



TANTALINE®

Application Note: Tantaline® Treated Valves

Description

Valves of many different types and sizes are used as critical components to manage fluid flow in process equipment. Corrosion due to aggressive chemical environments can cause problems such as reduced reliability, increased safety risks, leaks, and contamination of the process fluid. In many cases corrosion of metal valves is caused by the removal of the passive surface oxide layer after exposure to acidic and/or chlorinated compounds and can commonly appear as pitting. Different metal alloys will reform the passive surface oxide layer at varying rates which impacts the overall corrosion resistance of the valve. Use of exotic alloys in the manufacture of valves to reduce corrosion is limited due to the cost and lead-time required to obtain these specialized parts. Tantalum metal has proven to rapidly reform a surface oxide layer in even the most aggressive hot acid environments. By applying a tantalum surface layer using our unique Tantaline® treatment, the practicality of its use is now a more affordable option for valves.

Benefits

The proprietary Chemical Vapor Deposition (CVD) process used by Tantaline CVD produces a uniform, thin diffusion bonded layer of tantalum on readily available stainless steel valves and related equipment. This layer conforms to complex geometries such as valve bodies and orifices ensuring surface uniformity. Tantaline® treatment provides superior corrosion and pitting resistance for extended service life in chlorinated compounds, hot acids, and other aggressive chemicals. The robust, metallurgically bonded layer can withstand high pressure and erosion corrosion conditions found in pipelines, vessels, and process equipment. These features provide an economical alternative to valves made from exotic alloys such as Hastelloy®, Inconel®, Zirconium, and Titanium with shorter lead times.



Availability

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

VALVE TYPES

- | | |
|----------|--------------------|
| ✓ Globe | ✓ Check |
| ✓ Needle | ✓ Relief |
| ✓ Plug | ✓ Butterfly |
| ✓ Ball | ✓ Valve components |

SUPERIOR CORROSION RESISTANCE FOR AGGRESSIVE SERVICE CONDITIONS

- ✓ Hydrochloric acid
- ✓ Sulfuric acid
- ✓ Acetic acid
- ✓ Nitric acid
- ✓ Sour gas (H₂S)
- ✓ 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 ₂ S) compounds	<ul style="list-style-type: none"> ✓ Flow control ✓ Isolation ✓ Metering ✓ Pressure relief ✓ Safety disconnect ✓ Couplings ✓ Mixing
Oil & Gas	Acid gases (CO ₂ , H ₂ S, SO ₂), ammonia (NH ₃), hydrogen cyanide (HCN) and amine derivatives	
Pharmaceutical	Oxidizing agents (Hydrogen Peroxide, Bromine, chlorine)	
Semiconductor	Strong HCl etchants, corrosive Nital (alcohol + nitric acid), byproducts of Silicon deposition	
Mining	Strong acid leaching, pressure oxidation, heap leaching	
Marine	Corrosive sea water with chlorides, dissolved O ₂ , microbial corrosion	

Key Technical Information

Hastelloy®* Inconel®**, Zirconium, Titanium, and Stainless Steel valve components are susceptible to Stress Corrosion Cracking (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 (H₂SO₄).***
- ✓ Superior corrosion resistance against wet, dry chlorine atmospheres, and other chlorinated environments.

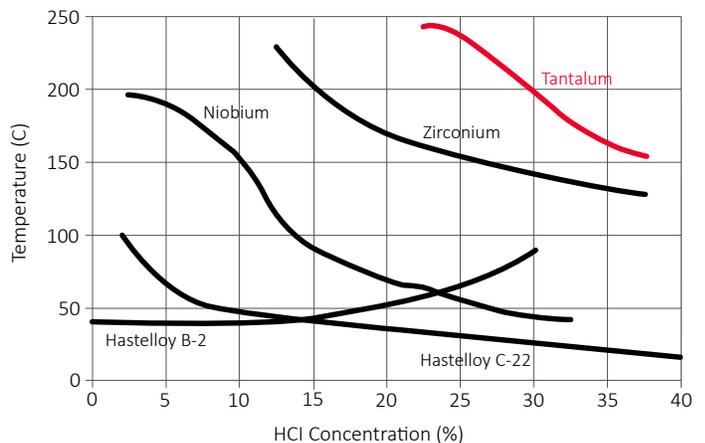
*Hastelloy® is a registered trademark of Haynes International.

**Inconel® is a trademark of Special Metals Wiggin Limited.

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

HCl Corrosion Resistance

5mpy (0.13mm/y)



Tantaline® is a brand and registered trademark of CVD Materials Corporation

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