BIOTECH

2014
CATALOG

FLUIDIC PRODUCTS & INFORMATION for LABORATORY APPLICATIONS

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View from our office windows

BIOTECH

Biotech Sweden is a company highly specialized in chromatography accessories and consumables. Biotech is located on the Swedish Westcoast – south of Gothenburg – at the beautiful Onsala peninsula, covering 15.000 sq.m. land and 700 sq.m. production and office area.

A SIMPLE PHILOSOPHY...

We at Biotech believe that value is not "the lowest price" – our customers are the reason we exist – our customers always come first. We have not lost sight where we come from and therefore we try harder to be your partner, we're not satisfied unless you are satisfied.

Thank you for your business. I know we'll continue to grow and prosper together.

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SEE WHAT'S NEW!

NEW! Biocompatible

Biocompatible Tubing for UHPLC
PEEK-Lined Stainless Steel (PLS)

Page 63

NEW! Biocompatible

Four Independent Channels!
Reglo ICC Peristaltic Pump

Page 92

NEW! Biocompatible

High Pressure Manual Injection Valve
Active Flow-Splitter for LC/MS

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Biocompatible

Our Biocompatible logo indicates the use of materials anticipated to maintain the integrity and improve the analysis of biological samples in their intended application.

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FITTINGS

SEE STARRED PRODUCTS FOR **TOP SELLERS!**

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Fittings Chapter

In this catalog, we've taken a new approach to presenting our extensive line of fittings. In one comprehensive chapter, you will find fittings for several applications — very high pressure (> 15,000 psi/1,034 bar), high pressure (> 1,000 psi/69 bar), and low pressure (< 1,000 psi/69 bar). There is also a separate section for micro and nano-scale applications.

You'll also find information on:

THREADS (10-32, 6-32, M6, etc.)

TUBING SIZE (1/16", 1/32", 360 µm, etc.)

PORT GEOMETRY (Coned, Flat-bottom)

Specification tables at the bottom of each page include:

- Part numbers
- Part description
- Materials of construction
- Standard size packages
- Pressure ratings
- Available colors

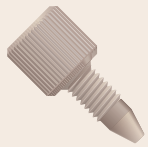
Additionally, you will find fitting-related application notes and, if available, special ordering options throughout the chapter.

Please Note: in the product descriptions, a "Fitting" refers to a complete product ready to assemble and connect tubing into a part. This could be a one-piece connector or a nut and ferrule packaged together. A "Nut" indicates the male or female threaded product sold separately, and a "Ferrule" is sold separately when indicated in the description. For your convenience we ship most Upchurch Scientific® Fittings and Ferrules in 10-packs, however, you may order individual pieces (an "x" in the product part number designates "10-pk").

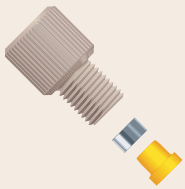
You may notice a change in some of our pressure ratings — be assured that the IDEX Health & Science team is dedicated to providing the most reliable, proven products on the market. We have implemented more stringent testing protocols and a generous safety margin to our ratings to ensure your safety.

Please Note: all testing is performed with water at room temperature unless otherwise specified. Results may vary depending on the material of the receiving port and tubing, actual tubing diameters (with stated tolerances), temperature and solvents used. If a pressure range is listed for a product's specification, the pressure rating depends on the tubing material used. The lower end of the range will represent testing performed on softer tubing such as FEP, and the higher end of the range will represent testing performed on harder tubing such as Stainless Steel. For more detail, please see the product specification sheets on our website, www.idex-hs.com, or contact us directly.

FINGERTIGHT FITTINGS
Found on pages 11–15



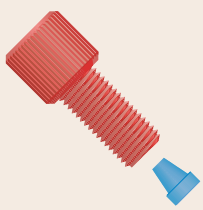
SUPER FLANGELESS™ FITTINGS
Found on pages 21–23



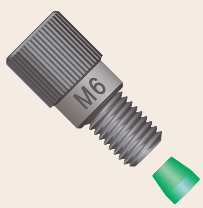
TUBING SLEEVES
Found on pages 19–20

MICROTIGHT® FITTINGS
Found on pages 18–19

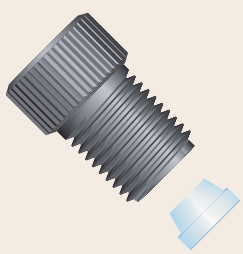
FLANGELESS FITTINGS
Found on pages 24–26



FLANGELESS FITTINGS FOR METRIC SIZED TUBING
Found on page 27



FITTINGS FOR 3/16" TO 5/16" OD TUBING
Found on page 30



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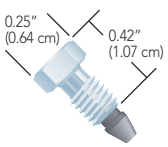
Reusable Very High Pressure (VHP) Fittings

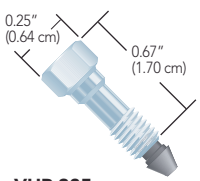
- Pressure rated up to 25,000 psi (1,720 bar)
- Patent pending innovative design
- Capable of up to ten repeat assembly cycles with no impact on pressure holding ability or carry-over
- Available in 10-32 threads for 1/16" OD tubing and M4 threads for 1/32" OD tubing
- Materials of construction: stainless steel and proprietary PEEK polymer blend (PK)

IDEX Health & Science introduces an innovative line of Upchurch Scientific® Very High Pressure (VHP) fittings, designed to withstand extreme pressures. This patent-pending line of ground-breaking fitting systems is perfect for use within the increasingly demanding requirements of today's high performance analytical systems.

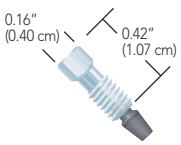
The Reusable VHP fittings can be reused when following the tightening torque specification listed below. With a polymer front ferrule, there is no damage to the tubing or receiving port, also increasing the life of these components.



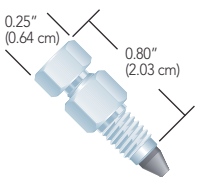
VHP-320
10-32 VHP Fitting
for 1/16" OD tubing



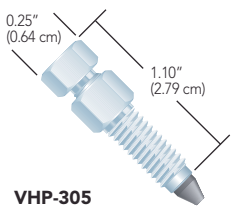
VHP-325
10-32 VHP Fitting, Long
for 1/16" OD tubing



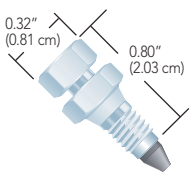
VHP-920
M4 VHP Fitting
for 1/32" OD tubing



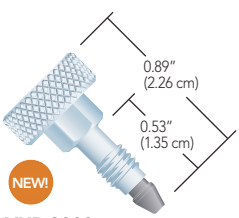
VHP-300
10-32 VHP Fitting
for 1/16" OD tubing



VHP-305
10-32 VHP Fitting, Long
for 1/16" OD tubing



VHP-310
10-32 VHP Fitting
for 1/16" OD tubing



VHP-3200
10-32 VHP Fitting
for 1/16" OD tubing

VHP-1001
VHP Fingertight
1/4" Hex Tool

APPLICATION NOTE

Reusability

- Using a reusable fitting eliminates the problems described on stainless steel fitting interchangeability on page 185 of the Technical Resources section. A reusable fitting will allow for quick column, sample loop, inline filter or tubing changes with minimal downtime.
- The VHP-300, VHP-305, and VHP-310 fittings can be used up to 30,000 psi (2,070 bar) if tightened to 14 in-lbs (1.6 N·m). This limits the reusability to 5 cycles. The stacked design of these fittings allows the user to lightly assemble the fitting before tightening into the port. Leaving the tubing extended at least half an inch beyond the end of the ferrule will ensure that the tubing is bottomed out in the port before the fitting is tightened down, avoiding any potential dead volume that could be introduced during fitting installation.

RELATED PRODUCTS

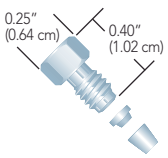
- Find tightening tools on page 8 designed to deliver the torque necessary for these fittings.

	Part No.	Description	Port	Pressure Rating	Required Torque	Head Style	Material	Qty.
	REUSABLE VHP FITTINGS							
	VHP-300x	VHP Fitting for 1/16" OD	10-32 Coned	20,000 psi (1,380 bar)	10 in-lbs (1.10 N·m)	1/4" Hex	SST/PK	10-pk
	VHP-305x	VHP Fitting for 1/16" OD, Long	10-32 Coned	20,000 psi (1,380 bar)	10 in-lbs (1.10 N·m)	1/4" Hex	SST/PK	10-pk
	VHP-310x	VHP Fitting for 1/16" OD	10-32 Coned	20,000 psi (1,380 bar)	10 in-lbs (1.10 N·m)	8 mm Hex	SST/PK	10-pk
	VHP-320x	VHP Fitting for 1/16" OD	10-32 Coned	25,000 psi (1,720 bar)	10 in-lbs (1.10 N·m)	1/4" Hex	SST/PK	10-pk
	VHP-325x	VHP Fitting for 1/16" OD, Long	10-32 Coned	25,000 psi (1,720 bar)	10 in-lbs (1.10 N·m)	1/4" Hex	SST/PK	10-pk
	VHP-920x	VHP Fitting for 1/32" OD	M4 Coned	25,000 psi (1,720 bar)	8 in-lbs (0.90 N·m)	4 mm Hex	SST/PK	10-pk
NEW!	**VHP-3200**	VHP Fitting for 1/16" OD	10-32 Coned	11,000 psi (760 bar)	3.5 in-lbs (0.40 N·m)	1/2" Knurl	SST/PK	10-pk
NEW!	**VHP-1001**	VHP Fingertight 1/4" Hex Tool	—	—	—	—	PPS	ea.

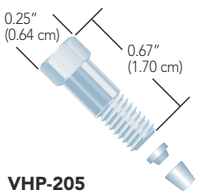
Stainless Steel VHP Fittings

- Pressure rated to 30,000 psi (2,070 bar)
- Double compression ferrule design
- Available with 10-32 threads for 1/16" OD tubing and M4 threads for 1/32" OD tubing

The all Stainless-Steel VHP Fittings include a unique ferrule system with two compression points to provide twice the grip of a standard ferrule. This design also allows the bite on the tubing to be less concentrated and does not restrict the inner diameter, as discussed in the Application Note. The ferrules for 1/16" OD tubing and 10-32 coned ports are two pieces, while the grooved ferrule for 1/32" OD tubing and M4 coned ports is a one-piece design for easier handling, but it will act as two pieces with double compression on the tubing as it is tightened down.

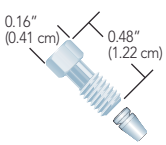


VHP-200
VHP 10-32 Fitting
for 1/16" OD tubing



VHP-205
VHP 10-32 Fitting, Long
for 1/16" OD tubing

VHP-700
VHP 6-40 Fitting
for 1/32" OD tubing

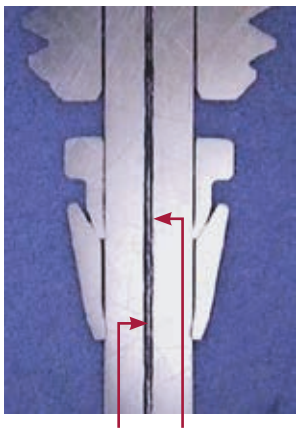


VHP-900
VHP M4 Fitting
for 1/32" OD tubing

APPLICATION NOTE

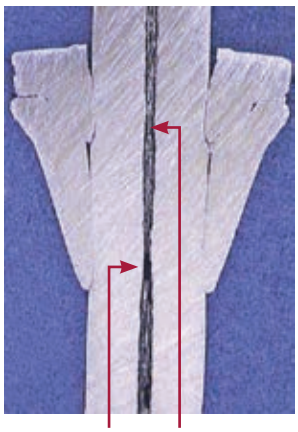
In order to seal up to the stated pressure rating, the VHP-200-01 ferrule requires 20 in-lbs (2.25 N·m) of torque. Similar ferrules on the market require tightening torque of at least 30 in-lbs (3.3 N·m), which can result in a restricted tubing passage, as shown in the picture below. This restriction can increase turbulence and add a 'throttling' effect to the fluid pathway, resulting in mixing and other potential chromatographic problems.

IDEX Health & Science VHP-200



Uniform Tubing Passage

Conventional Two Piece Ferrule Design



Constricted Tubing Passage

Part No.	Description	Port	Pressure Rating	Required Torque	Head Style	Material	Qty.
STAINLESS STEEL VHP FITTINGS (INCLUDES NUT AND FERRULE)							
VHP-200x	VHP Fitting for 1/16" OD	10-32 Coned	30,000 psi (2,070 bar)	20 in-lbs (2.25 N·m)	1/4" Hex	SST	10-pk
VHP-205x	VHP Fitting for 1/16" OD, Long	10-32 Coned	30,000 psi (2,070 bar)	20 in-lbs (2.25 N·m)	1/4" Hex	SST	10-pk
VHP-900x	VHP Fitting for 1/32" OD	M4 Coned	30,000 psi (2,070 bar)	20 in-lbs (2.25 N·m)	4 mm Hex	SST	10-pk
NEW! **VHP-700x**	VHP Fitting for 1/32" OD	6-40 Coned	30,000 psi (2,070 bar)	20 in-lbs (2.25 N·m)	4 mm Hex	SST	10-pk
STAINLESS STEEL VHP FERRULES							
VHP-200-01x	VHP Ferrule for 1/16" OD	10-32 Coned	30,000 psi (2,070 bar)	20 in-lbs (2.25 N·m)	—	SST	10-pk
VHP-900-01x	VHP Ferrule for 1/32" OD	M4 Coned	30,000 psi (2,070 bar)	20 in-lbs (2.25 N·m)	—	SST	10-pk

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Tightening Tools for VHP Fittings

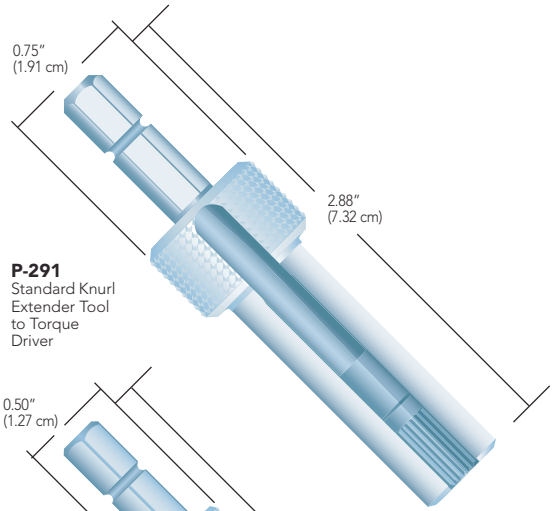
- Configured for the optimum torque to provide assurance of a strong connection
- Prolongs the lifetime of reusable fittings by not overtightening
- Available for multiple fitting head styles

This new line of tightening tools is designed for the VHP fittings and can also be used with any fitting in this chapter described to have a corresponding head style to the tool listed below. There are three styles of tightening tools available for various applications. The Torque Tools (VHP-1000, VHP-2000, and VHP-3000) are breakaway torque wrenches designed to deliver a precise amount of torque to the fitting system. These torque wrenches come calibrated according to ISO 6789:2003 (± 6% of setting) and have been tested extensively with the reusable VHP fittings on page 6. Choose the appropriate torque delivered and the proper head style to work with the VHP fittings, increasing the ease of use with these fittings.

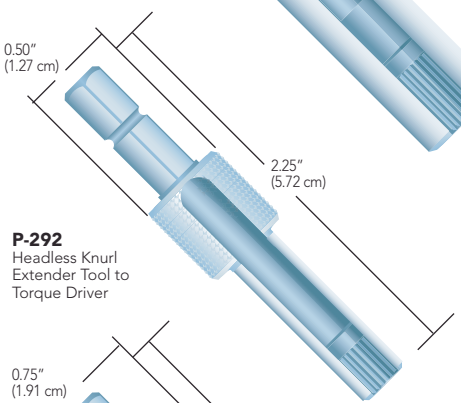
The VHP-4000 Torque Driver couples with the specially designed Extender Tools listed below and provides an externally adjustable torque setting. This tool along with the appropriate Extender Tools will tighten any Upchurch Scientific® knurled polymer fitting in your system. Reference the head style found in the tables at the bottom of each page for information on the proper Extender Tool to select.

Because of the small hex-head on the M4 fittings (VHP-900 and VHP-920), a custom wrench, the VHP-9000, is available below.

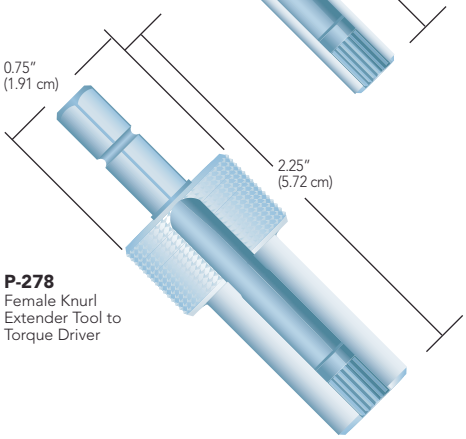
VHP-1000
VHP Wrench
1/4 in Hex
10 in-lbs (1.13 N·m)



P-291
Standard Knurl Extender Tool to Torque Driver



P-292
Headless Knurl Extender Tool to Torque Driver



P-278
Female Knurl Extender Tool to Torque Driver

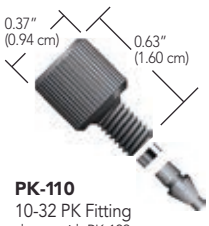
	Part No.	Description	Use With Head Style	Torque Delivered	Qty.
	VHP TIGHTENING TOOLS				
NEW!	**F-347**	Extender Tool to Torque Driver	FlushNut (1/4-28)	—	ea.
NEW!	**N-291**	Extender Tool to Torque Driver	Micro Headless	—	ea.
NEW!	**P-268**	Extender Tool to Torque Driver	1/4" Hex	—	ea.
	P-278	Extender Tool to Torque Driver	Female Nut Knurl	—	ea.
	P-279	Extender Tool to Torque Driver	Micro Nut Knurl	—	ea.
	P-291	Extender Tool to Torque Driver	Standard Nut Knurl	—	ea.
	P-292	Extender Tool to Torque Driver	Headless Nut Knurl	—	ea.
	P-1000	Standard Knurl Torque Tool	Standard Knurl	4 in-lbs (0.45 N·m)	ea.
	VHP-1000	VHP Torque Tool	1/4" Hex	10 in-lbs (1.13 N·m)	ea.
	VHP-2000	VHP Torque Tool	1/4" Hex	14 in-lbs (1.58 N·m)	ea.
	VHP-3000	VHP Torque Tool	8 mm Hex	10 in-lbs (1.13 N·m)	ea.
	VHP-4000	VHP Torque Driver	Extender Tool 1/4" Drive	Adjustable between 2–12 in-lbs (0.23–1.35 N·m)	ea.
	VHP-9000	4 mm Wrench	4 mm Hex	—	ea.

Very High Pressure PK Fittings

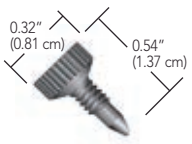
Upchurch Scientific® Ultra High Performance fittings are manufactured from a proprietary PEEK blend (PK) which allow them to be used at higher temperatures (up to 200 °C) and higher pressures.

The VHP PK One-Piece fittings are available for 10-32 coned, 6-32 coned, or M4 coned ports, and Two-Piece fittings are available to connect either 1/16" or 1/32" OD tubing into 10-32 coned ports in multiple styles.

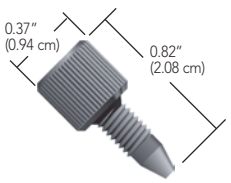
PK-110
10-32 PK Fitting
shown with PK-100
for 1/16" OD tubing



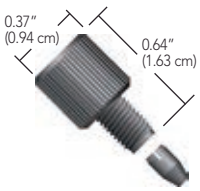
PK-110
10-32 PK Fitting
shown with PK-132
for 1/32" OD tubing



PK-126
6-32 PK MicroTight® Fitting
for 1/32" OD tubing

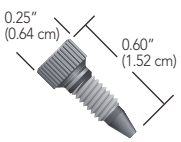


PK-120BLK
10-32 PK Fitting
for 1/16" OD tubing



PK-195
10-32 PK Fitting
with PK 192
for 1/16" OD tubing

PK-126H
6-32 PK MicroTight® Fitting
for 1/32" OD tubing

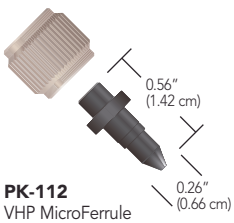


UH-904
M4, 1/32" Fitting
for Rheodyne® MX valves

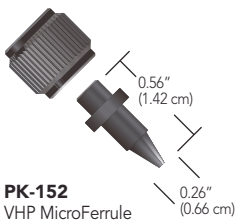
PK-124
6-32 PK MicroTight® Fitting
for 1/32" OD tubing

VHP MicroFerrules

VHP MicroFerrules are made from a proprietary high performance PEEK polymer blend, a material which is unique in its ability to enable the use of capillary tubing in UHPLC environments. The new high pressure MicroFerrules are available for use with 1/32" or 360 µm OD tubing, and they are incorporated into several of our VHP products for capillary tubing.



PK-112
VHP MicroFerrule
shown with P-416
for 1/32" OD tubing



PK-152
VHP MicroFerrule
shown with P-416BLK
for 360 µm OD tubing

APPLICATION NOTE

CAUTION: While the proprietary blend of the PK fittings will allow a fitting to attain a higher pressure and minimal cold flow properties relative to pure PEEK, some fittings molded of PK are known to be conductive. Use caution when employing PK fittings in high voltage applications.

NOTE

MicroTight fittings and MicroFerrules

While the MicroTight Female Nuts may be used with any of the separate MicroFerrules, the MicroFerrules themselves are port-specific and are thus not interchangeable. Additionally, the one-piece MicroTight fittings are also port-specific and should not be exchanged.

RELATED PRODUCTS

▶ Find unions, tees and crosses for VHP applications on pages 36, 37, and 42.

	Part No.	Description	Port	Pressure Rating	Required Torque	Head Style	Material	Qty.
	PK VHP ONE-PIECE FITTINGS							
★	**PK-120BLKx**	PK One-Piece Fitting for 1/16" OD Tubing	10-32 Coned	12,000 psi (827 bar)	8.0 in-lbs (0.90 N·m)	Standard Knurl	PK	10-pk
NEW!	**PK-124x**	PK One-Piece Fitting for 360 µm OD Tubing	6-32 Coned	15,000 psi (1,035 bar)	3.0 in-lbs (0.34 N·m)	Standard Micro Knurl	PK	10-pk
NEW!	**PK-126Hx**	PK One-Piece Headless Fitting for 1/32" OD Tubing	6-32 Coned	15,000 psi (1,035 bar)	3.0 in-lbs (0.34 N·m)	Headless Micro Knurl	PK	10-pk
	PK-126x	PK One-Piece Fitting for 1/32" OD Tubing	6-32 Coned	15,000 psi (1,035 bar)	3.0 in-lbs (0.34 N·m)	Standard Micro Knurl	PK	10-pk
	UH-904x	PK One-Piece Fitting for 1/32" OD Tubing	M4 Coned	15,000 psi (1,035 bar)	4.0 in-lbs (0.45 N·m)	Headless Knurl	PK	10-pk
	PK VHP FITTINGS (SEALTIGHT™ STYLE, FITTINGS INCLUDE PK-192X)							
	PK-192x	PK Ferrule for 1/16" OD Tubing	10-32 Coned	11,000 psi (760 bar)	—	—	PK	10-pk
	PK-195x	PK Fitting for 1/16" OD Tubing	10-32 Coned	11,000 psi (760 bar)	8.0 in-lbs (0.90 N·m)	Standard Knurl	PK	10-pk
	PK VHP FITTINGS (LITETOUCH® STYLE, NUTS AND FERRULES SOLD SEPARATELY)							
★	**PK-100x**	PK Ferrule for 1/16" OD Tubing	10-32 Coned	16,500 psi (1,140 bar)	—	—	PK	10-pk
	PK-110x	PK Nut for 1/16" OD Tubing	10-32 Coned	16,500 psi (1,140 bar)	8.0 in-lbs (0.90 N·m)	Standard Knurl	PK	10-pk
	PK-132x	PK Ferrule for 1/32" OD Tubing	10-32 Coned	16,500 psi (1,140 bar)	—	—	PK	10-pk
	PK MICRO FERRULES AND FEMALE NUTS							
	P-416	Female Nut for Microferrule	5/16-24 Coned	15,000 psi (1,035 bar)	4.0 in-lbs (0.45 N·m)	Female Knurl	PEEK, Natural	ea.
	P-416BLK	Female Nut for Microferrule	5/16-24 Coned	15,000 psi (1,035 bar)	4.0 in-lbs (0.45 N·m)	Female Knurl	PEEK, Black	ea.
★	**PK-112**	VHP MicroFerrule for 1/32" OD Tubing	5/16-24 Coned	15,000 psi (1,035 bar)	—	—	PK	ea.
	PK-152	VHP MicroFerrule for 360 µm OD Tubing	5/16-24 Coned	15,000 psi (1,035 bar)	—	—	PK	ea.

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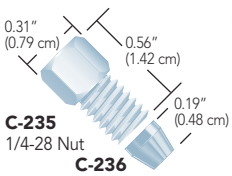
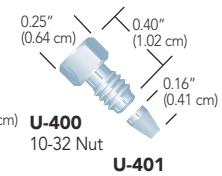
Stainless Steel Fittings

These 316 Stainless Steel Fittings are rated to 20,000 psi (1,380 bar) when wrench tightened. Choose Upchurch Scientific® Standard Fittings, or select from the Rheodyne® or other manufacturer-compatible offerings.

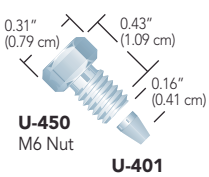
Standard Stainless Steel Fittings



C-235
1/4-28 Nut
C-236
Ferrule

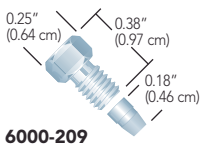


U-400
10-32 Nut
U-401
Ferrule

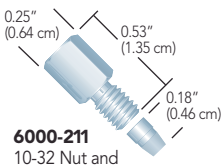


U-450
M6 Nut
U-401
Ferrule

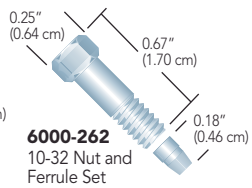
Rheodyne Fittings



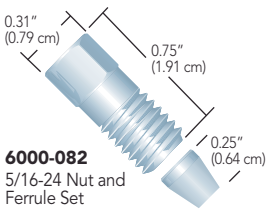
6000-209
10-32 Nut and Ferrule Set



6000-211
10-32 Nut and Ferrule Set

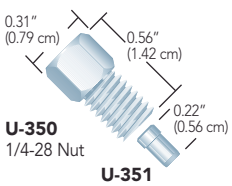


6000-262
10-32 Nut and Ferrule Set



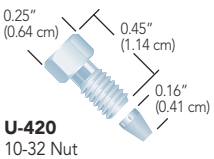
6000-082
5/16-24 Nut and Ferrule Set

SSI Compatible Fittings

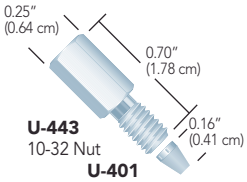


U-350
1/4-28 Nut
U-351
Ferrule

Beckman® Compatible Fittings

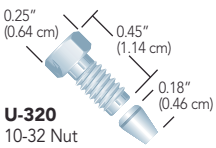


U-420
10-32 Nut
U-401
Ferrule



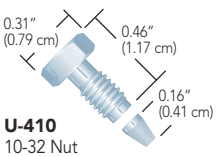
U-443
10-32 Nut
U-401
Ferrule

VICI® (Valco) Compatible Fittings



U-320
10-32 Nut
U-321
Ferrule

Waters® Compatible Fittings



U-410
10-32 Nut
U-401
Ferrule

NOTE

- Do not use metal fittings in plastic ports, as this can damage the port. Please see the "Material Structural Compatibility" chart on page 184 for more information about fittings compatibility with tubing and port materials.
- The recommended torque to tighten these fittings is 20 in-lbs (2.25 N·m).

	Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
	STANDARD STAINLESS STEEL FITTINGS						
	C-235x	Nut for 1/8" OD Tubing	1/4-28 Coned	20,000 psi (1,380 bar)	5/16" Hex	SST	10-pk
	C-236x	Ferrule for 1/8" OD Tubing	1/4-28 Coned	20,000 psi (1,380 bar)	—	SST	10-pk
★	**U-400x**	Nut for 1/16" OD Tubing	10-32 Coned	20,000 psi (1,380 bar)	1/4" Hex	SST	10-pk
★	**U-401x**	Ferrule for 1/16" OD Tubing	10-32 or M6 Coned	20,000 psi (1,380 bar)	—	SST	10-pk
	U-450x	Nut for 1/16" OD Tubing	M6 Coned	20,000 psi (1,380 bar)	5/16" Hex	SST	10-pk
	RHEODYNE FITTINGS						
	6000-082	Fitting for 1/8" OD Tubing	5/16-24 Coned	20,000 psi (1,380 bar)	5/16" Hex	SST	ea.
	6000-083	Ferrule for 1/8" OD Tubing	5/16-24 Coned	20,000 psi (1,380 bar)	—	SST	5-pk
	6000-209	Fitting for 1/16" OD Tubing	10-32 Coned	20,000 psi (1,380 bar)	1/4" Hex	SST	10-pk
	6000-210	Ferrule for 1/16" OD Tubing	10-32 Coned	20,000 psi (1,380 bar)	—	SST	10-pk
	6000-211	Fitting for 1/16" OD Tubing, Long	10-32 Coned	20,000 psi (1,380 bar)	1/4" Hex	SST	10-pk
	6000-262	Fitting for 1/16" OD Tubing, Extra Long	10-32 Coned	20,000 psi (1,380 bar)	1/4" Hex	SST	10-pk
	MANUFACTURER COMPATIBLE FITTINGS						
★	**U-320x**	Nuts for 1/16" OD Tubing, Valco/VICI Compatible	10-32 Coned	20,000 psi (1,380 bar)	1/4" Hex	SST	10-pk
★	**U-321x**	Ferrule for 1/16" OD Tubing, Valco/VICI Compatible	10-32 Coned	20,000 psi (1,380 bar)	—	SST	10-pk
	U-350x	Nuts for 1/16" OD Tubing, SSI Compatible	10-32 Coned	20,000 psi (1,380 bar)	5/16" Hex	SST	10-pk
	U-351x	Ferrule for 1/16" OD Tubing, SSI Compatible	10-32 Coned	20,000 psi (1,380 bar)	—	SST	10-pk
★	**U-410x**	Nuts for 1/16" OD Tubing, Waters Compatible	10-32 Coned	20,000 psi (1,380 bar)	5/16" Hex	SST	10-pk
	U-420x	Nuts for 1/16" OD Tubing, Beckman Compatible	10-32 Coned	20,000 psi (1,380 bar)	1/4" Hex	SST	10-pk
	U-443x	Nuts for 1/16" OD Tubing, Beckman Compatible, Long	10-32 Coned	20,000 psi (1,380 bar)	1/4" Hex	SST	10-pk

One-Piece Fingertight Fittings

- The original One-Piece Fingertight Fitting
- All polymer construction
- Versions available for 1/16", 1/32" or 1/8" OD tubing

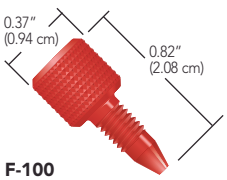
The Upchurch Scientific® One-Piece Fingertight Fittings provide convenience and ease of use because the ferrule will not stick in a receiving port and the fitting is more easily found if dropped. The fittings for 1/16" OD tubing and 10-32 coned ports are available in a variety of colors, materials and lengths to suit virtually every application.

Beyond the standard 10-32 fittings, also featured in this product family are specialty fittings for specific applications. Our M-645 Fitting is a direct replacement for the 6-40 threaded VICI® (Valco) fitting. The P-100 can be used in 1/4-28 coned ports for 1/8" OD tubing including some of the inlet filters starting on page 157.

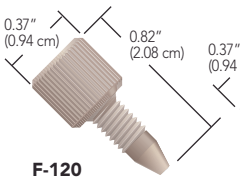
RheFlex® One-Piece Fittings are included in many of the Rheodyne® manual valves, starting on page 132. The One-Piece RheFlex M4 Fittings, for use with Rheodyne MX Nano-Scale Modules, are listed on page 12.

NOTE

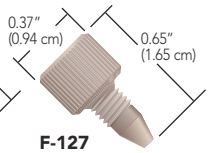
- For your convenience we ship most Upchurch Scientific Fingertight Fittings in 10-packs. However, you may order individual pieces (the letter "x" in the product part number simply designates "10-pk").
- Some of the Upchurch Scientific fittings on this page are available in additional colors. Please contact your distributor or us for more information.
- The F-120FUN PACK includes six F-120 Fittings in the following colors: natural, blue, black, green, red, and yellow.
- Fingertight is generally equal to 3–4 in-lbs (0.34–0.45 N·m).



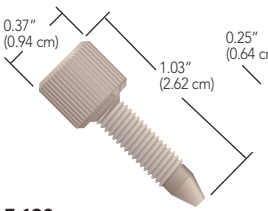
F-100
10-32 PCTFE Fitting



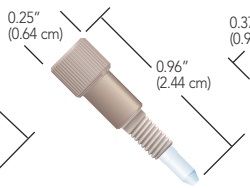
F-120
10-32 PEEK Fitting



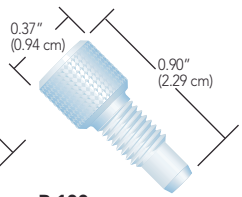
F-127
10-32 PEEK Fitting



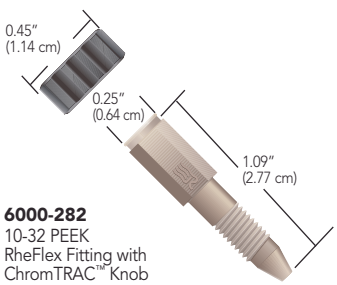
F-130
10-32 PEEK Fitting



M-645
6-40 PEEK/PCTFE Fitting
for 1/32" OD tubing



P-100
1/4-28 PCTFE Fitting
for 1/8" OD tubing



6000-282
10-32 PEEK
RheFlex Fitting with
ChromTRAC™ Knob

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
ONE-PIECE FINGERTIGHT FITTINGS						
6000-282	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	5,000 psi (345 bar)	ChromTRAC knob	PEEK, Natural	10-pk
F-100x	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	4,000 psi (276 bar)	Diamond Knurl	PCTFE, Red	10-pk
F-100Nx	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	4,000 psi (276 bar)	Diamond Knurl	PCTFE, Natural	10-pk
★ **F-120x**	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	5,000 psi (345 bar)	Standard Knurl	PEEK, Natural	10-pk
F-120FUN PACK	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	5,000 psi (345 bar)	Standard Knurl	PEEK, Natural, Blue, Black, Green, Red, Yellow (one each color)	6-pk
F-127x	Fingertight Fitting for 1/16" OD Tubing, Short	10-32 Coned	5,000 psi (345 bar)	Standard Knurl	PEEK, Natural	10-pk
★ **F-130x**	Fingertight Fitting for 1/16" OD Tubing, Long	10-32 Coned	5,000 psi (345 bar)	Standard Knurl	PEEK, Natural	10-pk
M-645x	Fingertight Fitting for 1/32" OD Tubing	6-40 Coned	1,750–3,250 psi (121–224 bar)	Headless Knurl	PEEK, Natural/PCTFE, Natural	10-pk
P-100	Fingertight Fitting for 1/8" OD Tubing	1/4-28 Coned	1,000 psi (69 bar)	Diamond Knurl	PCTFE, Natural	ea.

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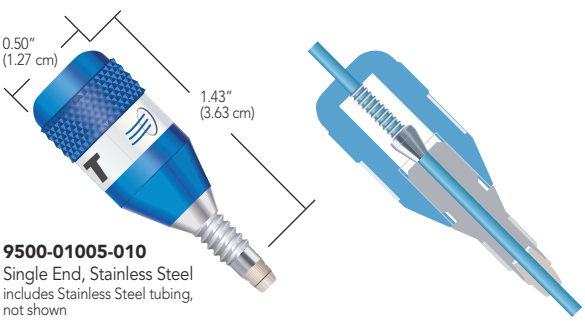
Sure-Fit™ Connector

- Self-adjusting to any port depth regardless of column manufacturer
- Fingertight to 6,000 psi (414 bar)
- Available in PEEK or stainless steel

Eliminating leaks and dead volume is critical to achieving good chromatographic results. The Sure-Fit connector gives you a perfect fit in nearly every 10-32 coned receiving port — every connection, every time. Typically leaks and dead volume are caused by an improperly plumbed system and can occur for many reasons, including switching columns. The problem occurs not only when switching from one manufacturer to another, it can also occur when changing columns from the same manufacturer. This is because internal port depths vary, even within the same manufacturing lot. Unless the connector is universal, eliminating leaks and dead volume cannot be guaranteed. The Sure-Fit connector has a unique internal spring-tensioned mechanism that automatically self-adjusts to virtually any port depth while maintaining constant pressure on the 1/16" OD tubing.

Sure-Fit connectors come with either PEEK tubing or stainless steel tubing, in varying lengths and internal diameters, pre-assembled for ease of use. Choose the 9502-01007-HP — a U-shaped Sure-Fit connector — for use in Agilent® 1100 systems, or select the 9504-01005-050 for micro-scale applications where biocompatibility is desired.



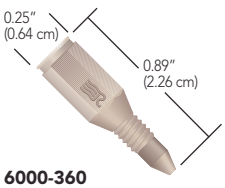
9500-01005-010
Single End, Stainless Steel
includes Stainless Steel tubing, not shown

RheFlex® M4 Fittings

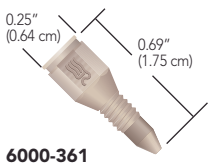
- Incorporates M4 coned threads for 1/32" OD tubing
- Pressure rated to 5,000 psi (345 bar)

The Rheodyne® RheFlex M4 Fitting is designed to connect 1/32" OD tubing in MX Series II™ valves (see Actuated Valves, starting on page 130). This PEEK fitting has a one piece design, which eliminates the need for a separate nut and ferrule. The M4 Fitting design provides dependable zero dead volume connections for micro and nano applications. Due to the unique RheFlex gripping design, the M4 Fitting will hold to 5,000 psi (345 bar) on PEEK or with a PEEK tubing sleeve on fused silica tubing. A PEEK M4 Plug is also available.

Use Rheodyne ChromTRAC™ knobs with the RheFlex M4 Fitting for fingertight convenience and to color-code connections.



6000-360
M4 Fitting
M4 threads
for 1/32" OD tubing



6000-361
M4 Plug
M4 threads

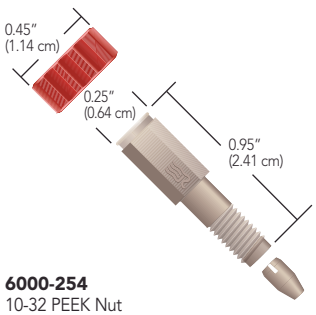
Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
SURE-FIT FITTINGS						
9500-01005-010	Single End Fitting, 1/16" x 0.005" x 10 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	SST	ea.
9500-01007-010	Single End Fitting, 1/16" x 0.007" x 10 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	SST	ea.
9500-01010-010	Single End Fitting, 1/16" x 0.010" x 10 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	SST	ea.
9500-01020-030	Single End Fitting, 1/16" x 0.020" x 30 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	SST	ea.
9502-01007-HP	Single End Fitting, 1/16" x 0.007", U-Shape for Agilent 1100 System	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	SST	ea.
9504-01005-050	Single End Fitting, 1/16" x 0.005" x 50 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	PEEK, Natural	ea.
9504-01007-050	Single End Fitting, 1/16" x 0.007" x 50 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	PEEK, Natural	ea.
9504-01010-050	Single End Fitting, 1/16" x 0.010" x 50 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	PEEK, Natural	ea.
SURE-FIT FITTINGS REPLACEMENT PARTS						
9500-FP	Replacement Ferrule	10-32 Coned	6,000 psi (414 bar)	—	PEEK, Natural	ea.*
RHEFLEX ONE-PIECE FITTINGS						
6000-360	RheFlex Fitting for 1/32" OD Tubing	M4 Coned	5,000 (345 bar)	1/4" Hex	PEEK, Natural	10-pk
6000-361	RheFlex Plug	M4 Coned	5,000 (345 bar)	1/4" Hex	PEEK, Natural	10-pk

** Minimum order quantity of 100.*

Two-Piece RheFlex® Fingertight Fittings

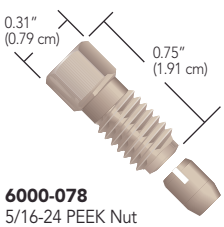
The Rheodyne® RheFlex Precision Two-Piece PEEK Fittings sets provide inert, biocompatible connections for instrumentation. These fittings have a reliable, time-tested design. Each 1/16" fittings set contains a 10-32 threaded nut and a specially-designed PEEK ferrule. Three lengths of the 1/16" nut are available: Standard, Short, and Extra Long. RheFlex Fingertight Fittings are rated for use up to 7,000 psi (483 bar). Also offered in this product line is the 6000-078 fitting, designed to connect 1/8" OD tubing into our manual preparative-scale injection valves. (See pages 128–134 for more information on these valves.)

View the online product bulletin at: www.idex-hs.com.



6000-254
10-32 PEEK Nut
with 6000-251 PEEK Ferrule
(RD ChromTRAC suffix)

6000-255
10-32 PEEK Nut
with 6000-251 PEEK Ferrule



6000-078
5/16-24 PEEK Nut
with 6000-079 PEEK Ferrule

Biocompatible

ChromTRAC™

- Brightly colored knobs to easily track inlets and outlets of valves, columns, and detectors

All ChromTRAC-compatible RheFlex fittings offer the ChromTRAC knob option. Specify the ChromTRAC two letter suffix for the color choice when ordering. Please see the ChromTRAC Suffix Codes table below. For example, to order red ChromTRAC knobs with the RheFlex One-Piece Fitting on this page, specify 6000-282RD. No suffix indicates black knobs.

View the online product bulletin for RheFlex fittings at: www.idex-hs.com.

CHROMTRAC SUFFIX CODES

CODE	COLOR
BL	Blue
GN	Green
GY	Gray
RD	Red
WH	White
YL	Yellow
MC	Multi-color (two each of blue, green, gray, red, and yellow)

Add these letter suffixes to the end of the seven-digit part numbers of the 10-32 and M4 threaded RheFlex Fittings on pages 11, 12, and 13.

RELATED PRODUCTS

- For PEEK tubing sleeves that can be used with these M4 RheFlex fittings, see page 20.
- For reusable fittings that both work in UHPLC applications and can help ensure the tubing is fully inserted into the receiving port, see the VHP-300 fitting shown earlier in this chapter on page 6.

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
RHEFLEX TWO-PIECE FITTINGS (INCLUDES FERRULES)						
6000-078	RheFlex Fitting for 1/8" OD Tubing	5/16-24 Coned	5,000 psi (345 bar)	5/16" Hex	PEEK, Natural	ea.
6000-254	RheFlex Fitting for 1/16" OD Tubing	10-32 Coned	7,000 psi (483 bar)	ChromTRAC knob	PEEK, Natural	10-pk
6000-255	RheFlex Fitting for 1/16" OD Tubing, Short	10-32 Coned	7,000 psi (483 bar)	1/4" Hex	PEEK, Natural	10-pk
REPLACEMENT FERRULES						
6000-079	RheFlex Ferrule for 1/8" OD Tubing	5/16-24 Coned	7,000 psi (483 bar)	ChromTRAC knob	PEEK, Natural	5-pk
6000-251	RheFlex Ferrule for 1/16" OD Tubing	10-32 Coned	7,000 psi (483 bar)	ChromTRAC knob	PEEK, Natural	10-pk

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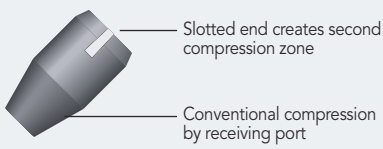
Two-Piece SealTight™ Fingertight Fittings

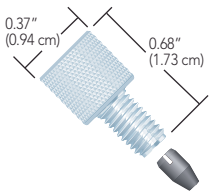
- Several nut lengths and head styles to fit into a variety of applications
- Designed to connect 1/16" OD tubing to 10-32 coned ports
- Hold up to 9,000 psi (620 bar)

The dual compression created by the specially designed nut and ferrule enables the Upchurch Scientific® SealTight Fittings system to outperform standard finger tightened fittings. The forward cone of the SealTight Ferrule provides gripping power and a leak-free seal via conventional compression by the receiving port. The slotted end creates the second compression zone in conjunction with a SealTight Nut. All SealTight Nuts are for use with 1/16" OD tubing and are designed to be used with the F-192 Ferrule. A wide variety of fitting head styles are available for various space constraints. This fittings system is also interchangeable with the Two-Piece RheFlex® Fittings System for 1/16" OD tubing, shown on the previous page.

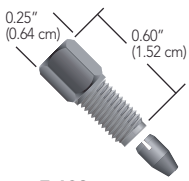


NOTE

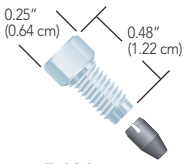
Overtightening these fittings on fluoropolymer (e.g., FEP, PFA, and ETFE) tubing can cause the ID of your tubing to collapse.



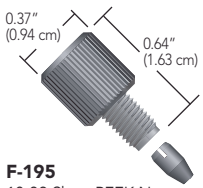
F-190
10-32 Standard Stainless Steel Nut, with F-192 Ferrule



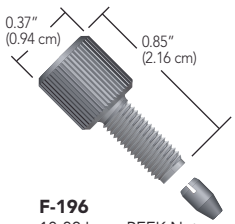
F-193
10-32 Short PEEK Hex Head Nut, with F-192 Ferrule



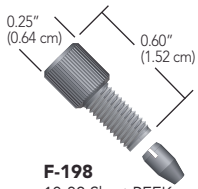
F-194
10-32 Short Stainless Steel Hex Head Nut, with F-192 Ferrule



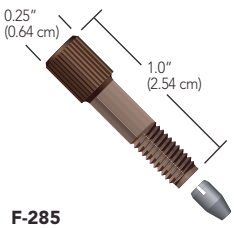
F-195
10-32 Short PEEK Nut, with F-192 Ferrule



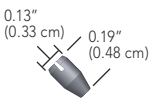
F-196
10-32 Long PEEK Nut, with F-192 Ferrule



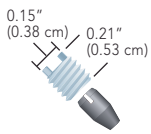
F-198
10-32 Short PEEK Headless Nut, with F-192 Ferrule



F-285
10-32 Long PPS Headless Nut, with F-192 Ferrule



F-192
SealTight Ferrule, for 1/16" OD tubing



F-350
10-32 Stainless Steel FlushNut, with F-192 Ferrule

RELATED PRODUCTS

- Find tightening tools for these fittings on page 33.
- Try the F-350 FlushNut™ for the ultimate streamline design. For more information on these innovative products, please see page 31.

	Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
	SEALTIGHT TWO-PIECE FITTINGS (INCLUDES F-192 FERRULES)						
	F-190x	SealTight Fitting for 1/16" OD Tubing	10-32 Coned	7,000–9,000 psi (483–620 bar)	Standard Knurl	SST	10-pk
★	**F-193x**	SealTight Fitting for 1/16" OD Tubing, Short	10-32 Coned	7,000–9,000 psi (483–620 bar)	1/4" Hex	PEEK Black	10-pk
	F-194x	SealTight Fitting for 1/16" OD Tubing, Short	10-32 Coned	7,000–9,000 psi (483–620 bar)	1/4" Hex	SST	10-pk
	F-195x	SealTight Fitting for 1/16" OD Tubing, Short	10-32 Coned	7,000–9,000 psi (483–620 bar)	Standard Knurl	PEEK Black	10-pk
★	**F-196x**	SealTight Fitting for 1/16" OD Tubing, Long	10-32 Coned	7,000–9,000 psi (483–620 bar)	Standard Knurl	PEEK Black	10-pk
	F-198x	SealTight Fitting for 1/16" OD Tubing, Short	10-32 Coned	3,000–9,000 psi (207–620 bar)	Headless Knurl	PEEK Black	10-pk
	F-284x	SealTight Fitting for 1/16" OD Tubing, Long	10-32 Coned	3,000–9,000 psi (207–620 bar)	Headless Knurl	PEEK Black	10-pk
	F-285x	SealTight Fitting for 1/16" OD Tubing, Long	10-32 Coned	3,000–9,000 psi (207–620 bar)	Headless Knurl	PPS Brown	10-pk
	F-287x	SealTight Fitting for 1/16" OD Tubing, Long	10-32 Coned	7,000–9,000 psi (483–620 bar)	Knurl-1/4" Hex	PEEK Black	10-pk
	F-350x	SealTight Fitting for 1/16" OD Tubing, FlushNut	10-32 Coned	7,000–9,000 psi (483–620 bar)	FlushNut	SST	10-pk
	REPLACEMENT FERRULES						
★	**F-192x**	SealTight Ferrule for 1/16" OD Tubing	10-32 or M6 Coned	7,000–9,000 (483–620 bar)	—	PEEK/Black	10-pk

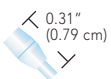
Two-Piece Fingertight Fittings

- Designed to connect tubing to 10-32 coned ports
- Ferrules available for directly connecting 1/16", 1/32", 360 µm, or 190 µm OD tubing

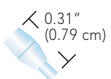
Two-Piece Fingertight Fittings feature a separate ferrule. With a two-piece design, you can replace just the ferrule instead of the entire unit, making these Fingertights more economical than the one-piece version. Use a standard knurled head fitting for traditional fingertight applications, or use a fitting with wings built into the head for extra tightening leverage. A stainless steel hex headed fitting can be used for applications where a wrench may be needed for added tightening torque.

