

KERONITE

ADVANCED SURFACE TECHNOLOGY

ALUMINIUM DATA SHEET

The limiting factor in the use of aluminium has traditionally been that of the soft surface and tendency to wear. KERONITE technology provides the solution by transforming the surface into a hard, dense layer of ceramic which not only has excellent abrasion-resistance but also improved protection against corrosion.

One third lighter than steel and with a higher strength:weight ratio, aluminium has found favour in a variety of transportation systems where manufacturers are seeking to improve fuel efficiency without compromising safety, performance or the environment. It is here that 30% of all aluminium produced is used. In other applications where portability and aesthetics are important, aluminium is continuing to grow in popularity.

The Process

The KERONITE process transforms the surface of aluminium alloys into a complex ceramic matrix by passing a pulsed, bi-polar electrical current in a specific wave formation through a bath of low concentration aqueous solution. A plasma discharge is formed on the surface of the substrate, transforming it into a hard, dense, ceramic oxide (mainly alumina), without subjecting the substrate itself to damaging thermal exposure.

As an immersion process, KERONITE can be used to treat the inner surfaces of complex shapes.

The KERONITE layer can be adjusted for optimal performance in the chosen application. The process produces a completely uniform layer, typically between 10 –150 microns at a rate of around 1 micron per minute.

The KERONITE process is compatible with all known aluminium alloys, even those with a high copper content that cannot be treated using hard anodising.

The Environment

The proprietary electrolyte solution contains no chrome, no heavy metals, no ammonia and no other toxic chemicals. The non-hazardous liquid requires no complex treatment prior to disposal and presents no danger to those handling it.

The Coating

The KERONITE layer is attached to the substrate by a strong molecular bond, ensuring excellent adhesion.

The fused ceramic layers closest to the surface provide protection against corrosion and wear.

The outer surfaces of the KERONITE layer are porous and lend themselves well to the application of scratch-resistant, decorative top-coats such as paints and lacquers, or can form composite coatings with PTFE, adhesives or metals.

Process Performance

PREDICTABLE DIMENSIONS	Coatings range from 10-150 microns. The coating grows predictably, partly above the surface and partly below. The surface is uniform, even in the case of complex shapes or internal surfaces.
COMPATIBLE	KERONITE can be applied to all aluminium alloys. The properties and appearance of the coating will depend upon the alloy selected.
FAST DEPOSITION	The coating grows at a rate of around 1 micron per minute.
SAFE	The process uses no toxic chemicals and generates no hazardous waste.

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Coating Performance

HARD	From 800-2,000 HV, depending on the alloy used and the thickness of the coating. KERONITE is approx. 3 times harder than hard anodising and the surface is less prone to cracking.
WEAR RESISTANT	Independent tests show that KERONITE is 7 times more wear resistant than hard anodising, out-performing electroless nickel in ball-on-disk tests. Impregnation with PTFE can improve performance further.
SCRATCH RESISTANT	The atomic bond with the substrate provides KERONITE with adhesion values similar to the fracture strength of aluminium. The porous outer layer provides an excellent key for top coats or composite layers such as PTFE.
CORROSION RESISTANT	Withstands over 2,000 hours in salt fog when sealed. Corrosion under the coating, a common problem in the case of anodising, is unlikely to occur with KERONITE.
THERMAL BARRIER	Excellent thermal resistance. Can withstand 500° C continuously or up to 2,000° for short periods.
ELECTRICAL INSULATOR	KERONITE provides good dielectric resistance up to 30 V DC per micron of coating when sealed, and as the coating is unlikely to crack, this resistance is extremely reliable.

Applications

When coated with KERONITE, aluminium is able to offer a significant weight reduction in those applications where it is used as a substitute for steel. Furthermore, it can be cast with thinner walls, often obviating the need for costly machining and offering more design flexibility. 100% recyclable, it is economically, environmentally and aesthetically very attractive.

In the AUTOMOTIVE industry, the ability of KERONITE-coated aluminium to absorb kinetic energy makes it ideal for safety components. It performs twice as well as steel in crash tests, improving braking and handling whilst at the same time, being so light, it increases acceleration and improves fuel efficiency. Using aluminium components can help to balance the distribution of weight between the front and rear axles. With KERONITE surface treatment technology, it is possible to use aluminium in a wider variety of parts including not only engine parts and powertrain systems but also body structures, safety components and exterior body panels. The fact that it is KERONITE-coated aluminium is 100% recyclable is extremely important in the light of recent end-of-life vehicle legislation.

Aluminium makes up around 80% of today's aircraft weight. A growing number of structural components and stress-bearing parts in the AEROSPACE industry are produced from aluminium, reducing weight and manufacturing costs. New high pressure casting techniques have given aluminium greater strength and elongation, making it possible to integrate a number of parts, reducing the need for heavy and time-consuming fastening and riveting. Coating with KERONITE improves durability and performance as well as enabling new applications.

Other TRANSPORTATION systems such as motorcycles, bicycles, escalators, shopping trolleys, wheelchairs and push chairs are produced using aluminium in order to reduce weight and dampen vibrations and noise. Again, KERONITE coatings give greater durability through improved wear and corrosion resistance.

A variety of SPORTING EQUIPMENT is produced from aluminium coated with KERONITE, particularly where hardness, strength and portability are required.

In the world of FASHION, aluminium offers designers more flexibility as it can be easily formed into complex shapes. With KERONITE scratch-resistant surfaces, products can be given greater durability and a more attractive finish without the risk of corrosion.

In the FOOD INDUSTRY, aluminium coated with KERONITE and impregnated with PTFE produces a non-toxic, durable and scratch-resistant surface for high quality non-stick cookware.

Because aluminium is non-sparking, non-combustible and non-magnetic it is well-suited to a variety of ELECTRONICS applications. KERONITE provides the all-important corrosion resistance to hand-held consumer products.

In the PULP and PAPER industries, KERONITE coatings reduce downtime and increase the lifetime of aluminium equipment by improving the wear resistance of those parts which frequently come into contact with abrasive materials such as paper and wood.

The TEXTILE industry has found that KERONITE-coated aluminium provides an ideal surface for a variety of parts which come into contact with the yarn. It is not too abrasive but extremely durable and resistant to corrosion, despite the working conditions.

There are many other GENERAL ENGINEERING applications that can benefit from the use of KERONITE-coated aluminium. Plastic moulds can be lined with KERONITE plus PTFE for a hard, wear-resistant surface with outstanding adhesion and good release properties. The lifetime of ball valves, pulleys and pumps can be extended and manufacturing costs reduced.