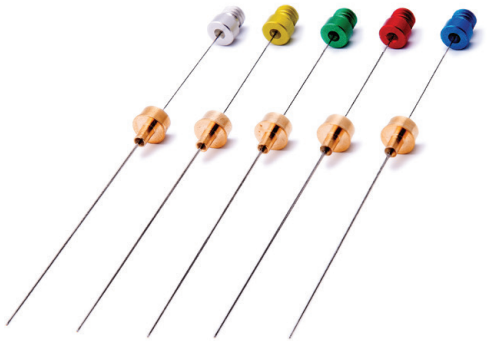
Restek PAL SPME Fibers

Solid phase microextraction (SPME) fibers are used to extract organic compounds from solid, liquid, and vapor matrices onto a stationary phase that is bonded to a fused silica fiber. Typically, the analytes are then thermally desorbed in the inlet of a gas chromatograph (GC). Prior to using this product, SPME end users should read this instruction sheet and become familiar with SPME fiber selection and proper conditioning procedures.



SPME Fiber Selection

Restek PAL SPME fibers are available with different stationary phases and film thicknesses to support a wide range of analyte chemistries and sample matrices. Choose the best SPME fiber for your application based on the properties of the compounds to be analyzed. Use Table I to select the proper fiber type. Fiber types can be identified by the color of the hub, as shown in Figure 1 and Table II.

Table I: Select the correct SPME fiber based on the properties of the target analytes. See Table II for hub colors and part numbers.

Target Analytes	Molecular Weight*	Stationary Phase	Thickness (µm)
Nonpolar	125–600	Polydimethylsiloxane (PDMS)	7
Nonpolar, semivolatile	80–500	Polydimethylsiloxane (PDMS)	30
Volatile	60–275	Polydimethylsiloxane (PDMS)	100
Polar, semivolatile	80–300	Polyacrylate	85
Highly volatile	30–225	Carbon Wide Range (WR)/PDMS	95
Aromatic, semivolatile	50–300	Divinylbenzene (DVB)/PDMS	65
Volatile and semivolatile	40–275	DVB/Carbon WR/PDMS	80 (50 DVB / 30 Carbon WR)

*These molecular weight ranges are a reasonable approximation; however, end users should verify suitability for their specific application.

Figure 1: SPME fiber identification can be confirmed by the color of the hub.

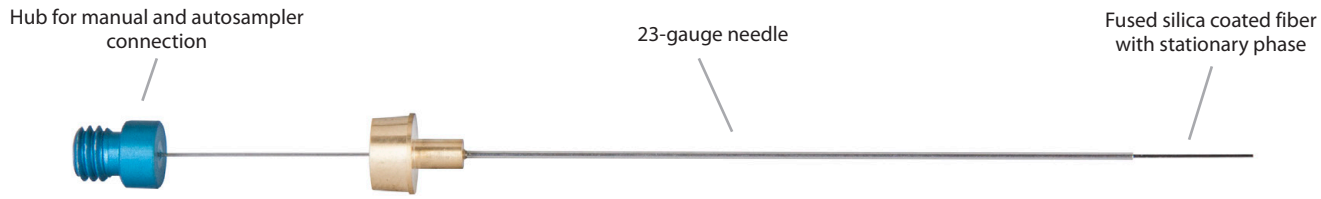


Table II: SPME Fiber Hub Color and Part Number Reference

Stationary Phase Description*†	Thickness (µm)	Restek Hub Color	Similar to Sigma Aldrich Hub Color	Each (cat.#)	3-pk. (cat.#)	5-pk. (cat.#)
Polydimethylsiloxane (PDMS)	7	Green	Green	27482.1	27482.3	27482.5
Polydimethylsiloxane (PDMS)	30	Golden	Yellow	27481.1	27481.3	27481.5
Polydimethylsiloxane (PDMS)	100	Red	Red	27480.1	27480.3	27480.5
Polyacrylate	85	Grey	White	27478.1	27478.3	27478.5
Carbon Wide Range (WR)/PDMS	95	Dark Blue	Black	27479.1	27479.3	27479.5
Divinylbenzene (DVB)/PDMS	65	Violet	Blue	27874.1	27874.3	27874.5
DVB/Carbon WR/PDMS	80 (50 DVB / 30 Carbon WR)	Dark Gray	Gray	27873.1	27873.3	27873.5
Method Development Fiber Kit (Set of 5; includes one fiber each of the first 5 types listed above.)	See above	See above	See above	–	–	27483

*All Restek PAL SPME fibers are 10 mm in length and are housed in a 23-gauge needle. The phase is bonded onto a fused silica fiber core.
† Recommended maximum GC inlet pressure is 50 psi or less.

