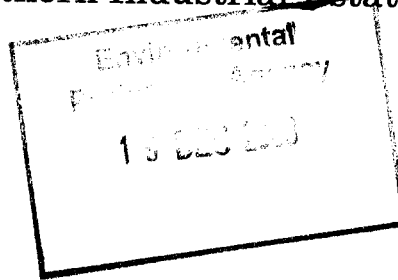


Waterford Plating Company Ltd.

Unit 605/606, Northern Industrial Estate, Waterford, Eire.

Office of Climate, Licensing
and Resource use,
EPA Headquarters,
P.O. Box 3000,
Johnstown Castle Estate,
Co. Wexford.



Date: 19th December 2008

Registration No: PO280-02 proposed determination

Dear Sir/Madam,

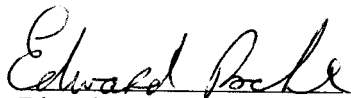
In accordance with Section 87 of the Environmental Protection Agency Acts 1992 to 2007, we, Waterford Plating Company Ltd., Unit 605/606, Northern Industrial Estate, Waterford, object to the following conditions contained in the Proposed Determination resulting from a review of our IPPC Licence Registration no. 280.

- Part 1 Schedule of Activities Licenced;** The surface treatment of metals and plastic materials using an electrolytic or chemical process where the volume of treatment vats exceeds 30m³.
Grounds for Objection; The total treatment vat volumes for the electrolytic and chemical processed used for surface treatment of metals and plastic materials is significantly lower than that specified within the Scope of Category 2.6 of Annex 1 of council directive 96/61/EC. The facility has a total treatment vat capacity of 16.48m³. A full description of the process vat volumes and contents with the relevant technical data sheets is contained in **Attachment 1**.
- Condition 6.16.1; The licensee shall carry out air dispersion modelling, based on the operation of both the wet spray paint booth (A2-1) and the wet/dry paint booth (A2-3) simultaneously, at the limits set in *Schedule B.1: Emission Limit*, of this licence and compare with relevant ambient air standards.
Grounds for Objection; There is a change in the use of this booth between the Licence Review Application and the Dispersion Modelling. The description of this booth through the application is Wet/Dry Spray booth and page 4 of Attachment E.1 lists the emissions as Particulates and Volatile Organic Compounds. The assumption is based on the use of Organic Solvent based paint in this booth. This is incorrect. Booths A2-2 and A2-3 form the painting stations on the main powder line which is a dry spray operation. A2-3 is the initial production booth on the line and is the first booth for the product to pass through. Some of the product consists of Aluminium castings and Galvanised steel which required the use of a wet primer. This is sprayed on in a wet format and the product used is Anoprime which is not solvent based.
This is the only wet product to be used in the A2-3 booth. All solvent based paints are used in the enclosed booth A2-1. The Air Dispersion Modelling carried out by Bord na Mona was completed with A2-3 booth listed for non organic solvent products. This was confirmed to them by e-mail in September and August of 2008. The Air Modelling completed makes the required comparisons for the booth as an organic solvent free applicator.

3. Condition 6.16.2; Coatings using organic solvent based paints may only commence in the wet/dry spray booth (A2-3) after receipt of written approval from the Agency.
Grounds for Objection; The Emission plant A2-3 will not use solvent based organics.
4. Condition 3.12; The licensee, shall maintain in a prominent location on the site a wind sock, or other wind direction indicator, which shall be visible from the public roadway outside the site.
Grounds for Objection; We view the installation of a wind sock as an unnecessary expense in that it will have no influence on plant operations or any function in protection of the environment.

As the nature of the primary objection is both complex in nature and industry specific, we have included both the fee for objection and the Oral hearing request fee.

Yours faithfully,



Edward Roche
General Manager

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T: (051) 378695
F: (051) 378778

E-mail: waterfordplating@indigo.ie
Web: www.ifltd.ie

Attachment No. 1.

