riag Oberflächentechnik AG · Postfach 169 · CH-9545 Wängi TG

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# riag Sn 865S

**Satin tin process based on sulphuric acid**

The **riag Sn 865S** process can be used in both barrel and rack applications as well as in vibration systems. Applications include both decorative and technical purposes.

## Properties

- satin mat deposits across a wide current density range
- excellent coat thickness distribution
- excellent solderability of coats
- rack -and barrel application
- technical and decorative application

## Make up

| | Range | | | | Optimum | |
|---|---|---|---|---|---|---|
| Tin(II)-sulphate | 40 | – | 70 | g/L | 55 | g/L |
| *Sulphuric acid conc. | 55 | – | 135 | g/L | 97 | g/L |
| **riag Sn 865 Tenside** | 40 | – | 80 | mL/L | 50 | mL/L |
| **riag Sn 865 Additive** | 3.5 | – | 7 | mL/L | 5 | mL/L |
| **riag Sn 865 Antiox** | 1 | – | 2 | g/L | 1.5 | g/L |

*Sulphuric acid: figures are based on 96 % acid, for safety reasons the use of pre-diluted acid is recommended, of course the figures must then be adjusted
.

## Make up

The tank is filled with deionised water to 80 % of the final volume. Then add sulphuric acid (it is advantageous to use a pre-diluted solution) and tin(II) sulphate carefully while stirring well (be careful, the solution gets warm). Stir until everything is dissolved. As soon as the temperature of the electrolytes has cooled down to 25° C, while stirring you add the required amount **riag Sn 865 Tenside**, **riag Sn 865 Additive** and **riag Sn 865 Antiox** (predissolved). The electrolyte is filled up with water to the final volume. First some dummy parts are coated to work in the process.

## Operating values

| | Range | Optimum |
|---|---|---|
| Tin(II) | 22 – 39 g/L | 30 g/L |
| Sulphuric acid conc. | 55 – 135 g/L | 97 mL/L |

## Operating parameters

| | |
|---|---|
| Temperature: | 20 °C (14 – 25 °C) |
| Cathodic current density: | 0.5 – 5.0 A/dm$^2$ in rack applications<br>0.1 – 1.0 A/dm$^2$ in barrel applications |
| Anodic current density: | 1.0 A/dm$^2$ (0.5 – 3.0 A/dm$^2$) |
| Current efficiency: | < 100 % |
| Deposit rate: | at 2 A/dm$^2$ approx. 1 µm/min. |
| Anodes: | The purity of the tin anodes should at least be 99.99 %. We recommend the use of polypropylene anode bags. |
| Agitation: | Electrolyte agitation by using goods movement at 2 – 5 m/min. required. The filter pump supports the movement and agitation of the electrolyte. |
| Tanks: | Plastic or lined steel |
| Filtration: | For high performance electrolytes constant filtration is necessary.<br>The electrolyte should be circulated two to three times per hour. Especially important in barrel applications in order to ensure the circulation of the electrolyte. |
| Heating: | Thermostatic controlled temperature regulation is essential |
| Cooling: | Usually required, cooling coils of acid resistant plastic or plastic coated steel- or copper tubing, respectively PTFE |
| Fume extraction: | Recommended |
| Preparation of new tanks: | New tanks should be treated with sulphuric acid ca. 5 % and **riag Sn 865 Tenside** for 24 hours**.**<br>When a conversion of the tank from a lead containing electrolyte takes place, an alkaline primary cleaning is recommended. Our sales staff will gladly advise you. |
| Maintenance: | Analyse and adjust tin(II) sulphate and sulphuric acid as well as **riag Sn 865 Antiox** regularly. To increase the tin content in the electrolyte by 1 g/L, 1.8 g/L tin(II) sulphate (contains 55 % tin) is required.<br>Dosage of **riag Sn 865 Additive** and **riag Sn 865 Tenside** are determined by ampère hours. |

| | |
|---|---|
| Usage: | The additives are used up by drag out as well as electrochemical, that is by anodic or cathodic processes. Therefore the usage may vary process-related. |
| | **riag Sn 865 Tenside** 2.5 – 5.0 L/10 kAh |
| | **riag Sn 865 Additive** 3.0 – 5.0 L/10 kAh |
| General: | In particular the drag-in of chloride into the tin electrolyte has to be avoided. Therefore the parts are activated with sulphuric acid (approx. 5 % V) instead of hydrochloric acid.<br>Brass and other zinc containing alloys must not at all tin-plated directly since zinc diffuses into the tin coat. In this case a barrier coat of copper or nickel is required. **riag Sn 865 Antiox** prevents the formation of Sn (IV) and the following clouding of the electrolyte. |

## Environmental considerations and product safety

All concentrates, rinse waters and waste solution must be treated and discharged in accordance with local effluent control regulations. Information can be gleaned from the material safety data sheets. Chemicals shall not be stored below 10 °C.

## Liability

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riag Oberflächentechnik AG
Murgstrasse 19a
CH-9545 Wängi
T +41 (0)52 369 70 70
F +41 (0)52 369 70 79
riag.ch
info@riag.ch

## Analysis (Analytical Methods)

Sample preparation:
The sample must be taken from a well-mixed point.

### Tin (II)

| | | |
|---|---|---|
| Reagents: | Iodine 0.05 mol/L<br>Hydrochloric acid 37 %<br>Starch solution 1 %<br>Calcium carbonate p.a. | |
| Procedure: | 5 mL | electrolyte are transferred via pipette into a |
| | 250 mL | beaker, add |
| | 50 mL | deion. water, add |
| | 40 mL | hydrochloric acid 37 %, add |
| | approx. 2 g | calcium carbonate, add |
| | approx. 2 mL | starch solution |
| | | Titrate with iodine 0.05 moL/L from colourless to dark blue. The dark blue colour has to stay for 30 s |
| Calculation: | Use in mL x 1.186 = g/L Tin(II) | |

### Sulphuric acid

| | | |
|---|---|---|
| Reagents: | Sodium hydroxide solution 1 mol/L<br>Methyl red 0.2 % in ethanol | |
| Procedure: | 5 mL | electrolyte are transferred via pipette into a |
| | 100 mL | beaker, add |
| | ca. 50 mL | deion. water |
| | ca. 3 drops | methyl red |
| | | Titrate with sodium hydroxide from orange-red to yellow |
| Calculation: | Sulphuric acid 96 % (mL/L) = Consumption in mL x 5.55<br>Sulphuric acid 96 % (g/L) = Consumption in mL x 10.2 | |