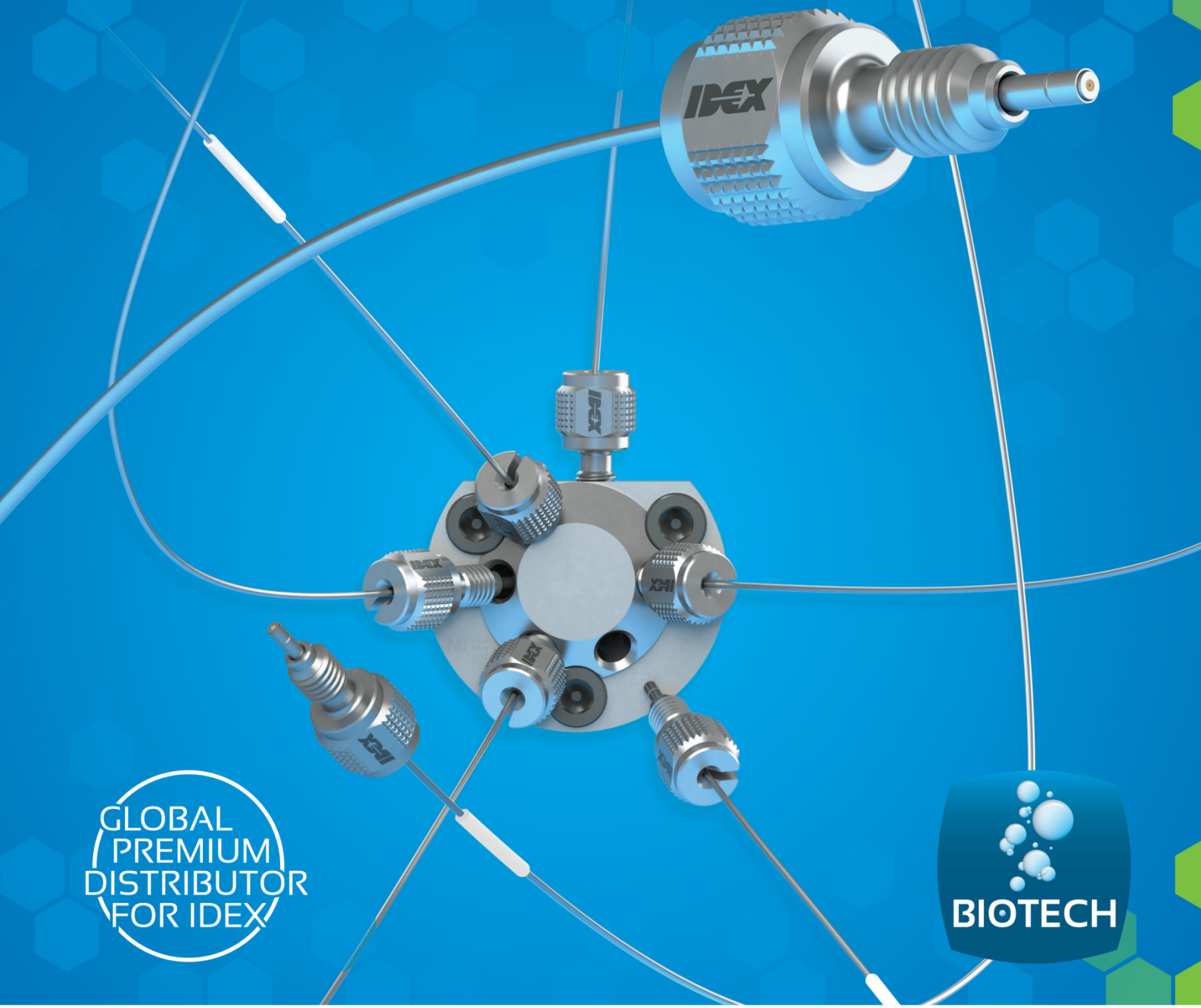
MARVEL X™

Comparison between Marvel X and SS tube

Next Generation UHPLC
Connection Technology



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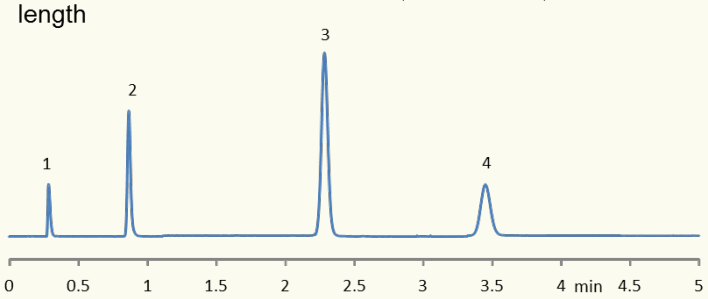
Comparison between Marvel X tube (75 µm i.d.) and SS tube (0.1mm i.d.)

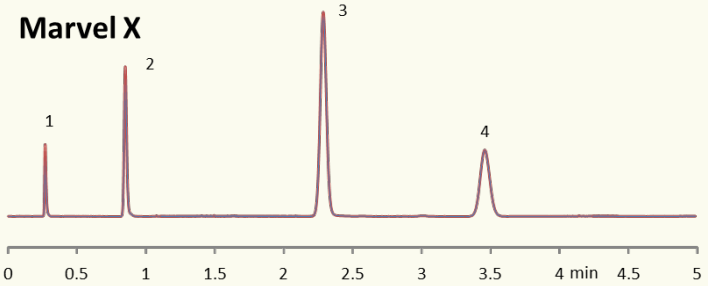
SunShell C18 2.6 µm, 50 x 2.1 mm

SS tube 0.1 mm

Connecting tube
Injector→Column: SS tube 0.1 mm i.d., 300 mm length
Column→Flow cell of UV: PeekSil, 0.1 mm i.d., 200 mm length



Marvel X



Connecting tube
Injector→Column: Marvel X, 0.075 mm i.d., 350 mm length
Column→Flow cell of UV: Marvel X, 0.075 mm i.d., 150 mm length

Measurement condition

Column:	SunShell C18, 2.6 µm 50 x 2.1 mm