To order the fittings as shown to the right, simply reference the part numbers as indicated. To exchange the ferrule typically packaged with our fittings with one of our specialty ferrules shown below, simply replace the letter "x" in the part number with a "-01", and then specify the ferrule needed on a separate line. For example, to order the F-140 fitting with the M-215 ferrule, specify F-140-01 and M-215 separately. *Please note: all "-01" fittings are packaged individually, not in 10-packs.*

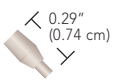
The M-215 Conductive Perfluoroelastomer Ferrule is designed for mass spectrometer electrospray applications. Unlike most graphite ferrules, the elastomeric properties of this ferrule let you use it through many tightening/retightening cycles. It also eliminates any possibility of graphite contamination in your system. Like graphite ferrules, you can apply voltage through a metallic port block or metallic nut, allowing voltage to translate to the flow path through the ferrule.



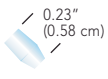
F-148
PCTFE Ferrule
for 190 µm OD tubing



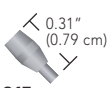
F-151
PCTFE Ferrule
for 360 µm OD tubing



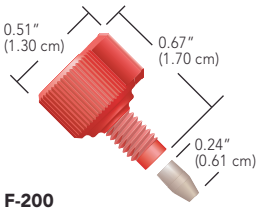
F-113
PEEK Ferrule
for 1/32" OD tubing



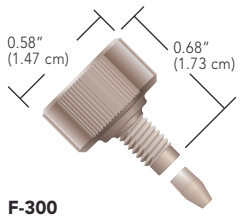
F-142N
ETFE Ferrule
for 1/16" OD tubing



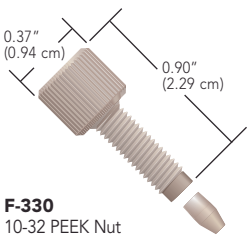
M-215
Conductive Perfluoroelastometer Ferrule
for 360 µm OD tubing



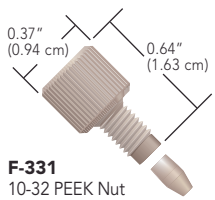
F-200
10-32 Delrin® Winged Nut
with F-142 PEEK Ferrule



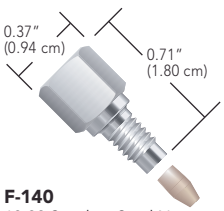
F-300
10-32 PEEK Double-Winged Nut
with F-142 PEEK Ferrule



F-330
10-32 PEEK Nut
with F-142 PEEK Ferrule



F-331
10-32 PEEK Nut
with F-142 PEEK Ferrule



F-140
10-32 Stainless Steel Nut
with F-142 PEEK Ferrule

APPLICATION NOTE

Some Upchurch Scientific® Fingertight Nuts feature wings in addition to a knurled head, which provide more leverage when tightening the fitting into a receiving port. Choose our single or double-winged design.

Please Note: customers can use the standard knurl head fittings with our tightening tools found on page 33.

	Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
	TWO-PIECE FINGERTIGHT FITTINGS (INCLUDES F-142 FERRULES)						
	F-140x	Fitting for 1/16" OD Tubing	10-32 Coned	6,000 psi (414 bar)	5/16" Hex	SST/PEEK Natural	10-pk
	F-200x	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	6,000 psi (414 bar)	Single Wing	Delrin Red/PEEK Natural	10-pk
★	**F-300x**	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	6,000 psi (414 bar)	Double Wing	PEEK Natural	10-pk
★	**F-330x**	Fingertight Fitting for 1/16" OD Tubing, Long	10-32 Coned	6,000 psi (414 bar)	Standard Knurl	PEEK Natural	10-pk
	F-331x	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	6,000 psi (414 bar)	Standard Knurl	PEEK Natural	10-pk
	REPLACEMENT FERRULES						
★	**F-113**	Ferrule for 1/32" OD Tubing	10-32 Coned	6,000 psi (414 bar)	—	PEEK Natural	ea.
	F-142x	Ferrule for 1/16" OD Tubing	10-32 Coned	6,000 psi (414 bar)	—	PEEK Natural	10-pk
	F-142Nx	Ferrule for 1/16" OD Tubing	10-32 Coned	4,000 psi (276 bar)	—	ETFE Natural	10-pk
	F-148	Ferrule for 190 µm OD tubing	10-32 Coned	6,000 psi (414 bar)	—	PCTFE Natural	ea.
	F-151	Ferrule for 360 µm OD Tubing	10-32 Coned	6,000 psi (414 bar)	—	PCTFE Natural	ea.
★	**M-215**	Conductive Ferrule for 360 µm OD tubing	10-32 Coned	1,500 psi (103 bar)	—	Conductive Perfluoroelastomer	ea.

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LiteTouch® Fittings

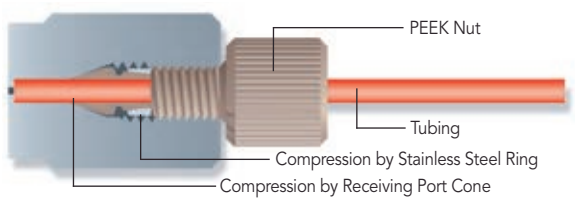
- Helps prevent twisting of polymer tubing
- High pressure with fingertight convenience
- Options available for 1/32", 1/16", or 1/8" OD tubing

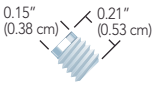
The LiteTouch Fittings System grips tubing at two compression points (see diagram), holding to high pressures with Fingertight convenience. It also prevents polymer tubing from twisting, a potential problem when using standard Fingertight fittings. LiteTouch Fittings are available for use with 1/32", 1/16", or 1/8" OD tubing sizes, and for 10-32 or 1/4-28 coned ports.

For those space-limited applications where nut heads interfere with each other, try the FlushNut™ Fittings. (FlushNut Fittings require a tightening tool. Please see page 31 for more information about these products.)

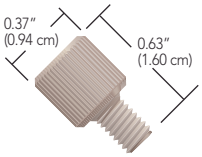
To avoid collapsing the ID of your tubing, the LiteTouch system can be used on hard tubing only, such as stainless steel and PEEK polymer tubing. The LiteTouch Ferrule System is not recommended for repeated use in plastic ports.

LiteTouch Fittings Systems

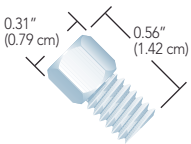




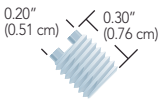
F-354
10-32 Stainless Steel FlushNut
for 1/32" and 1/16" OD tubing



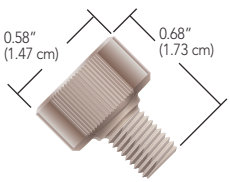
LT-110
10-32 PEEK Nut
for 1/32" and 1/16" OD tubing



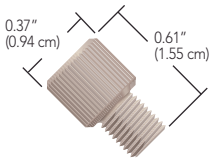
C-235
1/4-28 Stainless Steel Nut
for 1/8" OD tubing



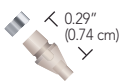
F-364
1/4-28 Stainless Steel FlushNut
for 1/8" OD tubing



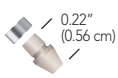
LT-210
1/4-28 PEEK Double-Winged Nut
for 1/8" OD tubing



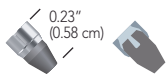
LT-215
1/4-28 PEEK Nut
for 1/8" OD tubing



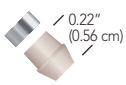
LT-132
PEEK Ferrule with Stainless Steel Lock Ring
for 1/32" OD tubing



LT-100
PEEK Ferrule with Stainless Steel Lock Ring
for 1/16" OD tubing



LT-135
One-Piece LiteTouch SealTight™ Ferrule with Stainless Steel Lock Ring
for 1/16" OD tubing



LT-200
PEEK Ferrule with Stainless Steel Lock Ring
for 1/8" OD tubing

RELATED PRODUCTS

- The stainless steel nuts on page 10 can also be used with the LiteTouch ferrules on this page.

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
LITETOUCH NUTS						
C-235x	LiteTouch Nut for 1/8" OD Tubing	1/4-28 Coned	4,500 psi (310 bar)	5/16" Hex	SST	10-pk
F-354x	LiteTouch Nut for 1/16" or 1/32" OD Tubing, FlushNut	10-32 Coned	5,000 psi (345 bar)	FlushNut	SST	10-pk
F-364x	LiteTouch Nut for 1/8" OD Tubing, FlushNut	1/4-28 Coned	4,500 psi (310 bar)	FlushNut	SST	10-pk
LT-110x	LiteTouch Nut for 1/16" or 1/32" OD Tubing	10-32 Coned	5,000 psi (345 bar)	Standard Knurl	PEEK Natural	10-pk
LT-210x	LiteTouch Nut for 1/8" OD Tubing	1/4-28 Coned	4,500 psi (310 bar)	Double Wing	PEEK Natural	10-pk
LT-215x	LiteTouch Nut for 1/8" OD Tubing, Short	1/4-28 Coned	4,500 psi (310 bar)	Standard Knurl	PEEK Natural	10-pk
LITETOUCH FERRULES						
★ **LT-100x**	LiteTouch Ferrule for 1/16" OD Tubing	10-32 Coned	5,000 psi (345 bar)	—	PEEK Natural/SST	10-pk
★ **LT-132x**	LiteTouch Ferrule for 1/32" OD Tubing	10-32 Coned	5,000 psi (345 bar)	—	PEEK Natural/SST	10-pk
★ **LT-135x**	LiteTouch Ferrule for 1/16" OD Tubing	10-32 Coned	10,000 psi (690 bar)*	—	PEEK Black/SST	10-pk
LT-200x	LiteTouch Ferrule for 1/8" OD Tubing	1/4-28 Coned	4,500 psi (310 bar)	—	PEEK Natural/SST	10-pk

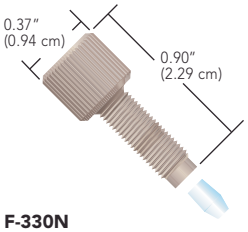
** When used with a stainless steel 10-32 nut from page 10.*

NanoTight™ Fittings & Sleeves

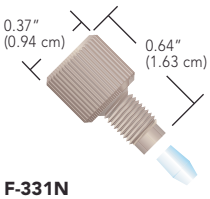
- For connecting 1/16" OD or capillary tubing using tubing sleeves to standard 10-32 coned ports
- Multiple nut styles available
- Nuts manufactured from PEEK polymer, ferrules manufactured from ETFE

Upchurch Scientific® NanoTight Fittings and Sleeves are designed to connect 70 µm–1 mm OD capillary tubing to any standard 10-32 coned port normally intended for 1/16" OD tubing using the NanoTight Tubing Sleeves on page 19. The fittings can also be used to connect any 1/16" OD tubing. The ETFE ferrule material is softer than PEEK, making it a good candidate for connecting thin walled semi-rigid tubing such as FEP and ETFE into 10-32 ports with minimal constricting to the inner diameter.

Select from our expansive line of PEEK NanoTight Fittings, featuring several head style and length options. Each 10-pack of nuts includes ten ETFE F-142N ferrules.



F-330N
Long Standard Head Nut
with F-142N Ferrule



F-331N
Short Standard Head Nut
with F-142N Ferrule

F-333N
Short Headless Nut
with F-142N Ferrule

RELATED PRODUCTS

- Find tightening tools for these head styles on page 33.
- NanoTight Tubing sleeves start on page 19.

	Part No.	Description	Port	Pressure Rating	Head Style	Material (Nut/Ferrule)	Qty.
	NANOTIGHT FITTINGS (INCLUDES F-142N FERRULES)						
★	**F-330Nx**	NanoTight Fitting for 1/16" OD Tubing and NanoTight Sleeves	10-32 Coned	4,000 psi (276 bar)	Standard Knurl	PEEK Natural/ETFE Natural	10-pk
	F-331Nx	NanoTight Fitting for 1/16" OD Tubing and NanoTight Sleeves, Short	10-32 Coned	4,000 psi (276 bar)	Standard Knurl	PEEK Natural/ETFE Natural	10-pk
★	**F-333Nx**	NanoTight Fitting for 1/16" OD Tubing and NanoTight Sleeves, Short	10-32 Coned	4,000 psi (276 bar)	Headless Knurl	PEEK Natural/ETFE Natural	10-pk
	REPLACEMENT FERRULES						
	F-142Nx	NanoTight Ferrule for 1/16" OD Tubing and NanoTight Sleeves	10-32 Coned	4,000 psi (276 bar)	—	ETFE Natural	10-pk

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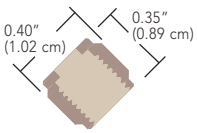
MicroTight® Fittings

- Comprehensive Fitting System for Connecting Capillary Tubing
- Made from PEEK Polymer

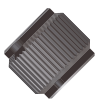
Upchurch Scientific® MicroTight One-Piece Fittings are designed for use with the NanoPort™ and MicroTight Unions, Adapters and Inline MicroFilters. Specifically made for 360 µm OD tubing, 1/32" OD tubing, or our MicroTight Tubing Sleeves (see page19), these fittings make superior fingertight connections with capillary tubing. MicroTight Fittings withstand temperatures up to 125 °C.

The MicroTight family also includes a female nut matched with one of five dedicated ferrules for connecting specific tubing ODs.

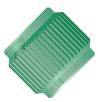
Use the P-277 Extender Tool to tighten standard micro knurl 6-32 fittings in hard-to-reach places. Tighten micro headless 6-32 fittings with our N-290 Tool. See page 33 for more information.



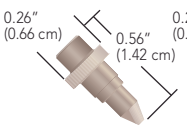
P-416
Female Nut
5/16-24
internal threads



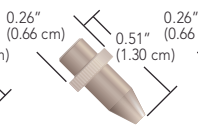
P-416BLK
Female Nut
5/16-24
internal threads



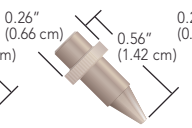
P-416G
Female Nut
5/16-24
internal threads



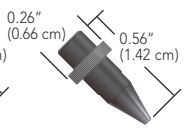
F-112
MicroFerrule
for 1/32" OD tubing



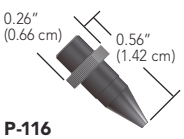
F-132
MicroFerrule
for 1/16" OD tubing



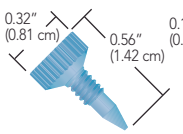
F-152
MicroFerrule
for 360 µm OD tubing



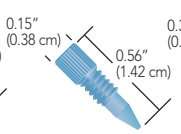
F-172
MicroFerrule
for 0.025" OD tubing



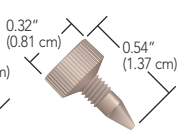
P-116
MicroFerrule Plug



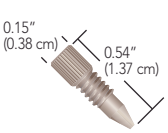
F-124S
Standard Head Fitting
for use with
360 µm OD tubing



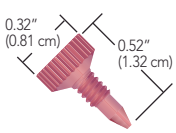
F-124H
Headless Fitting
for use with
360 µm OD tubing



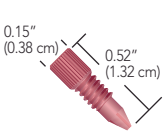
F-125
Standard Head Fitting
for use with
MicroTight Sleeves



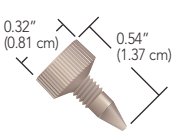
F-125H
Headless Fitting
for use with
MicroTight Sleeves



F-126S
Standard Head Fitting
for use with
1/32" OD tubing



F-126H
Headless Fitting
for use with
1/32" OD tubing



P-555
Standard Head Plug

RELATED PRODUCTS

- Connectors for Capillary Tubing can be found on pages 37–45.
- Very High Pressure fittings for capillary tubing can be found on page 9.
- Capillary tubing is featured on pages 67.

NOTE

MicroTight fittings and MicroFerrules

While the MicroTight Female Nuts may be used with any of the separate MicroFerrules, the MicroFerrules themselves are port-specific and are thus not interchangeable. Additionally, the one-piece MicroTight fittings are also port-specific and should not be exchanged.

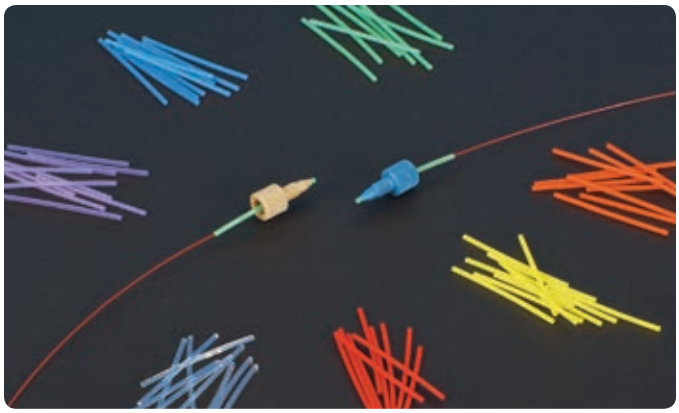
	Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
	MICROTIGHT FITTINGS						
	F-124Hx	MicroTight Fitting for 360 µm OD Tubing	6-32 Coned	5,000 psi (345 bar)	Micro Headless Knurl	PEEK Blue	10-pk
	F-124Sx	MicroTight Fitting for 360 µm OD Tubing	6-32 Coned	5,000 psi (345 bar)	Standard Micro Knurl	PEEK Blue	10-pk
	F-125Hx	MicroTight Fitting for MicroTight Tubing Sleeves	6-32 Coned	4,000 psi (276 bar)	Micro Headless Knurl	PEEK Natural	10-pk
	F-125x	MicroTight Fitting for MicroTight Tubing Sleeves	6-32 Coned	4,000 psi (276 bar)	Standard Micro Knurl	PEEK Natural	10-pk
★	**F-126Hx**	MicroTight Fitting for 1/32" OD Tubing	6-32 Coned	5,000 psi (345 bar)	Micro Headless Knurl	PEEK Red	10-pk
	F-126Sx	MicroTight Fitting for 1/32" OD Tubing	6-32 Coned	5,000 psi (345 bar)	Standard Micro Knurl	PEEK Red	10-pk
	P-555	MicroTight Plug	6-32 Coned	5,000 psi (345 bar)	Standard Micro Knurl	PEEK Natural	ea.
	MICROFERRULES AND FEMALE NUTS						
	F-112	MicroFerrule for 1/32" OD Tubing	5/16-24 Coned	5,000 psi (345 bar)	—	PEEK Natural	ea.
	F-132	MicroFerrule for 1/16" OD Tubing	5/16-24 Coned	5,000 psi (345 bar)	—	PEEK Natural	ea.
★	**F-152**	MicroFerrule for 360 µm OD Tubing	5/16-24 Coned	5,000 psi (345 bar)	—	PEEK Natural	ea.
	F-152BLK	MicroFerrule for 360 µm OD Tubing	5/16-24 Coned	5,000 psi (345 bar)	—	PEEK Black	ea.
★	**F-172**	MicroFerrule for MicroTight Tubing Sleeves	5/16-24 Coned	4,000 psi (276 bar)	—	PEEK Black	ea.
	P-116	MicroFerrule Plug	5/16-24 Coned	5,000 psi (345 bar)	—	PEEK Black	ea.
★	**P-416**	MicroTight Female Nut	5/16-24 Coned	4,000–5,000 psi (276–345 bar)	Female Knurl	PEEK Natural	ea.
	P-416BLK	MicroTight Female Nut	5/16-24 Coned	4,000–5,000 psi (276–345 bar)	Female Knurl	PEEK Black	ea.
	P-416G	MicroTight Female Nut	5/16-24 Coned	4,000–5,000 psi (276–345 bar)	Female Knurl	PEEK Green	ea.

MicroTight® Tubing Sleeves

- Manufactured from PEEK polymer
- Pressure rated to 4,000 psi (276 bar)
- Color-coded for easy inner diameter identification

Upchurch Scientific® MicroTight Tubing Sleeves feature an outer diameter of 0.025" and offer a wide assortment of inner diameters to help facilitate capillary tubing connections with our MicroTight accessories. Because the sleeves are manufactured from PEEK polymer, they carry an upper temperature threshold of 125 °C.

To use these sleeves properly, choose a sleeve with an inner diameter 0.001"–0.002" (25–50 µm) larger than the outer diameter of your capillary tubing. Then, slip the sleeve over your flow path tubing, such that your tubing extends all the way through the sleeve, but not beyond the end of the sleeve. Choose the correct fitting that corresponds with your receiving port, slide it over the sleeved flow path tubing and connect as normal.



NanoTight™ Tubing Sleeves

- Manufactured from FEP fluoropolymer
- Pressure rated to 4,000 psi (276 bar)
- Outer diameter of 1/16" — the most popular size used on most instrumentation

Upchurch Scientific NanoTight Tubing Sleeves are manufactured using FEP fluoropolymer and precisely cut to a 1.6" length. A wide assortment of sleeves is available, ensuring the availability of a NanoTight sleeve for most applications. Many of the sleeves feature a light color tint that can help more easily identify the inner diameter for future orders. Because FEP is the base polymer for these sleeves, there is a maximum recommended continuous operating temperature of 50 °C.

Upchurch Scientific NanoTight sleeves were designed primarily for use with the NanoTight fittings, found on page 17 and also work well with the Super Flangeless™ fittings for 1/16" OD tubing on pages 21. For tubing sleeves that can be used effectively with stainless steel fittings and at higher temperatures, consider using the Upchurch Scientific PEEK Tubing Sleeves, found on the next page.

	Part No.	ID	For Tubing OD Size	Color	Qty.
	MICROTIGHT PEEK TUBING SLEEVES AND KITS, 0.025" OD				
	F-180x	125 µm (0.005")	70–110 µm	Red	10-pk
	F-181x	180 µm (0.007")	125–165 µm	Yellow	10-pk
	F-182x	230 µm (0.009")	175–215 µm	Natural	10-pk
	F-183x	280 µm (0.011")	225–265 µm	Blue	10-pk
	F-184x	330 µm (0.013")	275–315 µm	Orange	10-pk
★	**F-185x**	395 µm (0.0155")	340–380 µm	Green	10-pk
	F-186x	455 µm (0.018")	400–440 µm	Black	10-pk
	F-187x	535 µm (0.021")	480–520 µm	Natural	10-pk
	F-188x	152 µm (0.006")	95–135 µm	Purple	10-pk
	1328	MicroTight Tubing Sleeve Kit contains (6) each of the sleeve sizes listed above			
	1356	MicroTight Connector Kit Kit contains: a 10-pack of each MicroTight Tubing Sleeve (F-180–F-187); (2) P-770 MicroTight Adapters; and (2) MicroTight P-720 Unions			
	NANOTIGHT FEP TUBING SLEEVES, 1/16" OD				
	F-237x	125 µm (0.005")	70–110 µm	Red	10-pk
	F-238x	180 µm (0.007")	125–165 µm	Yellow	10-pk
	F-239x	215 µm (0.0085")	160–200 µm	Natural	10-pk
	F-240x	280 µm (0.011")	225–265 µm	Blue	10-pk
	F-241x	330 µm (0.013")	275–315 µm	Orange	10-pk
★	**F-242x**	395 µm (0.0155")	340–380 µm	Green	10-pk
	F-243x	455 µm (0.018")	400–440 µm	Black	10-pk
	F-244x	535 µm (0.021")	480–520 µm	Natural	10-pk
	F-245x	610 µm (0.024")	555–595 µm	Red	10-pk
	F-246x	685 µm (0.027")	630–670 µm	Yellow	10-pk
	F-247x	840 µm (0.033")	785–825 µm	Green	10-pk
	F-252x	1.07 mm (0.042")	1 mm	Purple	10-pk

APPLICATION NOTE

Why use Sleeves?

Because most capillary tubing connections are made into coned receiving ports, where the port is not designed to be used with capillary tubing directly, special care must be used to ensure a good connection. While custom ferrules can help make these connections, they only offer a fixed-length nose — and because most tubing pockets will vary slightly in length, this can lead to leaking or dead volume.

To help save overall expense while maintaining a concentric connection with minimal dead volume, IDEX Health & Science recommends the use of sleeves. Because sleeves are not permanently attached to a ferrule, they can easily adapt to varying tubing pocket depths. Additionally, because they are manufactured using Upchurch Scientific extruded polymer tubing, you are assured of the concentricity of the resultant connection.

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1/16" OD PEEK Tubing Sleeves

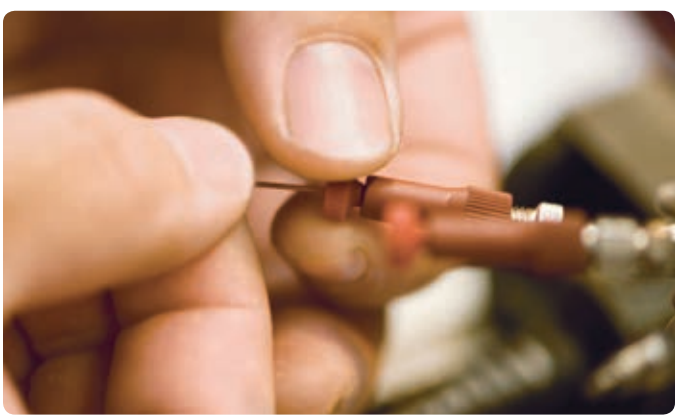
- For connecting capillary tubing to standard 10-32 ports
- Require the use of wrench tightened stainless steel nuts
- Pressure rated to 6,000 psi (414 bar)

Like the NanoTight™ FEP Sleeves on the previous page, these PEEK Tubing Sleeves are designed to be used with 1/16" OD, 10-32 threaded fittings to adapt capillary tubing to standard coned ports. Made of PEEK polymer, these 1.3" long sleeves can be used up to 125 °C.

These sleeves require a wrench tightened nut to achieve proper sealing. We recommend the F-140 Two-Piece Fingertight Fitting (page 15), which includes a PEEK ferrule or the hex-head SealTight™ fittings on page 14. Many researchers also use a stainless steel nut and ferrule with these sleeves, such as our U-400 and U-401 (page 10).

1/32" OD PEEK Tubing Sleeves

These 1.6" long Upchurch Scientific® 1/32" OD PEEK Tubing Sleeves can be used with any fitting designed for 1/32" OD tubing when smaller tubing must be connected. Select the appropriate sleeve from the product listing for your capillary tubing OD size. The 1/32" OD PEEK Tubing Sleeves have a maximum recommended temperature of 125 °C and have a pressure rating of 5,000 psi (345 bar).



1/32" OD FEP Tubing Sleeves

These 1.6" long sleeves facilitate connecting capillary tubing into ports designed for 1/32" OD tubing. Please refer to the product listing below to select the appropriate sleeve for your capillary OD size. These sleeves can be used at up to 50 °C and have a pressure rating of 1,750 psi (121 bar).

Clockwise, starting at top:

- 1/16" OD PEEK Tubing Sleeves, shown with F-140 Fitting
- 1/32" OD PEEK Tubing Sleeves, shown with F-126H Fitting
- 1/32" OD FEP Tubing Sleeves, shown with F-126S Fitting
- Fittings and tubing only shown to highlight how sleeves are designed to be used; they are not included with the sleeves

RELATED PRODUCTS

Use 1/32" OD PEEK or FEP Sleeves to connect capillary tubing with the following:

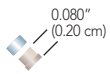
- The F-113 Ferrule and Two-Piece Fingertight Fittings for 10-32 ports (page 15).
- The F-112 and P-416BLK MicroTight® Fittings (page 18) — 1/32" OD PEEK Tubing Sleeves only.
- The 1/32" OD MicroTight Fittings on page 18.
- The Rheodyne® RheFlex M4 Fitting (page 12) for MX Module applications; the M-645 Valco®-Compatible Fitting (page 11) for Valco Nanovolume® valve applications.

	Part No.	ID	For Tubing OD Size	Color	Qty.
	PEEK TUBING SLEEVES FOR 1/16" OD FITTINGS				
	F-225	125 µm (0.005")	70–110 µm	Red	ea.
	F-226	180 µm (0.007")	125–165 µm	Yellow	ea.
	F-227	230 µm (0.009")	175–215 µm	Yellow	ea.
	F-228	250 µm (0.011")	225–265 µm	Blue	ea.
	F-229	330 µm (0.013")	275–315 µm	Natural	ea.
★	**F-230**	405 µm (0.016")	350–390 µm	Orange	ea.
	F-231	560 µm (0.022")	505–545 µm	Natural	ea.
	F-232	785 µm (0.031")	730–770 µm	Natural	ea.
	F-233	865 µm (0.034")	785–825 µm	Blue	ea.
	F-234	685 µm (0.027")	630–670 µm	Yellow	ea.
	PEEK TUBING SLEEVES FOR 1/32" OD FITTINGS				
	F-381x	180 µm (0.007")	125–165 µm	Yellow	10-pk
	F-382x	205 µm (0.008")	150–190 µm	Natural	10-pk
	F-384x	255 µm (0.010")	200–240 µm	Blue	10-pk
★	**F-385x**	380 µm (0.015")	325–365 µm	Natural	10-pk
	F-386x	510 µm (0.020")	455–495 µm	Orange	10-pk
	F-387x	250 µm (0.011")	225–265 µm	Red	10-pk
	F-388x	330 µm (0.013")	275–315 µm	Black	10-pk
	FEP TUBING SLEEVES FOR 1/32" OD FITTINGS				
	F-374x	280 µm (0.011")	225–265 µm	Blue	10-pk
	F-375x	330 µm (0.013")	275–315 µm	Orange	10-pk
★	**F-376x**	395 µm (0.0155")	340–380 µm	Green	10-pk

Super Flangeless™ Fittings

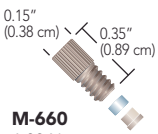
- Highest pressure holding flat-bottom fitting system we offer
- Eliminates loosening of fittings due to tubing twist
- Excellent for Tubing Assemblies
- Holds tight even through vibration

6-40 and 6-32 Options (for 1/16" OD Tubing)



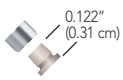
M-650
Super Flangeless Ferrule
for 1/16" OD tubing

M-644-03
6-40 Nut
shown with M-650 Ferrule
(not included)

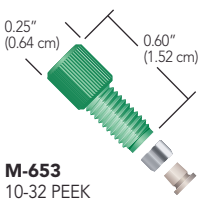


M-660
6-32 Nut
shown with M-650 Ferrule
(not included)

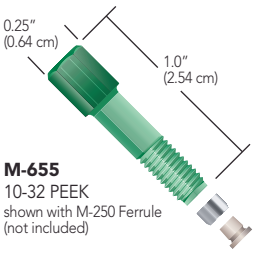
10-32 Options (for 1/16" OD Tubing)



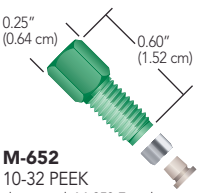
M-250
Super Flangeless Ferrule
for 1/16" OD tubing



M-653
10-32 PEEK
shown with M-250 Ferrule
(not included)

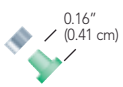


M-655
10-32 PEEK
shown with M-250 Ferrule
(not included)

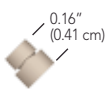


M-652
10-32 PEEK
shown with M-250 Ferrule
(not included)

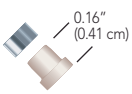
Ferrules for M6x1, 1/4-28, 5/16-24



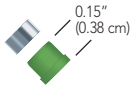
P-248 for 1/32" OD tubing
P-250 for 1/16" OD tubing
P-259 for 1/16" OD tubing



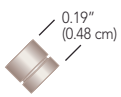
P-260
for 1/16" OD tubing



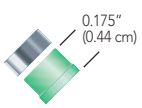
P-350, P-359
for 1/8" OD tubing



P-355 for 1.8 mm OD tubing
P-366 for 2.5 mm OD tubing
P-352 for 1/8" OD tubing

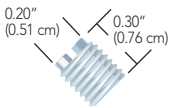


P-360
for 1/8" OD tubing

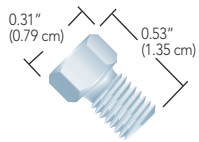


P-140
for 3/16" OD tubing

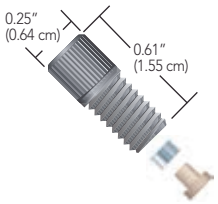
M6x1, 1/4-28, 5/16-24 Options for 1/32"–3/16" OD Tubing



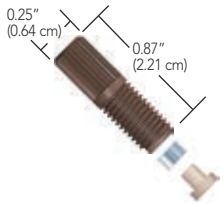
F-356 (1/4-28, ≤ 1/16" OD Tubing)
F-364 (1/4-28, > 1/16" OD Tubing)



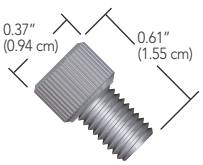
LT-105 (1/4-28, ≤ 1/16" OD Tubing)
C-235 (1/4-28, > 1/16" OD Tubing)



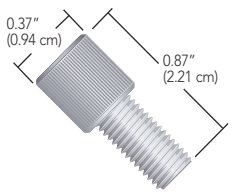
P-213 (M6X1, ≤ 1/16" OD Tubing)
P-337 (M6X1, > 1/16" OD Tubing)
P-232 (1/4-28, ≤ 1/16" OD Tubing)
P-336 (1/4-28, > 1/16" OD Tubing)



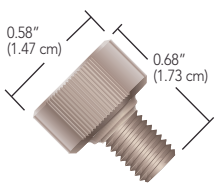
P-287 (1/4-28, ≤ 1/16" OD Tubing)
P-387 (1/4-28, > 1/16" OD Tubing)



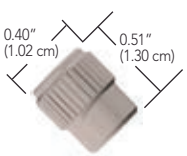
P-219 (M6X1, ≤ 1/16" OD Tubing)
P-319 (M6X1, > 1/16" OD Tubing)
LT-115 (1/4-28, ≤ 1/16" OD Tubing)
LT-215 (1/4-28, > 1/16" OD Tubing)



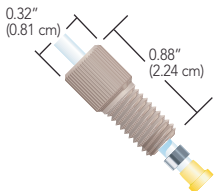
P-217 (M6X1, ≤ 1/16" OD Tubing)
P-317 (M6X1, > 1/16" OD Tubing)
P-246, P-252, P-255, P-281
(1/4-28, ≤ 1/16" OD Tubing)
P-331, P-332, P-381
(1/4-28, > 1/16" OD Tubing)



LT-210 (1/4-28, > 1/16" OD Tubing)



P-420 (1/4-28, ≤ 1/16" OD Tubing)
F-156 (1/4-28, > 1/16" OD Tubing)



P-141 (5/16-24, ≤ 1/16" OD Tubing)
P-131 (5/16-24, >1/16"– ≤ 1/8" OD Tubing)
P-137 (5/16-24, 3/16" OD Tubing)

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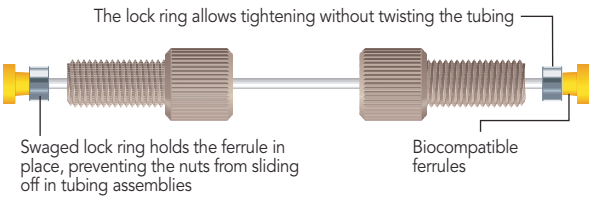
Super Flangeless™ Tubing OD / Thread Comparison

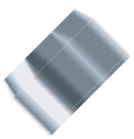
	1/32"	1/16"	1.8 mm	2.5 mm	1/8"	3/16"
6-40		•				
6-32		•				
10-32		•				
M6x1	•	•	•	•	•	
1/4-28	•	•	•	•	•	
5/16-24						•

SUPER FLANGELESS FITTINGS SYSTEM



TIP ASSEMBLY HINT

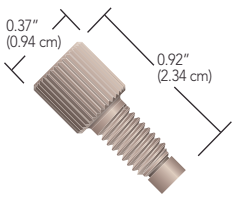
Make sure the locking ring is oriented correctly! The flattened end of the ring should face towards the nut with the narrow end of the ferrule towards the ring.



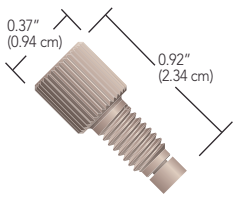
LT-100-02
Enlarged to show detail

New One-Piece Super Flangeless Fittings

- All-PEEK construction
- For 1/16" OD and 1/8" OD tubing
- M6x1 and 1/4-28 options
- Finger tight (2–3 in-lbs / 0.23–0.34 N·m)
- Extremely easy to use
- Reusable one piece design that requires no swaging



P-329 M6X1, for 1/8" OD Tubing
P-249 1/4-28, for 1/16" OD Tubing
P-349 1/4-28, for 1/8" OD Tubing



P-229 M6X1, for 1/16" OD Tubing

	Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
	SUPER FLANGELESS™ FERRULES FOR 1/32", 1/16", 1/8", 3/16", 1.8MM, 2.0MM, 2.5MM						
	M-250x	Super Flangeless Ferrule for 1/16" OD Tubing	10-32 Flat-Bottom	1,000–5,000 psi (69–345 bar)	—	PEEK Natural/SST	10-pk
★	**M-650x**	Super Flangeless Ferrule for 1/16" OD Tubing	6-32 or 6-40 Flat Bottom	750–3,750 psi (52–259 bar)	—	PEEK Natural/SST	10-pk
	P-248x	Super Flangeless Ferrule for 1/32" OD Tubing	10-32 Flat-Bottom	2,500 psi (172 bar)	—	ETFE Green/SST	10-pk
★	**P-250x**	Super Flangeless Ferrule for 1/16" OD Tubing	1/4-28 or M6 Flat Bottom	2,500 psi (172 bar)	—	PEEK Natural/SST	10-pk
★	**P-259x**	Super Flangeless Ferrule for 1/16" OD Tubing	1/4-28 or M6 Flat Bottom	1,350 psi (93 bar)	—	ETFE Yellow/SST	10-pk
	P-260x	Super Flangeless Ferrule for 1/16" OD Tubing	1/4-28 or M6 Flat Bottom	1,850 psi (128 bar)	—	PEEK Natural/SST	10-pk
★	**P-350x**	Super Flangeless Ferrule for 1/8" OD Tubing	1/4-28 Flat Bottom	2,500 psi (172 bar)	—	PEEK Natural/SST	10-pk
	P-352x	Super Flangeless Ferrule for 1/16" OD Tubing	1/4-28 or M6 Flat Bottom	2,500 psi (172 bar)	—	PEEK Black/SST	10-pk
	P-355x	Super Flangeless Ferrule for 1.8 mm OD Tubing	1/4-28 or M6 Flat Bottom	2,500 psi (172 bar)	—	PCTFE Green/SST	10-pk
	P-357-2x	Super Flangeless Ferrule for 2.0 mm OD Tubing	M6 Flat Bottom	5,000 psi (345 bar)	—	PEEK Natural/SST	10-pk
★	**P-359x**	Super Flangeless Ferrule for 1/8" OD Tubing	1/4-28 Flat Bottom	1,000 psi (69 bar)	—	ETFE Yellow/SST	10-pk
	P-360x	Super Flangeless Ferrule for 1/8" OD Tubing	1/4-28 Flat Bottom	1,500 psi (102 bar)	—	PEEK Natural/SST	10-pk
NEW!	**P-366x**	Super Flangeless Ferrule for 2.5" OD Tubing	1/4-28 Flat Bottom	1,000 psi (69 bar)	—	PEEK Natural/SST	10-pk
	P-140x	Super Flangeless Ferrule for 3/16" OD Tubing	5/16-24 Flat Bottom	500 psi (34 bar)	—	ETFE Green/SST	10-pk
	6-40 AND 6-32 FITTINGS FOR 1/16" OD TUBING						
	M-660x	Super Flangeless Nut for 1/16" OD Tubing	6-32 Flat Bottom	750–3,750 psi (52–259 bar)	Micro Headless	PEEK Natural	10-pk
★	**M-644-03x**	Super Flangeless Nut for 1/16" OD Tubing	6-40 Flat Bottom	750–3,750 psi (52–259 bar)	Micro Headless	PEEK Green	10-pk
	10-32 FITTINGS FOR 1/16" OD TUBING						
	M-652x	Super Flangeless Nut for 1/16" OD Tubing	10-32 Flat Bottom	1,000–5,000 psi (69–345 bar)	1/4" Hex	PEEK Green	10-pk
	M-653x	Super Flangeless Nut for 1/16" OD Tubing	10-32 Flat Bottom	1,000–5,000 psi (69–345 bar)	Headless Knurl	PEEK Green	10-pk
	M-655x	Super Flangeless Nut for 1/16" OD Tubing, Long	10-32 Flat Bottom	1,000–5,000 psi (69–345 bar)	1/4" Hex	PEEK Green	10-pk
	M6X1 FITTINGS FOR 1/16" AND 1/32" OD TUBING						
	P-213	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short	M6 Flat Bottom	*	Headless Knurl	PEEK Black	ea.
	P-217	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	M6 Flat Bottom	*	Standard Knurl	PPS Black	ea.
	P-219	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short	M6 Flat Bottom	*	Standard Knurl	PEEK Black	ea.
	M6X1 FITTINGS FOR 1.8 MM, 20. MM, 2.5 MM, 1/8" OD TUBING						
	P-317	Super Flangeless For >1/16"–≤ 1/8" OD Tubing	M6 Flat Bottom	*	Standard Knurl	PPS Black	ea
	P-319	Super Flangeless Nut for 1/8" OD Tubing, Short	M6 Flat Bottom	*	Standard Knurl	PEEK Black	ea.
	P-337x	Super Flangeless For >1/16"–≤ 1/8" OD Tubing, Short	M6 Flat Bottom	*	Headless Knurl	PEEK Black	10-pk
	P-357x	Super Flangeless Fitting for 2.0 mm OD Tubing	M6 Flat Bottom	*	Standard Knurl	PEEK Black, Natural/SST	10-pk
	1/4-28 FITTINGS FOR 1/16" AND 1/32" OD TUBING						
	F-356x	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, FlushNut	1/4-28 Flat Bottom	*	FlushNut	SST	10-pk
	LT-105x	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short	1/4-28 Flat Bottom	*	1/4" Hex	SST	10-pk
★	**LT-115x**	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short	1/4-28 Flat Bottom	*	Standard Knurl	PEEK Natural	10-pk
★	**P-232**	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short	1/4-28 Flat Bottom	*	Headless Knurl	PEEK Natural	ea.
	P-246x	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PFA Natural	10-pk
	P-252x	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	Delrin® Gray	10-pk
★	**P-255x**	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PEEK Natural	10-pk
	P-281	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PPS Natural	ea.
	P-287	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Headless Knurl	PPS Natural	ea.
	P-420	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Female	1/4-28 Flat Bottom	*	Female Knurl	PEEK Natural	ea.
	1/4-28 FITTINGS FOR 1.8MM, 2.5 MM, 1/8" OD TUBING						
	C-235x	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	1/4" Hex	SST	10-pk
	F-156	Super Flangeless Nut for 1/8" OD Tubing, Female	1/4-28 Flat Bottom	*	Female Knurl	PEEK Black	ea.
	F-364x	Super Flangeless Nut for 1/8" OD Tubing, FlushNut™	1/4-28 Flat Bottom	*	FlushNut	SST	10-pk
	LT-210x	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	Double Wings	PEEK Natural	10-pk
	LT-215x	Super Flangeless Nut for 1/8" OD Tubing, Short	1/4-28 Flat Bottom	*	Standard Knurl	PEEK Natural	10-pk
★	**P-331**	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PEEK Natural	ea.
	P-332x	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	Delrin Black	10-pk
★	**P-336**	Super Flangeless Nut for 1/8" OD Tubing, Short	1/4-28 Flat Bottom	*	Headless Knurl	PEEK Natural	ea.
★	**P-381**	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PPS Natural	ea.
	P-387	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PPS Natural	ea.
	5/16-24 FITTINGS FOR 1/16", 1/8", 3/16" OD TUBING						
NEW!	**P-131x**	Super Flangeless Fitting for 1/8" OD Tubing	5/16-24 Flat Bottom	*	Standard Knurl	PEEK Natural	10-pk
NEW!	**P-137x**	Super Flangeless Fitting for 3/16" OD Tubing	5/16-24 Flat Bottom	*	Standard Knurl	PEEK Black	10-pk
NEW!	**P-141x**	Super Flangeless Fitting for 1/16" OD Tubing	5/16-24 Flat Bottom	*	Standard Knurl	PEEK Natural	10-pk
	ONE-PIECE SUPER FLANGELESS FITTINGS FOR 1/16" AND 1/8" OD TUBING						
NEW!	**P-229x**	One Piece Super Flangeless Fitting for 1/16" OD Tubing	M6 Flat Bottom	1,000 psi (69 bar)	Standard Knurl	PEEK	10-pk
NEW!	**P-249x**	One Piece Super Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat Bottom	1,000 psi (69 bar)	Standard Knurl	PEEK	10-pk
NEW!	**P-329x**	One Piece Super Flangeless Fitting for 1/16" OD Tubing	M6 Flat Bottom	1,000 psi (69 bar)	Standard Knurl	PEEK	10-pk
NEW!	**P-349x**	One Piece Super Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat Bottom	1,000 psi (69 bar)	Standard Knurl	PEEK	10-pk

** Pressure rating of nut depends on the ferrule used.*

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Flangeless Fittings

Upchurch Scientific® Flangeless Fittings eliminate the need to flange tubing. This removable and reusable system provides several benefits:

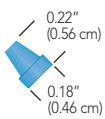
Convenience: Flangeless Fittings are easy to use. Just slip the nut and ferrule over the tubing and finger tighten the assembly into your receiving port. In tests, it is shown that the ideal amount of torque to achieve expected part performance should be approximately 3–4 in-lbs (0.34–0.45 N·m). Check out the line of special tightening tools designed to adapt to many standard torque wrenches, on page 33 and the adjustable torque driver, VHP-4000 on page 8.

Minimal Down-Time: Component replacement is quick, taking only a few seconds — unlike the significant time required to flange tubing.

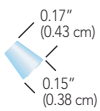
Cost-Effectiveness: Repairing a flanged tubing assembly requires a costly flanging tool or the purchase of a complete replacement assembly, including a new length of tubing and a set of fittings. The Flangeless Fittings system typically requires only one new ferrule at minimal cost when repairing a connection.

The 1/4-28 and M6 Flangeless Fittings for 1/16", 1/8", and metric sized OD tubing are summarized on the following page and listed on pages 25–27.