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| Water Rinses and Treatment Vats. | | | |
|---|---|------------|---------------|
| Tank No. | Contents. | Water Ltr. | Chemical Ltr. |
| 1 | Water Swill | 2500 | |
| 2 | Water Swill | 2500 | |
| 3 | Iron Phosphate. Trimite Granodine 606. Concentration @ 2.2% v/v. | | 2500 |
| 5 | Clear Chromate. Metfin CH3524. Concentration @ 5% v/v. | | 1200 |
| 6 | Colour Chromate. Metfin CH3520. Concentration @ 3% v/v. | | 1200 |
| 7 | Water Swill | 1200 | |
| 8 | Auxiclean 414L. Concentration @ 12.5% v/v. | 1200 | |
| 9 | Water Swill | 1200 | |
| 10 | Caustic Etch Pearl Grade Caustic 25 Kg / 1200 Ltr. | | 1200 |
| 11 | Water Swill | 1200 | |
| 12 | Water Swill | 1200 | |
| 13 | Water Swill | 1200 | |
| 14 | Colour Passivation. MacDermid Iridite LY-FPC Concentration @ 25ml. / Ltr. | | 1200 |
| 15 | Colour Passivation. Slotopass G10 Concentration @ 200ml. / Ltr. | | 1200 |
| 16 | Clear Passivation. Slotopass Z20 Blue. Concentration @ 35ml. / Ltr. | | 1200 |
| 17 | Soak Cleaner. Slotopass AK160. Concentration @ 30g / Ltr. | 1200 | |
| 18 | Electro Cleaner. Slotoclean EL30. Concentration @ 120g /Ltr. | 1500 | |
| 19 | Water Swill | 1200 | |
| 20 | Hydrochloric Acid Pre Dip. Concentration @ 2% v/v. | 1200 | |
| 21 | Hydrochloric Acid. Concentration @ 15% v/v. | | 1200 |
| 22 | Water Swill | 1200 | |
| 23 | Water Swill | 1200 | |
| 24 | Water Swill | 1200 | |
| 25 | Water Swill | 1200 | |
| 26 | Electroplating Tank. Zinc @ 28g/l. Cyanide @ 80g/l. Sodium Hydroxide @ 75g/l. | | 1750 |
| 27 | Electroplating Tank. Zinc @ 28g/l. Cyanide @ 80g/l. Sodium Hydroxide @ 75g/l. | | 3500 |

| | | | |
|----|---|-------|-------|
| 28 | Clear Chromate. MacDermid Iridite NCP. Concentration @ 5% v/v. | | 330 |
| 29 | Water Swill (Off Line) | 330 | |
| 30 | Water Swill (Off Line) | 330 | |
| | | | |
| | Total Volumes | 22760 | 16480 |
| | | | |

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TRIMITE LTD.,

ARUNDEL ROAD,
UXBRIDGE,
MIDDLESEX UB8 2SD.

TELEPHONE: 0189 525 1234.
FACSIMILE: 0189 525 6789.
TELEX: 934444 TRIMIT G.



The Paintmakers — for Industry

Product Information Sheet

Sheet No. P/MP0012 - 3/1

Simon Murray
07/10/03

GRANODINE 606 - MP0012

FEATURES:

A liquid chemical which when diluted in warm water will simultaneously degrease and form a thin, protective phosphate conversion coating on steel, zinc and aluminium surfaces. It can be used by Dip or Spray (Tunnel or Washing Machine) processes. Phosphate coatings on steel are usually 0.2 - 0.4 gram/m² and comply with DEF STAN 03-11/3 Class IV and BS 3189 (1973) Type 4.

BENEFITS:

- Degreases normally oily surfaces.
- Treats steel, zinc (Mazak/Zintec/Galvanised) and aluminium.
- Improves paint and powder adhesion.
- Operates at low temperatures - reduced energy.
- Forms very little sludge - low maintenance costs.
- Concentrated product for economy.

AVAILABILITY:

Granodine 606 is stocked in 30kg and 240kg drums. (1kg = 0.75 litre.) Prices can be obtained from our Regional Centres.

FLASHPOINT:

None.

STORAGE:

Granodine 606 should be kept in the original, closed containers and stored in a cool, dry area. Shelf life in unopened containers is 12 months minimum.

COVERAGE:

Consumption will depend greatly on bath losses through drag-out and overspray. As a guide the following ranges have proved reliable:

Dip: 100 - 200 m²/kilo of Granodine 606
 Spray: 150 - 300 m²/kilo of Granodine 606

APPLICATION:

Normally the process sequence is:

1. Phosphate by: Dip or Spray - normally 1 or 2 stages
2. Rinse - normally 2 stages (see RINSING below)
3. Dry-off (See FORCE DRYING below)

NOTE: If the work is oily and/or corroded, initial treatments of aqueous cleaning (T Cleaner 70 - Dip) and/or de-rusting (Deoxidine 125 - Manual or Deoxidine 49 - Dip) will prolong the tank life of the phosphate process.

