thermo scientific

Thermo Scientific Sample handling premium products

Ensure confidence when results are critical

ThermoFisher SCIENTIFIC

Introduction

When you select a sample handling product (vial, closure, plates and sealing mats) do you stop to think about the impact that this has on your sample integrity, security or the quality of analytical results you will achieve?

In fast paced, dynamic modern laboratories there is often little time to take this into consideration, and anyway with our state-of-the-art analytical systems do we really need to be worried about such a small part of the workflow?

The answer is yes. Our choice of sample handling solution can have a significant impact on:

- **Sample security** – are we sure we haven't lost any of our precious sample?
- **Sample integrity** – do we know that our sample handling product is clean and wont adulterate our sample?
- **Analytical results quality** – being able to answer these questions will help provide a level of confidence in our analytical results.

Fortunately, we have been working with analytical scientists like you to ensure our premium sample handling products deliver the highest levels of sample security, integrity and ultimately the highest quality analytical results.

Thermo Scientific premium range products

The premium range includes the following products which are designed to provide:

- Higher sample integrity
- Highest levels of sample cleanliness
- Reduced sample failure and repeat analysis
- Significantly easier use

Thermo Scientific™ Chromacol™ GOLD-Grade Vials	Thermo Scientific™ MSCert Vials	Thermo Scientific™ AVCS Closure and SureStop Vials
Provide greater confidence in results by ensuring sample integrity due to maximum level of inertness, low adsorption, low pH shift and alkaline content.	When the highest sensitivity is required during MS analysis. MS certified vials provide the optimum results due to pre-cleaning and low particulates.	Deliver consistent results due to reproducible sealing, reduced manual errors, and reduced evaporation.
PDF **Find out more here**	**Find out more here**	**Find out more here**
Learn more at **thermofisher.com/inertvials**		Learn more at **thermofisher.com/surestop**

Premium sample handling products deliver:	Due to:
• Consistency at lower limits of detection • Highly reproducible; consistent peak heights and symmetry • Longer instrument maintenance intervals • Reduced risk of repeated analysis • Long term stability for critical analytes, great pH stability	› Vials are made of 1st hydrolytic class glass, up to 33 expansion and special glass, meeting all criteria specified by the USP and Pharmacopeia
	› Gold Grade Inert Vials deliver highest recovery rates even at trace concentrations
	› Thermo Scientific™ Advanced Vial Closure System (AVCS) Closures with innovative features which eliminate septa push through
	› Thermo Scientific™ SureStop™ Vials - additional rim realizing lowest evaporation levels
	› Pre-Cleaned MS Certified (MSCert) Vial Kits provide lowest particle background for increased instrument sensitivity
	› Certified Vial Kits provide increased sample security

Why is glass quality so important?

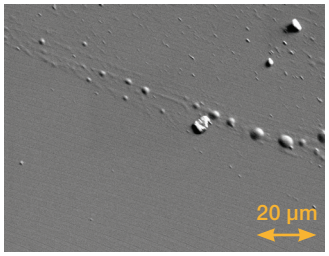
When we talk about glass quality for chromatography autosampler vials, we mostly talk about first hydrolytic class borosilicate glass with different expansion coefficients, which range from 70 type basic glass to 51 type, up to 33 type. What does that mean? The expansion coefficient describes the average linear thermal expansion coefficient between 20°C and 300°C, measured acc. to ISO 7991. As this number has only limited value for a chromatographic application, it can be seen as well as the activity of the surface of the glass wall, which relates to the amount of free silanol groups present, that can react with analytes and bind them to the glass surface.

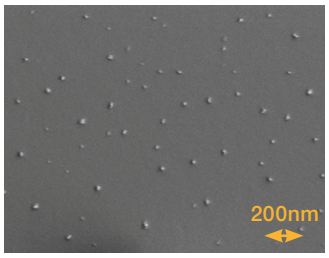
70 type glass e.g. can be seen as having a surface with about 70% free silanol groups. Additionally, as the following pictures show, the glass surface is not even. Coupled with large number of free silanol groups, these surface imperfections lead to higher surface activity.

Thermo Scientific Vials & Closures

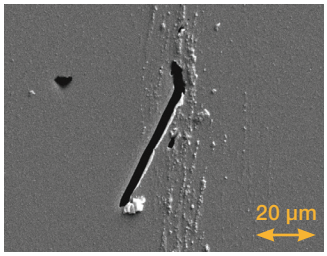
Vial/Glass quality comparison, 1st hydrolytic class glass types, 33 vs 70.

