

Providing versatile surface treatments ideal for corrosion resistance and durability, chemical inertness, and anti-stick properties.

### Overview

The **InSurf™** process deposits a chemically protective barrier of amorphous silicon, oxygen and carbon that is further functionalized to resist adsorption of corrosive, reactive, and otherwise unwanted molecules. Applied via chemical vapor deposition (CVD), the **InSurf™** process is required when both a robust and chemically inert surface are critical.

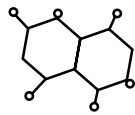


### Key Applications and Benefits

- All ASME-BPE fittings, process components and up to 2m spool lengths can be treated with **InSurf™**.  
Send us your product and we will process it.
- Helps prevent rouging and corrosion for increased system purity.
- Hydrophobic for cleanability, inert surfaces provide performance like exotic alloys at a fraction of the price and lead time.
- Process does not change surface roughness of ASME-BPE specifications including SF0-SF6.



Hydrophobicity



Chemical Process



Lab Analysis



Corrosion



Pharma and Bio-Pharma

### InSurf™ Specifications

<b>InSurf™</b> Structure:	Functionalized silica-like treatment ( $\alpha$ -SiOX:CHY)	
Deposition Process :	Thermal chemical vapor deposition (not plasma-enhanced)	
Maximum Temperature:	500° C (inert atmosphere) 450° C (oxidative)	
Substrate:	Compatibility:	Stainless steel, exotic alloys, ceramics
	Size:	Up to 78" (198 cm)
	Geometry:	Any shape, including complex geometrics
Typical Thickness:	400 - 1600 nm	
Hydrophobicity (contact angle):	>81°	
Allowable pH Exposure:	0 - 14	

# InSurf™ Features

## CHEMICAL COMPATABILITY

The silica-like structure provided by the **InSurf™** process is a robust and inert barrier suitable for several process environments.

## HYDROPHOBICITY

Surfaces produced by the **InSurf™** process are hydrophobic, non-stick, and easy to clean.

## CORROSION RESISTANCE

Surface Treatment with the **InSurf™** process can provide exotic alloy performance at a fraction of the price. Resists:

<b>Hydrochloric Acid</b>	<ul style="list-style-type: none"><li>• ASTM G31 Guidelines</li><li>• 6M HCl Acid Exposure</li><li>• 24 hrs at Room Temperature</li><li>• The treatment has added considerable lifetime to parts in refinery and chemical manufacturing service, amongst others.</li></ul>
<b>Bleach (NaClO)</b>	<ul style="list-style-type: none"><li>• ASTM G31 Guidelines</li><li>• 15% NaClO Exposure</li><li>• 72 hrs at Room Temperature</li><li>• This is especially useful in biomedical and pharma applications where bleach is commonly used.</li></ul>
<b>Sulfuric Acid (H<sub>2</sub>SO<sub>4</sub>)</b>	<ul style="list-style-type: none"><li>• ASTM G31 Guidelines</li><li>• Sulfuric Acid Exposure</li><li>• 24 hrs at Room Temperature</li><li>• The <b>InSurf™</b> can even withstand aggressive concentrations of sulfuric acid.</li></ul>
<b>Nitric Acid (HNO<sub>3</sub>)</b>	<ul style="list-style-type: none"><li>• ASTM G31 Guidelines</li><li>• 68% HNO<sub>3</sub> Exposure</li><li>• 11 days (264 hours) at Room Temperature</li></ul>
<b>Phosphoric Acid (H<sub>3</sub>PO<sub>4</sub>)</b>	<ul style="list-style-type: none"><li>• ASTM G31 Guidelines</li><li>• 85% H<sub>3</sub>PO<sub>4</sub> Exposure</li><li>• 13 days (311 hours) at Room Temperature</li></ul>
<b>Salt Water</b>	<ul style="list-style-type: none"><li>• <b>InSurf™</b> treated samples show no degradation in saltwater after 60 days of exposure</li><li>• <b>InSurf™</b> treated samples shows excellent dielectric stability in saltwater after 60 days, providing an effective corrosion barrier on the substrate.</li></ul>

## INERTNESS

Flow paths treated with the **InSurf™** process enable low parts-per-million sensitivity to sulfur compounds.

## DURABILITY

The **InSurf™** process doubles the wear resistance of 316L stainless steel and creates resistance to cracking and flaking, which plague PTFE.

	<b>Avg. Coeff. Friction</b>	<b>Wear Rate (x10<sup>-5</sup>mm<sup>3</sup>/Nm)</b>
Untreated Stainless Steel	<b>0.589</b>	13.810
<b>InSurf™</b>	<b>0.378</b>	6.129