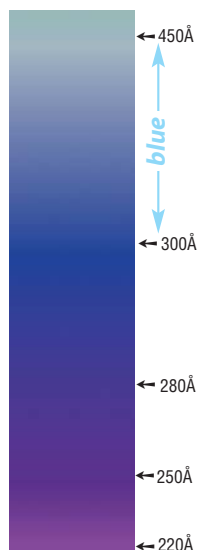


Restek Surface Treatments: Frequently Asked Questions

What are the colors associated with the treatments?

Colors are created by the treatment's light refraction properties. The visible color depends on the treatment layer's thickness. Layer thickness ranges from 0.03 μm to 30 μm , controlled by variables in the process to our specifications. There is a degree of variability to the process, and each piece is treated individually. Therefore, every piece is unique!



Rainbow
minimum 1200Å
(0.12 μm)



Gray
minimum 5 μm

1. Can treated tubing be bent?

Treated tubing can be bent into curves with a bend radius greater than 1 inch for 1/16-inch OD tubing, 2 inches for 1/8-inch OD tubing, or 4 inches for 1/4-inch OD tubing. The treatment layer will remain intact as long as the tubing isn't stretched dramatically. If tight bends are necessary, use a treated elbow union or bend untreated tubing and send it to Restek for custom treatment.

2. Can compression fittings be used without crushing the treatment layer?

Yes. The layer is thin and permeates the surface. It compresses with minimal damage.

3. Why are the Restek treatments varied colors?

The colors are caused by light passing through the thin layer. As the film thickness changes, so does the color. Coating depths and colors are: blue: 300-450 angstroms (Silcosteel®); rainbow: 1200 angstroms (Silcosteel®, Siltek®, Sulfinert®); silver/gray: up to 20 μm (Silcosteel®-AC, Silcosteel®-CR, Silcosteel®-UHV).

4. Is welding possible after Restek treatment?

Yes. The coating does not interfere with the welding of two coated components. The coating is lost at the weld and in the heat affected zones approximately 2 to 5mm on either side of the weld.

5. Is any additional chemical deactivation necessary?

A Sulfinert® or Silcosteel® layer leaves few exposed active sites, so there usually is no need for additional treatment. Chemical deactivation is useful in chromatographic applications in which water will be vaporized on the Silcosteel® treated surface, but is not necessary for Sulfinert® treated surfaces. Parts used in high-temperature applications (>400°C) cannot be chemically deactivated.

6. What are the temperature constraints of Restek surface treatments?

On stainless steel, a Silcosteel® layer is stable to 600°C. Parts treated with a secondary polymeric layer are limited to temperatures of 400°C in inert atmospheres and 250°C when oxygen is present, the temperature maximums for the polymer. Temperatures above 600°C can be used under certain conditions—please contact us for information.

7. How is treated tubing cut?

Cut treated tubing with a conventional tubing cutter or with Restek's cutting pliers (cat. #20193). The thin layer cleaves, leaving a clean break.

8. What dimensions of treated tubing are available?

Treated tubing is available in a wide range of ID and OD dimensions. For stock treated tubing see pages 372-374 of this catalog.

9. Why use Sulfinert® or Silcosteel® treatment instead of Teflon® coating?

Three reasons: 1) Sulfinert® and Silcosteel® layers are non-polymeric, so they do not exhibit the problems associated with gas permeability. 2) Teflon® coating often flakes off the surface, while the Sulfinert® or Silcosteel® layer is tightly integrated into the substrate lattice. 3) Teflon® coating is limited to 280°C, while Silcosteel® treated stainless steel tubing and fittings can be used to 600°C.

10. Why use Sulfinert® or Silcosteel® treated tubing for transfer lines?

Sulfinert® or Silcosteel® treated stainless steel tubing offers all of the advantages of glass or fused silica tubing for the transfer of active compounds (e.g., sulfurs), but is far more durable and flexible.

11. Is treated tubing similar to glass-lined tubing (GLT™)?

No. Sulfinert® or Silcosteel® treated tubing is flexible and can be bent without heating. Also, the Sulfinert® or Silcosteel® layer is highly inert, unlike impure glass.

12. How can I clean the surface of a treated part after use?

Most often, a mild organic solvent (methylene chloride, methanol, hexane) or water is sufficient. Mild sonication may assist and accelerate the process. Do not use caustic, abrasive, or high pH (pH >8) cleaners, as they will damage or dissolve the layer. Steam cleaning in the presence of oxygen or air could create surface activity, and also should be avoided.

13. What materials should I avoid using with Silcosteel® treated parts?

The Silcosteel® coating is silicon-based and is prone to attack by hydrofluoric acid or by basic compounds. The surface should not be exposed to media with pH >8.

