



TANTALINE®

Application Note: Tantaline® Treated Thermowells

Description

Thermowells protect sensitive temperature measuring probes from corrosive fluids and conditions handled by special equipment found in many industries. Tantalum is recognized as the most corrosion resistant metal commercially available. Tantalum can be applied by the proprietary Tantaline® treatment process to produce a robust and cost effective option for threaded, flanged, Van Stone, and sanitary thermowells. Tantaline® treatment provides superior corrosion resistance in hot acids and chlorinated compounds. This has been shown to extend equipment service life and reduce maintenance costs in Chemical, Pharmaceutical, Oil & Gas, Semiconductor, and Mining industries.

Benefits

The Chemical Vapor Deposition (CVD) process used by Tantaline® produces a thin, uniform, tantalum layer that conforms to complex geometries and adheres to the base metal part through diffusion bonding. The typical 50 micron thick layer is thermally conductive which minimizes sensor error while maintaining excellent chemical compatibility in wide range of corrosive fluids. The robust, metallurgically bonded layer can withstand high pressure and erosion corrosion conditions found in pipelines, vessels, and process equipment.

These features result in enhanced thermowells that can be offered as a substitute for ones made from exotic alloys with more economical pricing and shorter lead-times.

Availability

Types of thermowells suitable for Tantaline® treatment:

CONNECTION TYPE	SHANK TYPE
✓ Thread	✓ Straight
✓ Flanged	✓ Tapered
✓ Van Stone	✓ Stepped
✓ Sanitary	



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 H ₂ S compounds	Piping systems, tanks, distillation columns, cracking units, incinerators and waste treatment systems
Oil & Gas	Acid gases (CO ₂ , H ₂ S, SO ₂) in vapor phase, ammonia (NH ₃) and hydrogen cyanide (HCN) & amine derivatives	Pipelines, storage vessels, compression systems, emission control, exploration/extraction, hydrocarbon cracking and treating units
Pharmaceutical	Oxidizing agents (hydrogen peroxide, bromine, chlorine)	Fermentation tanks, sterilization units and separators
Semiconductor	Strong HCl etchants, corrosive Nital (alcohol + nitric acid), byproducts of Silicon deposition	Wafer processing units, deposition systems, cleaning and waste treatment systems
Mining	Strong acid leaching (HPAL), partial oxidation (POX), extraction	Mineral extraction units

Key Technical Information

Stainless Steel, Hastelloy®, Inconel®, Zirconium, and Titanium thermowells are susceptible to Stress Corrosion Cracking (SCC) and pitting under certain conditions especially hot acids. Tantaline® treated thermowells offers the following beneficial characteristics:

- ✓ Integrity is verified through manufacturing QC testing in concentrated HCl at 60° C for 48 hours
- ✓ 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 HCl and 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.



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