HANDLING SOLUTIONS

PUMPS, TUBING AND FITTINGS GUIDE









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Fit and Flow Guaranteed

Cole-Parmer[®] delivers a portfolio of fluid handling solutions with guaranteed performance flow rates, including equipment and consumables to help accelerate scientific discovery in life sciences, clinical, academic, and research laboratories. Since 1955, we have been known for our knowledgeable team of scientific experts devoted to providing one-on-one guidance in fluid handling product selection, usage, and troubleshooting, enabling laboratories to run efficiently worldwide. We also offer a true one-stop-shop supply chain solution by curating a portfolio of industry-leading brands.

Fluid Handling Product Lines

FITTINGS

Cole-Parmer[®] Cleanroom – Various Versions and Materials

- Couplers
- Luers
- Plugs
- Adapters
- Y Fittings
- Elbows
- Port Discs

Stainless Steel

- Reducer Clamps
- Adapters
- Tees
- Crosses





- AseptiQuik[®]
 Connectors Series
 G, L, S, W, and STC II
- MPC Series
 Connectors
- HPC Series
 Connectors

Connectors

- MPX Series
 Connectors
- MPC/MPX Adapters
 and Connectors
- Steam-Thru[®]
 Connectors





ELBOWS, TEES, AND SANITARY CLAMPS

Cole-Parmer[®] Tees, Elbows, Bio-Ease+[™] Sanitary Clamps

- Designed for critical fluid applications where regulatory compliance, seal integrity, and repeatability are of the utmost importance
- Can be gamma irradiated in cleanroompackaged kits

WATSON-MARLOW PUMPS

Pump Systems

- 120S Drive with
 400D1 Pump Head
- 120S Drive with
 114DV Pump Head
- 120 Drive with
 102R Pump Head
- 323Du Drive with
 313D Pump Head
- 323 Drive with
 313D Pump Head

Drives Only

- 323Du Drive
- 323S Drive

Applications Biopharmaceutical manufacturing

- Single-use systems
- Sterile filling/ evacuating
- Containment
- Sterile transfer
- Cell-culture media
- Aseptic fill and transfer

Pump Heads Only

- 313 Rapid-Load[®] Pump Head and Extension Pump Head
- 314 Rapid-Load[®] Pump Head and Extension Pump Head
- 314 Multichannel Pump Head and Extension Pump Head
- 318 Multichannel Pump Head and Extension Pump Head



TUBING

- Cole-Parmer[®] Thermoplastic Vulcanizate (TPV) Industrial; compatible with most clean-in-place and steam-in-place solutions
- Cole-Parmer® Thermoplastic Elastomer (TPE)
- Cole-Parmer[®] Reinforced Thermoplastic Elastomer (TPE)
- Cole-Parmer® Soft Thermoplastic Elastomer (TPE)
- Cole-Parmer[®] Platinum-Cured Silicone, 61 Shore A and 50 Shore A
- Cole-Parmer[®] Food, Milk, and Dairy
- Cole-Parmer® Peroxide-Cured Silicone
- Cole-Parmer[®] Black TPE
- Cole-Parmer[®] Thermoplastic Vulcanizate (TPV) Pharma Grade
- Cole-Parmer[®] Thermoplastic (SEBS)
- Cole-Parmer[®] PTFE
- Cole-Parmer® PFA
- Cole-Parmer[®] PVDF
- Tygon[®] E-3603; phthalate-free for food and beverage dispensing
- Versilon™ C-210-A; oil-, fuel-, and grease-resistant
- Tygon® A-60-F; long life, temperature-resistant food and beverage
- Tygon[®] A-60-G; high-performance chemical dispensing alternative to rubber
- Tygon[®] B-44-4X; lightweight and extremely flexible for food and beverage dispensing
- Tygon[®] F-4040-A; high-performance fuel and lubricant tubing for small engines
- Tygon[®] B-44-3; phthalate-free and flexible for beverage transfer
- Tygon[®] E-1000; soft and very flexible for food and beverage dispensing
- Versilon[™] Silver; antimicrobial, excellent for food and beverage applications
- Versilon[™] PFA; chemical-resistant for critical applications