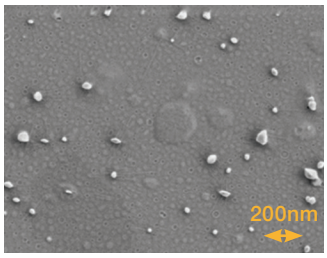
33 expansion glass, clear





70 expansion glass, clear





Higher surface activity increases the amount that a susceptible analyte will stick to, or be adsorbed, on the surface. This problem is further compounded because the degree of adsorption varies over time, particularly when complex matrices are present (for example in the presence of serum). When analysing low concentration of susceptible analytes the percentage of analyte adsorbed is relatively greater and the scale of the problem is compounded. This results in less free analyte available for analysis on the chromatographic system and potentially incorrect results.

A good example of the effect of glass composition can be seen with the analysis of TCA's (Tricyclic antidepressants) out of a biological matricies. **Find out more**

The below illustrates the composition of clear Glass Tubing used for Vial Production

Compound	33 Expansion	51 Expansion	70 Expansion
Silicium Dioxide (SiO_2)	80%	75%	67% - 74%
Boron Oxide (B_2O_3)	13%	11%	0.5% - 12%
Aluminum Oxide (Al_2O_3)	3%	5%	1% - 8%
Calcium Oxide (CaO)	0.1%	2%	2% - 11%
Magnesium Oxide (MgO)	Not detected	Not detected	0.2% - 3%
Sodium Oxide (Na_2O)	4%	7%	9% - 16%
Potassium Oxide (K_2O)	0.1%	Not detected	1% - 5%
Barium Oxide (BaO)	<0.1%	1%	0.1% - 1%
Other impurities	Not detected	Not detected	1% - 2%

Ensure sample integrity with Gold Grade inert vials

Thermo Scientific Chromacol GOLD-Grade vials provide increased productivity, confidence in results and reduce cost of analysis. These vials are manufactured from a higher grade of glass with the lowest levels of alkaline materials to deliver the lowest surface activity possible.

Increase productivity and save time

- Highest recovery rates; even with critical compounds (e.g. trisubstituted N-atoms, tertiary amines) in trace concentrations.
- Highly reproducible; consistent peak heights and symmetry.

Confidence in results with highest quality vial

- Made of 1st hydrolytic class, special 33 expansion glass; meeting current USPs and Pharmacopeias.
- Ultra-low adsorption surface for critical polar compound; enables ultra trace-level analysis for strongly adsorbing analytes.
- The high-class standard in Europe and Asia for decades.
- Ultra-low pH shift, due to the minimized surface activity.
- Lowest alkaline content, for less glass-wall interactions.

A vial that reduces the cost of analysis

- Stable analysis and higher reproducibility; increases security and integrity of analytical results.
- Buffer reduction possible.
- No risk of run-stops during overnight analysis.
- Optimal autosampler fit regardless of lot.

Thermo Scientific Chromacol GOLD-Grade Vials and Inserts

Volume	Description	Cat. no.
8 mm Crimp-Top Clear GOLD Grade Vials (to be used with 8 mm Crimp Closures)		
0.1 mL	SCI-VI™ Crimp Top Inert Vial, Round Bottom	01-CVG
0.2 mL	SCI-VI™ Crimp Top Inert Vial, Tapered	02-CTVG
0.3 mL	SCI-VI™ Crimp Top Inert Vial, Round Bottom	03-CVG
8-425 Screw Thread Clear GOLD Grade Vials, 12 × 32 mm (to be used with 8-425 Screw Thread Closures)		
2 mL	Screw Thread Inert Vial, Standard Opening	2-SVG
1.1 mL	Screw Thread Inert Vial, Conical	1.1-STVG
9 mm Screw Thread Clear GOLD Grade Vials, 12 × 32 mm (to be used with 9 mm Screw Thread Closures)		
2 mL	Screw Thread SureStop Inert Vial, with Patch and Wide Opening	2-SVWGK
0.2 mL	Screw Thread Inert Vial, with Patch and Fused Insert	02-FISVG
11 mm Crimp Top Clear GOLD Grade Vials, 12 × 32 mm (to be used with 11 mm Crimp Closures)		
2 mL	Crimp Top Inert Vial, Wide Opening	2-CVG
1.1 mL	Crimp Top Inert Vial, Conical	1.1-CTVG
0.2 mL	Crimp Top Inert Vial, with Patch and Fused Insert	02-FIVG
Micro Insert GOLD Grade for Wide Opening Vials		
0.2 mL	Conical Inert Glass Insert for Wide Opening Vials	02-MTVWG

Achieve the highest quality results with MS certified vials

When your instrumentation, sample handling and methodology is pushing the limits, a chromatography vial that can keep up is essential. Thermo Scientific™ Mass Spec (MS) Certified Vials enable this by provide low levels of background essential for highly sensitive MS assays.