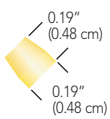
Ferrules



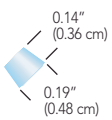
Standard 1/16"
P-200 P-200N



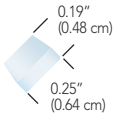
Small Valve 1/16"
P-240



Standard 1/8" and Metric Ferrules
P-300 P-300N P-342
P-353 P-363R P-343



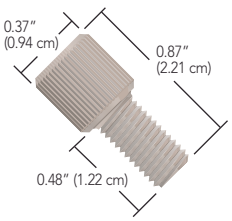
Small Valve 1/8"
P-340



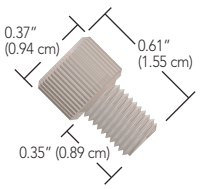
Standard 4.0 mm
P-344

Dimensions for 1/4-28 Flangeless Fittings (pages 24–27)

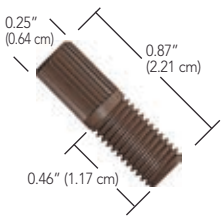
Nuts



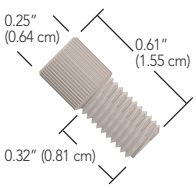
Standard
XP-201 XP-301–XP-305
XP-202 XP-330
XP-220
XP-230
XP-238
XP-245



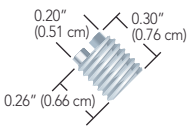
Short
XP-218 P-207S
XP-235 P-247
XP-308 P-307S
XP-335 P-347



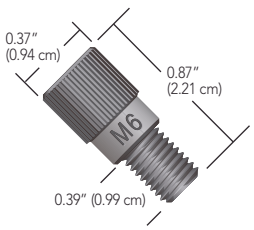
Headless
XP-286 XP-386



Short Headless
XP-283

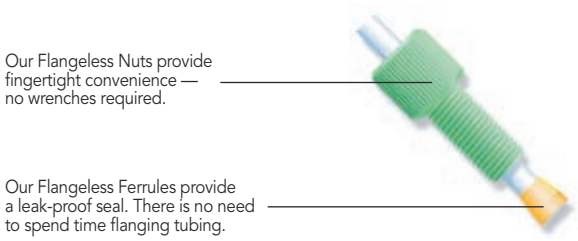


FlushNut™
XF-358 XF-368



Standard Metric
P-207 P-307

TIP THE CONVENIENCE OF FLANGELESS FITTINGS



RELATED PRODUCTS

▸ For the Large Bore Flangeless Fittings, please refer to page 30.

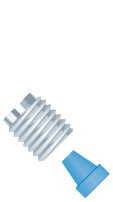
Flangeless Fittings for 1/16" OD Tubing

- Wide variety of materials and geometries to fit most applications
- Fittings and ferrules packaged together for easy ordering convenience

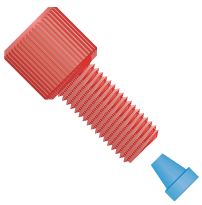
The Upchurch Scientific® Flangeless Fittings are excellent replacements for flanged fittings. Flangeless Fittings are dependable, easy to use and easy to replace.

Additionally, all fittings on this page come pre-packaged with appropriate ferrules (1/4-28 threaded fittings are packaged with P-200 ferrules; however, the XLT-111 — a 10-32 threaded fitting — is packaged with P-240 ferrules). Nuts are available in a wide variety of materials, and replacement ferrules are available in ETFE and polypropylene. The designs of many small, low pressure valves incorporate many shallow ports. The P-240 ferrule is designed to seal tightly in such ports and the special sealing rign on this ferrule helps ensure a minimum dead-volume seal between the tubing, ferrule, and port. (Please refer to our website, www.idex-hs.com for polymer chemical compatibility information.)

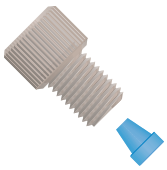
For higher pressure and temperature applications where a Flangeless connection is desired, consider the Flangeless SealTight™ Fitting System. Both fitting and ferrule are manufactured from PEEK polymer; additionally, the ferrule has been specially engineered to incorporate the dual-compression mechanism of the F-192 SealTight ferrule in a design that allows its use in a 1/4-28 flat-bottom port.



XF-358
Stainless Steel FlushNut™



XP-202
Delrin® Nut



XP-235
PEEK Nut

P-200
ETFE Ferrule

P-200N
ETFE Ferrule

P-240
ETFE Small Valve Ferrule

Please see page 24 for the dimensions of the products on this page.

Please Note: The nuts can be ordered separately — simply remove the preceding "X" from the part number to reference the nut separate from the pre-packaged ferrules.

	Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
	FLANGELESS FITTINGS (INCLUDES P-200 FERRULES)						
	XF-358x	Flangeless Fitting for 1/16" OD Tubing, FlushNut	1/4-28 Flat-Bottom	2,000 psi (138 bar)	FlushNut	SST/ETFE Blue	10-pk
	XLT-111x	Flangeless Fitting for 1/16" OD Tubing	10-32 Flat-Bottom	2,500 psi (172 bar)	Standard Knurl	PEEK Natural/ETFE Natural	10-pk
★	**XP-201x**	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Black/ETFE Blue	10-pk
	XP-202x	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Red/ETFE Blue	10-pk
★	**XP-218x**	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	ETFE Natural/ETFE Blue	10-pk
	XP-230x	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	PEEK Natural/ETFE Blue	10-pk
★	**XP-235x**	Flangeless Fitting for 1/16" OD Tubing, Short	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	PEEK Natural/ETFE Blue	10-pk
	XP-238x	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Purple/ETFE Blue	10-pk
	XP-245x	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	PFA Natural/ETFE Blue	10-pk
★	**XP-286x**	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Headless Knurl	PPS Natural/ETFE Blue	10-pk
	REPLACEMENT FERRULES						
★	**P-200x**	Flangeless Ferrule for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	—	ETFE Blue	10-pk
★	**P-200Nx**	Flangeless Ferrule for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	—	ETFE Natural	10-pk
	P-240x	Flangeless Ferrule for 1/16" OD Tubing, Small Valve	1/4-28 or 10-32 Flat-Bottom	2,500 psi (172 bar)	—	ETFE Natural	10-pk

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Flangeless Fittings for 1/8" OD Tubing

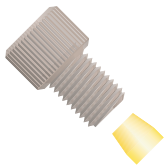
- Wide variety of materials and geometries to fit most applications
- Fittings and ferrules packaged together for easy ordering convenience

Upchurch Scientific® Flangeless Fittings for 1/8" OD tubing feature a wide assortment of nut geometries and materials from which to choose. Fittings shown on this page come in convenient 10-packs and also include P-300 Flangeless Ferrules. (The nuts can be ordered separately — simply remove the preceding "X" from the part number to reference the nut separate from the pre-packaged ferrules.)

All nuts on this page have 1/4-28 threads.

XF-368
Stainless Steel FlushNut™

XP-305
Delrin® Nut



XP-335
PEEK Nut

XP-386
PPS Nut

P-312
Lock Nut White Delrin

Lock Nut

The P-312 Lock Nut is for use with any 1/4-28 male Flangeless Fitting. Use this product in applications where vibrations can loosen fittings.

To Use: Thread the lock nut onto the male fitting. When the male fitting is firmly seated into the receiving port, tighten the lock nut down against the receiving port to securely hold the male fitting in place.

P-300
ETFE Ferrule

P-300N
ETFE Ferrule

P-340
ETFE Small Valve Ferrule

Please see page 24 for the dimensions of the products on this page.

NOTE

- The P-340 ferrule is designed for use with shallow receiving ports, such as those used on some low pressure valves.
- The XF-368 FlushNut is an excellent choice for applications where port-to-port spacing is limited; see page 31 for more information on this innovative product line. As an alternative, consider one of the "headless" fittings shown on this page.

RELATED PRODUCTS

- Nuts for M6 threaded ports are on page 27; nuts for 5/16-24 threaded ports are on page 30.

	Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
	FLANGELESS FITTINGS (INCLUDES P-300 FERRULES)						
	XF-368x	Flangeless Fitting for 1/8" OD Tubing, FlushNut	1/4-28 Flat-Bottom	500 psi (34 bar)	FlushNut	SST/ETFE Yellow	10-pk
★	**XP-301x**	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Delrin Black/ETFE Yellow	10-pk
	XP-302x	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Delrin Red/ETFE Yellow	10-pk
	XP-305x	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Delrin Green/ETFE Yellow	10-pk
★	**XP-308x**	Flangeless Fitting for 1/8" OD Tubing, Short	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Delrin Black/ETFE Yellow	10-pk
	XP-315x	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	ETFE Natural/ETFE Yellow	10-pk
★	**XP-330x**	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	PEEK Natural/ETFE Yellow	10-pk
★	**XP-335x**	Flangeless Fitting for 1/8" OD Tubing, Short	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	PEEK Natural/ETFE Yellow	10-pk
★	**XP-386x**	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Headless Knurl	PPS Natural/ETFE Yellow	10-pk
	REPLACEMENT FERRULES						
★	**P-300x**	Flangeless Ferrule for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Yellow	10-pk
★	**P-300Nx**	Flangeless Ferrule for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Natural	10-pk
★	**P-340x**	Flangeless Ferrule for 1/8" OD Tubing, Small Valve	1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Natural	10-pk
	P-312x	Lock Nut for Flangeless Nuts	1/4-28 Flat-Bottom	—	—	Delrin White	10-pk

Metric Flangeless Fittings

- For 1/16", 1.8 mm, 2.0 mm, 2.5 mm, 3.0 mm, 4.0 mm, or 1/8" OD tubing
- Convenience of flangeless fittings for metric tubing sizes and M6 flat-bottom ports

Upchurch Scientific® Metric Flangeless Ferrules are designed to connect 1.8, 2.0, 2.5, 3.0, or 4.0 mm OD tubing to flat-bottom ports when paired with the appropriate M6, 1/4-28, or 5/16-24 Flangeless Nuts. We also offer M6-threaded nuts to connect 1/16" or 1/8" OD tubing, plus a tubing sleeve to facilitate 1.0 mm OD tubing connections. Please refer to the "Metric Connections" chart on this page for information regarding which nuts and ferrules to use with your tubing.

P-342
ETFE Ferrule
for 1.8 OD tubing

P-363R
ETFE Ferrule
for 2.0 mm OD tubing

P-353
ETFE Ferrule
for 2.5 mm OD tubing

P-343
ETFE Ferrule
for 3.0 mm OD tubing

NEW!

P-344
ETFE Ferrule
for 4.0 mm OD tubing

P-207
Delrin® Nut
for 1/16" OD tubing

P-347
PEEK Nut
for 1.8, 2.0, 3.0 mm or 1/8" OD tubing

Please see page 24 for the dimensions of the products on this page.

TIP METRIC CONNECTIONS

Use this chart to determine the low pressure fittings needed to connect metric and English-sized tubing into the indicated ports.

Tubing Size	Port	Ferrules	Nuts
1.0 mm	M6 1/4-28	P-200 (w/F-252 sleeve, not included) P-200 (w/F-252 sleeve, not included)	P-207, P-207S, P-247 Any 1/4-28 nut from page 25[1]
1.8 mm	M6 1/4-28	P-342 P-342	P-307, P-307S, P-347 Any nut from page 26[1]
2.0 mm	M6 1/4-28	P-363R P-363R	P-307, P-307S, P-347 Any nut from page 26
2.5 mm	M6 1/4-28	P-353 P-353	P-307, P-307S, P-347 Any nut from page 26[1]
3.0 mm	M6 1/4-28	P-343 P-343	P-307, P-307S, P-347 Any nut from page 26[1]
4.0 mm	5/16-24	P-344	XP-132x from page 30
1/16"	M6 M6	P-200 P-840	P-207, P-207S, P-247, P-931, page 28
1/8"	M6 M6	P-300 P-940	P-307, P-307S, P-347, P-945, page 28

[1] *To order 1/4-28 threaded Flangeless Nuts separately from the Flangeless Ferrules, simply remove the preceding "X" from the appropriate part number — for example, order P-301x instead of XP-301x.*

RELATED PRODUCTS

More Metric–Sized Products

	Page
High Pressure Polymer Fittings	9, 12
High Pressure Stainless Steel Fittings	10
Luer Adapters	56
Metric Threaded Adapters	51
External NPT Adapters	52
VacuTight™ Fittings	28
Plugs and Caps	172
Low Pressure Unions	40
Bulkhead Unions	41
PEEK (1.8 mm OD and Capillary) and Fused Silica Tubing	65
PEEKsil™ Tubing	66
FEP Tubing (1.0–4.0 mm OD) and PFA Capillary Tubing	71
Frit-In-A-Ferrule™	166

In addition, many of our 1/4-28 threaded Filters, Valves and Flow Control Accessories can be converted to accept 1.8, 2.0, 2.5 and 3.0 mm tubing, using the ferrules listed for 1/4-28 ports in the "Metric Connections" table, this page.

	Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
	METRIC FLANGELESS NUTS						
	P-207x	Flangeless Nut for 1/16" OD Tubing	M6 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Black	10-pk
	P-207Sx	Flangeless Nut for 1/16" OD Tubing, Short	M6 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Black	10-pk
	P-247x	Flangeless Nut for 1/16" OD Tubing, Short	M6 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	PEEK Black	10-pk
	P-307x	Flangeless Nut for 1.8 mm, 2.0 mm, 3.0 mm, 1/8" OD Tubing	M6 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Delrin Black	10-pk
	P-307Sx	Flangeless Nut for 1.8 mm, 2.0 mm, 3.0 mm, 1/8" OD Tubing	M6 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Delrin Black	10-pk
	P-347x	Flangeless Nut for 1.8 mm, 2.0 mm, 3.0 mm, 1/8" OD Tubing	M6 Flat-Bottom	500 psi (34 bar)	Standard Knurl	PEEK Black	10-pk
	FLANGELESS FERRULES						
	F-252x	1/16" OD Tubing Sleeve for 1.0 mm ID Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	FEP Purple	10-pk
★	**P-200x**	Flangeless Ferrule for 1/16" OD Tubing	M6 or 1/4-28 Flat-Bottom	2,000 psi (138 bar)	—	ETFE Blue	10-pk
★	**P-300x**	Flangeless Ferrule for 1/8" OD Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Yellow	10-pk
★	**P-342x**	Flangeless Ferrule for 1.8 mm OD Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Green	10-pk
	P-343x	Flangeless Ferrule for 3.0 mm OD Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Orange	10-pk
NEW!	**P-344x**	Flangeless Ferrule for 4.0 mm OD Tubing	5/16-24	250 psi (17 bar)	—	ETFE Natural	10-pk
	P-353x	Flangeless Ferrule for 2.5 mm OD Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Natural	10-pk
	P-363Rx	Flangeless Ferrule for 2.0 mm OD Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Red	10-pk

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VacuTight™ Fittings

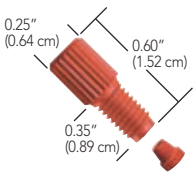
- For 1/16" or 1/8" OD tubing connections into 10-32, 1/4-28, or M6 flat-bottom ports
- Vacuum Rated to 25 in-Hg (84 kPa)
- Improve transfer volume consistency

Upchurch Scientific® VacuTight Fittings are designed to provide airtight, dependable connections under vacuum and low pressure conditions. Many of the VacuTight Nuts have streamlined profiles for use in systems requiring a large number of connections in a small area. Furthermore, the VacuTight Ferrule's small size ensures sufficient nut/thread engagement, even in shallow ports. These features make VacuTight Fittings ideal for "combichem" high throughput screening, clinical diagnostic, and other automated liquid handling applications.

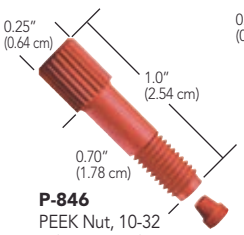
The configuration of the VacuTight flat-bottom ferrules prevents overcompression and tubing ID reduction that can occur with many coned fittings. The result is more consistent aspirating and dispensing volumes across all system connections.

The VacuTight fittings can also work well in some positive pressure applications. The pressure range for each fitting is listed below and depends upon the tubing used for the connection. Please contact your distributor or IDEX Health & Science for more information. Additionally, please note that some of the VacuTight fittings have changed in color from red to black; however, this color change does not affect product performance.

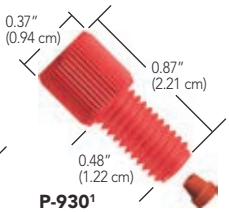
All VacuTight Nuts must be used exclusively with VacuTight Ferrules.



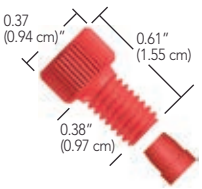
P-844
PEEK Nut, 10-32
with P-840 Ferrule



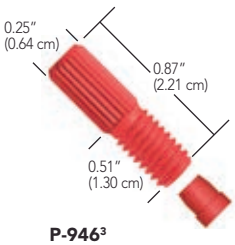
P-846
PEEK Nut, 10-32
with P-840 Ferrule



P-930[1]
Delrin® Nut, 1/4-28
with P-840 Ferrule



P-945[2]
Delrin Nut, M6
with P-940 Ferrule



P-946[3]
Delrin Nut, 1/4-28
with P-940 Ferrule

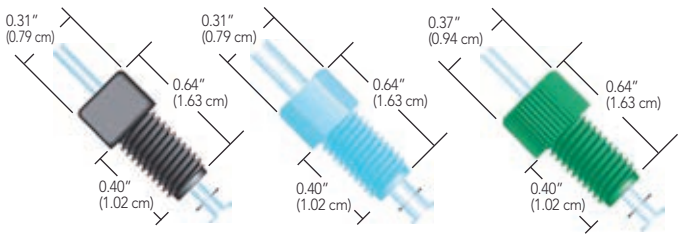
[1] The dimensions shown apply to P-930, P-931, P-938, P-942, and P-948.
[2] The dimensions shown apply to P-945.
[3] The dimensions shown apply to P-946.

	Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
	VACUTIGHT FITTINGS (INCLUDES P-840 OR P-940 FERRULES)						
★	**P-842x**	VacuTight Fitting for 1/16" OD Tubing, Short	10-32 Flat-Bottom	400–800 psi (27–55 bar)	1/4" Hex	PEEK Red	10-pk
★	**P-844x**	VacuTight Fitting for 1/16" OD Tubing, Short	10-32 Flat-Bottom	400–800 psi (27–55 bar)	Headless Knurl	PEEK Red	10-pk
	P-846x	VacuTight Fitting for 1/16" OD Tubing, Long	10-32 Flat-Bottom	400–800 psi (27–55 bar)	Headless Knurl	PEEK Red	10-pk
	P-930x	VacuTight Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	400–800 psi (27–55 bar)	Standard Knurl	Delrin Red	10-pk
	P-931x	VacuTight Fitting for 1/16" OD Tubing	M6 Flat-Bottom	400–800 psi (27–55 bar)	Standard Knurl	Delrin Red	10-pk
	P-938x	VacuTight Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	400–800 psi (27–55 bar)	Standard Knurl	PEEK Natural	10-pk
	P-942x	VacuTight Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500–1,000 psi (34–69 bar)	Standard Knurl	Delrin Red	10-pk
	P-945x	VacuTight Fitting for 1/8" OD Tubing, Short	M6 Flat-Bottom	500–1,000 psi (34–69 bar)	Standard Knurl	Delrin Red	10-pk
	P-946x	VacuTight Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500–1,000 psi (34–69 bar)	Headless Knurl	Delrin Red	10-pk
	P-948x	VacuTight Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500–1,000 psi (34–69 bar)	Standard Knurl	PEEK Natural	10-pk
	REPLACEMENT FERRULES						
	P-840x	VacuTight Ferrule for 1/16" OD Tubing	M6 or 1/4-28 Flat-Bottom	400–800 psi (27–55 bar)	—	ETFE Red	10-pk
★	**P-940x**	VacuTight Ferrule for 1/8" OD Tubing	M6 or 1/4-28 Flat-Bottom	500–1,000 psi (34–69 bar)	—	ETFE Red	10-pk

Flanged Fittings

- Fittings for 1/16" or 1/8" OD tubing, supplied with nut and 316 stainless steel washer
- Multiple head styles and materials available
- For 1/4-28 and M6 flat-bottom ports
- All head styles, square, hex, and knurl are available in the following colors: black, red, white, green, and blue

Upchurch Scientific® Flanged Fittings are compatible with most standard 1/4-28 or M6 Flat-Bottom flanged fittings. The hard, inert Delrin® (acetal resin) nut resists cross threading or loosening during use, while the ETFE nuts work well in chemically aggressive environments.



P-401[1]
Flanged Fitting
for 1/16" OD tubing*

P-580B[2]
Flanged Fitting
for 1/8" OD tubing*

P-482G[3]
Flanged Fitting
for 1/16" OD tubing*

1 The dimensions shown apply to all square-head Flanged Fittings
2 The dimensions shown apply to all hex-head Flanged Fittings
3 The dimensions shown apply to all knurled-head Flanged Fittings
** Flanged tubing not included*

RELATED PRODUCTS

- For an alternative to flanging tubing, we highly recommend the Flangeless Fittings found on pages 24–27, the Super Flangeless™ Fittings found on pages 21–23, or the VacuTight™ Fittings on page 28.

Part No.	Description	Port Geometry	Head Style	Material (Nut/Washer)	Qty.
FLANGED FITTINGS (INCLUDES STAINLESS STEEL WASHERS)					
P-401x	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Black/SST	10-pk
★ **P-480BLK**	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Black/SST	ea.
P-482BLK	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin Black/SST	ea.
P-501x	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Black/SST	10-pk
P-580BLK	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Black/SST	ea.
P-582BLK	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin Black/SST	ea.
P-982BLKx	Flanged Fitting for 1/16" OD Tubing	M6 Flat-Bottom	Standard Knurl	Delrin Black/SST	10-pk
P-1082BLKx	Flanged Fitting for 1/8" OD Tubing	M6 Flat-Bottom	Standard Knurl	Delrin Black/SST	10-pk
REPLACEMENT WASHERS					
P-407x	Washer for 1/16" OD Tubing	1/4-28 Flat-Bottom	—	SST	10-pk
P-507x	Washer for 1/8" OD Tubing	1/4-28 Flat-Bottom	—	SST	10-pk
P-987x	Washer for 1/16" OD Tubing	M6 Flat-Bottom	—	SST	10-pk
P-1087x	Washer for 1/8" OD Tubing	M6 Flat-Bottom	—	SST	10-pk

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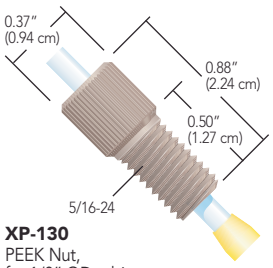
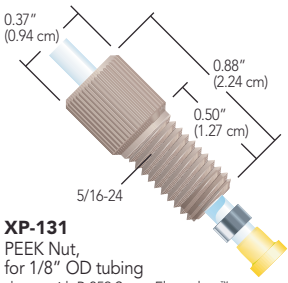
Large Bore Fittings

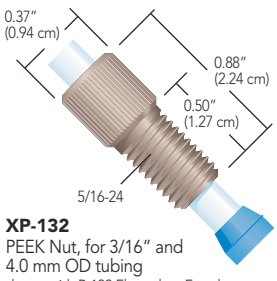
- 5/16-24 or 1/2-20 threads
- For use with 1/16", 1/8", 3/16", 1/4", 5/16", 3.0 mm, or 4.0 mm OD tubing



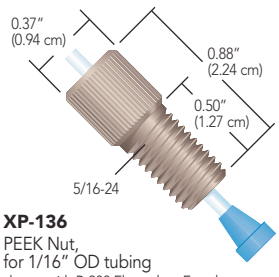
XP-130
PEEK Nut,
for 1/8" OD tubing
shown with P-300 Flangeless Ferrule
(page 26)



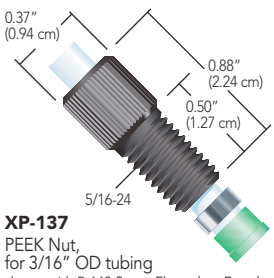
XP-131
PEEK Nut,
for 1/8" OD tubing
shown with P-359 Super Flangeless™
Ferrule (included and found on page 23)



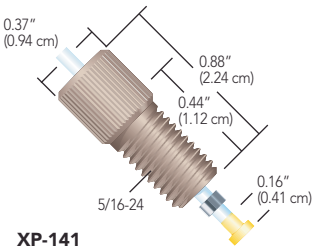
XP-132
PEEK Nut, for 3/16" and
4.0 mm OD tubing
shown with P-133 Flangeless Ferrule
(included and found on this page)



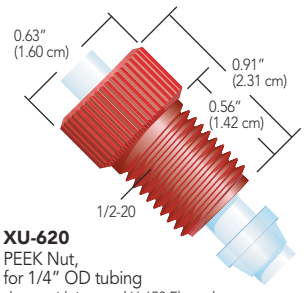
XP-136
PEEK Nut,
for 1/16" OD tubing
shown with P-200 Flangeless Ferrule
(included and found on page 25)



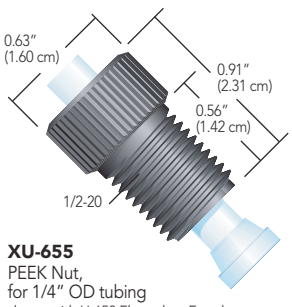
XP-137
PEEK Nut,
for 3/16" OD tubing
shown with P-140 Super Flangeless Ferrule
(included and found on this page)



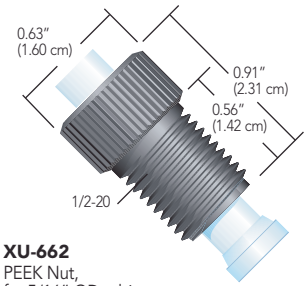
XP-141
PEEK Nut,
for 1/16" OD tubing
shown with P-259 Super Flangeless Ferrule
(included and found on page 23)



XU-620
PEEK Nut,
for 1/4" OD tubing
shown with inverted U-650 Flangeless
Ferrule for coned ports
(included and found on this page)



XU-655
PEEK Nut,
for 1/4" OD tubing
shown with U-650 Flangeless Ferrule
(included and found on this page)



XU-662
PEEK Nut,
for 5/16" OD tubing
shown with U-660 Flangeless Ferrule
(included and found on this page)

Please Note: Each of the Large Bore Fittings shown on this page comes in a convenient 10-pack and is packaged with the most popularly chosen Ferrule option. The Fittings can be ordered separately by removing the preceding letter "X" from the part number. Additionally, to connect metric-sized tubing with outer diameters less than 4.0 mm to 5/16-24 threaded ports, reference the chart on page 27 to choose the correct nut/ferrule combination.

RELATED PRODUCTS

More Large Bore Products

	Page
5/16-24 Coned Fittings	18
Barbed Adapters	58
Threaded Adapters	48
Plugs	32, 159
Y Connector	47
ETFE Tubing	73

	Page
FEP, PFA Tubing	71, 72
Tubing Cutter	74
Pressure Relief Valve	154
Solvent Inlet Filters	157
Bottle Caps	159
Semi-Prep Inline Filters	161

Part No.	Description	Port	Pressure Rating	Head Style	Material (Nut/Washer)	Qty.
LARGE BORE FITTINGS						
XP-130x	Flangeless Fitting for 1/8" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)	Standard Knurl	PEEK Natural/ETFE Yellow	10-pk
XP-131x	Super Flangeless Fitting for 1/8" OD tubing	5/16-24 Flat-Bottom	1,000 psi (69 bar)	Standard Knurl	PEEK Natural/ETFE Yellow/SST	10-pk
★ **XP-132x**	Flangeless Fitting for 3/16" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)	Standard Knurl	PEEK Natural/ETFE Blue	10-pk
XP-136x	Flangeless Fitting for 1/16" OD tubing	5/16-24 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	PEEK Natural/ETFE Blue	10-pk
XP-137x	Super Flangeless Fitting for 3/16" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)	Standard Knurl	PEEK Black/ETFE Green/SST	10-pk
XP-141x	Super Flangeless Fitting for 1/16" OD tubing	5/16-24 Flat-Bottom	1,350 psi (93 bar)	Standard Knurl	PEEK Natural/ETFE Yellow/SST	10-pk
XP-143x	Flangeless Fitting for 3.0 mm OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)	Standard Knurl	PEEK Natural/ETFE Orange	10-pk
XU-620x	Flangeless Fitting for 1/4" OD tubing	1/2-20 Coned	250 psi (17 bar)	Large Knurl	PEEK Red/ETFE Natural	10-pk
XU-655x	Flangeless Fitting for 1/4" OD tubing	1/2-20 Flat-Bottom	250 psi (17 bar)	Large Knurl	PEEK Black/ETFE Natural	10-pk
XU-662x	Flangeless Fitting for 5/16" OD tubing	1/2-20 Flat-Bottom	250 psi (17 bar)	Large Knurl	PEEK Black/ETFE Natural	10-pk
REPLACEMENT FERRULES						
★ **P-133x**	Flangeless Ferrule for 3/16" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)	—	ETFE Blue	10-pk
P-133Nx	Flangeless Ferrule for 3/16" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)	—	ETFE Natural	10-pk
P-140x	Super Flangeless Ferrule for 3/16" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)	—	ETFE Green	10-pk
U-650x	Flangeless Ferrule for 1/4" OD tubing	1/2-20 Flat-Bottom	250 psi (17 bar)	—	ETFE Natural	10-pk
U-660x	Flangeless Ferrule for 5/16" OD tubing	1/2-20 Flat-Bottom	250 psi (17 bar)	—	ETFE Natural	10-pk

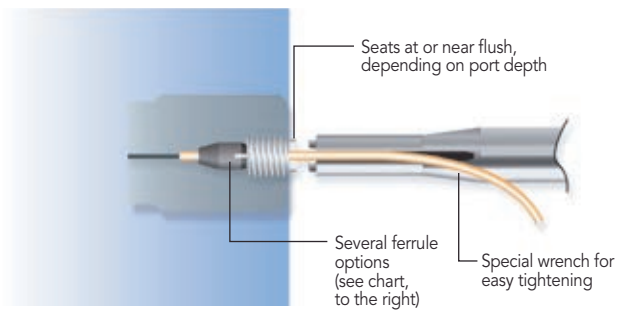
FlushNut™ Fittings

- Tightens flush with the top of the receiving port
- Several ferrule options

Upchurch Scientific® FlushNut Fittings are designed for those tight-space applications where nut heads often interfere with each other. When coupled with an appropriate ferrule and tightened into a receiving port, the FlushNut's slotted head seats at or near flush with the top of the port. This feature allows FlushNut Fittings to reside in closer proximity than any other option on the market. All FlushNut Fittings are manufactured from 316 stainless steel, except the P-321 Plug, which is made of PEEK polymer.

Tighten or remove FlushNut Fittings with our specially designed FlushNut Wrenches, available in 10-32 or 1/4-28 versions. For more information on the FlushNut wrenches, see page 33.

FlushNut Fittings System

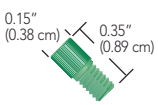


Lee Company "MINSTAC®" Compatible Fittings

- Super Flangeless™ style ferrules designed specifically to work with 6-40 nuts in Lee MINSTAC valve ports
- For 1/16" OD tubing

Upchurch Scientific TinyTight™ Fittings are easy-to-use alternatives for Lee Company 062 MINSTAC fittings systems. These fittings consist of a TinyTight Ferrule which works with the 6-40 threaded nut on this page, M-644-03. Choose from two ferrule options, with 0.020" (0.50 mm) or 0.030" (0.75 mm) thru-holes. To use, simply slide a fitting head-first onto your tubing, followed by the ring and ferrule, and thread this assembly into the solenoid valve receiving port, while making sure the tubing is bottomed out. No collets, colleting tools, or chamfering tools required; however, if needed for easier assembly of the TinyTight fittings, the M-150 tool is available. To use, first place the tool in a vise, then tighten tubing, fitting, and ferrule into the tool as you would into any port. Once removed, the swaged ferrule will be held in place on the tubing.

The TinyTight fittings have a pressure range that depends upon the tubing used for the connection. Please contact your distributor or IDEX Health & Science for more information.



M-644-03
Headless Nut
6-40 threads

M-647
TinyTight Ferrule
for 1/16" OD tubing
0.020" thru-hole

M-657
TinyTight Ferrule
for 1/16" OD tubing
0.030" thru-hole

RELATED PRODUCTS

FlushNut Ferrule Options

FlushNut	Threads/ Port*	For Tubing OD	Ferrule Options	Page
F-350	10-32 C	1/16"	SealTight™ F-192	14
F-354	10-32 C	1/32"	LiteTouch® LT-132	16
	10-32 C	1/16"	LiteTouch LT-100	16
	10-32 C	1/16"	LiteTouch SealTight LT-135	16
F-364	1/4-28 C	1/8"	LiteTouch LT-200	16
	1/4-28 FB	1/8"	Super Flangeless P-350, P-352, P-359, P-360	23
	1/4-28 FB	2.0 mm	Super Flangeless P-355	23
F-356	1/4-28 FB	1/32"	Super Flangeless P-248	23
	1/4-28 FB	1/16"	Super Flangeless P-250, P-259, P-260	23
XF-358	1/4-28 FB	1/16"	Flangeless P-200, P-200N, P-240	24
XF-368	1/4-28 FB	1/8"	Flangeless P-300, P-300N, P-340	24
	1/4-28 FB	1.8 mm	Flangeless P-342	24
	1/4-28 FB	2.0 mm	Flangeless P-363R	24
	1/4-28 FB	2.5 mm	Flangeless P-353	24
	1/4-28 FB	3.0 mm	Flangeless P-343	24
P-321	1/4-28 FB	N/A	Plug — No ferrule required	32

** C=Coned; FB=Flat-bottom*
To order FlushNuts separately from the included ferrules, simply remove the preceding "X" from the appropriate part number — for example, order F-358 instead of XF-358.

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
TINYTIGHT FITTINGS						
M-150	Swaging Tool for TinyTight Fittings	6-40 MINSTAC	—	—	SST	ea.
M-644-03x	Super Flangeless Nut for 1/16" OD Tubing	6-40 Flat Bottom or MINSTAC	750–3,750 psi (52–259 bar)	Micro Headless	PEEK Green	10-pk
M-647x	TinyTight Ferrule for 1/16" OD Tubing, 0.020" Thru-Hole	6-40 MINSTAC	750–3,750 psi (52–259 bar)	—	PEEK Natural/SST	10-pk
★ **M-657x**	TinyTight Ferrule for 1/16" OD Tubing, 0.030" Thru-Hole	6-40 MINSTAC	750–3,750 psi (52–259 bar)	—	PEEK Natural/SST	10-pk

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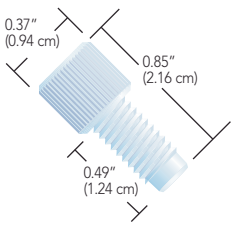
Plugs & Caps

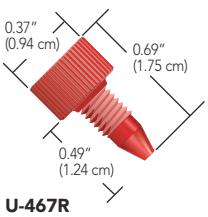
- Seal 6-32, 6-40, 10-32, 1/4-28, M6, or 5/16-24 threaded ports or fittings

Use Upchurch Scientific® plugs to close off unused ports in valves and multi-port connectors. Our color-coded 10-32 threaded plugs are perfect for identifying stored columns that have different packing materials, or in which different mobile phases have been utilized. Cap off tubing with one of the PEEK or ETFE caps presented on this page and the appropriate fittings from this chapter.

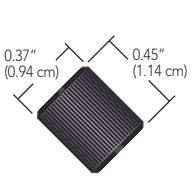
To help determine which plug or cap is best suited for your application, please visit www.idex-hs.com for detailed chemical compatibility data.



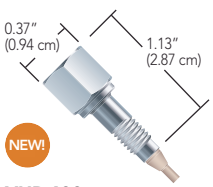
P-316
PFA Plug
for 1/4-28 flat-bottom ports



U-467R
Delrin® Column Plug
for 10-32 coned ports



P-755
ETFE Cap
for 1/4-28 flat-bottom fittings



VHP-600
VHP Plug
for 10-32 coned ports

	Part No.	Description	Head Style	Material	Qty.
	PLUGS				
	P-120	Plug for 1/4-28 Coned Ports for 1/8″ OD Tubing	Standard Knurl	PCTFE Natural	ea.
	P-123	Plug for 1/4-28 Flat-Bottom Ports	5/16″ Hex	ETFE Natural	ea.
★	**P-309x**	Plug for 1/4-28 Flat-Bottom Ports	Standard Knurl	Delrin Black	10-pk
★	**P-311**	Plug for 1/4-28 Flat-Bottom Ports	Standard Knurl	ETFE Natural	ea.
	P-314	Plug for M6 Flat-Bottom Ports	Standard Knurl	ETFE Black	ea.
★	**P-316**	Plug for 1/4-28 Flat-Bottom Ports	Standard Knurl	PFA Natural	ea.
	P-321	Plug for 1/4-28 Flat-Bottom Ports, FlushNut™	FlushNut	PEEK Natural	ea.
	P-520	Plug for 10-32 Coned Ports	5/16″ Hex	SST	ea.
	P-550	Plug for 10-32 Coned Ports, Extra Long	Standard Knurl	PEEK Natural	ea.
★	**P-551**	Plug for 10-32 Coned Ports	Standard Knurl	PEEK Natural	ea.
	P-552	Plug for 6-40 Coned Ports	Headless Knurl	PEEK Natural/PCTFE	ea.
	P-555	Plug for 6-32 Coned Ports	Standard Micro Knurl	PEEK Natural	ea.
	P-556	Plug for 5/16-24 Flat-Bottom Ports	Standard Knurl	PEEK Natural	ea.
	P-558	Plug for 6-40 Flat-Botton Ports	Micro Headless Knurl	PEEK Green	ea.
	P-559	Plug for 6-32 Flat-Bottom Ports	Micro Headless Knurl	PEEK Natural	ea.
	P-849	Plug for 10-32 Flat-Bottom Ports	Standard Knurl	Delrin Black	ea.
	U-467Rx	Plug for 10-32 Coned Ports	Standard Knurl	Delrin Red	10-pk
NEW!	**VHP-600**	VHP Plug for 10-32 Coned Ports	3/8″ Hex	PK-SST	ea.
	CAPS				
	P-754	Cap for 10-32 Coned Ports	Standard Knurl	ETFE Yellow	ea.
★	**P-755**	Cap for 1/4-28 Flat-Bottom Ports	Standard Knurl	ETFE Black	ea.
	P-756	Cap for M6 Flat-Bottom Ports	Standard Knurl	ETFE Blue	ea.

Extender Tools

These tools can be used to tighten most of our knurled nuts in hard to reach places. See the application note on this page for knurl size and corresponding extender tool.

For precise tightening, the extender tools listed with 1/4" hex drives are designed to adapt to any torque wrench with a female 1/4" socket, such as the VHP-4000 Torque Driver on page 8. The tools featured on this page also include the FlushNut™ wrenches, used to tighten the FlushNuts found throughout this chapter and described in detail on page 31.

Removal Tool

Use the LT-300 Removal Tool to detach LiteTouch® and Super Flangeless™ Ferrules from tubing. Simply slide the appropriate tool blade slot between the lock ring and the ferrule body. With a slight twist, the ring will pop off, releasing the ferrule from the tubing. *Please Note: This Removal Tool will not work with the LT-135 Ferrule System.*

Wrenches

For your convenience, we offer wrenches in three standard sizes. You will need two A-304 wrenches to tighten most nuts into unions found on page 36 (for union 1593, you need one A-304 and one A-320 wrench).

The IDEX Wrench is slotted to fit over 1/16" and 1/8" OD tubing, and has 1/4" and 5/16" internal hex ends, to engage with the heads of the hex-head fittings most commonly used with Rheodyne® valves and the stainless steel fittings listed on page 10.

APPLICATION NOTE

The drawings represent actual size of the various knurled head designs of the Upchurch Scientific® nuts featured in this chapter. Select the appropriate extender tool for the knurl pattern of the nut you've selected.

Female Knurl	Standard Knurl	Headless Knurl
		

Standard Micro Knurl	Micro Headless Knurl
	

Part No.	Description	Material	Qty.
EXTENDER TOOLS			
P-291	Extender Tool for Standard Head Nuts, with 1/4" Hex Drive	Aluminum	ea.
P-298	Extender Tool for Standard Head Nuts	Delrin®	ea.
P-299	Extender Tool for Standard Head Nuts	Aluminum	ea.
P-399	Extender Tool for Standard Head Nuts, Short	Aluminum	ea.
P-297	Extender Tool for Headless Nuts	Aluminum	ea.
P-292	Extender Tool for Headless Nuts, with 1/4" Hex Drive	Aluminum	ea.
P-277	Extender Tool for Standard Micro Nuts	Aluminum	ea.
N-290	Extender Tool for Micro Headless Nuts	Aluminum	ea.
P-278	Extender Tool for Female Nuts, with 1/4" Hex Drive	Aluminum	ea.
MISCELLANEOUS TOOLS			
A-304	Wrench, 1/4" x 5/16"	Steel	ea.
A-305	Wrench, 1/2" x 9/16"	Steel	ea.
A-320	Wrench, 3/8" x 7/16"	Steel	ea.
6810	IDEX Wrench, 1/4" x 5/16"	Steel	ea.
F-345	FlushNut Wrench for 10-32 Threaded Fittings	Steel/Plastic Handle	ea.
F-346	FlushNut Wrench for 1/4-28 Threaded Fittings	Steel/Plastic Handle	ea.
LT-300	Removal Tool for LiteTouch and Super Flangeless Ferrules	Steel/Plastic Handle	ea.

CONNECTORS

SEE STARRED PRODUCTS FOR **TOP SELLERS!**

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www.biotech.se
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Connectors Reference Chart

This chart offers suggestions for connecting two pieces of inline tubing. The required product numbers are listed, with the appropriate page numbers listed below them in respective order. In most cases other options exist. For more information, please contact IDEX Health & Science or your local distributor.

TUBING SIZE (OD)	CAPILLARY (<1/32" OD)	1/32"	1 mm	1/16"	1.8–3 mm	1/8"	4 mm, 3/16"	1/4"	5/16"
CAPILLARY (<1/32" OD)	P-720 + MTSlv or P-882 or P-772 or P-779 + (2) NTSlv Pages: 39, 19, 52, 39, 38, 19	P-779 + NTSlv + F-247 Pages: 38, 19	P-779 + NTSlv + F-252 Pages: 38, 19	P-770 + MTSlv Pages: 38, 19	P-627 + NTSys + MFF + XP-335 Pages: 48, 19, 27, 26	P-627 + NTSys + XP-335 Pages: 49, 19, 26	P-135 + P-259 + NTSys + LT-115 + LBFF + XP-132 Pages: 48, 23, 19, 23, 30	U-665 + P-259 + NTSlv + LT-115 Pages: 48, 23, 19, 23	U-665 + XU-662 + P-259 + NTSlv + LT-115 Pages: 48, 30, 60, 19, 23
1/32"	P-779 + NTSlv + F-247 Pages: 38, 19	P-771 Page: 39	P-779 + F-247 + F-252 Pages: 38, 19, 19	P-881 Page: 52	P-702 + P-248 + LT-115 + MFF + XP-335 Pages: 40, 23, 23, 27, 26	P-702 + P-248 + LT-115 + XP-335 Pages: 40, 23, 23, 26	P-135 + P-248 + LT-115 + LBFF + XP-132 Pages: 48, 23, 23, 30, 30	U-665 + P-248 + LT-115 Pages: 48, 23, 23	U-665 + XU-662 + P-248 + LT-115 Pages: 48, 30, 23, 23
1 mm	P-779 + NTSlv + F-252 Pages: 38, 19	P-779 + F-247 + F-252 Pages: 38, 19, 19	P-779+ (2) F-252 Pages: 38, 19	P-779 + F-252 Pages: 38, 19	P-702 + F-252 + MFF + XP-335 Pages: 40, 19, 27, 26	P-702 + F-252 + XP-335 Pages: 40, 19, 26	P-135 + XP-235 + F-252 + LBFF + XP-132 Pages: 48, 25, 19, 27, 30	U-665 + XP-235 + F-252 Pages: 48, 25, 19	U-665 + XU-662 + XP-235 + F-252 Pages: 48, 30, 25, 19
1/16"	P-770 + MTSlv Pages: 38, 19	P-881 Page: 52	P-779+ F-252 Pages: 38, 19	P-742 or P-702 Pages: 38, 40	P-702 + MFF + XP-335 Pages: 40, 27, 26	P-703 + XP-235 Pages: 40, 25	P-135 + XP-235 + LBFF + XP-132 Pages: 48, 25, 30, 30	U-665 + XP-235 Pages: 49, 25	U-665 + XU-662 + XP-235 Pages: 48, 30, 25
1.8–3 mm	P-627 + NTSys + MFF + XP-335 Pages: 48, 19, 27, 26	P-702 + P-248 + LT-115 + MFF + XP-335 Pages: 40, 23, 23, 27, 26	P-702 + F-252 + MFF + XP-335 Pages: 40, 19, 27, 26	P-702 + MFF + XP-335 Pages: 40, 27, 26	P-703 + (2) MFF Pages: 40, 27	P-703 + MFF Pages: 40, 27	P-135 + XP-335 + LBFF + XP-132 Pages: 48, 27, 26, 30	U-665 + MFF + XP-335 Pages: 48, 27, 26	U-665 + XU-662 + MFF + XP-335 Pages: 48, 30, 27, 26
1/8"	P-627 + NTSys + XP-335 Pages: 48, 19, 26	P-702 + P-248 + LT-115 + XP-335 Pages: 40, 23, 23, 26	P-702 + F-252 + XP-335 Pages: 40, 19, 26	P-703 + XP-235 Pages: 40, 25	P-703 + MFF Pages: 40, 27	P-703 Page: 40	P-135 + XP-335 + LBFF + XP-132 Pages: 48, 26, 30, 30	U-665 + XP-335 Pages: 48, 26	U-665 + XU-662 + X P-335 Pages: 48, 30, 26
4 mm, 3/16"	P-135 + P-259 + NTSys + LT-115 + LBFF + XP-132 Pages: 48, 23, 19, 23, 30	P-135 + P-248 + LT-115 + LBFF + XP-132 Pages: 48, 23, 23, 30, 30	P-135 + XP-235 + F-252 + LBFF + XP-132 Pages: 48, 25, 19, 27, 30	P-135 + XP-235 + LBFF + XP-132 Pages: 48, 25, 30, 30	P-135 + XP-335 + LBFF + XP-132 Pages: 48, 27, 26, 30	P-135 + XP-335 + LBFF + XP-132 Pages: 48, 26, 30, 30	P-134 + (2) LBFF + (2) XP-132 Pages: 41, 27, 30, 30	U-659 + LBFF + XP-132 Pages: 48, 30, 30	U-659 + XU-662 + LBFF + XP-132 Pages: 48, 30, 27, 30, 30
1/4"	U-665 + P-259 + NTSlv + LT-115 Pages: 48, 23, 19, 23	U-665 + P-248 + LT-115 Pages: 48, 23, 23	U-665 + XP-235 + F-252 Pages: 48, 25, 19	U-665 + XP-235 Pages: 48, 25	U-665 + MFF + XP-335 Pages: 48, 27, 26	U-665 + XP-335 Pages: 48, 26	U-659 + LBFF + XP-132 Pages: 48, 30, 30	Contact Us	U-665 + P-684 + XU-662 Pages: 48, 48, 30
5/16"	U-665 + XU-662 + P-259 + NTSlv + LT-115 Pages: 48, 30, 60, 19, 23	U-665 + XU-662 + P-248 + LT-115 Pages: 48, 30, 23, 23	U-665 + XU-662 + XP-235 + F-252 Pages: 48, 30, 25, 19	U-665 + XU-662 + XP-235 Pages: 48, 30, 25	U-665 + XU-662 + MFF + XP-335 Pages: 48, 30, 27, 26	U-665 + XU-662 + XP-335 Pages: 48, 30, 26	U-659 + XU-662 + LBFF + XP-132 Pages: 48, 30, 27, 30, 30	U-665 + P-684 + XU-662 Pages: 48, 48, 30	Contact Us

MTSlv *MicroTight® Sleeves. Select the appropriate MicroTight Sleeve(s) for your tubing OD size.*
NTSys *NanoTight™ System. Select the appropriate NanoTight Sleeve(s) for your tubing OD size, and NanoTight fitting(s).*
NTSlv *Select the appropriate NanoTight Sleeves for your tubing OD size.*

MFF *Select the appropriate Metric Flangeless Ferrule(s) for your tubing OD size. Choose from P-342, P-343, P-353, and P-363R.*
LBFF *Select from the following Large-Bore Flangeless Ferrules: P-133 (3/16" OD) or P-139 (4.0 mm OD).*

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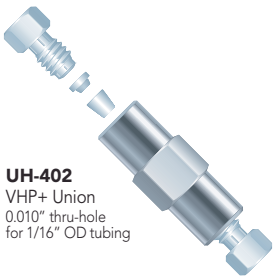
VHP Stainless Steel ZDV Unions

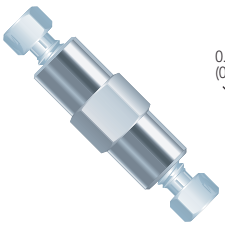
- Supplied with fittings for 1/16" OD or 1/8" OD tubing
- Manufactured from 316 stainless steel
- All union assemblies rated to 20,000 psi (1,380 bar) or higher

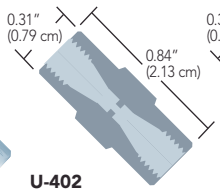
These Upchurch Scientific®, high pressure, zero-dead-volume (ZDV) unions, manufactured by IDEX Health & Science, are precision machined from 316 stainless steel, carefully passivated, then thoroughly rinsed. Each comes complete with stainless steel nuts and ferrules.

