

SurTec® 670

High Performance Passivation

Properties

- chromium(VI)-free passivation with very good corrosion resistance
- suitable for galvanic zinc deposits
- applicable at room temperature
- suited for rack and barrel application
- produces clear, slightly iridescent passivation layers
- highly concentrated products
- layer fulfils all requirements of ELV, RoHS and WEEE when following the recommended process sequence (see application)
- IMDS-number: 10649640

Application

SurTec 670 is applied in rack or barrel application. The process SurTec 670 includes the following products:

- SurTec 670 I Passivation contains chromium(III), cobalt and the complexing agent in the correct relations.
- SurTec 670 II Booster is added for better corrosion resistance

optional recommended:

- SurTec 670 A Antifoam Agent can be added to the bath in case of too high foam formation

make-up values:

SurTec 670 I Passivation	10 %vol
SurTec 670 II Booster	5 %vol

analytical values:	SurTec 670 I	10 %vol
	cobalt	0.8 g/l

make-up:

Steps for make-up:

1. Fill in the tank the calculated amount of SurTec 670 I Passivation.
2. Dilute with tap water to about 90 % of the final volume (hot tap water is possible) and mix well.
3. Add the calculated amount of SurTec 670 II Booster slowly under continuous stirring.
4. Fill up to the final volume with tap water.
5. Check the pH value and adjust if necessary.

temperature:	25 °C	(20-30 °C)
pH-value:	2.2	(2.0-2.4)
	adjust with nitric acid or NaHCO ₃ (or Na ₂ CO ₃)	
application time:	60 s	(30-90 s)
tank material:	steel with acid resistant plastic coating	
agitation:	rack or (low) air agitation	
filtration:	necessary	
hints:	<p>As last step before SurTec 670 High Performance Passivation we recommend an acid activation in 0.5 %vol nitric acid (conc.), especially for parts plated in alkaline electrolytes.</p> <p>High iron contents in the passivation bath will firstly lead to a colour change of the layer, and later to a reduced corrosion resistance. So for baths with a high input of iron we recommend the installation of an ion exchange system. SurTec 680 IAT Ion Exchange Resin (see separate product information sheet) is specially able to exchange selectively iron out of the passivation solution, without disturbing the process of passivation.</p>	

recommended process sequence:

1. alkaline non cyanide zinc plating SurTec 704, minimum 8 µm
2. cascade rinsing
3. activation (nitric acid or hydrochloric acid) pH 1.0 for 10 s
4. rinse
5. **High Performance Passivation SurTec 670**
6. cascade rinsing
7. optional: sealing with SurTec 555 or SurTec 555 S
8. hot air drying (70-85 °C)

The rinsing methods have to be adapted to the plating line.

Technical Specification

(at 20 °C)	Appearance	Density (g/ml)	pH-value
SurTec 670 I	liquid, violet	1.186 (1.16-1.21)	< 1
SurTec 670 II	liquid, colourless, slightly turbid	1.037 (1.01-1.06)	10 (9-11)
SurTec 670 A	liquid, colourless-yellowish	0.965 (0.95-0.98)	-

Maintenance and Analysis

Check the pH-value regularly. Analyse and adjust the concentration of SurTec 670 I Passivation regularly.

Add SurTec 670 II Booster together with SurTec 670 I Passivation, in the same ratio as for the initial make-up.

In case of strong foam formation, SurTec 670 A Antifoam Agent can be added.
We recommend a maximum addition of 0.3 ml/l (only if foam occurs).

Dragged-in organic compounds (especially from acid zinc electrolytes) lead to precipitation of SurTec 670 II Booster. In this case we recommend an active carbon filtration of the rinse prior to the passivation.

Sample Preparation

Take a sample at a homogeneously mixed position. Let it cool down to room temperature.
If the sample is turbid, let the turbidity settle down and decant or filter the solution.

