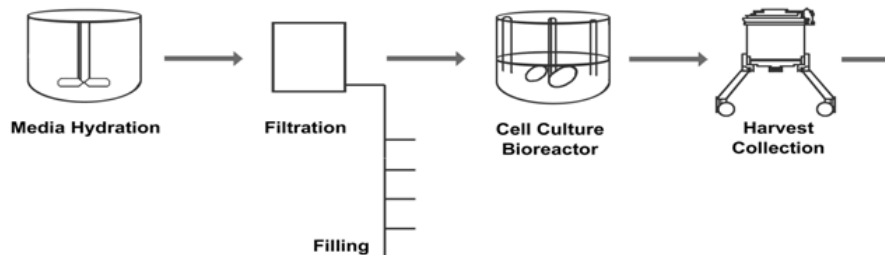


Platinum-Cured Silicone Tubing



- **Applications:**

- Process transfer of pharmaceutical fluids and intermediates
- High-purity fluid processing
- General analytical applications
- Bioreactor process lines
- Buffer and media preparation



Puri-Flex™ Tubing



- **Specifications:**

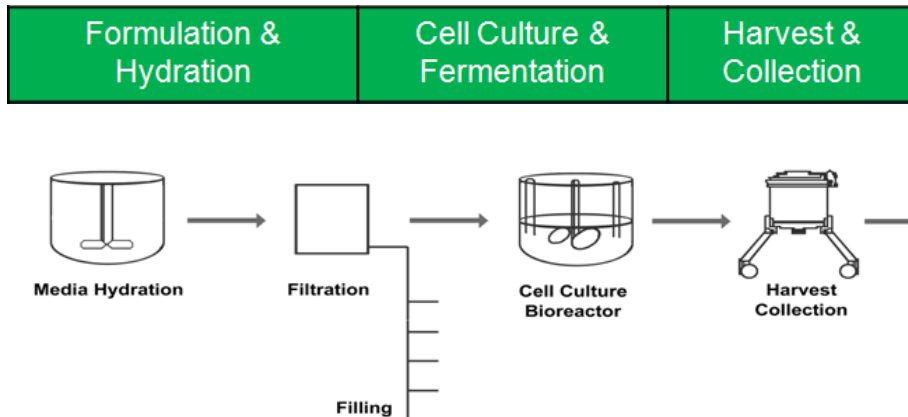
- Biocompatible
- Heat sealable and weldable
- Longer lifetime when compared to silicone
- Lower spallation when compared to silicone
- Higher pressure when compared to silicone
- Lower gas permeability compared to silicone
- Translucent
- Dynamic temperature range: -30 to 100°C (-22 to 212°F)
- USP Class VI, FDA 21 CFR 177.2600 and 177.1810, REACH, RoHS, ADCF
- Sterilization: autoclave, gamma, EtO



Puri-Flex™ Tubing



- **Applications:**
 - Cell harvest and media process systems
 - Bioreactor process lines
 - Buffer and media preparation
 - Cell culture operations
 - Purification operations
 - Diagnostics products
 - Tubing and bag manifolds



C-Flex[®] Tubing



- **Specifications:**

- Biocompatible
- Heat sealable and weldable
- Similar lifetime when compared to silicone
- Similar spallation when compared to silicone
- Similar pressure when compared to silicone
- Similar gas permeability compared to silicone
- Opaque
- Dynamic temperature range: -40 to 40°C (-40 to 104°F)
- USP Class VI, EP 3.2.9, FDA 21 CFR 177.2600, REACH, RoHS, ADCF
- Sterilization: autoclave, gamma, EtO



C-Flex[®] Tubing

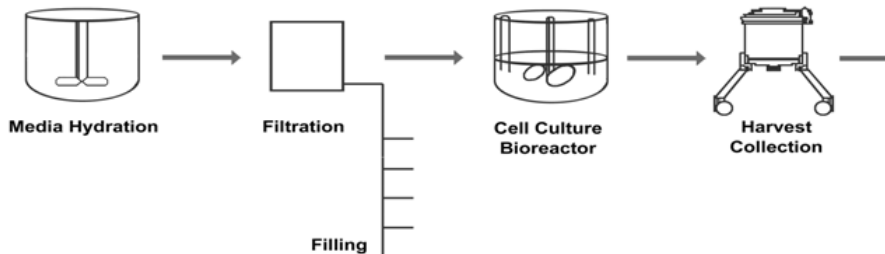


- **Applications:**
 - Aseptic sealing disconnections
 - Aseptic welding connections
 - Ideal for use in single-use assemblies
 - Buffer and media preparation
 - Cell culture operations
 - Purification operations
 - Diagnostics products
 - Tubing and bag manifolds