BATH MAKE-UP:

1 Fill the bath with mains water - for every 1000 litres of bath:

By Dip

- 2 Add 22 litres Granodine 606
- 3 Warm the bath and stir thoroughly

By Spray

- 2 Add 10 litres Granodine 606
- 3 Warm the bath and circulate through the spray jets for 5 minutes

NOTE: If the work is significantly oily, Ridosol 580 (MP0052) may be added to increase detergency - normally up to 1 part Ridosol to 20 parts Granodine.

CONTROL POINTS:

| | DIP | SPRAY |
|----------------|-----------|-----------|
| Pointage | 9 - 12 | 3 - 6 |
| Acidity (pH) | 4.0 - 4.5 | 4.0 - 4.5 |
| Temperature °C | 40 - 60 | 35 - 55 |
| Time min | 3 - 6 | 2 - 4 |
| Pressure bar | n/a | 0.8 - 1.5 |

(continued overleaf)

- BATH CONTROL/ REPLENISHMENT:** The baths are primarily controlled by a pointage titration done routinely according to usage and after the bath has been brought to its normal level with water. A pH measurement may be of value particularly if there can be alkaline drag-in.
- Pointage Titration:** Measure 10 cm³ of the bath into a flask and add 4 - 6 drops of Phenolphthalein Indicator solution. Titrate with 0.1 M Sodium Hydroxide until the colour changes to a permanent pink.
Replenishment: Add 2.2 litres Granodine 606 per 1000 litres of bath for each cm³ the titration is below the operating level. If required, up to 0.5 litre Ridosol 580 may be added for every 10 litres of Granodine 606 used.
 - Acidity:** Measure pH preferably using a reliable meter or narrow range (4-7) pH paper. Normally, the pH will be restored to the correct level when Granodine 606 is added; should the pH remain high, our Technical Service Department should be contacted.
- Details on the prices and availability of suitable test chemicals and control equipment may be obtained from our Regional Centres.
- RINSING:** By **dip**, the work should be rinsed thoroughly with water in tanks fitted with weirs and continuously overflowed with mains water. By **spray**, a similar holding tank is suitable but the clean water is better introduced over the work through the last spray risers. The overflowed water can be used to overflow to any rinses prior to the Granodine 606 stage.
Improved results can be gained by using de-mineralised water or T Rinse 10 (MP0016) in a warmed final rinse; in this case the rinse is not normally overflowed but should be changed regularly.
- FORCE DRYING:** For most reliable results, the work should be dried in an indirect-fired oven at 70°C - 125°C.
- MAINTENANCE:** Granodine 606 forms a small amount of sludge in normal use which will need periodic removal. The tank should be allowed to settle, the clear liquid transferred to an adjacent rinse tank, the tank and heating surfaces cleaned and the clear liquid returned when it should be replenished with water and Granodine.
- EQUIPMENT:** **For Dipping:** The tanks can be made of mild steel with built-up welds.
For Spraying: The whole plant can be constructed of mild steel although the Granodine stage(s) should have pumps with stainless steel impellers, etc and suitable plastic or stainless steel jets.
Rinse tanks can be made of mild steel, preferably painted inside with a suitable paint, although polypropylene, rigid PVC or stainless steel should be used for de-ionised water tanks and spray equipment.
Guidance on suppliers of processing equipment may be obtained from our Regional Centres.
- ENVIRONMENTAL CONSIDERATIONS:** Granodine 606 contains no VOCs. The occasional discharge for either cleaning out or desludging requires conditions of temperature (usually not greater than 40°C), suspended solids (usually not greater than 500ppm) and pH (usually 6 - 10) to be met. To increase the pH of 1000 litres of bath from 4 to 9 carefully dissolve 0.4kg of caustic soda in water for each point of the bath strength and add slowly with stirring or circulation. The decrease in acidity can be checked with pH papers.
- SAFETY:** Granodine 606 is a mildly acid liquid.
Before use, refer to Product Safety Data Sheet.

Information provided in this leaflet is given in good faith but without warranty on the understanding that users satisfy themselves about the product's suitability for their own purpose. The services of the Trimate Product Advisory Department are available to assist in cases of doubt.

