

APPLICATIONS

Investigation into the Robustness and Reproducibility of SecurityLINK™ UHPLC/HPLC Fittings

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Background

When using a UHPLC column, a sub-2 μm particle, a superficially porous particle, or a narrow ID column, the overall dead-volume of a system is an important variable to minimize. A bad connection will directly cause additional dead-volume which can contribute greatly to poor peak shape and lower overall efficiency of the system regardless of the column used.

Introduction

The minimization of the dead or dwell volume in a UHPLC system is an important consideration. An incorrect or poor connection can be defined as any connection where the base of the tubing used does not sit flush against the inlet of the column and which contributes to the overall dead-volume of the system. Although most chromatographers consider the connection of the column as the largest potential spot for an incorrect connection, poor connections can happen in many places throughout the system, including connections from the autosampler to the column heater. Additional dead-volume in a system can lead to more diffusion contributing to poor peak shape which in turn can cause failing results during method transfers or when assessing system suitability. This is especially true for both UHPLC and HPLC where chromatography problems can be seen when columns with lower inner diameters or core-shell/sub-2 μm particles are used.

Continuous reconnections, or make and breaks, of the column and overtightening can cause both stainless steel and PEEK fittings to start to deform over time. The deformation, or the flaring out of the ferrule from the tube, can cause leaking at the inlet of the column

and can even cause the fitting to become stuck inside the column's inlet as it can no longer fit through the threading portion of the column's endfitting.

This technical note investigates the lifetime of the SecurityLINK fittings over numerous reconnections and whether an essential level of efficiency and asymmetry is maintained.

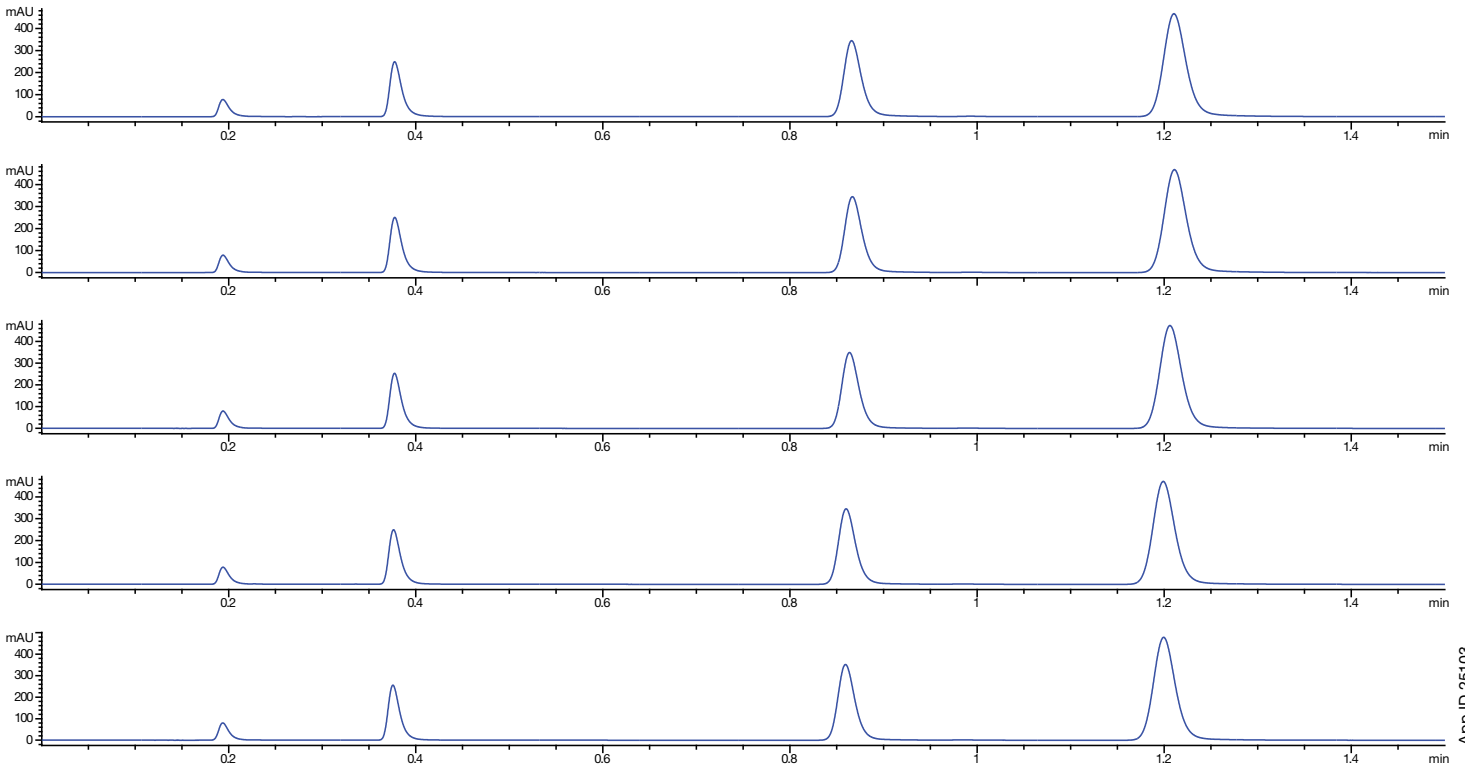
Experimental Conditions

A SecurityLINK stainless steel 100 μm x 250 mm connection was used on an Agilent® 1290 Infinity II system. The tubing was connected directly from the autosampler to a Kinetex® 1.3 μm C18 50 x 2.1 mm column. A SecurityLINK stainless steel 100 μm x 150 mm connection was then used to connect the outlet of the column directly to the detector. The column was installed, conditioned and then three injections of the Test Mix were injected. The inlet and outlet connection were then disconnected and reconnected 25 times. On the 25th connection the column was conditioned and the Test Mix was injected in triplicate. This was repeated an additional 3 times to collect data for 50, 75 and 100 connections for this experiment.