Formulation &
Hydration

Cell Culture &
Fermentation

Harvest &
Collection



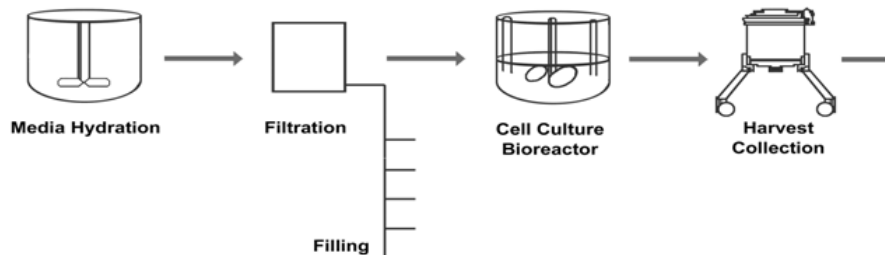


- **Specifications:**

- Biocompatible, nontoxic, nonhemolytic
- Heat weldable
- Much longer lifetime when compared to silicone
- Much lower spallation when compared to silicone
- Higher pressure when compared to silicone
- Lower gas permeability compared to silicone
- Opaque
- Dynamic temperature range: -20 to 100°C (-4 to 212°F)
- USP Class VI, FDA 21 CFR 177.2600, EP 3.2.9, REACH, RoHS, ADCF
- Sterilization: autoclave, gamma, EtO



- **Applications:**
 - Cell harvest and media process systems
 - Vaccine manufacturing
 - Bioreactor process lines
 - Aseptic filling
 - Diagnostic test products
 - Production filtration and fermentation





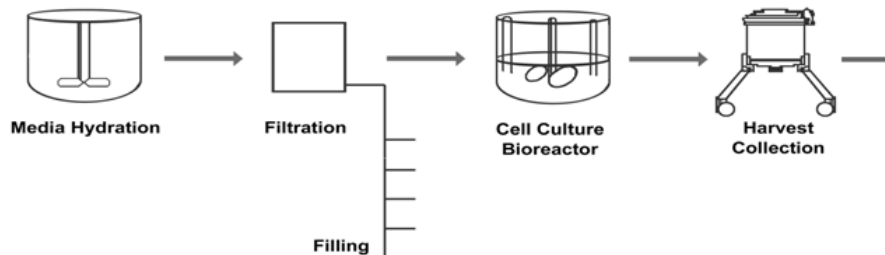
- **Specifications:**

- Biocompatible, nontoxic, nonhemolytic
- Heat weldable
- Much longer lifetime when compared to silicone
- Lower spallation when compared to silicone
- Higher pressure when compared to silicone
- Lower gas permeability compared to silicone
- Opaque
- Dynamic temperature range: -50 to 40°C (-58 to 104°F)
- USP Class VI, EP 3.2.9, REACH, RoHS, ADCF
- Sterilization: autoclave, gamma, EtO





- **Applications:**
 - Cell harvest and media process systems
 - Bioreactor process lines
 - Production filtration and fermentation
 - Aseptic filling
 - Shear-sensitive fluid transfer
 - Diagnostics and laboratory analysis



GORE® STA-PURE® Tubing, Series PCS



- **Specifications:**

- Biocompatible
- Stable, repeatable flow
- Much longer lifetime when compared to silicone
- Much lower spallation when compared to silicone
- Much higher pressure when compared to silicone
- Lower gas permeability compared to silicone
- Opaque
- Dynamic temperature range: -44 to 200°C (47 to 392°F)
- USP Class VI, EP 3.2.9, FDA 21 CFR 177.2600, REACH, RoHS, ADCF
- Sterilization: autoclave, EtO

