SurTec® 618
Tri-Cationic Phosphating

Properties

- low temperature process
- for spray or immersion application
- suitable for steel substrates
- produces micro-crystalline and uniform layers
- excellent corrosion protection
- forms only very small amounts of sludge
- adherent deposition of predominantly hopeite crystals
- excellently prepares the surface for subsequent coatings
- IMDS number: 98172765

Application

SurTec 618 can be used for spray or immersion application. The process SurTec 618 includes the following products:

- SurTec 618 Phosphating Concentrate is used for the make-up and the maintenance
- SurTec 612 S is used as Accelerator
- NaOH (99 %) only is used to neutralise too high amounts of Free Acid

	spray		*immersion*	
make-up values:				
SurTec 618	40 ml/l		40 ml/l	
SurTec 612 S	0.8 ml/l		2.7 ml/l	
analytical values:	*spray*		*immersion*	
Total Acid (TA)	22 Points	(20-25 Points)	22 Points	(20-25 Points)
Free Acid (FA)	1.3 Points	(0.8-1.5 Points)	1.7 Points	(1.5-2.0 Points)
	(to neutralise 1 Point add 0.4 g/l NaOH)			
SurTec 612 S	4 Points	(3-5 Points)	12 Points	(6-12 Points)
temperature:	35 °C	(25-55 °C)	30 °C	(20-35 °C)
application time:	> 1 min	(1-3 min)	3 min	(3-5 min)

make-up: Steps for make-up:

1. Dissolve SurTec 618 in water with strong agitation.
2. Pre-dilute SurTec 612 S in water and add it to the bath; e.g. for 1000 l bath, dissolve 800 ml SurTec 612 S in 5 l water and add it to the bath.
3. Analyse the Free Acid Points and adjust them by adding pre-diluted caustic soda (10 %) very carefully and slowly.

spraying pressure: 0.8 bar (0.6-1.0 bar)

agitation: in case of immersion a slight agitation by stirring or pump systems are recommended

tank material:	stainless steel
filtration:	periodically remove sludge: filter sludge and return filtrate to the bath
heating:	necessary; stainless steel heaters (type 1.4571), or steel coated with PTFE
cooling:	not necessary
exhaust:	required for worker's protection
hint:	The deposited layer weight varies from 1.8-2.4 g/m^2.

recommended process sequence (for iron parts):

1. degreasing combined with grain refinement, e.g. SurTec 145
2. rinsing
3. phosphating with **SurTec 618**
4. rinsing
5. DI-water rinsing
6. drying at max. 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 618	liquid, greenish	1.430 (1.40-1.46)	< 2
SurTec 612 S	liquid, yellowish	1.214 (1.19-1.24)	11.5 (10-12.5)

Maintenance and Analysis

Replenish evaporation losses continuously by adding deionised water.

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

In case of high throughput, use an automatic dosing system 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:	Add 1.6 ml/l SurTec 618 for each missing Total Acid Point

Free Acid (FA) – Analysis by Titration

reagents: 0.1 N sodium hydroxide solution
indicator: bromphenol 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 neutralise 1 Free Acid Point, add 0.4 g/l NaOH (pre-diluted with water, 10 %).

SurTec 612 S Accelerator – Analysis by Titration

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

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

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

correction: Add 0.27 ml/l SurTec 612 S for each missing Point

Layer Weight Determination

reagents: chromic acid (5 %)

procedure:
1. Phosphate a test part of known surface area, rinse it with DI-water, dry and weigh it by means of an analytical balance with an accuracy of 0.1 mg (= **A**).
2. Remove the phosphate layer in 5 % chromic acid at 75 °C for 10 min.
3. Rinse the part, dry it and weigh again (= **B**).

calculation: [**A** - **B**] / area in m^2 = g/ m^2

Ingredients

SurTec 618

- phosphoric acid
- nitric acid
- zinc salts
- nickel salts
- manganese 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 618	90 kg
SurTec 612 S	30 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 618	T - Toxic 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

29 October 2009/DK, PV