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Clinical

Chromatography columns and consumables

Clinical workflow solutions

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Complete clinical workflow solutions

For clinical scientists pursuing lower detection limits and higher robustness in their analysis, the correct workflow section can be imperative for their speed in delivering high quality results.

We strive to create a better understanding of how to compose an optimal workflow allowing scientists to improve their throughput and provide imperative clinical data faster and more consistent. The workflows in this brochure offer a sampling of available solutions from Thermo Fisher Scientific.

Forensic toxicology, drugs of abuse, and drug monitoring

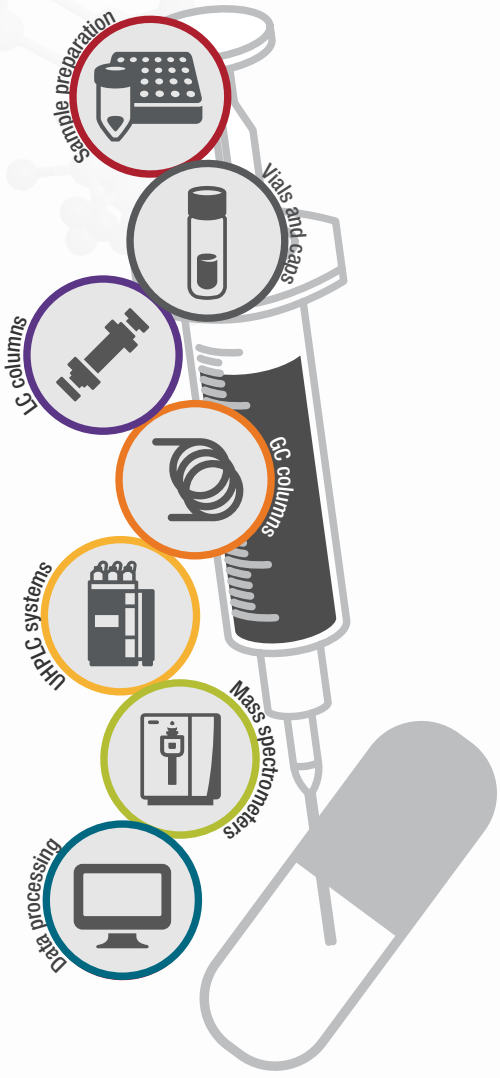
- Thermo Scientific™ SOLA™/SOLAμ SPE cartridges and plates
- Thermo Scientific™ Accucore™ (U)HPLC columns
- Thermo Scientific™ TraceGOLD™ GC columns
- Thermo Scientific™ TurboFlow™ columns
- Thermo Scientific™ SureSTART™ vials and caps

Amino acids, acylcarnitines, and succinylacetone research

- Thermo Scientific™ Hypersil GOLD™ (U)HPLC columns
- Accucore (U)HPLC columns
- Thermo Scientific™ Acclaim™ HPLC columns
- Thermo Scientific™ Titan3™ syringe filters
- TraceGOLD GC columns
- SureSTART vials and caps

Translational proteomics

- Thermo Scientific™ SMART Digest™ kits
- SOLAμ SPE cartridges and plates
- Thermo Scientific™ EASY-Spray™ LC columns
- Thermo Scientific™ PepMap™ Neo columns
- Thermo Scientific™ μPAC™ HPLC columns
- Thermo Scientific™ WebSeal™ well plates and mats



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Metabolomics workflow

Metabolomics on Acclaim PA2 columns

Favorable separation in metabolomics workflows can be particularly challenging as the majority of the analytes will have highly polar functional groups that provide the necessary excretion from the body. When analyzing polar analytes on reversed phase retention often becomes an issue as the polarity of the compounds lacks the ability to retain well on a traditional C18. Thermo Scientific™ Acclaim™ PolarAdvantage II (PA2) column is a polar embedded mixed-mode C18 that not only retains polar compounds well but also separates the various compounds from each other based on their subsequent polar functional groups. This chromatogram of catecholamines, and inherently difficult compound group to retain on reversed phase, are separated well on an Acclaim PolarAdvantage II column.

