

# P.T. SINAR CEMARAMAS ABADI

- VERCOPPER (ACID/CYANIDE COPPER)
  - VERNICKEL
  - VERCHROME
  - VERZINC ACID / CYANIDE ZINC
  - CLEANER (ELEKTRO/SOAK)
  - PHOSPHATING
  - CHROMATING
  - ELECTROLESS NICKEL
- FOR HIGHTECT ELECTROPLATING**
- ELECTROLESS NICKEL PLATING FOR ALUMINIUM AND ZINC DIE CAST, MAGNESIUM
  - GOLD PLATING
  - PTFE FORELECTROLESS NICKEL
  - HARDCHROM
  - SAND CAST ALUMINIUM ALLOYS PLATING
  - MAGOXID – COAT FOR PROTECTING MAGNESIUM SUBSTRATES
- KEPLA – COATING FOR ALUMINIUM AND TITANIUM ALLOYS
  - ELECTROLESS NICKEL PLATING WITH INTEGRATED SILICON CARBIDE PARTICLES (SIC)
  - GLISS – COAT
  - A CLEAN SOLID FILM LUBRICATION FOR A MAINTENANCE FREE PERMANENT LUBRICATION OF ALL KIND OF FRICTION PAIRINGS
  - SEPA – COAT
  - (ANTI ADHESIVE COATING AND ACTIVATOR) FOR THE REMOVAL OF PART FROM MOULDS

## HR S 50 S

Working instructions for the **HR S 50 S** Bright Nickel Bath

### 1. DESCRIPTION

The new bright nickel process **HR S 50 S** produces fully bright, excellent levelling nickel deposits. The process distinguishes by a very good throwing power, and the deposits are ductile and can be easily chromium plated.

### 2. RECOMMENDED EQUIPMENT

- Tanks : Steel, with hard rubber or synthetic linings, synthetic tanks. Prior to commissioning, new tanks must be washed out with 10% sulphuric acid at the prescribed temperature for 12 hours. 2 ml/l of Wetting Agent M should be added for improved wetting. This will eliminate any plasticizers or pigments which might otherwise interfere with the process. The bath must be thoroughly washed out after this treatment.
- Heating : Porcelain or silica immersion heaters. Thermostatic heat control is essential.
- Filtration : Constant filtration is vital for high- performance baths. The contents of the bath must be turned over at least twice every hour.

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Agitation : Both air as well as mechanical agitation are possible for the **HR S 50 S** process. If agitation is mechanical, a stroke of 5- 6 m/min is necessary. If air agitation is employed, 8 - 12 m<sup>3</sup> of oil-and dust-free air are required per m<sup>2</sup> of bath surface per hour.

Anodes : All types of nickel anodes can be used, providing they satisfy the prescribed purity standard ( 99.9% ). We recommend the use of anode bags made of polypropylene. New anode sacks must be treated in a 10% hydrochloric acid solution first, before being used. The bags are ready for use after a thorough rinsing.

### 3. BATH MAKE-UP FOR 100 LITRES

Nickel Sulphate (NiSO <sub>4</sub> x 6 H <sub>2</sub> O)	240 - 320	g/l
Nickel Chloride (NiCl <sub>2</sub> x 6 H <sub>2</sub> O)	50 - 65	g/l
Boric Acid (H <sub>3</sub> BO <sub>3</sub> )	40 - 45	g/l
CARRIER HR	10 - 15	ml/l
CARRIER A 20	3 - 6	ml/l
<b>HR S 50 S</b>	0.5 - 1	ml/l
Wetting Agent L	1 - 3	ml/l

(Or Wetting Agent M 1 - 2 ml/l for mechanical agitated baths)

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## 4. HR S 50 S NICKEL-BATH

New tanks lined with hard rubber or plastic must first be cleaned with hydrochloric acid (10% vol.) before bath make-up. Useful is the addition of 1 ml/l Wetting Agent M, to dissolve eventual lining impurities. Afterwards rinse thoroughly with cold water.

Use deionised water to fill  $\frac{3}{4}$  of bath volume into separate tank. Dissolve the necessary salts by a temperature of at least 60 °C, then fill up to end volume. Add 0.5 ml/l hydrogen peroxide to prevent impurities. After vigorous stirring add 5 g/l active carbon. The electrolyte should now be stirred for at least 30 minutes. After settling (preferably over night) the clear electrolyte will be filtered into the working tank.

pH will be established by sulphuric acid, chem. pure 10% vol. at the required pH value (4.2 – 4.5). Last of all the necessary additions of CARRIER HR and CARRIER A 20, WETTING AGENT L or M and **HR S 50 S** will be made.

## 5. WORKING CONDITIONS

Temperature	:	50 - 60 °C
pH value	:	4.0 - 4.5
Current density	:	1 - 8 A/dm <sup>2</sup>
Voltage	:	3 - 10 V

pH value must be controlled regularly. A too deep value can only be established with nickel carbonate. Do not use caustic soda or ammonia.