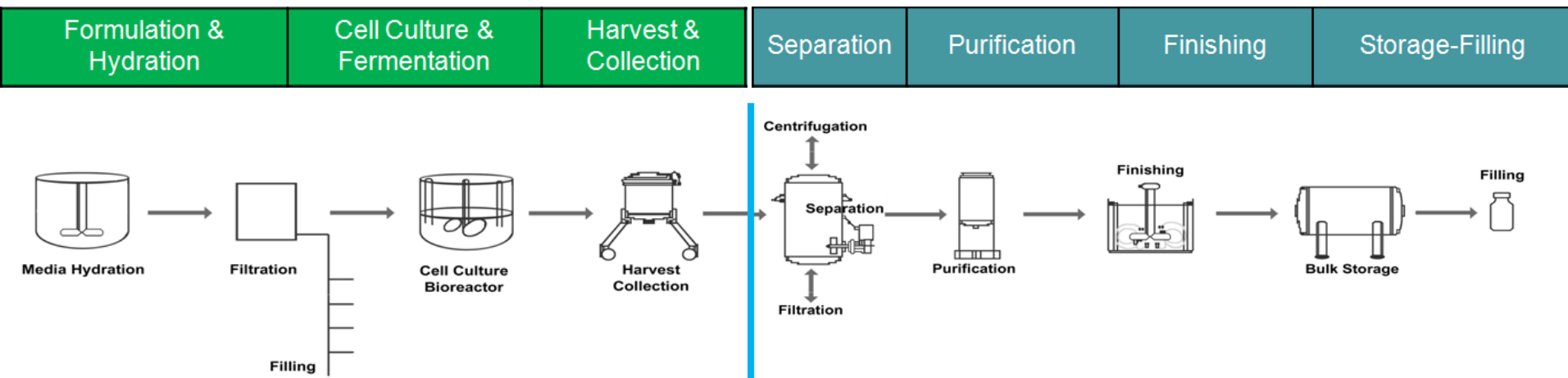


GORE® STA-PURE® Tubing, Series PCS



• Applications:

- Ultra-pure fluid transfer
- Media processing
- Cell harvesting and filtration
- Purification
- Final product fill
- Sensitive and sanitary production environment

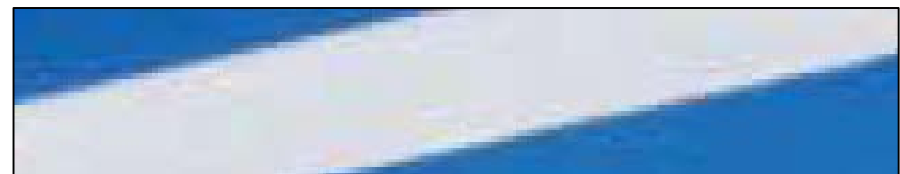


GORE® STA-PURE® Tubing, Series PFL



- **Specifications:**

- Biocompatible
- Stable, repeatable flow
- Much longer lifetime when compared to silicone
- Much lower spallation when compared to silicone
- Much higher pressure when compared to silicone
- Lower gas permeability compared to silicone
- Opaque
- Dynamic temperature range: -44 to 200°C (47 to 392°F)
- USP Class VI, REACH, RoHS, ADCF
- Sterilization: autoclave

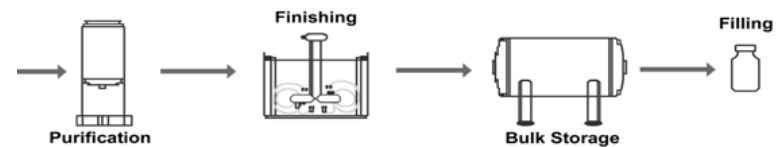
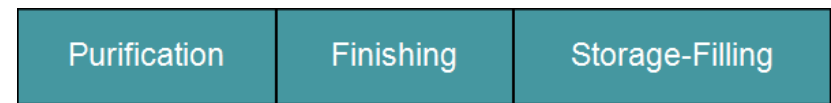


GORE® STA-PURE® Tubing, Series PFL



- **Applications:**

- Drug final fill
- Pumping aggressive solvents in chromatography and combinatorial chemistries
- Pumping solvent-based reactants during synthesis of active pharmaceutical ingredients



Chem-Durance[®] Bio Tubing



- **Specifications:**

- Biocompatible
- Heat weldable
- Longer lifetime when compared to silicone
- Lower spallation when compared to silicone
- Higher pressure when compared to silicone
- Lower gas permeability compared to silicone
- Opaque
- Dynamic temperature range: 0 to 40°C (32 to 104°F)
- USP Class VI, FDA 21 CFR 177.2600, REACH, RoHS, ADCF
- Sterilization: autoclave, EtO



Chem-Durance[®] Bio Tubing



- **Applications:**
 - Wide variety of pharmaceutical processing and biotech applications
 - General laboratory and analytical use
 - Specialty chemical production/processing
 - Diagnostic testing
 - Sensitive-fluid transfer