- Tygon[®] E-LFL; peristaltic pump tubing for food and beverage dispensing
- Tygon[®] 2475 and 2475 IB; plasticizer-free thermoplastic for various sensitive applications
- PharmaPure[®] low spallation for media processing, vaccine manufacturing, aseptic filling, and diagnostic testing applications
- Cole-Parmer® PVC Lab and Vacuum
- Cole-Parmer® PVC Fuel and Lubricant
- Excelon® Micro-Line Translucent Mini-Bore
- Excelon[®] Bev-A-Line[®] V HT
- Excelon[®] Clear Platinum-Cured Silicone 70A
- Excelon® Platinum-Cured Braid-Reinforced Silicone
- Tygon[®] SPT 3350 Silicone
- Cole-Parmer[®] FEP
- Versilon™ FEP
- DuPont[™] Liveo[™] Pharma-50 Platinum-Cured Silicone^{*}
- DuPont[™] Liveo[™] Pharma-65 Platinum-Cured Silicone*
- DuPont[™] Liveo[™] Pharma-80 Platinum-Cured Silicone*
- DuPont[™] Liveo[™] Pharma Advanced Pump Platinum-Cured Silicone^{*}
- DuPont™ Liveo™ Pharma TPE*
- Versilon™ 2001; plasticizer-free chemical-resistant
- C-Flex® 072 Thermoplastic Elastomer (TPE)
- C-Flex[®] 374 Thermoplastic Elastomer (TPE)
- PharMed[®] BPT Biocompatible for peristaltic pumping of sensitive bioprocess fluids
- Watson-Marlow Marprene® TPE 3-Stop
- Watson-Marlow PVC 3-Stop
- Watson-Marlow Peroxide-Cured Silicone 3-Stop
- Watson-Marlow Pumpsil® Platinum-Cured Silicone
- Watson-Marlow Bioprene® TPE
- Excelon[®] Bev-A-Line[®] IV
- Tygon[®] B-44-5X IB Reinforced for food and beverage dispensing

Pumps

Choosing the Right Pump

Cole-Parmer[®] is offering Watson-Marlow cased peristaltic pumps in our industry-leading line of fluid handling solutions.





The 100 Series offers convenient preconfigured drive and pump head options for off-the-shelf use in fermentation, cell culture, and numerous other applications. The compact, stackable design saves valuable benchtop space, while the maintenance-free, brushless motor with superior speed control ensures accurate and repeatable performance.

The 300 Series features interchangeable modular components for added flexibility. The MemoDose facility allows for precise single-shot dosing, and the optional serial interface enables streamlined remote operation and integration into automated systems.

Series	Drive	Pump Head	No. of Channels	Interchangeable Drive and Head	Multichannel Option	Flow Range* (mL/min)	Control					
		400D1		No		0.01–120	Manual Manual, analog, and remote					
	120S	114DV			No	0.02–170						
100		102R	1			0.03–54						
	120U	400D1	I			0.001–120						
		114DV				0.001–120						
		102R				0.003–54						
300	323S	313DW										Manual
	323Du	313DW	1	Yes	Yes	0.81–2000	Manual, analog, remote, and RS-232					

PERISTALTIC PUMP DRIVES

The 323S and 323Du drives allow for speed control from 2 to 400 rpm in 1 rpm increments. Speed can be easily adjusted while the pump is stopped or running; reverse the direction with a simple push of a button. Program the pump to dispense a set amount of fluid each time using the MemoDose function. The 323S drive features reliable manual control via a digital keypad interface.

The advanced features of the 323Du drive allow manual control or remote control to start/stop the pump or control the speed using analog signals (4 to 20 mA, 0 to 10 V) or an RS-232 interface.

PERISTALTIC PUMP DRIVES (continued)

Series	Drive	Pump Heads Accepted	Reversible Motor	IP Rating	Speed Range (rpm)	Flow Range* (mL/min)	Control
300	323S	313 or 314 Rapid-Load® pump heads		10.04	2,400	0.000.0000	Manual
	323Du	or 314MC or 318MC multichannel pump heads	Yes	IF 31	2–400	0.002-3000	Manual, analog, remote, and RS-232

PERISTALTIC PUMP HEADS

The single channel Rapid-Load[®] pump heads feature a flip-top design for fast and easy tubing changes. Select the three-roller model for high-flow applications or four-roller model for high performance and less pulsation. Add up to five extension pump heads depending on the type and size of tubing.

The multichannel microcassette pumps heads are specially designed for low-flow applications. Easily remove cassettes without disturbing other channels. Each pump head comes with five pumping channels which load easily with a single cam lever action. Add an extension pump head to double your pumping capability to 10 channels. Select the four-roller model for higher flow rate applications or the eight-roller model for higher precision with less pulsation.

Pump Head	Feature	Drives Compatible With	Tubing Sizes Accepted	No. of Channels	No. of Rollers	Flow Range* (mL/min)
313DW	Rapid-Load® pump head		Standard tubing with		3	0.00.2000
313X	Extension Rapid-Load [®] pump head		1.6 mm wall and bore			0.09-3000
314DW	Rapid-Load® pump head	sizes: 0.5, 0.8, 1.6,		I	1	0.00.2400
314X	Extension Rapid-Load [®] pump head		5.2, 4.0, 0.4, 0 11111		4	0.09–2400
314MC	Multichannel microcassette pump head	323S and	2-stop tubing with bore sizes: 0.13, 0.19, 0.25, 0.38, 0.5, 0.63,	F	4	0.002–53
314MCX	Multichannel microcassette extension pump head	323Du				
318MC	Multichannel microcassette pump head		0.76, 0.88, 1.02, 1.14, 1.29, 1.42, 1.52, 1.65,	5		
318MCX	Multichannel microcassette extension pump head	2.79 mm			8	0.002–36

* Flow range is determined by drive, tubing size, and continuous vs. intermittent use. Flow rate is per channel.

