

SurTec® 619

Zinc Phosphating

Properties

- for immersion application
- suitable for steel substrates
- prepares the surface for cold forming, stamping and wire drawing
- produces micro-crystalline layers
- uniform deposition
- excellent corrosion protection
- forms only very small amounts of sludge
- very profitable process
- adherent deposition of predominantly phosphophyllite crystals
- IMDS-number: 7026761

Application

The process SurTec 619 can be run with or without accelerator on the iron side. By the use of an accelerator the phosphate layer will become thicker and more microcrystalline. The phosphating of rolled and forged parts will become more uniform.

The process includes the following products:

- SurTec 619 for make-up and maintenance
- SurTec 619 A Additive for the initial make up
- SurTec 612 S is used as accelerator

make-up values:	with accelerator	without accelerator
SurTec 619	16.5 ml/l (15.5-17.5 ml/l)	16.5 ml/l (15.5-17.5 ml/l)
SurTec 619 A	18.8 ml/l	18.8 ml/l
SurTec 612 S	1.5 ml/l	-
analytical values:		
Total Acid (TA)	21.5 TA-Points (20-23)	21.5 TA-Points (20-23)
Free Acid (FA)	3.1 FA-Points (2.7-3.5)	3.1 FA-Points (2.7-3.5)
	(to neutralize 1 Point, add 0.4 g/l NaOH)	
SurTec 612 S	4.5 Points (2.5-6.5)	-
Iron(II)	-	< 10 g/l (0-10 g/l)
temperature:	75°C (70-80°C)	75°C (55-80°C)
application time:	3-10 min	4-15 min
layer weight:	approx. 5-8 g /m ²	approx. 6-10 g /m ²

make-up:	<p>Steps for make-up:</p> <ol style="list-style-type: none"> 1. Dissolve SurTec 619 in deionised water portion by portion under strong agitation. 2. Add SurTec 619 A to the bath under agitation. 3. For application with accelerator: Pre-dilute SurTec 612 S in water and add it to the bath under strong agitation. Example for 1000 l bath: Dissolve 1.5 l SurTec 612 S in 5 l water and add it to the bath. 4. Analyse the Free Acid Points and adjust them, if necessary, by adding pre-diluted caustic soda very carefully and slowly.
agitation:	<p>not recommended; in case of barrel application: very slow barrel movement, if possible with occasional stop of the barrel rotation</p>
tank material:	stainless steel
filtration:	<p>periodically remove sludge: filter the sludge and return the filtrate to the bath</p>
heating:	necessary: stainless steel heaters (type 1.4571), out of acid resistant material
cooling:	not required
exhaust:	required for worker's protection
hint:	In case of high throughput, use an automatic dosing system to avoid varying concentrations.

Recommended process sequence:

1. degreasing, e.g. SurTec 168/089 or SurTec 138/089
2. rinsing
3. pickling, e.g. sulfuric acid with SurTec 424
4. rinsing
5. activation with SurTec 610 V Grain Refiner
6. **phosphating with SurTec 619**
7. rinsing
8. neutralizing, e.g. SurTec 533
9. lubrication
10. forming

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

Maintenance and Analysis

Replenish evaporation losses continuously by adding DI-water.

Analyse and adjust Total Acid, Free Acid and, depending on the process, SurTec 612 S or iron regularly.

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:	<ol style="list-style-type: none">1. Pipette 10 ml bath sample into a 250 ml Erlenmeyer flask.2. Dilute with deionised water to approx. 100 ml.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:	To adjust the Total Acid Points, use SurTec 619: Add 1.0 ml/l SurTec 619 for each missing TA-Point.

Free Acid (FA) – Analysis by Titration

reagents:	0.1 N sodium hydroxide solution indicator: bromophenol blue
procedure:	<ol style="list-style-type: none">1. Pipette 10 ml bath sample into a 250 ml Erlenmeyer flask.2. Dilute with deionised water to approx. 100 ml.3. Add 3 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 %). Add 2.7 ml/l SurTec 619 for each missing FA-Point.

SurTec 612 S Accelerator – Analysis by Titration

reagents:	0.1 N potassium permanganate solution sulfuric acid (50 %) urea p.a.
procedure:	<ol style="list-style-type: none">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 = A4. 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.7. 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:	A - B = SurTec 612 S - Points
correction:	Add 0.27 ml/l SurTec 612 S for each missing Point.

Iron(II) – Analysis by Titration

reagents:	0.1 N potassium permanganate solution sulfuric acid (50 %)
procedure:	<ol style="list-style-type: none">1. Pipette 10 ml bath sample into a 250 ml Erlenmeyer flask.2. Dilute with approx. 100 ml deionised water.3. Add 1-2 ml sulfuric acid.4. Titrate with 0.1 N potassium permanganate solution to a stable pink colour (for at least 15 s).
calculation:	consumption in ml · 0.56 = g/l Iron(II)
correction:	Usually the iron content stabilizes itself at about 6.0 g/l iron. If the iron content exceeds 10 g/l, a partly new make-up of the bath is necessary.

Technical Specification

(at 20°C)	Appearance	Density (g/ml)	pH-value (conc.)
SurTec 619	liquid, light greenish	1.670 (1.65-1.69)	< 2
SurTec 619 A	liquid, colourless	1.420 (1.40-1.44)	< 2
SurTec 612 S	liquid, yellowish	1.214 (1.19-1.24)	11.5 (10-12.5)

Ingredients

SurTec 619

- phosphoric acid
- nitric acid
- zinc salts
- nickel salts

SurTec 619 A

- zinc salts
- nitric acid

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](#).

SurTec 619 is very profitable:

1 kg of SurTec 619 is sufficient to phosphate 40 m² surface.

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

SurTec 619	50 kg
SurTec 619 A	50 kg
SurTec 612 S	10 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 619	T - Toxic N - Dangerous for the environment	WHC 3
SurTec 619 A	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>

28 June 2011/DK, WT