U-411
NanoTight™ Union
0.007" thru-hole
for 1/16" OD tubing

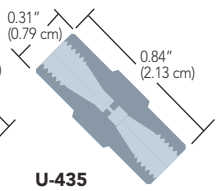


UH-402
VHP+ Union
0.010" thru-hole
for 1/16" OD tubing



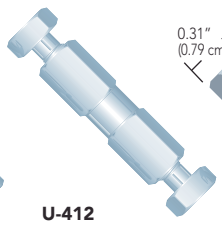


U-402
ZDV Union
0.020" thru-hole
for 1/16" OD tubing

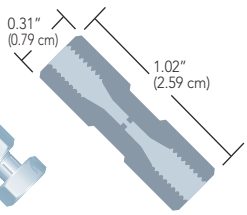


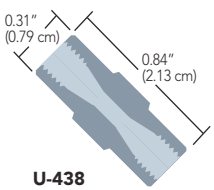
U-435
ZDV Union
0.010" thru-hole
for 1/16" OD tubing

U-322
VICI® (Valco) Compatible
ZDV Union
0.020" thru-hole
for 1/16" OD tubing

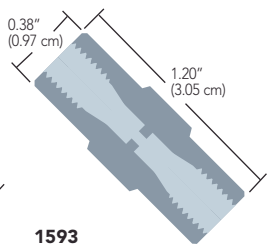


U-412
Waters Compatible
ZDV Union
0.020" thru-hole
for 1/16" OD tubing





U-438
True ZDV Union
0.067" thru-hole
for 1/16" OD tubing



1593
ZDV Union
0.050" thru-hole
for 1/8" OD tubing

NOTE

It is possible to order the products on this page without the fittings. Simply use a -01 at the end of the product number to order the union body without fittings.

	Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	VHP STAINLESS STEEL ZDV UNIONS						
	1593	Stainless Steel Union for 1/8" OD Tubing	1/4-28 Coned	(2) C-235/C-236	0.050" (1.25 mm)	1.48 µL	20,000 psi (1,380 bar)
★	**U-402**	Stainless Steel Union for 1/16" OD Tubing	10-32 Coned	(2) U-400/U-401	0.020" (0.50 mm)	0.13 µL	20,000 psi (1,380 bar)
★	**U-411**	Stainless Steel Union for 1/16" OD Tubing	10-32 Coned	(2) U-400/U-401	0.007" (178 µm)	13 nL	20,000 psi (1,380 bar)
★	**U-435**	Stainless Steel Union for 1/16" OD Tubing	10-32 Coned	(2) U-400/U-401	0.010" (0.25 mm)	20 nL	20,000 psi (1,380 bar)
	U-438	Stainless Steel Union for 1/16" OD Tubing	10-32 Coned	(2) U-400/U-401, (1) P-554 Gauge Plug	0.067" (1.70 mm)	Near 0 µL	20,000 psi (1,380 bar)
	UH-402	VHP+ Stainless Steel Union for 1/16" OD Tubing	10-32 Coned	(2) VHP-200	0.010" (0.25 mm)	20 nL	30,000 psi (2,070 bar)
	VICI (VALCO) COMPATIBLE ZDV UNION						
★	**U-322**	Stainless Steel Union for 1/16" OD Tubing	10-32 Coned	(2) U-320/U-321	0.020" (0.50 mm)	0.15 µL	20,000 psi (1,380 bar)
	WATERS® COMPATIBLE ZDV UNION						
	U-412	Stainless Steel Union for 1/16" OD Tubing	10-32 Coned	(2) U-410/U-401	0.020" (0.50 mm)	0.10 µL	20,000 psi (1,380 bar)

VHP Unions for Capillary Tubing

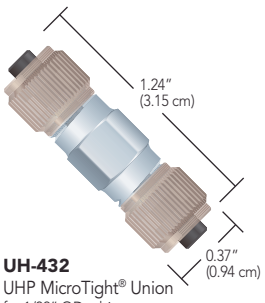
- Featuring stainless steel bodies and PK/PEEK fittings
- Pressure rated up to 15,000 psi (1,034 bar)
- Options to direct-connect both 1/32" OD tubing and 360 µm OD tubing

Upchurch Scientific® has expanded its line of specialized fittings and connectors for UHPLC applications to include several innovative unions and adapters.

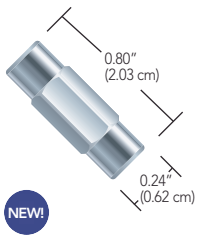
Two of these products — the UH-432 and UH-436 — follow the design of our popular Mini MicroFilters (see page 162) and allow a convenient union between either 1/32" OD tubing or 360 µm OD tubing. Each features a stainless steel union body and a unique stainless steel union capsule, enabling both excellent chemical compatibility as well as conductivity, making these a great choice for electrical interfacing in certain LC-MS applications. Each is also coupled with direct-connect ferrules made from our proprietary PEEK polymer blend (PK), allowing tubing connections up to 15,000 psi (1,034 bar). *(Please Note: While these connectors can be used at elevated pressures, they are not recommended for applications above 100 °C.)*

The UH-632 is a more traditionally designed connector, incorporating internally threaded ports. The union (UH-632) features a true ZDV (zero dead volume) connection between both tubes. This unique product is coupled with our one-piece Ultra-High Performance Fingertight fittings manufactured from our proprietary PEEK polymer blend, allowing them to be used in high temperature applications (up to 200 °C) at pressures up to 6,000 psi (414 bar) — or use these connectors at room temperature up to 15,000 psi (1,034 bar)!

The 1959-01 is a new VHP union designed to accept the popular M4x0.7 threaded fittings for 1/32" OD tubing, made popular by Rheodyne®. These unions will work nicely with both the VHP-900 fittings (found on page 7) as well as the reusable VHP-920 (found on page 6).

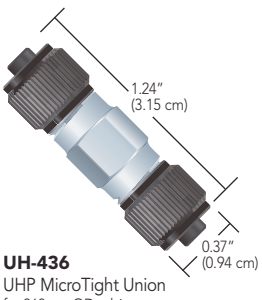


UH-432
UHP MicroTight® Union
for 1/32" OD tubing
with fittings and capsule union included

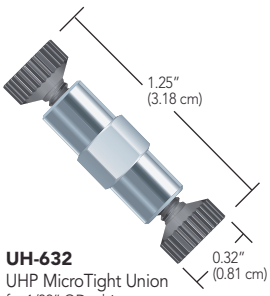


NEW!

1959-01
UHP MicroTight® Union
for 1/32" OD tubing



UH-436
UHP MicroTight Union
for 360 µm OD tubing
with fittings and capsule union included

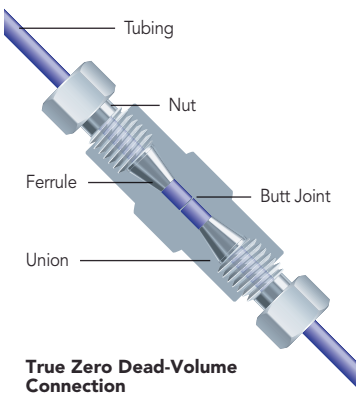


UH-632
UHP MicroTight Union
for 1/32" OD tubing
with fittings included

APPLICATION NOTE

What is a True ZDV Union?

True zero dead volume (ZDV) unions are designed so that the two joined pieces of tubing butt perfectly together as shown in the image to the right. These products have no swept volume contained within the union body. The fluid moves directly from one tube into another in this type of connector.



True Zero Dead-Volume Connection

When using true ZDV unions, it is important to take care to ensure connecting tubing has burr-free 90 degree ends. Find tubing cutters on page 74 to assist with cleanly cutting polymer and fused silica tubing. Gauge plugs are supplied with True ZDV Unions to assist with assembly. With the gauge plug inserted into one side of the union, a hard stop is created for the tubing to bottom out against as it is connected to the opposite port. The gauge plug is removed and then the second piece of tubing is connected, using the first piece of tubing to bottom out against resulting in the two tubes joined together in the center of the union.

ORDER ONLINE

RELATED PRODUCTS

- Find replacement VHP fittings on page 9.
- Find Fused Silica tubing on page 67.
- Find 1/32" OD Stainless Steel tubing on page 64–65.
- To achieve 15,000 psi (1,034 bar) with the female threaded fittings used with some of these products, use the P-278 extender tool found on page 8.

	Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	VHP UNIONS FOR CAPILLARY TUBING						
★	**UH-432**	VHP Union for 1/32" OD Tubing, PEEK/SST	5/16-24 Coned	(2) PK-112, (2) P-416	0.006" (0.150 mm)	5 nL	15,000 psi (1,034 bar)
	UH-436	VHP Union for 360 µm OD Tubing, PEEK/SST	5/16-24 Coned	(2) PK-152, (2) P-416BLK	0.006" (0.150 mm)	5 nL	15,000 psi (1,034 bar)
	UH-632	VHP True ZDV Union for 1/32" OD Tubing, PEEK/SST	6-32 Coned	(2) PK-126, (1) P-553 Gauge Plug	N/A	N/A	15,000 psi (1,034 bar)
NEW!	**1959-01**	VHP Union for 1/32" OD Tubing, SST	M4x0.7	N/A (Fittings must be ordered separately)	0.007" (178 µm)	16 nL	30,000 psi (2,070 bar)

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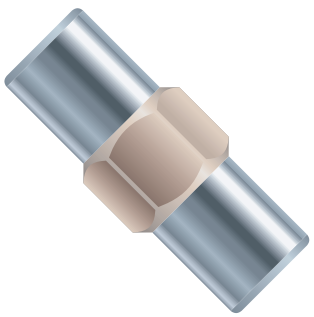
New Bio-Inert UHPLC Unions

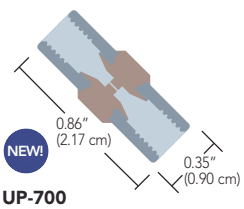
- Unique, Patent-Pending Process allows a fully-PEEK fluid contact area combined with the strength of stainless steel
- Pressure rated to 1,200 bar (17,400 psi)
- Two inner diameters available: 0.008" and 0.016"

Upchurch Scientific® introduces two new unions specifically engineered for Bio-Inert UHPLC applications. Combining the physical strength of 316 stainless steel with the inertness and biocompatibility of an all-PEEK fluid pathway, these unions will work well in applications where pressures reach up to 17,400 psi (1,200 bar) — without allowing metal contact by the fluid.

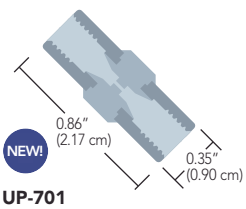
Neither union comes with fittings, but can be paired successfully with any 10-32 coned fitting that uses a polymer nose or ferrule.

Note: All-stainless steel fittings should NOT be used with these unions, as they will damage the internal conical seat.





UP-700
Bio-Inert UHPLC Union
0.008" thru-hole
for 1/16" OD tubing

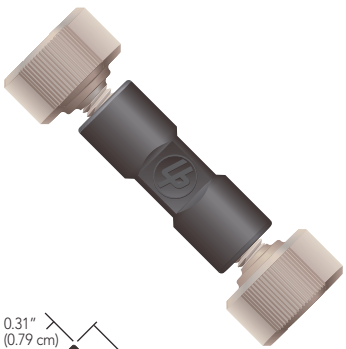


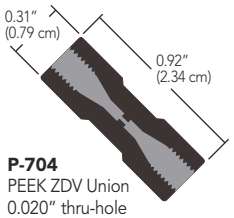
UP-701
Bio-Inert UHPLC Union
0.016" thru-hole
for 1/16" OD tubing

Biocompatible

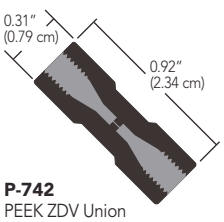
PEEK ZDV Unions

Upchurch Scientific PEEK zero-dead-volume (ZDV) Unions come complete with two F-300 Fingertight Fittings for 1/16" OD tubing and are pressure rated to 5,000 psi (344 bar).

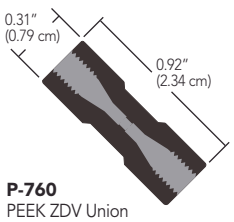




P-704
PEEK ZDV Union
0.020" thru-hole
with F-300 Fittings



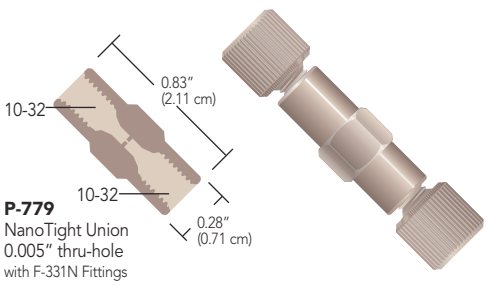
P-742
PEEK ZDV Union
0.010" thru-hole
with F-300 Fittings



P-760
PEEK ZDV Union
0.050" thru-hole
with F-300 Fittings

NanoTight™ Union

This Upchurch Scientific NanoTight Union improves capillary tubing connections in several ways. The internal design of the union greatly reduces the incidence of tubing misalignment. When using 1/16" OD tubing sleeves (found on page 19) to connect capillary tubing, the webbed thru-hole minimizes breaking of fused silica while adding only miniscule swept volume. The results are fewer blockages, fewer flow rate reductions and fewer back pressure problems.

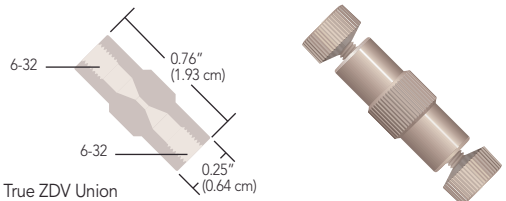


P-779
NanoTight Union
0.005" thru-hole
with F-331N Fittings

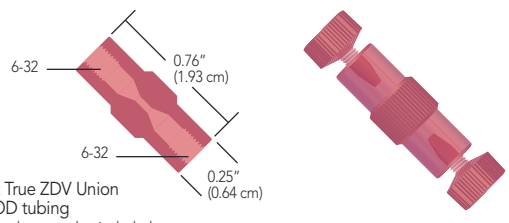
	Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	BIO-INERT UHPLC UNIONS						
NEW!	**UP-700**	Bio-Inert UHPLC Union for 1/16" OD Tubing, Natural (Tan)	10-32 Coned	N/A	0.008" (0.20 mm)	0.05 µL	17,400 psi (1,200 bar)
NEW!	**UP-701**	Bio-Inert UHPLC Union for 1/16" OD Tubing, Gray	10-32 Coned	N/A	0.016" (0.40 mm)	0.20 µL	17,400 psi (1,200 bar)
	PEEK ZDV UNIONS						
★	**P-704**	PEEK Union for 1/16" OD Tubing	10-32 Coned	(2) F-300	0.020" (0.50 mm)	0.28 µL	5,000 psi (344 bar)
★	**P-742**	PEEK Union for 1/16" OD Tubing	10-32 Coned	(2) F-300	0.010" (0.25 mm)	0.07 µL	5,000 psi (344 bar)
★	**P-760**	PEEK Union for 1/16" OD Tubing	10-32 Coned	(2) F-300	0.050" (1.25 mm)	1.2 µL	5,000 psi (344 bar)
	NANOTIGHT UNION						
★	**P-779**	PEEK NanoTight Union for 1/16" OD Tubing and Tubing Sleeves	10-32 Coned	(2) F-331N	0.005" (125 µm)	8 nL	5,000 psi (344 bar)

MicroTight® Connectors for Capillary Tubing

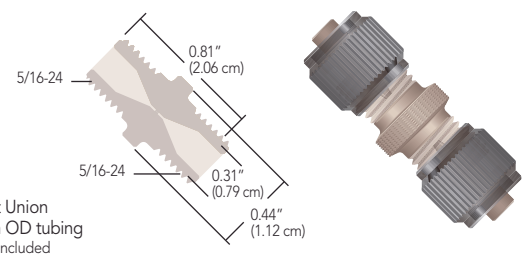
Connect two pieces of capillary tubing with these Upchurch Scientific® PEEK MicroTight Connectors. The True ZDV Unions allow two pieces of tubing to connect directly to each other — using the included gauge plug to ensure proper alignment. The standard union and elbow both feature a 0.006" (0.150 mm) thru-hole, adding only a small amount of additional flow-path volume to help ensure proper chromatographic results. For MicroTight unions designed for UHPLC applications, see page 37.



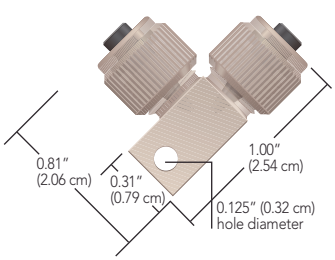
P-720
MicroTight True ZDV Union
for use with MicroTight Sleeves
with fittings and gauge plug included



P-771
MicroTight True ZDV Union
for 1/32" OD tubing
with fittings and gauge plug included



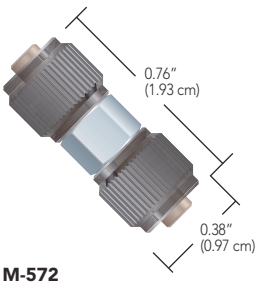
P-772
MicroTight Union
for 360 µm OD tubing
with fittings included



P-874
MicroElbow for
MicroTight Tubing Sleeves
with fittings included

Conductive MicroTight Union

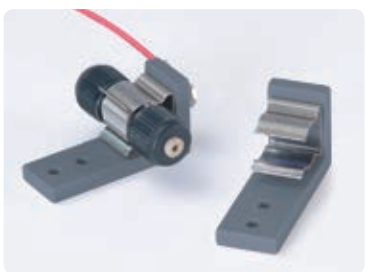
The Upchurch Scientific Conductive MicroTight Union manufactured by IDEX Health & Science provide an excellent opportunity to introduce voltage into an electrospray or capillary electrophoresis system. With an extremely low internal volume of 16 nL, this union can be placed inline with 360 µm OD capillary tubing. Mount and apply voltage to these unions using our Insulating Mounting Bracket below.



M-572
Conductive MicroTight Union
for 360 µm OD tubing
with fittings and Capsule Union included

Insulating Mounting Bracket

Use our Insulating Mounting Bracket to easily integrate the Conductive MicroTight Union (shown above) or our Conductive Mini MicroFilters (on page 162) into your system or lab.



Insulating Mounting Bracket, shown with lead wire and Conductive MicroTight Union, not included.

The product snaps into place. Voltage from your lead wire is conducted through the attaching stainless steel nut and screw (included), then onto the mounted product via the stainless steel clip.

The bracket's base includes two holes (#2 screw clearance) for easy mounting onto any lab surface. Dimensions are 1.25" L x 0.45" W x 0.63" H.

APPLICATION NOTE

For an example of using a Conductive MicroTight Union in a pressure driven ion preconcentration application see: "Self-Sealed Vertical Polymeric Nanoporous Junctions for High Throughput Nanofluidic Applications."

Sun Jae Kim and Jong Yoon Han. Analytical Chem. 2008, 80: 3507-3511.

	Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	MICROTIGHT UNIONS						
★	**P-720**	PEEK True ZDV Union for MicroTight Sleeves	6-32 Coned	(2) F-125, (1) P-553	N/A	N/A	4,000 psi (276 bar)
★	**P-771**	PEEK True ZDV Union for 1/32" OD Tubing	6-32 Coned	(2) F-126S, (1) P-553	N/A	N/A	5,000 psi (345 bar)
★	**P-772**	PEEK Union for 360 µm OD Tubing	5/16-24 Coned	(2) F-152, (2) P-416BLK	0.006" (0.150 mm)	5 nL	5,000 psi (345 bar)
	P-874	PEEK MicroElbow for MicroTight Sleeves	5/16-24 Coned	(2) F-172, (2) P-416	0.006" (0.150 mm)	20 nL	4,000 psi (276 bar)
	REPLACEMENT GAUGE PLUGS (TO ACHIEVE TRUE ZDV CONNECTIONS WITH OUR P-720 AND P-771 UNIONS)						
	P-553	Gauge Plug, Delrin®	6-32 Coned	N/A	N/A	N/A	N/A
	CONDUCTIVE MICROTIGHT UNIONS						
	M-572	Conductive Union for 360 µm OD Tubing, PEEK/SST	5/16-24 Coned	(2) F-152, (2) P-416BLK, (1) M-128NF	0.011" (0.279 mm)	16 nL	5,000 psi (345 bar)
	INSULATING MOUNTING BRACKET						
	M-447	Insulating Mounting Bracket	N/A	N/A	N/A	N/A	N/A

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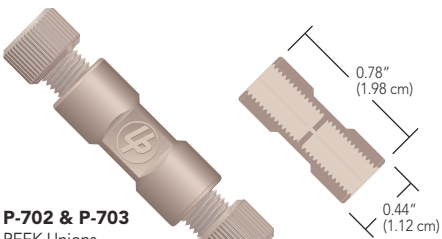
Low Pressure Unions

- Manufactured from PEEK, ETFE, Delrin®, polypropylene, or PCTFE
- Available with 1/4-28, M6, or 10-32 flat-bottom threads

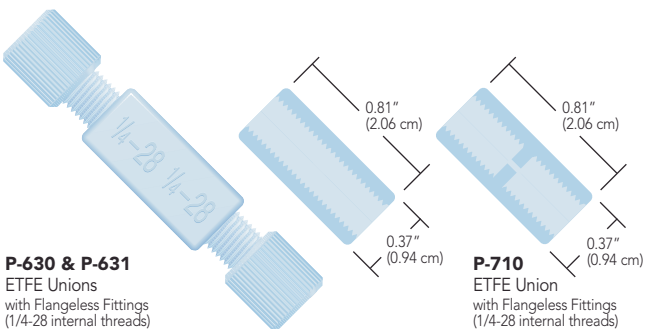
Upchurch Scientific® Low Pressure Unions are available in a variety of polymers, providing several low-cost and chemically-resistant options. The union assemblies below include fittings as shown in the table. The unions in the right column do not include fittings, allowing for customizing the fitting selection. In some cases, a union can be configured to connect two different tubing sizes—for example, if 1/4-28 Flangeless fittings for 1/16" and 1/8" OD tubing were selected from pages 25 and 26 they can be used with the P-603 union to connect the two different tubing sizes.

Low Pressure PEEK Union Assemblies



P-702 & P-703
PEEK Unions
with Flangeless Fittings
(1/4-28 internal threads)

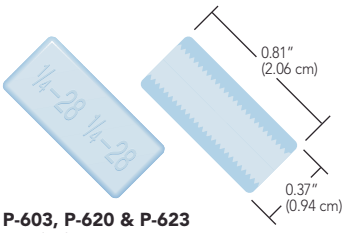
Low Pressure ETFE Union Assemblies



P-630 & P-631
ETFE Unions
with Flangeless Fittings
(1/4-28 internal threads)

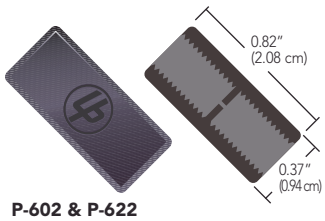
P-710
ETFE Union
with Flangeless Fittings
(1/4-28 internal threads)

Low Pressure Standard Unions



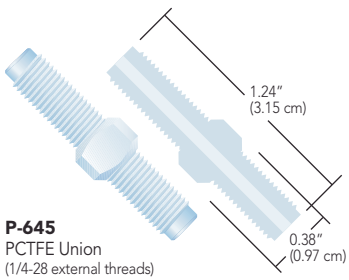
P-603, P-620 & P-623
Standard Unions
(1/4-28 internal threads)

Low Pressure Metric Unions



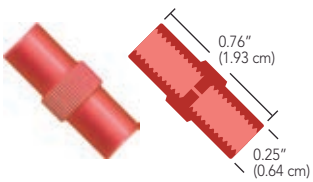
P-602 & P-622
Metric Unions
(M6 internal threads)

Low Pressure Male Union



P-645
PCTFE Union
(1/4-28 external threads)

VacuTight™ Union



P-845-01
PEEK Union
(10-32 internal threads)

Biocompatible

RELATED PRODUCTS

- To use connectors in higher pressure applications, simply replace the provided fittings with Super Flangeless™ Nuts and Ferrules, found on pages 21–23.
- Use any of the 10-32 flat-bottom fittings on page 21 and 28 to make an inline connection with our VacuTight Union. This product is designed for use with 1/16" OD tubing.

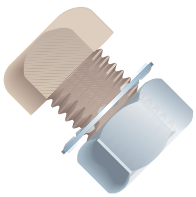
	Part No.	Description	Color	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	PEEK UNION ASSEMBLIES							
★	**P-702**	PEEK Union for 1/16" OD Tubing	Natural	1/4-28 FB	(2) XP-235	0.020" (0.50 mm)	0.41 µL	1,000 psi (69 bar)
★	**P-703**	PEEK Union for 1/8" OD Tubing	Natural	1/4-28 FB	(2) XP-335	0.050" (1.25 mm)	2.57 µL	1,000 psi (69 bar)
	ETFE UNION ASSEMBLIES							
	P-630	ETFE True ZDV Union for 1/16" OD Tubing	Natural	1/4-28 FB	(2) P-200N/P-245	N/A	N/A	1,000 psi (69 bar)
	P-631	ETFE True ZDV Union for 1/8" OD Tubing	Natural	1/4-28 FB	(2) P-300N/P-345	N/A	N/A	1,000 psi (69 bar)
	P-710	ETFE Union for 1/16" OD Tubing	Natural	1/4-28 FB	(2) XP-245	0.030" (0.75 mm)	0.93 µL	1,000 psi (69 bar)
	STANDARD UNIONS							
★	**P-603**	Delrin True ZDV Standard Union	Natural	1/4-28 FB	N/A	N/A	N/A	N/A*
★	**P-620**	Polypropylene True ZDV Standard Union	Natural	1/4-28 FB	N/A	N/A	N/A	N/A*
★	**P-623**	ETFE True ZDV Standard Union	Natural	1/4-28 FB	N/A	N/A	N/A	N/A*
	METRIC UNIONS							
	P-602	Delrin Metric Union	Black	M6 FB	N/A	0.020" (0.50 mm)	0.41 µL	N/A*
	P-622	ETFE Metric Union	Blue	M6 FB	N/A	0.020" (0.50 mm)	0.41 µL	N/A*
	MALE UNION							
★	**P-645**	PCTFE Male Union	Natural	1/4-28 FB	N/A	0.062" (1.60 mm)	61.3 µL	500 psi (34 bar)
	VACUTIGHT UNION							
	P-845-01	PEEK Union for 1/16" OD Tubing	Red	10-32 FB	N/A	0.020" (0.50 mm)	0.20 µL	N/A*

** Pressure Rating depends on Fittings selected. See pressure rating for fittings on appropriate page.*
FB = Flat-Bottom

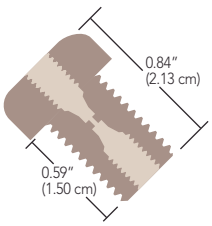
Bulkhead Unions

- Designed for plumbing tubing through equipment housing
- For use with standard 10-32 coned or 1/4-28 flat-bottom threaded fittings

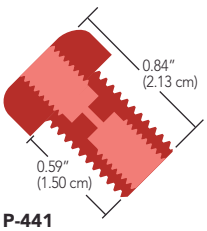
Thread Upchurch Scientific® PEEK Bulkhead Unions directly through your equipment housing to connect internal tubing to the outside. Each union has unique 3/8-24 external threads and comes complete with a stainless steel nut and lock washer to hold it in place. Requires a 3/8" hole to mount. The recommended torque limit for these unions is 15 in.– lbs (1.7 N·m).



Bulkhead Union
includes stainless steel nut/lock washer



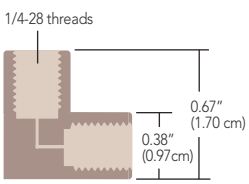
P-440
10-32 internal threads



P-441
1/4-28 internal threads

Elbow Connectors

Use these Elbow Connectors to easily navigate tight corners. One Elbow is designed for use with 1/16" OD tubing and has a 0.020" (0.50 mm) thru-hole. Use 1/8" OD tubing with the other Elbow, which has a 0.062" (1.6 mm) thru-hole. Both come complete with 1/4-28 PEEK nuts and ETFE ferrules, and are pressure rated to 1,000 psi (69 bar).

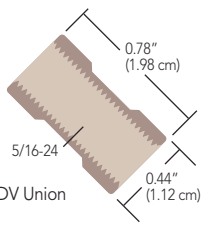


P-430
PEEK Elbow
comes with Flangeless Fittings

Large Bore Union

- 5/16-24 flat-bottom threads

Use any of the 5/16-24 fittings on page 55 and the appropriate ferrule to create a true zero dead volume (ZDV) connection with the P-134 Union.



P-134
PEEK ZDV Union

RELATED PRODUCTS

- Stainless Steel Bulkhead Unions are also available. Please contact us for more information.
- To use Elbows in higher pressure applications, simply replace the provided fittings with Super Flangeless™ Nuts and Ferrules, found on pages 21–23.

	Part No.	Description	Threads	Color	Includes	Thru-hole	Swept Volume
	BULKHEAD UNIONS						
★	**P-440**	PEEK Bulkhead Union	10-32 Coned	Natural	(1) SST Nut/Washer	0.020" (0.50 mm)	1.9 µL
★	**P-441**	PEEK Bulkhead Union	1/4-28 Flat-Bottom	Red	(1) SST Nut/Washer	0.040" (1.00 mm)	2.9 µL
★	**P-441N**	PEEK Bulkhead Union	1/4-28 Flat-Bottom	Natural	(1) SST Nut/Washer	0.040" (1.00 mm)	2.9 µL
	ELBOW CONNECTORS						
	P-430	PEEK Elbow for 1/16" OD Tubing	1/4-28 Flat-Bottom	Natural	(2) XP-235	0.020" (0.50 mm)	1.4 µL
	P-432	PEEK Elbow for 1/8" OD Tubing	1/4-28 Flat-Bottom	Natural	(2) XP-335	0.062" (1.60 mm)	13.6 µL
	LARGE BORE UNION						
	P-134	PEEK True ZDV Union	5/16-24 Flat-Bottom	Natural	N/A	N/A	N/A

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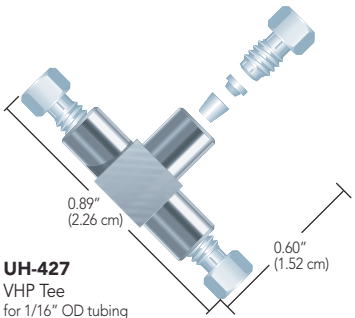
VHP Tee for 1/16" OD Tubing

IDEX Health & Science offers this Very High Pressure (VHP) Tee Connector, designed to bring three pieces of tubing together. The all-316 stainless steel connector is designed for 1/16" OD tubing and is pressure rated to 30,000 psi (2,070 bar).



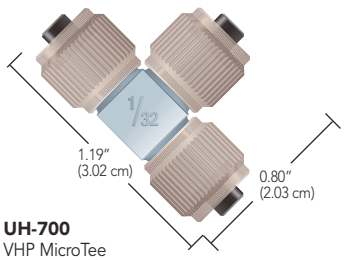
UH-427
VHP Tee
for 1/16" OD tubing
with fittings included

VHP Tees & Crosses for Capillary Tubing

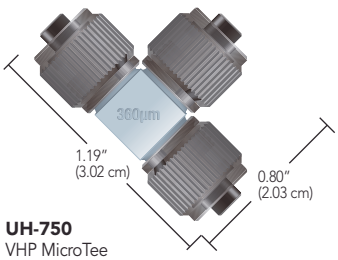
- Direct-connect either 360 µm or 1/32" OD tubing — no sleeves required!
- Available in both tee and cross configurations
- Pressure rated to 15,000 psi (1,034 bar)

To help facilitate multi-port connections in UHPLC applications, Upchurch Scientific® has developed a line of MicroTees and MicroCrosses, manufactured from stainless steel and featuring small thru-holes and very low internal volume. Additionally, the stainless steel construction allows these products to be used in applications where electrical conductivity is desired.

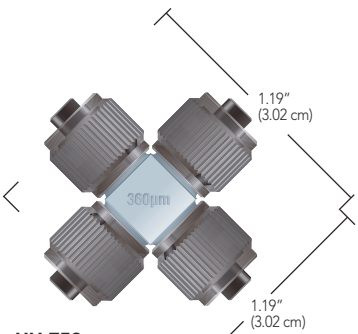
Included with the MicroTees and MicroCrosses are the VHP MicroFerrules found on page 9. The P-278 Extender Tool on page 33 can be used to tighten the female nuts that are included with these connectors.



UH-700
VHP MicroTee
for 1/32" OD tubing
with fittings included



UH-750
VHP MicroTee
for 360 µm OD tubing
with fittings included



UH-752
VHP MicroCross
for 360 µm OD tubing
with fittings included

APPLICATION NOTE

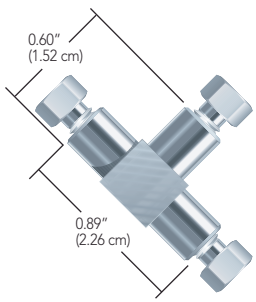
Why 1/32" OD Tubing and 360 µm OD Tubing?

IDEX Health & Science has focused strongly on the development of a variety of connectors and accessories for 1/32" OD tubing and 360 µm OD tubing. We have focused on these specific sizes due to their overwhelming popularity in analytical instruments, especially where micro and nano-scale analyses are being performed. By creating products designed for these popular sizes, the overall connection is easier to make and generally holds to increased pressures over connections where tubing sleeves are involved.

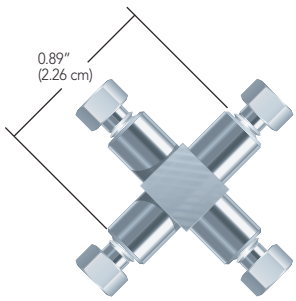
	Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	VHP TEE FOR 1/16" OD TUBING						
	UH-427	VHP Tee for 1/16" OD Tubing, SST	10-32 Coned	(3) VHP-200	0.020" (0.50 mm)	0.57 µL	30,000 psi (2,070 bar)
	VHP TEES & CROSSES FOR CAPILLARY TUBING						
★	**UH-700**	VHP MicroTee for 1/32" OD Tubing, PEEK/SST	5/16-24 Coned	(3) PK-112, (3) P-416	0.010" (0.25 mm)	84 nL	15,000 psi (1,034 bar)
	UH-750	VHP MicroTee for 360 µm OD Tubing, PEEK/SST	5/16-24 Coned	(3) PK-152, (3) P-416BLK	0.010" (0.25 mm)	84 nL	15,000 psi (1,034 bar)
	UH-752	VHP MicroCross for 360 µm OD Tubing, PEEK/SST	5/16-24 Coned	(4) PK-152, (4) P-416BLK	0.010" (0.25 mm)	101 nL	15,000 psi (1,034 bar)

Stainless Steel Tees & Crosses

These 316 stainless steel connectors come complete with 10-32 stainless steel fittings for use with 1/16" OD tubing and are rated to 20,000 psi (1,380 bar). They are compatible with any 10-32 coned threaded fittings.



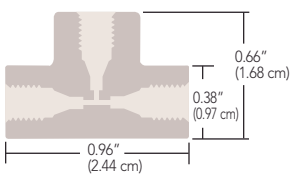
U-428 Stainless Steel Tee
0.020" thru-hole
with U-400 and U-401 Fittings



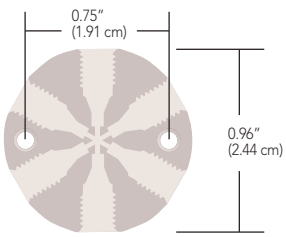
U-430 Stainless Steel Cross
0.020" thru-hole
with U-400 and U-401 Fittings

PEEK 7-Port Manifold

Combine several streams into one or split one fluid stream into several. This PEEK 7-Port Manifold comes complete with F-331 Fingertight Fittings for 1/16" OD tubing and offers a pressure rating of 5,000 psi (345 bar). Seal unused ports with any of our polymer 10-32 coned plugs on page 32.



Side View

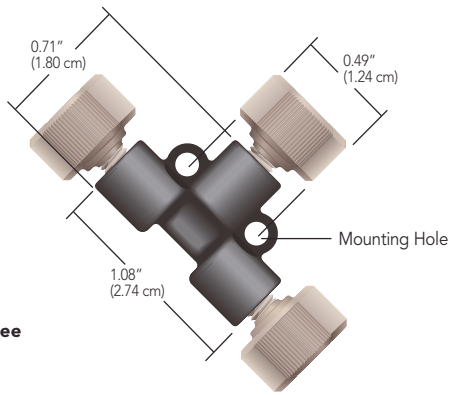


Top View

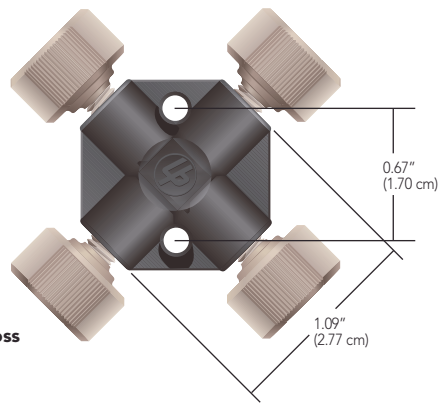
P-170
PEEK 7-Port Manifold
0.020" thru-holes
with F-331 Fittings

PEEK Tees & Crosses

Our PEEK Tees and Crosses include high pressure F-300 PEEK Fingertight Fittings — allowing maximum operating pressures to 3,500 psi (241 bar) when used with 1/16" OD PEEK or stainless steel tubing.



P-727 PEEK Tee
0.020" thru-hole
with F-300 Fittings



P-729 PEEK Cross
0.020" thru-hole
with F-300 Fittings

Biocompatible

	Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	VHP TEE FOR 1/16" OD TUBING						
★	**U-428**	Stainless Steel Tee for 1/16" OD Tubing	10-32 Coned	(3) U-400, (3) U-401	0.020" (0.50 mm)	0.57 µL	20,000 psi (1,380 bar)
★	**U-429**	Stainless Steel Tee for 1/16" OD Tubing	10-32 Coned	(3) U-400, (3) U-401	0.040" (1.00 mm)	2.1 µL	20,000 psi (1,380 bar)
	U-430	Stainless Steel Cross for 1/16" OD Tubing	10-32 Coned	(4) U-400, (4) U-401	0.020" (0.50 mm)	0.72 µL	20,000 psi (1,380 bar)
★	**U-431**	Stainless Steel Cross for 1/16" OD tubing	10-32 Coned	(4) U-400, (4) U-401	0.040" (1.00 mm)	2.5 µL	20,000 psi (1,380 bar)
	PEEK MANIFOLD						
	P-170	PEEK 7-Port Manifold for 1/16" OD Tubing	10-32 Coned	(7) F-331	0.020" (0.50 mm)	2.2 µL	5,000 psi (345 bar)
	PEEK TEES AND CROSSES						
★	**P-727**	PEEK Tee for 1/16" OD Tubing	10-32 Coned	(3) F-300	0.020" (0.50 mm)	0.57 µL	3,500 psi (241 bar)
	P-728	PEEK Tee for 1/16" OD Tubing	10-32 Coned	(3) F-300	0.050" (1.25 mm)	3.0 µL	3,500 psi (241 bar)
	P-729	PEEK Cross for 1/16" OD Tubing	10-32 Coned	(4) F-300	0.020" (0.50 mm)	0.72 µL	3,500 psi (241 bar)

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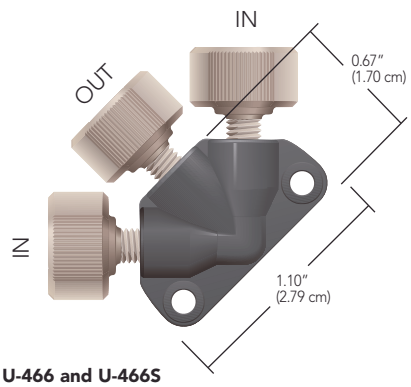
Static Mixing Tees

- PEEK body with two-piece fingertight fittings
- Low swept volume

Upchurch Scientific® Static Mixing Tees are ideal for microbore or analytical gradient HPLC. They have a low swept volume of 2.2 µL (includes frit volume) and are designed for flow rates of 0.5 to 3 mL/min and a maximum pressure of 5,000 psi (345 bar). The back pressure caused by the tee is typically only 10 to 20 psi (0.7 to 1.4 bar) at these flow rates. The thru-holes are 0.020" (0.50 mm) and the center port features a 10 µm UHMWPE or stainless steel frit that aids mixing.

NOTE

- Turbulent mixing of solvents often increases outgassing. To maintain a bubble-free fluid pathway, we recommend solvent degassing when using this product.
- The frit incorporated into our U-466 and U-466S Static Mixing Tees is not replaceable. If it becomes clogged, the Mixing Tee must be replaced.

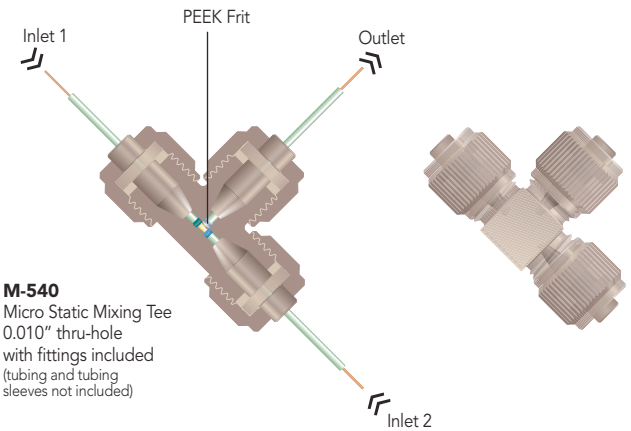


U-466 and U-466S Static Mixing Tees
with F-300 Fingertight Fittings for 1/16" OD tubing

Micro Static Mixing Tee

- Constructed of inert PEEK and PCTFE
- Low swept volume of 0.95 µL
- Designed for flow rates of 20–250 µL/min

The Upchurch Scientific® Micro Static Mixing Tee utilizes a specifically engineered internal geometry to efficiently mix two fluid streams into one combined stream. The center port also features a 0.5 µm porosity PEEK polymer frit to aid in mixing. This frit adds a maximum of 20 psi (1.4 bar) back pressure to most systems (within the stated flow rate range). The Mixing Tee handles a maximum pressure of 5,000 psi (345 bar) when directly connecting 1/16" OD tubing, or up to 4,000 psi (276 bar) with capillary tubing when using our NanoTight™ Fittings and Tubing Sleeves (pages 17 and 19).



M-540
Micro Static Mixing Tee
0.010" thru-hole
with fittings included
(tubing and tubing sleeves not included)

RELATED PRODUCTS

- See the Systec® Vacuum Degassing Systems on pages 178.
- Our standard Static Mixing Tees are designed for flow rates from 0.5 mL/min to 3 mL/min.

	Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	STATIC MIXING TEE						
	U-466	PEEK Static Mixing Tee for 1/16" OD Tubing, 10 µm UHMWPE Frit	10-32 Coned	(3) F-300	0.020" (0.50 mm)	2.2 µL	5,000 psi (345 bar)
★	**U-466S**	PEEK Static Mixing Tee for 1/16" OD Tubing, 10 µm SST Frit	10-32 Coned	(3) F-300	0.020" (0.50 mm)	2.2 µL	5,000 psi (345 bar)
	MICRO STATIC MIXING TEE						
★	**M-540**	PEEK Micro Static Mixing Tee, for 1/16" OD Tubing	5/16-24 Coned	(3) F-132/P-416	0.010" (0.250 mm)	0.95 µL	5,000 psi (345 bar)

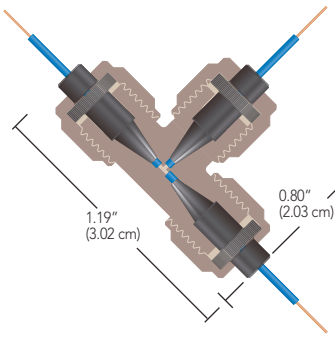
MicroTee & Cross for Capillary Tubing

- Direct connect 1/16", 1/32", 360 µm OD tubing, plus other capillary tubing
- Low swept volume

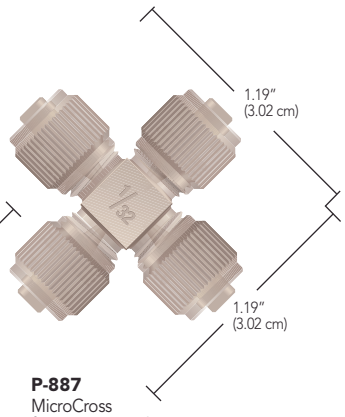
Use Upchurch Scientific® MicroTees and MicroCrosses to join capillary tubing. All of these products are made entirely of PEEK and have 0.006" (0.150 mm) thru-holes, with resulting swept volumes ranging from 29 to 81 nL.

NOTE

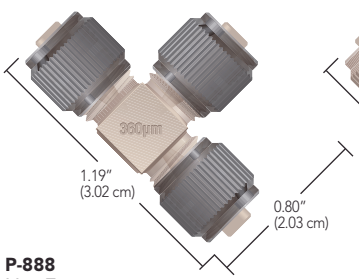
- Use only the ferrules supplied with each connector — they are not interchangeable. Replacement ferrules and female nuts are available on page 18. For MicroUnions, MicroTees, and MicroCrosses for UHPLC applications, see page 42.



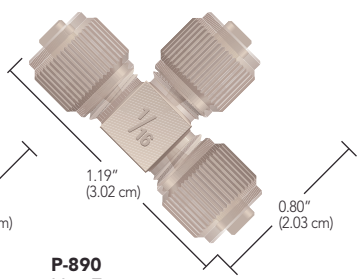
P-775
MicroTee for MicroTight® Tubing Sleeves
0.006" thru-holes
with fittings included
(tubing sleeves not included)



P-887
MicroCross
for 1/32" OD tubing
0.006" thru-holes
with fittings included



P-888
MicroTee
for 360 µm OD tubing
0.006" thru-holes
with fittings included



P-890
MicroTee
for 1/16" OD tubing
0.006" thru-holes
with fittings included

Biocompatible

APPLICATION NOTE

Several researchers use our PEEK MicroTee to introduce ionizing voltage to their fluid stream just prior to a Mass Spectrometer[1]. MicroTees are well suited for this application due to advantageous internal geometry and PEEK polymer's electrical resistance. The materials required for this setup are as follows: one gold or platinum conducting wire, one P-775 or P-875 MicroTee (this page), one MicroTight Tubing Sleeve (page 19) for the conducting wire (as needed to accommodate wire diameter), and at least two more MicroTight Tubing Sleeves (page 19) to connect your capillary tubing.

To set up a similar connection, first thread your wire through the appropriate tubing sleeve, if necessary, with the wire extending beyond both ends of the sleeve. Slip the female nut included with the MicroTee over the wire or sleeved wire, followed by the ferrule — ensuring the wire (and its sleeve) extends well past the end of the ferrule tip. Align the tip of the wire with the thru-hole of the MicroTee and gently insert the wire until it bottoms out. Now finger tighten the female nut into place. Attach your flow path tubing to the MicroTee's two other available ports, following the instructions provided with the MicroTee.

Begin fluid flow through the tee and apply voltage to the conducting wire lead. This setup typically provides effective electrospray ionization in applications having a flow rate of 100 µL/min or greater.

