

Sulfinert® Treatment*

The most inert passivation surface available, Sulfinert® treatment is ideal for complying with the most stringent sulfur and mercury regulations and achieving the lowest detection limits. The Sulfinert® layer prevents compounds from contacting the reactive stainless steel surface. Sulfinert® parts can be used over a wide pH range. Combine our custom service for parts such as manifolds and valves with our stock Sulfinert® parts to ensure your entire system is inert.

Features	Benefits
Inert.	Sample, transfer, and analyze sulfur compounds and other active compounds at parts-per-billion levels.
Durable and flexible layer, incorporated into the surface.	Items can be worked after treatment—no flaking, chipping, or cracking.
Stable in acidic or weakly basic (pH 8-9) environments.	Sample sulfur compounds without compromising compound stability.
Proven thermal stability to 450°C in an inert atmosphere.	Effectively bake-out contaminants.
Nonpolymeric.	No memory effects, as seen with Teflon®-coated parts.
Treated tubing and fittings in stock for immediate delivery.	Parts are available when you need them.

industries served

Petrochemical (exploration and refining)
Chemical
Mercury monitoring

Sulfur Compound Sampling, Storage, and Transfer Considerations**More accurate results and faster cycle times, using Sulfinert® treated components**

Accurate analyses for parts-per-million to parts-per-billion levels of sulfur-containing compounds in petrochemical streams are critical to meeting new regulations for lower levels of sulfur in diesel fuel and gasoline. Many organo-sulfur compounds—hydrogen sulfide, methyl mercaptan, and ethyl mercaptan among them—react with or adsorb strongly to metal surfaces. Adsorption of sulfur compounds in sampling, storage, and/or transfer apparatus can cause prolonged analysis cycle times as well as inaccurate, falsely low values. Sulfinert® treatment adds value to your process by ensuring accurate analytical results, improved yields, and faster cycle times. Save thousands by improving the surface performance of your analytical and process systems.

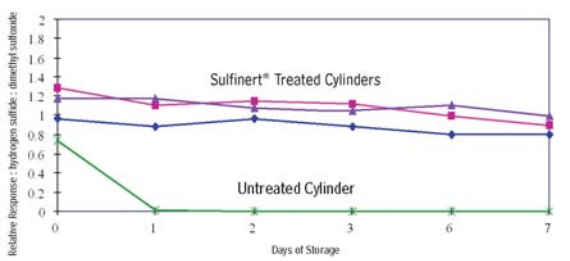
Sulfinert® offers exceptional performance in sample storage systems.

Figure 1 compares a gas containing 17ppbv of hydrogen sulfide stored for 7 days in untreated and Sulfinert® treated stainless steel sample cylinders. The data show the Sulfinert® treated system will reliably

store ppb levels of the active sulfur-containing compound during transport from the sampling site to the analytical laboratory. In contrast, hydrogen sulfide degraded rapidly in the untreated cylinder, and was lost totally within 24 hours.

Visit www.restekcoatings.com to download technical studies and learn more about how Sulfinert® can improve the performance of your analytical system.

Figure 1 Sulfur compounds are stable in Sulfinert® treated stainless steel systems (17ppbv hydrogen sulfide in 500mL cylinders).

**it's a fact**

A Sulfinert® treated system will store and transfer ppb levels of active sulfur-containing compounds without adsorption.

*See Frequently Asked Questions on page 391.

product guide



A wide variety of stock Sulfinert® treated **tubing and fittings** are available—see pages 392–396.

Custom treatment is available for **your existing equipment**—see page 398.

Eliminate adsorptive effects in sample transfer systems with Sulfinert.

A comparison of the transport properties of Sulfinert® treated electropolished stainless steel tubing, untreated electropolished stainless steel tubing, and raw commercial grade stainless steel tubing show only Sulfinert® treated electropolished stainless steel has the inertness necessary for quantitatively transferring sulfur compounds at low ppmv to low ppbv concentrations in sample streams.

