Siltek™ and Silcosteel®-CR Treated Fittings and Tubing for Demanding Applications

by Gary Barone, Restek Performance Coatings Division

- Siltek™ treatment for exceptional inertness.
- Silcosteel®-CR treatment for protection from acids or seawater.
- Treated surfaces will not chip, flake, or delaminate.
- Custom treatment available.

Siltek™ and Silcosteel®-CR Treated Swagelok® Fittings

Swagelok® fittings are world-renowned for meeting demanding standards. Now, a wide selection of Swagelok® products, available from stock with Restek's unparalleled surface treatments, set the highest standards for inertness and corrosion resistance.

Restek *Performance* Coatings

Siltek™ treated fittings ensure ultimate inertness, and are the ideal choice for systems used to collect, store, and transfer active compounds.* The most reactive sample components can be retained in a Siltek™ treated system: even at parts-per-billion levels, sulfur-containing compounds, chlorinated pesticides, or other very active compounds exhibit virtually no adsorption. And, unlike coatings, the protective layer produced by Siltek™ or other Restek treatments is integral with the surface - it will not chip, flake, or delaminate, not even in the most stressful applications.

Silcosteel®-CR treatment is highly effective protection for stainless steel exposed to hydrochloric acid, nitric acid, or sulfuric acid, or to marine environments. In independent tests, Silcosteel®-CR treatment upgraded the corrosion resistance of 300-grade stainless steel by an order of magnitude (Table 1) and totally protected samples against crevice corrosion (Figure 1).

If you need to construct a tubing system for a demanding application, you will not find more suitable fittings than the Siltek™ and Silcosteel®-CR treated Swagelok® fittings listed on page 5. If you already have the components of your system, or need unusual parts, Siltek™, Silcosteel®-CR, or other Restek surface treatments can be applied to these parts on request. For information, contact our Technical Service chemists or your Restek representative.

Table 1 Silcosteel®-CR treated stainless steel coupons show little weight loss after exposure to 6% w/w ferric chloride solution.

Sample	Weight Loss (g/m²)
Silcosteel®-CR	19
Silcosteel®-CR	25
Silcosteel®-CR	25
Bare Steel	231
Bare Steel	20
Bare Steel	228

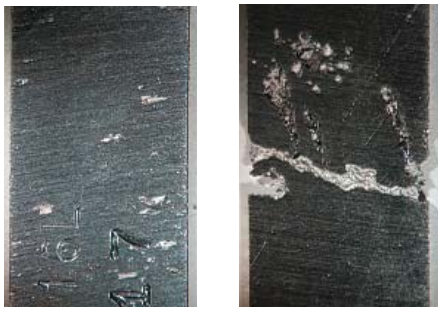
Siltek™ and Silcosteel®-CR Treated Electropolished Stainless Steel Tubing

Restek also sets the highest standard of inertness for transfer tubing for analytical and process applications. The near-mirror finish inside our electropolished tubing (surface roughness of only 5-7 micro-inches), in combination with our unequalled surface treatments, ensures superior inertness or greatly enhanced corrosion resistance. We can provide continuous coils of treated 1/8" tubing up to 100 feet/30.5m long, or coils of 1/4" tubing up to 300 feet/91.4m long; these lengths of treated electropolished tubing are not available anywhere else.

Extremely inert, Siltek™ treated tubing is ideal in systems used for transferring active sulfur-containing compounds, for testing automotive exhaust or sampling stack gas, for process monitoring, or in any other application in which a representative sample of chemically active compounds must be transferred without loss.

In systems used to transfer hydrochloric, nitric, or sulfuric acid, or seawater, Silcosteel®-CR treated electropolished stainless steel tubing will last longer and require less maintenance than untreated tubing. Table 1 and Figure 1 show Silcosteel®-CR treated stainless steel is very well protected from both pitting and crevice corrosion, compared to untreated stainless steel.

Figure 1 Silcosteel®-CR treated 316L stainless steel coupons show no crevice corrosion and only slight pitting corrosion; untreated coupons exhibit severe crevice corrosion.



Silcosteel®-CR treated | untreated

Restek Surface Technology Earns R&D 100 Award

Our newest surface treatment, Silcosteel®-UHV, has been recognized by a panel of independent judges and editors of R&D Magazine as one of the 100 most technologically significant products introduced in 2003. Silcosteel®-UHV treatment minimizes the migration of water and oxygen molecules from the surfaces of ultra high vacuum system components into the vacuum chamber, allowing the system to be evacuated much more quickly, with less costly pumping equipment.

Total Protection

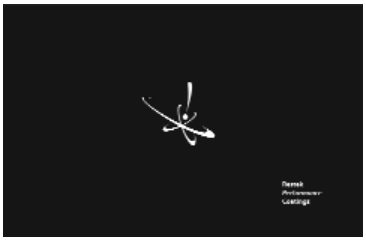
For maximum inertness, we recommend a sample transfer system constructed from Restek treated electropolished stainless steel tubing and Restek treated Swagelok® fittings. To find out how these components can improve the reliability of your data, and/or minimize costly, time-consuming maintenance, contact our Technical Service Group (ext. 4), or your Restek representative, and speak with our surface treatment experts.

