

## Product Information

### Molded Thermogreen™ LB-2 Septa

#### Introduction

Injection port septa used in gas chromatographic analyses should exhibit low bleed, resist leaks, and be easy to penetrate. For years, Thermogreen LB-2 septa have been considered by many as the benchmark GC septa for these parameters due to several performance advantages over other commercially available septa. A new generation septum, molded Thermogreen LB-2, continues the Supelco tradition of setting the benchmark in high performance.

#### Molded Thermogreen LB-2 Septa

Molded Thermogreen LB-2 septa are manufactured from high quality, low bleed material using the same exclusive rubber formulation as the popular Thermogreen LB-2 septa. Therefore, they exhibit the same traits. Conditioned and ready to use, they offer extremely low bleed over a wide range of inlet temperatures (100 °C to 350 °C). The difference is that molded septa, unlike traditional die cut septa, offer easier installation and also provide a better seal inside the injection port. The reason for this can be seen in Figure 1. With a die cutting process, cupped and/or distorted septa can result when the cutting surface becomes dull. With a liquid injection molding process, every septum conforms to the same mold shape with crisp, clean sides. Additionally, the liquid injection molding procedure used to manufacture our molded Thermogreen LB-2 septa results in septa with ultra low bleed. The complete list of features/benefits of molded Thermogreen LB-2 septa include:

- Rubber formulation exclusive to Supelco
- Strict tolerances (diameter, thickness) due to the constant dimensions of the mold itself, resulting in easier installation and better sealing
- Ultra low bleed over a wide range of inlet temperatures (100 °C to 350 °C)
- No foreign substances or powders (which could contaminate the inlet) are used during manufacturing
- Fully tested for bleed and contamination
- Already conditioned, ready to use
- Ideal for use with low bleed GC-MS columns
- Version without injection hole designed for customers who do not use autosamplers

Figure 1. Comparison of Molded and Die Cut Septa



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#### Molded Thermogreen LB-2 Septa With Injection Hole

A liquid injection molding process allows injection holes to be incorporated into the septa. An injection hole allows needle penetration through the same location, time after time. This helps reduce septum coring, and prevents septum fragments from entering the injection port. The high puncture tolerance makes these septa ideal for autosamplers as well as users of solid phase microextraction (SPME). Figure 2 shows examples of our molded septa with and without injection holes. Molded Thermogreen LB-2 septa, with injection hole, have the same features/benefits as the version without an injection hole. In addition they offer:

- A dimpled center that guides the needle through the septa, resulting in minimal coring
- Easier needle penetration and high puncture tolerance (ideal for autosamplers)
- Strict tolerances of injection hole (centering, size, and depth) resulting in long life
- Version with injection hole designed for customers who use autosamplers and/or SPME

Figure 2. Molded Thermogreen LB-2 Septa, Without and With Injection Hole



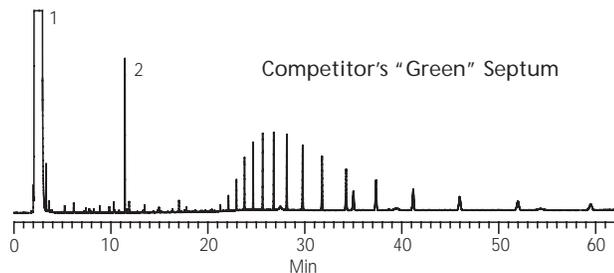
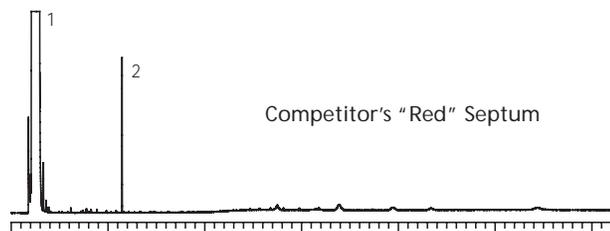
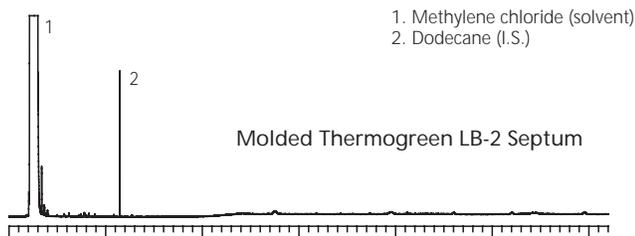
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## Low Bleed Profile

A molded Thermogreen LB-2 septum and popular molded septa from two competitors were solvent extracted using a proprietary in-house procedure. Dodecane was used as an internal standard to eliminate differences in detector response between analyses. This procedure was chosen because it gives a profile of the amount of silicone oil present on each septum, as an indication of bleed level. All three molded septa tested were a standard design without injection hole. The resulting chromatograms are shown in Figure 3. As seen, the bleed from the molded Thermogreen LB-2 septum is on par with a popular "red" septum. A competitor's "green" septum performed very poorly when subjected to this bleed test. The unlabelled peaks represent silicone oils that were extracted from the septum. When placed on an injection port and heated, these silicone oils would inevitably bleed off, collect on the head of the column, and appear as contamination peaks in chromatograms.