UHPLC Conditions

Column:	Kinetex 1.3 μm C18
Dimensions:	50 x 2.1 mm
Part No.:	00B-4515-AN
SecurityLINK Part No.:	AJ1-1441 (100 μm x 250 mm) AJ1-1421 (100 μm x 150 mm)
Mobile Phase:	Water/Acetonitrile (50:50)
Injection:	0.2 μL
Flow Rate:	0.5 mL/min
Temperature:	25 °C
Sample:	1. Uracil 2. Acetophenone 3. Toluene

Figure 1.
1, 25, 50, 75 and 100 connections made with SecurityLINK™



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Table 1.
Based on Naphthalene

Number of Connections	Retention Time	Asymmetry	Width	Plates
1	1.176	1.23	0.0245	12810
25	1.181	1.22	0.0247	12724
50	1.180	1.22	0.0250	12341
75	1.179	1.21	0.0250	12295
100	1.160	1.23	0.0245	12411
%RSD	0.76 %	1.37 %	1.16 %	1.87 %

Results & Discussion

Over the course of 100 connections using SecurityLINK fittings to the columns inlet and outlet, no noticeable change in chromatography was observed as can be seen by the chromatograms and the data for Naphthalene in **Table 1**. The SecurityLINK connection performed as well on the first injection as it did for the last injection. There was no visual deformation or flaring out of the end of the connections fitting, including the PEEK portion. Additionally, the connection was easily removed from the columns inlet and did not stick at any point during the study. No leaking was observed at any point during the investigation as evident by a continuous leak checking and pressure observation during the analysis.

It should be noted that conventional UHPLC connections require the use of two wrenches to be properly installed. Extra time is

needed for this installation to ensure a proper connection is made and that no leaking at the connection site is observed. The fingertight SecurityLINK connection employs a responsive and auditory feedback that 'Clicks' when the connection is complete and the proper amount of torque has been applied to ensure no leaking will occur. This enables the connection to be made quickly and without the use of tools.

Conclusion

These results demonstrate the robustness and reproducibility of the SecurityLINK fittings. The SecurityLINK connection featured in this technical note provided a zero dead-volume connection after 100 connections with no impact to overall chromatography.

SecurityLINK™ Ordering Information



PEEKsil™

PEEKsil Double-Sided 10-32 Fittings with 1/16 in. OD tubing

Part No.	ID (µm)	Length (mm)
AJ1-2111	25	100
AJ1-2121	25	150
AJ1-2141	25	250
AJ1-2151	25	300
AJ1-2171	25	500
AJ1-2191	25	750
AJ1-21A1	25	1000
AJ1-2211	50	100
AJ1-2221	50	150
AJ1-2231	50	200
AJ1-2241	50	250
AJ1-2251	50	300
AJ1-2271	50	500
AJ1-2291	50	750
AJ1-22A1	50	1000
AJ1-2321	75	150
AJ1-2341	75	250
AJ1-2371	75	500
AJ1-23A1	75	1000
AJ1-2411	100	100
AJ1-2421	100	150
AJ1-2441	100	250
AJ1-2471	100	500
AJ1-24A1	100	1000

PEEK-Lined Stainless Steel

PEEK-Lined Stainless Steel Double-Sided 10-32 Fittings with 1/16 in. OD tubing



Part No.	ID (µm)	Length (mm)
AJ1-3121	25	150
AJ1-3141	25	250
AJ1-3161	25	350
AJ1-3171	25	500
AJ1-3181	25	600
AJ1-3221	50	150
AJ1-3241	50	250
AJ1-3261	50	350
AJ1-3271	50	500
AJ1-3281	50	600
AJ1-3321	75	150
AJ1-3341	75	250
AJ1-3361	75	350
AJ1-3371	75	500
AJ1-3381	75	600
AJ1-3421	100	150
AJ1-3441	100	250
AJ1-3461	100	350
AJ1-3471	100	500
AJ1-3481	100	600

Stainless Steel

Stainless Steel Double-Sided 10-32 Fittings with 1/16 in. OD tubing



Part No.	ID (µm)	Length (mm)
AJ1-1421	100	150
AJ1-1441	100	250
AJ1-1461	100	350
AJ1-1471	100	500
AJ1-1481	100	600
AJ1-1521	125	150
AJ1-1541	125	250
AJ1-1561	125	350
AJ1-1571	125	500
AJ1-1581	125	600
AJ1-1621	254	150
AJ1-1641	254	250
AJ1-1661	254	350
AJ1-1671	254	500
AJ1-1681	254	600

PEEKsil

PEEKsil Single-Sided 10-32 Fitting with 1/16 in. OD tubing



Part No.	ID (µm)	Length (mm)
AJ1-2224	50	150
AJ1-2274	50	500
AJ1-2294	50	750
AJ1-22A4	50	1000

APPLICATIONS

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