

SurTec® 609 GV

ZetaCoat

Properties

- suitable as multi-metal passivation prior to painting (steel, aluminium, HDG and EG zinc and zinc die cast)
- for spray and immersion application
- especially designed for subsequent anaphoretic or cataphoretic paint
- based on trivalent chromium
- produces uniform nano-size layers
- gives perfect adhesion of lacquers and excellent corrosion protection
- no or very low sludge formation
- low process temperature
- especially robust against flash corrosion
- enables automatic dosing via pH-measurement or conductivity
- free of phosphates, zinc, nickel, manganese and VOC
- in full compliance with RoHS (EU Directive 2002/95/EC), WEEE (EU Directive 2002/96/EC) and ELV
- IMDS-number: 127253084

Application

make-up value: 1.5 %vol (0.5-3.0 %vol)

control parameter for the bath maintenance:

Total Acidity (TA) 4.0 Points (3.5-15.0 Points)

chromium(III) 10-50 ppm

pH-value: 4.7 (4.2-5.2)

optional control parameter:

zirconium 10-240 mg/l

temperature: room temperature (20-35° C)

application time: 30 s (20-120 s)

spray pressure: 0.8-1.2 bar

make-up: Steps for make-up:

1. Dilute SurTec 609 GV ZetaCoat concentrate with deionised water under vigorous stirring.
2. Control the pH-value and adjust it, if necessary.

tank material: stainless steel or steel with acid-resistant coating

filtration: remove sludge, only if necessary (see: "hints")

heating: required, out of acid-resistant material

exhaust: required for worker's protection

- hints: After some time a minor amount of sludge might be formed in the bath, which does not affect the quality of the process. Occasionally it can be removed by pressure cleaning, e.g. during a revision or a bath change.
- During processing steel parts, the colour of the passivation bath turns from light green to red-brown.
- The colour of the processed parts depends on material and alloy. Steel surfaces appear silver to brass/gold. Aluminium surfaces will appear colourless to yellowish.
- storage: During storage, in the SurTec 609 GV concentrate a slight precipitation may occur. This will not impair quality or function of the product.
- recommended process sequence:
1. cleaning SurTec 168 / SurTec 086 (for steel only)
SurTec 132 / SurTec 086 (for multi-metal)
 2. rinsing
 3. DI-rinsing (maximum 350 $\mu\text{S}/\text{cm}$, 100 ppm Ca)
 4. passivation SurTec 609 GV ZetaCoat
 5. rinsing with DI-water (max. 50 $\mu\text{S}/\text{cm}$)
 6. hot air drying
- The rinsing methods have to be adapted to the pretreatment line.

Technical Specification

(at 20 °C)	Appearance	Density (g/ml)	pH-value (conc.)
SurTec 609 GV	liquid, green, clear	1.015 (1.00-1.03)	approx. 1.8

Maintenance and Analysis

The pH-value needs to be controlled and adjusted regularly, at least 2 times per shift. The maintenance of the pH-value in the desired range of pH 4.2-5.2 is done by using SurTec 609 GV.

The concentration of SurTec 609 GV can be analysed by Total Acidity (TA) and it is highly recommended to control the concentration by Total Acidity regularly. By dragging-in of impurities like inorganic or organic salts, the Total Acidity (TA) can be influenced. In case of such a drag-in, after adjusting the pH-value, the determination of the TA-Points may yield in misleading, that means at too high values. This effect can be strongly reduced by a good rinsing quality.

An additional routine control of the chromium content is recommended. If the Total Acidity exceeds 25 Points and the chromium(III) content is below 10 ppm, a new bath make-up is necessary.

Besides analysing the chromium content, a photometric analysis of zirconium can be used for additional control.

An automatic dosing system is recommended to avoid strong variations of the process parameter.

Sample Preparation

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

Total Acidity (TA) - Analysis by Titration

reagents:	0.1 N sodium hydroxide solution (NaOH solution) indicator: phenolphthalein
procedure:	1. Pipette 100 ml bath sample into a 250 ml Erlenmeyer flask. 2. Add 3 drops of indicator. 3. Titrate with 0.1 N NaOH solution from colourless to pink.
calculation:	consumption in ml = TA-Points
correction:	For each missing TA-Point: add 0.5 ml/l SurTec 609 GV

Zirconium - Analysis by Photometry (optional)

equipment:	Photometric Test LCK 364 Zirconium of Co. HACH LANGE Table photometer or POCKET photometer with a wave length of 500 nm with adapter for LANGE cuvette test and POCKET light protection cap. (Currently the LCK 364 Test Kit is commercially available only in Europe and India.)
procedure:	For bathes with 0.25-1.5 %vol SurTec 609 GV the test can be used directly after the filtration with a blue ribbon filter. For all other bathes an adequate dilution is required. For bathes with 1.5-6 %vol SurTec 609 GV make a 1:4 dilution (F = 4): 1. Pipette 25 ml filtered bath sample into a 100 ml volumetric flask, fill up to the mark with deionised water and mix well. Measuring of the zero value: 2. Close the cuvette slit of the photometer and set the blank value at 500 nm against air. 3. Then remove the sealing from the DosiCap, unscrew the cap from the cuvette and screw the inverted cap on the cuvette. 4. Then let the dye stuff dissolve in the cuvette by shaking for 10 seconds (now the solution is yellow, it must be clear and free of air bubbles and particles). Clean the cuvette with a soft towel to remove fingerprint residues and measure the absorbance $ABS_{(zero)}$ in the photometer at 500 nm. Measuring of the bath sample: 5. Take the cuvette out of the photometer, open the cap and pipette 0.2 ml diluted bath sample into the cuvette. 6. Close the cuvette with the cap and shake it very well (depending on the zirconium content, the solution becomes slightly or strongly orange). 7. After 5 minutes measure the absorbance $ABS_{(zero + sample)}$ at 500 nm in the photometer.

