

# Antitarnish 614

## Operating Instructions

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### Process for the antitarnish protection of silver free from CFCs, CHCs, HCs and chromium

- Simple immersion process
- For technical components such as contacts as well as for decorative applications
- Good sliding properties
- Good solderability
- Low contact resistance

## Characteristics

Antitarnish 614 is a passivation process for silver. Treated silver surfaces will be protected against tarnishing caused by hydrogen sulphide.

A thin, transparent protective layer is applied by a simple immersion process. This will not have any adverse effect on the solderability and hardly any influence on the contact resistance compared to an untreated silver surface.

Depending on the application, in reel-to-reel equipment either a depot layer or a thin monolayer can be applied.

However, the friction coefficient of the surface will be clearly reduced, thus lowering insertion and withdrawal forces and the susceptibility to welding of sliding contacts. Therefore Antitarnish 614 is particularly suitable for sliding and plug-in contacts.

Neither colour nor brightness of the silver coatings will be influenced. Therefore the process can be very well used for decorative purposes too.

The easy-to-use immersion solution does not contain any components harmful to the environment, no chlorofluorohydrocarbons, chlorinated hydrocarbons, hydrocarbons or chromium compounds in particular.

Bath type: Aqueous, metal-free immersion process

pH-value: Weakly alkaline

Temperature: 40 °C (30 - 45 °C)

Immersion time:

Rack/barrel: 2 min (30 s - 4 min)

Reel-to-reel: 10 s (5 s - 20 s)

## Properties

Colour:	Uninfluenced
Brightness:	Uninfluenced
Friction coefficient:	Reduced
Sliding properties:	Improved
Solderability:	Virtually uninfluenced
Contact resistance:	Hardly any influence in initial state, after storage lower than that of unprotected silver
Bondability:	Protected parts cannot be bonded

## Form of Supply

Bath makeup:	a) Antitarnish 614 Concentrate 10 ml for 1 litre of solution Storage stability: min. 1 year The Concentrate must be stored in a frost-protected place.
Bath replenishment:	b) Antitarnish 614 Concentrate (as item a) 1,000 ml per 2,000 m <sup>2</sup> of protected surface Storage stability: min. 1 year

## Bath Makeup

Makeup sequence:	Fill 950 ml of deionized water into the bath tank and heat to operating temperature. Then add the desired volume of Antitarnish 614 Concentrate which should be previously warmed to 40 - 50 °C and shaken well. Rinse the empty bottles with warm water. After filling up with deionized water to a volume of 1 litre and thorough mixing, the immersion solution is ready for use.
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## Operating Conditions

Concentration:	10 ml/l (5 - 50 ml/l) Antitarnish 614 Concentrate
Operating temperature:	40 °C (30 - 45 °C) Better protective action at higher temperature!  The operating temperature should not exceed 50 °C, otherwise the emulsifier will oil off and no homogeneous protective layer can be produced.
pH-value:	Weakly alkaline (uncritical, no control)
Agitation:	For the uniform mixing of the electrolyte (undissolved components), slow agitation by means of a pump and agitation of the parts is advantageous.
Filtration:	Not permitted because of undissolved components.
Time of exposure:	Immersion (electroless)
Rack/barrel:	2 min (30 s - 4 min)
Reel-to-reel:	10 s (5 - 20 s)

## Process Sequence

The optimum process sequence is as follows:

### Rack / barrel:

1. Silver-plated parts
2. Static rinse
3. Rinse
4. Cathodic degreasing (containing cyanide)
5. Rinse
6. Acid dip
7. Rinse
8. Rinse
9. Antitarnish 614
10. Static rinse
11. Rinse
12. Rinse in deionized water
13. Dry

### Reel-to-reel equipment:

1. Silver-plated strip
2. Static rinse
3. Rinse (strip must be active)
4. Antitarnish 614
5. Blow off / dry (for depot layer)

*Alternatively* for monolayers:

After point 4, continue with point 6.

6. Static rinse (recovery rinse for return)
7. Rinse in deionized water
8. Dry / blow off for monolayer

## Rinsing:

We recommend at least two rinsing stages. The first rinse - made up with deionized water - can be used as a static rinse to compensate any evaporation losses of the antitarnish solution. If the first rinse is designed as a flow rinse, clean tap water (town water) should be used.

