

Frequently Asked Questions

What is Alonizing? How Does it Work?

Alonizing is referred to as diffusion alloying, pack cementation and chemical vapour disposition (CVD). Endurance technicians fill a steel tube full of aluminum and enriched elements referred to as “pack”. The tube is loaded into one of Endurance’s custom-built tubing furnaces and heated to a pre-determined temperature for a specified period of time. The heat vapourizes the aluminum enriched pack composition, which diffuses into the substrate of the tube and creates a new alloy.

Is Alonizing a Coating?

Alonizing is a diffusion alloying process, NOT a coating. Alonizing diffuses aluminum molecules directly into the substrate of steel. Coatings such as hard chrome have an interface with the host material, which means they can separate.

What are the turn-around times for Endurance products?

Processing tubing depends on the volume of tubes ordered. Processing other parts usually takes 2-5 weeks, depending on the size and material of the part and Endurance’s production schedule. Rush jobs can sometimes be completed more quickly. Cool down duration is subject to the mass of the retorting and required mechanical properties.

What is the diffusion zone thickness or case depth of Alonizing?

The normal thickness for the alloy formed is about 0.003 inches (0.076 mm) for austenitic grades of steel, cobalt-based alloys, and super alloys: 0.005” (0.127 mm) for ferritic alloys and about 0.007” (0.178 mm) minimum for carbon steels. The case depth can be substantially thicker on many materials when required.

Can Alonizing be applied on the outside diameter and the inside diameter?

Alonizing can be performed on any or all surfaces of tubes or other parts. Areas not to be Alonized can be “mased off” to prevent them from being diffusion alloyed. This is quite common for boiler tubes being fabricated into tube sheets.

What happens to the mechanical properties of the substrate material?

The mechanical properties vary from material to material after they have been processed. Test data supporting the mechanical properties of some materials after processing is available. Some customers do however request tensile and yields for large size projects. This is usually provided at the customer’s cost.



Alonizing

Can Alonizing be applied to other products?

The Alonizing process can be applied to a wide range of materials used in many different industries where carburization, sulfidation, oxidation and corrosive environments exist.

What is the largest part that can be processed?

Parts up to 10,000 pounds or six feet in diameter can be processed by Endurance Technologies. The part to be processed must be able to fit into one of our furnaces.

What is the largest tube that can be processed?

Endurance can process pipe/tubing up to 38 feet in overall length and from very small to very large diameters. Our normal tube diameters are limited to five inches, but custom fixturing can allow for processing larger diameters.

What is the maximum operating temperature of the Alonized surface?

The maximum continuous operating temperature is 1,750 degrees F or 955 degrees C.

What materials can be Alonized?

Plain carbon steels with no, or few, alloys are the best material for Alonizing. Endurance can also treat low alloy carbon steels, stainless steel, iron-, nickel-, and cobalt-based super alloys as well as copper-based alloys.

Can the Alonized surface be machined?

Yes, the Alonized surface can be machined; but the thickness of the case depth must be considered. Machining of the surface of a processed component will reduce the case depth of the diffused zone.

Can I weld to the Alonized surface?

Yes, pipe welding procedures are available from Endurance Technologies.

Can the Alonized surface be repaired if the diffused surface is damaged?

No, but the part can be processed again to re-establish the Alonized surface.



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