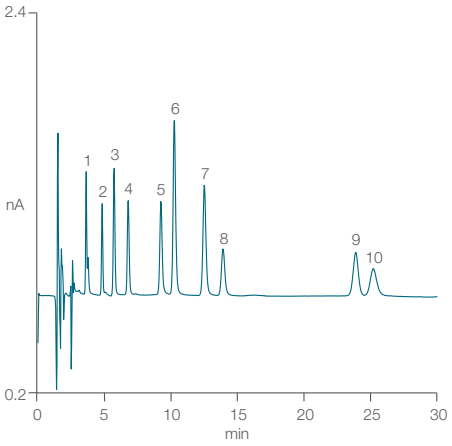


Figure 1. Catecholamines in urine

Workflow solution

Thermo Scientific instruments	Cat. no.
Thermo Scientific™ Vanquish™ Flex UHPLC system	—
Thermo Scientific™ Orbitrap™ IQ-X™ Tribrid™ mass spectrometer	—
Thermo Scientific columns and guard columns	**Cat. no.**
Thermo Scientific™ Acclaim™ VANQUISH™ PA2 column	15652747
Thermo Scientific™ Acclaim™ PA2 guard cartridge	11371733
Thermo Scientific™ Acclaim™ guard holder and coupler	11321933
Thermo Scientific vials and caps	**Cat. no.**
Thermo Scientific™ SureSTART™ 1.5 mL snap vial	17364033
Thermo Scientific™ SureSTART™ 9 mm screw cap	17334063

This workflow includes the newest recommended products

D vitamin workflow

Routine D vitamin screening with sample preparation

Chromatographic separation is required for simultaneous analysis of 25-hydroxyvitamin D3 (25(OH)D3) and its epimeric form 3-epi-25-hydroxyvitamin D3 (epi-25(OH)D3) in a liquid chromatography-mass spectrometry (LC-MS) method because both compounds have the same molecular formulas and the same fragmentation spectra. This workflow provides baseline separation between the two isobaric compounds. Samples were processed by protein precipitation followed by solid phase extraction using Thermo Scientific™ SOLAμ HRP plates to increase sensitivity and improve robustness. Thermo Scientific™ SOLA™ fritless SPE plates deliver robust processing at elution volumes as low as 25 µL, thus eliminating the sample evaporation step and allowing for high-efficiency, cost-efficient analytical methods.

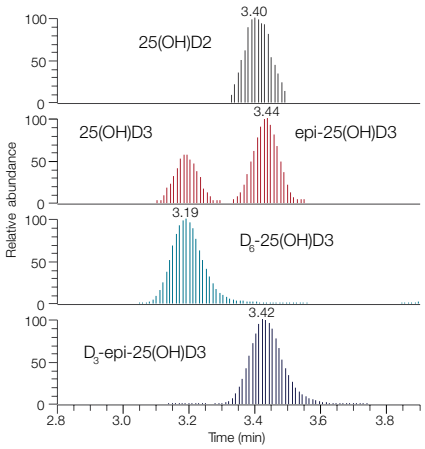


Figure 2. Chromatogram of the lowest calibration standard (1 ng/mL) reconstructed with mass accuracy of 5 ppm.

Workflow solution

Thermo Scientific instruments	Cat. no.
Vanquish Flex UHPLC system	—
Thermo Scientific™ TSQ Altis™ Plus triple quadrupole mass spectrometer	—
Thermo Scientific columns and guard columns	**Cat. no.**
Thermo Scientific™ Hypersil™ GOLD PFP column	10583025
Thermo Scientific™ direct-connection filter holder	10775706
Thermo Scientific™ filter	10127594
Thermo Scientific sample preparation products	**Cat. no.**
SOLA SPE plates	11899163
Thermo Scientific™ HyperSep™ protein precipitation plates	10331435
Thermo Scientific™ HyperSep™ universal vacuum manifold*	10641704
Thermo Scientific vials and caps	**Cat. no.**
Thermo Scientific™ SureSTART™ 0.3 mL screw vial	17314073
SureSTART 9 mm screw cap	17334043

This workflow includes the newest recommended products

*Optional

Estrone/estradiol workflow

High sensitivity analysis in human serum

Estrogens are a class of steroid hormones with numerous characterized functions in adults, where the steroid concentrations are relatively abundant and can be routinely measured. The biology of steroids at lower concentrations is less understood, primarily because the methods to quantitate steroids in low abundance are insufficiently accurate, specific, sensitive, or reproducible. High performance liquid chromatography coupled with tandem mass spectrometry (HPLC-MS/MS) has been widely adopted as an analytically sensitive and selective technique for measuring estrone and estradiol in complex matrices such as human blood plasma or serum.