Any sale by this Company is strictly subject to our Conditions of Sale.

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Metfin CH3524

Product code C3524

Formerly known as Metfin 0725

Clear chromate conversion coating for aluminium



PRODUCT DESCRIPTION

METFIN CH3524 is a chromate conversion coating for aluminium which produces a clear, non visible film. Unlike other products of its type the clear film is not achieved by simple dilution and the performance in service is therefore improved.

Features

- Liquid formulation
- Greatly increases the adhesion of paints and laquers
- Provides excellent corrosion protection

Benefits

- Suitable for Automated Systems
- Improved final product performance
- Enhances final product durability

DIRECTIONS FOR USE

Process conditions are dependant on the specific application, but are typically as follows:

| | |
|----------------|---------------|
| Concentration | 5%v/v |
| Spray pressure | 5 – 20 psi |
| pH | 2.2 – 2.9 |
| Temperature | 30°C |
| Duration | 1 – 3 minutes |

PLANT

Use tanks constructed from 304, 316 stainless steel or high density polyethylene or polypropylene.

PHYSICAL CHARACTERISTICS

| | |
|------------|------------------------|
| Appearance | Orange coloured liquid |
| Sg | 1.028 |

HEALTH AND SAFETY INFORMATION – SEE SEPARATE HEALTH AND SAFETY SHEET

GRAMOS APPLIED LTD

Spring Road, Smethwick, West Midlands B66 1PT.
Tel: 0121 525 4000 / 0121 524 1000 Fax: 0121 525 4950 / 0121 525 4919
E-mail: info@gramos-applied.com website: www.gramos-applied.com

All recommendations made and information supplied are to assist customers, they do not infer any legal warranty or liability.
Printed in the UK. 11/2003 Issue No. 1 Page 1 of 2

METFIN CH3524

Solution Control Method for Metfin CH3524

Apparatus

Measuring Cylinder
Conical Flask
Burette
Burette Filler

Reagents

Sample of solution to be tested
Potassium iodide
Thyodene indicator
0.1N sodium thiosulphate

Concentration

1. Measure out 5 ml of the product solution to be tested into the measuring cylinder.
2. Place this sample into the conical flask
3. Add approximately 10 ml of 10% sulphuric acid and 40 ml of clean water
4. Add a 0.2 gm of potassium iodide and swirl the flask to mix the contents
5. Add a small quantity of thyodene indicator, the solution should turn black
6. Titrate with 0.1N sodium thiosulphate to a clear or pale green end point
7. Record the number of ml of sodium thiosulphate as T.

$$\text{Concentration of CH3524} = T \times 0.6 \%V/V$$

Concentration maintenance

Metfin CH3521 is used to replenish working solutions of this product.

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Printed in the UK. 11/2003 Issue No. 1 Page 2 of 2

Metfin CH3520

Product code C3520

Formerly known as Metfin 0720

Chromate conversion coating for aluminium



PRODUCT DESCRIPTION

METFIN CH3520 is a liquid chromate conversion coating designed for use on aluminium and zinc. It produces a range of tightly adherent complex iridescent coatings which provide an ideal base for subsequent application of organic coatings, or it can be used as a final decorative corrosion resistant finish.

Benefiting from economical usage and ease of control, **METFIN CH3520** gives excellent adhesion and corrosion resistance and when applied in accordance with Gramos directions, will meet the requirements of BS 6496.

Meets the requirements of Def Stan 03/18.

Features

- Liquid formulation
- Suitable as a paint base or final protective coating
- Conforms to recognised standards

Benefits

- Suitable for Automated Systems
- Product versatility
- Proven product

DIRECTIONS FOR USE

Process conditions are dependant on the specific application, but are typically as follows:

| | |
|----------------|----------------|
| Concentration | 2 – 4% w/v |
| Spray pressure | 5 – 20 psi |
| pH | 1.6 – 2.1 |
| Temperature | ambient – 30°C |
| Duration | |
| Spray | 1 – 2 minutes |
| Immersion | 2 – 5 minutes |

PLANT

Use tanks constructed from 304, 316 stainless steel or high density polyethylene or polypropylene.

