

# Antitarnish-A-100 PRO-KIT



Passivation of Precious Metal Surfaces  
by Electrophoretic Coating Process

**Antitarnish-A-100 PRO-KIT** is based on an aqueous, metal-free solution in which the organic inhibitor is present as a fine dispersion. The passivation layer is applied by an electrophoretic coating process and is specially designed for the passivation of precious metal surfaces and its alloys.

A thin transparent layer protects precious metal surfaces and its alloys from tarnishing generally caused by hydrogen sulfide. The layer will neither affect the solderability nor the bondability compared to an untreated metal surface.

The conductivity and contact resistance will not be affected. Color and brightness of the metal surfaces will also not be influenced. The passivation layer also acts as a lubricant due to its chemical composition.

Antitarnish-A-100 and A-100 PRO-SALT do not contain any components that are harmful to the environment - no chlorofluorohydrocarbons, chlorinated hydrocarbons, aromatic hydrocarbons or chromium compounds in particular.

## Properties

Bath:	Aqueous, metal-free electrophoretic coating process
Color:	Uninfluenced
Brightness:	Uninfluenced
Friction coefficient:	Hardly reduced
Sliding properties:	Improved
Solderability:	Uninfluenced
Bondability:	Uninfluenced
Contact resistance:	Uninfluenced

## Form of Supply

### **Antitarnish-A-100 PRO-KIT**

is delivered in following package sizes:

### **Antitarnish-A-100:**

100ml / 1L / 5L / 10L

### **A-100 PRO-SALT:**

100g / 500g / 1kg / 5kg

### **ALBILEX®-MMO-Anode:**

Standard dimensions or customized

### **Sodium hydroxide, 32%:**

100ml / 500ml / 1liter

The concentrate must be stored in a frost-protected area and should not be stored at temperatures above 35°C. If Antitarnish-A-100 is stored at temperatures above 35°C, the color may change to a clear solution. When cooled down the solution will return to its white color. If this occurs, Antitarnish-A-100 must be mixed well by shaking the bottle. Storage stability of 24 months refers to the status in the closed original package.

## Necessary Equipment

**Bath tank:** Preferably polypropylene tank provided with a built-in overflow. The overflow is important to ensure that no foam will float on the bath surface. Otherwise there will be stains on the surface of the parts when taking them out of the bath.

**Heating system:** Temperature adjustable heaters (coated with quartz, Teflon or porcelain). Ensure sufficient recirculation and avoid local overheating of the bath.

**Agitation equipment:** Parts and/or bath should be sufficiently agitated in order to reach a uniform passivation. Bath agitation can be achieved with an immersion pump.

**Exhaust system:** Recommended as concentrate and makeup-solution have a particular smell.

**Anode:** ALBILEX®-MMO-Anode

**Chemicals:** Diluted sodium hydroxide (about 20g/L): Do not use concentrated sodium hydroxide as a high amount of sodium will reduce the passivation effectiveness.

## Bath Make-up for 1 Liter Bath

**Make-up:** Fill 960ml of DI-water into a clean bath tank and heat it to an operating temperature of 40°C (no higher as working solution will become cloudy at higher temperatures). For the next step warm up Antitarnish-A-100 to 40°C, shake thoroughly and add the desired amount of the concentrate (normally 10ml/l; range: 5 -50ml/l). Always pour the product, do not use pipettes, even for small amounts. Fill up with DI-water to a volume of 1 liter and mix thoroughly. Finally add 2.5 g/L of the A-100 PRO-SALT and adjust the pH value to 3.7 (range 3.4- 4.1) with diluted sodium hydroxide.

**Replenishment:** Continuous replenishment of Antitarnish-A-100 is recommended according to throughput of the parts to be passivated. 1 liter Antitarnish-A-100 is approximately required to apply a passivation on 2000 sqm of metal surface.

## Operating Conditions

### Concentration:

10 - 20ml/L Antitarnish-A-100 (range: 5-50ml/L).

### Operating temperature:

40°C - 50° C.  
The temperature must not exceed 60°C as bath components will otherwise be destroyed. The temperature is too high if the solution becomes cloudy and opaque – this will occur at temperatures above 52° C.

**pH-value:** 3.7 (range 3.4-4.1), to be adjusted with diluted sodium hydroxide solution (increasing the pH) or A-100 PRO-SALT (decreasing the pH).

**Agitation:** Slow agitation by means of a pump and/or agitation of the parts recommended.

**Filtration:** Not recommended as active compounds might be absorbed by the filter.

**Voltage:** 3.5 V (range: 2.5 bis 5.0 V).

The optimum depends on structure and size of your parts. It is easy to evaluate the optimum: prepare several testing parts at voltages of 3.0 / 3.5 / 4.0 / 4.5 / 5.0 V and do the testing procedure, described in chapter „Control and correction of bath function“.

### Time of exposure:

Rack/Barrel: 5 min (range: 3 - 7 min);

Reel-to-reel: 10 seconds (range: 5 - 20 seconds).

## Process Sequence

The process sequence depends on the surface quality of the metal surfaces to be protected. Used surfaces must be cleaned, degreased and finally activated with an acid dip before starting the passivation process.