calculation: *Determination with POCKET or table photometer at 500 nm (measuring without program):*
 First calculate the 0.2 ml cuvette volume change for the determination of the blank value:
 $ABS_{(zero)} \cdot 0.9643 = ABS_{(corr.)}$
 With the corrected zero value calculate the absorbance of the sample:
 $ABS_{(zero + sample)} - ABS_{(corr.)} = ABS_{(sample)}$
 $ABS_{(sample)} \cdot 174.6 - 1.2 = \text{mg/l zirconium}$
 For dilutions multiply the calculated zirconium content with the dilution factor F (F = 4):
 $\text{mg/l zirconium} \cdot F = \text{mg/l zirconium in the bath}$

correction: addition of 1 ml/l SurTec 609 GV = rise by 4 mg/l zirconium

Chromium - Analysis by Titration

reagents: sulfuric acid (conc.)
 ammonium peroxodisulfate p. a.
 0.1 mol/l silver nitrate solution
 potassium fluoride p. a.
 potassium iodide solution (10 %)
 0.01 N sodium thiosulfate solution
 starch solution (2 %)

procedure:

1. Pipette 100 ml bath sample into a 250 ml Erlenmeyer flask.
2. Acidify with 3 ml sulfuric acid.
3. Add 3 g ammonium peroxodisulfate.
4. Add 10 ml silver nitrate solution.
5. Cover the flask with a watch glass. Then boil the solution slightly for 20 min (it must not evaporate completely!).
6. Let it cool down to room temperature.
7. Add a spatula tip of potassium fluoride.
8. Add 15 ml potassium iodide solution.
9. Leave 5 min for reaction.
10. Titrate with 0.01 N sodium thiosulfate solution until the solution becomes weakly yellow.
11. Add 5 ml starch solution (solution colour turns to blue-black).
12. Continue to titrate to a milky light green colour.

calculation: consumption in ml $\cdot 1.6 = \text{ppm chromium}$

correction: For each missing ppm chromium: add 0.7 ml/l SurTec 609 GV
 If the Total Acidity exceeds 25 TA-Points and simultaneously the chromium content is below 10 ppm, the bath has to be replaced by a new make-up.

Hints for Automatic Process Control

In case of a good DI-rinse quality prior to the SurTec 609 GV bath (fresh water with $< 100 \mu\text{S}/\text{cm}$; max. value of the DI-Rinse $200 \mu\text{S}/\text{cm}$), a control via conductivity might be possible. This is only recommended, if the dosing is done completely automatically.

The correct automatic process controls the settings in respect to the process parameter and process maintenance will be set during the start-up phase.

The correct adjustment, defining the desired conductivity value and adjusting the pump system for replenishment, is done during the start-up of a new process together with SurTec personnel.

SurTec 609 GV - Automatic Process Control via Conductivity

Only applicable after the process has been stabilised in the start-up phase and the dosing is running completely automatically.

equipment: conductivity meter

procedure: A new make-up has the following conductivity:

1.5 %vol SurTec 609 GV = 4 TA-Points = $450 \mu\text{S}/\text{cm}$

In the beginning the conductivity will increase, but after a certain time it will stabilize at a certain level, e.g. at $700 - 900 \mu\text{S}/\text{cm}$.

setting: If a good rinse water quality can be guaranteed before the SurTec 609 GV bath, the conductivity can be maintained at a certain conductivity level by automatic dosing of SurTec 609 GV.

Still for process control the concentrations (TA, Cr and/or Zr) and the pH value need to be kept within the desired ranges in order to ensure the optimum process quality.

comment: If the conductivity increases rapidly for more than $200 \mu\text{S}/\text{cm}$, the potential sources have to be evaluated, like drag-in (e.g. quality of the DI-rinse prior to the SurTec 609 GV tank) or other possible sources for pollution of the SurTec 609 GV bath.

After a rapid increase of the conductivity the adjustment of the conductivity is not possible. In those cases - both from a technical and from a commercial point of view - a fresh make-up of the bath is the optimum solution.

Ingredients

- chromium(III)salts
- fluorides

Stock Keeping

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

SurTec 609 GV ZetaCoat 100 kg

Product Safety and Ecology

Classification and designation are noted in the Material Safety Data Sheets (according to European legislation). 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 contain explicit details for this.

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

If you have any questions concerning the process, please contact your local technical department.

For further information and contact details please visit our homepage:

<http://www.SurTec.com>

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