

UHV, high-purity gas system and vacuum

SilcoGuard™1000 formerly Silcosteel®-UHV

SilcoGuard™1000 greatly enhances semiconductor & vacuum process performance

Dramatically Reduce Outgassing in UHV Systems

SilcoGuard™1000

- **Save process time** - reduce vacuum pump-down times by 2.5X.
- **Improve process yields** - reduce moisture and ion contamination.
- **Add value** - reduces or eliminates costly equipment burn-in or stabilization
- **Simple!** - improve performance of existing components with SilcoTek™ custom coating service.

Applying SilcoGuard™1000 on the internal surfaces of vacuum systems can dramatically reduce outgassing rates and provide a productivity advantage to process chambers that require more rapid and efficient evacuations.

A SilcoGuard™1000 layer significantly reduces outgassing by steel components in ultra high vacuum (UHV) systems. Applied to and incorporated into the steel surface, the SilcoGuard™1000 layer acts as a barrier, isolating any materials trapped on or in the steel and preventing them from entering the UHV environment, without liberating any contamination of its own.

Figure 1 compares pump-down rates for a SilcoGuard™1000 treated vs. an untreated chamber. SilcoGuard™1000 will reduce pump down times by 2.5x or more, compared to untreated chambers. Data courtesy of Elvac Laboratories¹.

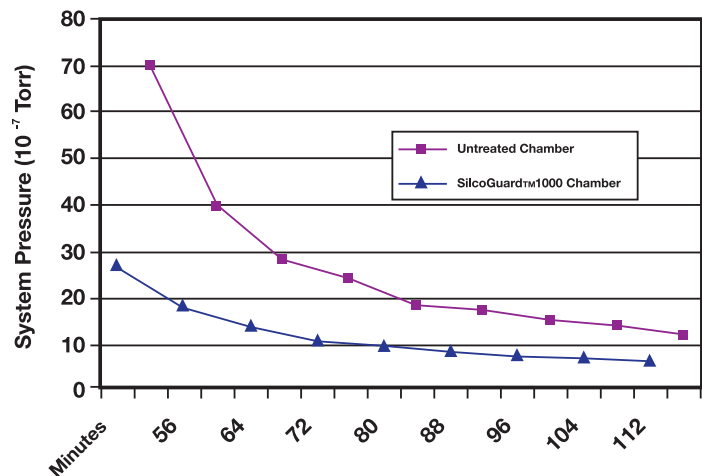


Figure 1 demonstrates the dramatic improvement attained by using SilcoGuard™1000-treated components in a UHV assembly, relative to heat-cleaned components. After 10 hours under vacuum at 61°C, the SilcoGuard™1000 coated part demonstrated a 14-fold lower outgassing rate than the heat-cleaned part, SilcoGuard™1000-treated parts make it possible to achieve and maintain a UHV environment with less pumping capacity and with little to no pre-cleaning or bake-out.

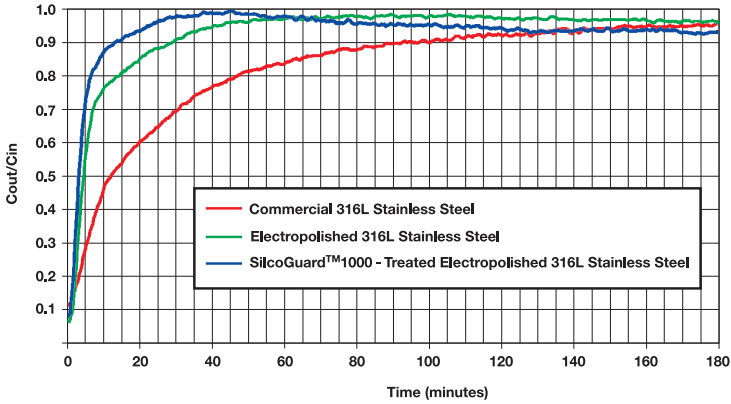


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Accelerate moisture dry-down with SilcoGuard™1000