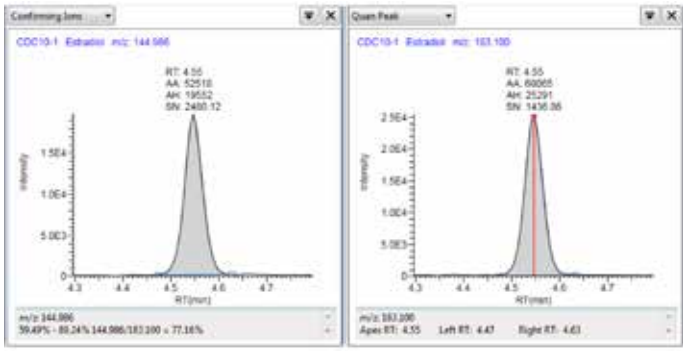


Figure 3. Representative chromatograms of CDC HoSt program samples analyzed here showing both a low and high concentration sample

Workflow solution

Thermo Scientific instruments	Cat. no.
Thermo Scientific™ Vanquish™ Horizon system	—
TSQ Altis Plus triple quadrupole mass spectrometer	—
Thermo Scientific columns and guard columns	**Cat. no.**
Thermo Scientific™ Accucore™ Biphenyl column	15914427
Accucore Biphenyl guard cartridge	15904427
Thermo Scientific™ Uniguard™ direct-connection guard cartridge holder	10776714
Thermo Scientific sample preparation products	**Cat. no.**
SOLA SPE plate	11899163
HyperSep universal vacuum manifold*	10641704
Thermo Scientific™ HyperSep™ positive pressure manifold*	11517651
Thermo Scientific vials and caps	**Cat. no.**
Thermo Scientific™ SureSTART™ 1.5 mL screw vial	17384083
SureSTART 9 mm screw cap	17334063

This workflow includes the newest recommended products
*Optional

Drugs of abuse workflow

Robust method for screening of drugs in human serum

Opioid class compounds has several isobaric varieties, and the adequate and stable resolution of these compounds is essential in ensuring a robust and accurate analysis. High chromatographic resolution is also important in complex mixtures such as this to minimize co-elution of both monitored and unseen matrix components to ensure optimal ionization efficiency and a reduction in matrix effects. Thermo Scientific Accucore Biphenyl column, 2.6 µm shows a well-tuned balance of efficiency and selectivity and is a powerful and robust tool for the determination of drugs of abuse. Coupled with Thermo Scientific SOLA HPR solid-phase extraction plates. The Biphenyl and SOLA columns provide a robust high sensitivity method of these 23 drugs of abuse, as well as many others.

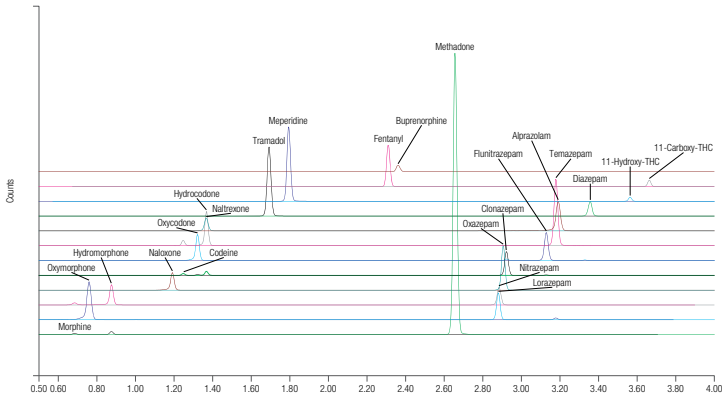


Figure 4. Separation of 23 drugs of abuse under 4 minutes on the Accucore Biphenyl column

Workflow solution

Thermo Scientific instruments	Cat. no.
Vanquish Horizon UHPLC system	—
TSQ Altis Plus triple quadrupole mass spectrometer	—
Thermo Scientific columns and guard columns	**Cat. no.**
Accucore Biphenyl column	15914427
Accucore Biphenyl guard cartridge	15904427
Uniguard direct-connection guard cartridge	10776714
Thermo Scientific sample preparation products	**Cat. no.**
SOLA SPE plate	11899163
HyperSep universal vacuum manifold*	10641704
Thermo Scientific vials and caps	**Cat. no.**
SureSTART 1.5 mL screw vial	17384083
SureSTART 9 mm screw cap	17334043