In general the parts are taken out of an electroplating bath, rinsed with water and passivated with the Antitarnish-A-100 PRO-KIT. After passivation parts require a two-step rinse to maintain a shiny surface. The first rinse should be a static rinse with hot water (50 - 60°C). The second rinse is a flow rinse with DI water. Afterwards the parts can be dried.

To avoid stains caused by Antitarnish-A-100-PRO-KIT particles (foam etc.), the static rinse can be improved by adding 1% Antitarnish-A-POST-DIP. In this case a rinse solution temperature of 40 - 50°C is sufficient. This rinse solution can also be used to compensate evaporation losses of the Antitarnish-A-100 PRO-KIT solution.

**Drying:** The passivated parts are almost dry (i.e. with just a few drops of water on the metal surface) after the passivation and rinsing steps. The drying can be done in forced air ovens and in case of strip material in continuous furnaces at a temperature below 150°C or by blowing off. In case of a limited drying duration of 4-6 seconds temperatures up to 300°C are also possible.

## Control & Correction of Bath Function

**Testing the passivation capacity:** Prepare a fresh 2% solution of potassium polysulfide (42-45%) and place the passivated parts in this solution for a few minutes – see appendix.

Perfectly passivated surfaces must not show any dark discoloration. A slightly cloudy appearance is normal. Also place a non-passivated part into the solution to see the difference. In case of a poor tarnish protection, check the pH and voltage of the working solution. If both are fine, the concentration of Antitarnish-A-100 must be analytically determined (see appendix) and increased.

If there is no improvement after having adjusted the concentration of Antitarnish-A-100 the passivation solution must be recreated due to impurities.

## Further Process Recommendations

**Pretreatment:** The parts to be protected must be clean and free of grease and oxides. The parts should either be wet or should have an active surface when placed in the solution. Drag-in impurities from previous electrolytes should be strictly avoided by careful rinsing.

**Removal of the passivation layer:** The passivation layer can be completely removed by cathodic degreasing in an alkaline degreasing bath (such as ALBILEX®-ED-100).

## Disposal of Spent Solutions

The working solution of Antitarnish-A-100-PRO-KIT is not a hazardous substance. The active ingredients can be absorbed by active carbon and burnt with it. It is recommended to stir the spent passivation solution with 4g/L of active carbon for several hours at room temperature and to filter it afterwards.

Due to drag-in, silver and cyanide sometimes accumulate in the passivation solution. In this case a treatment for the oxidation of cyanide and the precipitation of the heavy metals is necessary. The spent solution may be discharged into the sewage system according to local regulations.

The instructions of the local water / sewage authorities must be observed in any case.

## Safety Instructions

For information on safety, please see the corresponding material safety data sheets. The valid accident prevention regulations and safety information must be observed.

## Additional Products

### Antitarnish-A-POST-DIP

Function: Rinse improvement, avoids staining.  
Package Size: 1 L

### ALBILEX®-ED-100

Function: Remover of passivation layer.  
Package Size: 1 kg

### Antitarnish-A-TITRATION

Function: Chemical additive for the titration process to determine quantity of active components.  
Package Size: 1 L

# APPENDIX

## Analysis Methods for Antitarnish-A-100 PRO-KIT

### 1. The inhibitor concentration can be determined using the following method of analysis:

Equipment:	<ul style="list-style-type: none"><li>– 250 ml Erlenmeyer flask</li><li>– 50 ml volumetric pipette</li><li>– 25 ml burette</li></ul>
Chemicals:	<ul style="list-style-type: none"><li>– Sulfuric acid 30 %</li><li>– Iodine solution 0.1 N</li><li>– Sodium thiosulfate solution 0.1 N</li><li>– Antitarnish-A-TITRATION</li></ul>
Method:	<p>Pipet 50 ml of the warm, homogeneous process solution into a 250 ml Erlenmeyer flask mixed with about 10 ml Antitarnish-A-TITRATION and add about 5 ml sulfuric acid (30%).</p> <p>Dilute this solution with 50 ml deionized water.</p> <p>Add 10 ml 0.1 N iodine solution and shake thoroughly leaving the sample in a dark place for about 15 min.</p> <p>Titrate the resultant red-brown solution with 0.1 N sodium thiosulfate solution until the red-brown color changes to the white color of the original solution.</p>
Calculation:	<p>Concentration of Antitarnish-A-100 (ml/L)</p> $= (10 - \text{consumption of } 0.1 \text{ N Na}_2\text{S}_2\text{O}_3) \times 6$

### 2. Method for testing the passivation capacity of a metal surface:

Chemicals:	<p>2% aqueous solution of potassium polysulfide (20 g potassium polysulfide 42 - 45% solved in 1.0 L deionized water.)</p> <p>A fresh solution should always be prepared before testing. The temperature should not exceed 25°C.</p>
Method:	<p>Dip the test sample (passivated part) and the control sample for 5 min in a 2% aqueous solution of potassium polysulfide, then rinse the parts under running water. Test a non-passivated part as a reference at the same time.</p>
Interpretation:	<p>Perfectly passivated parts should not show any dark color changes (spots). The control sample is used for checking the usability of the testing solution.</p>

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