

# SurTec® 618

## Tri-Cationic Phosphating

### Properties

- low temperature process
- for spray or immersion application
- suitable for steel and zinc substrates
- produces micro-crystalline and uniform layers
- excellent corrosion protection
- forms only very small amounts of sludge
- adherent deposition of predominantly hopeite crystals
- prepares the surface excellently for subsequent coatings
- very inert layer, suitable for electrophoretic lacquering (EPD)
- 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 make-up and maintenance
- SurTec 612 S is the Accelerator
- NaOH (99 %) is used only to neutralize too high amounts of Free Acid

make-up values:	<i>spray application</i>	<i>immersion application</i>
SurTec 618	40 ml/l	40 ml/l
SurTec 612 S	0.8 ml/l	2.7 ml/l

  

analytical values:		
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 neutralize 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 under strong agitation;  
Example 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<sup>2</sup>.

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 the content of 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: 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 with 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 of sulfuric acid. 3. Titrate with 0.1 N potassium permanganate solution to a stable pink colour (for at least 15 s). = consumption <b>A</b> (ml) 4. Pipette 50 ml bath sample into another 250 ml Erlenmeyer flask. 5. Add 1-2 ml sulfuric acid. 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 <b>B</b> (ml)
calculation:	consumption <b>A</b> - consumption <b>B</b> = SurTec 612 S -Points
correction:	Add 0.27 ml/l SurTec 612 S for each missing Point

### SurTec 618 – Determination of the Layer Weight

reagents:	chromic acid (5 %)
procedure:	1. Phosphate a test part of known surface area, rinse it with deionised water, dry and weigh it by means of an analytical balance with an accuracy of 0.1 mg (= <b>A</b> ). 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>B</b> ).
calculation:	$[A - B] / \text{area in m}^2 = \text{g/ m}^2$

## 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:

<u>product</u>	<u>hazard designation</u>	<u>water hazard class</u>
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>

15 July 2011/DK, WT