

Alonizing Process

Alonizing is a metallurgical process for treating the surface of steel, stainless steels and alloys, with aluminum that provides protection against elevated-temperature scaling and corrosion.

Adding aluminum to carbon and stainless steel is commonly known to improve corrosion resistance. A side effect of the process, however, is unfavorable changes in the mechanical properties of the base steel.

Alonizing solves this problem. Alonizing diffuses aluminum into the steel surface to form an alloy with excellent heat and corrosion-resistance properties, retains the base steel's inherent strength and rigidity, but does not change the high-temperature mechanical properties of the base steel. The protection provided by the Alonized diffusion zone remains effective at all temperatures up to the boiling point of the base metal.

During the Alonizing process the steel is positioned in a retort and surrounded by a mixture of blended aluminum powders. The retort is sealed and placed in an atmosphere-controlled furnace. The aluminum diffuses into the surface of the steel at elevated temperatures and forms an alloy with the substrate.

After furnace cooling, the steel is taken out of the retort and excess powder is removed. Straightening, trimming, beveling and other secondary operations are then performed if required.

Process quality is monitored by testing coupons (of the same grade of metal) that are run in the retort with the production materials. The nature of the process, the air-tight retorts and the controlled atmospheres ensure uniform alloy protection over the entire surface of the Alonized materials. After the process is completed, the coupons are removed from the retort, sectioned and examined in a laboratory for quality and depth of diffusion. Special standards and processes may be selected by the client.

The end result of the Alonizing process is a true alloy with the base steel. The process is not a coating and there is no mechanical interface with the substrate. The protective diffusion zone cannot be removed except by a machining operation.

Alonizing is used to enable engineered materials to better resist high temperature sulfidation, oxidation, carburization, scaling and hydrogen permeation. All types of wrought and cast steels can be Alonized: plain carbon and low alloy grades, ferritic and austenitic steels, highly alloyed nickel-chromium steels. The high-temperature values of the process determine the specification of steel to be Alonized.

Advantages of an Alonized surface include:

- Elimination of problems inherent in coating processes due to the difference in thermal expansion between coating and substrate;
- Ease with which fabricated shapes, internals and tube internal diameters can be treated; line of sight is not required

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