These are achieved due to:

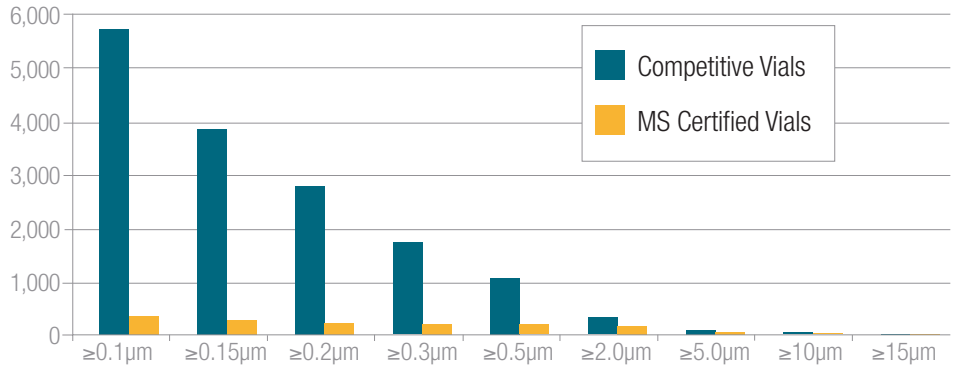
- Pre-cleaning of vials to provide higher levels of cleanliness
- Pre-cleaned vial packaging to protect product integrity
- High purity closures packed in air-tight re-closeable container
- Testing and certification for up to 15 critical physical characteristics affecting vial performance
- Tested and certified for low background by positive ESI LC/MS and GC/ms

MS Certified Vials undergo a proprietary cleaning process that greatly reduces the background particulates along with their potential affect on high sensitivity chromatography. The table below gives a comparison of the particle distribution obtained from an analysis of standard vials versus the MS Certified Vials.

All MS Certified Vials are processed and tested for background particulates. A typical vial that has not been pre-cleaned can exhibit particle counts exceeding 5000 particles per mL. This can have a detremental effect on columns, autosampler injectors as well as the sample itself.

VIAL	≥0.1µm	≥0.15µm	≥0.2µm	≥0.2µm	≥0.5µm	≥2.0µm	≥5.0µm	≥10µm	≥15µm
Competitive Vials	5,677	3,809	2,755	1,709	1,051	307	76	4	0
Thermo Scientific Vials	356	264	218	192	176	160	45	8	3

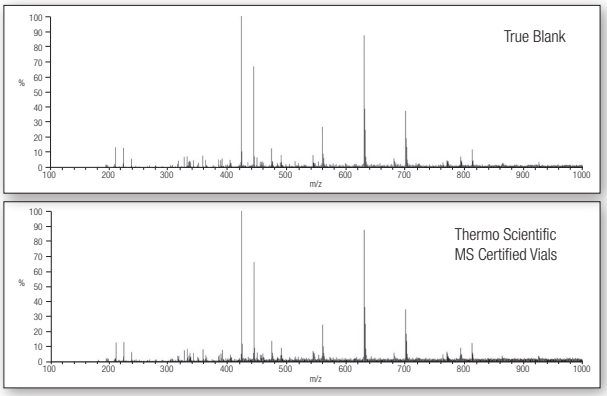
Typical Cumulative Particle Counts



MS Certified vials and closures have been shown to exhibit MS spectra which closely match “true blanks“ as can be seen from the examples below where MS Certified vials and closures were exposed to acetonitrile at room temperature for two hours prior to analysis.