This workflow includes the newest recommended products
*Optional

Alcohol biomarker workflow

High sensitive method for EtS and EtG in urine

Ethanol metabolites are often monitored for clinical research and forensic purposes. These programs often require a robust, non-invasive, and simple testing protocol to determine abstinence. Monitoring blood alcohol content is not suitable in many cases as it requires an invasive sampling technique and the half-life of ethanol and its major metabolites are short. This means that by the time a sample is taken for testing, the ethanol and major metabolites have already been excreted. Therefore, there has been a growing interest in monitoring of minor metabolites such as ethyl sulfate (EtS) and ethyl glucuronide (EtG) as they are better biomarkers for recent exposure to ethanol, even a few days after the ethanol was consumed.

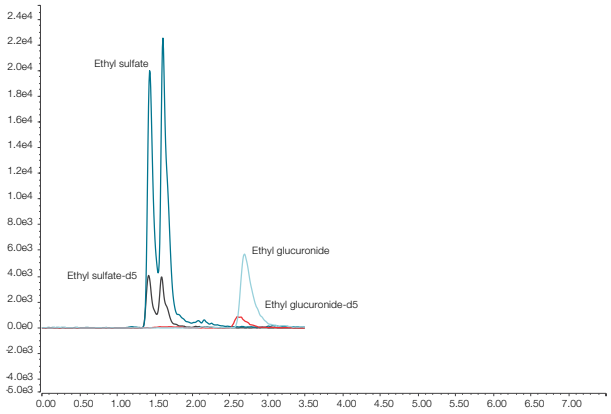


Figure 5. Chromatogram showing ethyl sulfate and ethyl glucuronide at the high QC level in human urine on the Thermo Scientific™ Hypersil GOLD™ VANQUISH™ aQ UHPLC column

Workflow solution

Thermo Scientific instruments	Cat. no.
Vanquish Horizon UHPLC system	—
Thermo Scientific™ TSQ Quantiva™ triple quadrupole mass spectrometer	—
Thermo Scientific columns and guard columns	**Cat. no.**
Hypersil GOLD aQ Polar Endcapped C18 column	10736734
UHPLC direct-connection filter holder	10775706
UHPLC filter cartridge	10127594
Thermo Scientific sample preparation products	
SOLA SPE plate	15547495
HyperSep universal vacuum manifold*	10641704
Thermo Scientific well plates and mats	**Cat. no.**
Thermo Scientific™ WebSeal™ 96-well non-coated plastic microplate	15142699
Thermo Scientific™ WebSeal™ non-sterile sealing tape	15162719

This workflow includes the newest recommended products

*Optional

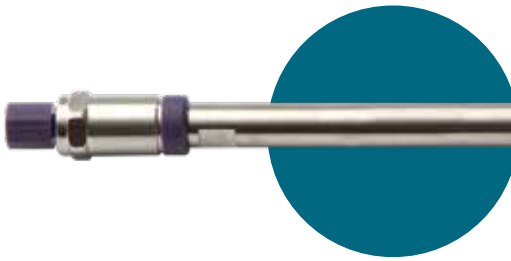
Columns and guard columns

Estrone, estradiol workflow

Drugs of abuse workflow

Accucore Biphenyl LC columns

Choose Accucore Biphenyl LC columns for fast and reliable separation of critical pairs and isomers. These columns provide unique selectivity for aromatic and moderately polar analytes. Their optimized packing offers a rugged platform for a variety of matrices. Based on Core Enhanced Technology, Accucore liquid chromatography reversed phase columns provide fast, high-resolution separations without the elevated backpressures seen using sub-2 µm particles.



Uniguard direct-connection guard cartridge holders

Eliminate the requirement for extra fittings using Uniguard direct-connection guard cartridge holders. They are reusable, stainless-steel guard cartridge holders that attach directly to the analytical column inlet.

Accucore Biphenyl LC columns

Format	Length (metric)	Particle size	Cat. no.
LC column	50 mm	2.6 µm	15914427
Guard cartridge (4/pk)	10 mm	2.6 µm	15904427
Uniguard guard holder			
Uniguard direct-connection guard cartridge holder			10776714

Which Thermo Scientific columns meets your separation needs?

