



PT. SINAR CEMARAMAS ABADI

- VERCOPPER (ACID / CYANIDECOPPER)
- 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 105

ELECTROLESS NICKEL PROCESS

1. DESCRIPTION

The electroless nickel process HR 105 is perfectly suited for technical application.

This process distinguishes by the following advantages :

- Outstanding corrosion resistance
- Phosphorus content of approx. 12 % (according to deposition conditions)
- The deposits show compression strength.
- The nickel coatings are easily solderable with RMA flux.
- The process is ammonia-free.
- Tolerant to very low load per litre.

The HR 105 process is delivered in three liquid components :

- HR 105 Part 1 For new bath make-up and bath replenishment
- HR 105 Part 2 For bath make-up and occasional addition.
- HR 105 Part 3 for continuous operation.

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2. SOLUTION MAKE – UP

a) BATH MAKE –UP FOR 100 LITRES

HR 105 Part 1	6.5	lt
HR 105 Part 2	15.0	lt
Deionized water	78.5	lt

The tank is filled up to approx. 60 % of the planned volume with deionized water. Then the required quantity of HR 105 Part 1 is added and thoroughly mixed. Ensuing the calculated quantity of HR 105 Part 2 is added and very well stirred again.

Fill now up the bath to final volume with deionized water and mix again well.

The pH value has now to be adjusted to the recommend value.

The pH value is lowered by means of 10 to 20 vol. % sulphuric acid cem. Pure.

To raise the pH value a 50 vol. % solution of potassium carbonate is applied.

The HR 105 process is now ready for operation.

b) HR 105 in Barrel Operation :

Make - up for 100 litres :

HR 105 Part 1	6.5	litres
HR 105 Part 2	20.0	litres

Take care that the barrel is dipped to 2/3 of its volume only. The arising gases can escape there with.

The speed of the barrels should be small : the barrels should dispose of a good electrolyte exchange.

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3. OPERATING CONDITIONS :

	Operating range	Optimum
pH - value	4.5 - 5.4	4.8
Temperature	70 – 95 °C	88.0 °C
Deposition speed	9 – 16 my/h	10.0 my/h
Load of bath dm ² /l	0.25 – 2.5 dm ² /l	1.5 dm ² /l

4. EQUIPMENT

Tank	Stainless steel or other tank with corresponding lining. Unpigmented polypropylene
Bath heating	Immersion heater of porcelain, titanium, stainless steel. Possibly heat exchange of teflon
Agitation	A stirrer resp. a circulation as well as a cathode movement must be available.
Filtration	The electrolyte must be filtered continuously through a 5 my filter candle.

5. MAINTENANCE

The replenishing of the electroless nickel process HR 105 depends on the nickel concentration determined by analysis.

Concentration Acc. analysis	HR 105 Part 1	HR 105 Part 3
90 %	6.5 ml/l	13.0 ml/l
80 %	13.0 ml/l	26.0 ml/l
70 %	19.5 ml/l	39.0 ml/l
60 %	26.0 ml/l	52.0 ml/l
50 %	32.5 ml/l	65.0 ml/l

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6. ADDITION OF HR 105 PART 2 :

After each MTO, i.e. 65 ml/l HR 105 part 1, approx. 2.5 ml/l HR 105 part 2 must be added.

Possibly HR 105 part 2 must also be added at intense drag-out.

Calculation of the necessary addition for intermediate quantities

- ml **HR 105** part 1 = 100 – Concentration percentage x 0.65
- ml **HR 105** part 3 = 100 – Concentration percentage x 1.30

Concentration acc. analysis : 66:

- - 100 – 66 = 34 x 0.65 ml = 22.1 ml **HR 105 part 1**
- - 100 – 66 = 34 x 1.30 ml = 44.2 ml **HR 105 part 3**

7. REPLENISHMENTS

The replenishments during operation must be made carefully. In advance to the addition the concentrate must be mixed well with bath solution. It is important to stir well during addition.

By no means the additions may be added over parts being plated.

On replenishing add always first HR 105 Part 1 and afterward Part 3 under powerful stirring.

ATTENTION : In case that the concentration has dropped below 50 % of maximum value, the replenishment must not be made before the electrolyte has been cooled down to room temperature.

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REMARKS : 6 MTO can be accomplished under normal operation condition.

If per litre electrolyte 65 ml/l of HR 105 Part 1 are added, the nickel content of the bath was replenished once (7.8 g/l).

In case that regularly pieces of the same size are plated, it is possible to carry out the necessary additions based on experience values.

After having deposited 1 my / dm² in the **HR 105** process the following additions have to be made per litre bath

- 0.65 ml Part 1 und 1.30 ml Part 3

the deposition speed depends on the pH value. Regular addition of **HR 105** Part 3 keep the pH within the recommended value.

REMARK : The **HR 105** process is tolerant to sligh impurities. However the electrolyte can be affected by drag-in of specific impurities such as cadmium, palladium as well as organic matters such as wetting agent etc.

Good rinsing is imperative prior to the electroless nickel-plating process.

An optimum pre-treatment of all parts to be plated is most important prior to dip them in the electroless nickel bath.

An unobjectionable mode of operation as well as a long service life resp. achievement of 6 MTO depend on cleanness in and around the electroless nickel bath.

The maintenance of the electrolyte can be simplified by using a heat- resistant plastic foil for operation. This plastic foil should be exchanged at each new

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bath make-up. By this means the inconvenient and troublesome treatment of the tanks with 50 vol. % nitric acid can be avoided.

But nickel deposits on tanks, equipments etc. must be removed by means of 50 vol.% nitric acid.

Important : After the nitric acid treatment the tanks and equipment must be rinsed scrupulously clean.

8. DETERMINATIONS OF ACTIVITY IN %

Required reagents

Ammonium hydroxide conc.
Murexide indicator
EDTA solution 0.05 M

Determination

- Pipette 10 ml of the cooled down electrolyte in a 300 ml Erlenmeyer glass.
- Add 100 ml of deionized water
- Add now 15 ml of ammonium hydroxide
- Then add a small amount of murexide indicator.
- Titrate with 0,05 M EDTA solution turning to end point violet.

ml 0,05 M EDTA X 3,8 = **HR 105 %**

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9. STORAGE LIFE OF HR 105 PRODUCTS

Provided that the three HR 105 products are stored at room temperature and without exposure, they are storable for at least 6 months without losing their activity.

10. WASTE WATER

The rinsing water of the HR 105 process contains nickel. All waste water must be treated as law requires before being admitted to the public canalization.

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

Our technical service is at your disposal for any further information.

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