PHYSICAL CHARACTERISTICS

| | |
|------------|------------------------|
| Appearance | Orange coloured liquid |
| Sg | 1.142 |

HEALTH AND SAFETY INFORMATION – SEE SEPARATE HEALTH AND SAFETY SHEET

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Printed in the UK. 11/2003 Issue No. 1 Page 1 of 2

METFIN CH3520

Solution Control Method for Metfin CH3520

Apparatus

Measuring Cylinder
Conical Flask
Burette
Burette Filler

Reagents

Sample of solution to be tested
Potassium iodide
Thyodene indicator
0.1N sodium thiosulphate

Concentration

1. Measure out 5 ml of the product solution to be tested into the measuring cylinder.
2. Place this sample into the conical flask
3. Add approximately 10 ml of 10% sulphuric acid and 40 ml of clean water
4. Add a few grains of potassium iodide and swirl the flask to mix the contents
5. Add a small quantity of thyodene indicator, the solution should turn black
6. Titrate with 0.1N sodium thiosulphate to a clear or pale green end point
7. Record the number of ml of sodium thiosulphate as T.

$$\text{Concentration of CH3520} = T \times 0.56 \%V/V$$

Concentration maintenance

Metfin CH3521 is used to replenish working solutions of this product.

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Issue No. 1

Page 2 of 2

CARBON GROUP

| | | |
|-----------------------------|---|--|
| Technical Data Sheet | Effective Date 04/01/00 | Specification No. AUX-414L-001 |
| Auxiclean 414L | Prepared By <i>Joyce O'Flynn</i> QC Chemist | Revision No. 1 Page 1/2 |

Introduction

Auxiclean 414L is an acidic liquid etching solution for the cleaning and etching of aluminum surfaces. The fluoride rich etch will clean and etch aluminium parts, fabrications and castings as a preparation for chromating or as a direct pretreatment to improve paint adhesion. Auxiclean 414L is also effective in rust and oxide removal from steel and galvanic surfaces.

Property Data

Composition: Water based formulation of phosphoric acid containing fluoride, surfactants and sequesterants.
Appearance: Clear to Yellow liquid.
Odour: Sweet acidic.
Specific Gravity: 1.12
Solubility: Infinite water solubility.

Application Data

Working Diluent: Water.
Working Concentration: 10 -25% by volume.
Working Temperature: Ambient.
Treatment Time: 1 - 3 minutes.

Application Recommendations

Aluminium Etching: Auxiclean 414L will give a light even etch on aluminium fabrications, sheets and extrusion by dipping at ambient temperature in a solution of 20 - 25% by volume for 1 - 3 minutes. The degree of etch can be varied by the adjustment of time and concentration.

Galvanic Treatment: A 1 minute dip in a 10% solution of Auxiclean 414L will ensure removal of white oxides and enhance paint adhesion.

Derusting Steel: Rust and scale can be removed from steel by treatment in a solution of Auxiclean 414L. Time and concentration are dictated by the quantity of same present.

Aluminium Castings: Auxiclean 414L can be used to surface activate aluminium castings prior to other treatments. Care should be taken to test sample castings as some alloys are unsuitable.

Following treatment in Auxiclean 414L, parts should be rinsed in cold water in advance of further processing.

CARBON GROUP

| | | |
|-----------------------------|---|--|
| Technical Data Sheet | Effective Date 04/01/00 | Specification No. AUX-414L-001 |
| Auxiclean 414L | Prepared By <i>Joyce O'Flynn</i> QC Chemist | Revision No. 1 Page 2/2 |

Safety Recommendations

Handling:

Auxiclean 414L is acidic and corrosive. Use protective gloves, goggles and clothing. Wash thoroughly after handling. Flush spills from concrete floors quickly with plenty of water.

Storage:

Protect from freezing conditions.

Disposal:

Neutralise with suitable alkali before disposal. Auxiclean 414L contains phosphoric acid and, if phosphate removal is required before disposal, consult your representative.

Equipment:

Acid resistant tanks should be used.

First Aid

Eyes:

Flush out eyes liberally with water and get immediate medical attention.

Skin:

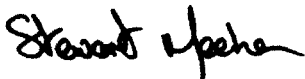
Wash skin well with plenty of water.

Swallowing:

Wash out mouth and drink plenty of water, followed by proprietary antacid (milk of magnesia).

ALWAYS CONSULT A MEDICAL OPINION, FOLLOWING INCIDENTS.

