



SEA-CURE®

High Performance Stainless Steel

Why Nuclear Power Plants Are Switching To SEA-CURE

Thank you for your interest in SEA-CURE® high performance stainless steel as an alternative to titanium. SEA-CURE® is one of the most cost-effective alloys in high chloride applications and where the potential for microbiological influenced corrosion (MIC) exists. SEA-CURE®, which was designed for seawater applications, has excellent corrosion resistance and similar thermal conductivity as titanium Grade 2. Depending upon the OD and wall, it can be 15-20% less expensive. It is currently outselling titanium in the US 2.5 to 1, and because of its excellent performance record, has outsold all other super-ferritics combined 4 to 1. It has several technical advantages over titanium:

- A. SEA-CURE has a significantly higher modulus that allows the use of a lighter wall with less problem of vibration. On new designs, SEA-CURE® requires less support plates resulting in additional savings. Typically 0.5 to 0.55 mm wall thickness is used in new construction. When tubing is used as a simple replacement in power plant condensers, most utilities can use 0.7 mm wall SEA-CURE® if the original condenser design was for heavier wall copper alloy tubing. When 0.7 mm wall Ti Grade 2 is used as a replacement, expensive staking is normally needed to prevent vibration. Because of SEA-CURE's higher modulus, staking is rarely needed saving some additional costs, and the time saved may reduce the outage schedule.
- B. SEA-CURE has significantly higher steam and water droplet erosion resistance. This prevents the need for preventative plugging common with titanium tubing. Also, its high hardness provides excellent sand erosion resistance.
- C. SEA-CURE is weldable to other stainless steels. If the concern is about tube to tubesheet leakage, SEA-CURE® can be successfully welded to TP 304, TP 316, high performance austenitic alloys, duplex stainless steels, and nickel alloys. Seal welds on titanium can only be made to titanium or Ti clad tube sheets. To keep overall costs low, the fabricator can use either high performance duplex or austenitic tube sheet materials.
- D. SEA-CURE can be used with either monolithic or clad tube sheets, whichever is most cost effective. When monolithic tube sheets are used, seal welding is not required.
- E. SEA-CURE's higher strength and modulus provides significantly higher pullout loads than titanium. For example, loads exceeding 2000 kgs are common for 25.4 mm x 0.7 mm wall tubes rolled into duplex stainless steel tube sheets. Pullout loads for titanium tubes of this size rarely exceed 500 kgs. This eliminates tube to tube sheet leaks developed with time.

F. SEA-CURE®'s higher strength and modulus allows more tolerance for those tough designs and installations. This allows for thinner walls than titanium. It is also significantly more damage tolerant when impacted.

G. If exposed to nacent hydrogen, SEA-CURE's embrittlement is reversible. Once, embrittled, titanium's embrittlement cannot be reversed.

SEA-CURE® has over 25 years of commercial history with an outstanding performance record. It is accepted by both Section III and Section VIII of the ASME Boiler Code. It can be ordered to ASTM A268, ASME SA268, ASTM A 803, or ASME SA 803 specifications as UNS S44660. Plymouth Tube has delivered over 21,000,000 meters of this alloy for use in power generation condensers and over 26,000,000 overall. To our knowledge, no SEA-CURE tubed power plant condenser has ever been replaced. If you have any questions, please call Plymouth Tube at 262-206-4516 or email us at sales@plymouth.com.

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