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## 6. CONSUMPTION OF BRIGHTENER.

The consumption for 10000 Ah is:

CARRIER A 20	:	0.3 – 0.8 litres
<b>HR S 50 S</b>	:	1.0 – 2.0 litres

In all kinds of dosing it is recommended that you install dosing devices. In this way the brightener will be added regularly and in small quantities. Also the consumption of brightener can be lowered by using the devices.

## 7. SPECIAL INFORMATION / TROUBLESHOOTING

- a) The regular addition of **HR S 50 S** and Carrier A 20 in small amounts is very important if brilliant and well-levelled deposits are to be achieved.

Dosages of small, but regular, amounts will increase the evenness of deposits and lower the consumption of **HR S 50 S**.

Regular checks on the pH value (4.3) will also help to reduce the consumption of **HR S 50 S**.

### **Addition of CARRIER HR**

CARRIER HR need not be added on a continuous basis. A lack of CARRIER HR is indicated by blooming at medium to high current densities. If this occurs, 3 - 8 ml/litre of CARRIER HR must be added.

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CARRIER HR content can be ascertained analytically. If the current value is optimized (12 ml/litre) following analysis, all ensuing work will be trouble free.

## CARRIER A 20

Carrier A 20 is used when making-up a new bath and for continuous additions

## Wetting Agent M

(Mechanically agitated baths).

When used in mechanically agitated nickel baths, Wetting Agent M is consumed at a rate of 0,2 – 0,5 litre per 10'000 Ah.

## Wetting Agent L

(Air agitated baths)

When used in air agitated, Wetting Agent L is consumed at a rate of 0.1 litre per 10,000 Ah.

- b) Metallic impurities can be removed by regular, selective cleaning at 0.2 – 0.5 A/dm<sup>2</sup>. We recommend that the filter pump should be run during the cleaning process, and the electrolyte allowed to return from the pump into the bath over the selective plates. This will ensure that the electrolyte is exchanged satisfactorily. The electrolyte must always be vigorously agitated around the selective plates. In the case of large installations, the bath should be serviced via a supply bath. In this way, the pH value, the dosage of organic products, filtration as well as selective cleaning can be centrally controlled.

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## c) Nickel bath Additive HR Purifier

The nickel bath additive HR PURIFIER is added to the electrolyte when the nickel deposits on the test panels are dark in the low current density areas and when this defect cannot be eliminated by low current density plating – out.

Although the effects of contamination with foreign metals (copper, zinc) will be hidden by the addition of the HR PURIFIER, but nevertheless these foreign metals must be removed from the bath by low current density plating – out procedure.

In any case the addition of the HR PURIFIER should be limited to 1 ml/l, higher concentrations reduce the brightness and levelling of the deposit.

A reduced throwing power, caused by overdosing of the bath with the brightener, can be removed with HR PURIFIER (0,2 – 0,5 ml).

In order to avoid overdosage of HR PURIFIER, the dosage should be made in small steps.

## d) Nickel bath Additive Z

If Zinc die – cast is nickel – plated not only in barrel – but also in rack operation, it may be that regularly zinc and copper contaminations are dragged – in the nickel baths. This happens mostly in so large quantities that the addition of HR PURIFIER is no more sufficient.

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Z has especially been created to enable a continuous nickel – plating.

It is known from the practice that also a continuous selective cleaning does not suffice anymore for the nickel – plating of Zinc die – cast. Regularly the nickel electrolyte must be filtered out of the tank, worked up and then filtered back again into the tank. This means, that possibly a second nickel electrolyte should be available, one for operation, the other one for replenishment. This handling is very expensive, apart from losses of time by pumping.

Z is excellently suited, to guarantee a continuous nickel – plating without interruption, by regular addition per 10 k Ah ( 0.5 – 1.5 litre ).

Depending on the drag – in of copper – and zinc contaminations, Z must be dosed more or less.

In any case it is better to dose Z continuously, the efficiency is better herewith.

However, it is also possible to eliminate cropping up problems by dark deposits in the low current density area by particular additions of 0.2 – 0.5 ml/l.

Overdosages of Z are to avoid, as they will reduce both brilliance and levelling of the electrolyte.

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- e) Constant filtration via active carbon is recommended (by pass). Negative influences (pores) caused by contamination due to oils and fats being dragged in resp. organic contamination can thus be absorbed. The additional **HR S 50 S** used amounts to max. 5 % per 10'000 Ah.

Contamination by iron (pores) is removed by the regular addition of potassium persulphate (dissolve in water before adding) via the filter pump. No more than 0.5 g/l should be added each time.

- f) The pH value can be corrected by adding 10 vol. % sulphuric or hydrochloric acid. Hydrochloric acid is mainly used if the chloride content has to be increased when the nickel content is high, without causing the metal content to rise any higher.

## 8. WASTE WATER

All waste water must be treated as law requires before being admitted to the public canalization.

These working instructions are based on laboratory values and practical experiences. We have however no influence on the precise and conscientious use of our products.

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