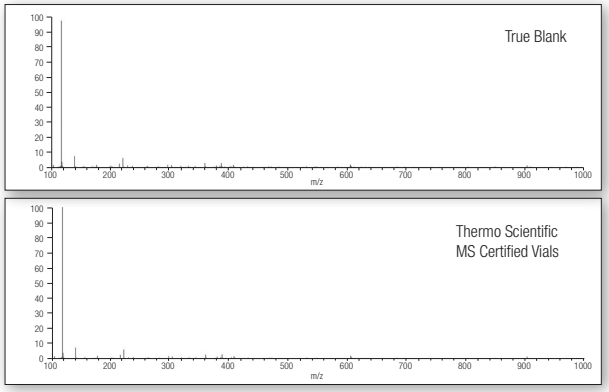
To learn more about how MS Certified vials can help with you analysis visit **here**

LC/MS Background Scan (Positive ESI)



Conditions:
RT: 0.01-25.01
AV: 1211
NL: 2.31E4
T: +c ESI Full MS
[100.00-1000.00]

LC/MS Background Scan (Negative ESI)



Conditions:
RT: 0.01-25.00
AV: 1155
NL: 4.45E6
T: c ESI Full MS
[50.00-1500.00]

Thermo Scientific MS Certified Vials Kits

Description	Volume	Residual volume [µL]	Vial	Patched	Septa material	Kit cat. no.	Pack size
MSCert Kit with SureStop Glass Vial and AVCS Cap	2.0mL	<120µL	Clear	Yes	PTFE/Silicone	MSCERT5000-34W	100 each
	2.0mL	<120µL	Clear	Yes	PTFE/Silicone, Pre-slit	MSCERT5000-40W	100 each
	2.0mL	<120µL	Amber	Yes	PTFE/Silicone	MSCERT5000-35W	100 each
	2.0mL	<120µL	Amber	Yes	PTFE/Silicone, Pre-slit	MSCERT5000-41W	100 each
MSCert Kit with Fused Insert Vial and Cap	200µL	<2µL	Clear	Yes	Bonded PTFE/Silicone	MSCERT5000-30LVW	100 each
	350µL	<2µL	Clear	Yes	Bonded PTFE/Silicone, Pre-slit	MSCERT5000-37LVW	100 each
	350µL	<1µL	Clear	Yes	Bonded PTFE/Silicone	MSCERT5000-31LVW	100 each
	200µL	<1µL	Clear	Yes	Bonded PTFE/Silicone, Pre-slit	MSCERT5000-36LVW	100 each
MSCert Kit with Total Recovery Vial and Cap	1.5mL	<1µL	Clear	No	Bonded PTFE/Silicone	MSCERT5000-33TR	100 each
	1.5mL	<1µL	Clear	No	Bonded PTFE/Silicone, Pre-slit	MSCERT5000-39TR	100 each
MSCert Kit with High Recovery Vial and Cap	1.7mL	<4µL	Clear	No	Bonded PTFE/Silicone, Pre-slit	MSCERT5000-38	100 each
MSCert Vial Kit and Cap	2.0mL	<120µL	Clear	Yes	Bonded PTFE/Silicone	MSCERT5000-341W	100 each
	2.0mL	<120µL	Clear	Yes	Bonded PTFE/Silicone, Pre-slit	MSCERT5000-401W	100 each
	2.0mL	<120µL	Amber	Yes	Bonded PTFE/Silicone	MSCERT5000-351W	100 each
	2.0mL	<120µL	Amber	Yes	Bonded PTFE/Silicone, Pre-slit	MSCERT5000-411W	100 each
Assembled MS Cert Vial Kit	2.0mL	<120µL	Clear	Yes	Bonded PTFE/Silicone	MSCERT5000-134W	100 each
	2.0mL	<120µL	Amber	Yes	Bonded PTFE/Silicone	MSCERT5000-135W	100 each

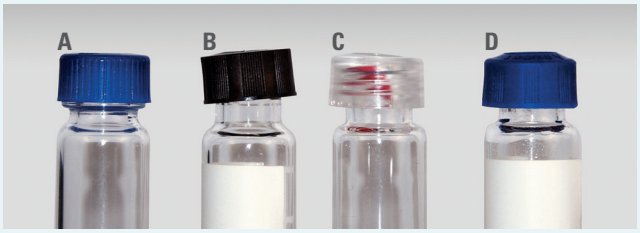
Achieve sample security with AVCS closures and SureStop vials

In addition to glass quality the union between the vial and cap can have a significant bearing on the integrity of your sample. Ensuring ease of use and security of fit can have a a dramtic effect on sample security and integrity, preventing sample loss via incorrect handling and evaporation.

Thermo Scientific™ SureStop™ 9mm vials, and Thermo Scientific AVCS closures are designed as part of the Advanced Vial Closure System (AVCS), to remove subjectivity around achieving the optimal seal compression when closing a vial.

