

PharMed® Biocompatible Tubing



Created with a unique combination of long flex life and biocompatibility, PHARMED Tubing is ideal for life science applications employing peristaltic pumps.

Maintains Fluid Integrity During Fluid Transport

Transporting biocompatible fluids through a peristaltic pump limits the risk of fluid contact with any portion of the pump itself. PharMed Tubing has been formulated to withstand the rigors of peristaltic pumping action while providing the biocompatible fluid surface required in sensitive applications. With its superior flex life characteristics, PharMed Tubing simplifies manufacturing processes by reducing production downtime due to pump tubing failure (see comparative Peristaltic Pump Tubing Life chart on back of page). The excellent wear properties of PharMed also can lead to reduced erosion of the tubing interior walls, improving the overall efficiency of filtering systems.

Simplifies Cleaning and Sterilization

PharMed Tubing is ideal for use in clean-in-place and steam-in-place cleaning and sterilization systems. It is compatible with virtually all commercial cleaners and sanitizers and can be repeatedly autoclaved for up to five cycle times, without affecting overall service life. PharMed Tubing also can be exposed to Cobalt 60 gamma radiation levels of up to 5 megarads with minimal effect on physical properties.

Superior to Silicone Tubing for Many Applications

PharMed Tubing is less permeable to gases and vapors than silicone tubing (see Permeability Coefficient Comparison chart on back of page). It is ideal for protecting sensitive cell culture, fermentation, synthesis, separation, purification, and process monitoring and control systems. PharMed Tubing has very good general chemical resistance and excellent acid, alkali and oxidation resistance. Opaque to visible and UV light, PharMed Tubing will help to protect sensitive fluids. Continuous service temperature range is -60°F (-51°C) to 275°F (135°C).

Facilitates the Validation Process

PharMed Tubing complies fully with the requirements of the USP XXIV Class VI criteria and is non-toxic, non-hemolytic and non-pyrogenic. In addition, PharMed Tubing meets FDA 21 CFR PART 177.2600 criteria for food contact. PharMed Tubing also complies with the ISO 10993 guidelines for contact with blood (or other body fluids and tissue) for up to 30 days as listed in the FDA GP-95.

BIOPHARMACEUTICAL PRODUCTS

*For peristaltic pumps
and cell culture*

Features/Benefits

- Outlasts Silicone Tubing in Peristaltic Pumps by Up to 30 Times
- Low Particulate Spallation
- Can Be Autoclaved Repeatedly
- Temperature Resistant from -60°F to 275°F
- Withstands Repeated CIP and SIP Cleaning and Sterilization
- Fully Tested to ISO 10993 Standards to Facilitate Validation Process
- Meets USP Class VI, FDA and NSF Criteria

Typical Pump Applications

- Diagnostic Test Product Manufacturing
- Cell Harvest and Media Process Systems
- Vaccine Manufacturing
- Bioreactor Process Lines
- Production Filtration and Fermentation
- Sterile Filling
- Shear-Sensitive Fluid Transfer

PharMed® Tubing Inventoried Sizes

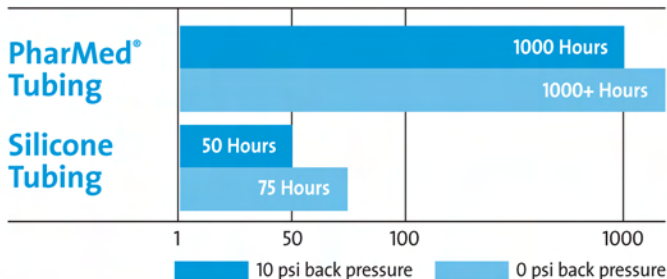
Part Number	I.D. (inches)	O.D. (inches)	Wall Thickness (inches)	Length (feet)	Minimum Bend Radius (inches)	Max. Working Pressure at 73°F (psi) * at 180°F (psi) *		Vacuum Rating In. of Mercury at 73°F at 160°F	
AYX42605	.020	.145	1/16	25	1/8	115	72	29.9	29.9
AYX42606	1/32	5/32	1/16	25	1/8	78	49	29.9	29.9
AYX42002	1/16	1/8	1/32	25	1/4	24	14	29.9	29.9
AYX42003	1/16	3/16	1/16	25	1/8	43	27	29.9	29.9
AYX42005	3/32	7/32	1/16	25	1/4	30	19	29.9	29.9
AYX42006	1/8	3/16	1/32	25	1/2	13	8	25.0	15.0
AYX42007	1/8	1/4	1/16	25	1/2	24	15	29.9	29.9
AYX42012	3/16	5/16	1/16	25	5/8	17	10	29.9	27.0
AYX42017	1/4	3/8	1/16	25	7/8	13	8	25.0	15.0
AYX42019	1/4	1/2	1/8	25	3/4	24	15	29.9	29.9
AYX42022	5/16	7/16	1/16	25	1-1/4	11	6	15.0	9.0
AYX42027	3/8	1/2	1/16	25	1-3/8	9	5	10.0	6.0
AYX42029	3/8	5/8	1/8	25	1-1/8	17	10	29.9	27.0
AYX42038	1/2	3/4	1/8	25	1-1/8	10	8	25.0	15.0
AYX42046	5/8	7/8	1/8	25	2-3/4	11	6	15.0	9.0
AYX42053	3/4	1	1/8	25	3-1/2	9	5	10.0	6.0