Figure 2 demonstrates how Sulfinert® treatment can eliminate costly analytical test errors caused by sulfur adsorption. Sulfinert® treated electropolished tubing did not adsorb methyl mercaptan to any measurable extent, delivering a representative sample with no delay. The untreated electropolished tubing, in contrast, totally adsorbed methyl mercaptan for more than 75 minutes, and the sulfur gas level did not stabilize until approximately 130 minutes. Conventional 316L seamless tubing totally adsorbed methyl mercaptan for more than 90 minutes, and the sulfur gas level did not stabilize until approximately 140 minutes.

Closely correlated to the adsorption of sulfur compounds by system components is the subsequent release of the adsorbed compounds. When adsorption of sulfur-containing compounds is prolonged, desorption from the surface also is slow. This “memory” of adsorbed active compounds can cause long delays in equilibrating a sample stream. Figure 3 demonstrates the memory effects of the three types of tubing. The Sulfinert® treated tubing shows less retention of sulfur compounds by several orders of magnitude, indicating very high inertness.



David Smith
Restek Performance
Coatings Senior Scientist
16+ years of service!

Figure 2 Sulfinert® treated electropolished stainless steel tubing (red) does not adsorb methyl mercaptan (500ppbv).

blue—untreated electropolished tubing,
violet—commercial grade tubing.

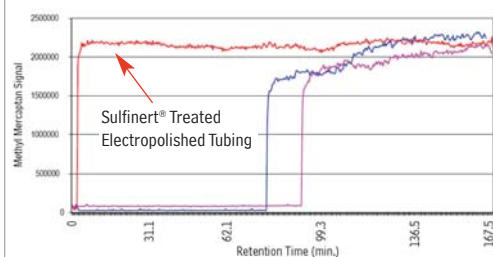
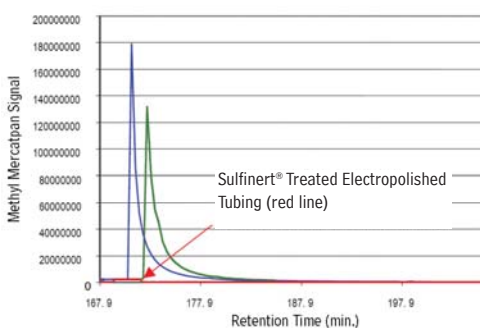


Figure 3 Sulfinert® treatment (red) prevents memory effects compared to untreated electropolished (blue) and raw (green) tubing.



free sample

www.restekcoatings.com/sample

free literature

Sulfinert®-Treated Sample Cylinders: Increase Storage Time for Active Sulfur Compounds

Download your free copy from www.restek.com.

Applications Note
lit. cat.# 59164B

Improve reliability while reducing costs!

Sulfinert® adds value to sampling and transfer systems by improving test accuracy and reducing cycle times. Improved accuracy and reliability of data for sulfur, achieved using Sulfinert® treated transfer and sampling equipment, mean downstream processes can be more precisely controlled, resulting in considerable cost savings. Shorter cycles translate directly into more samples collected and analyzed in a given period of time. Typical savings can be calculated by looking at the average per-hour cost of operating a process that relies on accurate quantification of sulfur compounds.¹ Example monetary values are listed in Table I.

Table I

A 1-hour delay can cost:¹

800,000 tpy ethylene plant	\$50,000
250,000 tpy LDPE unit	\$36,000
250,000 tpy EBSM styrene plant	\$33,000
200,000 tpy anti-freeze process	\$3,600

tpy = tons per year

In Summary

We obtained accurate data, with no delay between samples, by using Sulfinert® treated electropolished tubing in the sampling-storage-transport system. In contrast, we obtained significantly less accurate data, even with delays of more than two hours between samples, by using untreated tubing. Analysts charged with monitoring sulfur levels in process streams can significantly improve profitability by using Sulfinert® treated system components and Sulfinert® treated electropolished tubing transport lines.

Reference

¹Application of TrueTube™ in Analytical Measurement Cardinal UHP (St. Louis, MO) August 2004. Available at www.restekcoatings.com, by contacting us at 800-356-1688, ext. 4, or by contacting your Restek representative. Request lit. cat.# 59088.

thank you

Shell Research and Technology Centre, Amsterdam, for data used in evaluating sulfur gas uptake and memory effects of tubing substrates.