



**TANTALINE®**

## Application Note: Tantaline® Treated Fasteners

### Description

Tantaline® is a unique Tantalum treatment solution that can extend the life of fasteners in a wide range of aggressive chemical environments. Stress Corrosion Cracking (SCC) of fasteners is a common problem that occurs when both tensile stress and corrosion act simultaneously. Tantaline® treatment can prevent failures due to SCC by eliminating corrosion. Tantalum is recognized as the most corrosion resistant metal available for industrial use. Tantalum coatings applied by the proprietary Tantaline® treatment process provides superior corrosion resistance for extended service of a wide range of fasteners.

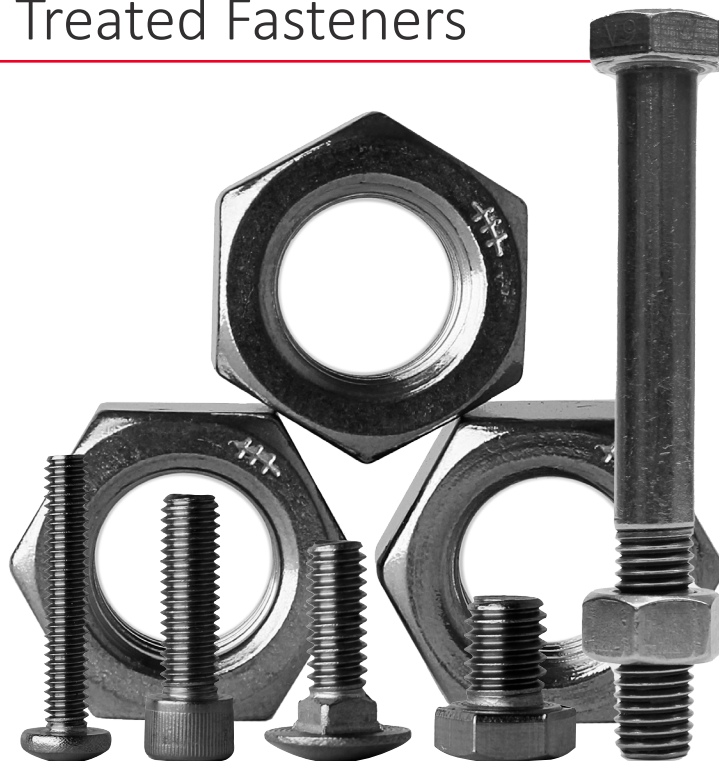
### Benefits

The Chemical Vapor Deposition (CVD) process used by Tantaline produces a uniform diffusion bonded tantalum layer that conforms to complex geometries such as threads. Tantaline® treated fasteners offer superior high temperature corrosion resistance compared to Hastelloy®, Inconel®, and Stainless Steel. It provides protection against all forms of corrosion including SCC, corrosion fatigue, and crevice corrosion in the presence of hot acids, thereby reducing failures. An additional benefit is that ease of disassembly reduces maintenance time and costs. The metallurgical properties of the tantalum surface combined with the uniform and conformal CVD layer results in a robust product that can be offered with economical pricing and short lead-times.

### Availability

A wide range of styles and configurations are suitable for Tantaline® treatment.

FASTENER TYPE	THREAD TYPE
✓ Bolts	✓ Unified national coarse
✓ Studs	✓ Unified national fine
✓ Cap Screws	✓ ISO metric
✓ Machine Screws	✓ Special order
✓ Threaded Rods	




### SUPERIOR CORROSION RESISTANCE FOR AGGRESSIVE SERVICE CONDITIONS

- ✓ Hydrochloric acid
- ✓ Sulfuric acid
- ✓ Acetic acid
- ✓ Nitric acid
- ✓ Sour gas (H<sub>2</sub>S)
- ✓ Chlorine
- ✓ Many other process fluids

## Use

MARKET	TYPICAL PROCESSES	TYPICAL USES
Chemical Processing	Hot acids, wet and dry chlorine, sulfur compounds, sour gases containing hydrogen sulfide (H <sub>2</sub> S) compounds	✓ Valve assemblies ✓ Pipe flange connections ✓ Pump body assemblies
Oil & Gas	Acid gases (CO <sub>2</sub> , H <sub>2</sub> S, SO <sub>2</sub> ), ammonia (NH <sub>3</sub> ), hydrogen cyanide (HCN), and amine derivatives	✓ Equipment mounts ✓ Pressure vessel closures ✓ Process equipment
Pharmaceutical	Oxidizing agents including hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> ), bromine (Br), chlorine (Cl) and various cleaning chemistries	✓ Storage tank mounting ✓ Drilling equipment ✓ Exhaust system components
Semiconductor	Strong HCl etchants, corrosive Nital (alcohol + nitric acid), byproducts of Silicon deposition process	✓ Engine components ✓ Heat exchangers ✓ Motor equipment
Mining	High Pressure Acid Leach (HPAL), Partial Oxidation (POX), Extraction	
Marine	Corrosive sea water with chlorides, dissolved oxygen (O <sub>2</sub> ), microbial corrosion	



## Key Technical Information

Hastelloy®, Inconel®, or Stainless Steel fasteners are susceptible to SCC and pitting especially in hot acids like HCl. Tantaline® treatment offers the following beneficial characteristics:

- ✓ Chemically resistant to SCC and pitting in many aggressive media and environments.
- ✓ Tantalum layer remains passivated and inert to corrosion under high temperature (>200° C) acidic conditions including concentrated hydrochloric acid (HCl) and sulfuric acid (H<sub>2</sub>SO<sub>4</sub>).\*\*\*
- ✓ Superior corrosion resistance against wet, dry chlorine atmospheres, and other chlorinated environments.

\*Hastelloy® is a registered trademark of Haynes International.

\*\*Inconel® is a trademark of Special Metals Wiggins Limited.

\*\*\*FJ, H. (n.d.). Properties of Tantalum for Applications in the Chemical Process Industry.



### Tantaline CVD ApS

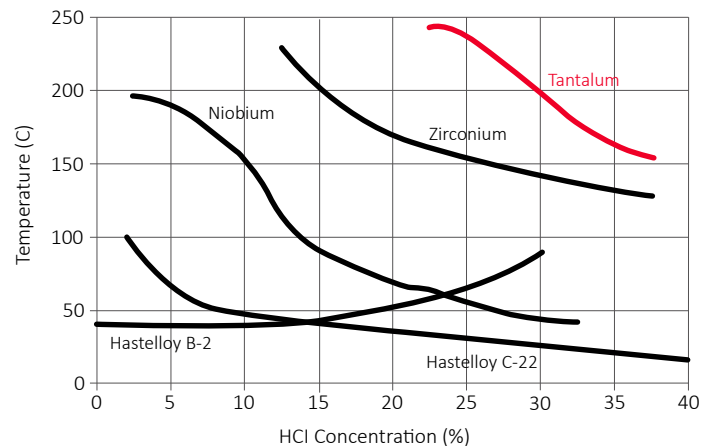
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### HCl Corrosion Resistance

5mpy (0.13mm/y)



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