



TubeArmor

DEFEND AGAINST SLAG, ASH
AND VOLATILE DEPOSITS WITH TUBEARMOR

Introduction

Despite their industrial application and heavy-duty appearance, tubes require stringent care and maintenance. This is a result of slag – the fine particulates that build up on tubes to cause corrosion, erosion, leaks and other failures. Too much slag literally chokes a boiler by restricting airflow. Once this happens, the specified air-to-fuel ratio no longer applies, causing fuels to burn improperly. If the fuel in question has high mineral content, you also have the added safety challenges caused by clinker formation.

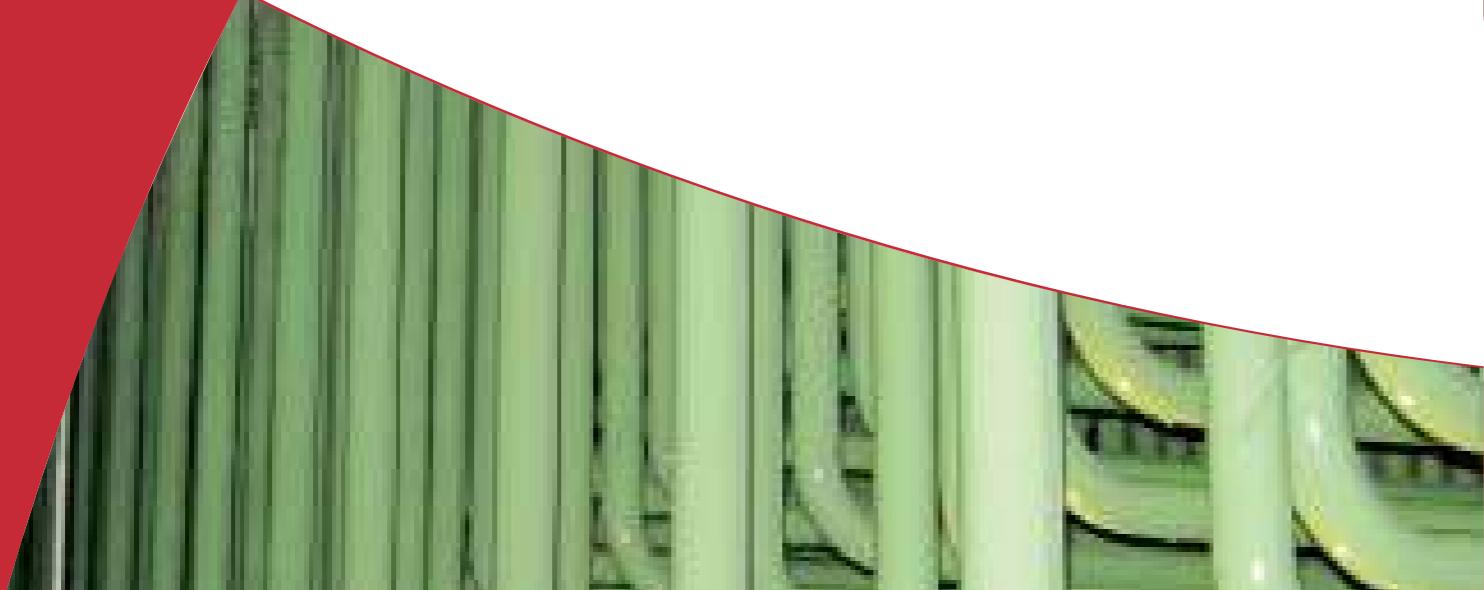
TubeArmor helps prevent slag from depositing on tubes and boilers with a proprietary spray-on ceramic coating. It is a non-porous, non-reactive shield that resists ash, oxidation, erosion, iron sulfide corrosion, sulfur permeation and hazardous chemical byproducts. TubeArmor is applied on the prepared surface one coat at the time until the recommended thickness is achieved. The convenient spray-on delivery system allows us to cover up to 2000 square meters in a single day.



TubeArmor is an advanced high emissivity ceramic coating, specially formulated to provide erosion resistance and corrosion protection while increasing heat transfer and thermal efficiency. The coating is a high solids system which is applied as a stand-alone dry film at thicknesses up to 0.5 mm. It is thermally conductive and bonds extremely well to properly prepared steel substrates. TubeArmor is also applied over our ChromeClad thermal spray coatings.

Upon curing, TubeArmor becomes a durable ceramic coating that provides protection to boiler tubing up to 900°C and can withstand thermal cyclic conditions up to 1000°C. It is not just the technical features of TubeArmor that makes it a superior choice for preventing slag build up. Castolin Eutectic's thorough and detailed application and quality control procedure ensures optimum results. It includes:

- ➊ Advanced equipment technology
- ➋ Trained and experienced personnel
- ➌ Detailed application procedures
- ➍ Quality control and assurance
- ➎ Detailed on-site documentation and reports



A unique solution against slag build up

- ➊ Non-reactive sealing of exposed surfaces
- ➋ Better heat transfer than typical protective coatings
- ➌ Reduced amount of sootblowing
- ➍ Lower furnace exit gas temperature
- ➎ Prevent corrosion
- ➏ Ease the cleaning process during outage
- ➐ Longer service life of your equipment
- ➑ Enhanced fuel consumption rates
- ➒ Reduction in emissions of CO₂, NOx and particulates

Typical TubeArmor uses:

- ➊ Water walls
- ➋ Nose arch and slope tubes
- ➌ Superheaters and reheat tubes
- ➍ Burners
- ➎ Chutes and ducts
- ➏ Back pass areas
- ➐ Pulverised coal fired boilers
- ➑ Circulating fluidised bed boilers
- ➒ Waste-to-Energy boilers
- ➓ Biomass boilers
- ➔ Waste heat units
- ➕ Air preheated baskets

Based on Kirchhoff's law of thermal radiation, the absorptivity of a given material is equal to its emissivity. A higher value means that the surface has a better ability to absorb the heat. A perfect black body that absorbs all the thermal radiation coming towards it has a coefficient of 1, while a polished metallic surface has a very low absorptivity as most of the radiation is reflected away. TubeArmor has the capacity to absorb thermal radiation hitting its surface and transfer it towards the steam to improve the thermal efficiency of the boiler.

Emissivity Coefficients (ASTM E1933-99A)

Carbon steel	0.34
TubeArmor	0.80





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