Tygon[®] E-LFL Tubing

- **Specifications:**

- Biocompatible
- Smooth bore
- Longer lifetime when compared to silicone
- Lower spallation when compared to silicone
- Higher pressure when compared to silicone
- Much lower gas permeability compared to silicone
- Transparent
- Dynamic temperature range: 0 to 40°C (32 to 104°F)
- USP Class VI, EP 3.2.9, FDA 21 CFR 177.2600, EU Food, REACH, RoHS, ADCF
- Sterilization: autoclave, gamma, EtO





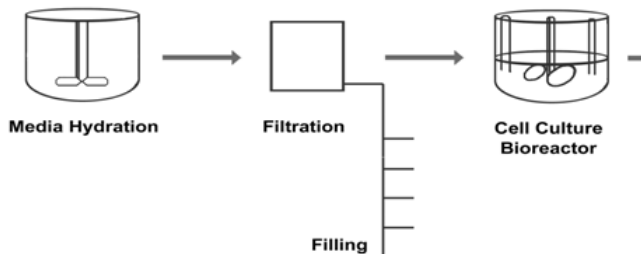
Tygon[®] E-LFL Tubing

- **Applications:**

- Wide range of liquid transfer in labs and bioprocess applications
- Production filtration and fermentation
- Food and cosmetic processing
- Flavor and vitamin concentrate dispensing
- Shear-sensitive fluid transfer

Formulation &
Hydration

Cell Culture &
Fermentation



Peroxide-Cured Silicone Tubing



- **Specifications:**

- Biocompatible
- Moderate lifetime
- Moderate spallation
- Moderate pressure
- Moderate gas permeability
- Translucent
- Dynamic temperature range: -40 to 100°C (-40 to 212°F)
- USP Class VI, EP 3.2.9, FDA 21 CFR 177.2600, REACH, RoHS, ADCF
- Sterilization: autoclave, gamma, EtO



Peroxide-Cured Silicone Tubing



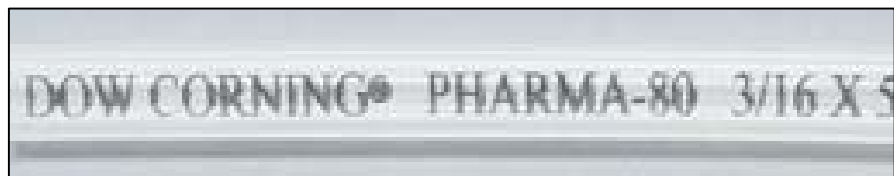
- **Applications:**
 - Process transfer within food & beverage, and industrial markets
 - General analytical applications

Dow Corning® Pharma Tubing



- **Specifications:**

- Biocompatible
- Lower extractables when compared to silicone
- Moderate to much high pressure when compared to silicone
- Moderate to lower gas permeability when compared to silicone
- Translucent
- Dynamic temperature range: -51 to 232°C (-60 to 460°F)
- USP Class V Extractables, USP class VI, FDA 21 CFR 177.2600, FDA 21 CFR 221 and 211, REACH, RoHS, ADCF
- Sterilization: autoclave, gamma, EtO
- Available as either Pharma-50, Pharma-65, or Pharma-80 formulations (durometer)

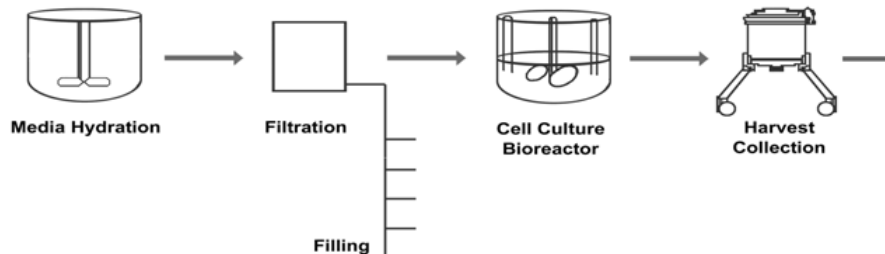


Dow Corning® Pharma Tubing



- **Applications:**

- Pharmaceutical, biotech, and ultra-pure fluid processing
- Fluid transfer applications
- Higher durometer tubing capable of higher pressure transfer of fluids



Additional Tubing Data



- Tubing Life
- Pressure Guidelines
- Vacuum/Suction Lift
- Gas Permeability

Ensure top performance with your Masterflex® pump head by using precision-extruded Masterflex® tubing to deliver accurate flow rates. Twenty-one different material formulations are available.

