



Preventing GC Septum Problems

By Mark Badger and Scott Grossman

- Avoid extraneous peaks by proper septum handling and maintenance.
- Handy size chart and septum choice guidelines.
- Optimize performance by choosing the right septum for the job.

Septum Handling

All GC septa, regardless of their composition, puncturability, or resistance to thermal degradation, will be a source of problems if they are mishandled. Always use clean forceps, or wear clean powderless or cotton gloves when handling septa. Do not handle them with bare fingers or with powdered latex gloves—contaminants such as finger oils, perfumes, make-up, fingernail polish, skin creams, hand soaps, and talcum can be absorbed into the septum and will bleed out during your analyses.

Also, always follow septum and instrument manufacturers' recommendations when installing a septum. Overtightening a septum nut will invariably reduce septum lifetime by increasing coring and splitting problems.

Septum Bleed

All GC septa contain various amounts of volatile materials (e.g., silicone oils, phthalates) that can be released when the septum is heated to analysis temperatures. GC septum bleed occurs when these volatiles enter the column, then elute from the column, creating elevated baselines (for isothermal analyses), baseline disturbances, or extraneous (but consistent) peaks in the chromatogram. This problem is prevalent in temperature-programmed analyses because the septum volatiles collect on the column during the oven cooldown and initial hold periods.

To avoid GC septum bleed, either condition your septum prior to running your analyses, or use a preconditioned septum that is ready for immediate use. Allowing the septum to condition at operating temperatures for a few hours is an excellent way to assure optimum performance.

Septum Coring

Most modern gas chromatographs have a septum purge flow that is designed to flow across the inward face of the septum, sweeping most of the volatiles away from the column. What happens when either the septum has been punctured too many times, or the syringe is damaged or has the wrong tip type? In these cases, small septum particles can be cored from the body of the septum and fall into the inlet liner. Once in the liner, they are typically subjected to even higher temperatures than in the septum housing (see our [How Hot is Your Septum?](http://www.restek.com) article on www.restek.com), and the volatile compounds they release are swept directly into the column or out the split vent.

To prevent GC septum coring, don't overtighten the septum nut, be sure to routinely replace your septum, and inspect your syringe (manual or autosampler) for tip damage. Also, consider switching to a softer, more pliable septum. Softer septa are less likely to core than firmer septa. Remember, however, that softer septa usually have a lower maximum operating temperature than firmer septa, so consider your method requirements carefully before deciding to switch. Changing syringe needle styles can also help reduce GC septum coring. For example, Point Style 2 needles (beveled needle point) are much more likely to core septa (especially when the tip has become bent or dull) than a Point Style 5 needle (conical needle with side port).

Why are Low-Bleed Septa Important?

Either baseline rise or extraneous peaks caused by GC septum bleed can interfere with identification and quantification of target analytes.

Why Does Septum Puncturability Matter?

A septum that can be penetrated cleanly and easily by a syringe needle has a longer life. Moreover, consistent injections made through such a septum help ensure accurate results. The soft silicone rubber from which all Restek septa are manufactured is specially formulated for chromatographic performance, which ensures our septa are easy to puncture. However, in cases in which a small degree of pliability is sacrificed for high-temperature optimization, the CenterGuide dimple will help guide the syringe, for clean, consistent injections, minimizing septum coring.

What Septum Configurations Are Available, and for Which GCs?

Restek has fashioned septa for all major brands of gas chromatographs and injectors. Use our handy septum size chart (www.restek.com) to determine the septum diameter for your instrument or contact us at 1-800-356-1688 (ext. 4) to discuss your application.

Which Septa Should I Use?

Thermolite Plus septa are a proven low-bleed champion. With a maximum temperature of 350 °C, Thermolite Plus septa are suitable for most applications.



BTO septa are bleed and temperature optimized with a maximum temperature of 400 °C, for the most demanding GC and GC-MS applications. They attain remarkable softness and puncturability at high temperatures. However, at lower temperatures, BTO septa have limited puncturability and septum coring or needle damage may occur. The CenterGuide can help reduce coring when tapered (rounded tip) needles are used to puncture the septum.



Restek septa are precision molded for a consistent and accurate fit, they are preconditioned so they are ready for immediate use, and they are packaged in ultra-clean blister packs for a reliably clean product.