Mobile phase:	Acetonitrile/water=60/40
Flow rate:	0.30 mL/min
Temperature:	RT
Detection:	UV@250 nm
Injection volume:	0.4 µL
Sample:	1=Uracil 2=Ethylbenzene 3=Acenaphthene 4=Butylbenzene

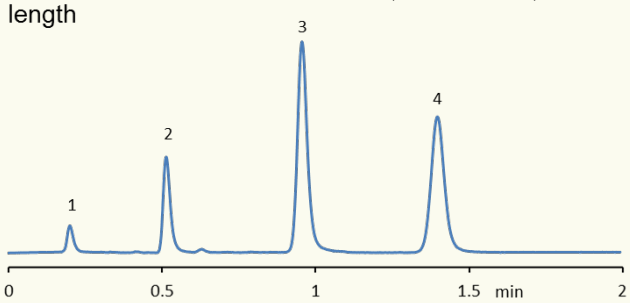
SunShell C18 2.6 µm, 50 x 2.1 mm

	Peak No.	SUS	Marvel X	
Efficiency	1	1107	2614	136% up
	2	6852	10146	48% up
	3	10976	11907	8% up
	4	10768	11129	3% up
Tailing factor	1	0.939	0.913	
	2	1.320	1.210	
	3	1.057	1.037	
	4	1.041	1.051	
Peak width, $h_{0.5}$ (min)	1	0.0201	0.0124	
	2	0.0246	0.0199	
	3	0.0513	0.0493	
	4	0.0783	0.0772	

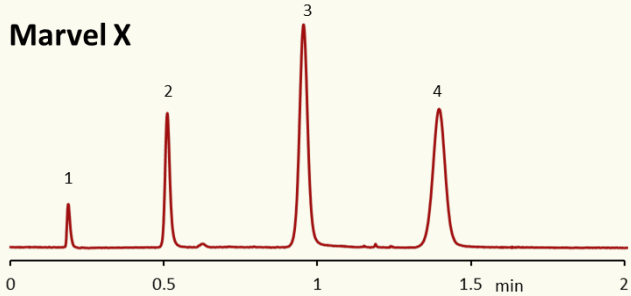
SunShell C8 2.6 µm, 30 x 2.1 mm

SS tube 0.1 mm

Connecting tube
Injector→Column: SS tube 0.1 mm i.d., 300 mm length
Column→Flow cell of UV: PeekSil, 0.1 mm i.d., 200 mm length