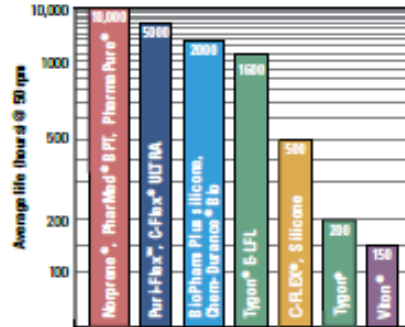
To order the correct tubing:

1. Consider all the aspects of your application: flow rate, pressure, etc.
2. Review the Masterflex Tubing Compatibility Data (available online), as well as specific information about individual tubing materials.
3. Use the “Tubing Material Life Comparison” graph and table at right to select the tubing with the longest life.

If your application requires the generation of high pressure or a strong vacuum/suction lift, refer to the “Pressure Guidelines” and “Vacuum/Suction Lift” graphs at right. These graphs can assist you in determining which tubing will pressurize most rapidly or develop the strongest vacuum/suction lift in your application.

If your application requires pumping air-sensitive gases or liquids, refer to the “Gas Permeability” graph below right to choose the tubing with the lowest permeability.

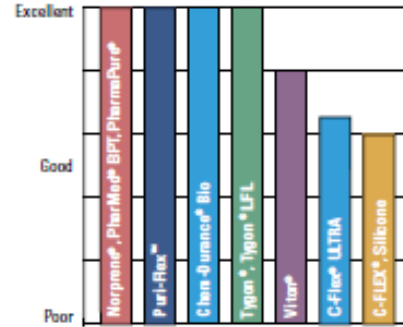
Tubing Material Life Comparison



The graph above displays the average tubing life in hours of Masterflex® tubing. This tubing was tested in a Masterflex® pump head continuously pumping water at 70°F (21°C) and 0 psig (0 bar). Tubing life is calculated to time of failure or of 50% reduction in flow rate, whichever comes first. Reduce drive speeds to extend tubing life. Average tubing life for L/S® 16, I/P® 73, and B/T® 91 tubing at various speeds are listed in the table below.

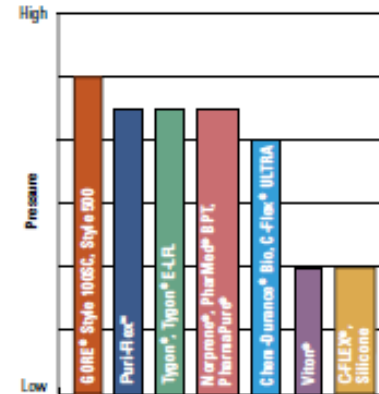
Tubing class	L/S® 16		I/P® 73		B/T® 91	
Drive rpm	50	600	50	600	50	321
Norprene®, PharMed® BPT, PharmaPure®	10,000	1,000	4,000	800	3,000	600
Puri-Flex®, C-Flex® ULTRA	5,000	1,000	3,000	500	500	100
Tygon® E-LFL	1,600	700	800	400	600	200
C-FLEX®, Silicone	500	100	400	80	250	100
Tygon®	200	50	180	35	100	30
Viton®	150	30	120	25	—	—

Vacuum/Suction Lift



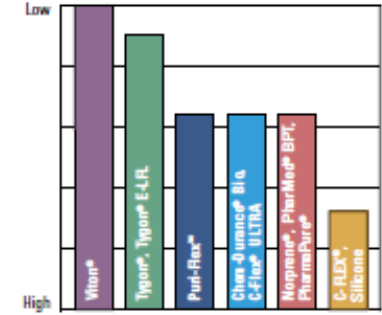
Vacuum/suction lift capability depends greatly on the tubing's ability to maintain its shape. Thus, a firmer tubing type in the smallest possible bore size will generate a stronger vacuum for your application. Higher drive speeds are required to generate the strongest possible vacuum with some tubing sizes.

Pressure Guidelines



All tubing types accept pressure, but the firmer formulations accept more pressure than the softer types of tubing.

Gas Permeability



To minimize permeation of gases through the tubing wall, use firm tubing. Masterflex® L/S® and I/P® High-Performance precision tubing (L/S® 15, L/S® 24, L/S® 35, L/S® 36, I/P® 70, I/P® 88, and I/P® 89) is less permeable than Precision tubing sizes.

Additional tubing data can be found in our [Masterflex® Encyclopedia](#)