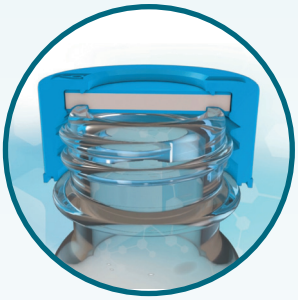
This is achieved by incorporating a definite stop point into the design of the vial finish, preventing incorrect fit, over tightening of the closure and as a result:

- Reduce analytical errors that result from evaporation of samples
- Reduce costly re-analysis
- Improve sample data integrity and sample throughput



Examples of vial and closure misalignment/ deformation. (A) SureStop vial self aligning cap; (B) generic vial, cap tilt; (C) generic vial, septum dislodged; and (D) generic vial, deformed top.

Cap tilt and septum displacement due to over tightening



SureStop provides optimal cap positioning

How different vials affect evaporation rates

To compare the different cap types we measured evaporation rates for 100% methanol held for 48 hours at a constant incubation temperature of 40°C. This represents an extreme condition. The table below shows the evaporation rates of different closure and vial combinations.

Cap type	Vial type	Weight loss
AVCS cap	Glass	0.001
Crimp cap	Glass	0.002
Screw cap	Glass	0.004
Snap cap	Glass	0.008
Snap cap	Polypropylene	0.011

To learn more about AVCS closures and SureStop Vials visit: **thermofisher.com/surestop**

AVCS/SureStop Convenience Kits

Convenience Vial Kits – including 2mL Short Thread Vials and AVCS Caps, 100 each

Vial volume	Residual volume	Septa material	Clear Glass Vial kit cat. no.	Clear Glass Vial with patch kit cat. no.	Amber Glass Vial with patch kit cat. no.
2.0mL	<120µL	PTFE/Red Rubber	C5000-580*	C5000-580W*	C5000-82W
2.0mL	<120µL	PTFE/Red Rubber, Pre-slit		C5000-83W	
2.0mL	<120µL	PTFE/Silicone	C5000-592*	C5000-592W*	C5000-94W
2.0mL	<120µL	PTFE/Silicone/PTFE	C5000-86	C5000-586W*	C5000-88W
2.0mL	<120µL	PTFE/Silicone, Pre-slit	C5000-95	C5000-595W*	
475µL	<2µL	PTFE/Silicone, Pre-slit	C5000-LV95		
2.0mL	<120µL	Bonded PTFE/Silicone		C5000-78W	
2.0mL	<120µL	Bonded PTFE/Silicone, Pre-slit		C5000-93W	
Assembled Vial Kits – including 100 Short Thread Vials with pre-assembled AVCS Cap					
2.0mL	<120µL	PTFE/Red Rubber	C5000-180	C5000-180W	C5000-182W
2.0mL	<120µL	PTFE/Red Rubber, Pre-slit		C5000-183W	C5000-184W
2.0mL	<120µL	PTFE/Silicone/PTFE	C5000-186	C5000-186W	C5000-188W
2.0mL	<120µL	PTFE/Silicone	C5000-192	C5000-192W	C5000-194W
2.0mL	<120µL	Bonded PTFE/Silicone, Pre-slit		C5000-195W	C5000-196W

* This Vial Kit includes a SureStop Vial.