[1] *One such paper describing pioneering electrospray work:* ***Protein Identification at the Low Femtomole Level from Silver-Stained Gels Using a New Fritless Electrospray Interface for Liquid Chromatography-Microspray and Nanospray Mass Spectrometry.*** *Christine L. Gatlin, Gerd R. Kleemann, Lara G. Hays, Andrew J. Link, John R. Yates III (1998) Analytical Biochemistry 263, 93-101.*

	Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	MICROTEE, MICROCROSS AND MICROELBOW						
★	P-775	PEEK MicroTee for MicroTight Sleeves	5/16-24 Coned	(3) F-172, (3) P-416	0.006" (0.150 mm)	29 nL	4,000 psi (276 bar)
★	P-777	PEEK MicroCross for MicroTight Sleeves	5/16-24 Coned	(4) F-172, (4) P-416	0.006" (0.150 mm)	38 nL	4,000 psi (276 bar)
	P-875	PEEK MicroTee with Mounting Hole, for MicroTight Sleeves	5/16-24 Coned	(3) F-172, (3) P-416	0.006" (0.150 mm)	29 nL	4,000 psi (276 bar)
★	P-885	PEEK MicroTee for 1/32" OD Tubing	5/16-24 Coned	(3) F-112, (3) P-416	0.006" (0.150 mm)	29 nL	5,000 psi (345 bar)
	P-887	PEEK MicroCross for 1/32" OD Tubing	5/16-24 Coned	(4) F-112, (4) P-416	0.006" (0.150 mm)	38 nL	5,000 psi (345 bar)
★	P-888	PEEK MicroTee for 360 µm OD Tubing	5/16-24 Coned	(3) F-152, (3) P-416BLK	0.006" (0.150 mm)	29 nL	5,000 psi (345 bar)
	P-889	PEEK MicroCross for 360 µm OD Tubing	5/16-24 Coned	(4) F-152, (4) P-416BLK	0.006" (0.150 mm)	38 nL	5,000 psi (345 bar)
★	P-890	PEEK MicroTee for 1/16" OD Tubing	5/16-24 Coned	(3) F-132, (3) P-416	0.006" (0.150 mm)	58 nL	5,000 psi (345 bar)
	P-891	PEEK MicroCross for 1/16" OD Tubing	5/16-24 Coned	(4) F-132, (4) P-416	0.006" (0.150 mm)	81 nL	5,000 psi (345 bar)

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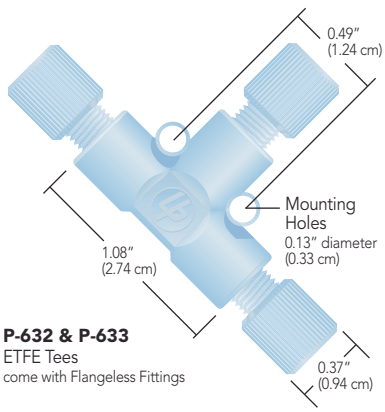
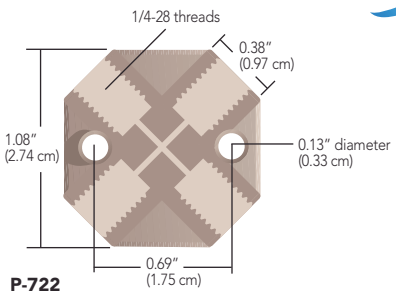
Low Pressure Tees & Crosses

Upchurch Scientific® Low Pressure Tees and Crosses manufactured by IDEX Health & Science are available in two inert polymers and can handle pressures to 500 psi (34 bar) or 1,000 psi (69 bar), depending upon the configuration of the products. Each is designed with handy mounting holes. All ETFE Tees and Crosses ship complete with 1/4-28 PFA Flangeless nuts and ETFE ferrules, while their PEEK polymer counterparts ship with 1/4-28 PEEK nuts and ETFE ferrules. Replacement fittings are located on pages 25 and 26.



P-632 & P-633
ETFE Tees
come with Flangeless Fittings

Biocompatible



P-722
PEEK Cross
comes with Flangeless Fittings

NOTE

- To order just the body of one of our tees and crosses without fittings, simply add a '-01' to the part number — e.g., P-632-01.

RELATED PRODUCTS

- Seal off unused ports with any of our 1/4–28 flat-bottom plugs found on page 32.
- To use the PEEK polymer versions of our Tees and Crosses in higher pressure applications, simply replace the provided fittings with Super Flangeless™ Nuts and Ferrules, found on pages 21–23.
- High Pressure Tees, Crosses, and a 7-Port Manifold (all with 10-32 threaded ports) are on page 43.

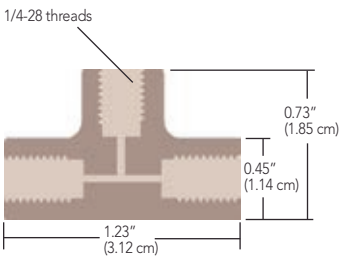
	Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	LOW PRESSURE TEES AND CROSSES						
★	P-632	ETFE Tee for 1/16" OD Tubing	1/4-28 Flat-Bottom	(3) P-245, (3) P-200N	0.020" (0.50 mm)	2.9 µL	1,000 psi (69 bar)
★	P-633	ETFE Tee for 1/8" OD Tubing	1/4-28 Flat-Bottom	(3) P-345, (3) P-300N	0.050" (1.25 mm)	17.5 µL	500 psi (34 bar)
	P-634	ETFE Cross for 1/16" OD Tubing	1/4-28 Flat-Bottom	(4) P-245, (4) P-200N	0.020" (0.50 mm)	3.8 µL	1,000 psi (69 bar)
	P-635	ETFE Cross for 1/8" OD Tubing	1/4-28 Flat-Bottom	(4) P-345, (4) P-300N	0.050" (1.25 mm)	22.8 µL	500 psi (34 bar)
★	P-712	PEEK Tee for 1/16" OD Tubing	1/4-28 Flat-Bottom	(3) XP-235	0.020" (0.50 mm)	2.9 µL	1,000 psi (69 bar)
★	P-713	PEEK Tee for 1/8" OD Tubing	1/4-28 Flat-Bottom	(3) XP-335	0.050" (1.25 mm)	17.5 µL	500 psi (34 bar)
★	P-714	PEEK Tee for 1/16" OD Tubing	1/4-28 Flat-Bottom	(3) XP-235	0.040" (1.00 mm)	11.4 µL	1,000 psi (69 bar)
	P-722	PEEK Cross for 1/16" OD Tubing	1/4-28 Flat-Bottom	(4) XP-235	0.020" (0.50 mm)	3.8 µL	1,000 psi (69 bar)
	P-723	PEEK Cross for 1/8" OD Tubing	1/4-28 Flat-Bottom	(4) XP-335	0.050" (1.25 mm)	22.8 µL	500 psi (34 bar)

Manifolds

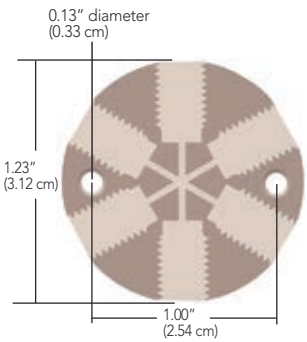
Choose a 5, 7, or 9 Port Manifold to combine several streams into one, or split one fluid stream into several. Each PEEK manifold comes complete with 1/4-28 Super Flangeless™ Fittings for either 1/16" or 1/8" OD tubing, with pressure ratings of 2,000 psi (138 bar) and 500 psi (34 bar), respectively.

A few useful applications include:

- Multiport mixing chamber
- Gas sparging splitting union
- Sample injection onto multi-well plates or a multiple direction flow path union



Side View



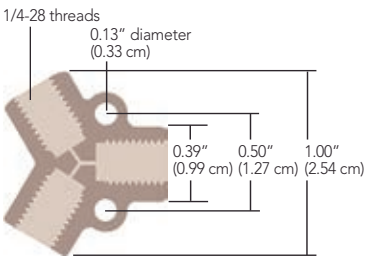
Top View

P-150
PEEK 7-Port Manifold
comes with Super Flangeless Fittings

Y Connectors

Upchurch Scientific® PEEK Y Connectors are designed to split a stream or join two streams together, just like a tee. However, the configuration of a tee can lead to turbulent flow and solvent outgassing, which increases baseline noise and reduces sensitivity. The geometry of a Y connector creates less turbulence and thus can improve analytical results.

All of these Y Connectors use 1/4-28 Flangeless fittings, except P-515 which uses 5/16-24 fittings (to accommodate larger tubing).



P-512
PEEK Y
comes with Flangeless Fittings

Biocompatible

	Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
	MANIFOLDS						
	Standard						
★	**P-150**	PEEK 7-Port Manifold for 1/16" OD Tubing	1/4-28 FB	(7) P-255, (7) P-250	0.040" (1.00 mm)	42.0 µL	1,000 psi (69 bar)
	P-154	PEEK 5-Port Manifold for 1/16" OD Tubing	1/4-28 FB	(5) P-255, (5) P-250	0.040" (1.00 mm)	22.3 µL	1,000 psi (69 bar)
	P-155	PEEK 5-Port Manifold for 1/8" OD Tubing	1/4-28 FB	(5) P-331, (5) P-359	0.062" (1.60 mm)	53.8 µL	500 psi (34 bar)
★	**P-190**	PEEK 9-Port Manifold for 1/8" OD Tubing	1/4-28 FB	(9) P-331, (9) P-359	0.062" (1.60 mm)	160 µL	500 psi (34 bar)
	P-191	PEEK 9-Port Manifold for 1/16" OD Tubing	1/4-28 FB	(9) P-255, (9) P-250	0.040" (1.00 mm)	139 µL	1,000 psi (69 bar)
	Y CONNECTORS						
★	**P-512**	PEEK Y for 1/16" OD Tubing	1/4-28 FB	(3) XP-235	0.020" (0.50 mm)	1.7 µL	1,000 psi (69 bar)
	P-513	PEEK Y for 1/8" OD Tubing	1/4-28 FB	(3) XP-335	0.040" (1.00 mm)	6.0 µL	500 psi (34 bar)
★	**P-514**	PEEK Y for 1/8" OD Tubing	1/4-28 FB	(3) XP-335	0.060" (1.50 mm)	13.6 µL	500 psi (34 bar)
	P-515	PEEK Y for 3/16" OD Tubing	5/16-24 FB	(3) XP-132	0.125" (3.20 mm)	47.7 µL	500 psi (34 bar)

FB = Flat-Bottom

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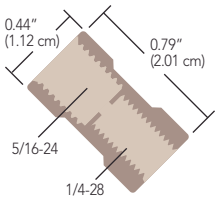
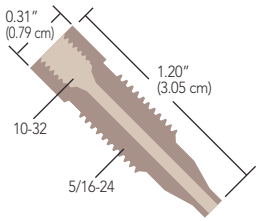
Threaded Adapters

- Threaded adapters in a variety of configurations
- Both English and Metric threaded adapters offered
- Bring together connectors with different threads
- Manufactured from inert polymers — PEEK, PCTFE, ETFE, and PTFE

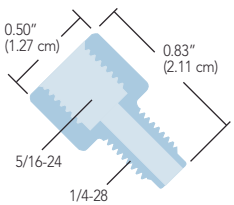
English Threaded Adapters



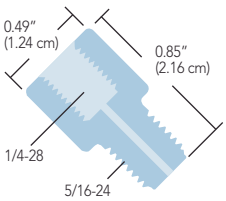
P-135
0.080" (2.05 mm) thru-hole



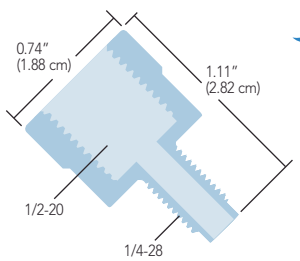
6000-076
0.066" (1.70 mm) thru-hole



P-681
0.125" (3.20 mm) thru-hole

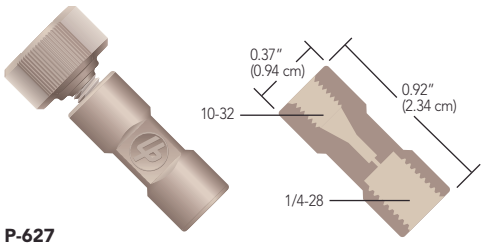


P-718
0.040" (1.00 mm) thru-hole

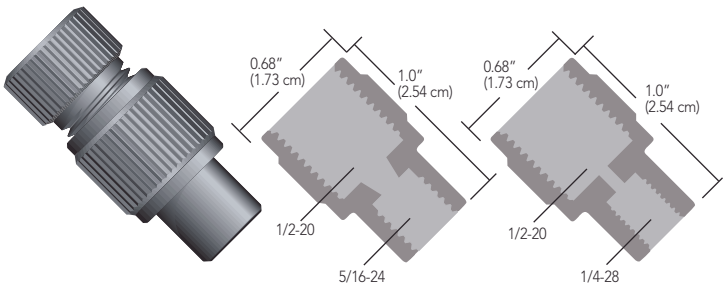


P-684
0.130" (3.30 mm) thru-hole

Biocompatible



P-627
0.020" (0.50 mm) thru-hole
Includes (1) F-300 for 1/16" OD tubing



U-659
Tapered thru-hole
Includes (1) U-650/U-655 for 1/4" OD tubing

U-665
0.063" (1.60 mm) thru-hole
Includes (1) U-650/U-655 for 1/4" OD tubing

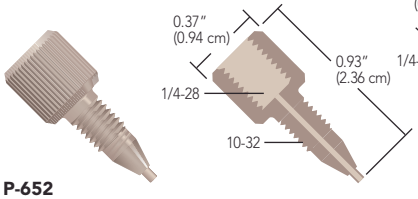
RELATED PRODUCTS

- Please refer to our Connections Reference Chart on page 35 for assistance with choosing the right product for your needs.
- Use the Rheodyne® 6000-076 Adapter to connect 1/16" OD tubing to the Rheodyne Preparative-Scale Injector Valve (page 132).

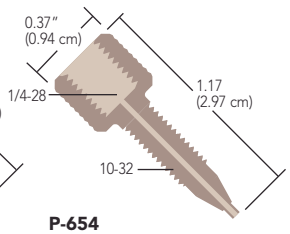
	Part No.	Description	Includes	Thru-hole	Swept Volume	Pressure Rating
	ENGLISH THREADED ADAPTERS					
	6000-076	PEEK Adapter, 5/16-24 C, M to 10-32 C, F	N/A	0.066" (1.70 mm)	49.8 µL	3,000 psi (207 bar)
	P-135	PEEK Adapter, 5/16-24 FB, F to 1/4-28 F	N/A	0.080" (2.05 mm)	4.1 µL	1,000 psi (69 bar)
★	**P-627**	PEEK Adapter, 10-32 C, F to 1/4-28 FB, F	(1) F-300	0.020" (0.50 mm)	0.30 µL	1,000 psi (69 bar)
★	**P-681**	PCTFE Adapter, 5/16-24 FB, F to 1/4-28 FB, M	N/A	0.125" (3.20 mm)	96.6 µL	1,000 psi (69 bar)
	P-684	PCTFE Adapter, 1/2-20 FB, F to 1/4-28 FB, M	N/A	0.130" (3.30 mm)	121.7 µL	250 psi (17 bar)
	P-718	PCTFE Adapter, 5/16-24 FB, M to 1/4-28 FB, F	N/A	0.040" (1.00 mm)	10.3 µL	1,000 psi (69 bar)
	U-659	PEEK Adapter, 5/16-24 FB, F to 1/2-20 FB, F	(1) XU-655	Tapered*	42.0 µL	250 psi (17 bar)
	U-665	PEEK Adapter, 1/2-20 FB, F to 1/4-28 FB, F	(1) XU-655	0.063" (1.60 mm)	6.6 µL	250 psi (17 bar)

F = Female (internal) threads; M = Male (external) threads; C = Coned; FB = Flat-Bottom
** Thru-hole tapers from 0.188" (4.80 mm) to 0.125" (3.20 mm).*

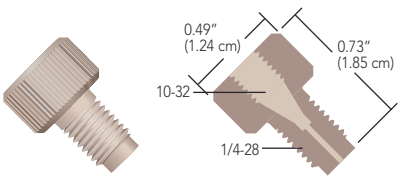
English Threaded Adapters, cont.



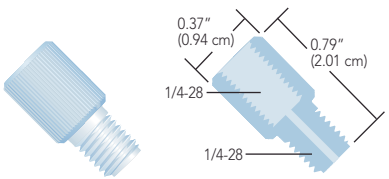
P-652
0.030" (0.75 mm) thru-hole
Note the new knurled design



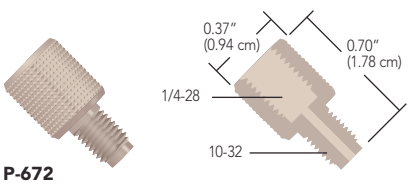
P-654
Extra Long, 0.030"
(0.76 mm) thru-hole



P-669-01
0.040" (1.00 mm) thru-hole



P-671
0.040" (1.00 mm) thru-hole



P-672
0.050" (1.25 mm) thru-hole

Biocompatible

APPLICATION NOTE

Here are application ideas using two of our popular adapters:

- Many injection valves used in HPLC systems have 10-32 coned ports designed to accept 1/16" OD tubing. However, this may be a problem if large injection volumes are required (in excess of 10 mL). The most popular loops for large volume samples are made from 1/8" OD tubing, making it impossible to connect these larger volume loops to your injection valve. The solution: use our P-654 Adapter and the appropriate fittings for your sample loop. This set-up allows connection of 1/8" OD sample loop leads to your injection valve.
- Another potential application is connecting tubing to low-pressure solenoid valves with 1/4-28 flat-bottom ports. Most low-pressure valves of this type have very shallow threaded ports, which typically preclude the use of our Flangeless Fittings. However, by first threading our P-671 Adapter into the valve port(s), you can effectively use standard 1/4-28 fittings to connect your tubing into the backside of the adapter body. This also saves "wear and tear" on the threads in the valve ports.

NOTE

- When using an adapter with male (external) threads, we recommend you first attach the adapter body into the receiving port, and then connect your tubing and fitting into the head of the adapter body.

RELATED PRODUCTS

- You may not need an adapter to connect 1/16" OD tubing into your flat-bottom port. A less expensive alternative is to use a Flangeless Nut and Ferrule starting on page 24 or a Super Flangeless™ Nut and Ferrule starting on page 21. Our Connections Reference chart on page 35 is also a good resource to consult when making connections.

	Part No.	Description	Includes	Thru-hole	Swept Volume	Pressure Rating
	ENGLISH THREADED ADAPTERS					
★	**P-652**	PEEK Adapter, 1/4-28 FB, F to 10-32 C, M	N/A	0.030" (0.75 mm)	6.7 µL	1,000 psi (69 bar)
★	**P-654**	PEEK Adapter, 1/4-28 FB, F to 10-32 C, M, Extra Long	N/A	0.030" (0.75 mm)	9.5 µL	1,000 psi (69 bar)
★	**P-669-01**	PEEK Adapter, 10-32 C, F to 1/4-28 FB, M	N/A	0.040" (1.00 mm)	6.6 µL	1,000 psi (69 bar)
	P-671	PTFE Adapter, 1/4-28 FB, F to 1/4-28 FB, M	N/A	0.040" (1.00 mm)	8.0 µL	1,000 psi (69 bar)
	P-672	PEEK Adapter, 1/4-28 FB, F to 10-32 FB, M	N/A	0.050" (1.25 mm)	11.4 µL	1,000 psi (69 bar)

F = Female (internal) threads; M = Male (external) threads; XL = extra long; C = Coned; FB = Flat-Bottom
** The pressure ratings of these adapters exceed the pressure holding ability of the fittings and tubing used with them.*

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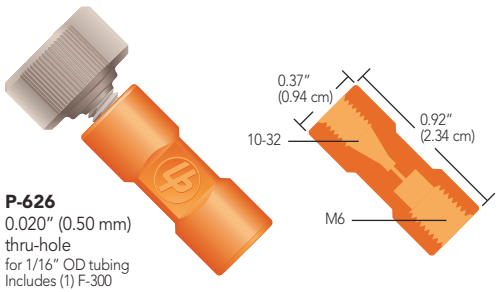
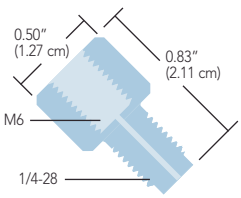
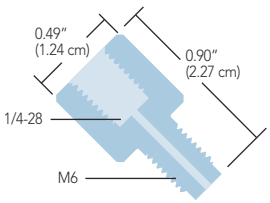
Metric Threaded Adapters



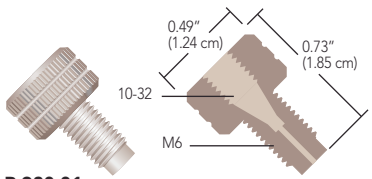
P-626
0.020" (0.50 mm) thru-hole
for 1/16" OD tubing
Includes (1) F-300



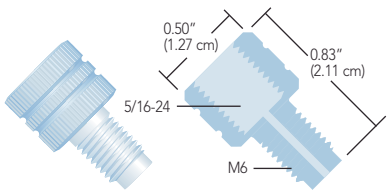
P-670
0.030" (0.75 mm) thru-hole



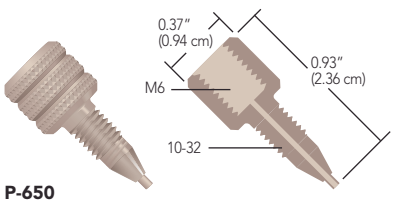
P-694
0.040" (1.00 mm) thru-hole



P-920-01
0.040" (1.00 mm) thru-hole



P-673
0.040" (1.00 mm) thru-hole



P-650
0.030" (0.75 mm) thru-hole

RELATED PRODUCTS

- For an alternative to the Female M6 Adapters presented in the left column of this page, try a P-602 or P-622 Low Pressure Metric Union from page 40, along with the appropriate Metric Flangeless Fittings on page 27.
- To direct connect your tubing into a flat-bottom port, find the appropriate Flangeless or Super Flangeless™ Fittings on pages 24–27 and 21–23 respectively.
- Need metric fittings for your connections? See page 27.

Part No.	Description	Includes	Thru-hole	Swept Volume	Pressure Rating
METRIC M6 THREADED ADAPTERS					
P-626	PEEK Adapter, 10-32 C, F to M6 FB, F	(1) F-300	0.020" (0.50 mm)	0.3 µL	1,000 psi (69 bar)
★ **P-650**	PEEK Adapter, M6 FB, F to 10-32 C, M Standard	N/A	0.030" (0.75 mm)	6.7 µL	1,000 psi (69 bar)
P-670	PCTFE Adapter, M6 FB, F to 1/4-28 FB, M	N/A	0.030" (0.75 mm)	2.6 µL	1,000 psi (69 bar)
P-673	PCTFE Adapter, 5/16-24 FB, F to M6 FB, M	N/A	0.040" (1.00 mm)	9.9 µL	1,000 psi (69 bar)
P-694	PCTFE Adapter, 1/4-28 FB, F to M6 FB, M	N/A	0.040" (1.00 mm)	11.3 µL	1,000 psi (69 bar)
P-920-01	PEEK Adapter, 10-32 C, F to M6 FB, M	N/A	0.040" (1.00 mm)	8.0 µL	1,000 psi (69 bar)

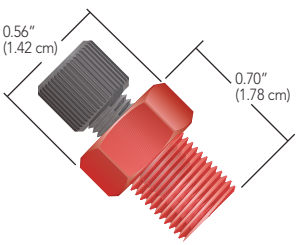
F = Female (internal) threads; M = Male (external) threads; C = Coned; FB = Flat-Bottom
** The pressure rating of this adapter exceeds the pressure holding ability of the fittings and tubing used with it.*

External National Pipe Thread Adapters

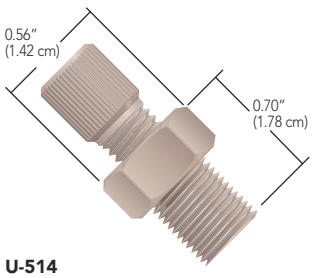
These adapters make connections to female 1/8" and 1/4" National Pipe Thread (NPT) ports.

Manufactured from PEEK polymer by IDEX Health & Science, Upchurch Scientific® NPT Adapters are durable and chemically resistant. We provide versions with either 1/4-28 or 5/16-24 flat-bottom threads, suitable for most low pressure applications.

Please Note: Wrap the threads on the NPT side of these adapters with thread seal tape (plumber's tape) to ensure a leak-free seal.



U-510
1/8" NPT to 1/4-28 Flat-Bottom Female Adapter
for 1/8" OD tubing
Includes (1) XP-308 Fitting



U-514
1/8" NPT to 5/16-24 Flat-Bottom Female Adapter
for 3/16" OD tubing
Includes (1) XP-132 Fitting

Biocompatible

APPLICATION NOTE

Our U-500 and U-510 NPT Adapters are great for attaching 1/8" OD fluoropolymer sparging lines to sparging gas tank regulating valves. Simply thread the appropriately-sized NPT Adapter into the valve's receiving port and then attach your sparging tubing to the adapter body using the fittings provided.

RELATED PRODUCTS

Replacement fittings for these adapters are located on the pages indicated below:

	Page(s)
1/4-28 for 1/8" OD tubing	26
5/16-24 for 1/8" OD tubing	23, 30
5/16-24 for 3/16" OD tubing	30

Other tubing/fitting combinations are available. For more information, please contact your local Distributor or IDEX Health & Science directly.

Part No.	Description	Color	Tubing OD	Includes	Thru-hole	Swept Volume	Pressure Rating
1/8" MALE NPT ADAPTERS							
★ **U-510**	PEEK 1/8" NPT, M to 1/4-28 FB, F Adapter	Red	1/8"	(1) XP-308	0.062" (1.60 mm)	17.3 µL	500 psi (34 bar)
U-514	PEEK 1/8" NPT, M to 5/16-24 FB, F Adapter	Natural	3/16"	(1) XP-132	0.125" (3.2 mm)	70.4 µL	500 psi (34 bar)
1/4" MALE NPT ADAPTERS							
U-500	PEEK 1/4" NPT, M to 1/4-28 FB, F Adapter	Red	1/8"	(1) XP-308	0.062" (1.60 mm)	17.3 µL	500 psi (34 bar)
U-504	PEEK 1/4" NPT, M to 5/16-24 FB, F Adapter	Natural	3/16"	(1) XP-132	0.125" (3.2 mm)	70.4 µL	500 psi (34 bar)

F = Female (internal) threads; M = Male (external) threads; FB = Flat-Bottom

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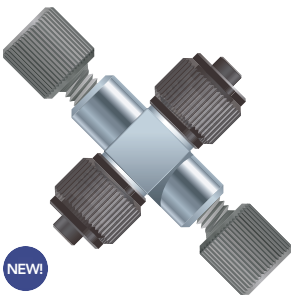
MicroTight Adapters

- Convenient adapters for common 1/16" OD to capillary tubing
- Direct connect to 1/32" OD or 360 µm OD tubing options available
- VHP adapters pressure rated to 12,000 psi (828 bar)

Create a true zero dead volume (ZDV) connection between 1/16" OD tubing and capillary tubing with these Upchurch Scientific® MicroTight Adapters.

For Very High Pressure applications the UH-630 will connect 1/16" OD to 1/32" OD tubing in an inline true ZDV connection with the ability to withstand 12,000 psi (828 bar)! The materials of construction also allow this product to be used up to 200 °C, which reduces the pressure rating to 8,000 psi (552 bar). For more information on the fittings used with the VHP adapter, please see page 9.



NEW!

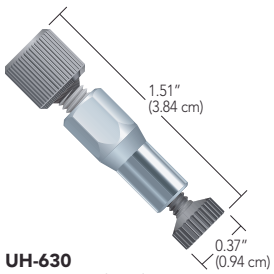
UH-906
VHP MicroTight Adapting Cross
10-32 Coned for 1/16" OD tubing and 5/16-24 Coned for 360 µm OD tubing

NEW!

UH-753
VHP MicroTight Adapting Tee
360 µm (2 ports) to 10-32 C for 1/16" OD tubing (1 port)

NEW!

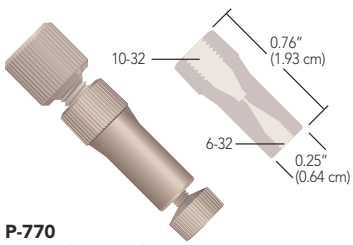
UH-631-01
VHP MicroTight Adapter
10-32 Coned for 1/16" OD tubing and 6-40 Coned for 1/32" OD tubing fittings not included



UH-630
VHP MicroTight Adapter
for 1/16" and 1/32" OD tubing with fittings included

NEW!

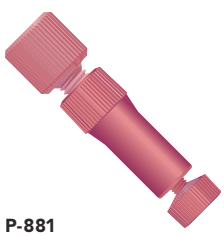
UH-634
VHP MicroTight Adapter
for 1/16" and 360 µm OD tubing with fittings included



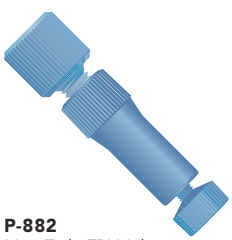
P-770
MicroTight ZDV Adapter
for 1/16" OD to MicroTight Sleeves with fittings included

NEW!

1958-01
VHP MicroTight Adapter
10-32 Coned for 1/16" OD tubing and M4x0.7 for 1/32" OD tubing



P-881
MicroTight ZDV Adapter
for 1/16" to 1/32" OD tubing with fittings included



P-882
MicroTight ZDV Adapter
for 1/16" to 360 µm OD tubing with fittings included

NOTE

While many 10-32 coned fittings are interchangeable, coned fittings using different threads are generally not interchangeable. As such, IDEX Health & Science recommends that only the style of coned fittings that accompanies these connectors be used for replacements.

RELATED PRODUCTS

- Replacement 6-32 fittings are on page 54.
- Replacement F-120 style nuts are on page 11 (when ordering, replace the "x" with an "R" or "B" to order either red or blue fittings).
- Use this list to find micro flow products outside this chapter.

	Part No.	Description	Threads	Includes	Color	Swept Volume	Pressure Rating
	MICROTIGHT ADAPTERS						
★	**P-770**	PEEK Micro Adapter, True ZDV, for 1/16" OD Tubing to MicroTight Tubing Sleeve	10-32 C to 6-32 C	(1) F-120, (1) F-125, (1) P-554	Natural	N/A	4,000 psi (276 bar)
	P-881	PEEK Micro Adapter, True ZDV, for 1/16" to 1/32" OD Tubing	10-32 C to 6-32 C	(1) F-120R, (1) F-126S, (1) P-554	Red	N/A	5,000 psi (345 bar)
★	**P-882**	PEEK Micro Adapter, True ZDV, for 1/16" to 360 µm OD Tubing	10-32 C to 6-32 C	(1) F-120B, (1) F-124S, (1) P-554	Blue	N/A	5,000 psi (345 bar)
	UH-630	Stainless Steel VHP Micro Adapter, for 1/16" to 1/32" OD Tubing	10-32 C to 6-32 C	(1) PK-120BLK, (1) PK-126, (1) P-554	SST/Black	N/A	12,000 psi (827 bar)
NEW!	**UH-634**	Stainless Steel VHP Micro Adapter, for 1/16" to 360 µm OD Tubing	10-32 C to 6-32 C	(1) PK-120BLK, (1) PK-124, (1) P-554	SST/Black	N/A	12,000 psi (827 bar)
NEW!	**UH-753**	Stainless Steel VHP Micro Adapting Tee, for 1/16" to 360 µm OD Tubing	10-32 C to 5/16-24 C	(2) P-416BLK, (2) PK-152	SST/Black	152 nL	15,000 psi (1,035 bar)*
NEW!	**1958-01**	Stainless Steel VHP Micro Adapter, for 1/16" to 1/32" OD Tubing	10-32 C to M4x0.7 C	N/A	SST	16 nL	30,000 psi (2,070 bar)*
NEW!	**UH-631-01**	Stainless Steel VHP Micro Adapter, for 1/16" to 1/32" OD Tubing	10-32 C to 6-40 C	N/A	SST	13 nL	30,000 psi (2,070 bar)*
NEW!	**UH-906**	Stainless Steel VHP Micro Adapting Cross, for 1/16" to 360 µm OD Tubing	10-32 C to 5/16-24 C	(2) PK-120BLK, (2) P-416BLK, (2) PK-152	SST/Black	0.11 µL	15,000 psi (1,035 bar)*
	REPLACEMENT GAUGE PLUGS (TO ACHIEVE TRUE ZDV CONNECTIONS WITH THE ABOVE ADAPTERS)						
	P-554	Delrin® Gauge Plug	10-32 C		White	N/A	N/A

C = Coned
** Pressure rating depends upon the fitting used.*

NanoPort Assemblies

- For lab-on-a-chip applications
- Options to connect 360 µm, MicroTight® tubing sleeves, 1/32" OD or 1/16" OD tubing
- Wetted materials: PEEK and perfluoroelastomer

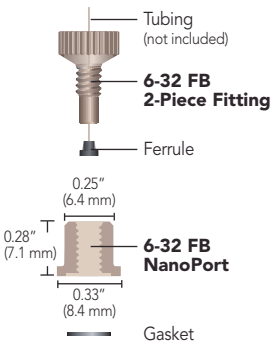
Upchurch Scientific® NanoPort Assemblies provide consistent fluid connections for chip-based analyses. Once attached, NanoPort connections can withstand pressures to 1,000 psi (69 bar).* NanoPorts will adhere to silicon, quartz, glass and some polymers.

All NanoPort components are made of inert, biocompatible PEEK polymer (nuts and ports) and Perlast® perfluoroelastomer (ferrules and gaskets). These products bond easily to chip surfaces with the provided Preformed Adhesive Rings (see Application Note below). Their unique design also prevents adhesive contamination of the fluid path. And NanoPort connections add no additional volume to the fluid path, virtually eliminating dead volume traditionally associated with chip-based fluid connections.

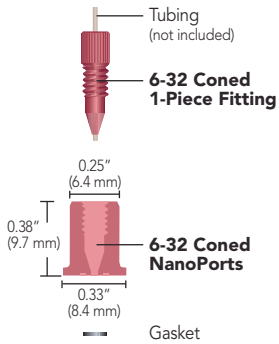
Our NanoPort Reservoir Assembly is designed for open well applications, such as CE.

**Except the N-333 NanoPort Assembly, which is rated to 500 psi (34 bar).*

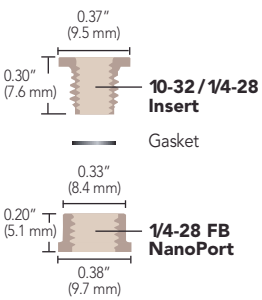
6-32 Flat-Bottom Assemblies



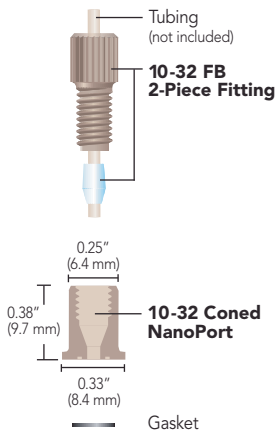
6-32 Coned Assemblies



Reservoir Assembly



10-32 Coned Assembly



APPLICATION NOTE

NanoPort Adhesive Cure Requirements

- Preformed Adhesive Rings (included with each order).

Cure Temperature	Cure Time
165–177 °C (330–350 °F)	1 hour

- Place clamped Ports in oven at a temperature of 165–177 °C (330–350 °F) for one hour to develop a complete bond between the Port and the substrate.
- Due to differences in thermal expansion rates, IDEX Health & Science does not recommend the use of the Preformed Adhesive Rings when connecting NanoPorts to metal substrates. For information on this, for information regarding the adherence of NanoPorts to other polymer substrates, or for information on other adhesive options, please contact us or your authorized Distributor directly.

NanoPort Reservoir Applications

- Sample reservoir.
- Open wells for capillary electrophoresis.
- Syringe injection or flushing/priming, using our P-604 Luer Adapter, page 55, and luer syringe (such as our B-310) on page 55.

See following page for replacement parts

Part No.	Nut	Ferrule	For Chip Hole (dia. x depth)	For Tubing OD	Qty.
NANOPORT ASSEMBLIES					
6-32 Flat-Bottom NanoPort Assemblies					
N-121S	F-123S	N-123-04	0.04" x 0.04" (1.0 mm x 1.0 mm)	360 µm	ea.
N-123H	F-123H	N-123-03	0.04" (1.0 mm) dia. or less	360 µm	ea.
N-123S	F-123S	N-123-03	0.04" (1.0 mm) dia. or less	360 µm	ea.
6-32 Coned NanoPort Assemblies					
N-124S	F-124S	None	Up to 0.063" (1.6 mm)	360 µm	ea.
N-125S	F-125	None	Up to 0.063" (1.6 mm)	70–520 µm[1]	ea.
N-126H	F-126H	None	Up to 0.063" (1.6 mm)	1/32"	ea.
N-126S	F-126S	None	Up to 0.063" (1.6 mm)	1/32"	ea.
10-32 Coned NanoPort Assembly					
★ **N-333**	F-333N	F-142N	Up to 0.063" (1.6 mm)	1/16"	ea.
NanoPort Reservoir Assembly					
N-131	80 µL Reservoir with Insert				ea.

[1] Designed to use our MicroTight® Tubing Sleeves (page 19) to connect tubing OD sizes from 70–520 µm.

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NanoPort Assemblies (cont.)

NOTE

To select the appropriate NanoPort assembly you will need to consider:

- Size of tubing you are connecting
- Dimensions of the chip hole
- Fitting style (one-piece or two-piece fittings)
- Nut head style (standard or headless nut)

Please Note: Each NanoPort Assembly includes a fitting (one- or two-piece), a NanoPort, gasket, a 2-pack of preformed adhesive rings, and a clamp for holding the port in place while the adhesive cures.

Full NanoPort Assemblies can be found on the previous page

	Part No.	Description	Threads	For Chip Hole	Tubing OD	Qty.
	NANOPORT REPLACEMENT PARTS					
	Fittings					
	F-123Hx	Headless Nuts	6-32 FB	N/A	360 µm	10-pk
	F-123Sx	Standard Head Nuts	6-32 FB	N/A	360 µm	10-pk
	F-124Sx	Standard Head Fittings	6-32 C	N/A	360 µm	10-pk
★	**F-125x**	Standard Head Fittings	6-32 C	N/A	70–520 µm[1]	10-pk
	F-126Hx	Headless Fittings	6-32 C	N/A	1/32"	10-pk
	F-126Sx	Standard Head Fittings	6-32 C	N/A	1/32"	10-pk
	F-333Nx	Headless Fittings	10-32 C	Up to 0.063" (1.6 mm)	1/16"	10-pk
	F-142Nx	Ferrules	10-32 C	Up to 0.063" (1.6 mm)	1/16"	10-pk
★	**N-123-03x**	Ferrules	6-32 FB	0.04" (1.0 mm) dia. or less	360 µm	10-pk
★	**N-123-04x**	Ferrules	6-32 FB	0.04" x 0.04" (1.0 mm x 1.0 mm)	360 µm	10-pk
	N-123-05x	Ferrules	6-32 FB	0.04" x 0.06" (1.0 mm x 1.5 mm)	360 µm	10-pk
	Gaskets					
	N-123-02	Gasket, For all assemblies *except* 6-32 Coned Assemblies		N/A	N/A	ea.
	N-124-02	Gasket, For 6-32 Coned Assemblies		N/A	N/A	ea.
	Adhesives and Clamp					
	N-006	Clamp		N/A	N/A	ea.
★	**N-100-01**	Preformed Adhesive Rings		N/A	N/A	2-pk

[1] *Designed to use our MicroTight® Tubing Sleeves (page 19) to connect tubing OD sizes from 70–520 µm.*
Abbreviation Definitions: FB = Flat-Bottom; C = Coned; N/A = Not Applicable

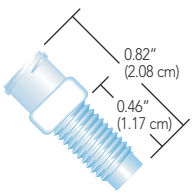
Quick Connect Luer Adapters

- Delrin®, polypropylene, ETFE, or PEEK Versions
- Adapts luers to 1/4-28, 10-32, 5/16-24, or M6 threaded ports

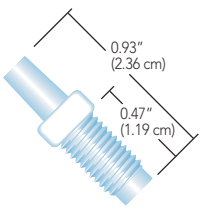
These luer adapters were designed to work in a variety of applications. By connecting any male luer to any female luer, you can create your own quick connect union or adapter. Each Upchurch Scientific® Quick Connect Luer Adapter conforms to ISO requirements for medical luer taper configuration and performance (45 psi/3.1 bar).

Find fittings to connect tubing to the threaded ports of these adapters in the Fittings chapter, starting on page 4.

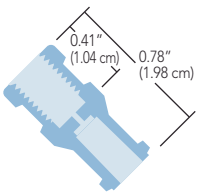
Please Note: Our Female Quick Connect Luer Adapters can be used with any of the Male Luers on this page, i.e., those with and without lock hubs.



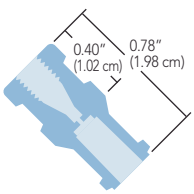
P-604, P-618, P-624
Female Luer to 1/4-28 Male
(luer end of P-604 different than shown)



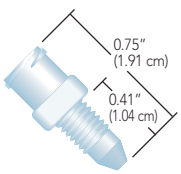
P-619, P-625
Male Luer to 1/4-28 Male



P-628
Female Luer to 1/4-28 Female

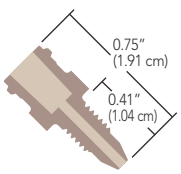


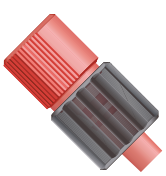
P-629
Female Luer to 10-32 Female



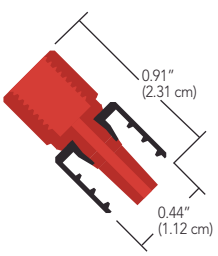
P-642
Female Luer to 10-32 Male

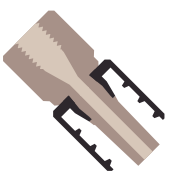
P-719
Female Luer to 10-32 Male



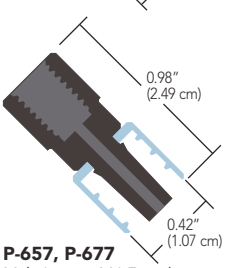


P-655, P-675
Male Luer to 1/4-28 Female

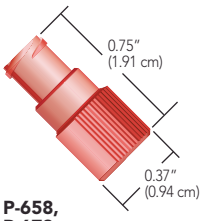




P-656
Male Luer to 10-32 Female

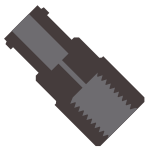


P-657, P-677
Male Luer to M6 Female

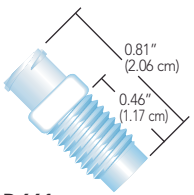


P-658, P-678
Female Luer to 1/4-28 Female

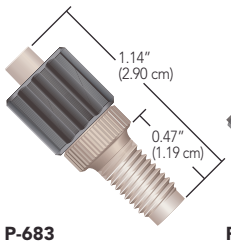
P-659
Female Luer to 10-32 Female



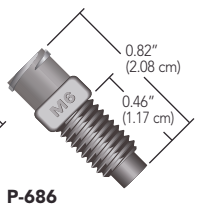
P-660, P-680
Female Luer to M6 Female



P-661
Female Luer to 5/16-24 Male



P-683
Male Luer to 1/4-28 Male



P-686
Female Luer to M6 Male

APPLICATION NOTE

- Our A-626 Bottle Cap Plug (page 159) can be used to plug any of the female luer adapters on this page.
- To prevent a chemical spill when disconnecting your solvent reservoir tubing from the pump, try our Quick-Stop Luer Check Valve on page 151.
- To economically prime an HPLC pump, simply remove the 10-32 fitting on the outlet check valve (standard on most models), insert a P-642 luer adapter, attach a syringe (such as our B-310) and draw the mobile phase through the pump head.

	Part No.	Description	Body Material	Lock Hub Material	Thru-hole
	QUICK CONNECT LUER ADAPTERS				
	P-604	F Luer to 1/4-28 FB, M	Nat. Delrin	N/A	0.05" (1.3 mm)
	P-618	F Luer to 1/4-28 FB, M	Nat. PP	N/A	0.05" (1.3 mm)
	P-619	M Luer to 1/4-28 FB, M	Nat. PP	None *	0.05" (1.3 mm)
★	**P-624**	F Luer to 1/4-28 FB, M	Nat. ETFE	N/A	0.05" (1.3 mm)
★	**P-625**	M Luer to 1/4-28 FB, M	Nat. ETFE	None *	0.04" (1.0 mm)
★	**P-628**	F Luer to 1/4-28 FB, F	Nat. ETFE	N/A	0.04" (1.0 mm)
	P-629	F Luer to 10-32 C, F	Nat. ETFE	N/A	0.04" (1.0 mm)
★	**P-642**	F Luer to 10-32 C, M	Nat. ETFE	N/A	0.05" (1.3 mm)
★	**P-655**	M Luer to 1/4-28 FB, F	Red PEEK	Black PEEK	0.04" (1.3 mm)
★	**P-656**	M Luer to 10-32 C, F	Nat. PEEK	Black PEEK	0.05" (1.3 mm)
	P-657	M Luer to M6 FB, F	Black PEEK	Black PEEK	0.05" (1.3 mm)
★	**P-658**	F Luer to 1/4-28 FB, F	Red PEEK	N/A	0.05" (1.3 mm)
★	**P-659**	F Luer to 10-32 C, F	Nat. PEEK	N/A	0.05" (1.3 mm)
	P-660	F Luer to M6 FB, F	Black PEEK	N/A	0.05" (1.3 mm)
	P-661	F Luer to 5/16-24 FB, M	Nat. ETFE	N/A	0.05" (1.3 mm)
★	**P-675**	M Luer to 1/4-28 FB, F	Red ETFE	Natural PP	0.05" (1.3 mm)
	P-677	M Luer to M6 FB, F	Black ETFE	Natural PP	0.05" (1.3 mm)
★	**P-678**	F Luer to 1/4-28 FB, F	Red ETFE	N/A	0.05" (1.3 mm)
	P-680	F Luer to M6 FB, F	Black ETFE	N/A	0.05" (1.3 mm)
★	**P-683**	M Luer to 1/4-28 FB, M	Nat. PEEK	Black PEEK	0.04" (1.0 mm)
★	**P-686**	F Luer to M6 FB, M	Black ETFE	N/A	0.05" (1.3 mm)
NEW!	**P-719**	F Luer to 10-32 C, M	Nat. PEEK	N/A	0.05" (1.3 mm)
	SYRINGE WITH MALE LUER LOCK				
	B-310	10 cc Disposable Luer-Lock Syringe For use with any Female Luer Adapter			0.05" (1.3 mm)

F = Female (internal) threads; M = Male (external) threads; Nat. = Natural; N/A = Not Applicable; PP = Polypropylene; FB = Flat-Bottom; C = Coned
** Slip-type male luer.*

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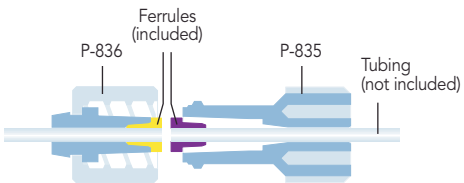
LuerTight™ Fittings

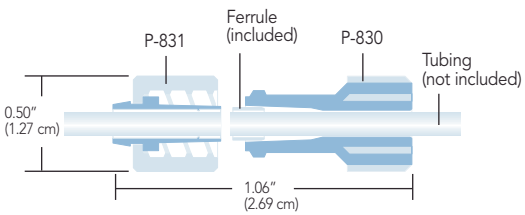
- Luer fittings for fluoropolymer tubing
- Quick disconnect and barbless
- For 1/16" and 1/8" OD tubing

Upchurch Scientific® LuerTight fittings are specifically designed to connect fluoropolymer tubing without barbs or nuts! By integrating ferrules into the luer bodies, LuerTights will reliably hold your tubing in place while giving you the convenience of a luer connection. An inline set of LuerTight fittings provides a quick and easy disconnection option. LuerTight connections are also less bulky and more economical than nut-to-luer style fittings.

The bodies of these products are manufactured from polypropylene and the ferrules, where used, are made of ETFE.



P-837
LuerTight Fittings System
for 1/16" OD tubing



P-838
LuerTight Fittings System
for 1/8" OD tubing

NOTE

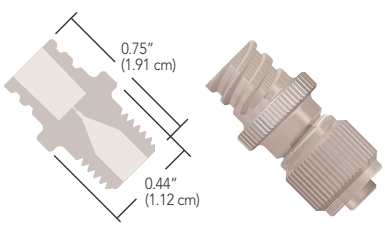
LuerTight fittings are designed to be used exclusively within the LuerTight family. Combining LuerTight fittings with non-LuerTight luer products may result in a poor connection.

Luer-To-MicroTight® Adapter

- Easily connect 360 µm OD tubing to a syringe

The Upchurch Scientific Luer-to-MicroTight Adapter is ideal for infusing sample into lab-on-a-chip devices. This product is made entirely of biocompatible PEEK polymer and introduces only 14 nL of additional volume to the flow path. Use it to directly connect a luer-tip syringe or other product that terminates with a standard male luer to 360 µm OD capillary tubing without tubing sleeves (see photo). MicroTight Fittings are included.

P-662 Luer-to-MicroTight Adapter, shown with a B-310 Syringe (page 55) and PEEK capillary tubing (page 67), not included.



