
TuffCorr

Material Description:

TuffCorr wires are a group of materials with a unique resistance to high-temperature chemical corrosion, which, for example, occurs in industrial power boilers. Coatings produced with the use of these materials are extremely resistant to chemical corrosion for the atmosphere typical for coal and biomass fired boilers, caused by sulfur and chlorine compounds, and vanadium corrosion.

Titanium addition to the TuffCorr material results in improved bond strengths, which allows for thick single-layer coating's build-up. The remarkable ability to form a strong bond between the alloy and the surface to be protected is attributed to the extremely high temperature of metal particles which diffuse upon impact on the substrate, forming a partial metallurgical bond.

Metallurgical tests show negligible loss of chromium during spraying. Coating porosity is below one percent, with minimal through-porosity, thus maximizing the material's anti-corrosion barrier characteristics.

Applications:

Our materials have been proved by numerous applications to be very effective corrosion barrier, providing long-term protection of boiler tube surface against high-temperature corrosion caused by sulfur and chlorine compounds formed during the combustion of coal, biomass and waste products. TuffCorr materials exhibit very high resistance to sulfur / vanadium atmospheres at temperatures up to 980 ° C. When used for superheaters, TuffCorr showed very low corrosion losses, at the level of 50 µm / year, which translated into effective protection of the pipes for a period of nine years. TuffCorr coatings applied to boiler tubes showed virtually no loss in thickness or chipping after 24 months of service.

Tests have shown that the high content of chromium in combination with nickel significantly improves the resistance of the alloy to high-temperature corrosion. If the chromium content is greater than 40%, sufficient chromium oxide is produced to prevent the formation of nickel sulphide, which is not a protective layer. Results of the material accelerated corrosion tests for sixty-four days are presented in Figure 1. These tests were conducted at the same time in the same test chamber, to ensure identical test conditions were maintained for all samples. The samples were surrounded by a synthetic melt consisting of sodium chloride, sodium sulfate and sodium carbonate.

Figure 1 requires no explanation; both, plasma sprayed and multi-layer materials degraded significantly within 35 to 40 days. On the other hand, coatings made with TuffCorr wire showed virtually no weight loss during the entire 64-day test. Their excellent corrosion resistance has been proven in hundreds of field applications.

The TuffCorr material has been designed to perfectly match the thermal expansion characteristics of the boiler tube material.

Practical experience with real boilers applications has shown that the strong bond between the coating and the substrate is essential to prevent coating spalling. Figure 2 shows the thermal expansion of TuffCorr coating, A178 material, and an iron-based plasma coating.

The high spraying efficiency achieved with this material combined with significantly higher deposition speeds without compromising the quality of the coating contributes to lower application costs.

TuffCorr coatings build to the required thickness is obtained by multi layer deposition. Final coating can be sprayed with a graded edge finish to allow potential coating extension or easy repair of mechanically damaged section during operation.

Finishing:

If required, TuffCorr coatings can be finished by machining or grinding. Machining will produce a smooth, and grinding a very smooth surface finish.

