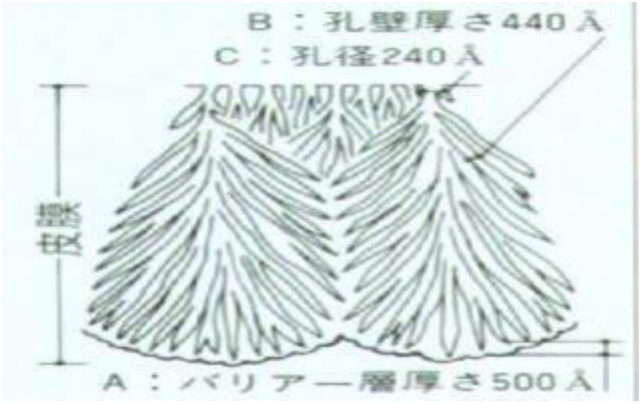
Chromic Acid Anodic Oxide Coating
(Chromic Acid Alumite)
ANODIZE
(Anodic Coatings for Aluminum and Aluminum Alloys)

Chromic acid alumite is a coating produced by anodizing of aluminum in an aqueous solution of chromic anhydride. Chromic acid alumite provides excellent corrosion resistance particularly for high-strength aluminum alloys with a high copper content. As a crack-free coating having resistances against heat, rapid temperature changes and cyclic fatigue, chromic acid alumite has been applied to aircraft structures and functional components. The chromic acid used for electrolysis solution proves effective as a corrosion inhibitor. Even if remaining on a product, chromic acid is harmless to the product. Chromic acid alumite is therefore applicable to assembling components.

For pore-sealing treatment, we offer hot water, dichromate, and nickel acetate sealings. (Other types of sealing besides the above-mentioned sealings are also available upon your request. Please contact us for more information.)



Chromic acid alumite has been also applied to the International Space Station (ISS). (The picture shows the airlock part of the ISS.)

図中語句	
日本語	英語
皮膜	Coating
A：バリアー層厚さ 500Å	A: Barrier layer thickness 500Å
B：孔壁厚さ 440Å	B: Pore wall thickness 440Å
C：孔径 240Å	C: Pore size 240Å

Features

◎Appearance: The coating gives an opaque gray white or gray-colored appearance. (Depending on the type of alloy, some alloys may develop a yellowish or yellow-greenish color, and other alloys may develop no color.)

◎Adhesion property: The coating allows high adhesion of paint and adhesive agents, proving effective when applied to surface preparation treatment for painting and adhesive coating. (Depending on the paint or adhesive agent, the coating treated with relatively cold deionized water sealing or without sealing may allow strong adhesion of paint and adhesive agents.)

◎Fatigue strength: The coating hardly reduces fatigue strength of aluminum alloys.

◎Application to assembling components: Any residual electrolyte is harmless to the product.

◎Crack-free coating: Since the coating is soft and flexible, coating breakdown does not occur even under high-temperature and ultralow-temperature environments. The features prevent reduction in corrosion resistance due to cracking. (This does not guarantee any use under such extremely high temperatures as affecting the base metal.)

◎Precision level: Product size change after coating is negligible. As one of its features, the coating provides hardly any size change for products regardless of whether dyed or undyed.

◎Pureness: The unsealed chromic acid anodic oxide coating is reported to have a pure γ-alumina structure. Compared with other treatment methods, the coating treated with chromic acid is stable and contains extremely small amount of residual electrolyte anions, causing hardly any anion elution.

Standard performance and quality assurance

◎Meets the performance requirements of the U.S. military specification MIL-A-8625 Type I (Guaranteed by salt spray test (ASTM B117) for 336 hours using materials 2024-T3 and 7075-T6/coating mass 200mg or greater/ft^2 (2.15g or greater/m^2))

Applicable standards

MIL-A-8625 Type I Classes 1 and 2 (the latest version: F Amendment 1)
SAE-AMS 2470 and other aeronautical standards

Sealing

Hot water sealing and steam sealing are pore-sealing treatments utilizing hydration reactions of anodic oxide coating. With the hydration reactions, microscopic pores of anodic oxide coating are sealed off, while the coating becomes chemically inactivated. The sealing treatment improves corrosion resistance and stain resistance of coating, which is also applied to dye fixing for dyed products. In nickel acetate sealing, orifices of microscopic pores are filled with deposits, thus preventing dye bleeding and providing excellent corrosion resistance and surface smoothness. The MIL-A-8625 specifies that pores of non-dyed coating should be completely sealed off in 5% sodium dichromate, potassium dichromate, acetate, or other suitable solutions. The high-pressure steam sealing developed by the Institute of Physical and Chemical Research (RIKEN) allows the maximum-level hydration sealing treatment and provides outstanding corrosion resistance. At the Riken Alumite Industry, we offer nickel acetate sealing treatment, dichromate sealing treatment, deionized water (hot water) sealing treatment, and pressurized steam sealing treatment.

Design Information

◎Size change: Depending on the product and the coating thickness, the coating causes hardly any product size change. (Note that in some cases, reduction in size may be observed during pretreatment.)

◎Products with complex shapes and assembled products: Chromic acid alumite is produced by using chromic acid which is a corrosion inhibitor as the electrolytic solution. Chromic acid alumite is therefore safely applicable to objects where electrolytic solution is highly likely to remain such as products with complex shapes, components with deep blind holes, and products assembled by using welding, riveting and other methods. To perfectly eliminate the residual chromic acid or prevent discoloration caused by the residual chromic acid, post-processing, coating applied separately for individual components, masking of any gaps and other methods would prove effective.

◎Electrical insulation: The anodic oxide coating has electrical insulation properties. For the sites requiring electrical contacts, electrical contacts can be secured by removing the coating through post-processing or leaving the conductive substrate uncoated with prior masking.

◎Precautions pertaining to chemical substances: The residual electrolyte Cr (VI) in the coating is extremely small in quantity, complying with the regulations on chemical substances contained in products. (Not applicable to products subject to the regulations on substances prohibited from in-process use.)

◎Application of MIL-A-8625: Type I coating method is inapplicable to alloys with a Cu content of 5% or higher or an Si content of 7% or higher, or alloys with a total alloy content exceeding 7.5%. (In

these alloys, anodic dissolution may occur.) For the above-mentioned alloys, Type IB coating method using a low voltage chromic acid anodizing process is applicable. In these cases, please specify that Type IB coating method was applied instead of Type I in the drawing instruction.

Examples of alloys with a Cu content of 5% or higher: 2001, 2004, 2011, 2111, 2219, 2319, 2419, 2519, 2021

Examples of alloys with an Si content of 7% or higher: 4004, 4104, 4032, 4343, 4045, 4147

Examples of alloys with an alloy content of 7.5% or higher: 7000 series, and castings and die castings with some exceptions