P-662
Luer-To-MicroTight Adapter
for Luer to 360 µm OD tubing
with fittings included

Biocompatible

ORDER ONLINE

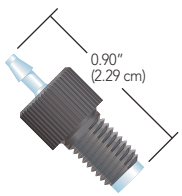
	Part No.	Description	Includes	Thru-hole	Pressure Rating
	LUERTIGHT FITTINGS SYSTEMS				
★	**P-837**	LuerTight System for 1/16" OD Tubing	(1) P-835, (1) P-836, (1) P-830T	N/A	100 psi (7 bar)
	P-838	LuerTight System for 1/8" OD Tubing	(1) P-830, (1) P-831, (1) P-830T	N/A	100 psi (7 bar)
	LUERTIGHT FITTING COMPONENTS				
	P-830	Female Fitting for 1/8" OD Tubing	(1) Ferrule	N/A	N/A
	P-830T	Set Plug to swage Ferrules into P-835 and P-830	N/A	N/A	N/A
	P-831	Male Fitting for 1/8" OD Tubing	No Ferrule Required	N/A	N/A
	P-835	Female Fitting for 1/16" OD Tubing	(1) Ferrule	N/A	N/A
	P-836	Male Fitting for 1/16" OD Tubing	(1) Ferrule	N/A	N/A
	LUER-TO-MICROTIGHT ADAPTER				
★	**P-662**	Luer-to-MicroTight Adapter	(1) F-152, (1) P-416	0.006" (0.150 mm)	45 psi (2.4 bar)

Female = internal receiving luer pocket; Male = external luer nose (surrounded by internally-threaded locking ring)

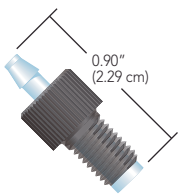
Swivel Barb Adapters

- Barb connection spins freely from the nut to prevent twist during installation
- Manufactured from polypropylene

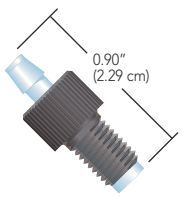
The new Swivel Barb Adapters from Upchurch Scientific® are made up of two captive pieces acting as a one-piece fitting for ease of use. Manufactured from polypropylene and available in three barb sizes, the Swivel Barb will facilitate connection between flexible tubing to a 1/4-28 flat-bottom port. The barbed insert spins freely from the threaded nut in order to prevent the tubing from twisting during installation.



D-646
1/4-28 to 1/16" ID tubing



D-647
1/4-28 to 3/32" ID tubing



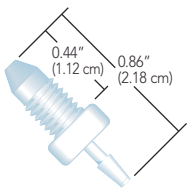
D-648
1/4-28 to 1/8" ID tubing

Biocompatible

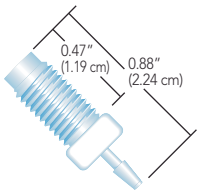
Thread to Barbed Adapters

- Three barb sizes, for 1/16", 1/8", and 3/16" ID flexible tubing
- Adapt to 1/4-28 flat-bottom, 5/16-24 flat-bottom, or 10-32 coned receiving ports

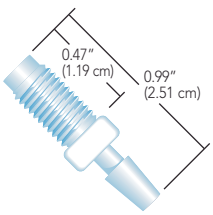
These Upchurch Scientific adapters make it easy to connect flexible tubing to any standard 1/4-28 flat-bottom or 10-32 coned receiving port. Simply thread the adapter into a receiving port and slip tubing over the barbed stem to create a reliable low pressure connection.



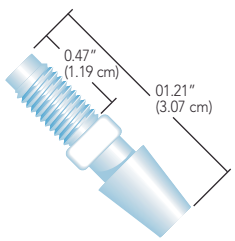
P-663
10-32 to 1/16" ID tubing



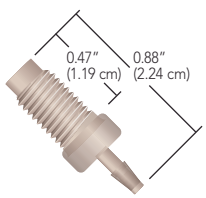
P-646
1/4-28 to 1/16" ID tubing



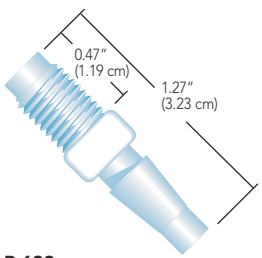
P-647
1/4-28 to 1/8" ID tubing



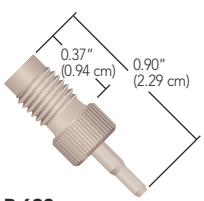
P-648
1/4-28 to 3/16" ID tubing



P-668
1/4-28 to 1/16" ID tubing



P-689
5/16-24 to 3/16" ID tubing



P-692
1/4-28 to 0.020"–1/32"ID tubing

RELATED PRODUCTS

- To connect low pressure fluoropolymer tubing, try the LuerTight™ Adapters on page 56.
- To connect peristaltic tubing to low pressure fluoropolymer tubing, see page 60.
- For peristaltic tubing, see pages 75–89.

	Part No.	Description	Material	Threads	Thru-hole
	SWIVEL BARB ADAPTERS				
	D-646	Swivel Barb Adapter, 1/16" (1.55 mm) ID Tubing	Polypropylene	1/4-28 Flat-Bottom	0.03" (0.75 mm)
	D-647	Swivel Barb Adapter, 3/32" (2.40 mm) ID Tubing	Polypropylene	1/4-28 Flat-Bottom	0.056" (1.5 mm)
	D-648	Swivel Barb Adapter, 1/8" (3.20 mm) ID Tubing	Polypropylene	1/4-28 Flat-Bottom	0.08" (2.0 mm)
	THREAD TO BARBED ADAPTERS				
★	**P-663**	Barb Adapter, 1/16" (1.55 mm) ID Tubing	ETFE	10-32 Coned	0.04" (1.0 mm)
★	**P-646**	Barb Adapter, 1/16" (1.55 mm) ID Tubing	ETFE	1/4-28 Flat-Bottom	0.04" (1.0 mm)
★	**P-647**	Barb Adapter, 1/8" (3.20 mm) ID Tubing	ETFE	1/4-28 Flat-Bottom	0.08" (2.0 mm)
	P-648	Barb Adapter, 3/16" (4.75 mm) ID Tubing	ETFE	1/4-28 Flat-Bottom	0.10" (2.5 mm)
★	**P-668**	Barb Adapter, 1/16" (1.55 mm) ID Tubing	PEEK	1/4-28 Flat-Bottom	0.04" (1.0 mm)
	P-689	Barb Adapter, 3/16" (4.75 mm) ID Tubing	ETFE	5/16-24 Flat-Bottom	0.10" (2.5 mm)
	P-692	Barb Adapter, 0.020" to 1/32" (0.50 to 0.80 mm) ID Tubing	PEEK	1/4-28 Flat-Bottom	0.02" (0.5 mm)

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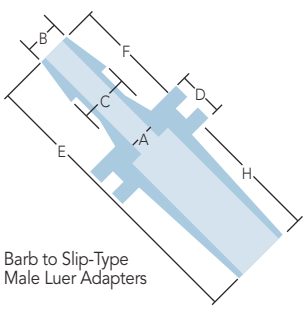
Barbed Adapters

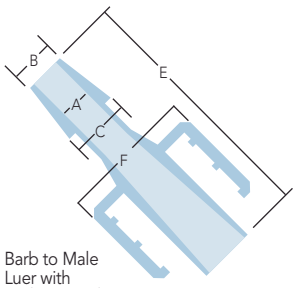
- Adapters on this page feature various luer to barb adaptations
- Adapters on the next page feature a variety of barb-to-barb connectors

Use these barbed adapters to connect peristaltic-type flexible tubing for general, low pressure applications, such as plumbing Ismatec® Peristaltic Pumps (listed on pages 92–108).

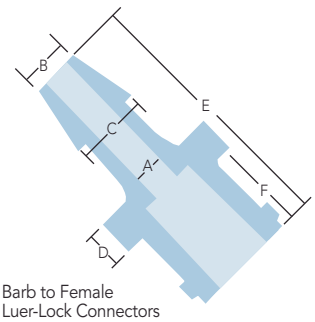
The polypropylene used to manufacture the majority of these products is a Class VI material. Due to the low melt point of polypropylene (PP), these adapters are not autoclavable, however, they can be sterilized via gamma radiation. There are also Barb to Female Luer-Lock connectors available from ETFE, which has superior solvent resistance and a higher temperature rating (80 °C).



Barb to Slip-Type
Male Luer Adapters



Barb to Male
Luer with
Lock Ring Adapters



Barb to Female
Luer-Lock Connectors

Part No.	Description	Material
BARB TO SLIP-TYPE MALE LUER ADAPTERS (10-PK)		
P-854x	Male Luers (Slip-type) for use with 1/16" ID (1.55 mm) Tubing A=0.046" B=0.064" C=0.090" D=0.129" E=0.711" F=0.198" H=0.384"	PP
These slip-type male luer fittings are for use in systems for which luer lock rings are not desired.		
BARB TO MALE LUER WITH LOCK RING ADAPTERS (10-PK)		
P-850x	Male Luers with Lock Ring for use with 1/16" ID (1.55 mm) Tubing A=0.049" B=0.065" C=0.090" E=0.583" F=0.434"	PP
P-851x	Male Luers with Lock Ring for use with 3/32" ID (2.40 mm) Tubing A=0.071" B=0.100" C=0.139" E=0.681" F=0.436"	PP
P-852x	Male Luers with Lock Ring for use with 1/8" ID (3.20 mm) Tubing A=0.099" B=0.132" C=0.184" E=0.777" F=0.436"	PP
BARB TO FEMALE LUER-LOCK CONNECTORS (10-PK)		
★ **P-857x**	Female Luer Connectors for use with 1/16" ID (1.55 mm) Tubing A=0.030" B=0.063" C=0.106" D=0.100" E=0.598" F=0.253"	PP
P-858x	Female Luer Connectors for use with 3/32" ID (2.40 mm) Tubing A=0.056" B=0.102" C=0.145" D=0.100" E=0.648" F=0.253"	PP
P-859x	Female Luer Connectors for use with 1/8" ID (3.20 mm) Tubing A=0.080" B=0.135" C=0.187" D=0.100" E=0.733" F=0.253"	PP
P-870	For use with 1/16" (1.55 mm) ID Tubing A=0.030" B=0.063" C=0.106" D=0.100" E=0.598" F=0.253"	ETFE
P-872	For use with 1/8" (3.20 mm) ID Tubing A=0.080" B=0.137" C=0.187" D=0.100" E=0.733" F=0.253"	ETFE
An "x" in the product part number designates "10-pk."		

Barbed Connectors

- Specifically designed for Ismatec® pump tubing
- Wide variety of unions, adapters and multi-port connectors in multiple material choices

There are several Ismatec connectors for connecting multiple pieces of peristaltic tubing. Reference the tubing size of the barb in the tables below to select from unions (to connect same tubing size), reducers (to connect two different tubing sizes) in both straight, tee, Y, elbow and cross configurations.

For very small peristaltic tubing, steel connectors are available to couple two pieces of the same size tubing together. Match the OD of the steel tubing connector to be slightly larger than the ID of the peristaltic tubing.

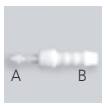
Standard Tube Connectors in Plastic

Type 1

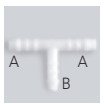
Type 2

Type 3

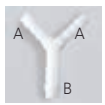
Reducer Tube Connectors in Plastic



Type 6

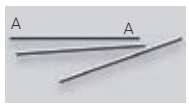


Type 7



Type 8

Steel 18/8 Standard Tube Connectors



Part No.	Tubing ID	Material	Qty.
STANDARD TUBE CONNECTORS IN PLASTIC			
Type 1			
P-801x	0.06″ (1.5 mm)	Polypropylene	10-pk
ISM557A	0.10″ (2.5 mm)	Polypropylene	10-pk
P-802x	0.12″ (3.0 mm)	Polypropylene	10-pk
ISM559	0.16″ (4.0 mm)	Nylon	10-pk
ISM560	0.20″ (5.0 mm)	Nylon	10-pk
ISM561	0.24″ (6.0 mm)	Nylon	10-pk
ISM562	0.31″ (8.0 mm)	Nylon	10-pk
ISM563	0.40″ (10.0 mm)	Nylon	10-pk
ISM564	0.47″ (12.0 mm)	Nylon	10-pk
ISM565	0.51″ (13.0 mm)	Nylon	10-pk
ISM566	0.55″ (14.0 mm)	Nylon	10-pk
ISM567	0.63″ (16.0 mm)	Nylon	10-pk
Type 2			
ISM693A	0.06″ (1.5 mm)	Polypropylene	10-pk
ISM694	0.10″ (2.5 mm)	Polypropylene	10-pk
ISM510	0.12″ (3.0 mm)	Polypropylene	10-pk
ISM511	0.16″ (4.0 mm)	Nylon	10-pk
ISM512	0.20″ (5.0 mm)	Nylon	10-pk
ISM513	0.24″ (6.0 mm)	Nylon	10-pk
ISM514	0.28″ (7.0 mm)	Nylon	10-pk
ISM515	0.31″ (8.0 mm)	Nylon	10-pk
ISM516	0.40″ (10.0 mm)	Nylon	10-pk
Type 3			
P-860x	0.06″ (1.5 mm)	Polypropylene	10-pk
P-861x	0.10″ (2.5 mm)	Polypropylene	10-pk
ISM524	0.12″ (3.0 mm)	Polypropylene	10-pk
ISM525	0.16″ (4.0 mm)	Polypropylene	10-pk
ISM526	0.20″ (5.0 mm)	Polypropylene	10-pk
ISM527	0.24″ (6.0 mm)	Polypropylene	10-pk
P-862x	0.12″ (3.0 mm)	Polypropylene	10-pk
P-863x	0.18″ (4.8 mm)	Polypropylene	10-pk
P-864x	0.25″ (6.4 mm)	Polypropylene	10-pk
ISM528	0.31″ (8.0 mm)	Polypropylene	10-pk
ISM529	0.40″ (10.0 mm)	Polypropylene	10-pk
ISM530	0.47″ (12.0 mm)	Polypropylene	10-pk

Part No.	Tubing ID		Material	Qty.
REDUCER TUBE CONNECTORS IN PLASTIC				
Type 6	**A**	**B**		
ISM569A	0.06″ (1.5 mm)	0.10″ (2.5 mm)	Polypropylene	10-pk
ISM570A	0.06″ (1.5 mm)	0.12″ (3.0 mm)	Polypropylene	10-pk
ISM571A	0.10″ (2.5 mm)	0.12″ (3.0 mm)	Polypropylene	10-pk
ISM572	0.12″ (3.0 mm)	0.16″ (4.0 mm)	Nylon	10-pk
ISM573A	0.16″ (4.0 mm)	0.24″ (6.0 mm)	Nylon	10-pk
ISM574	0.16″ (4.0 mm)	0.31″ (8.0 mm)	Nylon	10-pk
ISM575	0.24″ (6.0 mm)	0.31″ (8.0 mm)	Nylon	10-pk
ISM576	0.24″ (6.0 mm)	0.40″ (10.0 mm)	Nylon	10-pk
ISM577	0.31″ (8.0 mm)	0.40″ (10.0 mm)	Nylon	10-pk
ISM578	0.31″ (8.0 mm)	0.47″ (12.0 mm)	Nylon	10-pk
ISM579	0.40″ (10.0 mm)	0.47″ (12.0 mm)	Nylon	10-pk
Type 7	**A**	**B**		
ISM538	0.12″ (3.0 mm)	0.16″ (4.0 mm)	Polypropylene	10-pk
ISM539	0.16″ (4.0 mm)	0.24″ (6.0 mm)	Polypropylene	10-pk
ISM540	0.24″ (6.0 mm)	0.16″ (4.0 mm)	Polypropylene	10-pk
ISM541	0.31″ (8.0 mm)	0.16″ (4.0 mm)	Polypropylene	10-pk
ISM542	0.31″ (8.0 mm)	0.24″ (6.0 mm)	Polypropylene	10-pk
ISM544	0.40″ (10.0 mm)	0.24″ (6.0 mm)	Polypropylene	10-pk
ISM545	0.40″ (10.0 mm)	0.31″ (8.0 mm)	Polypropylene	10-pk
ISM546	0.40″ (10.0 mm)	0.51″ (13.0 mm)	Polypropylene	10-pk
ISM547	0.47″ (12.0 mm)	0.31″ (8.0 mm)	Polypropylene	10-pk
Type 8	**A**	**B**		
ISM553	0.16″ (4.0 mm)	0.24″ (6.0 mm)	Polypropylene	10-pk
ISM554	0.24″ (6.0 mm)	0.31″ (8.0 mm)	Polypropylene	10-pk

Part No.	Tubing ID	Tubing OD	Connector Length	Material	Qty.
STEEL 18/8 STANDARD TUBE CONNECTORS					
ISM580	0.01″ (0.30 mm)	0.02″ (0.63 mm)	0.59″ (15.0 mm)	SST	6-pk
ISM581	0.02″ (0.58 mm)	0.04″ (0.90 mm)	0.59″ (15.0 mm)	SST	6-pk
ISM582	0.02″ (0.58 mm)	0.04″ (0.90 mm)	0.43″ (11 mm)	SST	6-pk
ISM583	0.03″ (0.84 mm)	0.05″ (1.27 mm)	0.43″ (11 mm)	SST	6-pk
ISM584	0.03″ (0.84 mm)	0.05″ (1.27 mm)	0.63″ (16.0 mm)	SST	6-pk
ISM585A	0.01″ (0.30 mm)	0.02″ (0.63 mm)	0.98″ (25 mm)	SST	6-pk
ISM586A	0.02″ (0.58 mm)	0.04″ (0.90 mm)	0.98″ (25 mm)	SST	6-pk
ISM587	0.02″ (0.58 mm)	0.04″ (0.90 mm)	0.75″ (19.0 mm)	SST	6-pk

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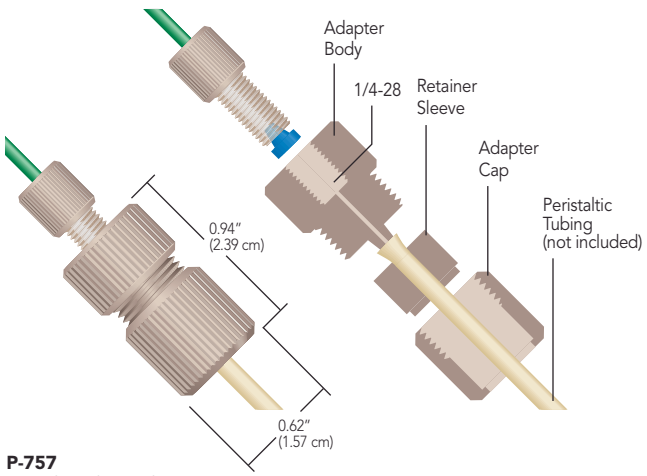
Peristaltic Tubing Adapters

These unique adapters connect peristaltic tubing to standard 1/16" or 1/8" OD tubing. A specially-designed nose allows the peristaltic tubing to simply press fit over the nose and then be held tightly in place by the retainer sleeve. Your 1/16" OD tubing may then be connected with the Flangeless Fittings supplied with the adapter. To connect your peristaltic tubing to tubing with a different OD, simply replace the supplied fittings with your choice of Flangeless Fittings from page 24.

One popular application for these adapters is to use them as "stops" for your peristaltic pump. By doing so, you can reduce the amount of peristaltic tubing required for your flow path, thus reducing cost.

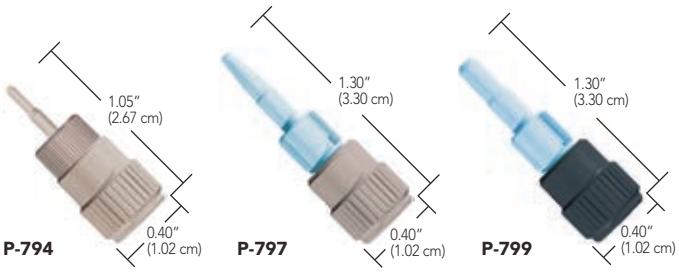


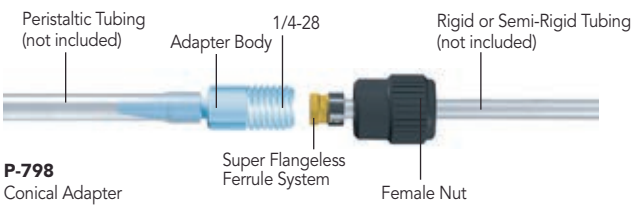
P-757
Peristaltic Tubing Adapter
includes P-200/P-235 Flangeless Fittings, and 3 sizes of retainer sleeves

Conical Adapters

- Direct connect 1/16" and 1/8" OD rigid and semi-rigid tubing to peristaltic tubing
- Accept 0.020"–1/8" (0.50–3.2 mm) ID peristaltic tubing
- Biocompatible flow path with excellent chemical compatibility

Upchurch Scientific® Conical Adapters manufactured by IDEX Health & Science provide a reliable connection between rigid/semi-rigid tubing and peristaltic-type flexible tubing, such as Tygon® and PharMed®. These adapters are composed of a PEEK polymer female nut, our Super Flangeless™ ferrule system and an ETFE or PEEK conical adapter body. The narrow coned end of the adapter body allows peristaltic tubing to slide on more easily than it does onto conventional barbed adapters. Peristaltic tubing is also easier to remove from our Conical Adapters, since no cutting or excessive pulling is required.





P-798
Conical Adapter

Biocompatible

RELATED PRODUCTS

- Use the adapters on this page to connect rigid and semi-rigid tubing (pages 63–69 and 70–73) to the peristaltic tubing on pages 75–89.

APPLICATION NOTE

To help secure peristaltic tubing more firmly to the Upchurch Scientific Conical Adapters, simply attach a cable tie to the outside of the peristaltic tubing once it has been placed onto the Adapter body.

	Part No.	Description	Peristaltic Tubing OD	Peristaltic Tubing ID	Thru-Hole
	PERISTALTIC TUBING ADAPTERS				
★	**P-757**	Standard Adapter	up to 0.180" (4.55 mm)	0.048"–0.110" (1.20–2.80 mm)	0.030" (0.75 mm)
	P-767	Large Bore Adapter	up to 0.250" (6.35 mm)	0.100"–0.150" (2.55–3.80 mm)	0.070" (1.78 mm)
	CONICAL ADAPTER ASSEMBLIES				
	Part No.	**Description**	**Rigid or Semi-Rigid Tubing OD**	**Peristaltic Tubing ID**	**Thru-Hole**
★	**P-794**	Conical Adapter	1/16"	0.020"–0.030" (0.50 mm–0.75 mm)	0.020" (0.50 mm)
	P-797	Conical Adapter	1/16"	1/16"–3/32" (1.55 mm–2.40 mm)	0.040" (1.0 mm)
	P-798	Conical Adapter	1/8"	1/16"–3/32" (1.55 mm–2.40 mm)	0.040" (1.0 mm)
	P-799	Conical Adapter	1/8"	3/32"–1/8" (2.40 mm–3.20 mm)	0.060" (1.5 mm)
	CONICAL ADAPTER REPLACEMENT PARTS				
	Part No.	**Description**	**Material**	**For Use With**	
	F-156	Female Nut, 1/8", 1/4-28	Black PEEK	P-798, P-799	
	P-420	Female Nut, 1/16", 1/4-28	Natural PEEK	P-794, P-797	
	P-259	Super Flangeless Ferrule, 1/16"	Yellow ETFE/SST	P-794, P-797	
	P-359	Super Flangeless Ferrule, 1/8"	Yellow ETFE/SST	P-798, P-799	
	P-691	Conical Adapter Body	Natural ETFE	P-799	
	P-692	Conical Adapter Body	Natural PEEK	P-794	

TUBING

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TUBING	PEEK-LINED STAINLESS STEEL (PLS)	STAINLESS STEEL	PEEK	CAPILLARY PEEK	FUSED SILICA	PEEKsil™	SPIRAL-LINK™	RADEL®
Page	63	64	66	67	67	68	69	69
Description	Biocompatible, chemically inert to most commonly-used solvents, PLS tubing offers a PEEK inner layer which serves as the fluid pathway, jacketed by stainless steel. • Ideal for bio-inert UHPLC applications • Can be bent into various shapes without affecting performance	Seamless, pre-cut 316 stainless steel tubing meets the exacting requirements of today's analyses. Thorough preparation guarantees that the tubing is truly ready-to-use, with flat-burr-free ends and a clean finish. • Wide selection of outside and inside diameters and lengths • Pre-cut to ensure burr-free, flat connections • Many sizes feature a color-coded band for easy ID identification	Biocompatible, chemically inert to most commonly used solvents, PEEK tubing is flexible, offers a very smooth internal surface, and can be easily cut to desired lengths. • Great alternative for stainless steel tubing in high pressure applications • Many sizes available in color scheme to help identify ID	All the benefits of larger sized PEEK tubing, while serving as an excellent alternative to more traditional fused silica and stainless steel capillary tubing. Capillary PEEK tubing is available in a wide range of micro and nano-scale inner diameters. • Available in common capillary tubing sizes with tight tolerances on OD and ID • Tubing sleeves available for capillary tubing connections	Because of the tight tolerances of fused silica's inner diameters, this tubing is used for micro-scale analyses such as micro and nano-HPLC and capillary electrophoresis. • Most commonly used OD and ID sizes available • High quality, polyimide-clad fused silica • Offered in convenient, two meter lengths	PEEKsil is mechanically strong and has ideal characteristics for sealing with metal or polymer fittings. • Comprised of high quality fused silica sheathed by PEEK tubing • Excellent chemical compatibility • Very tight manufacturing tolerances • Good replacement for stainless steel, PEEK, or standard fused silica	The PEEK Spiral Link coils expand and contract, allowing you to easily move your system components or even make equipment repairs whenever needed, without the hassle of breaking connections. • Available in several specific volumes • Includes two SealTight™ fittings	A mechanically strong and chemically resistant material, much like PEEK polymer, Radel is frequently used in medical applications where repeated autoclave sterilization is performed (tests show product stability after 1,000 cycles). Radel tubing is also transparent, allowing technicians to visually monitor flow through their instrument. Readily wetted surfaces help keep air bubbles from accumulating on inner surfaces as well. • Withstands up to 12,500 psi (862 bar) • Transparent and autoclavable
Specifications								
OD (outside diameter)	1/16" (1.6 mm)	0.020" (510 µm), 1/32" (785 µm), 1/16" (1.55 mm), 1/8" (3.2 mm)	1/16" (1.55 mm), 0.071" (1.8 mm), 0.079" (2.0 mm), 1/8" (3.2 mm)	0.0145" (360 µm), 1/32" (785 µm), 0.020" (0.5 mm)	0.0145" (360 µm)	0.0145" (360 µm), 1/32" (785 µm), 1/16" (1.55 mm)	1/16" (1.55 mm)	1/16" (1.55 mm), 1/8" (3.2 mm)
ID (inside diameter)	0.001" (25 µm)–0.010" (254 µm)	0.004" (100 µm)–0.080" (2.0 mm)	0.001" (25 µm)–0.080" (2.0 mm)	0.001" (25 µm)–0.020" (0.50 mm)	0.0008" (20 µm)–0.006" (150 µm)	0.001" (25 µm)–0.012" (300 µm)	0.005" (125 µm)–0.030" (0.75 mm)	0.010" (0.25 mm)–0.062" (1.55 mm)
Operating Temp	-51 to 100 °C	-51 to 289 °C	-51 to 100 °C	-51 to 100 °C	-51 to 100 °C	-51 to 100 °C	-51 to 100 °C	-51 to 100 °C
Pressure Rating	17,400 psi (1,200 bar)	N/A*	500–10,000 psi (34–690 bar)	2,000–5,000 psi (138–345 bar)	N/A*	10,000 psi (690 bar)	7,000 psi (484 bar)	5,500–12,500 psi (379–862 bar)
Typical Tolerances	±5 to 15 µm	±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing	±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing	±0.0005" (12.5 µm)	±0.0004" (10 µm)	±0.0004" (10 µm)	±0.001" (25 µm) for 1/16" OD tubing	±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing
Refractive Index (Clarity)	Opaque	Opaque	Opaque	Opaque	1.78	Opaque	Opaque	1.672
pH Range	0–14	1–14	0–14	0–14	0–10	0–10	0–14	1–14
Sterilization Techniques	Gamma irradiation; ethylene oxide; thermal	Gamma irradiation; ethylene oxide; thermal	Gamma irradiation; ethylene oxide; thermal	Gamma irradiation; ethylene oxide; thermal	Ethylene oxide; thermal	Ethylene oxide; thermal	Gamma irradiation; ethylene oxide; thermal	Thermal, gamma irradiation
Autoclavable?	Y	Y	Y	Y	Y	Y	Y	Y

**The manufacturer of this tubing or material does not publish this specification.*

Upchurch Scientific® Tubing OD Sizes

Please use this table as a reference tool to help quickly locate within this chapter the appropriate OD size tubing for your application.

Size	Tubing OD	Page(s)
.	360 µm	67, 68, 72
.	510 µm	65, 67
•	1/32"	65, 67, 68, 71
●	1/16"	63, 65, 66, 68, 69, 71, 72, 73, 77
●	1/8"	65, 66, 69, 71, 72, 73
●	3/16"	71, 72
●	1/4"	71, 72, 73

Size	Tubing OD	Page(s)
●	5/16"	71
•	1 mm	71
●	1.8 mm	66
●	2 mm	66, 71
●	3 mm	71
●	4 mm	71

Biocompatible UHPLC Tubing

- PEEK-Lined Stainless Steel (PLS)
- Pressures to 17,400 psi (1,200 bar)
- Bends with no loss of performance
- 6 different inner diameters in 4 pre-cut lengths available
- Pre-assembled with VHP-325 fittings

IDEX Health & Science introduces NEW PEEK-Lined Stainless Steel (PLS) Tubing for biocompatible UHPLC applications. The tubing combines the strength of industry-standard 316 Stainless Steel with the chemical inertness of PEEK polymer to enable more efficient bio-separations at pressures up to 17,400 psi (1,200 bar).

The unique design features of PLS Tubing allow it to be bent into shapes that may be required by the system equipment — including angled bends and even sample loops for the injection valve — all with no loss of performance. Even in a bent shape, the PEEK lining maintains its integrity along the entire length.

PLS Tubing achieves its maximum performance of 17,400 psi (1,200 bar) when used with Upchurch Scientific® VHP Fittings. The standard configuration of this tubing automatically pairs a length of tubing with two VHP-325 fittings, which allow repeat connections at UHPLC pressures.

PLS Tubing

Part No.	ID	Length	Includes
PEEK-LINED STAINLESS STEEL (PLS) TUBING, 1/16" OD			
UP-6025100	25 µm (0.001")	100 mm (4")	(2) VHP-325
UP-6025200	25 µm (0.001")	200 mm (8")	(2) VHP-325
UP-6025300	25 µm (0.001")	300 mm (12")	(2) VHP-325
UP-6025500	25 µm (0.001")	500 mm (1.6')	(2) VHP-325
UP-6050100	50 µm (0.002")	100 mm (4")	(2) VHP-325
UP-6050200	50 µm (0.002")	200 mm (8")	(2) VHP-325
UP-6050300	50 µm (0.002")	300 mm (12")	(2) VHP-325
UP-6050500	50 µm (0.002")	500 mm (1.6')	(2) VHP-325
UP-6075100	75 µm (0.003")	100 mm (4")	(2) VHP-325
UP-6075200	75 µm (0.003")	200 mm (8")	(2) VHP-325
UP-6075300	75 µm (0.003")	300 mm (12")	(2) VHP-325
UP-6075500	75 µm (0.003")	500 mm (1.6')	(2) VHP-325
UP-6100100	100 µm (0.004")	100 mm (4")	(2) VHP-325
UP-6100200	100 µm (0.004")	200 mm (8")	(2) VHP-325
UP-6100300	100 µm (0.004")	300 mm (12")	(2) VHP-325
UP-6100500	100 µm (0.004")	500 mm (1.6')	(2) VHP-325
UP-6125100	125 µm (0.005")	100 mm (4")	(2) VHP-325
UP-6125200	125 µm (0.005")	200 mm (8")	(2) VHP-325
UP-6125300	125 µm (0.005")	300 mm (12")	(2) VHP-325
UP-6125500	125 µm (0.005")	500 mm (1.6')	(2) VHP-325
UP-6175100	175 µm (0.007")	100 mm (4")	(2) VHP-325
UP-6175200	175 µm (0.007")	200 mm (8")	(2) VHP-325
UP-6175300	175 µm (0.007")	300 mm (12")	(2) VHP-325
UP-6175500	175 µm (0.007")	500 mm (1.6')	(2) VHP-325
UP-6254100	254 µm (0.010")	100 mm (4")	(2) VHP-325
UP-6254200	254 µm (0.010")	200 mm (8")	(2) VHP-325
UP-6254300	254 µm (0.010")	300 mm (12")	(2) VHP-325
UP-6254500	254 µm (0.010")	500 mm (1.6')	(2) VHP-325

Custom lengths of tubing are available. Contact us for more information.

SPECIFICATIONS & DETAILS

PEEK-lined Stainless Steel (PLS) tubing carries a maximum pressure rating of 17,400 psi (1,200 bar). Additionally, inner diameter tolerances range from ±5–15 µm, depending upon the nominal inner diameter of the tubing.

Peek-lined Stainless Steel (PLS) Tubing "Smart" Numbering System

UP-{OD}{ID}{Length}

{OD}	{ID}	{Length}
6 (for 1/16")	025 (for 25 µm)	050 (for 50 mm)
	050 (for 50 µm)	100 (for 100 mm)
	075 (for 75 µm)	200 (for 200 mm)
	100 (for 100 µm)	300 (for 300 mm)
	125 (for 125 µm)	
	175 (for 175 µm)	
	254 (for 254 µm)	

Stainless Steel Tubing

- Precut 316 stainless steel*
- Available ODs include 0.020", 1/32", 1/16", and 1/8"
- Color-coded banding for easy identification of the inner diameter

IDEX Health & Science seamless, precut stainless steel tubing is designed to meet the exacting requirements of today's analyses. We machine cut and polish each end, deburr the inside and outside edges, and passivate the tubing (please see the passivation information on this page). Finally, we flush reagent-grade isopropanol through each piece.

Our thorough preparation and cleaning procedure guarantees tubing that is truly ready-to-use, with flat, burr-free ends and a clean finish. This care is important in achieving zero-dead-volume connections and good chromatographic results.

We offer a variety of precut lengths as well as longer lengths (5' and 25') of some sizes. Cutting the tubing disturbs and roughens the tubing's end surface, so we recommend using our precut tubing whenever possible. If you need to cut tubing to custom lengths, we suggest you then passivate the tubing. For a description of a cold passivation process, please contact IDEX Health & Science or visit our website at www.idex-hs.com and search for "stainless steel tubing."

** Except our 0.020" OD Stainless Steel Tubing, which is manufactured from 304 series stainless steel.*

APPLICATION NOTE

- Our 1/32" OD tubing is designed for enhanced flexibility in high pressure applications.
- Standard 1/16" and 1/8" OD stainless steel tubing is suited for most analytical applications.

SPECIFICATIONS & DETAILS

- Maximum Recommended Operating Temperature: 750 °F (399 °C).
- Rockwell Hardness (B): Maximum of 95.
- Meets ASTM A269 and A213.

Tubing OD	OD Tolerance	Tubing ID	ID Tolerance
0.020"	±0.0005" (12.5 µm)	All	±0.0005" (12.5 µm)
1/32"	+0.002"/-0.000" (+50 µm/-0 µm)	All, except 0.004" (0.10 mm)	+0.000"/-0.002" (+0 µm/-50 µm)
1/32"	+0.002"/-0.000" (+50 µm/-0 µm)	0.004" (0.10 mm)	+0.002"/-0.000" (+50 µm/-0 µm)
1/16"	+0.002"/-0.000" (+50 µm/-0 µm)	All	±0.001" (25 µm)
1/8"	±0.003" (75 µm)	All	±0.003" (75 µm)

RELATED PRODUCTS

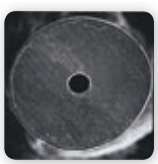
- Our 0.020" OD tubing is the size of choice for the Rheodyne® Model 8125 Micro-Scale Injector Valve (page 132).
- PEEK polymer tubing is available in all of these sizes, listed on pages 66–67.

NOTE

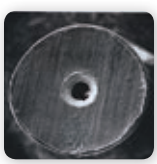
PEEK polymer tubing can be used to replace stainless steel tubing in most liquid analytical systems. Unlike stainless steel tubing, PEEK tubing is biocompatible, flexible, and can easily be cut to desired lengths. See pages 66–68.

All Stainless Steel tubing longer than 1 m is coiled.

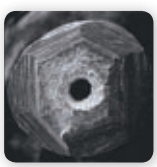
The Beauty of Precut Tubing



Precut tubing



Tubing cut by a commercially available tubing cutter



File cut tubing

Stainless Steel Tubing Passivation

Stainless steel is naturally self-passivating, forming an oxidized layer on newly created surfaces. IDEX Health & Science takes extra steps to ensure the chemical resistance of our stainless steel tubing by manually passivating before and after the tubing is cut into specified lengths (except in a few cases where size is prohibitive). In the precut stage, the internal wall is acid passivated and flushed. After the tubing is cut, deburred and polished, it is completely submerged in an acid passivation bath and again flushed clean. The table below summarizes the manual passivation steps performed for each size of our stainless steel tubing:

Tubing OD	Precut Passivation	Postcut Passivation
0.020"	All	All
1/32"	All	All
1/16"	All	All, ex. 25' lengths
1/8"	None	All, ex. 3 & 5 m lengths

NOTE

Understanding the Maximum Pressure Value of Stainless Steel Tubing

Stainless steel is unique as a material. The Maximum Pressure value listed for each part number is the safe, continuous working pressure limit that IDEX Health & Science has assigned for the tubing. It reflects a safety margin before the tubing begins to "yield" — which is well below the tubing's "burst" pressure. For more information, contact IDEX Health & Science or your authorized Distributor.

Part No.	ID	Length	Color	Maximum Pressure
STAINLESS STEEL, 0.020" OD				
U-119	0.005" (0.125 mm)	5 cm (2")	N/A	17,200 psi (1,186 bar)
U-120	0.005" (0.125 mm)	10 cm (4")	N/A	17,200 psi (1,186 bar)
U-121	0.005" (0.125 mm)	20 cm (8")	N/A	17,200 psi (1,186 bar)
U-122	0.005" (0.125 mm)	30 cm (12")	N/A	17,200 psi (1,186 bar)
U-123	0.005" (0.125 mm)	50 cm (1.6')	N/A	17,200 psi (1,186 bar)
U-124	0.005" (0.125 mm)	1 m (3.2')	N/A	17,200 psi (1,186 bar)
U-125	0.005" (0.125 mm)	1.5 m (5')	N/A	17,200 psi (1,186 bar)
STAINLESS STEEL, 1/32" OD				
U-1114	0.004" (0.10 mm)	5 cm (2")	Red	19,300 psi (1,331 bar)
U-1115	0.004" (0.10 mm)	10 cm (4")	Red	19,300 psi (1,331 bar)
U-1116	0.004" (0.10 mm)	20 cm (8")	Red	19,300 psi (1,331 bar)
U-1117	0.004" (0.10 mm)	30 cm (12")	Red	19,300 psi (1,331 bar)
U-1120	0.006" (0.15 mm)	5 cm (2")	Yellow	19,300 psi (1,331 bar)
U-1121	0.006" (0.15 mm)	10 cm (4")	Yellow	19,300 psi (1,331 bar)
U-1122	0.006" (0.15 mm)	20 cm (8")	Yellow	19,300 psi (1,331 bar)
U-1123	0.006" (0.15 mm)	30 cm (12")	Yellow	19,300 psi (1,331 bar)
U-1125	0.008" (0.20 mm)	5 cm (2")	Clear	17,800 psi (1,227 bar)
U-1126	0.008" (0.20 mm)	10 cm (4")	Clear	17,800 psi (1,227 bar)
U-1127	0.008" (0.20 mm)	20 cm (8")	Clear	17,800 psi (1,227 bar)
★ **U-1128**	0.008" (0.20 mm)	30 cm (12")	Clear	17,800 psi (1,227 bar)
U-1130	0.010" (0.25 mm)	5 cm (2")	Blue	16,200 psi (1,117 bar)
U-1131	0.010" (0.25 mm)	10 cm (4")	Blue	16,200 psi (1,117 bar)
U-1132	0.010" (0.25 mm)	20 cm (8")	Blue	16,200 psi (1,117 bar)
U-1133	0.010" (0.25 mm)	30 cm (12")	Blue	16,200 psi (1,117 bar)
U-1140	0.015" (0.40 mm)	5 cm (2")	Green	12,300 psi (848 bar)
U-1141	0.015" (0.40 mm)	10 cm (4")	Green	12,300 psi (848 bar)
U-1142	0.015" (0.40 mm)	20 cm (8")	Green	12,300 psi (848 bar)
U-1143	0.015" (0.40 mm)	30 cm (12")	Green	12,300 psi (848 bar)
U-1145	0.018" (0.45 mm)	5 cm (2")	Black	10,000 psi (689 bar)
U-1146	0.018" (0.45 mm)	10 cm (4")	Black	10,000 psi (689 bar)
U-1147	0.018" (0.45 mm)	20 cm (8")	Black	10,000 psi (689 bar)
U-1148	0.018" (0.45 mm)	30 cm (12")	Black	10,000 psi (689 bar)

Part No.	ID	Length	Color	Maximum Pressure
STAINLESS STEEL, 1/16" OD				
U-220	0.004" (0.100 mm)	5 cm (2")	N/A	22,100 psi (1,523 bar)
U-221	0.004" (0.100 mm)	10 cm (4")	N/A	22,100 psi (1,523 bar)
U-222	0.004" (0.100 mm)	20 cm (8")	N/A	22,100 psi (1,523 bar)
U-223	0.004" (0.100 mm)	30 cm (12")	N/A	22,100 psi (1,523 bar)
U-224	0.004" (0.100 mm)	0.5 m (1.6')	N/A	22,100 psi (1,523 bar)
U-225	0.004" (0.100 mm)	1 m (3.2')	N/A	22,100 psi (1,523 bar)
U-152	0.005" (0.125 mm)	5 cm (2")	Red	21,600 psi (1,489 bar)
U-153	0.005" (0.125 mm)	10 cm (4")	Red	21,600 psi (1,489 bar)
U-154	0.005" (0.125 mm)	20 cm (8")	Red	21,600 psi (1,489 bar)
U-155	0.005" (0.125 mm)	30 cm (12")	Red	21,600 psi (1,489 bar)
U-156	0.005" (0.125 mm)	0.5 m (1.6')	Red	21,600 psi (1,489 bar)
U-157	0.005" (0.125 mm)	1 m (3.2')	Red	21,600 psi (1,489 bar)
U-158	0.005" (0.125 mm)	1.5 m (5')	Red	21,600 psi (1,489 bar)
U-160	0.005" (0.125 mm)	7.6 m (25')	Red	21,600 psi (1,489 bar)
U-126	0.007" (0.175 mm)	5 cm (2")	Black	20,900 psi (1,441 bar)
U-127	0.007" (0.175 mm)	10 cm (4")	Black	20,900 psi (1,441 bar)
U-128	0.007" (0.175 mm)	20 cm (8")	Black	20,900 psi (1,441 bar)
U-129	0.007" (0.175 mm)	30 cm (12")	Black	20,900 psi (1,441 bar)
U-130	0.007" (0.175 mm)	0.5 m (1.6')	Black	20,900 psi (1,441 bar)
U-131	0.007" (0.175 mm)	1 m (3.2')	Black	20,900 psi (1,441 bar)
U-108	0.007" (0.175 mm)	1.5 m (5')	Black	20,900 psi (1,441 bar)
U-161	0.007" (0.175 mm)	7.6 m (25')	Black	20,900 psi (1,441 bar)
★ **U-111**	0.010" (0.25 mm)	5 cm (2")	Blue	19,700 psi (1,358 bar)
★ **U-112**	0.010" (0.25 mm)	10 cm (4")	Blue	19,700 psi (1,358 bar)
U-113	0.010" (0.25 mm)	20 cm (8")	Blue	19,700 psi (1,358 bar)
★ **U-114**	0.010" (0.25 mm)	30 cm (12")	Blue	19,700 psi (1,358 bar)
U-132	0.010" (0.25 mm)	0.5 m (1.6')	Blue	19,700 psi (1,358 bar)
U-133	0.010" (0.25 mm)	1 m (3.2')	Blue	19,700 psi (1,358 bar)
U-106	0.010" (0.25 mm)	1.5 m (5')	Blue	19,700 psi (1,358 bar)
U-162	0.010" (0.25 mm)	7.6 m (25')	Blue	19,700 psi (1,358 bar)
U-101	0.020" (0.5 mm)	5 cm (2")	Yellow	15,800 psi (1,089 bar)
U-102	0.020" (0.5 mm)	10 cm (4")	Yellow	15,800 psi (1,089 bar)
U-103	0.020" (0.5 mm)	20 cm (8")	Yellow	15,800 psi (1,089 bar)
U-104	0.020" (0.5 mm)	30 cm (12")	Yellow	15,800 psi (1,089 bar)
U-134	0.020" (0.5 mm)	0.5 m (1.6')	Yellow	15,800 psi (1,089 bar)
U-135	0.020" (0.5 mm)	1 m (3.2')	Yellow	15,800 psi (1,089 bar)
★ **U-105**	0.020" (0.5 mm)	1.5 m (5')	Yellow	15,800 psi (1,089 bar)
U-163	0.020" (0.5 mm)	7.6 m (25')	Yellow	15,800 psi (1,089 bar)
U-115	0.030" (0.75 mm)	5 cm (2")	White	12,000 psi (827 bar)
U-116	0.030" (0.75 mm)	10 cm (4")	White	12,000 psi (827 bar)
U-117	0.030" (0.75 mm)	20 cm (8")	White	12,000 psi (827 bar)
U-118	0.030" (0.75 mm)	30 cm (12")	White	12,000 psi (827 bar)
U-136	0.030" (0.75 mm)	0.5 m (1.6')	White	12,000 psi (827 bar)
U-137	0.030" (0.75 mm)	1 m (3.2')	White	12,000 psi (827 bar)
★ **U-107**	0.030" (0.75 mm)	1.5 m (5')	White	12,000 psi (827 bar)
★ **U-164**	0.030" (0.75 mm)	7.6 m (25')	White	12,000 psi (827 bar)
U-138	0.040" (1.0 mm)	5 cm (2")	N/A	8,100 psi (558 bar)
U-139	0.040" (1.0 mm)	10 cm (4")	N/A	8,100 psi (558 bar)
U-140	0.040" (1.0 mm)	20 cm (8")	N/A	8,100 psi (558 bar)
U-141	0.040" (1.0 mm)	30 cm (12")	N/A	8,100 psi (558 bar)
U-142	0.040" (1.0 mm)	0.5 m (1.6')	N/A	8,100 psi (558 bar)
U-143	0.040" (1.0 mm)	1 m (3.2')	N/A	8,100 psi (558 bar)
U-144	0.040" (1.0 mm)	1.5 m (5')	N/A	8,100 psi (558 bar)
★ **U-165**	0.040" (1.0 mm)	7.6 m (25')	N/A	8,100 psi (558 bar)
U-145	0.046" (1.15 mm)	5 cm (2")	N/A	5,800 psi (400 bar)
U-146	0.046" (1.15 mm)	10 cm (4")	N/A	5,800 psi (400 bar)
U-147	0.046" (1.15 mm)	20 cm (8")	N/A	5,800 psi (400 bar)
U-148	0.046" (1.15 mm)	30 cm (12")	N/A	5,800 psi (400 bar)
U-149	0.046" (1.15 mm)	0.5 m (1.6')	N/A	5,800 psi (400 bar)
U-150	0.046" (1.15 mm)	1 m (3.2')	N/A	5,800 psi (400 bar)
U-151	0.046" (1.15 mm)	1.5 m (5')	N/A	5,800 psi (400 bar)
STAINLESS STEEL, 1/8" OD				
U-815	0.080" (2.0 mm)	15 cm (6")	N/A	7,600 psi (524 bar)
U-825	0.080" (2.0 mm)	25 cm (10")	N/A	7,600 psi (524 bar)
U-800	0.080" (2.0 mm)	1 m (3.2')	N/A	7,600 psi (524 bar)
U-803	0.080" (2.0 mm)	3 m (9.8')	N/A	7,600 psi (524 bar)
U-805	0.080" (2.0 mm)	5 m (16')	N/A	7,600 psi (524 bar)

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PEEK Tubing

- 1/16", 1/8", 1.8 mm, or 2.0 mm outside diameter available
- Biocompatible, inert, and easily cut
- Great for high pressure applications
- Maximum continuous use temperature: 100 °C

Upchurch Scientific® PEEK (polyetheretherketone) polymer tubing is biocompatible, chemically inert to most solvents, and can be used to replace stainless steel tubing in most liquid analytical systems. Unlike stainless steel tubing, PEEK tubing is flexible and can be easily cut to desired lengths.

