

# SurTec® 610 M/R

## Zinc Phosphating

### Properties

- for immersion application
- suitable for iron and steel substrates
- prepares the surface for subsequent forming processes, oiling and lubrication
- produces micro-crystalline layers
- uniform deposition
- works on the iron site
- excellent corrosion protection
- forms only very small amounts of sludge

### Application

SurTec 610 M/R is applied by immersion.

The process SurTec 610 M/R Zinc Phosphating includes the following products:

- SurTec 610 M Make-up Solution
- SurTec 610 R Replenishment Solution
- NaOH (99 %), only used to neutralize too high amounts of Free Acid

make-up value:	SurTec 610 M	120 ml/l	(110-130 ml/l)
analytical values:	Total Acid Points (TA)	37 Points	(35-40 Points)
	Free Acid Points (FA)	2.6 Points	(2.2-3.0 Points)
	to neutralize 1 Point, add 0.8 g/l NaOH		
	acid ratio (TA : FA)	16	(13-20) at 25-35°C
		12.5	(10-15) at 45-55°C
	iron content	max. 8 g/l	
make-up:	Steps for make-up:		
	1. Dissolve SurTec 610 M in water with strong agitation.		
	2. Analyse the Free Acid Points and adjust them by adding pre-diluted caustic soda very carefully and slowly.		
temperature:	45°C	(25-55°C)	
application time:	7-15 min		
agitation:	not recommendable		
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 applicable		
exhaust:	required for worker's protection		

hints:                   The deposited layer weight varies from 10-20 g/m<sup>2</sup>.  
In case of high throughput, use an automatic dosing system to avoid varying concentrations.

recommended process sequence:

1. degreasing, e.g. SurTec 168/089
2. rinsing
3. pickling, e.g. sulfuric acid with SurTec 424
4. rinsing
5. activation, e.g. SurTec 610 V  
(sometimes an activation in hot water is sufficient)
6. **phosphating with SurTec 610 M/R**
7. rinsing
8. neutralizing, e.g. SurTec 533
9. lubricating, e.g. SurTec 585 Reactive Soap;  
or oiling, e.g. SurTec 590
10. deforming

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

## Maintenance and Analysis

Replenish evaporation losses continuously by adding deionised water.

Analyse and adjust Total Acid, Free Acid and the iron concentration regularly.

If larger amounts of fresh bath solution are required after sludge removal, or if a partly new make-up of the bath is necessary only use **SurTec 610 M** for replenishment.

Best practice for maintenance is to replenish the bath regularly in order to avoid variations of the Total Acid resp. to avoid stock additions of more than 2 Points.

### 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 5 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:           lack of TA-Points > 4 Points:  
only use SurTec 610 M for replenishment  
For each missing TA-Point add 3.15 ml/l SurTec 610 M.

lack of TA-Points < 4 Points:  
adjust with SurTec 610 R in small dosage steps;  
the best way is a continuous dosage with a dosage pump  
For each missing TA-Point add 4.2 ml/l SurTec 610 R.

### Free Acid (FA) – Analysis by Titration

reagents:	0.1 N sodium hydroxide solution indicator: bromophenol blue
procedure:	1. Pipette 5 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 0.8 g/l NaOH (pre-diluted with water, 10 %).

### Iron (Fe) – Analysis by Titration

reagents:	0.1 N potassium permanganate solution sulfuric acid (50 %)
procedure:	1. Pipette 10 ml bath sample into a 250 ml Erlenmeyer flask. 2. Add 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 Fe(II)
correction:	Usually, the iron concentration stabilizes at approx. 8.0 g/l. If the iron concentration exceeds 8 g/l, a part of the bath has to be made up freshly.

## Technical Specification

(at 20°C)	Appearance	Density (g/ml)	pH-value (conc.)
SurTec 610 M	liquid, bluish	1.510 (1.48-1.54)	< 1
SurTec 610 R	liquid, greenish	1.379 (1.36-1.42)	< 1

## Ingredients

SurTec 610 M and SurTec 610 R

- phosphoric acid
- nitric acid
- zinc salts
- nickel 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 610 M Make-up Solution	200 kg
SurTec 610 R Replenishment Solution	150 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 610 M	T - Toxic N - Dangerous for the environment	WHC 3
SurTec 610 R	Xn - Harmful N - Dangerous for the environment	WHC 3

## 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>

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