**Figure 3. Septa Bleed Profiles of Several High Performance Septa**

column: SLB™-5ms, 30 m x 0.25 mm I.D., 0.25 µm (28471-U)  
 oven: 40 °C (3 min.), 15 °C/min. to 325 °C (15 min.)  
 inj.: 250 °C  
 det.: FID, 325 °C  
 carrier gas: helium, 25 cm/sec. constant  
 injection: 1 µL, splitless (1 min.)  
 liner: 4 mm I.D., single taper, unpacked  
 sample: solvent extracts of septa, dodecane (as an internal standard) added to 100 µg/mL



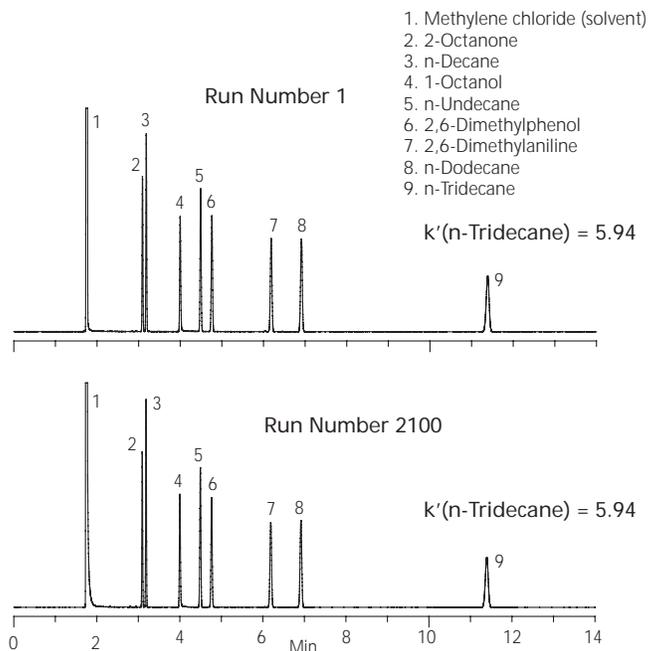
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## High Puncturability

As a measure of durability, a molded Thermogreen LB-2 septa with injection hole was subjected to repeated injections. Column head pressure and carrier gas linear velocity/flow rate were monitored throughout the test to determine if the septum developed a leak. An autosampler was used for the test, ensuring that the syringe needle (tapered 23s-26s gauge) punctured the same location repeatedly. Figure 4 shows chromatograms from the initial run and after 2100 injections. As demonstrated, no artifact peaks were present in the final run to indicate coring of the septum and subsequent bleed from particles in the inlet. Additionally, retention, head pressure, and column flow remained constant, indicating that a leak free seal was maintained.

**Figure 4. Molded Thermogreen LB-2 Septum Durability Test**

column: SLB-5ms, 30 m x 0.25 mm I.D., 0.25 µm (28471-U)  
 oven: 115 °C (15 min.)  
 inj.: 250 °C  
 det.: FID, 360 °C  
 carrier gas: helium, 30 cm/sec. @ 115 °C  
 injection: 1 µL, 100:1 split  
 liner: 4 mm I.D., split, cup design, unpacked  
 sample: Nonpolar Column Test Mix (47300-U), each analyte at 500 µg/mL in methylene chloride



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## Conclusion

The strict tolerances resulting from the constant dimensions of the mold itself result in septa that are easier to install and consistently fit better. Using a rubber formulation exclusive to Supelco, molded Thermogreen LB-2 septa exhibit an ultra low bleed profile, are very resistant to both slivering and coring, and have a high puncture tolerance when used in autosampler applications.

## Ordering Information

### Molded Thermogreen LB-2 Septa

Diam. (mm)	Description	Qty.	Cat. No.
9.5 (3/8 in.)		50	28670-U
9.5 (3/8 in.)		250	28671-U
9.5 (3/8 in.)	with injection hole	50	28331-U
9.5 (3/8 in.)	with injection hole	250	28332-U
10 (13/32 in.)		50	28673-U
10 (13/32 in.)		250	28675-U
10 (13/32 in.)	with injection hole	50	28333-U
10 (13/32 in.)	with injection hole	250	28334-U
11 (7/16 in.)		50	28676-U
11 (7/16 in.)		250	28678-U
11 (7/16 in.)	with injection hole	50	28336-U
11 (7/16 in.)	with injection hole	250	28338-U

### Molded Thermogreen LB-2 Cylindrical Septa for Shimadzu® Instruments

Diam. x Length (mm)	Qty.	Cat. No.
~ 6 x 9	10	20608
~ 6 x 9	50	20633



28676-U

28336-U

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20608

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## Did You Know?

Septa can become contaminated by volatile compounds in the room air or by finger oils. To ensure cleanliness, it is recommended that septa be stored in their shipping container with the lid securely closed and that forceps be used for handling them during installation. Because these septa are already conditioned, they need very little time before use. However, to ensure the lowest bleed for the most sensitive applications, change septa at the end of the day, allowing conditioning to occur overnight.