PEEK tubing has a very smooth internal surface, which causes less turbulence than similarly sized metal tubing, contributing to improved resolution of sample bands. Of all our polymer tubing materials, PEEK is the least permeable to gas (see material properties on our website: www.idex-hs.com).

In addition, much of our 1/16" OD tubing is color-coded so different IDs are easily identified. Our proprietary extrusion process ensures color permanence in our tubing.

Our 5' length tubing is rough cut to approximately 5'1". A trim cut should be made before use, especially for smaller ID tubing. PEEK tubing can be cut easily with a razor blade. However for an improved cut, try our Tubing Cutters on page 74.

	Part No.	ID	Color	Max. Pressure
	PEEK TUBING, 1/16" OD X 5' (1.5 M)			
	1559	0.001" (25 µm) ID	Natural	10,000 psi (690 bar)
	1560	0.0025" (65 µm) ID	Natural	7,000 psi (483 bar)
★	**1561**	0.004" (0.10 mm) ID	Black	7,000 psi (483 bar)
★	**1535**	0.005" (0.125 mm) ID	Red	7,000 psi (483 bar)
★	**1562**	0.006" (0.15 mm) ID	Purple	7,000 psi (483 bar)
	1536	0.007" (0.175 mm) ID	Yellow	7,000 psi (483 bar)
★	**1531**	0.010" (0.25 mm) ID	Natural	7,000 psi (483 bar)
★	**1531B**	0.010" (0.25 mm) ID	Blue	7,000 psi (483 bar)
★	**1565**	0.015" (0.40 mm) ID	Gray	7,000 psi (483 bar)
	1532	0.020" (0.50 mm) ID	Orange	7,000 psi (483 bar)
★	**1533**	0.030" (0.75 mm) ID	Green	7,000 psi (483 bar)
★	**1538**	0.040" (1.00 mm) ID	Natural	5,000 psi (345 bar)
★	**1537**	0.055" (1.40 mm) ID	Natural	500 psi (34 bar)
	PEEK TUBING, 1/8" OD X 5' (1.5 M)			
	1534	0.062" (1.55 mm) ID	Natural	4,000 psi (276 bar)
★	**1544**	0.080" (2.00 mm) ID	Natural	3,000 psi (207 bar)
	PEEK TUBING, 1.8 MM OD X 5' (1.5 M)			
	1539	0.055" (1.40 mm) ID	Natural	500 psi (34 bar)
	PEEK TUBING, 2.0 MM OD X 5' (1.5 M)			
	1590	0.042" (1.05 mm) ID	Natural	5,000 psi (345 bar)

APPLICATION NOTE

What Size PEEK Tubing Should I Use?

- It is usually safe to use 1/16" OD x 0.010" ID tubing throughout an analytical HPLC system. With a 0.010" ID, the pressure drop across most tubing lengths is negligible, and the ID is small enough to minimize band broadening.
- High pressure semi-prep LC systems will most likely use 1/8" OD tubing.
- Use 1.8 mm OD tubing to replace fluoropolymer tubing used in some Pharmacia®/GE Healthcare systems.
- Use our 1/32" OD tubing for the high pressure flow path of some microbore HPLC systems.
- Choose 360 µm OD tubing for most capillary systems.
- PEEK tubing is available in additional sizes and in 50' and 100' lengths. Contact your local Distributor or IDEX Health & Science directly for pricing information.

SPECIFICATIONS & DETAILS

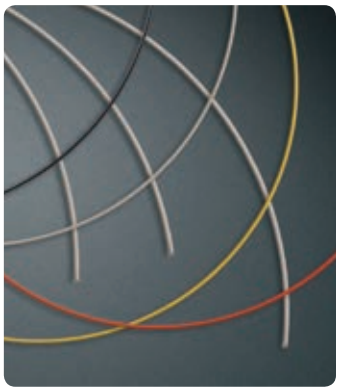
Tubing OD	OD Tolerance
1/16"	±0.001" (25 µm)
1.8 mm	±0.002" (50 µm)
2.0 mm	±0.002" (50 µm)
1/8"	±0.003" (75 µm)

Tubing ID	ID Tolerance
25 µm	±0.0005" (12.5 µm)
All	±0.001" (25 µm)
All	±0.001" (25 µm)
All	±0.003" (75 µm)

Capillary PEEK Tubing

- 360 µm, 510 µm, or 1/32" outside diameter available
- IDs as small as 25 µm (0.001")

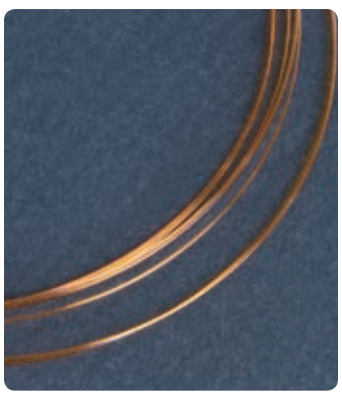
Capillary PEEK tubing offers all the benefits of larger sized PEEK tubing, while serving as an excellent alternative to more traditional fused silica and stainless steel capillary tubing (see Application Note, right). The capillary tubing can be coupled to many of the products in the Connectors chapter (starting on page 34) and to some of the valves in the Valves chapter (starting on page 124).



Fused Silica Tubing

- Five inner diameters with most common capillary outside diameter, 360 µm
- Cut in convenient lengths, up to 2 m

These products are manufactured from synthetic fused silica with a polyimide coating.



APPLICATION NOTE

- An independent study conducted by a major pharmaceutical company indicated LC-MS chromatographic performance could be improved in some cases by switching the post-column transfer line from fused silica to PEEK polymer tubing. The switch dramatically reduced peak tailing and eliminated the degradation of peak symmetry as injection volume was reduced. For more information, please contact us or order the "Improved LC-MS Results Study" from the "Request Literature" section of our website at www.idex-hs.com.
- To straighten PEEK polymer tubing, first choose a piece of stainless steel tubing with an inner diameter slightly larger than the OD of your tubing and with an appropriate length for the PEEK tubing you wish to straighten. For instance, for 1/16" OD PEEK tubing with a length of 10", choose our U-825 tubing (stainless steel, 1/8" OD x 0.080" ID x 25 cm long, page 64). Slip your PEEK tubing into the stainless steel tubing. Place this "sleeved" tubing into an oven and bake at 425 °F (218 °C) for 30 minutes or 350 °F (177 °C) for 60 minutes. Allow the sleeved tubing to return to room temperature naturally (i.e., do not quench it with water). Once cooled, remove the PEEK tubing from the stainless steel sleeve and inspect it for straightness. If needed, repeat the process until the desired straightness is achieved.

NOTE

Because the thru-hole of our 25 µm ID PEEK tubing is very small, it is possible for some fittings to cause the ID to become occluded. Please use caution, especially with wrench-tightened fittings. For more information, please contact IDEX Health & Science or your local Distributor directly.

	Part No.	ID	Color	Max. Pressure	Qty.
	CAPILLARY PEEK TUBING, 360 µm OD				
	1574	25 µm (0.001") ID x 5' (1.5 m)	Natural	5,000 psi (345 bar)	ea.
	1570	50 µm (0.002") ID x 5' (1.5 m)	Natural	2,000 psi (138 bar)	ea.
	1573	75 µm (0.003") ID x 5' (1.5 m)	Black	2,000 psi (138 bar)	ea.
	1571	100 µm (0.004") ID x 5' (1.5 m)	Red	2,000 psi (138 bar)	ea.
	1572	150 µm (0.006") ID x 5' (1.5 m)	Yellow	2,000 psi (138 bar)	ea.
	CAPILLARY PEEK TUBING, 510 µm (0.020") OD				
	1543	0.0025" (65 µm) ID x 5' (1.5 m)	Natural	2,000 psi (138 bar)	ea.
★	**1541**	0.005" (0.125 mm) ID x 5' (1.5 m)	Natural	2,000 psi (138 bar)	ea.
	1542	0.010" (0.254 mm) ID x 5' (1.5 m)	Natural	2,000 psi (138 bar)	ea.
	CAPILLARY PEEK TUBING, 1/32" OD				
	1567	0.001" (25 µm) ID x 5' (1.5 m)	Natural	5,000 psi (345 bar)	ea.
	1579	0.0025" (65 µm) ID x 5' (1.5 m)	Natural	5,000 psi (345 bar)	ea.
	1578	0.0035" (90 µm) ID x 5' (1.5 m)	Black	5,000 psi (345 bar)	ea.
	1576	0.005" (0.125 mm) ID x 5' (1.5 m)	Red	5,000 psi (345 bar)	ea.
	1577	0.007" (0.175 mm) ID x 5' (1.5 m)	Yellow	5,000 psi (345 bar)	ea.
	1575	0.008" (0.20 mm) ID x 5' (1.5 m)	Natural	5,000 psi (345 bar)	ea.
	1580	0.009" (0.23 mm) ID x 5' (1.5 m)	Gray	5,000 psi (345 bar)	ea.
	1581	0.010" (0.25 mm) ID x 5' (1.5 m)	Blue	5,000 psi (345 bar)	ea.
	1568	0.015" (0.40 mm) ID x 5' (1.5 m)	Natural	5,000 psi (345 bar)	ea.
★	**1569**	0.020" (0.50 mm) ID x 5' (1.5 m)	Orange	3,000 psi (207 bar)	ea.
	787-KIT	1/32" OD x 12" Kit Kit contains (1) 10-pack of each 1/32" OD x 12" size listed above.			Kit
	FUSED SILICA TUBING, 360 µm OD				
★	**FS-120**	20 µm (0.0008") ID x 2 m (6.4')	Natural	10,000 psi (690 bar)	ea.
★	**FS-150**	50 µm (0.002") ID x 2 m (6.4')	Natural	10,000 psi (690 bar)	ea.
	FS-175	75 µm (0.003") ID x 2 m (6.4')	Natural	10,000 psi (690 bar)	ea.
	FS-110	100 µm (0.004") ID x 2 m (6.4')	Natural	10,000 psi (690 bar)	ea.
	FS-115	150 µm (0.006") ID x 2 m (6.4')	Natural	10,000 psi (690 bar)	ea.

SPECIFICATIONS & DETAILS

Capillary PEEK Tubing Specifications

Tubing OD	Tubing ID	OD/ID Tolerances
360 µm	All	±0.0005" (12.5 µm)
510 µm	All	±0.001" (25 µm)
1/32"	All	±0.0005" (12.5 µm)

Fused Silica Tubing Specifications

Tubing OD	Tubing ID	OD Tolerance	ID Tolerance
360 µm	20 µm (0.0008")	±0.0004" (10 µm)	±0.00008" (2 µm)
360 µm	50 µm (0.002") and 75 µm (0.003")	±0.0004" (10 µm)	±0.00012" (3 µm)
360 µm	100 µm (0.004") and 150 µm (0.006")	±0.0004" (10 µm)	±0.00016" (4 µm)

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PEEKsil™ Tubing

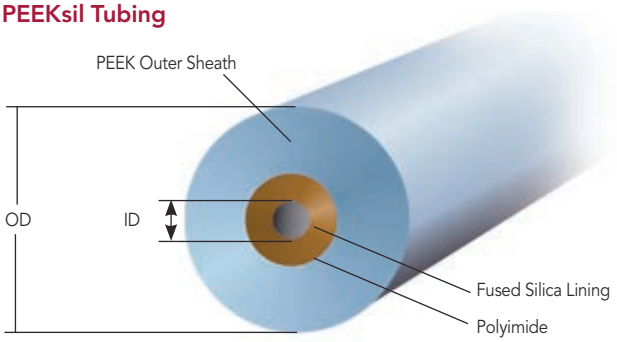
- PEEK covered fused silica
- 360 µm, 1/32", and 1/16" outside diameters with a wide variety of inside diameters
- Precut to numerous standard lengths

PEEKsil's sheathing is mechanically strong and has ideal characteristics for sealing with many styles of fittings. The fused silica core provides a consistent and rigid fluid pathway with very tight tolerances and industry-accepted chemical properties. Together, this makes PEEKsil tubing ideal for numerous applications. In fact, PEEKsil can be used as a direct replacement for conventional stainless steel or PEEK tubing in many analytical systems.

Like traditional fused silica tubing, PEEKsil has excellent chemical compatibility and extremely low adsorption characteristics, especially when compared with stainless steel.

Please Note: ***Do not cut this tubing.*** *It should be used at its precut lengths because of permanent damage caused by conventional cutters.*

PEEKsil Tubing



SPECIFICATIONS & DETAILS

Tubing OD	OD Tolerance	Tubing ID	ID Tolerance
360 µm	±0.0004" (10 µm)	25 µm	±0.00004" (1 µm)
1/32"	±0.0008" (20 µm)	50–100 µm	±0.00012" (3 µm)
1/16"	±0.0012" (30 µm)	0.15–0.30 mm	±0.0002" (5 µm)

Part No.	ID	Length	Color	Qty.
PEEKSIL TUBING, 360 µm OD				
360255	25 µm (0.001")	5 cm (2")	Orange	2-pk
3602510	25 µm (0.001")	10 cm (4")	Orange	2-pk
3602515	25 µm (0.001")	15 cm (6")	Orange	2-pk
3602525	25 µm (0.001")	25 cm (10")	Orange	2-pk
3602550	25 µm (0.001")	50 cm (1.6')	Orange	2-pk
360505	50 µm (0.002")	5 cm (2")	Natural	2-pk
3605010	50 µm (0.002")	10 cm (4")	Natural	2-pk
3605015	50 µm (0.002")	15 cm (6")	Natural	2-pk
3605025	50 µm (0.002")	25 cm (10")	Natural	2-pk
3605050	50 µm (0.002")	50 cm (1.6')	Natural	2-pk
PEEKSIL TUBING, 1/32" OD				
3255	25 µm (0.001")	5 cm (2")	Orange	2-pk
32510	25 µm (0.001")	10 cm (4")	Orange	2-pk
32515	25 µm (0.001")	15 cm (6")	Orange	2-pk
32520	25 µm (0.001")	20 cm (8")	Orange	2-pk
32550	25 µm (0.001")	50 cm (1.6')	Orange	2-pk
3505	50 µm (0.002")	5 cm (2")	Natural	2-pk
35010	50 µm (0.002")	10 cm (4")	Natural	2-pk
35015	50 µm (0.002")	15 cm (6")	Natural	2-pk
35020	50 µm (0.002")	20 cm (8")	Natural	2-pk

SPECIFICATIONS & DETAILS

Because PEEKsil tubing has fused silica tubing at its core, the pressure rating for this tubing is determined by the inner diameter of the tubing. The following chart highlights the Maximum Pressure values for this tubing, as determined by SGE International Pty., Ltd., the manufacturer of this tubing:

Tubing ID	Maximum Pressure	Tubing ID	Maximum Pressure
25 µm	25,000 psi (1,723 bar)	150–175 µm	8,500 psi (586 bar)
50 µm	20,000 psi (1,379 bar)	200–300 µm	6,000 psi (414 bar)
75–100 µm	15,000 psi (1,034 bar)		

The pressure ratings provided are indicative of the performance capabilities of the tubing. The actual pressure limits achievable will depend upon the fittings used, the quality of the receiving port, and other factors. Contact IDEX Health & Science or your authorized Distributor for more information.

Part No.	ID	Length	Color	Qty.
PEEKSIL TUBING, 1/32" OD				
★ **35050**	50 µm (0.002")	50 cm (1.6')	Natural	2-pk
3755	75 µm (0.003")	5 cm (2")	Black	2-pk
37510	75 µm (0.003")	10 cm (4")	Black	2-pk
37515	75 µm (0.003")	15 cm (6")	Black	2-pk
37520	75 µm (0.003")	20 cm (8")	Black	2-pk
37550	75 µm (0.003")	50 cm (1.6')	Black	2-pk
31005	100 µm (0.004")	5 cm (2")	Red	2-pk
310010	100 µm (0.004")	10 cm (4")	Red	2-pk
310015	100 µm (0.004")	15 cm (6")	Red	2-pk
310020	100 µm (0.004")	20 cm (8")	Red	2-pk
310050	100 µm (0.004")	50 cm (1.6')	Red	2-pk
31505	150 µm (0.006")	5 cm (2")	Purple	2-pk
315010	150 µm (0.006")	10 cm (4")	Purple	2-pk
315015	150 µm (0.006")	15 cm (6")	Purple	2-pk
315020	150 µm (0.006")	20 cm (8")	Purple	2-pk
★ **315050**	150 µm (0.006")	50 cm (1.6')	Purple	2-pk
PEEKSIL TUBING, 1/16" OD				
6255	25 µm (0.001")	5 cm (2")	Orange	5-pk
62510	25 µm (0.001")	10 cm (4")	Orange	5-pk
62515	25 µm (0.001")	15 cm (6")	Orange	5-pk
62520	25 µm (0.001")	20 cm (8")	Orange	5-pk
62550	25 µm (0.001")	50 cm (1.6')	Orange	2-pk
6505	50 µm (0.002")	5 cm (2")	Natural	5-pk
65010	50 µm (0.002")	10 cm (4")	Natural	5-pk
65015	50 µm (0.002")	15 cm (6")	Natural	5-pk
★ **65020**	50 µm (0.002")	20 cm (8")	Natural	5-pk
65050	50 µm (0.002")	50 cm (1.6')	Natural	2-pk
6755	75 µm (0.003")	5 cm (2")	Black	5-pk
67510	75 µm (0.003")	10 cm (4")	Black	5-pk
67515	75 µm (0.003")	15 cm (6")	Black	5-pk
67520	75 µm (0.003")	20 cm (8")	Black	5-pk
67550	75 µm (0.003")	50 cm (1.6')	Black	2-pk
61005	100 µm (0.004")	5 cm (2")	Red	5-pk
610010	100 µm (0.004")	10 cm (4")	Red	5-pk
610015	100 µm (0.004")	15 cm (6")	Red	5-pk
610020	100 µm (0.004")	20 cm (8")	Red	5-pk
610050	100 µm (0.004")	50 cm (1.6')	Red	2-pk
61505	150 µm (0.006")	5 cm (2")	Purple	5-pk
615010	150 µm (0.006")	10 cm (4")	Purple	5-pk
615015	150 µm (0.006")	15 cm (6")	Purple	5-pk
615020	150 µm (0.006")	20 cm (8")	Purple	5-pk
615050	150 µm (0.006")	50 cm (1.6')	Purple	2-pk
61755	175 µm (0.007")	5 cm (2")	Yellow	5-pk
617510	175 µm (0.007")	10 cm (4")	Yellow	5-pk
617515	175 µm (0.007")	15 cm (6")	Yellow	5-pk
617520	175 µm (0.007")	20 cm (8")	Yellow	5-pk
617550	175 µm (0.007")	50 cm (1.6')	Yellow	2-pk
62005	200 µm (0.008")	5 cm (2")	Blue	5-pk
620010	200 µm (0.008")	10 cm (4")	Blue	5-pk
620015	200 µm (0.008")	15 cm (6")	Blue	5-pk
620020	200 µm (0.008")	20 cm (8")	Blue	5-pk
620050	200 µm (0.008")	50 cm (1.6')	Blue	2-pk
63005	300 µm (0.012")	5 cm (2")	Gray	5-pk
630010	300 µm (0.012")	10 cm (4")	Gray	5-pk
630015	300 µm (0.012")	15 cm (6")	Gray	5-pk
630020	300 µm (0.012")	20 cm (8")	Gray	5-pk
630050	300 µm (0.012")	50 cm (1.6')	Gray	2-pk

Spiral-Link™ Tubing

- Preformed PEEK tubing into a convenient spiral for a sample loop or to facilitate tubing movement
- Many volumes available

The coils of our 1/16" OD Spiral-Link tubing expand and contract, allowing you to more easily move your system components or even make equipment repairs whenever needed, without the hassle of breaking connections.

Upchurch Scientific® Spiral-Link tubing is made of PEEK polymer, a biocompatible, chemically inert material. Spiral-Links come in six different lengths. Our proprietary extrusion process ensures color permanence.

Each Spiral-Link ships with two F-287 SealTight™ Fittings.

NOTE

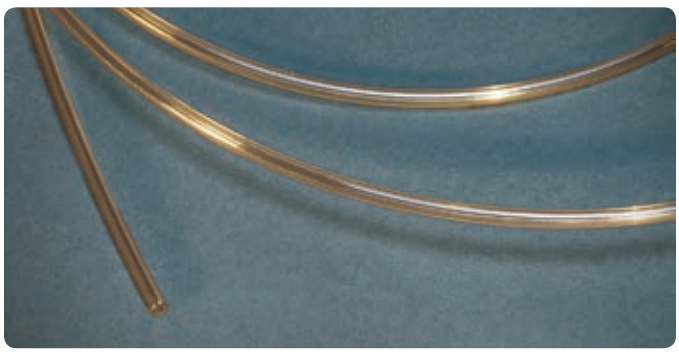
In addition to 0.010" ID shown in the price block below, Spiral-Link tubing is also available with the following IDs: 0.005" (125 µm), 0.020" (0.50 mm), and 0.030" (0.75 mm), all with 1/16" OD. Please contact us or an IDEX Health & Science Distributor for more information, or find these products at www.idex-hs.com.

Radel® Tubing

- Withstands up to 12,500 psi (862 bar)
- Transparent and autoclavable
- 1/16" and 1/8" outside diameters available
- Maximum continuous use temperature: 100 °C

Radel (polyphenylsulfone) is a mechanically strong and chemically resistant material, much like PEEK. Radel is frequently used in medical applications where repeated autoclave sterilization is performed (tests show product stability even after 1,000 cycles). Radel tubing is also transparent, allowing technicians to visually monitor flow through their instrument. Readily wetted surfaces help keep air bubbles from accumulating on inner surfaces.

Please visit our website, www.idex-hs.com, for more information regarding chemical compatibility of Radel.



SPECIFICATIONS & DETAILS

Tubing OD	OD Tolerance
1/16"	±0.001" (25 µm)
1/8"	±0.003" (75 µm)

Tubing ID	ID Tolerance
All	±0.001" (25 µm)
All	±0.003" (75 µm)

Part No.	ID	Length (Prior to Coiling)		Max coil span	Volume
SPIRAL LINK TUBING, 1/16" OD					
17202	0.25 mm (0.010")	20 cm (8")		1.3 cm (0.5")	10 µL
17204	0.25 mm (0.010")	40 cm (15.75")		6.1 cm (2.4")	20 µL
17205	0.25 mm (0.010")	50 cm (19.69")		7.6 cm (3.0")	25 µL
17210	0.25 mm (0.010")	100 cm (39.37")		17.8 cm (7.0")	51 µL
17220	0.25 mm (0.010")	200 cm (78.74")		33 cm (13.0")	101 µL
RADEL TUBING, 1/16" OD					
Part No.	**ID**	**Length**	**Color**	**Max Pressure**	**Volume**
1210	0.25 mm (0.010")	1.5 m (5')	Natural	12,500 psi (862 bar)	N/A
1210L	0.25 mm (0.010")	15 m (50')	Natural	12,500 psi (862 bar)	N/A
1210XL	0.25 mm (0.010")	30 m (100')	Natural	12,500 psi (862 bar)	N/A
1220	0.50 mm (0.020")	1.5 m (5')	Natural	7,500 psi (518 bar)	N/A
1220L	0.50 mm (0.020")	15 m (50')	Natural	7,500 psi (518 bar)	N/A
1220XL	0.50 mm (0.020")	30 m (100')	Natural	7,500 psi (518 bar)	N/A
1230	0.75 mm (0.030")	1.5 m (5')	Natural	5,500 psi (379 bar)	N/A
1230L	0.75 mm (0.030")	15 m (50')	Natural	5,500 psi (379 bar)	N/A
1230XL	0.75 mm (0.030")	30 m (100')	Natural	5,500 psi (379 bar)	N/A
RADEL TUBING, 1/8" OD					
1235	1.55 mm (0.062")	1.5 m (5')	Natural	4,500 psi (310 bar)	N/A
1235L	1.55 mm (0.062")	15 m (50')	Natural	4,500 psi (310 bar)	N/A
★ **1235XL**	1.55 mm (0.062")	30 m (100')	Natural	4,500 psi (310 bar)	N/A

RELATED PRODUCTS

- Some customers report using longer lengths of polymer tubing to add a little back pressure to their system. A more precise way to achieve this objective is to use one of our Back Pressure Regulators, found on page 152.

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TUBING	DuPont® FEP	DuPont PFA	DuPont HIGH PURITY PFA	360 µm DuPont HIGH PURITY PFA	ETFE
Page	**71**	**72**	**72**	**72**	**73**
Description	FEP tubing is a great alternative to traditional PTFE tubing, desirable for use because it is chemically inert to most solvents, easy to cut, and translucent for easy monitoring of solutions passing through. • Great for general, low pressure applications • Many sizes available in multiple colors for easy identification • Tight manufacturing tolerances to ensure product consistency	Offers excellent chemical compatibility, plus due to its inner surface smoothness, PFA tubing tends to be more translucent than PTFE tubing. • Offers higher purity and enhanced translucence when compared with other fluoropolymer tubes • Great for more critical, low pressure applications	This polymer tubing is manufactured from a premium grade of PFA — one of the most contaminant-free polymers on the market. • Offers chemical stability, mechanical strength, and purity for applications such as medical, diagnostic, pharmaceutical, biotechnology, and semiconductor • Excellent replacement for PTFE where gas permeability and surface texture are issues • Clarity of tubing makes PFA an excellent choice for monitoring fluid movement	This tubing offers excellent chemical compatibility, transparency, very low contaminant levels and is available in the most commonly-used outside diameter for capillary tubing applications. • Replacement for capillary tubing in low pressure applications where excellent chemical compatibility is required • Tubing sleeves available for capillary tubing connections	ETFE is chemically inert and more suitable for higher pressure applications (when using aqueous mobile phases) than PTFE, FEP, and PFA. Additionally, because ETFE is more rigid than PTFE, FEP, and PFA, this tubing better resists inner diameter collapse. • Excellent solvent resistance • More durable and less gas permeable than PTFE, FEP, and PFA • Operating temperatures up to 80 °C
Specifications					
OD (outside diameter)	1/32" (785 µm), 0.040" (1.0 mm), 1/16" (1.55 mm), 0.080" (2.0 mm), 0.118"(3.0 mm), 1/8" (3.2 mm), 0.157"(4.0 mm), 3/16" (4.8 mm), 1/4" (6.35 mm), 5/16" (7.94 mm)	1/16" (1.55 mm), 1/8" (3.2 mm)	1/16" (1.55 mm), 1/8" (3.2 mm), 3/16" (4.8 mm), 1/4" (6.35 mm)	0.0145" (360 µm)	1/16" (1.6 mm), 1/8" (3.2 mm), 1/4" (6.35 mm)
ID (inside diameter)	0.003" (0.075 mm) – 0.250" (6.35 mm)	0.020" (0.50 mm)– 0.062" (1.55 mm)	0.020" (0.50 mm)– 0.188" (4.80 mm)	0.002" (50 µm)– 0.006" (150 µm)	0.010" (0.25 mm)– 0.188" (4.80 mm)
Operating Temp	-51 to 50 °C	-51 to 80 °C	-51 to 80 °C	-51 to 80 °C	-51 to 80 °C
Pressure Rating	2,500–4,000 psi (172 - 276 bar)	500–2,000 psi (34–138 bar)	250–2,000 psi (17–138 bar)	1,750–3,500 psi (121–241 bar)	250–4,000 psi (17–276 bar)
Typical Tolerances	±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing	±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing	±0.001" (25 µm) for 1/16" OD tubing	±0.0005" (12.5 µm)	±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing
Refractive Index (Clarity)	1.338	1.34	1.34	1.34	1.4
pH Range	0–14	0–14	0–14	0–14	0–14
Sterilization Techniques	Ethylene oxide; thermal	Ethylene oxide; thermal	Gamma irradiation; ethylene oxide; thermal	Gamma irradiation; ethylene oxide; thermal	Ethylene oxide
Autoclavable?	Y	Y	Y	Y	Y

Upchurch Scientific® Tubing OD Sizes

Please use this table as a reference tool to help quickly locate within this chapter the appropriate OD size tubing for your application.

Size	Tubing OD	Page(s)
.	360 µm	67, 68, 72
.	510 µm	65, 67
•	1/32"	65, 67, 68, 71
●	1/16"	63, 65, 66, 68, 69, 71, 72, 73, 77
●	1/8"	65, 66, 69, 71, 72, 73
●	3/16"	71, 72
●	1/4"	71, 72, 73

Size	Tubing OD	Page(s)
●	5/16"	71
•	1 mm	71
●	1.8 mm	66
●	2 mm	66, 71
●	3 mm	71
●	4 mm	71

DuPont® FEP Fluoropolymer Tubing

- Great for moderate-to-low pressure applications
- 1/32", 1/16", 1/8", 3/16", 1/4", or 5/16" outside diameter available
- 1 mm, 2 mm, 3 mm, or 4 mm outside diameter available
- Maximum continuous use temperature: 50 °C

With virtually identical chemical resistance to PFA at a lower price, FEP tubing is great for general, low pressure applications. Compared to PTFE, FEP (fluorinated ethylene propylene) tubing is held to tighter tolerances and has lower gas permeability (see material properties on our website: www.idex-hs.com).

Much of our FEP Tubing — even the color-tinted options — is translucent, making it possible to watch fluid flow. Using different colored tubing can help identify transfer lines in multisolvent systems. Color coding also allows easy identification of the tubing thru-hole size. Black FEP tubing is available for light-sensitive applications (such as enzymatic and chemi-luminescent reactions) and entering/exiting flow cells.

SPECIFICATIONS & DETAILS

Tubing Size	OD Tolerances	ID Tolerances
1/32" OD	±0.0005" (12.5 µm)	±0.0005" (12.5 µm)
1/16" OD	±0.001" (25 µm)	±0.001" (25 µm)
1/8" OD	±0.003" (75 µm)	±0.003" (75 µm)
3/16" OD	±0.004" (0.10 mm)	±0.004" (0.10 mm)
5/16" OD	±0.004" (0.10 mm)	±0.004" (0.10 mm)
1 mm OD	±0.001" (25 µm)	±0.001" (25 µm)
2 mm OD	±0.003" (75 µm)	±0.003" (75 µm)
3 mm OD	±0.003" (75 µm)	±0.003" (75 µm)
4 mm OD	±0.004" (0.10 mm)	±0.004" (0.10 mm)

Part No.	ID	Length	Color	Max. Pressure
FEP TUBING, 1/32" OD				
1683	0.003" (75 µm)	5' (1.5 m)	Natural	4,000 psi (276 bar)
1684	0.004" (0.10 mm)	5' (1.5 m)	Black	3,000 psi (207 bar)
1685	0.005" (0.125 mm)	5' (1.5 m)	Red	3,000 psi (207 bar)
1686	0.006" (0.15 mm)	5' (1.5 m)	Violet	3,000 psi (207 bar)
1687	0.007" (0.175 mm)	5' (1.5 m)	Yellow	3,000 psi (207 bar)
1688	0.008" (0.20 mm)	5' (1.5 m)	Natural	2,500 psi (172 bar)
1689	0.009" (0.23 mm)	5' (1.5 m)	Blue	2,500 psi (172 bar)
1692	0.016" (0.405 mm)	5' (1.5 m)	Natural	1,500 psi (104 bar)
FEP TUBING, 1/16" OD				
1474	0.004" (0.10 mm)	10' (3 m)	Black	4,000 psi (276 bar)
1475	0.005" (0.125 mm)	10' (3 m)	Red	4,000 psi (276 bar)
1476	0.006" (0.150 mm)	10' (3 m)	Violet	4,00t0 psi (276 bar)
1477	0.007" (0.175 mm)	10' (3 m)	Yellow	4,000 psi (276 bar)
1478	0.008" (0.20 mm)	10' (3 m)	Natural	4,000 psi (276 bar)
1479	0.009" (0.23 mm)	10' (3 m)	Blue	4,000 psi (276 bar)
1526	0.010" (0.25 mm)	10' (3 m)	Natural	3,000 psi (207 bar)
1526B	0.010" (0.25 mm)	10' (3 m)	Blue	3,000 psi (207 bar)
1527	0.010" (0.25 mm)	20' (6 m)	Natural	3,000 psi (207 bar)
1527B	0.010" (0.25 mm)	20' (6 m)	Blue	3,000 psi (207 bar)
1518	0.020" (0.50 mm)	10' (3 m)	Black	2,000 psi (138 bar)
1549	0.020" (0.50 mm)	10' (3 m)	Natural	2,000 psi (138 bar)
1549OR	0.020" (0.50 mm)	10' (3 m)	Orange	2,000 psi (138 bar)
1519	0.020" (0.50 mm)	20' (6 m)	Black	2,000 psi (138 bar)
★ **1548**	0.020" (0.50 mm)	20' (6 m)	Natural	2,000 psi (138 bar)
1548OR	0.020" (0.50 mm)	20' (6 m)	Orange	2,000 psi (138 bar)
1522	0.030" (0.75 mm)	10' (3 m)	Natural	1,000 psi (69 bar)
1522G	0.030" (0.75 mm)	10' (3 m)	Green	1,000 psi (69 bar)
★ **1520**	0.030" (0.75 mm)	20' (6 m)	Natural	1,000 psi (69 bar)
1520G	0.030" (0.75 mm)	20' (6 m)	Green	1,000 psi (69 bar)

Part No.	ID	Length	Color	Max. Pressure
FEP TUBING, 1/8" OD				
★ **1521**	0.062" (1.55 mm)	20' (6 m)	Natural	500 psi (34 bar)
1521BL	0.062" (1.55 mm)	50' (15 m)	Blue	500 psi (34 bar)
1521GL	0.062" (1.55 mm)	50' (15 m)	Green	500 psi (34 bar)
1521ORL	0.062" (1.55 mm)	50' (15 m)	Orange	500 psi (34 bar)
1521RL	0.062" (1.55 mm)	50' (15 m)	Red	500 psi (34 bar)
1521YL	0.062" (1.55 mm)	50' (15 m)	Yellow	500 psi (34 bar)
1523	0.062" (1.55 mm)	10' (3 m)	Natural	500 psi (34 bar)
FEP TUBING, 3/16" OD				
1524	0.125" (3.20 mm)	20' (6 m)	Natural	500 psi (34 bar)
1524L	0.125" (3.20 mm)	50' (15 m)	Natural	500 psi (34 bar)
★ **1524XL**	0.125" (3.20 mm)	100' (30 m)	Natural	500 psi (34 bar)
1525	0.125" (3.20 mm)	10' (3 m)	Natural	500 psi (34 bar)
FEP TUBING, 1/4" OD				
1651	0.156" (4.0 mm)	10' (3 m)	Natural	250 psi (17 bar)
1651L	0.156" (4.0 mm)	50' (15 m)	Natural	250 psi (17 bar)
1651XL	0.156" (4.0 mm)	100' (30 m)	Natural	250 psi (17 bar)
1650	0.188" (4.80 mm)	10' (3 m)	Natural	250 psi (17 bar)
1650L	0.188" (4.80 mm)	50' (15 m)	Natural	250 psi (17 bar)
1650XL	0.188" (4.80 mm)	100' (30 m)	Natural	250 psi (17 bar)
FEP TUBING, 5/16" OD				
1652	0.250" (6.35 mm)	10' (3 m)	Natural	250 psi (17 bar)
1652L	0.250" (6.35 mm)	50' (15 m)	Natural	250 psi (17 bar)
1652XL	0.250" (6.35 mm)	100' (30 m)	Natural	250 psi (17 bar)
FEP TUBING, 1.0 mm OD				
1671	0.020" (0.50 mm)	10' (3 m)	Natural	500 psi (34 bar)
1671L	0.020" (0.50 mm)	50' (15 m)	Natural	500 psi (34 bar)
1671XL	0.020" (0.50 mm)	100' (30 m)	Natural	500 psi (34 bar)
FEP TUBING, 2.0 mm OD				
1673	0.040" (1.0 mm)	10' (3 m)	Natural	500 psi (34 bar)
1673L	0.040" (1.0 mm)	50' (15 m)	Natural	500 psi (34 bar)
1673XL	0.040" (1.0 mm)	100' (30 m)	Natural	500 psi (34 bar)
FEP TUBING, 3.0 mm OD				
1675	0.040" (1.0 mm)	10' (3 m)	Natural	500 psi (34 bar)
1675L	0.040" (1.0 mm)	50' (15 m)	Natural	500 psi (34 bar)
1675XL	0.040" (1.0 mm)	100' (30 m)	Natural	500 psi (34 bar)
1677	0.080" (2.0 mm)	10' (3 m)	Natural	500 psi (34 bar)
1677L	0.080" (2.0 mm)	50' (15 m)	Natural	500 psi (34 bar)
1677XL	0.080" (2.0 mm)	100' (30 m)	Natural	500 psi (34 bar)
FEP TUBING, 4.0 mm OD				
1679	0.120" (3.0 mm)	10' (3 m)	Natural	500 psi (34 bar)
1679L	0.120" (3.0 mm)	50' (15 m)	Natural	500 psi (34 bar)
1679XL	0.120" (3.0 mm)	100' (30 m)	Natural	500 psi (34 bar)

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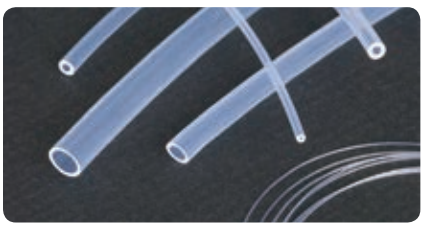
DuPont® PFA Tubing

- 1/16" and 1/8" ODs available
- Excellent solvent resistance and low gas permeability

PFA (perfluoroalkoxyalkane) tubing offers excellent solvent resistance (virtually identical to FEP and PTFE) while adding several advantages. These include smoother surface texture, higher continuous service temperature and superior polymer purity. The recommended maximum operating temperature for our PFA tubing is 80 °C.



DuPont High Purity PFA Tubing

- 360 µm, 1/16", 1/8", 3/16", and 1/4" outside diameters available
- PFA HP and PFA HP Plus Grades available
- Virtually contaminant free

PFA High Purity (HP) tubing offers all of the benefits of standard PFA tubing, with the additional benefit of being manufactured from a premium grade of PFA that is one of the most contaminant-free polymers available. In PFA HP, we offer tubing with the following outer diameters: 1/16", 1/8", 3/16", and 1/4".

PFA High Purity (HP) Plus tubing carries all of the benefits of PFA HP tubing, with the additional benefits of increased ability to withstand repeated flexing; improved resistance to stress cracking when exposed to aggressive fluorosurfactants; and smoother, clearer walls. In PFA HP Plus, we offer tubing with the following outer diameters: 360 µm, 1/16", and 1/8".

(Please Note: Due to the physical nature of the 360 µm OD tubing, we recommend using our A-350 Polymer Tubing Cutter from page 74 when cutting this tubing to length. Additionally, extra care should be taken to ensure fittings are not overtightened and to ensure the tubing is not stretched once secured in place, to ensure the dimensional stability of the tubing.)

SPECIFICATIONS & DETAILS

PFA Tubing Specifications

Tubing OD	OD Tolerances	Tubing ID	ID Tolerance
1/16"	±0.001" (25 µm)	All	±0.001" (25 µm)
1/8"	±0.003" (75 µm)	All	±0.003" (75 µm)

High Purity PFA Tubing Specifications

Tubing OD	OD Tolerances	Tubing ID	ID Tolerance
1/16"	±0.001" (25 µm)	All	±0.001" (25 µm)
1/8"	±0.003" (75 µm)	All	±0.003" (75 µm)
3/16"	±0.003" (75 µm)	All	±0.003" (75 µm)
1/4"	±0.004" (100 µm)	All	±0.004" (100 µm)

360 µm OD PFA HP Tubing Specifications

Tubing OD	OD Tolerance	Tubing ID	ID Tolerance
360 µm	±0.0005" (12.5 µm)	All	±0.0005" (12.5 µm)

Part No.	ID	Length	Color	Max. Pressure
PFA TUBING, 1/16" OD				
1500	0.020" (0.50 mm)	5' (1.5 m)	Natural	2,000 psi (138 bar)
1511	0.020" (0.50 mm)	10' (3 m)	Natural	2,000 psi (138 bar)
1512	0.020" (0.50 mm)	20' (6 m)	Natural	2,000 psi (138 bar)
1512L	0.020" (0.50 mm)	50' (15 m)	Natural	2,000 psi (138 bar)
1502	0.030" (0.75 mm)	5' (1.5 m)	Natural	1,000 psi (69 bar)
1513	0.030" (0.75 mm)	10' (3 m)	Natural	1,000 psi (69 bar)
1514	0.030" (0.75 mm)	20' (6 m)	Natural	1,000 psi (69 bar)
★ **1514L**	0.030" (0.75 mm)	50' (15 m)	Natural	1,000 psi (69 bar)
1503	0.040" (1.0 mm)	5' (1.5 m)	Natural	500 psi (34 bar)
1504	0.040" (1.0 mm)	10' (3 m)	Natural	500 psi (34 bar)
1507	0.040" (1.0 mm)	20' (6 m)	Natural	500 psi (34 bar)
1507L	0.040" (1.0 mm)	50' (15 m)	Natural	500 psi (34 bar)
PFA TUBING, 1/8" OD				
1508	0.062" (1.55 mm)	10' (3 m)	Natural	500 psi (34 bar)
★ **1509**	0.062" (1.55 mm)	20' (6 m)	Natural	500 psi (34 bar)
1509L	0.062" (1.55 mm)	50' (15 m)	Natural	500 psi (34 bar)
PFA TUBING, 1/4" OD				
1649	0.156" (4.0 mm)	10' (3 m)	Natural	250 psi (17 bar)
1649L	0.156" (4.0 mm)	50' (15 m)	Natural	250 psi (17 bar)
1649XL	0.156" (4.0 mm)	100' (30 m)	Natural	250 psi (17 bar)
PFA HP TUBING, 1/16" OD				
1620	0.020" (0.50 mm)	5' (1.5 m)	Natural	2,000 psi (138 bar)
1621	0.020" (0.50 mm)	10' (3 m)	Natural	2,000 psi (138 bar)
1622	0.020" (0.50 mm)	20' (6 m)	Natural	2,000 psi (138 bar)
1622L	0.020" (0.50 mm)	50' (15 m)	Natural	2,000 psi (138 bar)
1630	0.030" (0.75 mm)	5' (1.5 m)	Natural	1,000 psi (69 bar)
1631	0.030" (0.75 mm)	10' (3 m)	Natural	1,000 psi (69 bar)
1632	0.030" (0.75 mm)	20' (6 m)	Natural	1,000 psi (69 bar)
1632L	0.030" (0.75 mm)	50' (15 m)	Natural	1,000 psi (69 bar)
PFA HP TUBING, 1/8" OD				
1640	0.062" (1.55 mm)	10' (3 m)	Natural	500 psi (34 bar)
1641	0.062" (1.55 mm)	20' (6 m)	Natural	500 psi (34 bar)
★ **1641L**	0.062" (1.55 mm)	50' (15 m)	Natural	500 psi (34 bar)
PFA HP TUBING, 3/16" OD				
1642	0.125" (3.20 mm)	10' (3 m)	Natural	250 psi (17 bar)
1642L	0.125" (3.20 mm)	50' (15 m)	Natural	250 psi (17 bar)
1642XL	0.125" (3.20 mm)	100' (30 m)	Natural	250 psi (17 bar)
PFA HP TUBING, 1/4" OD				
1645	0.188" (4.80 mm)	10' (3 m)	Natural	250 psi (17 bar)
1645L	0.188" (4.80 mm)	50' (15 m)	Natural	250 psi (17 bar)
1645XL	0.188" (4.80 mm)	100' (30 m)	Natural	250 psi (17 bar)
PFA HP PLUS TUBING, 1/16" OD				
1900	0.010" (0.25 mm)	5' (1.5 m)	Natural	3,000 psi (207 bar)
1901	0.010" (0.25 mm)	10' (3 m)	Natural	3,000 psi (207 bar)
1902	0.010" (0.25 mm)	20' (6 m)	Natural	3,000 psi (207 bar)
1902L	0.010" (0.25 mm)	50' (15 m)	Natural	3,000 psi (207 bar)
1905	0.020" (0.50 mm)	5' (1.5 m)	Natural	2,000 psi (138 bar)
1906	0.020" (0.50 mm)	10' (3 m)	Natural	2,000 psi (138 bar)
1907	0.020" (0.50 mm)	20' (6 m)	Natural	2,000 psi (138 bar)
1907L	0.020" (0.50 mm)	50' (15 m)	Natural	2,000 psi (138 bar)
1910	0.030" (0.75 mm)	5' (1.5 m)	Natural	1,000 psi (69 bar)
1911	0.030" (0.75 mm)	10' (3 m)	Natural	1,000 psi (69 bar)
1912	0.030" (0.75 mm)	20' (6 m)	Natural	1,000 psi (69 bar)
1912L	0.030" (0.75 mm)	50' (15 m)	Natural	1,000 psi (69 bar)
PFA HP PLUS TUBING, 1/8" OD				
1920	0.062" (1.55 mm)	10' (3 m)	Natural	500 psi (34 bar)
1921	0.062" (1.55 mm)	20' (6 m)	Natural	500 psi (34 bar)
1921L	0.062" (1.55 mm)	50' (15 m)	Natural	500 psi (34 bar)
PFA HP PLUS TUBING, 360 µm OD				
1930	50 µm (0.002")	5' (1.5 m)	Natural	3,500 psi (241 bar)
1931	75 µm (0.003")	5' (1.5 m)	Natural	3,000 psi (207 bar)
1932	100 µm (0.004")	5' (1.5 m)	Natural	2,500 psi (172 bar)
1933	150 µm (0.006")	5' (1.5 m)	Natural	1,750 psi (121 bar)

ETFE Tubing

- Excellent chemical resistance
- Holds pressure up to 4,000 psi (276 bar)
- 1/16", 1/8", or 1/4" outside diameter available
- Maximum continuous operating temperature: 80 °C

Upchurch Scientific® ETFE (ethylene-tetrafluoroethylene) tubing is an excellent fluoropolymer product that offers several benefits over tubing manufactured from PTFE, FEP, or PFA. These benefits include enhanced pressure holding capabilities, increased mechanical stability and lower gas permeability.

Other tubing materials and dimensions may be available. Please contact IDEX Health & Science or your local representative directly.

APPLICATION NOTE

ETFE tubing is an ideal choice for the fluid pathway between the vacuum degasser and the system's pump. Its low gas permeability will help ensure the mobile phase solvents do not regas while in transit.

SPECIFICATIONS & DETAILS

ETFE Tubing Specifications

Tubing OD	Tubing ID	OD/ID Tolerances
1/16" OD	0.010" (0.25 mm), 0.020" (0.50 mm), 0.030" (0.75 mm)	±0.001" (25 µm)
1/16" OD	0.040" (1.0 mm)	±0.002" (50 µm)
1/8" OD	All	±0.003" (75 µm)
1/4" OD	All	±0.004" (100 µm)

	Part No.	ID	Length	Color	Max. Pressure
	ETFE TUBING, 1/16" OD				
	1529	0.010" (0.25 mm)	5' (1.5 m)	Natural	4,000 psi (276 bar)
	1529L	0.010" (0.25 mm)	50' (15 m)	Natural	4,000 psi (276 bar)
	1529XL	0.010" (0.25 mm)	100' (30 m)	Natural	4,000 psi (276 bar)
	1516	0.020" (0.50 mm)	5' (1.5 m)	Natural	3,000 psi (207 bar)
	1516L	0.020" (0.50 mm)	50' (15 m)	Natural	3,000 psi (207 bar)
★	**1516XL**	0.020" (0.50 mm)	100' (30 m)	Natural	3,000 psi (207 bar)
	1528	0.030" (0.75 mm)	5' (1.5 m)	Natural	2,000 psi (138 bar)
	1528L	0.030" (0.75 mm)	50' (15 m)	Natural	2,000 psi (138 bar)
★	**1528XL**	0.030" (0.75 mm)	100' (30 m)	Natural	2,000 psi (138 bar)
	1517	0.040" (1.00 mm)	5' (1.5 m)	Natural	500 psi (34 bar)
	1517L	0.040" (1.00 mm)	50' (15 m)	Natural	500 psi (34 bar)
	1517XL	0.040" (1.00 mm)	100' (30 m)	Natural	500 psi (34 bar)
	ETFE TUBING, 1/8" OD				
	1515	0.062" (1.55 mm)	5' (1.5 m)	Black	1,000 psi (69 bar)
	1515L	0.062" (1.55 mm)	50' (15 m)	Black	1,000 psi (69 bar)
	1515XL	0.062" (1.55 mm)	100' (30 m)	Black	1,000 psi (69 bar)
★	**1530**	0.062" (1.55 mm)	5' (1.5 m)	Natural	1,000 psi (69 bar)
	1530L	0.062" (1.55 mm)	50' (15 m)	Natural	1,000 psi (69 bar)
★	**1530XL**	0.062" (1.55 mm)	100' (30 m)	Natural	1,000 psi (69 bar)
	1648	0.093" (2.40 mm)	5' (1.5 m)	Natural	500 psi (34 bar)
	1648L	0.093" (2.40 mm)	50' (15 m)	Natural	500 psi (34 bar)
★	**1648XL**	0.093" (2.40 mm)	100' (30 m)	Natural	500 psi (34 bar)
	ETFE TUBING, 1/4" OD				
	1647	0.188" (4.80 mm)	5' (1.5 m)	Natural	250 psi (17 bar)
	1647L	0.188" (4.80 mm)	50' (15 m)	Natural	250 psi (17 bar)
	1647XL	0.188" (4.80 mm)	100' (30 m)	Natural	250 psi (17 bar)

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Fused Silica Tubing Cutters

We offer a precision cutter for fused silica tubing — SGT's Shortix™ Cutter (FS-315). This cutter ensures clean, trouble-free cutting of fused silica tubing, providing better cuts than any other product on the market. It also includes a built-in magnifying glass to examine the cut tubing ends. Order the FS-315-02 Maintenance Kit, as needed, to replace a worn or damaged cutting wheel.