Marvel X



Connecting tube
Injector→Column: Marvel X, 0.075 mm i.d., 350 mm length
Column→Flow cell of UV: Marvel X, 0.075 mm i.d., 150 mm length

Measurement condition

Column:	SunShell C8, 2.6 µm 30 x 2.1 mm
Mobile phase:	Acetonitrile/water=60/40
Flow rate:	0.30 mL/min
Temperature:	RT
Detection:	UV@250 nm
Injection volume:	0.4 µL
Sample:	1=Uracil 2=Ethylbenzene 3=Acenaphthene 4=Butylbenzene

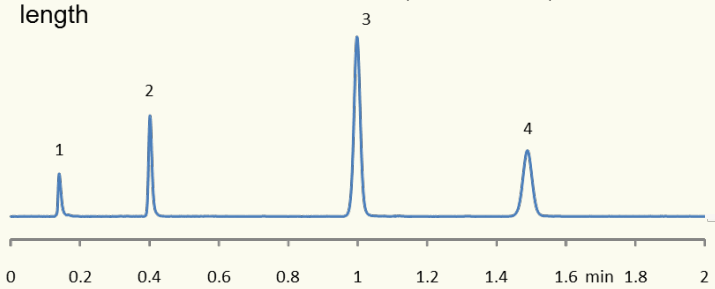
SunShell C8 2.6 µm, 30 x 2.1 mm

	Peak No.	SUS	Marvel X	
Efficiency	1	473	1405	197% up
	2	2395	5245	119% up
	3	4377	6030	38% up
	4	4991	5536	11%up
Tailing factor	1	1.225	1.037	
	2	1.395	1.235	
	3	1.266	1.062	
	4	1.118	1.028	
Peak width, $h_{0.5}$ (min)	1	0.0205	0.0119	
	2	0.0246	0.0166	
	3	0.0338	0.0288	
	4	0.0463	0.0440	

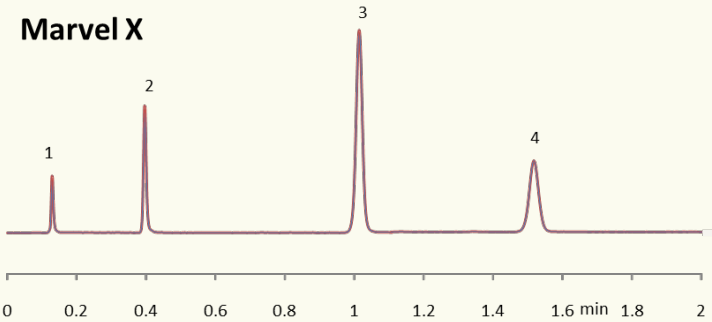
SunShell C18 2.0 µm, 50 x 2.1 mm

SS tube 0.1 mm

Connecting tube
Injector→Column: SS tube 0.1 mm i.d., 300 mm length
Column→Flow cell of UV: PeekSil, 0.1 mm i.d., 200 mm length



Marvel X



Connecting tube
Injector→Column: Marvel X, 0.075 mm i.d., 350 mm length
Column→Flow cell of UV: Marvel X, 0.075 mm i.d., 150 mm length

Measurement condition

Column:	SunShell C18, 2.0 µm 50 x 2.1 mm
Mobile phase:	Acetonitrile/water=60/40
Flow rate:	0.60 mL/min
Temperature:	RT
Detection:	UV@250 nm
Injection volume:	0.4 µL
Sample:	1=Uracil 2=Ethylbenzene 3=Acenaphthene 4=Butylbenzene

