Assure Accurate Sampling and Reliable Sample Purity

Restek Sampling System Treatments Prevent Adsorption, Protect Components

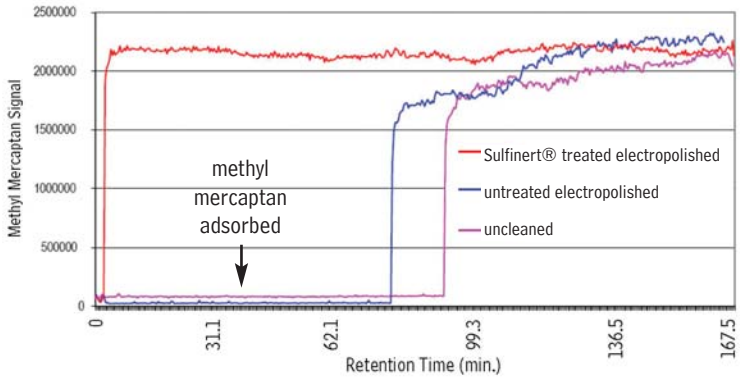
By Gary Barone, Manager, Restek Performance Coatings

- Quantify active compounds (e.g., sulfur, mercury, NOx) at parts-per-billion levels.
- Corrosion protection equal to specialty alloys – at lower cost.
- Assemble a new system from treated stock, or treat an existing system.

When surface activity or corrosion are a concern, solutions must be engineered. Restek Performance Coatings offers a family of surface treatments that address reactivity and corrosion over a wide spectrum of applications. These treatments reduce process upsets, reduce capital costs, and reduce maintenance costs.

Accurate sampling with Siltek®/Sulfinert® tubing and fittings.
Adsorption problems in sample pathways often can be traced to the tubing and fittings used to transfer the sample to the analytical instrument. Always use treated tubing and fittings for applications involving active compounds. To ensure maximum inertness and minimal surface area, use Siltek®/Sulfinert® treated electropolished tubing. Figure 1 shows uptake and release curves for 500ppbv of methyl mercaptan, an active sulfur compound, in a gas stream passing through a variety of tubing substrates. Siltek®/Sulfinert® treated tubing reduces uptake by orders of magnitude, relative to untreated stainless steel tubing.

Figure 1 Sulfinert® treated electropolished seamless stainless steel tubing does not adsorb methyl mercaptan (500ppbv).



Reduce maintenance cost, extend system life with Silcosteel®-CR tubing and fittings.
In corrosive environments, Silcosteel®-CR treatment is an excellent alternative to expensive alloys. Silcosteel®-CR treatment extends component life while reducing the frequency of preventive maintenance and ensuring the purity of the process or sample stream. Silcosteel®-CR improves corrosion resistance by up to 10X over untreated 316 stainless steel (Figure 2).

Figure 3 shows the results of a 4000-hour salt spray test on Silcosteel®-CR treated 316L stainless steel and untreated 316L stainless steel. The Silcosteel®-CR treated material exhibited virtually no change. Silcosteel®-CR treatment has extended the life of process systems in oil and gas production, oil refining, petrochemical processing, aerospace equipment, food and beverage processing, and laboratory testing. Figure 4 shows Silcosteel®-CR treatment can reduce the overall lifetime cost of a typical process system by hundreds of thousands of dollars. While the initial cost of an unprotected stainless steel system is lower than that of a comparable Silcosteel®-CR system, the overall lifetime cost, considering replacement cost due to corrosion, is nearly double that of a Silcosteel®-CR treated system. High performance alloy systems offer superlative corrosion performance, but the initial material cost can be up to six times that of a stainless steel system.

simply **the best**

Restek-treated electropolished tubing is the best tubing choice when purity, inertness, or reproducibility are concerns.

Top: electropolished finish, surface roughness average number: 5-10. Bottom: conventional finish, surface roughness average number: 23-27.

Treat the entire sample pathway for maximum benefit.

Fittings

Connections can be a source of adsorption and sample loss, and there is benefit to employing Restek surface treatment on many of these components. In corrosive environments, Silcosteel®-CR treatment will extend the useful life of system fittings, as well as tubing. We offer extensive lines of treated Swagelok® and Parker fittings, in sizes from 1/16" to 3/8".

Valves

The sample flow path through a valve can prolong contact between the sample stream and the valve components. Restek surface treatments have been applied to many valve geometries, to eliminate adsorption to bodies, stems, diaphragms, or other components.

