Oxalic Acid Anodic Oxide Coating
(Oxalic Acid Alumite)
ALMITE/Alumite
(Anodic Oxide Coatings for Aluminum and Aluminum Alloys)

The oxalic acid anodic oxide coating was developed based on the invention of oxalic acid anodizing using a process of superimposed direct current on alternating current by Tsunetaro Kujirai and Sakae Ueki of the Kujirai Laboratory at the Institute of Physical and Chemical Research (RIKEN). Research on the oxalic acid anodic oxide coating aimed at practical application of the coating was later taken over by Shoji Seto and Akira Miyata. Akira Miyata invented steam sealing treatment by taking a hint from his failure—he failed to rinse a set square in hot water. He then acquired a patent for steam sealing of oxalic acid anodic oxide coating. Aluminum-made apparatus and equipment treated by the steam sealing of oxalic acid anodic oxide coating was named alumite, whose logo mark was registered as a trademark in 1931. After that, research and development aimed at industrial manufacture of alumite started. The company engaged in the research and development was the Riken Alumite Industry Co., LTD., which was founded with contribution from RIKEN and others. Until now, our company has made a contribution to the popularization of aluminum-made apparatus and equipment in Japan as a specialized alumite processing plant. Although oxalic acid anodic coating is excellent in quality with a very high corrosion resistance and durability, oxalic acid anodizing of aluminum takes a high cost, and the processing of oxalic acid alumite is challenging. For this reason, sulfuric acid alumite, which is less expensive and more easily manufactured industrially compared with oxalic acid alumite, has become popular at present. Only a few companies in Japan now manufacture oxalic acid alumite.

Features

◎Appearance: The coating provides a beautiful appearance with a light yellow or gold color for the product. (Materials with a high alloy content exhibit gray color after coating.) In particular, 5000 series alloys exhibit a vivid gold color after coating.

◎Corrosion resistance: The coating provides a high corrosion resistance for the product.

◎Weather resistance: With a high fastness to light, the coating causes hardly any change in color tone. Combined with its high corrosion resistance, the coating is safely applicable to products used in the outdoor.

◎Pureness: The coating does not contain atoms heavier than Al. Only hydrous alumina and oxalate

exist in the coating. Unlike other anodic coatings, oxalic acid anodic oxide coating releases neither sulfur (S) nor phosphorus (P). In addition, the coating releases not any substances that interfere with film formation in semiconductor manufacturing equipment.

Standard performance and quality assurance

◎Coating thickness: 6μm as a standard (maximum 15 to 20μm (depending on the material))

◎Meets JIS H8601:1999 (With the exception of the coating thickness test, any of the following coating performance tests, when required, will be outsourced.)

Table 3: Coating thickness grade and coating performance (JIS H8603:1999 Anodic Oxide Coatings for Aluminum and Aluminum Alloys)

Grade	Coating Thickness (μm)		Corrosion Resistance			Abrasion Resistance JIS H8682		
	Minimum Local Thickness	Average Minimum Thickness	Alkaline Corrosion Resistance JIS H8681-1		CASS Test JIS H8681-2	Sand-Falling Abrasion Resistance Test	Abrasive Jet Test	Abrasive Wheel Wear Test
			Class A	Class B				
AA3	2.4	3.0	-		-	-	-	-
AA5	4.0	5.0	-		-	-	-	30 cycles or more --- Coating wear (μm)
AA6	4.8	6.0	30 sec or longer	90 sec or longer	8 h	150 sec or longer	-	
AA10	8.0	10.0	50 sec or longer	150 sec or longer	16 h	500 sec or longer	24 sec or longer	
AA15	12.0	15.0	75 sec or longer	225 sec or longer	32 h	750 sec or longer	36 sec or longer	
AA20	16.0	20.0	100 sec or longer	300 sec or longer	56 h	1000 sec or longer	48 sec or longer	
AA25	20.0	25.0	125 sec or longer	375 sec or longer	72 h	1250 sec or longer	60 sec or longer	

(RN9.0 or greater)

Note: The conditions shown for Class A in the table above are applicable to hot water sealing using nickel acetate aqueous solution and others, and those for Class B are applicable to high -pressure steam sealing. The conditions shown in the above table are applicable to corrosion-resistant wrought alloys.

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, which is also applied to dye fixing of 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 high-pressure steam sealing developed at RIKEN allows maximum-level hydration sealing treatment and provides outstanding corrosion resistance. At the Riken Alumite Industry, we offer nickel acetate sealing treatment,

deionized water (hot water) sealing treatment, and high-pressure steam sealing treatment.

Table 4: Coating thickness grade and major applications (JIS H8601:1999)

Coating Thickness Grade	Major Application
AA3	Reflectors, electrical parts (internal parts), etc.
AA5, AA6, AA10	Kitchen utensils, household products, home appliance parts, decorative products, furniture components, vehicle interiors, building components (indoors)
AA15, AA20 AA25	Kitchen utensils, vehicle exteriors, civil engineering and architectural materials, ship parts