SurTec 670 I – Analysis by Titration

reagents: sodium hydroxide solution (NaOH solution, 10 %)
 H₂O₂ (> 30 %)
 hydrochloric acid (1:1)
 potassium iodide
 0.1 N sodium thiosulfate solution (= 0.1 mol/l)
 starch solution (1 %)

procedure: Repeat determination:

1. Pipette 5 ml bath sample into a 250 ml beaker.
2. Add 20 ml NaOH solution, let it react for a short time.
3. Dilute with deionised water to approx. 100 ml.
4. Add 5 ml H₂O₂ to the cold solution, cover it with a watch glass and let it react for 5 min without stirring.
5. Add another 5 ml H₂O₂.
6. Now stir the solution and heat it up, boil it for exactly 20 min (the maximum evaporation loss should be 50 ml).
7. After cooling to room temperature, wash down the drops from the watch glass and from the beakers walls, using small amounts of deionised water.
8. Add 40 ml half conc. hydrochloric acid.
9. Dilute with deionised water to approx. 150 ml.
10. Add approx. 2 g potassium iodide (colour changes to dark red/brown).
11. Titrate with 0.1 mol/l sodium thiosulfate solution to a weak yellow colour of the solution.
12. Add a few drops of starch solution (colour changes to blue/violet).
13. Continue titrating until the colour disappears.

calculation: consumption in ml · 1.086 = %vol SurTec 670 I

SurTec 670 I – Analysis by Photometry

- equipment: spectrophotometer or
filter photometer with 560 nm filter unit (± 50 nm)
100 ml volumetric flask
1 cm cuvette
- procedure: Plot of the calibration curve (quarterly):
Prepare standards with SurTec 670 I concentrate (dilution 1:4) in a 100 ml volumetric flask:
- | | |
|---------|--|
| 8 %vol | Fill up 2.0 ml concentrate to 100 ml and mix well. |
| 10 %vol | Fill up 2.5 ml ... |
| 12 %vol | Fill up 3.0 ml ... |
| 14 %vol | Fill up 3.5 ml ... |
- Fill each standard into a 1 cm cuvette, clean the outside of the cuvette with a soft cloth. Measure all standards at 560 nm photometrically against air and plot the absorbance against the concentration.
- Sample measurement (dilution 1:4):
1. Fill 25 ml of the filtrated sample into a volumetric flask (100 ml).
 2. Fill up with deionised water and mix well.
 3. Fill the solution into the same 1 cm cuvette, that was used for determining the calibration curve.
 4. Clean the cuvette with a soft cloth.
 5. Measure the solution in the photometer at 560 nm against air.
 6. Determine the concentration using the calibration curve.
- possible errors:
- Bath turbidity simulates a higher concentration, therefore the sample should be filtrated.
 - High amounts of iron or zinc impurities lead to wrong results. For this reason, a titrimetric analysis has to be done from time to time to confirm the photometric measurement.

Cobalt – Analysis by AAS

- instruments: atomic absorption spectrometer (AAS)
wave length: 240.7 nm
slit: 0.2 nm
- reagents: hydrochloric acid (1:1)
cobalt laboratory standards
- procedure: Prepare a dilution 1:100:
1. Pipette 1 ml bath sample into a 100 ml measuring flask.
 2. Add 5 ml half conc. hydrochloric acid.
 3. Fill up to 100 ml with deionised water and mix well.
 4. Measure against cobalt laboratory standards by AAS.
- calculation: measured value in ppm $\cdot 0.1 =$ g/l cobalt

Consumption and Stock Keeping

The consumption depends heavily on the drag-out. To determine the exact amounts of drag-out, see [SurTec Technical Letter 11](#).

For each litre of dragged out solution, 100 ml of SurTec 670 I Passivation and 50 ml/ SurTec 670 II Booster have to be added.

In order to prevent delays in the production process, per 1,000 l bath, the following amounts should be kept in stock:

SurTec 670 I	150 kg
SurTec 670 II	75 kg
SurTec 670 A	20 kg

Product Safety and Ecology

The safety instructions and the instructions for environmental protection have to be followed in order to avoid hazards for people and environment. The Material Safety Data Sheets (according to European legislation) contain explicit details for this.

The following hazard designations and classifications into water hazard classes (WHC) have to be taken into account:

<u>product</u>	<u>hazard designation</u>	<u>water hazard class</u>
SurTec 670 I	T - Toxic N - Dangerous for the environment	WHC 2
SurTec 670 II	-	WHC 0
SurTec 670 A	Xi - Irritant	WHC 1

Warranty

We are responsible for our products in the context of the valid legal regulations. The warranty exclusively accesses for the delivered state of a product. Warranties and claims for damages after the subsequent treatment of our products do not exist. For details please consider our [general terms and conditions](#).

Further Information and Contact

In our forum, you can discuss topics of the surface technology:
<http://forum.SurTec.com/>

If you have any questions concerning the process, please contact your local technical department: <http://SurTec.com/International.html>