Tubing

Choosing the Right Tubing

Size, temperature, application, media, and pressure are crucial factors to consider when choosing tubing. Cole-Parmer® offers a wide range of flexible tubing, rigid tubing, and hoses that are perfect for your lab.

FACTORS TO CONSIDER



Size: We offer tubing and connection options in an array of thicknesses to accommodate your fit and function requirements.



Temperature: Our products come in a range of ambient, operating, and cleaning temperature ratings to ensure reliable performance and durability.



Application: We can help you select the appropriate formulation to comply with all applicable standards, including FDA, USDA, ISO, EPA, and NSF.

Media: Matching the formulation to the fluid being handled ensures ultra-low extractables, absorption/adsorption, and particulate entrapment.



Pressure: Choose the right materials for the job to minimize stress from vacuum and positive pressure on tubing, fittings, and other components.

SUGGESTED IMMERSION TEST PROCEDURE



Sanitize your tubing sample.



Weigh the tubing sample and measure its length and diameter.



Immerse the sample tube in the fluid you intend to use within a closed container for at least 48 hours.



Weigh and measure your sample tube again and examine it for swelling, brittleness, and other signs of deterioration.



Test the tubing in your pump at the actual temperature, pressure, vacuum level, and other conditions under which you plan to use it before beginning to use the tubing continuously.

Types of Tubing Used in Different Applications

Discover the perfect solution for all of your fluid handling needs with our extensive selection of tubing. Whether you need high-performance silicone tubing for medical research applications, durable industrial hoses for demanding environments, or versatile laboratory tubing, we have you covered. Our products are designed to meet the highest standards of quality and reliability, ensuring superior performance across a variety of applications.

Choosing Tubing by Chemical Resistance

Formulation	Chemical Resistance
Cole-Parmer® Reinforced Thermoplastic Elastomer (TPE)	Excellent
Cole-Parmer [®] Soft Thermoplastic Elastomer	Excellent
Cole-Parmer* PFA	Excellent
Cole-Parmer® Thermoplastic Vulcanizate (TPV)	Very Good
Tygon [®] B-44-4X Food and Beverage	Excellent
Tygon [®] A-60-F Food and Beverage	Excellent
Tygon [®] A-60-G Chemical Dispensing	Excellent
Tygon [®] E-1000 Food and Beverage Dispensing	Excellent
Tygon® E-3603 Laboratory	Excellent
Tygon [®] F-4040-A Fuel and Lubricant	Excellent
Versilon™ C-210-A Oil-, Fuel-, and Grease-Resistant	Excellent
Versilon™ Silver Antimicrobial	Excellent
Tygon [®] 2475 Plasticizer-Free Thermoplastic	Good
Tygon® E-3603 Vacuum	Good
Tygon [®] E-LFL Long Flexible Life	Good
Tygon [®] SPT-3350 Silicone	Excellent
Tygon [®] B-44-5X IB Reinforced Food and Beverage Dispensing	Excellent
Versilon™ 2001 Plasticizer-Free Chemical-Resistant	Excellent
PharMed [®] BPT Biocompatible Peristaltic Pump	Excellent
PharmaPure® Low Spallation Peristaltic Pump	Excellent
C-Flex® 374 Thermoplastic Elastomer (TPE)	Good

Fittings

Choosing the Right Fittings

Fittings play a pivotal role in establishing a robust tubing assembly, reducing leaks, restrictions, or expensive downtimes. They are essential for seamlessly integrating tubing into various systems, enhancing fluid handling efficiency and reliability.

KEY ASPECTS

- Hose barbs are for flexible tubing and must match the inner diameter of the tubing you're connecting with.
- Compression fittings are for rigid tubing and must match the outer diameter of rigid tubing; the mating piece is the tubing.
- Threaded fittings are gendered and need to connect male to female.
- Luer fittings are not sized and connect male to female.

- Sanitary fittings are easy to clean, have a "smoothness" rating, and require gaskets and clamps to work.
- Chromatography fittings are chemically inert, small compression fittings.
- There are two categories of tubing: flexible and rigid.
- We have multiple formulations to accommodate a wide variety of applications.







Quick-Disconnect Fittings

Quick-disconnect fittings are made of two different components: the coupling body and the insert. These two components join to create a watertight seal that is easy to disconnect.

The ends of the adapter can be a compression, thread, or hose barb fitting. However, the flow size must match the two fittings so they can connect.

There are two types of quick-disconnects fittings:

- **Valved:** Flow stops when the fitting is disconnected.
- **Straight Through:** Flow continues when the fitting is disconnected.

If you are selecting quick-disconnect fittings, make sure to stay within the same product line and brand.



Compression Fittings

- Compression fittings work with the outer diameter of rigid tubing.
- If you're unsure if your tubing is flexible or rigid, a quick way to find out is to see if it can bend without breaking.