## Forceps



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Use to prevent contamination of septa with finger oils while handling, or for picking up hot injector liners and detector parts.

**Description**  
Stainless Steel Forceps

**Cat. No.**  
22435-U

## Septum Pullers



20352



20353

P001226

The hook septum puller is great for removing soft silicone septa. It has dozens of uses around the lab. The screw septum puller is perfect for removing harder high temperature septa in addition to soft silicone septa.

**Description**  
Hook Septum Puller  
Screw Septum Puller

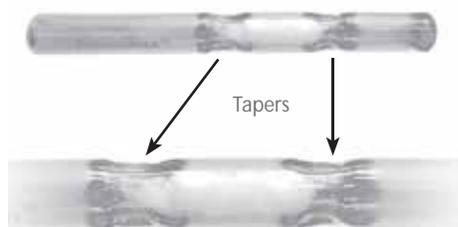
**Cat. No.**  
20352  
20353

## Maximize Performance!

### GC Accessory Products

On this page you will find other GC Accessory products that are designed to maximize instrument performance while helping to reduce the risk of chromatographic problems. Please note that this represents a brief listing of the GC Accessory products that we offer. For a complete listing of all products, please refer to our catalog and/or web site, [sigma-aldrich.com/supelco](http://sigma-aldrich.com/supelco)

### FocusLiner™ Inlet Liners



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The use of a wool plug in inlet liners has been used for many years to promote the rapid vaporization of the entire sample, minimize mass discrimination, and prevent non-volatile material from entering the column. FocusLiner inlet liners incorporate a unique design that prevents shifting of the wool plug during repeated injections or sudden inlet pressure changes.

- Typically reduces injection variability by at least 96%
- Maximum sensitivity and improved detection levels

Description	Qty.	Cat. No.
<b>For Agilent® 5890/6890 (78.5 mm length x 6.3 mm O.D.)</b>		
Split/splitless, 4 mm I.D., wool packed	5	2879805-U
Split/splitless with single taper, 4 mm I.D., wool packed	5	2879905-U
<b>For Finnigan</b>		
Same catalog numbers as Agilent		
<b>For PerkinElmer® AutoSystem™ (92 mm length x 6.3 mm O.D.)</b>		
Split/splitless with single taper, 4 mm I.D., wool packed	5	2879105-U
<b>For Shimadzu 17A with SPL-17 Injector (95 mm length x 5 mm O.D.)</b>		
Split/splitless with single taper, 3.4 mm I.D., wool packed	5	2878405-U
<b>For Thermo® ThermoQuest 8000/TRACE™ (105 mm length x 8 mm O.D.)</b>		
Splitless with single taper, 5 mm I.D., wool packed	5	2877505-U
<b>For Varian® 1075/1077 Injectors (72 mm length x 6.3 mm O.D.)</b>		
Split with single taper, 4 mm I.D., wool packed	5	2874805-U
<b>For Varian 1078/1079 Injectors (54 mm length x 5 mm O.D.)</b>		
Split/splitless with single taper, 3.4 mm I.D., wool packed	5	2875705-U
<b>For Varian CP-1177 Injectors</b>		
Same catalog numbers as Agilent		

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**Development/Bulk Manufacturing Inquiries SAFC™** (800) 244-1173

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### Therm-O-Ring™ Seals

Inlet liners used in an Agilent GC require an O-ring placed near the top for proper operation. This O-ring ensures that the only path for carrier gas to get to the outside of the inlet liner is through the grooves in the inlet seal at the bottom of the injection port.

- Fit 6.3 mm, 6.5 mm, or 1/4" O.D. capillary liners that use an O-ring seal
- Can be used with inlet temperatures up to 375 °C without sticking or fragmenting
- Superior replacements for O-rings made from Viton®

Qty.	Cat. No.
10	21003-U
25	21004-U



P000752

### Inlet Seals

The inlet seals in an Agilent GC must be regularly changed to prevent sample adsorption due to accumulation of sample residue and/or septum fragments. Supelco manufacturers replacement inlet seals of the highest quality.

- Stainless steel for analyses of non-reactive compounds
- Stainless steel seals plated with pure gold for applications requiring more inertness
- Cross design intended for high split flows (>200 mL/min.)
- Packs of ten include one washer for each seal

Material	Qty.	Cat. No.
Non-plated	10	23317-U
Gold-plated	10	23319-U
Gold-plated, cross design	10	23415-U

### Trademarks

Agilent — Agilent Technologies  
AutoSystem, PerkinElmer — PerkinElmer Corp.  
FocusLiner — SGE International Pty Ltd.  
Shimadzu — Shimadzu Corp.  
SLB, Supelco, Thermogreen, Therm-O-Ring — Sigma-Aldrich Biotechnology LP  
Thermo, TRACE — Thermo Electron Corp.  
Varian — Varian Associates Corp.  
Viton — E.I. duPont de Nemours & Co., Inc



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High Technology and Service*