TANTALINE®

Application Note: Tantaline® Treated Diaphragm Seals

Description

Diaphragm seals are designed to protect the pressure gauges from hot corrosive process media and aggressive chemicals while minimizing any negative effect on instrument accuracy and durability. Corrosion can cause loss of integrity leading to pressure gauge failures. Tantalum is recognized as the most corrosion resistant metal commercially available. Tantalum can be applied by the proprietary Tantaline® treatment to produce a robust and cost-effective option for threaded, flanged, welded and sanitary diaphragm seals. Tantaline® treatment offers superior corrosion resistance in hot acids and chlorinated compounds. This has been shown to extend equipment service life, reduce maintenance costs and downtime in Chemical, Pharmaceutical, Oil & Gas, and Semiconductor industries.

Availability

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

- ✓ Flanged
- ✓ Threaded
- ✓ Welded
- ✓ Sanitary

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 tantalum layer is chemically compatible in a wide range of corrosive fluids. The metallurgically bonded robust layer maintains the integrity while withstanding the high pressures and erosion corrosion conditions found in pipelines, vessels and process equipment. Tantaline® treated diaphragm seals offer superior high temperature corrosion resistance compared to Hastelloy®*, Inconel®** and Stainless Steel thereby reducing failures. These features result in diaphragm seals that can be offered as a substitute for the ones made from exotic alloys with more economical pricing and shorter lead times.

SUPERIOR CORROSION RESISTANCE FOR AGGRESSIVE SERVICE CONDITIONS

- ✓ Hydrochloric acid
- ✓ Sulfuric acid
- ✓ Acetic acid
- ✓ Nitric acid
- ✓ Sour gas (H_2S)
- ✓ Chlorine
- ✓ Many other process fluids

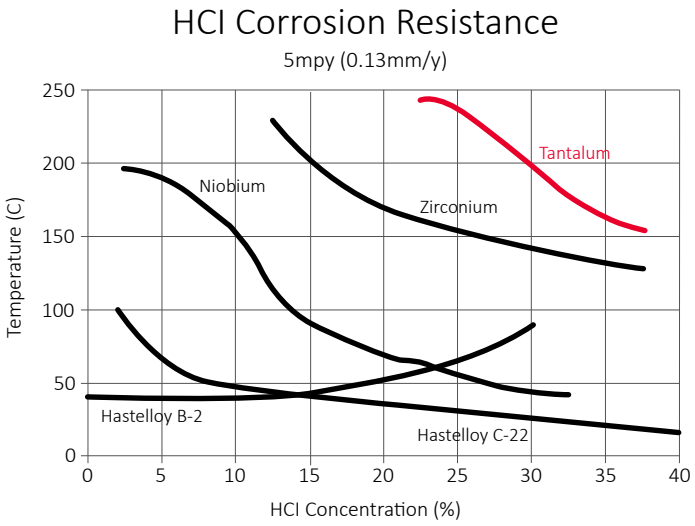
Use

MARKET	TYPICAL PROCESSES	TYPICAL USES
Chemical Processing	Hot acids, wet and dry chlorine, sulfur compounds, sour gases containing H_2S compounds	Piping systems, tanks, distillation columns, cracking units, incinerators and waste treatment systems
Oil & Gas	Acid gases (CO_2, H_2S, SO_2), ammonia (NH_3), hydrogen cyanide (HCN), alkylation, and 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 process	Wafer processing units, deposition systems, cleaning and waste treatment systems

Key Technical Information

Hastelloy®*, Inconel®**, or Stainless Steel fittings 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_2SO_4).***
- ✓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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