9mm Short Thread Vials, 12x32mm outer dimensions

Description	Color	Patch	Total volume	Usable volume	Residual volume	Cat. no.	Pack size
9mm Screw SureStop Glass Vial	Clear	No	2.0mL	1.5mL	<120µL	C5000-1	100
	Clear	Yes	2.0mL	1.5mL	<120µL	C5000-1W*	100
	Amber	No	2.0mL	1.5mL	<120µL	C5000-2	100
	Amber	Yes	2.0mL	1.5mL	<120µL	C5000-2W	100
9mm Screw High recovery Glass Vial	Clear	No	1.7mL	1.3mL	<4µL	C4000-9	100
	Amber	No	1.7mL	1.3mL	<4µL	C4000-9A	100
9mm Screw Total Recovery Glass Vial	Clear	No	1.5mL	1.2mL	<1µL	C4000-9TR	100
9mm Screw Fused Insert Glass Vial	Clear	No	475µL	350µL	<2µL	C4000-LV1	100
	Clear	Yes	475µL	350µL	<2µL	C4000-LV1W	100
	Amber	No	475µL	350µL	<2µL	C4000-LV2	100
	Amber	Yes	475µL	350µL	<2µL	C4000-LV2W	100
	Clear	Yes	375µL	240µL	<1µL	C4000-LV3W	100
9mm Screw Tapered Glass Vial	Clear	No	1.4mL	1.0mL	<4µL	C4000-V1	100
	Amber	No	1.4mL	1.0mL	<4µL	C4000-V2	100
9mm Screw Glass Vial, silanized	Clear	No	2.0mL	1.5mL	<120µL	C4000-S1	100
	Clear	Yes	2.0mL	1.5mL	<120µL	C4000-S1W	100
	Amber	Yes	2.0mL	1.5mL	<120µL	C4000-S2W	100
9mm Screw Ultra Low Bleed Polypropylene Vial	Clear	No	600µL	400µL	<4µL	06-PPSVW	500
9mm Screw Ultra Low Bleed Polyethylene Vial	Clear	No	600µL	400µL	<4µL	06-PESVW	500
9mm Screw Vial Polypropylene	Clear	No	2.0mL	1.5mL	<120µL	C4000-14	100
9mm Screw Insert Vial Polypropylene	Clear	No	400µL	300µL	<2µL	C4000-11	100

* This product is available in different colors for easy identification – available upon request

Other screw thread types (8-425, 10-425) for special autosamplers are available upon request

9mm Short Thread AVCS Closures

Description	Hardness [°shore]	Thickness [mm]	Pre-slit	Cat. no.	Pack size
9mm Screw AVCS Cap with soft PTFE/Silicone septa	30	1.0	No	C5000-44B*	100
	30	1.0	Yes	C5000-45B*	100
9mm Screw AVCS Cap with PTFE/Red Rubber septa	45	1.0	No	C5000-51B*	100
	45	1.0	Yes	C5000-57B*	100
9mm Screw AVCS Cap with PTFE/Silicone/PTFE septa	50	1.0	No	C5000-53B*	100
9mm Screw AVCS Cap with PTFE/Silicone septa	55	1.0	No	C5000-54B*	100
	55	1.0	Yes	C5000-55B*	100
9mm Screw Solid Top Cap with PTFE/Red Rubber septa	45	1.0	No	C5000-99B	100
Black 9mm Screw Cap with Bonded PTFE/Silicone septa	45	1.0	No	C5000-64B	100
Grey Screw 9mm Cap with Bonded PTFE/Silicone septa	45	1.0	Yes	C5000-75C	100
9mm Screw Cap with Bonded PTFE/Silicone septa	45	1.3	No	C5000-62B	100
Magnetic 9mm Screw AVCS Cap with soft PTFE/Silicone septa	30	1.0	No	C5000-46M	100
9mm Screw AVCS Cap with Aluminum Disk and Silicone sealing ring		0.06	No	C5000-56AL	100

* This product is available in different colors for easy identification – available upon request

Thermo Fisher Scientific has a wide portfolio of sample handling solutions which are applicable to a broad range of workflows. Find out more at **thermofisher.com/vials**

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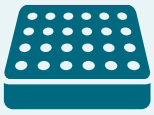
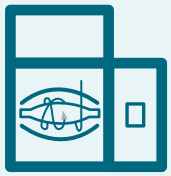
A comprehensive product offering for your complete chromatography workflow

Sample preparation	Sample handling	Separation	Detection	Interpretation
				
SMART Digest™ Kits Facilitating perfect digestion	**SureStop™ Vials** Innovative vial design, unmatched performance	**BioLC/UHPLC Columns** Separation technologies for every workflow	**Orbitrap Fusion™ Lumos™ Tribrid™ Mass Spectrometer** The new standard in characterization and quantitation	**Chromeleon™ Chromatography Data System** Streamlining laboratory workflow
SOLA™ and SOLAμ™ SPE Plates Increased sensitivity	**MS Certified (MSCert) Vial Kits** Protecting your valuable research	**Vanquish™ UHPLC Systems** Built for every workflow		**Watson LIMS™ and Data Manager** Powerful data processing, reporting and SDMS
HyperSep™ SPE Products Effective extraction and clean-up	**AVCS and SureStop Vials** Innovative vial design, unmatched performance			
Titan™ and Target™ Syringe Filters Cleaner sample extracts	**Chromacol™ GOLD-Grade Inert Vials** Maximised sample performance			
	WebSeal™ Products Sample integrity and cleanliness			

Find out more at
thermofisher.com/chromatographyconsumables

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