Compression Nut



Single Ferrule





Choosing Fittings by Chemical Resistance

Fitting Type	PVDF (Kynar [®])	Polypropylene (PP)	Engage [™] 8402	Nylon	c
	Excellent	Very good	Good	Good	e
Cleanroom Port Disks	 Image: A set of the set of the	 Image: A second s	~		
Cleanroom Reduction Y Fittings	~	 Image: A second s			
Threaded Hose Barb Fittings Cross Union	~	 Image: A set of the set of the			
Reduction Elbow Fittings	 Image: A set of the set of the	 Image: A set of the set of the		~	
Luer Fittings	 Image: A second s	 Image: A set of the set of the		~	~
Luer to Hose Barb Fittings Straight Adapters	✓	~		~	~
Luer to Plug Fittings Straight Adapters	✓	~		~	~
Male Luer Plug Fittings	✓	~		~	~
Male Stationary Fittings Lock Luer		~		~	~
Port Disk Hose Barb Fittings	~		✓		
CPC Colder® Quick-Disconnect Fittings					
Sanitary Steam-in-Place Connectors					
Threaded to Hose Barb Fittings Straight Adapters	~	~		~	
Hose Barb Fittings Straight Reducers	 Image: A second s	 Image: A second s		~	
Hose Barb Fittings Straight Union	✓	 Image: A set of the set of the		 Image: A second s	
Hose Barb Fittings Tee Union	 Image: A set of the set of the	 Image: A set of the set of the		~	
Hose Barb Fittings Straight Adapter, Straight Union, and Tee Union	 Image: A second s			~	
Luer Fittings Straight Adapter, Elbow Adapter, and Tee Union		 Image: A second s		~	
Luer to Hose Barb Fittings Straight Adapter and Y Union		 Image: A set of the set of the		~	
Luer to Threaded Fittings Straight and Elbow Adapter		~		~	
Hose Barb Fittings Straight Adapter, Union Adapter, and Tee Union		~			
Hose Barb Fittings Y Union	✓	 Image: A set of the set of the		~	



h	CrystalVu™	Polycarbonate	High-Temperature Polycarbonate	Polyphenylsulfone (PPSU)	Polysulfone	Stainless Steel	High-Density Polyethylene (HDPE)
	Good	Good	Good	Excellent	Excellent	Good	Good
	~						
	✓						
	~						
	 Image: A second s						
	 Image: A second s						
		✓	\checkmark	\checkmark	✓		
					~		
						✓	✓
							✓
							✓
		✓					
		✓					
		 Image: A second s					
							 Image: A second s

IMPORTANT NOTICE:

Chemical compatibility information provided by Cole-Parmer[®] is for the convenience of the user, but it is the sole responsibility of the user to verify the suitability and safety of Cole-Parmer[®] tubing for all intended applications and chemicals. Users must confirm the compatibility of any fluid with the tubing through which it is transmitted. Laboratory or field tests must be conducted in compliance with relevant standards to assess the safety and efficacy of the tubing in any specific application.

WARNING:

The information provided herein, while supplied to Cole-Parmer[®] by trusted sources, is intended solely as a guideline for selecting tubing for chemical compatibility. Prior to permanent installation, it is crucial to test the tubing with the chemicals and under the specific conditions of the intended application. Chemical behavior ratings listed are based on a 24- to 48-hour exposure period; effects beyond this time frame are unknown. The ratings in the charts DO NOT reflect the extent to which extraction 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 tubing. Cole-Parmer[®] disclaims all warranties, express or implied, regarding the accuracy, completeness, or reliability of this chemical compatibility data, including implied warranties of fitness or suitability for any specific purpose.

DANGER:

Chemical behavior can vary during handling due to factors like temperature, pressure, and concentration, potentially causing equipment failure despite passing initial tests. Such failures may result in serious injury, environmental hazards or property damage. Always use appropriate safety measures, including guards and personal protection, when handling chemicals.

Pharmaceutical and Biotechnology Solutions

Cole-Parmer[®] offers a variety of tubing and fittings for pharmaceutical and biotechnology applications. Our selection of cleanroom fittings are double-bagged and sealed, ensuring package-ready output for safe use. Our products are manufactured from FDA-conforming, nontoxic ingredients and contain no DEHP, BPA, or other phthalates. Tubing and fittings offer high purity and low spallation to meet the rigors of peristaltic pump and processing requirements.