Approved By:



Stewart Meehan
Quality Assurance Manager



| | |
|--------|--------------|
| As | COMMENT |
| Signed | Edward Poole |
| Date | 17/10/06 |

EU 86010

IRIDITE LY-FPC

Iridite LY-FPC (previously known as M.1309) provides a low concentration, low cost passivation solution for zinc and cadmium plated components.

The solution can be used to produce:

- Bright iridescent films of maximum corrosion resistance by single dip treatment.
- Blue chromate films with slight iridescence and having medium corrosion resistance by using a separate bleaching solution.

1. SOLUTION COMPOSITION

| | |
|---------------------------|--------------|
| Iridite LY-FPC (EU 86010) | 10 to 25 ml* |
| Water | to 1 litre |

*The initial make-up concentration will depend on the immersion time required, see table below.

| 10 - 15 seconds immersion | |
|---------------------------------|---------|
| for manual operation | 25 ml/l |
| 20 seconds } } for automatic | 20 ml/l |
| 30 seconds } } operation | 15 ml/l |
| 40 seconds } | 10 ml/l |

The required volume of Iridite LY-FPC should be added to cold water in the tank and stirred thoroughly.

2. EQUIPMENT

| | |
|-----------|--|
| Tank | Moulded polythene or polypropylene. PVC or polypropylene lined mild steel. |
| Heating | Occasional heating is required to keep operation temperature above minimum. Silica cased electric immersion heaters are ideal. |
| Agitation | Tank should be fitted with plastic air agitation coils where mechanical transfer is employed. |

3. OPERATING CONDITIONS

Temperature Room temperature within the limits 12 to 24°C.

Time 10 to 40 seconds as described in paragraph 1.

pH 1.2 to 1.8

4. PROCESS SEQUENCE

- (a) Bright zinc or cadmium plate, e.g. Unizin or Kadamax.
- (b) Rinse thoroughly in cold, running water preferably through two swills*.
- (c) Passivate in Iridite LY-FPC Solution.
- (d) Rinse thoroughly in cold, running water preferably through two swills.
- (e) Dry at a temperature not exceeding 65°C. The use of a centrifugal dryer is ideal.

**It is not generally necessary to employ a dilute nitric acid dip between the plating and passivation stages, however, where an extra bright passivated film is required, a dip in 1/2 to 1% v/v dilute nitric acid is advised. This will also extend the working life of the process.*

5. SOLUTION MAINTENANCE

Regular additions of Iridite LY-FPC are required in order to maintain the free acid content of the solution and ensure a consistent passivation film coating.

It is recommended that additions be made to maintain the pH at its original value between 1.2 and 1.8.

If a pH meter is not available then it is recommended that an addition of 1.5 to 2.5 ml/l of Iridite LY-FPC be made whenever there is a reduction in the normal performance of the passivation solution.

6. PRODUCTION OF BLUE CHROMATE COATINGS

For blue chromate passivation films the following sequence is recommended:

- (a) Passivate in Iridite LY-FPC Solution.
- (b) Rinse thoroughly in running water.
- (c) Bleach in the following solution:

| | |
|---------------------------------|------------|
| Sodium Hydroxide (caustic soda) | 25 g |
| Water | to 1 litre |
- (d) Rinse well in water.
- (e) Dry out.

The sodium hydroxide bleach solution is used at a temperature of 50 to 60°C depending on the degree of colour removal required. For the bleach solution a mild steel, plastic or plastic lined container may be used.

N.B. The higher the concentration of caustic soda, or temperature, used to bleach the indescent film, the lower will be the final corrosion resistance of the subsequent passivation film.

7. SAFETY IN HANDLING AND USE

Refer to relevant Material Safety Data Sheets.

8. EFFLUENT

It is recommended that waste water treatment is carried out to conform to the specific requirements of the local authority. Advice on how to meet these requirements, once known, can be obtained from MacDermid plc.

Disclaimer

Any information given here relating to Health & Safety should be regarded as general advice and is not to be regarded as comprehensive or definitive.

Every user should also be in possession of Safety Data Sheets for each individual product/chemical used. These are available for all products sold by MacDermid plc.

The Safety Data Sheet contains the definitive advice.