Filters

Frits and other filtering devices trap particles and prevent them from entering the analytical instrument, but they also very effectively adsorb active components in sample streams. Their large surface areas can increase sample/system contact by orders of magnitude. Siltek®/Sulfinert® treatment of frits and filters creates an inert flowpath. Our chemical vapor deposition technology ensures the treatment penetrates even the smallest pores in sintered metal frits.

Sample Vessel Equipment

Restek treated sampling containers prevent active components from adsorbing to vessel, valve, or outage tube surfaces. We offer a complete line of high pressure sampling equipment for applications involving liquefied petroleum gases, ethylene, natural gas, or propylene.

Sampling Probes

An untreated probe contributes to the active surface area in the system, and this should be considered when identifying potential adsorption sites during active stream transfer.

Heated Transport Lines

Active compounds in the sample quickly can be adsorbed onto the hot tubing in a heated "trace line". Restek surface treatment prevents adsorption of active compounds.

Summary

Surface treatments from the Restek Performance Coatings group prevent adsorption of active compounds or corrosion in process systems, and always should be considered in applications in which active or corrosive streams are to be sampled, transferred, or analyzed.

Siltek®/Sulfinert® Treated Coiled 316L Grade Stainless Steel Tubing

ID	OD	cat.#	5-24 ft.	25-199 ft.	200-399 ft.	>400 ft.
0.055" (1.40mm)	1/8" (3.18mm)**	22508				
0.180" (4.57mm)	1/4" (6.35mm)**	22509				
0.277" (7.04mm)	3/8" (9.52mm)***	22914				

Silcosteel®-CR Treated Coiled 316L Grade Stainless Steel Tubing

ID	OD	cat.#	5-24 ft.	25-199 ft.	200-399 ft.	>400 ft.
0.055" (1.40mm)	1/8" (3.18mm)**	22896				
0.180" (4.57mm)	1/4" (6.35mm)**	22897				
0.277" (7.04mm)	3/8" (9.52mm)***	22915				

Siltek®/Sulfinert® Treated Coiled Electropolished 316L Grade Stainless Steel Tubing

ID	OD	cat.#	5-24 ft.	25-99 ft.	100-299 ft.	>300 ft.
0.085" (2.16mm)	1/8" (3.18mm)*	22538				
0.180" (4.57mm)	1/4" (6.35mm)**	22539				

*0.020" wall thickness **0.035" wall thickness ***0.049" wall thickness

Figure 2 Silcosteel®-CR resists pitting and crevice corrosion when exposed to ferric chloride, per ASTM G48, B.

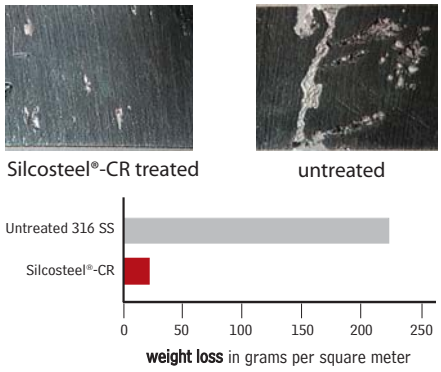


Figure 3 Silcosteel®-CR treated stainless steel shows no sign of attack after 4000-hour salt spray exposure, per ASTM B117.

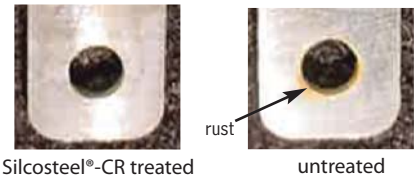
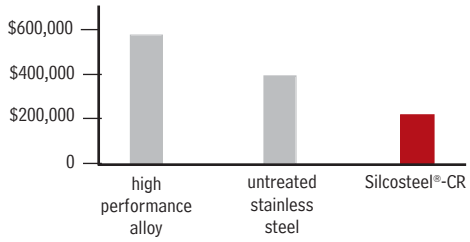


Figure 4 Silcosteel®-CR demonstrates significant cost savings, compared to untreated stainless steel or alloys (US dollars).



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Visit us at www.restekcoatings.com for:

- Siltek®/Sulfinert® treated and Silcosteel®-CR treated Swagelok® and Parker fittings
- Siltek®/Sulfinert® treated and Silcosteel®-CR treated valves
- Siltek® treated in-line filters
- Sulfinert® treated Swagelok® sample cylinders
- Sulfinert® treated Alta-Robbins sample cylinder valves
- Additional treated stainless steel tubing
  - Siltek®/Sulfinert® treated, electropolished, 316L grade
  - Siltek®/Sulfinert® treated, 316L grade
  - Siltek®/Sulfinert® treated, 304 grade
  - Silcosteel®-CR treated, electropolished, 316L grade
  - Silcosteel®-CR treated, 316L grade