

Tube Sheet Heat Exchanger Rebuilding and Protective Coating

ID: 10273

Industry: Water / Wastewater

Customer Location: Dammam, Saudi Arabia

Application: HEX-Heat Exchangers

Application Date: January 2026

Substrate: NAB Nickel Aluminum Bronze

Products: Belzona 1111 (Super Metal), Belzona 1321 (Ceramic S-Metal)

Problem

The customer manufactures and supplies heat exchanger units to end users under warranty. Units in service were experiencing premature failures caused by erosion and corrosion due to the high salt content of the water media, resulting in pitting, wall loss, and leaks at the tube sheet and water box. These failures were occurring within the warranty period, creating significant financial liability and reputational risk for the manufacturer.



Metal loss observed on the heat exchanger tube sheet.



The tube sheet was rebuilt using Belzona 1111 (Super Metal) and coated with Belzona 1321 (Ceramic S-Metal).



The covers were rebuilt using Belzona 1111 (Super Metal) and coated with Belzona 1321 (Ceramic S-Metal).

Application Situation

The customer required a reliable, long term solution that would enable them to fulfill warranty obligations to end users with confidence. Welding repairs were not considered suitable due to the nature of the damage and the need for a repeatable, scalable repair process across multiple units.

The Belzona system provided a cold applied, on-site solution that eliminated the need for hot work and component replacement, while offering a proven track record in immersion and erosion service environments. The two-product approach - substrate rebuilding followed by the application of a ceramic protective lining - addressed both the existing damage and future corrosion protection within a single mobilization.

Units repaired using Belzona 1111 (Super Metal) and protected with Belzona 1321 (Ceramic S-Metal) have remained in continuous service for more than two years with no reported failures or coating breakdown.

Application Method

1. The unit was cleaned and the surface prepared by abrasive blasting to achieve SSPC-SP10 / ISO 8501-1 Sa 2.5 cleanliness, removing all corrosion products and achieving the required anchor profile.
2. The pitted areas, wall loss zones, and tube sheet face were rebuilt to the original profile using Belzona 1111 (Super Metal), applied by Belzona spatula.
3. Belzona 1111 (Super Metal) was allowed to cure fully before overcoating.

For more examples of Belzona Know - How In Action, please visit <https://khia.belzona.com>

ISO 9001:2015
FS 695214
ISO 14001:2015
EMS 695213

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4. Two full coats of Belzona 1321 (Ceramic S-Metal) were applied by brush and roller to the tube sheet face, water box interior and cover.

5. Holiday testing was carried out on the completed lining prior to returning the unit to service.

Belzona Facts

Significant cost savings were achieved, and Belzona 1321 (Ceramic S-Metal) proved to be one of the most effective erosion-resistant coating systems for this application. The customer had previously tried several alternative coatings; however, the units repeatedly experienced the same failure issues. After implementing the Belzona system, the customer was satisfied with the long-term performance, leading to the repair and protection of more than 15 heat exchangers within a period of 1.5 years.

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