Recommended Formulations

- Cole-Parmer[®] FEP Tubing
- Cole-Parmer[®] PVDF Tubing
- Cole-Parmer[®] Platinum Tubing, Shore 50
- Cole-Parmer[®] Peroxide-Cured Silicone Tubing, Shore 60
- Cole-Parmer[®] Thermoplastic Vulcanizate (TPV) Industrial Tubing
- Cole-Parmer[®] Thermoplastic Elastomer (TPE) Tubing
- Cole-Parmer[®] Reinforced Thermoplastic Elastomer (TPE) Tubing
- Cole-Parmer[®] Soft Thermoplastic Elastomer (TPE) Tubing
- Cole-Parmer® Thermoplastic (SEBS) Tubing
- Cole-Parmer[®] Thermoplastic Vulcanizate (TPV) Pharma Grade Tubing

- Tygon[®] 2475 IB High-Pressure Thermoplastic Tubing
- Excelon[®] Bev-A-Line[®] IV Tubing
- Excelon[®] Bev-A-Line[®] V HT Tubing
- DuPont[™] Liveo[™] Pharma-50 Platinum-Cured Silicone Tubing^{*}
- DuPont[™] Liveo[™] Pharma-65 Platinum-Cured Silicone Tubing^{*}
- DuPont[™] Liveo[™] Pharma-80 Platinum-Cured Silicone Tubing^{*}
- DuPont[™] Liveo[™] Pharma Advanced Pump Platinum-Cured Silicone Tubing^{*}
- Versilon[™] PFA Tubing



Chemical Formulation Chart

Chemical	Cole-Parmer® TPE	Cole-Parmer® Platinum- Cured Silicone	Tygon [®] 2475	PharMed [®] BPT
Acetone	Fair	Severe Effect	Good	Severe Effect
Chloroform	Severe Effect	Severe Effect	Severe Effect	Severe Effect
Diethyl Ether	Fair	Severe Effect	Severe Effect	Fair
Dimethyl Sulfoxide (DMSO)	Severe Effect	Fair	Good	Excellent
Ethanol	Excellent	Good	Excellent	Fair
Hydrochloric Acid 37%	Severe Effect	Good	Excellent	Good
Hydrogen Peroxide	Severe Effect	Good	Good	Good
Paraffin	Excellent	Severe Effect	Severe Effect	Severe Effect
Sodium Chloride 20%	Excellent	Excellent	Excellent	Excellent
Sodium Hydroxide 30%	Fair	Excellent ¹	Excellent	Excellent
Water, Distilled	Excellent	Fair	Excellent	Excellent

1. Satisfactory to 48 °C (120 °F).



Industrial Solutions

Cole-Parmer[®] tubing and fittings are designed to provide reliable service in industrial applications under a wide range of conditions. Our tubing features low gas permeability and excellent resistance to low and high temperatures, chemicals, inorganic fluids, and ultraviolet radiation. These products provide varying degrees of flexibility and rigidity to suit your fluid transfer and pumping applications.

Recommended Formulations

• Tygon[®] A-60-G Chemical Dispensing Tubing

Versilon[™] PFA Tubing

Excelon[®] Bev-A-Line[®] V HT Tubing

Chemical Formulation Chart

Chemical	Cole-Parmer® TPE	Cole-Parmer® PVC	Versilon [™] C-210-A	Tygon [®] F-4040-A
Ammonia, Liquid	Severe Effect	Excellent ¹	Fair	Good
Aromatic Hydrocarbons	Fair	Severe Effect	Severe Effect	Severe Effect
Diesel Fuel	Good	Excellent ¹	Excellent	Good
Ethylene Glycol	Fair	Excellent	Excellent	Excellent
Gasoline	Excellent	Fair ²	Good	Excellent
Hexane	Excellent	Good ¹	Good	Good
Ink	Excellent	Fair	_	
Kerosene	Fair	Excellent ²	Good	Good
Mineral Oil	Excellent	Good	Excellent	Excellent
Sulfuric Acid, 30%	Severe Effect	Excellent ¹	Severe Effect	Good
Toluene	Fair	Severe Effect	Severe Effect	Severe Effect

1. Satisfactory to 22 °C (72 °F). | 2. Satisfactory to 48 °C (120 °F).



Food and Beverage Solutions

Cole-Parmer[®] offers a variety of tubing and fittings designed to meet the requirements of foods and beverages during processing, dispensing, and aseptic filling. These products feature smooth, nonporous bores that inhibit particle entrapment, minimizing the potential for bacterial growth. Our solutions comply with FDA and NSF requirements for processing and dispensing, as well as 3-A, California Prop 65, REACH, and RoHS. Our formulations are free of DEHP, BPS, phthalates, and other chemicals of concern.