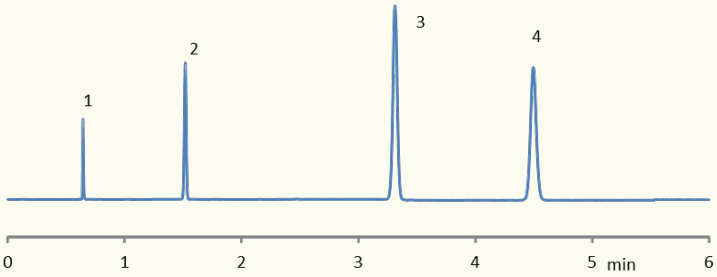
SunShell C18 2.0 µm, 50 x 2.1 mm

	Peak No.	SUS	Marvel X	
Efficiency	1	1208	3593	197% up
	2	7720	12625	64% up
	3	13589	15153	12% up
	4	13936	14733	6% up
Tailing factor	1	2.326	1.445	
	2	1.401	1.286	
	3	1.048	1.006	
	4	0.997	0.972	
Peak width, $h_{0.5}$ (min)	1	0.0094	0.0051	
	2	0.0107	0.0083	
	3	0.0201	0.0194	
	4	0.0297	0.0295	

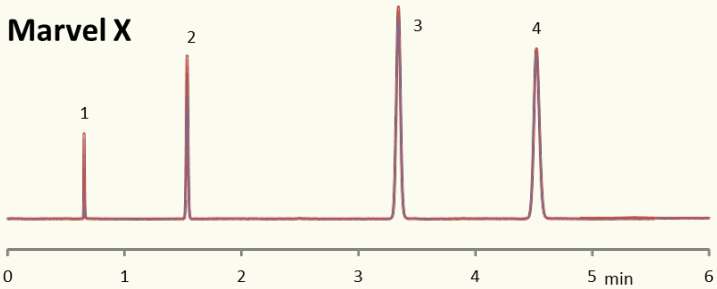
SunShell C18 2.6 µm, 150 x 4.6 mm

SS tube 0.1 mm

Connecting tube
Injector→Column: SS tube 0.1 mm i.d., 300 mm length
Column→Flow cell of UV: PeekSil, 0.1 mm i.d., 200 mm length



Marvel X



Connecting tube
Injector→Column: Marvel X, 0.075 mm i.d., 350 mm length
Column→Flow cell of UV: Marvel X, 0.075 mm i.d., 150 mm length

Measurement condition

Column:	SunShell C18, 2.6 µm 150 x 4.6 mm
Mobile phase:	Acetonitrile/water=70/30
Flow rate:	1.80 mL/min
Temperature:	RT
Detection:	UV@250 nm
Injection volume:	0.4 µL
Sample:	1=Uracil 2=Ethylbenzene 3=Acenaphthene 4=Butylbenzene

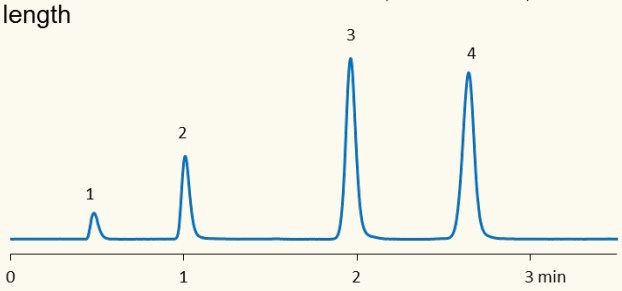
SunShell C18 2.6 µm, 150 x4.6 mm

	Peak No.	SUS	Marvel X	
Efficiency	1	41900	48912	18% up
	2	42934	44037	3% up
	3	38989	40899	5% up
	4	38125	39947	5% up
Tailing factor	1	1.176	1.207	
	2	1.015	1.024	
	3	1.001	1.020	
	4	1.048	1.090	
Peak width, $h_{0.5}$ (min)	1	0.0074	0.0070	
	2	0.0172	0.0170	
	3	0.0395	0.0390	
	4	0.0542	0.0533	

