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

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# RIAG Sn 860

**Methansulfonate-based bright tin process**

The **RIAG Sn 860** process can be used in both barrel and rack applications as well as in vibration systems. Applications include both decorative and technical purposes.

## Properties

- high deposition rates
- bright 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

| | Rack | | Barrel / Vibration system | |
|---|---|---|---|---|
| | Range | Optimum | Range | Optimum |
| **RIAG Sn 860 Tin** | 50 – 84 mL/L | 67 mL/L | 23 – 45 mL/L | 33 mL/L |
| **RIAG Sn 860 Acid** | 200 – 250 mL/L | 210 mL/L | 200 – 250 mL/L | 220 mL/L |
| **RIAG Sn 860 Make up** | 25 mL/L | 25 mL/L | 10 mL/L | 10 mL/L |
| **RIAG Sn 860 Tenside** | 100 mL/L | 100 mL/L | 100 mL/L | 100 mL/L |
| **RIAG Sn 860 Antiox** | 1.5 g/L | 1.5 g/L | 1.5 g/L | 1.5 g/L |

## Make up

The tank is filled with deionised water to 50 % of the final volume. While stirring you add the **RIAG Sn 860 Acid** and the **RIAG Sn 860 Tin** (Attention: the solution gets warm). As soon as the temperature of the electrolytes has cooled down to 25 °C while stirring you add the required amount of **RIAG Sn 860 Make up**, **RIAG Sn 860 Tenside** and **RIAG Sn 860 Antiox** (predissolved). The electrolyte is filled up with water to the final volume. First some dummy parts are coated.

## Operating values

| | Rack | | Barrel / Vibration system | |
|---|---|---|---|---|
| | Range | Optimum | Range | Optimum |
| Tin | 15 – 25 g/L | 20 g/L | 7.5 – 15 g/L | 10 g/L |
| **RIAG Sn 860 Acid** | 200 – 250 mL/L | 210 mL/L | 200 – 250 mL/L | 220 mL/L |

## Operating parameters

| | |
|---|---|
| Temperature | 22 °C (14 – 25 °C) |
| Cathodic current density | 0.5 – 5.0 A/dm$^2$ in rack applications<br>0.1 – 2.0 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. 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 **RIAG Sn 860 Acid** 5 % and **RIAG Sn 860 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 **RIAG Sn 860 Tin** and **RIAG Sn 860 Acid** as well as **RIAG Sn 860 Antiox** regularly. The **RIAG Sn 860 Tin** solution contains 300 g/L tin. To increase the tin content of the electrolyte by 1 g/L 3.3 mL/L **RIAG Sn 860 Tin** solution are required.<br>Dosage of **RIAG Sn 860 Replenisher** and **RIAG Sn 860 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 860 Replenisher** 3.0 – 5.0 L/10 kAh |
| | **RIAG Sn 860 Tenside** 1.5 – 2.5 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 **RIAG Sn 860 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 860 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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## Analysis (Analytical Methods)

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

### Tin (II)

Reagents:
Iodine 0.05 mol/L
Hydrochloric acid 37 %
Starch solution 1 %
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)

### RIAG Sn 860 Acid

Reagents:
Sodium hydroxide solution 1 mol/L
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: Use in mL x 20.3 = mL/L **RIAG Sn 860 Acid**