

Antitarnish 613

Operating Instructions

Edition: 10 June 2008

- immersion process on an aqueous basis for the antitarnish protection of silver
- without chlorinated hydrocarbons
- without chromium compounds
- for decorative and technical applications
- also suitable for the antitarnish protection of copper

Bath Characteristics

Antitarnish 613 is a novel immersion process on an aqueous basis to avoid tarnish effects on silver. The protective capacity is at least as good as that of the systems customary up to now using vaporizable organic solvents or electrolytic chromating, which are rejected for reasons of environmental protection or the pollution load of the waste waters. The immersion solution which is easy to use does not contain any components harmful to the environment, particularly no chlorinated hydrocarbons or chromium compounds. If treated correctly, silver-plated articles are provided with a safe storage protection which is largely fast to handling and rubbing but is not washer-proof.

Antitarnish 613 can be used for decoratively silver-plated articles as well as for silver-plated articles in electrotechnology.

The process also protects copper against oxidative discoloration and prevents silver migration on thinly gold-plated silver.

If silver-plated articles are protected when dry, a single-stage treatment in Antitarnish 613 is sufficient. If silver-plated articles are to be protected when wet, Inhibitor 1 has to be used previously for water displacement.

Process type: aqueous, metal-free immersion process
single-stage possible with dry parts
double-stage with wet parts

pH value: 1.5 (1.0 - 2.0)
Temperature: 35 °C (20 - 40 °C)
Immersion time: 30 sec (10 - 120 sec)

Coating Characteristics

Colour: is not influenced
Brightness: is not influenced

Further Coating Properties

Solderability: is not influenced
Surface resistivity: is not influenced
Bondability: protected parts can be bonded

Form of Supply

Antitarnish 613

Bath makeup: a) Antitarnish 613 Concentrate
250 ml for 1 l of bath
Storage stability: min. 2 years
b) Wetting Agent 20
2.5 ml for 1 l of bath
Storage Stability: min. 2 years

Bath replenishment: c) Antitarnish 613 Concentrate (as item a)
100 ml per 10 m² of protected surface
d) Wetting Agent 20 (as item b)
1 ml per 10 m² of protected surface

Phosphoric acid 85 %, chemically pure (d = 1.71), is additionally required and must be provided by the user.

Inhibitor 1

(required for the protection of wet articles)

Bath makeup: Inhibitor 1 Concentrate
2 ml for 1 l of bath
Storage stability: min. 1 year

Bath Makeup

Antitarnish 613

Makeup sequence: Dilute 250 ml of Antitarnish 613 Concentrate with approx. 650 ml of deionized water. Then add 9 ml of phosphoric acid 85 %, chemically pure. The resulting pH value is approx. 1.5. The pH value should be kept within the range of 1.0 - 2.0. If necessary, it can be adjusted to approx. 1.5 with minimal volumes (the solution is not buffered!) of phosphoric acid or sodium hydroxide. Then add 2.5 ml of Wetting Agent 20 (except in cases where foam formation must be avoided) and fill up to 1 l with deionized water.

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Inhibitor 1

Makeup sequence: Stir 2 ml of Inhibitor 1 Concentrate into approx. 950 ml of deionized water and fill up to 1 l with deionized water. The resulting pH value of 9.5 need not be controlled.

Process Sequence

Depending on the type of application, different process variants are possible or special requirements have to be observed.

Very important!

Silver-plated articles must not be subsequently de-greased in an alkaline bath!
The silver-plated articles to be protected have to be rinsed very well before the protection - this has to be observed particularly in the case of barrel ware! A yellow coloration caused by the Antitarnish is a result of insufficient pre-rinsing.

An **optimal protective effect** is reached if the parts to be protected go **dry** into the Antitarnish 613. This is usually achieved by conventional drying procedures after the silver plating (Method 1). If a (often manual) drying is not possible and a continuous procedure demanded (e.g. automatic line), Inhibitor 1 can be used as a dewatering fluid prior to the Antitarnish 613 (Method 2). The goods leave the subsequent rinse unwetted and practically dry and only now go into the Antitarnish 613 bath.

If a former drying/dewatering is not possible and wet parts are immersed in Antitarnish 613, even now there still is a protective effect. It is clearly reduced, however, compared with the optimal possibilities.

The full optimal process includes the following steps:

silver-plated parts	
very good rinsing	
method 1	method 2
dry	Inhibitor 1
	very good rinsing
the parts are now dry!	
Antitarnish 613	
economy rinse	
rinse in deionized water	
dry	

Operating Conditions

Inhibitor 1

Operating temperature: room temperature (20 - 40 °C)
pH value: approx. 9.5 (not critical, no control)
Bath density: approx. 0.99 g/cm³
Product agitation: recommended
Time of exposure: 30 sec (10 - 120 sec) immersion (without current)

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Operating temperature: 35 °C (RT - 40 °C)
Overheating to over 40 °C (even locally) must be avoided because the active ingredient will decompose at a too high temperature (white flakes, first at the bath surface).

pH value: 1.5 (1.0 - 2.0)
Corrections with phosphoric acid or NaOH.
Avoid an unnecessary increase in the salt concentration, if possible.

