AluGuard®

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Permanent protective seal

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Introduction

Anodized aluminum surfaces used in construction often face **contamination from concrete and cement water**, which have extremely high pH levels. These alkaline substances can completely strip the anodized layer, **causing permanent damage**, deep discoloration, and irreversible surface degradation. Once the contamination penetrates, the etching becomes embedded in the aluminum, making restoration impossible.

Traditional sealing methods struggle to provide any protection against these aggressive contaminants, **leading to costly maintenance, severe aesthetic damage, or the need for full replacement.**

AluGuard® introduces a breakthrough solution with its advanced sealing process. Rigorously tested, it has successfully passed the **VW TL 212 test** in a **pH 12.5** solution, proving its **high resistance to alkaline contamination**. Additionally, its superior **corrosion protection** ensures long-term durability, significantly extending the lifespan of anodized aluminum in demanding environments.

Approved under BS3987.

Approved under Qualanod.

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Traditional Sealing Methods

Cold sealing

Cold sealing is often used as a two-step process to enhance the overall performance. step one involves impregnation seal with a heavy metal compound such as nickel fluoride or nickel acetate, which operate at lower temperatures (typically 20-30°C). These salts help to partially close the pores before final sealing. Step two is a hydratation seal at 60°C demi water.

The chemical reactions for cold sealing include:

$NiF_2 + 2H_2O \rightarrow Ni(OH)_2 + 2HF$

$Ni(C_2H_3O_2)_2 + 2H_2O \rightarrow Ni(OH)_2 + 2C_2H_4O_2$

Although the cold seal reduces energy consumption compared to direct hot sealing, the use of nickel raises environmental and health concerns due to its toxicity. With increasing regulatory pressure, the industry is seeking alternative sealing solutions that maintain high performance without relying on nickel-based cold sealing.

Hot Sealing

Hot sealing involves immersing anodized aluminum in boiling water or steam at temperatures close to 100°C. This process facilitates the hydration of the anodic layer, causing the formation of boehmite crystals (AlO(OH)), which effectively fills and seals the pores in the anodized surface.

Hot sealing is a traditional proven process that has an excellent performance that is however susceptible to alkaline attack such as mortar spill over or cement contamination.

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AluGuard® - An innovative sealing process

Pre-seal

Mechanism: The pre-seal step uses non-heavy metal solution to penetrate the pores of the anodized layer. This environmentally friendly solution forms a complex salt composed of metal, aluminium, and fluoride. The reactions involved ensure the formation of a protective layer within the pores, enhancing corrosion resistance.

Environmental impact: By eliminating nickel, the process reduces environmental and health risks, aligning with modern sustainability and regulatory requirements.

Main Seal (Hot Seal)

Mechanism: Following the pre-seal, the anodized aluminium continues through a hot sealing process, providing an additional barrier against corrosion and mechanical wear. This step involves immersing the material in a hot ~ boiling water, where a hydrolysis reaction converts the anodic oxide layer into hydrated film.

The reaction can be summarized by the following equation:

Al2O3 + 2 H2O -> 2AlO (OH)

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Product Overview

AluGuard® is designed to guard againts contamination from concrete and cement water, making it an ideal choice for the building and architectural industries. This innovative product utilizes a unique sealing process that combines the benefits of both pre- and hot- sealing methods. **AluGuard®** is an advanced sealing solution engineered to enhance the performance and longevity of anodized aluminum surfaces.

Building Cladding

AluGuard® is perfectly applicable on rainscreen cladding.

The **AluGuard®** sealing process helps the facades withstand sudden temperature changes and adverse weather conditions, ensuring longevity.

Window Frames

AluGuard® is perfectly applicable on extrusions and frames.

AluGuard® offers superior corrosion resistance and durability, ensuring that window frames remain robust and visually appealing over time.

Components and accessoires

AluGuard® is perfectly applicable on components and accessoires.

AluGuard® enhances the durability and appearance of various components and accessoires.

No risk with **AluGuard®**

AluGuard® offers key advantages over traditional sealing and enhances the performance of anodized aluminium surfaces.

High pH resistance

Our new process has been rigorously tested and has successfully passed the VW TL 212 test in a solution with pH 12.5, demonstrating its superior reliability and performance in such conditions.

Excellent corrosion resistance

The double sealing process ensures protection against corrosion, significantly extending the lifespan of the aluminum. **AluGuard®** shows superior results on the CASS-test.

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Validations & Tests

Validation tests

Independent research ensures that **AluGuard®** meets the highest standards of performance and reliability. These conducted tests, evaluated the performance of **AluGuard®.**

The testing parameters included varying temperatures, pH levels, and durations to determine the optimal conditions for achieving superior sealing quality.

Test results

AluGuard®'s sealing process significantly improves the pH resistance, demonstrating its superior protective qualities and confirming its suitability for architectural and industrial applications.