Recommended Formulations

- Cole-Parmer[®] Reinforced Thermoplastic Elastomer (TPE) Tubing
- Cole-Parmer[®] Soft Thermoplastic Elastomer (TPE) Tubing
- Cole-Parmer[®] Thermoplastic Vulcanizate (TPV) Industrial Tubing
- Cole-Parmer[®] Thermoplastic Elastomer (TPE) Tubing
- Cole-Parmer[®] Food, Milk, and Dairy Tubing
- Versilon™ Silver Antimicrobial Tubing
- Tygon[®] B-44-4X Food and Beverage Tubing
- Tygon[®] B-44-3 Beverage Dispensing Tubing
- Tygon[®] A-60-F Food and Beverage Tubing
- Tygon[®] E-1000 Food and Beverage Dispensing Tubing
- Tygon[®] SPT-3350 Silicone Tubing

- Tygon[®] 2475 IB High-Pressure Thermoplastic Tubing
- Tygon[®] E-3603 Vacuum Tubing
- Tygon[®] E-LFL Long Flexible Life Tubing
- Excelon[®] Bev-A-Line[®] IV Tubing
- Excelon[®] Bev-A-Line[®] V HT Tubing
- DuPont[™] Liveo[™] Pharma-50 Platinum-Cured Silicone Tubing^{*}
- DuPont[™] Liveo[™] Pharma-65 Platinum-Cured Silicone Tubing^{*}
- DuPont[™] Liveo[™] Pharma-80 Platinum-Cured Silicone Tubing^{*}
- Excelon® Platinum-Cured Silicone Tubing
- Excelon[®] Platinum-Cured Braid-Reinforced Silicone Tubing

Chemical Formulation Chart

Chemical	Cole-Parmer® PVC	Cole-Parmer [®] Platinum- Cured Silicone	Tygon [®] A-60-F	Tygon [®] B-44-4X
Alcohol	Fair	Good	Excellent	Severe Effect
Beer	Excellent ²	Excellent	Excellent	Excellent
Cane Juice	Excellent ¹	Excellent	Excellent	Excellent
Chocolate Syrup	Excellent	Excellent	Excellent	Excellent
Coffee	Good ²	Excellent	Excellent	_
Honey	Excellent	Excellent	Excellent	Excellent
Milk	Excellent ²	Excellent	Excellent	Excellent
Olive Oil	Fair	Severe Effect	Fair	Good
Sugar	Excellent	Excellent	Excellent	Excellent
Vinegar	Good	Excellent	Excellent	Excellent
Whiskey and Wines	Excellent ²	Excellent	Good	Good

1. Satisfactory to 22 °C (72 °F). $\mid\,$ 2. Satisfactory to 48 °C (120 °F).

Research and Development Solutions

Tubing and fittings are indispensable components in research and development laboratories, where precise and contamination-free fluid handling is paramount. In R&D labs, the tubing materials are carefully selected for their compatibility with a wide range of chemicals and biological substances. The materials Cole-Parmer[®] fluid handling solutions include offer unique properties such as chemical resistance, flexibility, and durability.

The fittings used for research labs must provide secure and leak-proof connections to maintain the integrity of the fluid handling process. Made from materials like high-grade plastics or stainless steel, these fittings are designed to withstand various chemical exposures and mechanical stresses typical in laboratory environments.

Recommended Formulations

- Versilon[™] C-210-A Oil-, Fuel-, and Grease-Resistant Tubing
- Tygon[®] E-3603 Laboratory Tubing
- Versilon[™] FEP High-Purity Tubing

- Tygon[®] F-4040-A Fuel and Lubricant Tubing
- Tygon[®] 2475 Plasticizer-Free Thermoplastic Tubing
- Tygon[®] E-3603 Vacuum Tubing
- Tygon[®] E-LFL Long Flexible Life Tubing

Chemical Formulation Chart

Chemical	Cole-Parmer® TPV	Cole-Parmer [®] Platinum- Cured Silicone	PharmaPure [®]	Tygon [®] E-3603
Acetic Acid	Severe Effect	Fair	Good	Excellent
Acetonitrile	Fair	Severe Effect	Good	Severe Effect
Dyes	Excellent	Excellent	_	
Formaldehyde 37%	Excellent	Good	Severe Effect	Severe Effect
Glycerol (Glycerin)	Excellent	Excellent	Excellent	Excellent
Isopropanol (Isopropyl Alcohol)	Excellent	Severe Effect	Fair	Severe Effect
Methyl Ethyl Ketone (MEK)	Fair	Severe Effect	Fair	Severe Effect
Phenol	Severe Effect	Severe Effect	Excellent	Fair
Potassium Hydroxide <10%	Excellent ¹	Fair	Excellent	Excellent
Potassium Permanganate	Excellent	Excellent	Excellent	Excellent
Water, Deionized	Excellent	Excellent	Excellent	Excellent

1. Satisfactory to 22 °C (72 °F).



Our comprehensive lineup of peristaltic pumps meets a wide spectrum of flow rate requirements, capable of handling anything from microfluidic applications to high-volume industrial processes. This flexibility makes our pumps suitable for a range of environments, from compact lab spaces to large-scale industrial settings.

Peristaltic Pumps

- Highest accuracy for increased repeatability
- Low flow for minimum waste

- Smallest footprint available
- Multichannel pumping

Series	Model	Features	Interchangeable Drive and Head	Multichannel Option	Flow Range	Control
	120S	Small, stackable, off-	No		0.001–190 mL/min	Manual
100 12	120U	the-shelf solution for low-flow applications		Yes	0.0001–190 mL/min	Manual, analog, and remote
323S 300 323Du	Versatile, accurate,			0.002.2000	Manual	
	323Du	benchtop pumps for medium, precise flow	Yes	Yes	mL/min	Manual, analog, remote, and RS-232

Environmental Solutions

The tubing materials, typically made from elastomers, are selected for their chemical resistance, flexibility, and durability, ensuring reliable operation even in harsh conditions. Fittings we offer are suitable in environmental applications and meet stringent standards to ensure leak-free connections and compatibility with various environmental fluids.