14. Siltek® and Sulfinert®: What's the Difference?

Siltek® is the name for our patented deposition process. When we developed the Siltek® process, the application that showed the greatest benefit, among many we investigated, was the storage and transfer of low ppb level active sulfur compounds, such as hydrogen sulfide and mercaptans. Because there was (and continues to be) demand for a reliable surface treatment for this application, we use the name Sulfinert® to describe Siltek® treated products created specifically for this purpose.

We will work with you to meet your surface treatment needs. Please contact us to discuss unique requirements. See below for obtaining a quote for custom treatment.

What can be treated?

Parts that can tolerate a sustained temperature of 400°C, with pressurization/evacuation. For more information, request *Substrate Preferences* (lit. cat.# 59929) or visit us online.

Substrates:	300- and 400-grade stainless steel, high carbon steel, titanium, ceramics, borosilicate glass, Inconel®, Hastelloy®
Parts:	fittings, valves, frits, custom parts with complex topography (inside and/or out)
Sizes of Reaction Chambers:	Largest: 10" diameter cylinder w/ 48" height or 3" diameter cylinder w/ 72" height Large processing oven: 24" diameter x 31" deep Walk-in oven: 4 feet x 4 feet x 4 feet
Tubing:	0.004" to 0.5" ID (0.10–12.7mm); continuous lengths to 2000+ ft. / 600+ meters <i>Please allow 6 inches of extra tubing on each end if the final tubing length is critical.</i>

What can't be treated?

Nickel/nickel plate, aluminum (heat-dependent), Monel®, copper, brass, gold or silver-plated components, magnesium, elastomers. Painted items cannot be treated. All paints and finishes must be removed prior to sending items to Restek for treatment. Soldered joints will not survive the coating process. Silver soldered and brazed components will not coat properly. Restek recommends the use of TIG, MIG, or nickel vacuum brazed joints for use on items to be treated.

To obtain a quote for custom surface treatment, please follow these instructions:

1. Visit the home page of our website: www.restekcoatings.com
 - Navigate to **Custom Coating Services** in the **Info & Support** menu.
 - From the bottom of the screen, choose the worksheet for the treatment you need and print it.
2. Check the box next to the description matching that of the items to be treated. Indicate quantity to be sent for treatment. If the item cannot be matched with any of the listed options, check "other" and list the dimensions.
3. Initial the disclaimer on the request form. This initialed disclaimer is required before we can begin to process your items.
4. Fax the completed form to us at 814-353-1309.

Quotations will be prepared and returned within 24 hours of our receipt.

If you accept our quote, contact Restek Corporation for an authorization number. This number is required for any package shipped to Restek. Any package received without an authorization number will be returned to the sender.

Turnaround time for most custom treated items is 10 working days or less from date received.

Handling Tips

Cleaning

When cleaning a treated part, rinse with a solvent that will dissolve probable surface contaminants (i.e., use a nonpolar solvent to remove hydrocarbon contaminants, or a more polar solvent to remove more active contaminants). Avoid using cleaners containing abrasives as they can scratch the layer. Mild sonication may assist in contaminant removal, but do not oversonicate—this could damage the layer. **Do not use basic solutions with pH>8.** Do not steam clean any Restek treated system components or lines, as this could damage the layer.

Galling

As with any threaded fitting, galling may occur when assembling two treated parts. To prevent thread damage, use a thread lubricant or Teflon® tape (e.g. ResTape™ Stainless Steel Thread Sealing Tape, cat.# 22487). Galling potentially can be reduced when assembling a treated part and an untreated part.

Treatment Layer Troubleshooting

Under normal use, your treated items should deliver outstanding performance for years to come. However, effective lifetime is dependent on the severity of the environment. Factors that can impede performance are:

Contamination	Failure to properly clean the surface can allow increased surface activity. If performance changes, thoroughly clean the surface and inspect the layer for damage.
Erosion	Contact with abrasives can accelerate surface wear.
Bases	Contact with a base (pH 8 or higher) can accelerate deterioration of the layer.

Surface finish and color should stay consistent throughout the life of the product. Changes in the finish or color may indicate a partial loss of the layer. To prevent further loss, ensure no exposure to bases or abrasives.



Mark Eckley
Restek Performance
Coatings Manufacturing
Manager
8+ years of service!

ordering note

Price and delivery time for custom treatments:

Please be sure to obtain an authorization number before you send any items to Restek. Quotes will be made within 24 hours of receipt of the sketch or part. Product delivery time is typically 10 working days or less after we receive the material.

ordering note

Special shipping instructions

All shipments originating outside of the United States must be shipped to Restek under Inco Term DDP (all duties and freight paid by the customer).