Bath density: approx. 1.005 g/cm³
Product agitation: recommended
Time of exposure: 30 sec (10 - 120 sec) immersion (without current)

A clear protective effect is already reached after 10 sec.

Rinsing (after Antitarnish 613)

It is recommended to rinse in two stages.
The first rinse - operated with deionized water - can be used as a recovery rinse where drag-out losses of the Antitarnish bath (the parts reach it dry!) are compensated. If the first rinse is designed as a flow rinse, clean tap water (town water) should be used.
Important: An alkaline pH-value removes the protective film. Therefore the pH-value of the subsequent rinses must be controlled!

Operating temperature: room temperature (up to maximally 50 °C)
Product agitation: good agitation required
Time of exposure:
Recommended rinsing time: 10 sec (barrel ware 30 sec)

The second (final) rinsing must in any case be carried out in deionized water:

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Recommended rinsing time: 10 sec
(barrel ware 30 sec)

In reel-to-reel plants with intensive spray rinsing, the rinsing times can be reduced.

Drying

When leaving the Antitarnish bath and the rinses, the articles are largely unwetted, i. e. only few drops of water are on the surface.

A longer exposure (> 5 minutes) to temperatures over 180 °C will destroy the protective layer and the antitarnish protection. Exposure to temperatures like these must be avoided!

The parts can be dried in centrifugal dryers, hot-air ovens (forced air) or in the case of strip materials in continuous furnaces (< 180 °C). In this case previous blowing off of all remaining drops with cold compressed air is recommended.

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 Bath Monitoring and Correction Special Process Hints

Inhibitor 1

After making up the solution it is first clear but it will become turbid within a short time. This turbidity need not be removed. It does not adversely affect the function.

The bath is not replenished but freshly made up when the drying effect decreases (2 ml of Inhibitor 1 Concentrate per 1 l of bath). The bath should be newly made up at the latest after a throughput of 10 m² per 1 l of bath, or if the throughput is low after a bath life of 4 weeks at the latest.

With regard to the waste water, the product is completely harmless. Spent baths after neutralisation can be discharged into the waste water or can be neutralised together with it.

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The active ingredient is replenished with Antitarnish 613 Concentrate, phosphoric acid 85 %, chemically pure, and Wetting Agent 20.

Per 10 m² of protected surface, 100 ml of Antitarnish 613 Concentrate, 3,6 ml of phosphoric acid, and 1 ml of Wetting Agent 20 are added.

Floating particles in the bath and dust on the bath sur-

face should occasionally be removed by filtration, as well as occasionally occurring flakes, which do not adversely affect the function. Continuous filtration is not allowed (high consumption).

Reprocessing of spent solutions:

The active ingredient is not a hazardous substance as defined by the hazardous substances regulation. It can be adsorbed by active carbon and can be burnt with it.

To dispose of the spent solutions, we recommend stirring these with 4 g/l of Active Carbon 1 at room temperature for several hours and filtering them subsequently. The filtrate (water) can be discharged into the works' waste waters.

Testing the protective capacity:

Important: The protective capacity may not be tested by immersing the protected articles in solutions of potassium sulphide (potassium polysulphide, liver of sulphur). This alkaline-aqueous solution removes the protective layer.

Gas tests with a hydrogen sulphide component are suitable. We recommend an accelerated thioacetamide test:

The parts to be tested are placed in a desiccator, in the bottom part of which there are 30 g of sodium acetate trihydrate and 10 ml of water (saturated solution). Additionally there is a large tray with thioacetamide (5 g powder) strewn on. This tray should be placed on a distance holder (e.g. a small beaker) closely below the perforated ceramic plate. The volume of the desiccator must not be less than 6 - 7 litres. In the upper part the test pieces are kept in the desiccator for 16 hours at 40 °C ± 2 °C. For this purpose the parts are placed or hanged on plastic or glass racks.

The colour of protected goods can be slightly brownish to brownish after the test. Although all conditions are constant the result can deviate from test to test. But the relation of protected silver to unprotected silver is stable. This means: a protected article can tarnish (more or less) during a test, but unprotected articles then are even more tarnished. Therefore, to check the protection efficiency, protected parts must always be compared to unprotected silver-plated parts. Edges and corners always tarnish to some extent. They are not taken into consideration for the comparison.

Note:

The test should not take place in the vicinity of a silver bath, because certain types of silver baths can be damaged by hydrogen sulphide.

Removal of the protective coating:

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

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Equipment

Bath tanks:	plastic tanks, preferably made of polypropylene
Heating:	not required for Inhibitor 1 for Antitarnish 613 adjustable heaters (coated with quartz, Teflon, or porcelain), because the optimal operating temperature is 35 °C. (Avoid overheating to > 40 °C!)
Agitation equipment:	Parts and/or bath should be sufficiently agitated in order to reach a uniform protective effect.
Exhaust system:	not required

Note

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

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