

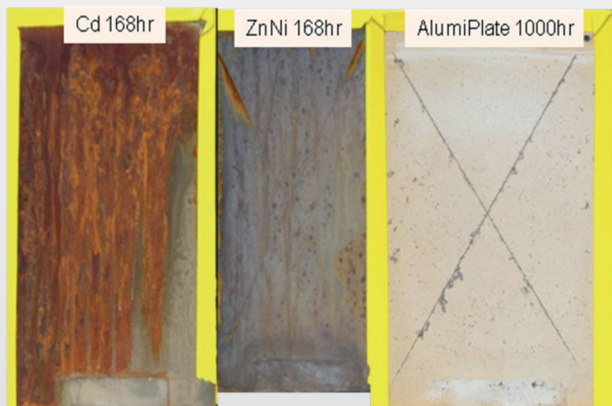
## ALUMIPLATE® AL IS THE HIGHEST PERFORMING METALLIC COATING FOR PREVENTING AND COMBATING CORROSION.

There are scores of coatings that claim to stop corrosion. Most act only as barriers to corrosion, but once breached they can no longer prevent corrosion of the substrate. Others provide additional galvanic protection but lack high temperature capability or a sound structure. New coatings have been developed as environmentally friendly alternatives but they cannot meet the performance of the baseline and legacy hazardous coatings they are trying to replace.

There is only one coating that can claim the title of “micron-per-micron” and “mil-per-mil” highest performing coating. Only AlumiPlate Al combines structure, chemical resistance and galvanic compatibility into an environmentally friendly knock-out punch to corrosion.

### ALUMIPLATE AL PROVIDES CORROSION PROTECTION THROUGH THE SYNERGISTIC ACTION OF MULTIPLE ANTI-CORROSION MECHANISMS.

- High purity 99.99% Al is inherently resistant to chlorides, sulfides, fluorides, nitrides and other corroding species found in industrial processes, and outdoor, coastal or marine environments. The plating is free of any contaminants, impurities, inclusions or other alloying elements that can act as corrosion initiation sites.
- The dense and void-free coating acts as an impervious barrier to corrosion of the basis material.
- Its tightly adhering protective oxide layer is self-healing in oxygen-containing environments. This oxide layer reforms continuously, dramatically slowing the overall field corrosion rate. The tenacious oxide on electroplated Al acts as a chemically resistant barrier to substrate attack.
- Pure Al provides sacrificial protection for most engineered metal alloys. The coating is highly electronegative and provides cathodic protection to metal substrates. In the presence of wet corroding species, the plating will preferentially corrode protecting and delaying corrosion of the underlying substrate.
- Pure electroplated Al eliminates galvanic corrosion with Al structures. Components that contact Al and Mg assemblies can cause galvanic corrosion. Ferrous materials, Ti, SST, Cu, Cr, Co and Ni alloys can dangerously corrode at the contacted area leading to failures. Now however, they can be plated with a thin layer of pure Al to immediately stop their galvanic interaction with dissimilar materials. They also gain the added protection of a highly inert and pure Al surface.



Cd and ZnNi vs AlumiPlate® Al (ASTM G-85 S02 testing for F-35 Lightning II program)  
 “NAVAIR Public Release 08-172: Cadmium Alternative Coating Corrosion Performance on Steel”

	AlumiPlate® Al	Cadmium	Organic Coatings	Zn / ZnNi / SnZn	IVD Al
Nominal Recommended Thickness	0.0003"	0.0003"	0.001-0.002"	0.0003"	0.0003"
SO <sub>2</sub> (G-85) Performance	336+ hrs	168 hrs	--	168 hrs (ZnNi)	--
Salt Spray (B-117) Performance	1,000+ hrs	1000 hrs	500 hrs	400-1000 hrs	500 hrs
RoHS and REACH Compliant	Yes	No	Yes	Partial	Yes
Drop-In Cad Replacement	Yes	--	No	No	No
No Re-Embrittlement nor 24 hr HE Bake	Yes	No	No	No	No
High Temperature Applicability	300-400 C	Up to 150 C	Up to 200 C	Up to 200 C	300-400 C
Sacrificial Protection	Yes	Yes	Partial	Yes	Yes
No galvanic reaction with Al parts	Yes	Yes	Partial	No	Yes
Complex Geometries and ID's	Yes	Yes	No	Yes	No
Tightly Adhering	Yes	Yes	No	Yes	No
Dense, thin and tough	Yes	Yes	No	Yes	No
Ductile, Formable and Stampable	Yes	Partial	No	No	No
Anodizable	Yes	No	No	No	No

### HIGH PURITY ALUMIPLATE AL IS 100% ROHS AND REACH-COMPLIANT AND A DROP-IN REPLACEMENT TO HAZARDOUS CADMIUM.

Electroplated Al is 99.99% pure, fully recyclable and a better alternative to metals coatings like cadmium, nickel, tin and zinc. The plating is fully compliant with North American initiatives and European directives for minimization of hazardous materials. The aluminum plating process is fully enclosed and automated, with a potential for zero emissions and zero worker exposure. The plating and the process are truly benign and environmentally friendly.