Accucore	Achieves high resolution separations on a solid core platform	Delivers increased sensitivity on a standard HPLC system	Provides fast and easy analyses with a wide selection of chemsitries
Hypersil GOLD	Built on a legacy of 40 years of innovation	The column of choice for fast method development	Recommended for general analysis or method scouting
Acclaim	Designed to meet the needs of your complicated sample	The go-to column for complex mixtures that require more resolution	Offers more phases, more choices

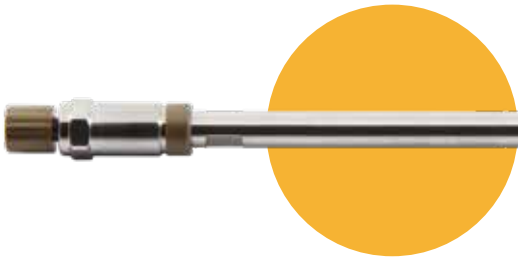
Columns and guard columns continued

D vitamin workflow

Alcohol biomarker workflow

Hypersil GOLD VANQUISH PFP UHPLC columns

Analyze difficult-to-resolve mixtures of halogenated compounds and non-halogenated polar compounds with Hypersil GOLD PFP (pentafluorophenyl) HPLC columns. These columns provide an alternative selectivity to C18 columns in reversed phase applications with excellent peak shape and sensitivity.



Hypersil GOLD aQ Polar Endcapped C18 columns

Retain and resolve polar analytes using Hypersil GOLD aQ Polar Endcapped C18 columns. These columns provide excellent peak shape, even with challenging reversed phase separations using highly aqueous mobile phases.

UHPLC filters

Sacrificing performance is not an option with UHPLC filters that protect columns for Thermo Scientific™ Hypersil™ GOLD 1.9 µm and Thermo Scientific™ Syncronis™ 1.7 µm columns. These UHPLC filters provide a low-volume filter cartridge design, maintain peak shape, and ensure minimal efficiency loss through dispersion.

Hypersil GOLD VANQUISH PFP columns

Format	Length (metric)	Particle size	Cat. no.
HPLC column	100 mm	1.9 µm	10583025
HPLC column	150 mm	1.9 µm	10736734

UHPLC filters

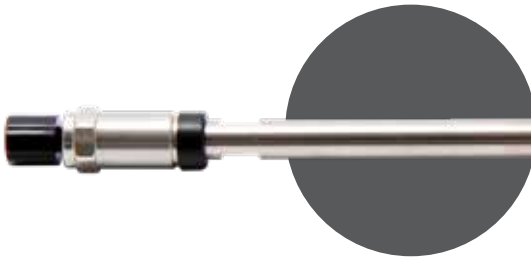
Type	Unit size	Cat. no.
UHPLC direct connect filter holder	1	10775706
2.1 mm I.D. replacement filter cartridge, 0.2 µm	5	10127594

Columns and guard columns continued

Metabolomics workflow

Acclaim VANQUISH UHPLC PA2 columns

Achieve even greater power of separation, speed, and throughput of polar and nonpolar compounds in a single run using Thermo Scientific™ Acclaim™ VANQUISH™ UHPLC PA2 columns. These reversed-phase columns were developed in conjunction with the Thermo Scientific™ Vanquish™ UHPLC system to take advantage of the system's extended pressure capabilities and robustness. The result is a new level of separation, speed and throughput that solve analytical challenges in liquid chromatography and LC-MS analyses. These PolarAdvantage II columns provide selectivity that is complementary to conventional C18 columns.



Acclaim PA2 guard cartridge

Resolve polar and nonpolar compounds in a single run with Acclaim PA2 reversed-phase columns. These high-efficiency, silica-based columns have a polar-embedded stationary phase that operates over a wider range of chromatographic conditions than possible with conventional reversed-phase stationary phases. Its unique chemistry provides enhanced hydrolytic stability from pH 1.5 to 10 with 100% aqueous mobile phases. The column exhibits selectivity that is complementary to conventional C18 columns and excellent peak shapes for both basic and acidic compounds.

Acclaim guard holder and coupler

Use the Acclaim guard holder and coupler for your Acclaim guard columns. They can be purchased separately or as a kit.