These fittings, often constructed from high-grade plastics or stainless steel, are designed to withstand the mechanical stresses and chemical exposures typical of environmental processes. Quick-connect fittings and hose barbs are commonly used to facilitate easy installation and maintenance, minimizing downtime and ensuring the integrity of fluid handling systems.

Recommended Formulations

- Cole-Parmer[®] FEP Tubing
- Cole-Parmer[®] PVDF Tubing
- Cole-Parmer[®] Thermoplastic (SEBS) Tubing
- Cole-Parmer[®] Thermoplastic Vulcanizate (TPV)
 Pharma Grade Tubing
- Cole-Parmer[®] Peroxide-Cured Silicone Tubing
- Cole-Parmer[®] PFA Tubing
- Cole-Parmer® PTFE Tubing
- Cole-Parmer[®] PVC Lab and Vacuum Tubing
- Cole-Parmer[®] Black TPE Tubing
- Cole-Parmer® PVC Fuel and Lubricant Tubing

- Cole-Parmer[®] Food, Milk, and Dairy Tubing
- Cole-Parmer[®] Platinum-Cured Silicone Tubing, 61 Shore A
- Excelon[®] Bev-A-Line[®] V HT Tubing
- Versilon[™] PFA Tubing
- Excelon® Micro-Line Translucent Mini-Bore Tubing
- Excelon® Platinum-Cured Silicone Tubing
- Excelon[®] Platinum-Cured Braid-Reinforced Silicone Tubing
- Excelon[®] Bev-A-Line[®] IV Tubing

Chemical Formulation Chart

Chemical	Cole-Parmer® PVC	Cole-Parmer® TPE	Tygon [®] E-LFL	Tygon [®] A-60-G
Acetaldehyde	Severe Effect	Good	Severe Effect	Severe Effect
Ammonium Nitrate	Excellent ²	Good	Excellent	Excellent
Chlorine	Severe Effect	Severe Effect	Fair	Severe Effect
Dimethyl Sulfoxide (DMSO)	Severe Effect	Severe Effect	Severe Effect	Good
Gasoline	Fair ²	Excellent	Severe Effect	Severe Effect
Nitric Acid 10%	Excellent ¹	Severe Effect	Excellent	Excellent
Potassium Chloride	Excellent	Severe Effect	Excellent	Excellent
Silver Nitrate	Excellent ¹	Severe Effect	Excellent	Excellent
Sodium Borate (Borax)	Excellent ²	Good	Excellent	Excellent
Water, Fresh	Good	Excellent	Excellent	Excellent

1. Satisfactory to 22 °C (72 °F). | 2. Satisfactory to 48 °C (120 °F).



Compliance and Support

Cleanroom Compliance

Our product ranges meet the highest cleanroom compliance standards, ensuring controlled environments with minimal contaminants. Ideal for pharmaceuticals, biotech, and semiconductors, our products meet FDA and ISO standards, guaranteeing exceptional product quality and safety. See the table below and continued on page 24 for a full tubing by classification list, highlighting our tubing range with the compliance standard per formulation.

Tubing Classification by Formulation

Tubing Formulation	ЗА	FDA Food Contact Criteria	FDA 21 CFR	NSF	ι
Tygon® E-3603 Laboratory		✓	 Image: A second s	 Image: A second s	
Tygon® S3™ E-3603 Vacuum		✓	~	~	
Tygon® E-LFL Long Flexible Life		✓		~	
Excelon® Micro-Line Translucent Mini-Bore		✓	~		
Excelon® Bev-A-Line® V HT		✓			~
DuPont™ Liveo™ Pharma-50 Platinum-Cured Silicone*		✓	~		
DuPont™ Liveo™ Pharma Advanced Pump Platinum-Cured Silicone*		✓	~		
Excelon® Platinum-Cured and Platinum-Cured Braid-Reinforced Silicone		✓			
C-Flex® 374 Thermoplastic Elastomer (TPE)					
Excelon® Bev-A-Line® IV		✓			~
Cole-Parmer* Thermoplastic Vulcanizate (TPV) Industrial					
Cole-Parmer* Thermoplastic Elastomer (TPE)					
Cole-Parmer* Reinforced Thermoplastic Elastomer (TPE)					
Cole-Parmer* Soft Thermoplastic Elastomer (TPE)		✓	~		
DuPont™ Liveo™ Pharma-80 Platinum-Cured Silicone*		✓	~		
DuPont™ Liveo™ Pharma TPE*					
Cole-Parmer [®] Platinum-Cured Silicone, 61 Shore A		✓	~		

Service and Technical Support

As a scientist, you didn't go to school to spend hours searching for lab equipment and supplies. At Cole-Parmer[®], we make it easy for you to get what you need so you can get back to doing what you love: creating your next scientific breakthrough. We're committed to providing the best products and services for your fluid handling needs, and we proudly support every product we deliver with a promise of achieving 100% satisfaction.