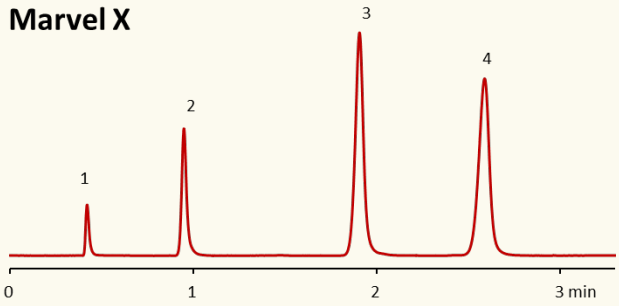
SunShell RP-AQUA 2.6 µm, 100 x 1.0 mm

SS tube 0.1 mm

Connecting tube
Injector→Column: SS tube 0.1 mm i.d., 300 mm length
Column→Flow cell of UV: PeekSil, 0.1 mm i.d., 200 mm length



Marvel X



Connecting tube
Injector→Column: Marvel X, 0.075 mm i.d., 350 mm length
Column→Flow cell of UV: Marvel X, 0.075 mm i.d., 150 mm length

Measurement condition

Column:	SunShell RP-AQUA, 2.6 µm 100 x 1.0 mm
Mobile phase:	Acetonitrile/water=60/40
Flow rate:	0.10 mL/min
Temperature:	RT
Detection:	UV@250 nm
Injection volume:	0.2 µL
Sample:	1=Uracil 2=Ethylbenzene 3=Acenaphthene 4=Butylbenzene

SunShell RP-AQUA8 2.6 µm, 100 x 1.0 mm

	Peak No.	SUS	Marvel X	
Efficiency	1	517	2459	377% up
	2	2138	6856	221% up
	3	5359	9275	73% up
	4	7115	9699	36% up
Tailing factor	1	1.228	1.667	
	2	1.336	1.376	
	3	1.121	1.060	
	4	1.008	0.956	
Peak width, $h_{0.5}$ (min)	1	0.0497	0.0199	
	2	0.0514	0.0270	
	3	0.0630	0.0467	
	4	0.0739	0.0619	

Recommended inner diameter of Marvel X tube

Analytical column	Totally porous column with 3 µm, 5 µm particle	Core shell column with 2 µm - 5 µm particle and totally porous column with not less than 2 µm particle
4.6 mm i.d.	254 µm - 125 µm	125 µm - 100 µm
3.0 mm i.d.	150 µm – 100 µm	100 µm - 75 µm
2.1 mm i.d.	125 µm – 75 µm	75 µm
1.0 mm i.d.	100 µm – 75 µm	75 µm - 50 µm

Back pressure on the tube <<Marvel X PLS 75 µm i.d., 250 mm length x 2, total length 500 mm>>

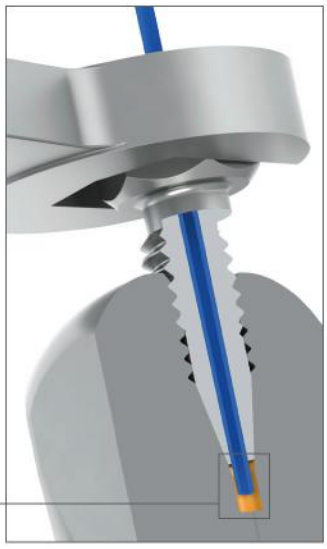
Flow rate (mL/min)	0.1	0.3	0.6	1.0	1.8
Back pressure (Mpa)	1.3	3.8	7.8	13.2	24.8

Measurement condition, mobile phase; acetonitrile/water=60/40, temperature; 25 ^{o}C

☆Relationship between inner diameter (R) and back pressure is $P=A/R^4$ (A, constant). When an inner diameter becomes a half, back pressure becomes 16 times higher.

MarvelX UHPLC Fittings vs. Conventional Coned Fittings

Conventional coned fittings require a ferrule in conjunction with a fitting for proper sealing. They depend on complex techniques, including tools, to improve sealing performance, which significantly increases probability of extra internal volume and poor chromatography results. The excessive force needed for tightening increases wear of expensive components and the likelihood of replacement, adding to overall costs.



EXTRA INTERNAL VOLUME

MarvelX UHPLC fittings do not depend on ferrules. They seal at the bottom of the port, without complex techniques, which significantly reduces required torque and enables many more connects and disconnects. Furthermore, they are virtually impossible to over-tighten by hand, limiting wear and increasing product life. An enhanced proprietary tip design also ensures zero dead volume (ZDV) and better chromatography results.