*Working pressures are calculated at a 1:5 ratio relative to burst pressure using ASTM D1599.

The values listed for working and burst pressures are derived from tests conducted under controlled laboratory conditions. Many factors will reduce the tubing's ability to withstand pressures, including temperature, chemical attack, stress, pulsation and the attachment to fittings. It is imperative that the user conduct tests simulating the conditions of the application prior to specifying the tubing for use.

Comparative Peristaltic Pump Tubing Life

The table below depicts hours until failure of 1/4" ID x 3/8" OD tubing. In each case, a 3-roller pump head was utilized operating at 600 rpm under room temperature (73° F). Tubing failure is measured in hours of use prior to rupture.



The performance of tubing in peristaltic pumping applications is affected by the conditions of use and equipment utilized, along with size and wall thickness of the tubing tested. The data above is presented for information only and should not be utilized for specification purposes.

PharMed® Sterilization Methods

Autoclavable — Steam 30 minutes at 15 psi (250°F).

Gas — Ethylene Oxide.

Radiation — Radiation up to 2.5 MRad.

BIOPHARMACEUTICAL PRODUCTS

Come through clean.™

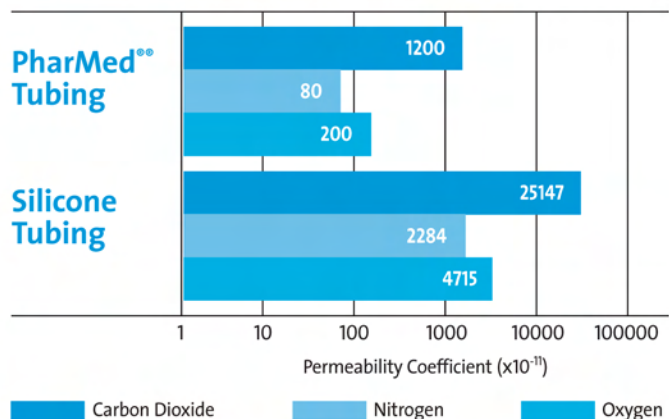
PharMed® Tubing Typical Physical Properties

Property	ASTM Method	Value or Rating
Durometer Hardness Shore A, 15 Sec	D2240-91	64
Tensile Strength psi (MPa)	D412-92	1,050 (7.2)
Ultimate Elongation, %	D412-92	375
Tensile Stress, @ 100% psi	D412-92	400
Tensile Set, %	D412-92	47
Tear Resistance lb-f/inch (kN/m)	D1004-93	128 (22)
Compression Set Constant Deflection, % @ 158°F (70°C) for 22 hrs.	D395-89 Method B	32
Specific Gravity	D792-91	0.970
Water Absorption, % 24 hrs. @ 23°C	D570-81	0.3
Brittle Point, °F (°C)	D746-79	-99 (-73)
Low Temp. Flex at -40°F	D412-92	Passed
Flame Resistance Classified	UL94-HB	Passed
Heat Resistance, °F (°C)	—	275 (132)
Dielectric Strength v/mil (kV/mm)	D149-93	610 (24.0)

Unless otherwise noted, all tests were conducted at room temperature (73°F). Values shown were determined on 0.075" thick extruded strip or 0.075" thick molded ASTM plaques or molded ASTM durometer buttons.

Permeability Coefficient Comparison

Permeability = $\frac{\text{amount of gas (cm}^3\text{) x tubing wall thickness (cm)}}{\text{Coefficient surface area of tubing ID (cm}^2\text{) x time (sec) x pressure drop across tubing wall (cm Hg)}}$



PHARMED TUBING IS NOT INTENDED FOR USE AS AN IMPLANT MATERIAL