To get help with your application, contact techinfo@coleparmer.com.

USDA	National Formulary	USP	USP 661	RoHS	BPOG	ISO 9001:2015	ISO 10993	USP Class VI
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		 Image: A second s	 Image: A second s	✓	✓	✓	~	✓
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		~					~	~
	✓	~	~	 Image: A start of the start of		✓	~	✓

Tubing Classification by Formulation

Tubing Formulation	ЗА	FDA Food Contact Criteria	FDA 21 CFR	NSF	ι
Cole-Parmer* Platinum-Cured Silicone, 50 Shore A		✓	~		Γ
Cole-Parmer [®] Thermoplastic (SEBS)					
Cole-Parmer® Thermoplastic Vulcanizate (TPV) Pharma Grade					
Cole-Parmer* FEP		✓	~		
Cole-Parmer* PFA					
Cole-Parmer* PTFE		✓	~		
Tygon® SPT-3350 Silicone		✓	~	 Image: A second s	
Cole-Parmer* PVDF					
Versilon™ PFA					
Versilon™ FEP High-Purity					
Versilon™ 2001 Plasticizer-Free Chemical-Resistant		✓	~		
Versilon™ C-210-A Oil-, Fuel-, and Grease-Resistant					
DuPont™ Liveo™ Pharma-65 Platinum-Cured Silicone*		✓	~		
Watson-Marlow PVC 3-Stop		✓		 Image: A second s	
Watson-Marlow Marprene® TPE 3-Stop		✓	~	 Image: A second s	
Watson-Marlow Peroxide-Cured Silicone 3-Stop				✓	
Watson-Marlow Bioprene® TPE		✓	~	 Image: A second s	
Watson-Marlow Pumpsil® Platinum-Cured Silicone					
Tygon® A-60-F Food and Beverage	~	✓	~	✓	
Tygon® E-1000 Food and Beverage Dispensing		✓		✓	
Tygon® S3™ B-44-4X Food and Beverage	~	✓		 Image: A second s	
Tygon® F-4040-A Fuel and Lubricant					
Tygon® S3™ B-44-3 Beverage Dispensing	~	✓	~	 Image: A second s	
Tygon® A-60-G Chemical Dispensing					
Tygon® 2475 and 2475 IB Plasticizer-Free Thermoplastic				 Image: A second s	
Tygon® S3™ B-44-5X IB Reinforced Food and Beverage Dispensing	~	✓	~	 Image: A second s	
C-Flex® 072 Thermoplastic Elastomer (TPE)					
PharMed® BPT Biocompatible Peristaltic Pump					
PharmaPure® Low Spallation Peristaltic Pump					
Versilon™ Silver Antimicrobial		✓	~		
Cole-Parmer* PVC Lab and Vacuum					
Cole-Parmer [®] Food, Milk, and Dairy	~	✓	~		
Cole-Parmer* Peroxide-Cured Silicone					
Cole-Parmer* Black TPE					
Cole-Parmer [®] PVC Fuel and Lubricant					
Viton®		\checkmark	\checkmark		

USDA	National Formulary	USP	USP 661	RoHS	BPOG	ISO 9001:2015	ISO 10993	USP Class VI
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				✓				

IMPORTANT NOTICE:

Chemical compatibility information provided by Cole-Parmer[®] is for the convenience of the user, but it is the sole responsibility of the user to verify the suitability and safety of Cole-Parmer[®] tubing for all intended applications and chemicals. Users must confirm the compatibility of any fluid with the tubing through which it is transmitted. Laboratory or field tests must be conducted in compliance with relevant standards to assess the safety and efficacy of the tubing in any specific application.

WARNING:

The information provided herein, while supplied to Cole-Parmer[®] by trusted sources, is intended solely as a guideline for selecting tubing for chemical compatibility. Prior to permanent installation, it is crucial to test the tubing with the chemicals and under the specific conditions of the intended application. Chemical behavior ratings listed are based on a 24- to 48-hour exposure period; effects beyond this time frame are unknown. The ratings in the charts DO NOT reflect the extent to which extraction 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 tubing. Cole-Parmer[®] disclaims all warranties, express or implied, regarding the accuracy, completeness, or reliability of this chemical compatibility data, including implied warranties of fitness or suitability for any specific purpose.

DANGER:

Chemical behavior can vary during handling due to factors like temperature, pressure, and concentration, potentially causing equipment failure despite passing initial tests. Such failures may result in serious injury, environmental hazards or property damage. Always use appropriate safety measures, including guards and personal protection, when handling chemicals.

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