Acclaim VANQUISH PA2 UHPLC columns

Format	Length (metric)	Particle size	Cat. no.
UHPLC column	250 mm	2.2 µm	15652747

Acclaim PA2 columns

Format	Length (metric)	Particle size	Cat. no.
Guard cartridge (2/pk)	10 mm	5 µm	11371733
Acclaim guard cartridge holder-coupler kit V-2			11321933

Sample preparation

Estrone, estradiol workflow

D vitamin workflow

Drugs of abuse workflow

Alcohol biomarker workflow

HyperSep protein precipitation plates

The Thermo Scientific™ HyperSep™ protein precipitation plates provide a quick, effective approach for removal of proteins from biological compounds using the protein crash technique. In combination with SPE and SLE, the protein precipitation plate offers a comprehensive range of options for sample preparation of biological based compounds. The 96-well plates are ideal for use in automated, high throughput systems.

SOLA SPE plates

Obtain clean, highly reproducible sample extracts with lower elution volumes using Thermo Scientific™ SOLA™ solid-phase extraction (SPE) plates. The enhanced performance gives you greater confidence in your analytical results and lowers operating costs—without compromising ease of use or requiring complex method development. Thanks to an innovative and unique frit-less design, SOLA SPE plates deliver unparalleled performance.

HyperSep universal vacuum manifold

Process your samples in solid phase extraction SPE cartridges or 96-well plates by using the flexible HyperSep universal vacuum manifold. The manifold is supplied with a base and vacuum gauge, flask and stopper tubing and spigots.

Sample preparation

Description	For use	Cat. no.
HyperSep protein precipitation plates	Protein denaturing in biological samples	10331435
HyperSep universal vacuum manifold	SPE columns and 96-well plates	10641704
SOLA SPE plate, 10 mg/2 mL	Hydrophobic retention of neutral compounds with complementary retention of polar analytes	11899163
SOLA-CX SPE plate, 10 mg/2 mL	Strong ion-exchange retention of weak basic compounds. Complementary reversed-phase retention of neutral compounds	15547495

Vials and caps

Metabolomics workflow | D vitamin workflow | Estrone, estradiol workflow | Drugs of abuse workflow | Alcohol biomarker workflow

SureSTART 0.3 mL glass screw vials

Choose SureSTART 0.3 mL glass screw top microvials, performance level 3, when you need to maximize the injection volume for <2 mL samples.

SureSTART 1.5 mL glass screw vials

Choose SureSTART 1.5 mL total recovery glass screw top microvials, performance level 3, when you need to maximize the injection volume for <2 mL samples.

SureSTART 1.5 mL glass snap vials

Choose SureSTART 1.5 mL total recovery glass snap top microvials, performance level 3, when you need to maximize the injection volume for <2 mL samples.

SureSTART 9 mm screw caps

Use SureSTART 9 mm screw caps with screw vials that have a 9 mm opening.

SureSTART vials

Type	Diameter	Total volume	Usable volume	Cat. no.
Screw	9 mm x 32 mm	0.3 mL	0.25 mL	17314073
Screw	11 mm x 32 mm	1.5 mL	1.10 mL	17364033
Snap	9 mm x 32 mm	1.5 mL	1.10 mL	17384083

SureSTART caps

Septum	Closure material	Thickness	Closure size	Cat. no.
Red PTFE/white silicone/red PTFE	Blue polypropylene	1 mm	9 mm	17334063
White silicone/red PTFE		1 mm	9 mm	17334063

Well plates and mats

Alcohol biomarker workflow

WebSeal 96-well non-coated plastic microplates

Whatever your standard or routine application or assay, you can be sure of excellent solvent resistance and low background noise with WebSeal 96-well non-coated plastic microplates. Made of high-quality, GC-tested polypropylene.

WebSeal non-sterile sealing tape

Safely seal your plates and eliminate cross-contamination of samples with Thermo Scientific™ MicroMat™ CLR silicone mats for well plates. Manufactured of pure silicone these mats resist coring and tearing, and provide superior resealability after multiple injections.

WebSeal 96-well non-coated plastic microplates

Type	Material	Diameter	Volume	Unit size	Cat. no.
Non-coated, non-sterile	Polypropylene	31.6 x 8 mm	1,300 µL	5	15142699

WebSeal sealing tapes

Type	Material	Color	Compatibility	Unit size	Cat. no.
Non-sterile	Silicone, PTFE	Clear	96-well plate	100	15162749

Chromatography columns and consumables

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