## ALUMIPLATE AL OFFERS THE BEST FIELD PROTECTION FOR CRITICAL HIGH STRENGTH COMPONENTS UNDER LOAD.

AlumiPlate Al is consistently identified as the best and preferred coating for high strength components. It is the best option for critical components or other non-redundant parts that cannot fail in service due to environmental or stress corrosion. Aerospace OEM and university studies have demonstrated that electroplated Al combats field re-embrittlement, stress corrosion cracking and environmentally assisted cracking. Side-by-side testing with cadmium, zinc-nickel, tin-zinc, IVD Al, and epoxy coatings with metallic “flakes” showed dramatic differences in re-embrittlement performance, with only Al plated specimens exhibiting no brittle failures consistent with embrittlement. Electroplated Al is the logical choice for critical landing gear, pins, fasteners, actuators, couplings and other flight-safety critical components sensitive to stress corrosion cracking, field re-embrittlement and environmentally assisted or environmentally induced cracking.

## ALUMIPLATE AL GREATLY EXPANDS THE TEMPERATURE PERFORMANCE ENVELOPE OF PROTECTIVE COATINGS.

AlumiPlate Al offers protection from high temperature exposure and oxidation up to 300-400 °C. Sacrificial coatings have traditionally only offered protection at near ambient temperatures. Cadmium and zinc suffer from low melting temperatures which can lead to liquid metal embrittlement of the substrate. Electroplated Al has a melting point of 660 °C, much higher than other sacrificial coatings, such as Cd, Zn and “Al or Zn flake” coatings (epoxies with Al or Zn particles).

Our newest innovation is the AlumiPlate HTI-A™ aluminide coating. This high temperature inter-metallic is formed by diffusing a thin layer of pure electroplated Al into high temperature Fe, Ni, Cr and Co substrates, such as SST's and Inconel. The surface of the component is transformed into an aluminide with the properties of both a ceramic and a metal. The HTI-A aluminide coating has the potential for unrivaled high temperature oxidation, corrosion and wear resistance, with a temperature envelope of 900-1100 °C (depending on the substrate material).

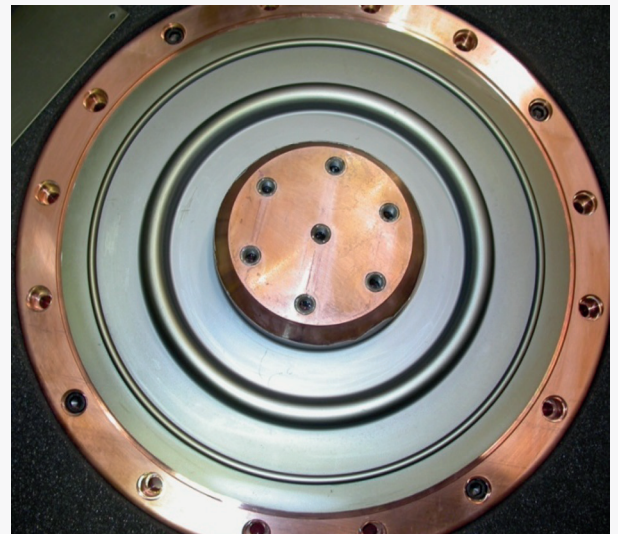
## ALUMIPLATE AL PROVIDES UNSURPASSED CORROSION RESISTANCE IN SALT FOG AND SULFUR DIOXIDE TESTING.

New aerospace and land vehicles demand long usable lifetimes for its components. Exposed components must be protected by superior anti-corrosion solutions. The industry has selected a tough target of 336 hours of exposure in cyclic sulfur dioxide accelerated corrosion tests, such as ASTM G-85. Testing performed for Lockheed Martin's F-35 Lightning II program (also known as the Joint Strike Fighter) proved that electroplated Al was unique in its ability to withstand this strenuous test. Components in the most exposed and corrosion prone locations, such as electrical connectors in the plane's wheel wells, are protected by high purity electroplated Al.

## ALUMIPLATE AL ENABLES THE ANODIZATION OF ANY SUBSTRATE AND YIELDS THE HIGHEST QUALITY ANODIZE LAYER

Any material can now be anodized by first applying a thin electrodeposited layer of pure Al. Steel, Copper, Titanium, Cast Al, Composites; any material that can benefit from anodization is now anodizable! Furthermore, the resultant anodized layer is optimal. Electroplated Al has no pores or impurities that transform into voids and inclusions during anodization. Pure anodic layers with extremely high purity, di-electric strength (2,000 V/mil) and corrosion resistance can only be obtained by anodized electroplated aluminum.

AlumiPlate has recently developed direct plating onto Al alloys through the use of the AlumiPlate Bond Layer™. This layer improves corrosion performance and provides superior adhesion strength onto Al alloys (in the 90 MPa range). The bond layer facilitates the complete anodization of the pure Al plating, reducing the complexity and cost of the component fabrication and finishing process.



Al Plated and Anodized Copper Cathode (US Department of Energy)

**For more information or to discuss your corrosion questions, please visit our website. Direct inquiries can be sent to [info@alumiplate.com](mailto:info@alumiplate.com).**

AlumiPlate Technical Bulletin - Corrosion Prevention (Rev. 1)

**AlumiPlate**  
PURE ALUMINUM. THE ELEMENTAL COATING™

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