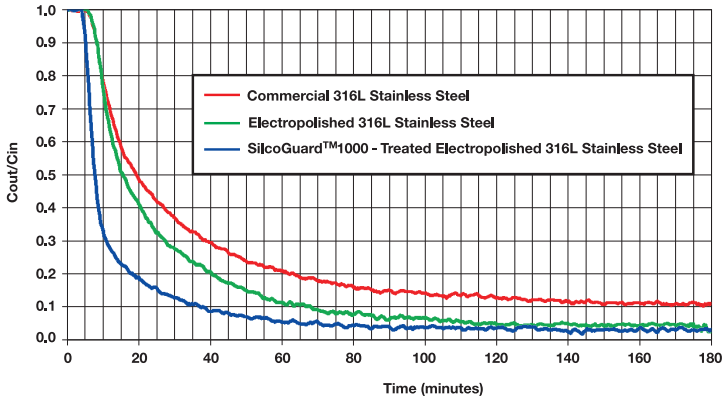
Gas transfer systems serving the semiconductor industry require low moisture content. Data for wet-up and dry-down experiments, measuring the relative response time for moisture content change in treated electropolished stainless steel tubing and standard 316L stainless steel tubing demonstrates a great advantage in using SilcoGuard™1000 treated versus untreated tubing.

Figure 2 SilcoGuard™1000 treated electropolished tubing stabilizes at 1ppm moisture much faster than conventional surfaces.²
Data courtesy of O'Brien Corporation.²



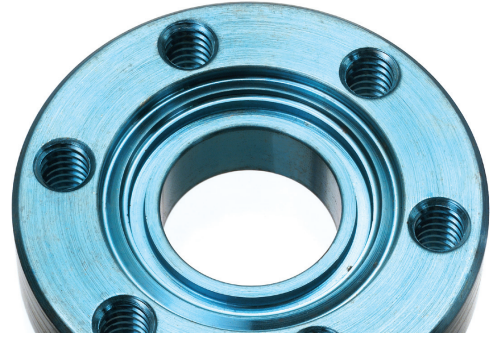
Wet-up curves for SilcoGuard™1000 treated electropolished, untreated electropolished, and standard tubing are compared in Figure 2. Treated electropolished tubing reached the 98% saturation limit in 30 minutes, compared to 60 minutes for electropolished tubing. Standard tubing could only achieve a 96% uptake, after 180 minutes.

Figure 3 SilcoTek™ treated electropolished tubing dries much faster than conventional surfaces.²



Moisture dry-down curves show SilcoGuard™1000 treated electropolished tubing achieved dry-down in 35 minutes, electropolished tubing required 65 minutes, and standard tubing required 175 minutes. Figure 3 compares the dry-down performance for tubing saturated with 10ppm of moisture.

Figure 4 The durable SilcoGuard™1000 layer will withstand the sealing requirements of UHV, maintaining knife-edge integrity.



The SilcoGuard™1000 layer is rugged and durable enough to stand up to the sealing requirements needed to attain a UHV environment. Figure 4 shows the knife-edge of a SilcoGuard™1000-treated Conflat® sealing surface. The knife-edge penetrates and seals in the copper O-ring seated within the Conflat® surface. Even after multiple cycles of this sealing process, the SilcoGuard™1000 layer remains intact.

In Summary

SilcoGuard™1000 is a high purity silicon chemical vapor deposition (CVD) surface treatment that can be applied to existing UHV systems. SilcoGuard™1000 significantly reduces outgassing in stainless steel UHV systems. The hydrophobic nature of SilcoGuard™1000 allows for fast, efficient pumping of moisture and other common surface contaminants from UHV systems. Less contamination results in improved process yields, improved process efficiency and improved process equipment productivity. For more information on how SilcoTek™ can improve the performance, productivity, and profit of your process; go to our web site, www.SilcoTek.com or call us at 814-353-1778.

References

1. D. Smith; M. Higgins; B. Kendall; Low Outgassing of Silicon-Based Coatings on Stainless Steel Surfaces for Vacuum Applications; Presented at annual SVC meeting, Restek Corporation/Elvac Laboratories (2005).
2. Relative Response Time of True Tube™ when Measuring Moisture Content in a Sample Stream Test Report, Haritec Scientific & Engineering Support, Calgary, Alberta, Canada, May 2004. Courtesy of O'Brien Corporation, available on request from SilcoTek™.