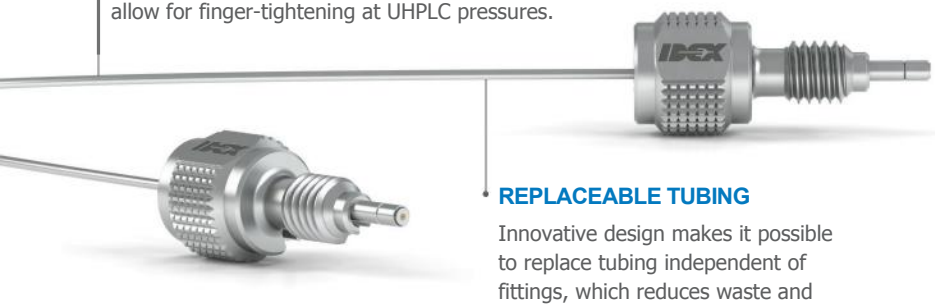
ZERO DEAD VOLUME

FOR ORDERING AND TECHNICAL SUPPORT, VISIT:

idex-hs.com/MarvelX

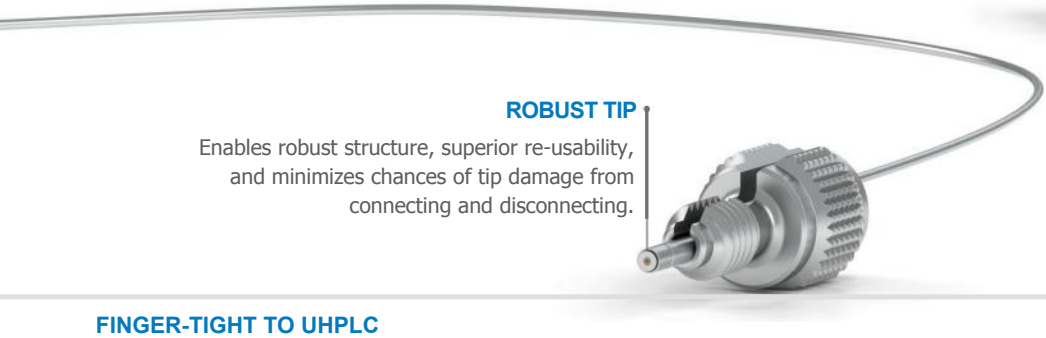
SMALL & ACCESSIBLE

Fittings are small enough to fit in tight spaces, yet allow for finger-tightening at UHPLC pressures.



REPLACEABLE TUBING

Innovative design makes it possible to replace tubing independent of fittings, which reduces waste and drives replacement costs down.



ROBUST TIP

Enables robust structure, superior re-usability, and minimizes chances of tip damage from connecting and disconnecting.

REMOVABLE FITTING

Facilitates easy routing of tubing in the instrument, which reduces time and effort during installation and instrument maintenance.