Tests Method	AluGuard®	Traditional sealing methods
Alkaline Resistance *Volkswagen test TL 212*	**Excellent**	Low
Corrosion resistance *Mass loss test ISO 3210 / CASS-test*	**Excellent**	Good
Abrasion Resistance *ISO 18771 / ISO 8251*	**Excellent**	Excellent
UV-resistance test *Lightfastness ISO 2135*	**Excellent**	Excellent
Thermal crazing test *Ref. Qualanod 9.13*	**Good**	Good

Alkaline Resistance test

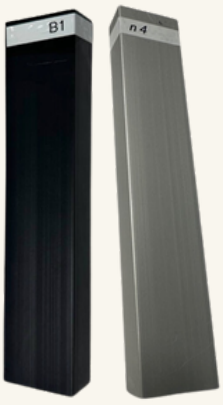
GM Alkaline resistance test pH 12.5. For 10 minutes the panel immerse in 12.5 pH test solution.

1 A high-pH solution (pH 12.5) is prepared according to VW TL 212 standards, replicating real-world alkaline exposure conditions.

2 Test samples are taken from the production lot or a similar alloy, ensuring consistency in testing.

3 The samples are submerged in the alkaline solution for a specific duration to test their resistance to chemical attack and surface degradation.

4 The anodized coating is examined for material loss, surface etching, and discoloration. If it remains intact, the material passes the test, confirming its high alkaline resistance.



After 2 sealings.

Samples after GM Alkaline resistance test pH 12.5

Mass loss Test

Assesses the quality of sealing by measuring the loss of mass after immersion in nitric acid and phosphoric acid. These samples also passed the mass loss test, as specified by the standard for mass loss testing.

1 The test solution (Solution B - phosphoric acid) is prepared following ISO 3210 Method 2, including a nitric acid pre-dip.

2 Test samples are taken from the production lot or a similar alloy to ensure reliability.

3 The specimens are immersed in the acid solution until 0.5 g of coating and aluminum dissolve per liter, then measured with a ±1 mg precision balance.

4 If the mass loss is within acceptable limits, the anodized coating passes the test, proving its resistance to chemical attack.

	Sample 1	Sample 2	Sample 3
Surface Area (dm^2)	0.9592	1.0357	79.69
Weighing 1	26.8381	29.1076	26.7638
Weighing 2	26.8377	29.1071	26.7637
Weighing	26.8325	29.1021	26.7576
Pre-dip	0.4	0.5	0.1
Mass Loss	5.4	4.8	6.4
Total Mass Loss	**5.8**	**5.3**	**6.5**

Craze Resistance test

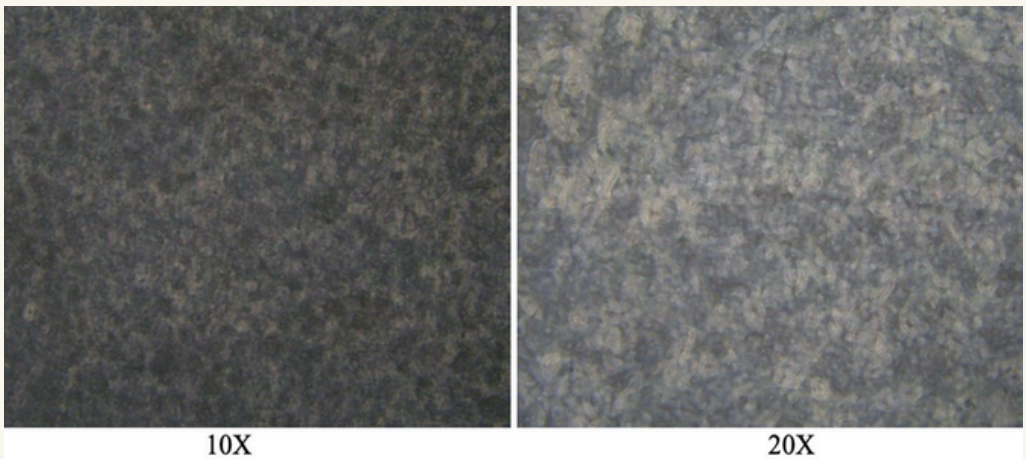
1 After preheating the oven to 50°C the sealed panels were placed inside.

2 After 30 minutes, panels were visually checked for crazing and if there's no crazing the temperature is raised to 5°C and tested for another 30 minutes.

3 The test continues till the crazing is noticed.

4 If there's no crazing up to 80°C the test is stopped.

5 If a panel shows no crazing up to 80°C then it indicates the panels passed the craze resistance test.



10X 20X

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Conclusion

AluGuard® sets a new benchmark in anodizing protection against alkaline contamination by offering a advanced sealing process which is approved under BS3987 and QUALANOD standards.

Through rigorous third-party testing, **AluGuard®** proves its exceptional resistance to alkaline contamination, successfully passing the VW TL 212 test in a pH 12.5 solution. With superior corrosion protection, **AluGuard®** ensures long-term durability, significantly extending the lifespan of anodized aluminum in even the most demanding environments.