# SurTec® 835
## Electroless Nickel Process

## Properties

- proofed, highly stable alkaline nickel process without current flow
- works even at lower temperatures and has a wide temperature window
- fast deposition of homogenous and well conducting nickel layers
- especially developed for pretreated plastic and other non-conductive parts

## Application

make-up values:

| | | |
|---|---|---|
| SurTec 835 I Nickel Concentrate | 55 ml/l | (45-65 ml/l) |
| SurTec 835 II Reductor | 50 ml/l | (40-55 ml/l) |

| | | | |
|---|---|---|---|
| analytical values: | nickel (out of part I) | 3.4 g/l | (3.2-3.5 g/l) |
| | reductor (out of part II) | 20.5 g/l | (19-22 g/l) |

make-up: Steps for make-up:

1. Fill 75 % of the deionised water into the tank.
2. Dissolve SurTec 835 I portion by portion, stirring well.
3. Add SurTec 835 II while stirring.
4. Adjust the pH-value with conc. ammonia solution (28 %) to pH 8.8-9.0.
5. Fill up to the final volume.

temperature: 25-35°C (20-40°C)

pH-value: 8.8-9.0 (8.5-9.0)
adjust with sulfuric acid (50 %vol)
resp. with concentrated ammonia solution (28 %)

application time: 6 min (5-10 min)

agitation: rack agitation (air agitation is not possible)

tank material: steel tanks with coating out of PP, PE or PVC

filtration: continuously with 1-2 x the total bath volume per hour;
PP filter cartridge with a pore size of 1-3 µm

Once a week a complete filtration into a reserve tank is necessary, while the working tank has to be passivated with nitric acid.
Wash new filter cartridges with hot water before use (until no foam can be seen any more).

heating: necessary; coated with silica, porcelain or Teflon;
To prevent local overheating, bath warmers should be flooded with bath solution (e.g. with the input of the filtration)

exhaust: recommended for worker's protection

hint: A throughput of 4 $dm^2$/l surface is not critical.

recommended process sequence (for ABS):

1. chromo-sulfuric acid pickling with SurTec 960
2. reduction with SurTec 965
3. Pd-Activator SurTec 966
4. Accelerator SurTec 969
5. **Electroless Nickel Process SurTec 835**
6. Watts Nickel Process SurTec 850
   (2 min at 2 Volt, than 8 min at 4 Volt, approx. 10 min)
7. Bright Acid Copper Process SurTec 869
8. Semi Bright Nickel Process SurTec 854
9. Bright Nickel Process SurTec 855
10. (optional: Microporous Nickel Process SurTec 859)
11. Bright Chromium Process — *trivalent:* SurTec 876; *hexavalent:* SurTec 871

Between each step, there has to be rinsed. The rinsing methods have to be adapted to the plating line.

## Technical Specification

| *(at 20°C)* | Appearance | Density (g/ml) | pH-value (conc.) |
|---|---|---|---|
| SurTec 835 I | liquid, blue | 1.168 (1.15-1.20) | 8.5 (8-9) |
| SurTec 835 II | liquid, colourless | 1.240 (1.22-1.27) | 6.8 (6-7.5) |

## Maintenance and Analysis

Analyse and adjust the concentration of SurTec 835 I Nickel Concentrate and SurTec 835 II Reductor regularly. Control and adjust the pH-value twice a day.

### 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.

### SurTec 835 I Nickel Concentrate – Analysis by Titration

reagents:
0.1 mol/l EDTA solution (Titriplex III)
ammonia solution (conc.)
indicator: Murexid

procedure:
1. Pipette 10 ml bath sample into a 250 ml Erlenmeyer flask.
2. Dilute with deionised water to approx. 50 ml.
3. Add 10 ml ammonia solution.
4. Add a spatula tip of indicator.
5. Titrate with 0.1 M EDTA solution from colourless-yellow to violet.

calculation:
consumption in ml · 0.587 = g/l nickel
consumption in ml · 9.48 = ml/l SurTec 835 I

correction:
For each added ml SurTec 835 I Nickel Concentrate, 1 ml SurTec 835 II Reductor has to be added as well.

**SurTec 835 II Reductor – Analysis by Titration**

| | |
|---|---|
| reagents: | 0.1 N sodium thiosulfate solution ($Na_2S_2O_3$-solution)<br>6 N hydrochloric acid (hydrochloric acid (37 %) p. a., 1:1 diluted with deionised water)<br>0.1 N iodine or iodine/iodate solution (= 0.05 M)<br>indicator: starch solution (1 %) |
| procedure: | 1. Pipette 10 ml bath sample into a 250 ml iodine counter flask.<br>2. Acidify with 25 ml hydrochloric acid.<br>3. Add 50 ml iodine or iodine/iodate solution.<br>4. Tap the flask and store it 30 min at a dark place (this is very important for the exactness of the analysis!).<br>5. Then titrate with 0.1 N sodium thiosulfate solution until the solution is only slightly yellowish.<br>6. Add some drops of starch solution.<br>7. Continue titrating from violet to colourless. |
| calculation: | (ml 0.1 N iodine solution - ml 0.1 N $Na_2S_2O_3$-solution) · 1.31 = ml/l SurTec 835 II Reductor |

## Ingredients

- ammonium chloride
- nickel sulfate
- sodium hypophosphite

## 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.

The following values per 1,000 $dm^2$ can be taken as estimated average consumption:

| | |
|---|---|
| SurTec 835 I | 0.7 l + 0.55 l for each 10 litre of drag-out |
| SurTec 835 II | 0.7 l + 0.5 l for each 10 litre of drag-out |

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

| | |
|---|---|
| SurTec 835 I | 60 kg |
| SurTec 835 II | 60 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 835 I | T - Toxic<br>N - Dangerous for the environment | WHC 2 |
| SurTec 835 II | Xi - Irritant | 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

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