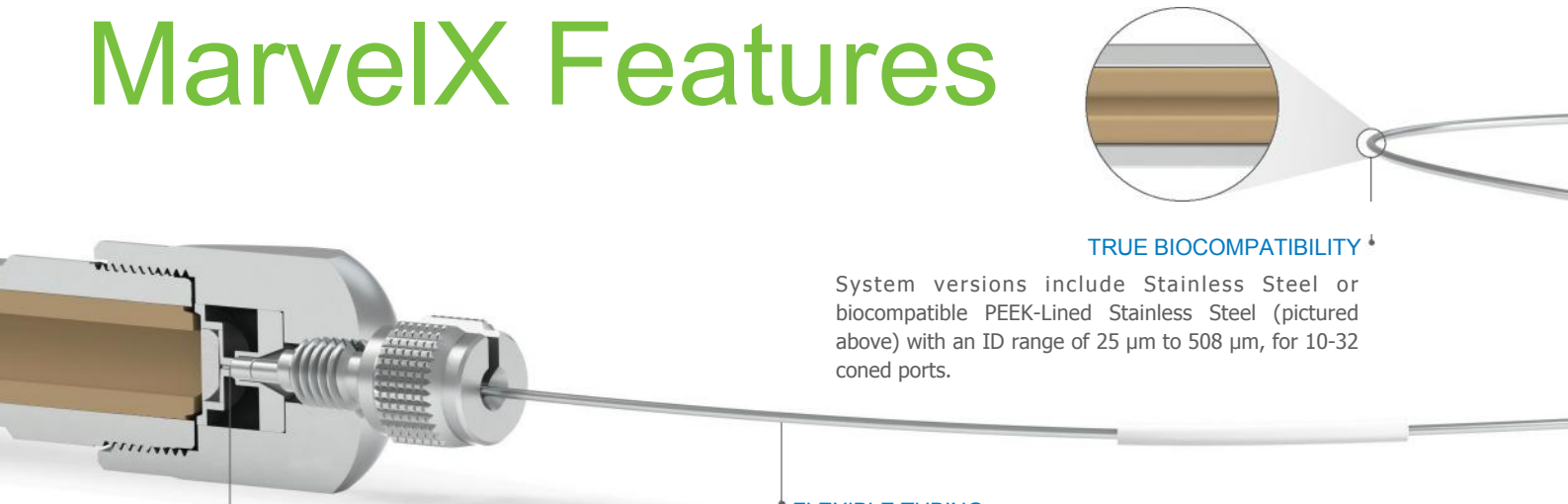
FINGER-TIGHT TO UHPLC

MarvelX is truly a finger-tight connection system that only requires 2 in-lbs of installation torque, and seals up to 19,000 psi (~1,310 bar) for routine use. Our combination of optimum nut dimensions and proprietary sealing design makes it virtually impossible to over-tighten by hand.

Advance Your Fluidic Systems with Finger-Tight MarvelX™ UHPLC Connection Technology from IDEX Health & Science

MarvelX UHPLC Connection Systems have been expertly designed for easy routing throughout your instrument, while providing consistent performance and superior re-usability. Built with convenient, removable stainless steel fittings and changeable, precision-cut flexible tubing, MarvelX can be used up to 200 times! The connection system is compatible with 10-32 coned receiving ports and is absolutely finger-tight — no tool required. MarvelX utilizes our unique next-generation patent-pending technology to auto-adjust to various port depths. This ensures zero dead volume and delivers better chromatography results with sleek, simple, and reliable functionality. In addition to our powerful Stainless Steel version, MarvelX offers a truly biocompatible option in PEEK-Lined Stainless Steel.

MarvelX Features



TRUE BIOCOMPATIBILITY

System versions include Stainless Steel or biocompatible PEEK-Lined Stainless Steel (pictured above) with an ID range of 25 µm to 508 µm, for 10-32 coned ports.

ZERO DEAD VOLUME

Proprietary sealing technology eliminates extra internal volume.

FLEXIBLE TUBING

Special tubing blend prevents kinking and allows considerable flexibility to route throughout your instrument. Usable in any application, and can be replaced independent of fittings.

FINGER-TIGHT TO 19,000 PSI

REUSABLE UP TO 200x

NO PEAK TAILING

HIGH PLATE EFFICIENCY

MarvelXTM Standard Configurations

PEEK-Lined Stainless Steel Assemblies*

D	Length 070mm	150mm	250mm	350mm	500mm	600mm
25µm	UPFP-6025070	UPFP-6025150	UPFP-6025250	UPFP-6025350	UPFP-6025500	UPFP-6025600
50µm	UPFP-6050070	UPFP-6050150	UPFP-6050250	UPFP-6050350	UPFP-6050500	UPFP-6050600
75µm	UPFP-6075070	UPFP-6075150	UPFP-6075250	UPFP-6075350	UPFP-6075500	UPFP-6075600
100µm	UPFP-6100070	UPFP-6100150	UPFP-6100250	UPFP-6100350	UPFP-6100500	UPFP-6100600
150µm	UPFP-6150070	UP FP-6150150	UPFP-6150250	UPFP-6150350	UPFP-6150500	UPFP-6150600
300µm	UPFP-6300070	UPFP-6300150	UPFP-6300250	UPFP-6300350	UPFP-6300500	UPFP-6300600