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Pure Chromatography

SPME Fiber Thermal Conditioning and Solvent Cleaning

General Precautions

- Never touch the stationary phase of a SPME fiber, not even when wearing gloves.
- Never expose a fiber to heat without an inert gas present to protect the stationary phase.
- Never exceed the maximum recommended temperature of the fiber.
- Never soak a fiber in chlorinated solvents.
- Note that sampling technique may affect fiber lifetime (i.e., number of viable analyses). Immersion sampling in liquids containing complex matrices may reduce fiber lifetime. In contrast, headspace sampling generally results in longer fiber lifetimes.
- It is not possible to judge fiber quality visually, except for obvious major mechanical damage.
- Staining, which can be caused by the beginning of vitrification on the surface of a PDMS fiber or appear as a yellowish discoloration in the case of a polyacrylate fiber, does not give any indication of the remaining life span of the fiber.

Thermal Conditioning

Prior to their first use, new SPME fibers need an initial preconditioning at a specified temperature and duration (Table III) in an inert gas environment. In addition, all fibers should undergo conditioning at the beginning of the workday and between samples to prevent carryover. The life span of a fiber can be extended if the fiber is not unnecessarily exposed to its maximum temperature. In general, fibers should be conditioned at 20 °C above the planned operating temperature, without exceeding the fiber's maximum temperature threshold.

Fibers may be conditioned in the inlet of a GC. However, to avoid contaminating the GC system, conditioning the fiber in a separate SPME fiber conditioning module is recommended. When conditioning fibers in a GC inlet, always use an appropriate liner (0.75–1.0 mm ID). Never use an inlet liner with glass wool; if the fiber contacts wool, the stationary phase may be damaged. When conditioning fibers in a GC inlet, be sure to use a high split (e.g., 40 or higher) to reduce the amount of contaminants entering the GC column.

Solvent Cleaning

If thermal conditioning was inadequate and/or particulates are present on the SPME fiber, solvents may be used to clean the fiber. All SPME fibers have bonded stationary phases, which may swell when exposed to certain solvents (particularly chlorinated solvents). If a swollen fiber is retracted into the needle, the needle may damage the stationary phase. Swelling may occur in both headspace and immersion modes; therefore, it is important to only use solvents that are compatible with each stationary phase (Table III). Never clean a SPME fiber by mechanical means.

Table III: SPME Fiber Thermal Conditioning and Solvent Cleaning Parameters

Stationary Phase, Thickness (µm)	Max Temp (°C)	Recommended Operating Temp (°C)	Conditioning Temp (°C) Min / Max	Preconditioning Time (min) Min / Max	Conditioning Time (min) Min / Max	Cleaning Solvent*	Cleaning Time (min) Min / Max
PDMS, 7	340	200–340	200 / 340	15 / 120 (30 is recommended)	1 / 60 (5 is recommended)	MeOH / EtOH / IPA	0.5 / 10 (2 is recommended)
PDMS, 30	280	200–280	180 / 280	15 / 120 (30 is recommended)	1 / 60 (5 is recommended)	MeOH / EtOH / IPA	0.5 / 10 (2 is recommended)
PDMS, 100	280	200–280	180 / 280	15 / 120 (30 is recommended)	1 / 60 (5 is recommended)	MeOH / EtOH / IPA	0.5 / 10 (2 is recommended)
Polyacrylate, 85	280	200–250	180 / 280	15 / 120 (30 is recommended)	1 /30 (5 is recommended)	MeOH / aliphatic HC	0.5 / 2 (1 is recommended)
Carbon Wide Range (WR)/PDMS, 95	300	220–300	200 / 300	15 / 120 (60 is recommended)	1 / 60 (10 is recommended)	MeOH / EtOH / IPA	0.5 / 10 (2 is recommended)
Divinylbenzene (DVB)/PDMS, 65	300	220–300	180 / 280	15 / 120 (60 is recommended)	1 / 60 (10 is recommended)	MeOH / EtOH / IPA	0.5 / 10 (2 is recommended)
DVB/Carbon WR/PDMS, 80 (50 DVB / 30 Carbon WR)	300	220–300	180 / 280	15 / 120 (60 is recommended)	1 / 60 (10 is recommended)	MeOH / EtOH / IPA	0.5 / 10 (2 is recommended)

*Cleaning solvents for a given fiber type may be used alone or mixed together. MeOH = methanol, EtOH = ethanol, IPA = isopropyl alcohol, aliphatic HC = hexane (or similar).

Refer to the equipment owner's manual for proper installation and operation of the SPME fiber within an autosampler or manual fiber holder.

Questions about this or any other Restek product?
Contact us or your local Restek representative (www.restek.com/contact-us).

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#500-60-001 Rev. date: 10/20

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