The parts should be processed wet in wet, intermediate drying is not required.

## Drying:

The parts will leave the antitarnish solution and the rinses largely unwetted, i.e. with just a few drops of water on the surface.

The parts can be dried in centrifugal dryers, hot-air ovens (forced air) or in the case of strip materials in continuous furnaces (< 200 °C) or by blowing off.

Examples of suitable drying conditions are:

Centrifugal drier cold up to 80 °C

Forced-air oven e.g.	80 °C	5 minutes
	120 °C	3 minutes
	150 °C	2 minutes

Continuous furnace for strip materials:

up to max. 180 °C, 5 - 20 sec.

## Bath Replenishment

Per 1,000 m<sup>2</sup> of surface, about half a litre of Antitarnish 614 Concentrate is required.

We recommend continuous replenishment according to throughput.

## Bath Monitoring and Correction

### Testing the protective capacity:

The parts to be tested must not be hot, they should have room temperature.

The protective capacity can be tested by immersion in a freshly prepared 2 % solution of ammonium polysulphide. Immersion time 30 s. The ammonium polysulphide solution can be prepared from e.g. 20 % (NH<sub>4</sub>)<sub>2</sub>S (Merck No. 105442) by dilution with deionized water (dilute 100 ml of 20 % solution to 1 litre with deionized water). After making up the test solution, allow it to stand for 10 – 15 min. Afterwards the test solution can be used for 2 hours.

Good protective capacity: Perfectly passivated parts must not show any dark discoloration anywhere on the surface. A slightly cloudy appearance is normal. For checking the activity of the test solution, use an unpassivated reference sample.

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**Poor protective capacity:** Dark discoloration of the coating, or black stains on the parts. In this case the concentration of Antitarnish 614 Concentrate must be analytically determined and adjusted to specified value. If the protection should not be any good even then, the antitarnish solution must be freshly made up. The analytical method is available on request.

## Special Process Hints

### Pre-treatment:

The parts must enter the immersion solution free from oxides and grease. The parts should be either wetted or have an active surface when placed in the solution.

Avoid any drag-in from previous electrolytes by careful rinsing steps.

### Staining due to adhering layer:

Undissolved active ingredient (possibly foam as well) may float on the surface of the electrolyte, it must be removed before taking the parts out of the solution, otherwise the layer will adhere to the parts and cause stains. It is best to use a bath tank with a built-in overflow for this purpose.

### Return of the recovery rinse or homogenisation of the immersion solution:

Undissolved active ingredient (see above) can be redissolved by heating the immersion solution up to more than 55 °C, mixing it thoroughly at the same time.

### Removal of the protective coating:

The anti-tarnish protection can be completely removed by cathodic degreasing in an alkaline degreasing bath.

### Reprocessing of spent solutions:

The active ingredient is no hazardous substance in the sense of the Hazardous Substances Decree. It can be adsorbed by active carbon and burnt with it. For disposing of spent solutions, we recommend stirring the solutions with 4 g/l of Active Carbon 1 for several hours at room temperature and filtering them afterwards.

Due to drag-in from the silver electrolyte, silver and cyanide may accumulate in the antitarnish bath. Then a treatment for the oxidation of cyanide and the precipitation of the heavy metals will be required.

The electrolyte cleaned in this way may be discharged into the works' wastewater system.

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

## Equipment

Bath tanks:	Plastic tanks, preferably made of polypropylene. <b>Important:</b> The bath tank should be provided with an overflow to reliably remove any foam floating on the bath surface. Otherwise there will be stains on the parts.
Heating:	Adjustable heaters (coated with quartz, Teflon, or porcelain). Local overheating of the solution should be avoided (temperatures exceeding 60 °C). Ensure sufficient recirculation of the bath when heating up the solution.
Agitation equipment:	Parts and/or bath should be sufficiently agitated in order to reach a uniform protection.
Exhaust system:	Required since concentrate and solution ready for use have a particular smell.

## Note

Our information relating to the storage stability refers to storage in closed original storage containers under the conditions stated on the label.

## Precautionary Measures/Safety Hints

For information on safety, please see the corresponding Material Safety Data Sheets!  
The valid accident prevention regulations and safety information must be observed!

## Reference to

Analytical control: Methods available on request

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