

Passivation of Aluminium



Passivation

Passivation is the process of making a material "passive", usually by the deposition of a layer of oxide on its surface. In air, passivation affects the properties of almost all metals—notable examples being aluminium, zinc, titanium, and silicon. In the context of corrosion, passivation is the spontaneous formation of a hard non-reactive surface film that inhibits further corrosion. This layer is usually an oxide that is a few nanometres thick.

Pure aluminium naturally forms a tough resistant oxide, almost immediately that protects it from further oxidation in most environments. Aluminium alloys, however, offer little protection against corrosion. There are three main ways to passivate these alloys: alclading, chromate conversion coating and anodizing. Alclading is the process of metallurgically bonding a thin layer of pure aluminium to the aluminium alloy. Chromate conversion coating is a common way of passivating not only aluminium, but also zinc, cadmium, copper, silver, magnesium, and tin alloys. Anodizing forms a thick oxide coating. This finish is more robust than the other processes and also provides good electrical insulation, which the other two processes do not.

For example, prior to storing hydrogen peroxide in an aluminium container, the container can be passivated by rinsing it with a dilute solution of nitric acid and peroxide alternating with deionized water. The nitric acid and peroxide oxidizes and dissolves any impurities on the inner surface of the container, and the deionized water rinses away the acid and oxidized impurities.



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Gardobond X4707

For many decades, hexavalent chrome pre-treatment has been the standard for aluminium. More recently, chrome-based pre-treatment processes have come under pressure for environmental and health and safety reasons. The first chrome-free pre-treatment processes started to appear in the marketplace about 20 years ago. Today, with almost two decades of operating experience gained, and hundreds of users worldwide, the performance of these programmes is equivalent to the "old" hexavalent chrome products. Users of chrome-free technology include all the world's biggest names in the industry.

Gardobond X4707 is a chromium free pre-treatment for aluminium and its alloys, the use of the process materially improves the performance of the subsequently applied paints, lacquers and powder coats.

It imparts a chemical conversion coating to the surface which enhances adhesion and corrosion resistance.

The performance of Gardobond X series products for aluminium is not only as good as hexavalent chrome which it replaces, in many cases even better results both in the real world and under laboratory conditions, the product has a range of approvals including those from Qualicoat and GSB.

Under NSS testing for mm creep the Gardobond X exceeded 1000hr

Aluminium Pre-Treatment Processes

- Based on Zirconium / Titanium.
- Easy to handle
- Chrome free solution
- Comply with directives (EU, local)
- Better environmental compatibility
- No heavy metal ions, phosphate sludge
- Less energy
- Less rinsing water (closed loop systems)
- Cleans surfaces for ease of welding.
- Improve workers safety, working hygiene
- Less capital investment
- Simplified waste water treatment
- Quantitative method for coating weight.
- Low maintenance (reduced amount of sludge)
- Comply with highest quality requirements
- Qualicoat, Qualanod, GSB, British Standard

Qualicoat approvals

GARDOBOND® X 4707 Rinse - Approval Nr. A – 62

GARDOBOND® X 4707 No Rinse - Approval Nr. A - 24

GSB: GARDOBOND® X 4707 - Approval Nr. 304A



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