*Siltek™ treatment is the multiple-purpose equivalent to Sulfinert® treatment, the surface we apply specifically to systems used to collect, store, and transfer active sulfur-containing compounds.

New Publication Features Restek Surface Technology

Learn more about our precisely applied, highly durable surface treatments: request our new 38-page brochure today (lit. cat.# 59493), or review it on our **new** Performance Coatings Division website:

www.restekcoatings.com



Fittings from Swagelok®

- Siltek™ treatment ensures ultimate inertness.
- Silcosteel®-CR treatment enhances corrosion resistance tenfold, or more.
- Custom treatment available for other Swagelok® fittings or other system parts.

Fitting Type	Size	Similar to Swagelok® #	Siltek™ qty.	Siltek™ cat.#	Silcosteel®-CR qty.	Silcosteel®-CR cat.#
Union	1/16"	SS-100-6	ea.	22540	ea.	22575
	1/8"	SS-200-6	ea.	22541	ea.	22576
	1/4"	SS-400-6	ea.	22542	ea.	22577
Tee	1/16"	SS-100-3	ea.	22543	ea.	22578
	1/8"	SS-200-3	ea.	22544	ea.	22579
	1/4"	SS-400-3	ea.	22545	ea.	22580
Reducing Union	1/8" to 1/16"	SS-200-6-1	ea.	22546	ea.	22581
	1/4" to 1/16"	SS-400-6-1	ea.	22547	ea.	22582
	1/4" to 1/8"	SS-400-6-2	ea.	22548	ea.	22583
Elbow	1/8"	SS-200-9	ea.	22549	ea.	22584
	1/4"	SS-400-9	ea.	22550	ea.	22585
Port Connector	1/8"	SS-201-PC	ea.	22557	ea.	22592
	1/4"	SS-401-PC	ea.	22558	ea.	22593
	1/8" tube to 1/4"	SS-401-PC-2	ea.	22559	ea.	22594
Male Connector	1/8" to 1/8" NPT	SS-200-1-2	ea.	22561	ea.	22595
	1/4" to 1/4" NPT	SS-400-1-4	ea.	22562	ea.	22596
	1/16" to 1/8" NPT	SS-100-1-2	ea.	22563	ea.	22610
	1/8" to 1/4" NPT	SS-200-1-4	ea.	22564	ea.	22611
	1/4" to 1/8" NPT	SS-400-1-2	ea.	22565	ea.	22612
Female Connector	1/8" to 1/8" NPT	SS-200-7-2	ea.	22566	ea.	22613
	1/4" to 1/4" NPT	SS-400-7-4	ea.	22567	ea.	22614
	1/4" to 1/8" NPT	SS-400-7-2	ea.	22568	ea.	22615
	1/8" to 1/4" NPT	SS-200-7-4	ea.	22569	ea.	22616
Female Connector	1/8"	SS-200-61	ea.	22570	ea.	22617
	1/4"	SS-400-61	ea.	22571	ea.	22618

Silcosteel®-CR-Treated Electropolished Tubing

ID	OD	cat.#	5-24 ft.	25-99 ft.	100-299 ft.	>300 ft.
0.085"	1/8"	22536				
0.180"	1/4"	22537				

Siltek™-Treated Electropolished Tubing

ID	OD	cat.#	5-24 ft.	25-99 ft.	100-299 ft.	>300 ft.
0.085"	1/8"	22538				
0.180"	1/4"	22539				

1/8" OD: 5 ft. to 100 ft. in one continuous coil; 1/4" OD: 5 ft. to 300 ft. in one continuous coil.
Longer lengths will be more than one coil.
Note: (required length in meters) x (3.2808) = length in feet.

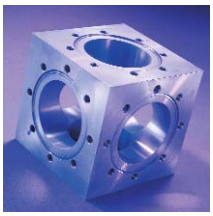
Performance Coatings Division Website Now Up and Running!

www.restekcoatings.com

- Descriptions and performance information about our innovative surface treatments.
- Frequently-asked questions.
- Bibliography of technical articles discussing surface passivation.
- Restek literature to download or request by mail.
- Stock treated tubing, fittings, and other items.
- Electronic custom request form.

We welcome your comments and suggestions! Discover our capabilities here, then give us your toughest surface activity problems, and let us do what "cannot be done" for you.

Internal surface smoothness in stainless steel tubing: a smoother surface is less adsorptive.
Top: electropolished finish, surface roughness average number: 5-10.
Bottom: conventional finish, surface roughness average number: approx. 23-27.



did you know?

Restek surface treatments are not only used in analytical chemistry.

Silcosteel®
A general-purpose passivation layer for steel and stainless steel. U.S. patent 6,511,760.

Silcosteel®-AC
Dramatically reduces carbon buildup on stainless steel components. U.S. patent 6,444,326.

Silcosteel®-CR
A corrosion resistant layer that increases the lifetime of system components in acidic environments containing hydrochloric acid, nitric acid, sulfuric acid, or seawater. Patent pending.

Silcosteel®-UHV
Greatly reduces outgassing from components of ultra-high vacuum systems. Patent pending.

Siltek™
The ultimate passivation for treated components, from glass to high nickel alloys of steel. U.S. patent 6,444,326.

Sulfinert®
A required treatment for metal components when analyzing for parts-per-billion levels of organo-sulfur compounds. U.S. patent 6,444,326.