FS-315
for fused silica tubing

When using traditional fused silica tubing cutters, only a small part of the tubing wall is scratched, then the tubing is snapped or pulled in two, often resulting in a jagged, uneven cut. With a Shortix Cutter, a clean cut is made every time, regardless of skill or experience, as the cut is made by rotating a diamond blade around the entire circumference of the tubing.

Please Note: The FS-315 Fused Silica Tubing Cutters are designed to cut only tubing with ODs of 350 µm–780 µm and IDs of 100 µm–350 µm.

Polymer Tubing Cutters

- For 1/16", 1/8", 3/16", 1/4", and 5/16" OD tubing

A flat, 90˚, burr-free cut is difficult to obtain with most commercial polymer tubing cutters. Upchurch Scientific® has designed several tubing cutters specifically to cut polymer tubing. This line of tubing cutters includes a standard cutter for 1/16" and 1/8" OD tubing (A-327), and another for large bore tubing (A-329). Each has guide holes to ensure precise cutting. These cutters are durable, reliable, and easy to operate. Five replacement blades are included with each tool.

A-329
for 3/16" - 5/16" OD tubing

A-327
for 1/16" and 1/8" OD tubing

NOTE

- The A-350 Capillary Polymer Tubing Cutter can be used to cut tubing OD sizes other than 360 µm, 510 µm, and 1/32". Simply use the proper NanoTight™ Tubing Sleeve found on page 17. Please note, however, that these sleeves are shorter than those listed on this page, and therefore will last through fewer cuts.
- Our tubing cutters are material specific: the A-327, A-329, A-350, and A-370 should only be used to cut polymer tubing, where as the FS-315 should only be used to cut fused silica tubing.

Capillary Polymer Tubing Cutters

The Upchurch Scientific A-350 Cutter is designed to cut capillary-sized polymer tubing. The cutter makes clean, perpendicular cuts without collapsing thin capillary walls. A set of ten tubing sleeves, required for cutting, are included with each cutter, along with five replacement blades. The included tubing sleeves are for cutting 360 µm OD polymer capillary tubing. Alternative sleeves are available for cutting 510 µm and 1/32" OD tubing. All tubing sleeves are 2" long and are made of DuPont® FEP.

Upchurch Scientific introduces a new tubing cutter specifically for cutting 2.0 mm OD polymer tubing. The A-370 tubing cutter is designed to cut in a similar method to the A-350 capillary polymer tubing cutter. The tubing slides through the cutter and the knob is rotated to spin the tubing as the razor blade circumscribes the tubing, providing a very clean, perpendicular cut.

A-350
for capillary polymer tubing

	Part No.	Description	Qty.
	FUSED SILICA TUBING CUTTERS		
	FS-315	Shortix Fused Silica Tubing Cutter	ea.
	CAPILLARY POLYMER TUBING CUTTER		
★	**A-350**	Capillary Polymer Tubing Cutter* for 360 µm–1/32" OD tubing Includes (1) F-262x 10-pack of sleeves and (1) M-438-03 wrench	ea.
	F-262x	Replacement Sleeves for A-350, 0.0155" ID, Green, for cutting 360 µm OD tubing	10-pk
	F-264x	Alternative Sleeves for A-350, 0.021" ID, Natural, for cutting 510 µm OD tubing	10-pk
	F-267Bx	Alternative Sleeves for A-350, 0.033" ID, Blue, for cutting 1/32" OD tubing	10-pk
★	**A-327**	Standard Polymer Tubing Cutter* for 1/16" and 1/8" OD tubing	ea.
	A-329	Large Bore Polymer Tubing Cutter* for 3/16"– 5/16" OD tubing	ea.
	A-328	Replacement Blades for A-350, A-370, A-327 and A-329	5-pk
NEW!	**A-370**	Polymer Tubing Cutter* for 2.0 mm OD tubing	ea.

** Includes (1) A-328 5-pack of replacement blades.*



TUBING	TYGON® LMT-55	TYGON E-LFL	ISMAPRENE (PHARMED®)	TYGON 3350 SI	SILICONE PEROXIDE
Page	78	78	79	79	80
Description	The inexpensive all-round tubing for general laboratory applications. • Transparent • Resistant to almost all inorganic chemicals • Smooth polished inner wall • Low gas permeability • Non-aging and non-oxidizing	The tubing with the longest service-life of any clear Tygon tubing. • Transparent • Broad chemical resistance • Tasteless • Extremely low particulate spallation • Meets USP Class VI and FDA criteria • Non-aging	The ideal tubing for pharmaceutical and medical applications, and for foodstuffs. • Recommended for cell cultures and tissue • Ideal for production filtration, fermentation, and bioreactor process lines • Very long service-life • Non-toxic and non-hemolytic • Impermeable to normal light and UV-radiation • Appropriate for medical products and foodstuffs • Low particulate spallation • Can be autoclaved repeatedly • Withstands repeated CIP and SIP cleaning and sterilization • Meets USP class VI, FDA, and NSF criteria	The platinum-cured silicone tubing with an ultra-smooth inner surface for sanitary transfer of sensitive fluids. • Can be autoclaved with steam • Excellent biological compatibility • Ultra-smooth inner-bore reduces potential for particle entrapment • Lower level of protein binding • Entirely non-toxic, non-hemolytic and non-pyrogenic • Weather, ozone, sunlight, and radiation resistant • Resistant to fungus • Odorless	Silicone tubing blended with organic peroxide for biological applications. • Can be autoclaved with steam • Excellent biological compatibility • Greater physical compression capability • Not prone to mold • Non-toxic • Waterproof and resistant to ozone, radiation, and sunlight • Resistant to fungus • Odorless
Specifications					
OD (outside diameter)	0.16–0.88" (4.0–22.3 mm)	0.19–0.75" (4.8–19.1 mm)	0.16–1.3" (4.0–33.4 mm)	0.16–1.3" (4.0–33.4 mm)	0.16–1.3" (4.0–33.4 mm)
ID (inside diameter)	0.03–0.61" (0.8–15.9 mm)	0.06–0.5" (1.6–12.7 mm)	0.03–1" (0.8–25.4 mm)	0.03–1" (0.8–25.4 mm)	0.03–1" (0.8–25.4 mm)
Operating Temp	-50 to 74 °C	-50 to 74 °C	-60 to 135 °C	-60 to +200 °C	-51 to 238 °C
Certification(s)		FDA 21 CFR 175.300; US Pharmacopoeia Class VI	FDA 21 CFR 177.2600; US Pharmacopoea Class VI, NSF listed (Standard 51)	FDA 21 CFR, 177.2600, Also exceeds 3A sanitary standards; US Pharmacopoea XXIII Cl.VI;	FDA 21 CFR 177.2600; US Pharmacopoea XXIII Cl.VI
Chemical Resistance					
Acids	Good	Fair	Good	Limited	Limited
Alkaline Solutions	Good	Fair	Good	Limited	Good
Solvents	Not Recommended	Not Recommended	Not Recommended	Limited	Not Recommended
Pressure	Fair	Good	Not Recommended	Not Recommended	Not Recommended
Vacuum	Good	Good	Excellent	Good	Good
Viscous Media	Excellent	Excellent	Good	Fair	Fair
Sterile Media	Limited	Limited	Excellent	Excellent	Excellent
Gas Permeability (at 25 °C)*					
CO_2	360	720	1200	25147	25147
H_2	—	—	—	—	—
0_2	80	160	200	4715	4715
N_2	40	80	80	2284	2284

** Permeability Coefficient =* $\frac{\text{Amount of Gas } (cm^3) \times \text{tubing wall thickness } (cm)}{\text{Surface Area of tubing ID } (cm^2) \times \text{time (sec)} \times \text{pressure drop across tubing wall (cm Hg)}} \times 10^{-10}$

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TUBING	TYGON 2001	TYGON MHLL	TYGON HC F-4040-A	NORPRENE® A-60-G	FLURAN® F-5500-A
Page	**80**	**81**	**81**	**82**	**82**
Description	The transparent, plasticizer-free tubing with superior pump-life. Especially designed for MEK and other aggressive solvents. • Plasticizer and oil-free • Smooth inner-bore • Low sorption maintains fluid and tube integrity • Does not impart anything into the pumping medium • No release of hazardous materials when properly incinerated	Chemically resistant to Acetone, MEK and other aggressive solvents. Long life tubing. • Plasticizer-free • Smooth inner-bore • Low sorption maintains fluid integrity • Minimal adhesion and diffusion • Suitable for MEK, Acetone and other corrosive solvents • Long life tubing	The special tubing for hydrocarbons, petroleum products and distillates. • Specially formulated to transport hydrocarbons, petroleum products and distillates • Ideal for gasoline, kerosene, heating oils, cutting liquids and coolants based on glycols • Low gas permeability	The high performance tubing for industrial use. • Offers longest service-life with good flow consistency • Good resistance to acids and alkaline chemicals • Superior weathering • Abrasion resistant • Non-aging and non-oxidizing • Outstanding flexural fatigue resistance • Low gas permeability versus rubber tubing • Ozone (300 pphm) and UV light resistant • Ideal for use in vacuum system	The special tubing for concentrated acids and corrosive solvents. • High chemical resistance • Low gas permeability • Wide temperature range
Specifications					
OD (outside diameter)	0.19–0.88" (4.8–22.3 mm)	0.09–0.18" (2.22–4.63 mm)	0.19–0.75" (4.8–19.1 mm)	0.16–0.9" (4.0–22.3 mm)	0.16–0.6" (4.0–15.9 mm)
ID (inside diameter)	0.06–0.61" (1.6–15.9 mm)	0.01–0.1" (0.38–2.79 mm)	0.06–0.5" (1.6–12.7 mm)	0.03–0.6" (0.8–15.9 mm)	0.03–0.4" (0.8–9.5 mm)
Operating Temp	-73 to 57 °C	-70 to 74 °C	-37 to 74 °C	-60 to 135 °C	-32 to 204 °C
Certification(s)	FDA 21 CFR 177.2600; FDA Approved for contact with foods	FDA 21 CFR 177.2600; US Pharmacopoea Class VI	None	None	GMP
Chemical Resistance					
Acids	Excellent	Excellent	Limited	Excellent	Excellent
Alkaline Solutions	Excellent	Excellent	Not Recommended	Excellent	Excellent
Solvents	Good	Excellent	Not Recommended	Not Recommended	Limited
Pressure	Good	Not Recommended	Good	Not Recommended	Not Recommended
Vacuum	Good	Good	Good	Good	Good
Viscous Media	Excellent	Good	Excellent	Excellent	Good
Sterile Media	Good	Good	Limited	Not Recommended	Fair
Permeability (at 25 °C)					
CO_2	1140	3800	100	1200	38
H_2	—	—	—	—	—
0_2	76	800	22	200	14
N_2	190	320	12	80	5

Peristaltic Pumps & Tubing

The pumps presented on pages 92–108 require peristaltic tubing to operate. Flow rate of a given fluid through a peristaltic tubing pump depends on two variables:

1. The speed of the pump, measured in revolutions per minute (rpm)
2. The volume held with the internal diameter (ID) of the selected tubing

Variable Speed Pump Flow Rates

For a variable speed pump, such as the products on pages 92, 93, and 95–104, the flow rate of a channel can be changed by varying the pump rpm, or by using tubing with different IDs, or a combination of both.

Ordering your Pump & Tubing

Follow these steps to complete your Ismatec® peristaltic tubing pump order:

1. Select the pump for your application from pages 92–104, determined by the requirements of your fluid delivery task(s):
    a. Level of accuracy
    b. Fluid streams (# of channels)
    c. Flow rate range(s)
    d. Need for constant flow, discrete dispensing, or both
    e. Need for variable speed
    f. Need for automation/programmability
2. Note whether the selected pump requires 2-stop, 3-stop, or standard tubing.
3. Review the tubing properties tables on pages 62, 70, 75, and 76 and select the tubing material best suited for your application.
4. Review the page that contains information and options for the tubing material you have selected.
5. Identify the correct part number for the tubing you need, based upon two factors: a) if your pump requires tubing with stops or not, and if so how many; and b) the correct inner diameter and wall thickness for the model pump you are using.
6. If required, order extension tubing that corresponds as closely as possible to the tubing material and ID of your 2-stop or 3-stop tubing.

RELATED PRODUCTS

- Connectors and adapters for peristaltic tubing are on pages 58, 59, and 60.

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Tygon® LMT-55 Tubing

- DEHP Free
- The Tygon blend of choice for general laboratory applications

Tygon LMT-55 offers an all-around, inexpensive option for general laboratory applications. Featuring transparent walls and low gas permeability — and with many different sizes from which to choose — this tubing material option is the option of choice for many less-critical applications. To determine the expected flow rates related to the tubing inner diameters, see the technical specifications for your pump model, listed here in this catalog or in your pump's operating manual.

Please Note: The low overall lifetime of this material will require tubing to replaced more frequently. For a longer life version of Tygon LMT-55, consider Tygon S3 E-LFL.

SPECIFICATIONS & DETAILS

Special Properties	The inexpensive all-round tubing for general laboratory applications	
Advantages	• Transparent • Resistant to almost all inorganic chemicals • Tasteless • Smooth polished inner wall	• Low gas permeability • Non-aging and non-oxidizing • High dielectric constant • LMT-55 will outlast R-3603 in most applications by 3 to 1
Limitations	• Potential leaching of plasticizers	• Short service-life
Physical Properties	• Thermoplastic • PVC-based material with phthalate-free plasticizer	• Flexible, firm, transparent
Service Temperature Range	-50 °C to +74 °C (-58 °F to + 165 °F)	
Applications		
Acids	Good	
Alkaline solutions	Good	
Solvents	Not recommended	
Pressure	Fair	
Vacuum	Good	
Viscous media	Excellent	
Sterile media	Limited	
Complies with the Following Standards		
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F); tubing will appear milky. Gas sterilization with Ethylene oxide. **Not recommended for sterilization with radiation.**	
Permeability		
CO_2	360	
O_2	80	
N_2	40	

$$\frac{\text{Volume of gas [cm3] x wall thickness [mm]}}{\text{Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$$

Odor and taste	None	
Toxicity	Non-toxic	
Tubing life	at 0 bar	35 hrs
	at 0.7 bar	30 hrs

Tygon E-LFL Tubing

- DEHP Free
- Longest service life of any clear Tygon tubing material
- Excellent choice where transparency and good chemical resistance is needed

Tygon S3 E-LFL tubing is available in a broad range of sizes for use throughout our pump product line. Its good chemical resistance coupled with its durability makes it an excellent choice in those applications where longer-life tubing is desired (i.e., where tubes are not disposed of frequently).

In many cases, this tubing can withstand system pressures that are in excess of most peristaltic pumps' abilities, providing built-in safety precautions for your system flow path.

Choose tubing without stops for use with most single-channel pumps. *(Note: Ensure the wall thickness of the tubing you have selected matches the requirements for the pump you are using.)* Choose the 2-stop or 3-stop tubing for use with the versions of our pumps that incorporate cassettes into the pumphead design.

SPECIFICATIONS & DETAILS

Special Properties	The tubing with the longest service-life of any clear Tygon tubing	
Advantages	• Transparent • Broad chemical resistance • Tasteless • Extremely low particulate spallation • Meets USP Class VI and FDA criteria • Non-aging	
Limitations	• Potential leaching of plasticizers	
Physical Properties	• Thermoplastic • PVC-based material with phthalate-free plasticizer • Flexible, firm, transparent	
Service Temperature Range	-50 °C to +74 °C (-58 °F to + 165 °F)	
Applications		
Acids	Fair	
Alkaline solutions	Fair	
Solvents	Not recommended	
Pressure	Good	
Vacuum	Good	
Viscous media	Excellent	
Sterile media	Limited	
Complies with the Following Standards	FDA 21 CFR 175.300; US Pharmacopoea Class VI	
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F); tubing will appear milky. Gas sterilization with Ethylene oxide. **Not recommended for sterilization with radiation.**	
Permeability		
CO_2	720	
O_2	160	
N_2	80	

$$\frac{\text{Volume of gas [cm3] x wall thickness [mm]}}{\text{Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$$

Odor and taste	None	
Toxicity	Non-toxic	
Tubing life	at 0 bar	800 hrs
	at 0.7 bar	700 hrs

Ismaprene Tubing (PharMed®)

- Excellent chemical resistance for traditional peristaltic pump tubing
- Offers FDA and USP Class VI certification

PharMed Ismaprene tubing has long been the tubing of choice for many demanding applications where other polymer blends have been unsuitable for use.

With strong chemical resistance, excellent lifetime, and low gas permeability — coupled with industry-standard certifications — PharMed tubing is offered in options for standard pumps as well as for pumps requiring 2-stop and 3-stop tubing. Special versions are available with welded stops for applications where repeated autoclaving must take place.

SPECIFICATIONS & DETAILS

Special Properties	The ideal tubing for pharmaceutical and medical applications, and for foodstuffs	
Advantages	• Recommended for cell cultures and tissue • Ideal for production filtration, fermentation, and bioreactor process lines • Very long service-life • Non-toxic and non-hemolytic • Impermeable to normal light and UV-radiation • Appropriate for medical products and foodstuffs • Low particulate spallation • Can be autoclaved repeatedly • Withstands repeated CIP and SIP cleaning and sterilization • Meets USP Class VI, FDA, and NSF criteria	
Limitations	• Potential leaching of additives (lubricants)	
Physical Properties	• Thermoplastic elastomer based on polypropylene • Firm, opaque, beige color	
Service Temperature Range	-60 °C to +135 °C (-75 °F to +275 °F)	
Applications		
Acids	Good	
Alkaline solutions	Good	
Solvents	Not recommended	
Pressure	Not recommended	
Vacuum	Excellent	
Viscous media	Good	
Sterile media	Excellent	
Complies with the Following Standards	FDA 21 CFR Part 177.2600; US Pharmacopoea Class VI, NSF listed (Standard 51)	
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 141 °C (250 °F) Gas sterilization with Ethylene oxide. Sterilization with radiation up to 2.5 mrad. **Caution: Use special tubing version (welded stoppers) when autoclaving 2 or 3-stop color-coded tubing.**	
Permeability		
CO_2	1200	Volume of gas [cm3] x wall thickness [mm] / Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg] **x 10^{-10}**
O_2	200	
N_2	80	
Odor and taste	Low	
Toxicity	Non-toxic and non-hemolytic	
Tubing life at 0 bar	1000+ hrs	
at 0.7 bar	1000 hrs	

Tygon® 3350 SI Tubing

- Platinum-cured silicone tubing
- Features ultra-smooth inner-bore
- Biocompatible for life science applications

Tygon 3350 SI tubing is a special silicone-based tubing that undergoes a special treatment with platinum to ensure a very smooth internal surface. This surface feature helps improve the material's use with biological applications where solid material may be present. Additionally, the material exhibits a low-level of protein-binding as well as being non-toxic, helping to make this material the top choice for many life science applications.

SPECIFICATIONS & DETAILS

Special Properties	The platinum-cured silicone tubing with an ultra-smooth inner surface for sanitary transfer of sensitive fluids	
Advantages	• Steam autoclavability • Excellent biological compatibility • Ultra-smooth inner-bore reduces potential for particle entrapment • Lower level of protein binding • Entirely non-toxic, non-hemolytic, and non-pyrogenic • Weather, ozone, sunlight, and radiation resistant • Resistant to fungus • Odorless	
Limitations	• Not suitable for concentrated solvents, oils, acids, or diluted sodium hydroxide • Relatively high gas permeability	
Physical Properties	• Thermal set rubber • Siloxane polymers and amorphous silica • Soft, translucent, clear to light amber • Excellent compression strength	
Service Temperature Range	-60 °C to +200 °C (-75 °F to +392 °F)	
Applications		
Acids	Limited	
Alkaline solutions	Limited	
Solvents	Limited	
Pressure	Not recommended	
Vacuum	Good	
Viscous media	Fair	
Sterile media	Excellent	
Complies with the Following Standards	US Pharmacopoea XXIII Cl.VI, FDA 21 CFR, Part 177.2600. Also exceeds 3A sanitary standards.	
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F) Gas sterilization with Ethylene oxide Sterilization with radiation up to 2.5 mrad.	
Permeability		
CO_2	25147	Volume of gas [cm3] x wall thickness [mm] / Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg] **x 10^{-10}**
O_2	4715	
N_2	2284	
Odor and taste	None	
Toxicity	Non-toxic	
Tubing life at 0 bar	200 hrs	
at 0.7 bar	100 hrs	

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Silicone Peroxide Tubing

- Non-toxic material great for biological applications
- Soft and translucent for applications requiring visual checks

SPECIFICATIONS & DETAILS

Special Properties	Silicone tubing blended with organic peroxide for biological applications	
Advantages	• Steam autoclavability • Excellent biological compatibility • Greater physical compression capability • Not prone to mold • Non-toxic • Waterproof and resistant to ozone, radiation, and sunlight • Resistant to fungus • Odorless	
Limitations	• Not recommended for concentrated solvents, oils, acids, or diluted sodium hydroxide • Relatively high gas permeability	
Physical Properties	• Polydimethylsiloxane with silica filter and silicone oil • Excellent resistance to compression • Soft, translucent, clear to light amber	
Service Temperature Range	-51 °C to +238 °C (-60 °F to +460 °F)	
Applications		
Acids	Limited	
Alkaline solutions	Good	
Solvents	Not recommended	
Pressure	Not recommended	
Vacuum	Good	
Viscous media	Fair	
Sterile media	Excellent	
Complies with the Following Standards	FDA 21 CFR 177.2600; US Pharmacopoea XXIII Cl.VI	
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °C) Radiation: Irradiate at up to 2.5 mrad **Gas: Not recommended to sterilize with ethylene oxide**	
Permeability		
CO_2	25147	Volume of gas [cm3] x wall thickness [mm] / Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg] **x 10^{-10}**
O_2	4715	
N_2	2284	
Odor and taste	—	
Toxicity	—	
Tubing life at 0 bar	—	
at 0.7 bar	—	

Tygon® 2001 Tubing for Aggressive Media

- High chemical resistance for broad application use
- Options available for single and multi-channel pump systems
- Ultra-pure tubing for peristaltic pumps

Tygon 2001 tubing features all of the benefits of most Tygon blends — including wall transparency and FDA approval. Added to this is strong chemical resistance for many solutions (excluding hydrocarbons), making Tygon 2001 a material of choice for many demanding applications where other blends may not be suitable.

Options are available in both Standard Tubing, up to 0.626" (15.9 mm) and Stopper Tubing up to 0.109" (2.79 mm).

SPECIFICATIONS & DETAILS

Special Properties	The transparent, plasticizer-free tubing with superior pump-life; especially designed for MEK and other aggressive solvents	
Advantages	• Plasticizer and oil-free • Smooth inner-bore • Low sorption maintains fluid and tube integrity • Does not impart anything into the pumping medium • No release of hazardous materials when properly incinerated	
Limitations	None	
Physical Properties	Polyolefin	
Service Temperature Range	-73 °C to +57 °C (-100 °F to +135 °F)	
Applications		
Acids	Excellent	
Alkaline solutions	Excellent	
Solvents	Good / Excellent	
Complies with the Following Standards	FDA certification for food contact	
Sterilization	Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 141 °C (250 °F). Gas sterilization with Ethylene oxide. Sterilization with radiation up to 2.5 mrad.	
Permeability		
CO_2	1140	Volume of gas [cm3] x wall thickness [mm] / Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg] **x 10^{-10}**
O_2	76	
N_2	190	
Odor and taste	No odor or taste	
Toxicity	–	
Tubing life at 0 bar	75 hrs	
at 0.7 bar	–	

Tygon® MHLL Tubing

- Dual-layered tubing material
- Pairs chemical resistance and long-life

Tygon MHLL is a unique tubing material, comprised of an inner layer of Tygon MH and an outer layer of PharMed®. This combination helps ensure excellent chemical resistance (except for hydrocarbons and strong ketones) as well as long service life. Available as Stopper Tubing for use with MS/CA cassettes.

Additionally, this material offers both FDA approval as well as USP Class VI approval, making it a material of choice for more demanding life-science applications.

SPECIFICATIONS & DETAILS

Special Properties		• The tubing can be used with acetone and MEK • Long life tubing
Advantages		• Plasticizer-free • Smooth inner-bore • Low sorption maintains fluid integrity • Minimal adhesion and diffusion • Suitable for MEK, Acetone and other corrosive solvents • Long life tubing
Limitations		• Cannot be repeatedly sterilized • Only available as stopper tubing
Physical Properties		• Special thermoplastic of high purity • Without additives • Without plasticizer • Environmental-friendly disposal • Flexible, firm, opaque
Service Temperature Range		-70 °C to +74 °C (-94 °F to + 165 °F)
Applications		
Acids		Excellent
Alkaline solutions		Excellent
Solvents		Excellent
Pressure		Not recommended
Vacuum		Good
Viscous media		Good
Sterile media		Good
Complies with the Following Standards		FDA 21 CFR, Part 177.2600; USP Pharmacopoea Class VI FDA certification for food contact
Sterilization		Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F). Gas sterilization with Ethylene oxide. Sterilization with radiation up to 2.5 mrad **Caution: Can not be repeatedly sterilized.**
Permeability		$\frac{\text{Volume of gas [cm3] x wall thickness [mm]}}{\text{Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$
	CO_2	—
	O_2	—
	N_2	—
Odor and taste		No odor or taste
Toxicity		—
Tubing life	at 0 bar	800+ hrs
	at 0.7 bar	800+ hrs

Tygon HC F-4040-A Tubing

- Specially formulated for hydrocarbon-based applications
- Features low gas permeability and good pressure resistance

Tygon F-4040-A tubing has been specially-formulated for use in petroleum (and similar) applications where other Tygon blends cannot be used successfully. The material offers some of the lowest gas permeability rates for atmospheric gases of all the Tygon blends, making it ideal for use in those applications where sensitivity to gas permeation is high or where vacuum may be applied.

In addition to being suitable for hydrocarbon-based applications, this material can also be used successfully with low-concentration acidic solutions as well as mineral salt solutions.

Yellow-tinted, the material offers some degree of translucency, however, it is not as transparent as many other Tygon blends.

SPECIFICATIONS & DETAILS

Special Properties		The special tubing for hydrocarbons, petroleum products and distillates
Advantages		• Specially formulated to transport hydrocarbons, petroleum products, and distillates • Ideal for gasoline, kerosene, heating oils, cutting liquids, and coolants based on glycols • High dielectric constant • Low gas permeability
Limitations		• Not recommended for strong acids and alkalies, foodstuffs, beverages, and medicines • Potential leaching of plasticizers
Physical Properties		• Thermoplastic • PVC-based material with plasticizer • Flexible, firm, translucent, yellow
Service Temperature Range		-37 °C to +74 °C (-35 °F to +165 °F)
Applications		
Acids		Limited
Alkaline solutions		Not recommended
Solvents		Not recommended
Pressure		Good
Vacuum		Good
Viscous media		Excellent
Sterile media		Limited
Complies with the Following Standards		None
Sterilization		Not recommended
Permeability		$\frac{\text{Volume of gas [cm3] x wall thickness [mm]}}{\text{Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$
CO_2		100
O_2		22
N_2		12
Odor and taste		Must not be used for foodstuffs, beverages, and drugs
Toxicity		Must not be used for foodstuffs, beverages, and drugs
Tubing life	at 0 bar	60 hrs
	at 0.7 bar	60 hrs

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Norprene® A-60-G Tubing

- Long-life tubing with strong chemical resistance
- Excellent option for industrial applications

Norprene tubing is an excellent alternative to traditional rubber tubing in industrial applications where good chemical resistance is paired with a desire for longer service life.

This tubing material offers additional benefits, including low gas permeability and broad temperature range compatibility. Combined, this material's features help make this tubing the tubing of choice in many applications.

SPECIFICATIONS & DETAILS

Special Properties	The high performance tubing for industrial use	
Advantages	• Offers longest service-life with good flow consistency • Good resistance to acids and alkaline chemicals • Superior weathering • Abrasion resistant • Non-aging and non-oxidizing • Outstanding flexural fatigue resistance • Low gas permeability versus rubber tubing • Ozone (300 pphm) and UV light resistant • Ideal for use in vacuum system	
Limitations	• Potential leaching of blend material	
Physical Properties	• Thermoplastic elastomer based on polypropylene • Excellent tensile strength • Firm, opaque, black	
Service Temperature Range	-60 °C to +135 °C (-75 °F to +275 °F)	
Applications		
Acids	Excellent	
Alkaline solutions	Excellent	
Solvents	Not recommended	
Pressure	Not recommended	
Vacuum	Good	
Viscous media	Excellent	
Sterile media	Not recommended	
Complies with the Following Standards	None	
Sterilization	Not recommended	
Permeability	Volume of gas [cm3] x wall thickness [mm] / Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]	x 10^{-10}
CO_2	1200	
O_2	200	
N_2	80	
Odor and taste	Must not be used for foodstuffs, beverages and drugs	
Toxicity	Must not be used for foodstuffs, beverages and drugs	
Tubing life at 0 bar	1000+ hrs	
at 0.7 bar	1000 hrs	

Fluran® F-5500-A Tubing

- Specially-formulated elastomer for use with strong acidic and basic solutions
- Very low gas permeability

Fluran tubing has been specially formulated for use in applications where strong acidic solutions or strong basic solutions are being used.

The material's very low gas permeability also makes this the choice material for applications where fluids can be transferred without being contaminated by atmospheric gases. Additionally, the low gas permeability and relative strength of this material make it a material of choice in vacuum based applications.

SPECIFICATIONS & DETAILS

Special Properties	The special tubing for concentrated acids and corrosive solvents	
Advantages	• High chemical resistance • Low gas permeability • Wide temperature range	
Limitations	• Limited service-life	
Physical Properties	• Fluoroelastomer • Firm, opaque, black	
Service Temperature Range	-31 °C to +204 °C (-25 °F to + 400 °F)	
Applications		
Acids	Excellent	
Alkaline solutions	Excellent	
Solvents	Limited	
Pressure	Not recommended	
Vacuum	Good	
Viscous media	Good	
Sterile media	Fair	
Complies with the Following Standards	None	
Sterilization	Not recommended	
Permeability	Volume of gas [cm3] x wall thickness [mm] / Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]	x 10^{-10}
CO_2	38	
O_2	14	
N_2	5	
Odor and taste	—	
Toxicity	—	
Tubing life at 0 bar	150	
at 0.7 bar	90	

The next seven pages contain product numbers for ordering Standard, 2-Stop, 3-Stop, and Extension tubing in each material offered.

Extension Tubing

ID (mm)	TYGON® LMT-55	TYGON R3603/ R3607*	ISMAPRENE (PHARMED®)	SILICONE PEROXIDE	TYGON 2001	TYGON HC F-4040-A	FLURAN® F-5500-A
	Part No.	**Part No.**	**Part No.**	**Part No.**	**Part No.**	**Part No.**	**Part No.**
0.13	SC0226T	SC0226*					
0.19	SC0025T	SC0025*					
0.25	SC0026T	SC0026*	SC0337			SC0173	
0.38	SC0027T	SC0027*	SC0338		SC0854	SC0174	
0.44	SC0028T	SC0028*					
0.51	SC0029T	SC0029*	SC0339			SC0175	SC0550
0.57	SC0030T	SC0030*					
0.64	SC0031T	SC0031*	SC0340	SC0448	SC0856	SC0176	SC0551
0.76	SC0032T	SC0032*	SC0341	SC0449		SC0177	SC0552
0.89	SC0033T	SC0033*	SC0342	SC0450		SC0120	SC0553
0.95	SC0034T	SC0034*					
1.02	SC0035T	SC0035*	SC0343	SC0451	SC0858	SC0121	SC0554
1.09	SC0036T	SC0036*					
1.14	SC0037T	SC0037*	SC0344	SC0452		SC0122	SC0555
1.22	SC0038T	SC0038*					
1.30	SC0039T	SC0039*	SC0345	SC0453		SC0123	SC0556
1.42	SC0040T	SC0040*	SC0346	SC0454		SC0124	SC0557
1.52	SC0041T	SC0041*	SC0347	SC0455	SC0860	SC0125	SC0558
1.65	SC0042T	SC0042*	SC0348	SC0456		SC0126	SC0559
1.75	SC0043T	SC0043*					
1.85	SC0044T	SC0044*	SC0349	SC0457		SC0127	SC0560
2.06	SC0045T	SC0045*	SC0350	SC0458	SC0862	SC0128	SC0561
2.29	SC0046T	SC0046*	SC0351	SC0459		SC0129	SC0562
2.54	SC0047T	SC0047*	SC0352	SC0460		SC0130	SC0563
2.79	SC0048T	SC0048*	SC0353	SC0461	SC0864	SC0131	SC0564
3.17	SC0223T	SC0223*					
Roll Length	10 m	10 m	3 m	15 m	10 m	3 m	10 m

** The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.*

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2-Stop Tubing

ID (mm)	COLOR CODES	TYGON® LMT-55	TYGON R3603/ R3607 *	TYGON E-LFL	ISMAPRENE (PHARMED®)	PHARMED BPT **	TYGON 3350 SI
		Part No.	**Part No.**	**Part No.**	**Part No.**	**Part No.**	**Part No.**
0.13	Orange-black	SC0188T	SC0188*				
0.19	Orange-red	SC0001T	SC0001*				
0.25	Orange-blue	SC0002T	SC0002*		SC0320	SC0740**	
0.27	Orange-blue			SCE0414			
0.38	Orange-green	SC0003T	SC0003*	SCE0415	SC0321		
0.44	Green-yellow	SC0004T	SC0004*				
0.48	Orange-yellow			SCE0416			
0.51	Orange-yellow	SC0005T	SC0005*		SC0322	SC0741**	SC0620
0.57	White-yellow	SC0006T	SC0006*				
0.64	Orange-white	SC0007T	SC0007*	SCE0417	SC0323		SC0621
0.76	Black-black	SC0008T	SC0008*	SCE0418	SC0324		SC0622
0.89	Orange-orange	SC0009T	SC0009*	SCE0419	SC0325	SC0742**	SC0623
0.95	White-black	SC0010T	SC0010*				
1.02	White-white	SC0011T	SC0011*	SCE0420	SC0326	SC0747**	SC0624
1.09	White-red	SC0012T	SC0012*				
1.14	Red-red	SC0013T	SC0013*	SCE0421	SC0327		SC0625
1.22	Red-grey	SC0014T	SC0014*				
1.25	Grey-grey			SCE0422			
1.30	Grey-grey	SC0015T	SC0015*		SC0328	SC0743**	SC0626
1.37	Yellow-yellow			SCE0423			
1.42	Yellow-yellow	SC0016T	SC0016*		SC0329		SC0627
1.52	Yellow-blue	SC0017T	SC0017*	SCE0424	SC0330	SC0744**	SC0628
1.53	Yellow-blue						
1.60	Blue-blue			SCE0425			
1.65	Blue-blue	SC0018T	SC0018*		SC0331		SC0629
1.75	Blue-green	SC0019T	SC0019*				
1.85	Green-green	SC0020T	SC0020*	SCE0426	SC0332		SC0630
2.06	Purple-purple	SC0021T	SC0021*	SCE0427	SC0333	SC0745**	SC0631
2.20	Purple-black			SCE0428			
2.29	Purple-black	SC0022T	SC0022*		SC0334		SC0632
2.54	Purple-orange	SC0023T	SC0023*		SC0335		SC0633
2.62	Purple-orange			SCE0429			
2.79	Purple-white	SC0024T	SC0024*	SCE0430	SC0336	SC0746**	SC0634
3.17	Black-white	SC0222T	SC0222*				
Tube Length		400 mm	400 mm	400 mm	400 mm	400 mm	400 mm
Pack Size		12 pieces	12 pieces	12 pieces	6 pieces	6 pieces	6 pieces

** The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.*
*** Welded stoppers for use in an autoclave.*

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SILICONE PEROXIDE	TYGON® 2001	TYGON MHLL	TYGON HC F-4040-A	FLURAN F-5500-A	COLOR CODES	ID (mm)	
Part No.	**Part No.**	**Part No.**	**Part No.**	**Part No.**			
					Orange-black	0.13	
					Orange-red	0.19	
			SC0156		Orange-blue	0.25	
					Orange-blue	0.27	
	SC0814	SC0716	SC0157		Orange-green	0.38	
					Green-yellow	0.44	
					Orange-yellow	0.48	
			SC0158	SC0132	Orange-yellow	0.51	
					White-yellow	0.57	
SC0092	SC0816		SC0159	SC0133	Orange-white	0.64	
SC0093		SC0717	SC0160	SC0134	Black-black	0.76	
SC0094			SC0161	SC0135	Orange-orange	0.89	
					White-black	0.95	
SC0095	SC0818		SC0162	SC0136	White-white	1.02	
					White-red	1.09	
SC0096		SC0718	SC0163	SC0137	Red-red	1.14	
					Red-grey	1.22	
					Grey-grey	1.25	
SC0097			SC0164	SC0138	Grey-grey	1.30	
					Yellow-yellow	1.37	
SC0098			SC0165	SC0139	Yellow-yellow	1.42	
SC0099	SC0820	SC0719	SC0166	SC0140	Yellow-blue	1.52	
					Yellow-blue	1.53	
					Blue-blue	1.60	
SC0100			SC0167	SC0141	Blue-blue	1.65	
					Blue-green	1.75	
SC0101			SC0168	SC0142	Green-green	1.85	
SC0102	SC0822	SC0720	SC0169	SC0143	Purple-purple	2.06	
					Purple-black	2.20	
SC0103			SC0170	SC0144	Purple-black	2.29	
SC0104			SC0171	SC0145	Purple-orange	2.54	
					Purple-orange	2.62	
SC0105	SC0824	SC0721	SC0172	SC0146	Purple-white	2.79	
					Black-white	3.17	
400 mm	381 mm	381 mm	400 mm	180 mm			**Tube Length**
6 pieces	6 pieces	6 pieces	12 pieces	12 pieces			**Pack Size**

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3-Stop Tubing

ID (mm)	COLOR CODES	TYGON® LMT-55	TYGON R3603/ R3607 *	TYGON E-LFL	ISMAPRENE (PHARMED®)	PHARMED BPT **	TYGON 3350 SI
		Part No.	**Part No.**	**Part No.**	**Part No.**	**Part No.**	**Part No.**
0.13	Orange-black	SC0189T	SC0189*				
0.19	Orange-red	SC0049T	SC0049*				
0.25	Orange-blue	SC0050T	SC0050*		SC0303	SC0730**	
0.27	Orange-blue			SCE0397			
0.38	Orange-green	SC0051T	SC0051*	SCE0398	SC0304		
0.44	Green-yellow	SC0052T	SC0052*				
0.48	Orange-yellow			SCE0399			
0.51	Orange-yellow	SC0053T	SC0053*		SC0305	SC0731**	SC0600
0.57	White-yellow	SC0054T	SC0054*				
0.64	Orange-white	SC0055T	SC0055*	SCE0400	SC0306		SC0601
0.76	Black-black	SC0056T	SC0056*	SCE0401	SC0307		SC0602
0.89	Orange-orange	SC0057T	SC0057*	SCE0402	SC0308	SC0732**	SC0603
0.95	White-black	SC0058T	SC0058*				
1.02	White-white	SC0059T	SC0059*	SCE0403	SC0309	SC0737**	SC0604
1.09	White-red	SC0060T	SC0060*				
1.14	Red-red	SC0061T	SC0061*	SCE0404	SC0310		SC0605
1.22	Red-grey	SC0062T	SC0062*				
1.25	Grey-grey			SCE0405			
1.30	Grey-grey	SC0063T	SC0063*		SC0311	SC0733**	SC0606
1.37	Yellow-yellow			SCE0406			
1.42	Yellow-yellow	SC0064T	SC0064*		SC0312		SC0607
1.52	Yellow-blue	SC0065T	SC0065*	SCE0407	SC0313	SC0734**	SC0608
1.53	Yellow-blue						
1.60	Blue-blue			SCE0408			
1.65	Blue-blue	SC0066T	SC0066*		SC0314		SC0609
1.75	Blue-green	SC0067T	SC0067*				
1.85	Green-green	SC0068T	SC0068*	SCE0409	SC0315		SC0610
2.06	Purple-purple	SC0069T	SC0069*		SC0316	SC0735**	SC0611
2.20	Purple-black			SCE0411			
2.29	Purple-black	SC0070T	SC0070*		SC0317		SC0612
2.54	Purple-orange	SC0071T	SC0071*		SC0318		SC0613
2.62	Purple-orange			SCE0412			
2.79	Purple-white	SC0072T	SC0072*	SCE0413	SC0319	SC0736**	SC0614
3.17	Black-white	SC0224T	SC0224*				
Tube Length		400 mm	400 mm	400 mm	400 mm	400 mm	400 mm
Pack Size		12 pieces	12 pieces	12 pieces	6 pieces	6 pieces	6 pieces

** The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.*
*** Welded stoppers for use in an autoclave.*
**** These tubes are equipped with only 2 stoppers for use with MS/CA cassettes.*

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SILICONE PEROXIDE	TYGON® 2001***	TYGON MHLL***	TYGON HC F-4040-A	FLURAN F-5500-A	COLOR CODES	ID (mm)	
Part No.	**Part No.**	**Part No.**	**Part No.**	**Part No.**			
					Orange-black	0.13	
					Orange-red	0.19	
			SC0286		Orange-blue	0.25	
					Orange-blue	0.27	
	SC0802***	SC0710***	SC0287		Orange-green	0.38	
					Green-yellow	0.44	
					Orange-yellow	0.48	
			SC0288	SC0255	Orange-yellow	0.51	
					White-yellow	0.57	
SC0106	SC0804***		SC0289	SC0256	Orange-white	0.64	
SC0107		SC0711***	SC0290	SC0257	Black-black	0.76	
SC0108			SC0291	SC0258	Orange-orange	0.89	
					White-black	0.95	
SC0109	SC0806***		SC0292	SC0259	White-white	1.02	
					White-red	1.09	
SC0110		SC0712***	SC0293	SC0260	Red-red	1.14	
					Red-grey	1.22	
					Grey-grey	1.25	
SC0111			SC0294	SC0261	Grey-grey	1.30	
					Yellow-yellow	1.37	
SC0112			SC0295	SC0262	Yellow-yellow	1.42	
SC0113	SC0808***	SC0713***	SC0296	SC0263	Yellow-blue	1.52	
					Yellow-blue	1.53	
					Blue-blue	1.60	
SC0114			SC0297	SC0264	Blue-blue	1.65	
					Blue-green	1.75	
SC0115			SC0298	SC0265	Green-green	1.85	
SC0116	SC0810***	SC0714***	SC0299	SC0266	Purple-purple	2.06	
					Purple-black	2.20	
SC0117			SC0300	SC0267	Purple-black	2.29	
SC0118			SC0301	SC0268	Purple-orange	2.54	
					Purple-orange	2.62	
SC0119	SC0812***	SC0715***	SC0302	SC0269	Purple-white	2.79	
					Black-white	3.17	
	300 mm	300 mm	400 mm	400 mm			**Tube Length**
	6 pieces	6 pieces	12 pieces	12 pieces			**Pack Size**

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Standard Tubing

ID (mm)	OD (mm)	TYGON® LMT-55	TYGON R3603/ R3607 *	TYGON E-LFL	ISMAPRENE (PHARMED®)	TYGON 3350 SI	SILICONE PEROXIDE
1.6 mm wall thickness (1/16") Standard Tubing		**Part No.**	**Part No.**	**Part No.**	**Part No.**	**Part No.**	**Part No.**
0.8	4.0	SC0355T	MF0001*		MF0009	MF0291	MF0044
1.6	3.2						
1.6	4.8	SC0373T	MF0028*	SCE0389	MF0010	SC0580B	MF0035
2.4	5.6	SC0691T	SC0691*		SC1006	SC0590B	
3.2	6.4	SC0374T	MF0030*	SCE0390	MF0012	SC0581B	MF0037
4.0	7.2	SC0462T	SC0462*				
4.8	8.0	SC0379T	SC0379*	SCE0391	MF0011	SC0582B	MF0045
6.4	9.6	SC0375T	MF0031*	SC0E392	MF0013	SC0584B	MF0046
8.0	11.2	SC0376T	MF0032*	SC0E394	MF0014	SC0587B	MF0047
9.5	12.7	SC0383T	SC0383*			SC0387B	
11.1	14.3	SC0384T	SC0384*			SC0697B	
Roll Length		15 m	15 m	7.5 m	7.5 m	15 m	7.5 m
2.4 mm wall thickness (3/32")							
4.8	9.6	SC0500T	MF0029*		MF0448	SC0583B	MF0288
6.4	11.2	SC0501T	MF0033*			SC0585B	MF0040
8.0	12.8	SC0502T	SC0502*			SC0515B	
9.5	14.3	SC0503T	SC0503*			SC0516B	
11.1	15.9	SC0504T	SC0504*			SC0517B	
12.7	17.5	SC0505T	SC0505*			SC0518B	
15.9	20.7	SC0506T	SC0506*			SC0519B	
Roll Length		15 m	15 m	7.5 m	7.5 m	15 m	7.5 m
3.2 mm wall thickness (1/8")							
4.8	11.2	SC0694T	SC0694*				
6.4	12.8	SC0380T	SC0380*	SCE0393	MF0015	SC0586B	MF0314
8.0	14.4	SC0535T	SC0535*				
9.5	15.9	SC0381T	SC0381*	SCE0395	MF0016	SC0588B	MF0041
11.1	17.5	SC0534T	SC0534*				
12.7	19.1	SC0382T	SC0382*	SCE0396	MF0034	SC0589B	MF0315
15.9	22.3	SC0695T	SC0695*		SC0696	SC0532B	
Roll Length		15 m	15 m	7.5 m	7.5 m	15 m	7.5 m

** The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.*

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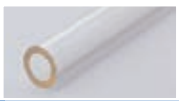



TYGON® 2001	TYGON HC F-4040-A	NORPRENE A-60-G	NORPRENE CHEMICAL	VITON®	OD (mm)	ID (mm)
Part No.	**Part No.**	**Part No.**	**Part No.**	**Part No.**	**1.6 mm wall thickness (1/16") Standard Tubing**	
		MF0017		MF0048	4.0	0.8
					3.2	1.6
SC0830	MF0002	SC0357		MF0049	4.8	1.6
					5.6	2.4
SC0831	MF0004	SC0358	SC1022	MF0051	6.4	3.2
					7.2	4.0
SC0832	MF0003	SC0359	SC1023	MF0322	8.0	4.8
SC0833	MF0005	SC0360	SC1024	MF0052	9.6	6.4
SC0834	MF0006	SC0361		MF0053	11.2	8.0
SC0835		SC0385	SC1025		12.7	9.5
		SC0386			14.3	11.1
15 m	15 m	15 m	15 m	7.5 m		**Roll Length**
						2.4 mm wall thickness (3/32")
	MF0476	SC0362		MF0050	9.6	4.8
	MF0007	SC0363		MF0054	11.2	6.4
		SC0511			12.8	8.0
		SC0512			14.3	9.5
					15.9	11.1
					17.5	12.7
					20.7	15.9
	15 m	15 m		7.5 m		**Roll Length**
						3.2 mm wall thickness (1/8")
					11.2	4.8
		SC0364		MF0323	12.8	6.4
					14.4	8.0
	MF0008	SC0365		MF0055	15.9	9.5
					17.5	11.1
SC0845	SC0725	SC0366	SC1026		19.1	12.7
SC0846		SC0698			22.3	15.9
15 m	15 m	15 m	15 m	7.5 m		**Roll Length**