SurTec® 614
Zinc-Calcium Phosphating
For Immersion Application

Properties

- suitable for steel and zinc substrates
- produces homogenous depositions of zinc-calcium phosphate layers
- good corrosion protection
- excellent adhesion properties for subsequent coatings such as rubber coatings, paint and adhesives
- forms a fine spherical crystal structure
- long service life
- IMDS-number: 7027255

Application

SurTec 614 is applied in immersion process.

The process SurTec 614 includes the following products:

- SurTec 614 Zinc-Calcium Phosphating is the make-up and replenishing solution
- SurTec 612 S Accelerator is added optionally (at lower working temperature)

make-up values:	SurTec 614	36 ml/l	
	SurTec 612 S	1.6 ml/l	(optional)
analytical values:	Total Acid (TA)	20 Points	(20-28 Points)
	Free Acid (FA)	4.5 Points	(3.0-6.0 Points)
	to neutralize 1 Point, add 0.4 g/l NaOH		
	Acid Ratio (TA/FA)	3.6	(3-4)
	SurTec 612 S	6.0 Points	(2.5-6.6 Points)
	iron(II) content	< 4 g/l	(without using SurTec 612 S)

make-up: Steps for make-up:

1. Dissolve SurTec 614 in water with strong agitation.
2. Pre-dilute SurTec 612 S Accelerator in water and add it under strong agitation to the bath:
   example: for 1000 l bath dissolve 1.6 l SurTec 612 S in 5 l water and add it to the bath.

temperature:	85°C	(80-90°C)	*<u>without</u> SurTec 612 S Accelerator*
	70°C	(65-75°C)	*<u>with</u> SurTec 612 S Accelerator*

application time: 2-5 min

agitation: not necessary

tank material: stainless steel

filtration: periodically remove sludge: filter sludge and return filtrate to the bath

heating:	necessary; stainless steel heaters (type 1.4571)
cooling:	not required
exhaust:	required for worker's protection
hint:	The bath must not be operated below 20 Total Acid Points.

recommended process sequence:

1. highly alkaline cleaning, e.g. SurTec 168/089
   or SurTec 138/089
2. rinsing
3. pickling, e.g. with sulfuric acid and SurTec 424
4. rinsing
5. grain refiner, e.g. SurTec 610 V
6. **Phosphating with SurTec 614**
7. rinsing
8. rinsing with DI-water
9. drying at < 110°C

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

Technical Specification

(at 20°C)	Appearance	Density (g/ml)	pH-value (conc.)
SurTec 614	liquid, colourless	approx. 1.440	< 1
SurTec 612 S	liquid, yellowish	approx. 1.214	approx. 11.5

Maintenance and Analysis

Replenish evaporation losses continuously by adding deionised water.

Analyse and adjust the concentration of SurTec 612 S, Total Acid and Free Acid regularly.

In case of high throughput, the use of an automatic dosing system is recommended in order to avoid varying concentrations.

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.

Total Acid (TA) – Analysis by Titration

reagents:	0.1 N sodium hydroxide solution indicator: phenolphthalein
procedure:	1. Pipette 10 ml bath sample into a 250 ml Erlenmeyer flask. 2. Dilute with approx. 50 ml deionised water. 3. Add 5 drops of indicator. 4. Titrate with 0.1 N sodium hydroxide solution from colourless to light pink.
calculation:	consumption in ml = TA-Points
correction:	for each missing TA-Point = addition of 1.8 ml/l SurTec 614

Free Acid (FA) – Analysis by Titration

reagents: 0.1 N sodium hydroxide solution
indicator: bromophenol blue

procedure:
1. Pipette 10 ml bath sample into a 250 ml Erlenmeyer flask.
2. Dilute with approx. 50 ml deionised water.
3. Add 5 drops of indicator.
4. Titrate with 0.1 N sodium hydroxide solution from yellow to blue.

calculation: consumption in ml = FA-Points

correction: To neutralize 1 Free Acid Point:
add 0.4 g/l NaOH (pre-diluted in water, 10 %)

SurTec 612 S Accelerator – Analysis by Titration

reagents: 0.1 N potassium permanganate solution
sulfuric acid (50 %)
urea p.a.

procedure:
1. Pipette 50 ml bath sample into a 250 ml Erlenmeyer flask.
2. Add 1-2 ml sulfuric acid.
3. Titrate with 0.1 N potassium permanganate solution to a stable pink colour (for at least 15 s).

   consumption in ml = **A**
4. Pipette 50 ml bath sample into another 250 ml Erlenmeyer flask.
5. Add 1-2 ml sulfuric acid.
6. Add 4 g urea.
7. Stir the solution until the urea has dissolved and wait for approx. 5 min.
8. Titrate with 0.1 N potassium permanganate solution to a stable pink colour (for at least 15 s).

   consumption in ml = **B**

calculation: SurTec 612 S Accelerator:
A - **B** = SurTec 612 S - Points

concentration of iron(II):
B · 0.5584 / 5 = g/l Fe(II)

Ingredients

SurTec 614

- phosphoric acid
- nitric acid
- zinc salts
- calcium salts

SurTec 612 S

- nitrite salts

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.

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

SurTec 614	60 kg
SurTec 612 S	1 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:

product	*hazard designation*	*water hazard class*
SurTec 614	Xn - Harmful N - Dangerous for the environment	WHC 3
SurTec 612 S	T - Toxic N - Dangerous for the environment	WHC 2

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

1 February 2012/DK, WT