Stainless Steel Assemblies*

D	Length 070mm 150mm 250mm 350mm 500mm 600mm					
100µm	UPFS-6100070	UPFS-6100150	UPFS-6100250	UPFS-6100350	UP FS-6100500	UPFS-6100600
125µm	UPFS-6125070	UPFS-6125150	UPFS-6125250	UPFS-6125350	UPFS-6125500	UPFS-6125600
254µm	UPFS-6254070	UPFS-6254150	UPFS-6254250	UPFS-6254350	UPFS-6254500	UPFS-6254600

Replacement Tubing

Add the letter "T" as the last character to any part num ber above

Example: UPFP-6020570T is the replacement tubing for UPFP-6020570

Replacement Fittings

UPN-61032

Note: Each UPN-61032 is a package of 3 replacement fittings

*Product availability and lead times may vary depending on the configuration. Contact Customer Service at +1 800 426 0191 or email CustomerService.hs@idexcorp.com for details.

MarvelX™ Technical Specifications

Part Number	Tubing ID	Tubing Length	Replacement Tubing Part Number
PEEK-Lined Stainless Steel*			
UPFP-6025150	25 µm (0.001")	150 mm (5.9")	UPFP-6025150T
UPFP-6025350	25 µm (0.001")	350 mm (13.8")	UPFP-6025350T
UPFP-6100150	100 µm (0.004")	150 mm (5.9")	UPFP-6100150T
UPFP-6100350	100 µm (0.004")	350 mm (13.8")	UPFS-6100350T
Stainless Steel*			
UPFS-6125150	125 µm (0.005")	150 mm (5.9")	UPFS-6125150T
UPFS-6125350	125 µm (0.005")	350 mm (13.8")	UPFS-6125350T
UPFS-6254150	254 µm (0.010")	150 mm (5.9")	UPFS-6254150T
UPFS-6254350	254 µm (0.010")	350 mm (13.8")	UPFS-6254350T

**For other ID and length configuration requests, please contact Customer Service at +1 800 426 0191, or e-mail CustomerService.hs@idexcorp.com*

Product Specifications

Pressure Capability 19,000 psi (~1,310 bar) for routine use; up to 23,000 psi max over pressure for PEEK-Lined versions; up to 29,000 psi max over pressure for Stainless Steel versions.

Installation Method Finger-tight, 1/8 – 1/4 turn after initial resistance (~2 in-lbs)

Tubing Type 1/32' OD flexible 316 Stainless Steel with 1/16' OD rigid tube ends

Fitting Type 10-32 threaded, removable 316 Stainless Steel

Wetted Materials PEEK-Lined versions: PEEK | **Stainless Steel versions:** PEEK and 316 Stainless Steel

Maximum Use Temperature 120 ºC

NOTE: The above performance specifications apply to use with appropriately-designed receiving ports under optimal conditions, using water at up to 120 °C for the testing process. If different conditions are used, the expected pressure threshold will be different.

IMPORTANT NOTES

- MarvelX tubing includes a sleeve that assists in product identification, with ID and length information, as shown here:

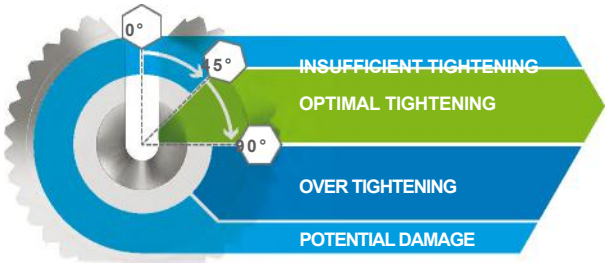
- Minimum recommended bend-radius with MarvelX tubing is 1/4" (~6.35 mm).

REGULATORY COMPLIANCE

As of the date of publication, MarvelX is compliant with current RoHS and REACH regulations.

INSTRUCTIONS FOR TIGHTENING

1. Route tubing to the target port.
2. Slide fitting onto the tubing end via slot.
3. Slowly finger-tighten to first resistance; continue tightening 1/8-turn minimum, to 1/4-turn maximum.
4. Learn more at www.idex-hs.com/MarvelX



MARVELOUS CONNECTIONS

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