All statements, information and data contained herein are published as a guide and although believed to be accurate and reliable (having regard to the manufacturers practical experience) neither the manufacturer, licensor, seller nor publisher represents or warrants, expressly or implied (1) their accuracy / reliability (2) that the use of the product(s) will not infringe third party rights (3) that no further safety measures are required to meet local legislation. All sales by the manufacturer/seller are based on their respective conditions of sale available on request.

EU 86010
SEPTEMBER 2001

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Yellow Passivation

SLOTOPAS G 10

IMDS ID No. 900896

SLOTOPAS G 10 is a chrome(VI)-free passivating process for electroplated zinc coatings. Yellow Passivation SLOTOPAS G 10 is an immersion process and produces yellow-green protective layers on zinc coatings. The corrosion resistance is excellent and is equivalent to the protecting effects of a yellow-chromating electrolyte based on chrome (VI). As far as surface corrosion (white rust) is concerned, tests have proven that barrel parts showed a minimum resistance of 72 hours, and rack parts of 120 hours in the salt spray test according to DIN 50021 SS.

Tempering of the protection layer up to temperatures of ≥ 80 °C does not affect the corrosion protection quality, as contrasted with yellow chromated (Cr^{VI}) zinc surfaces. On the contrary, temperatures of up to 120°C even improve the corrosion protection .

The information in this data sheet is based on laboratory as well as practical experience. Figures quoted for operating limits and replenishment quantities are for guidance. Actual values necessary will depend on the components being plated (material and geometry), their application and plating plant conditions.

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Important

Please read these instructions carefully and follow recommendations given.

We reserve the right to make technical changes as necessary.

In the interests of safety, please pay attention to the R- and S- phrases on the drum label.

The shelf life of the additives is generally 18 months.

The date of production is taken from the first 3 figures of the batch number.

Figure 1 = year; figures 2-3 = month; figures 4-7 = batch number; (UK labels use a 4 digit year code).

For the storage of chemical products only the Hazardous Substances Regulation must be followed.

The Hazardous Goods Regulation (ADR/GGVS) are only valid for transportation and must not be applied to storage.

Bath **09049-E**

page 1 of 11

issue **12.07.2005-G/PA**

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Galvanotechnik
Talgraben 30
D - 73312 Geislingen

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Certified Quality Company according to DIN EN ISO 9001:2000 of TÜV Quality Management GmbH (TÜV Süddeutschland)

1.0 TECHNICAL INFORMATION AND EQUIPMENT REQUIREMENTS

| | |
|----------------------------|--|
| Tanks: | Steel tanks with acid resistant lining. Suitable plastic tanks, eg polypropylene. |
| Extraction: | Recommended. |
| Part/electrolyte agitation | In order to optimise movement of solution around the parts, either air agitation or mechanical agitation is recommended. A barrel rotation of 4-6 times per minute is recommended in the barrel bath. |
| Heating/Cooling: | PTFE immersion heaters are recommended. |

2.0 MAKE UP AND OPERATING CONDITIONS

| List of products required for Yellow Passivation SLOTOPAS G 10 | | |
|--|------------------------------|------|
| Product Name | Product Number (AN) | SG |
| Concentrate SLOTOPAS G 11 | 090424 | 1.28 |
| Correction Additive SLOTOPAS G 12 | 090425 | 1.02 |
| Concentrated nitric acid (refer to 3.3) | must be supplied by the user | 1.40 |
| Sodium hydroxide solution 20% (refer to 3.3) | must be supplied by the user | 1.22 |

2.1 Requirements for a 100 litre bath

| Product name | Product no. | SG | Quantity | Optimum | |
|---------------------------|-------------|------|----------|---------|-----|
| Concentrate SLOTOPAS G 11 | 090424 | 1.28 | 18 - 25 | 20 | ltr |
| Concentrated nitric acid | -- | 1.40 | 150 | | ml |

NB:

Concentrate SLOTOPAS G 11 may show small sediments and should therefore be mixed well in the canisters prior to use.

2.2 Make up sequence for a 100 litre bath

- Fill the tank with 40 litres of tap water.
- Add 150 ml nitric acid.
- Mix thoroughly.
- Add the required quantity of Concentrate SLOTOPAS G 11.
- Mix thoroughly.
- Make up to final volume and mix well.
- Check pH value and make corrections if necessary.

Used tanks must always be properly cleaned due to the fact that a new make up of Yellow Passivation SLOTOPAS G 10 becomes inoperative when combined with hexavalent chrome compound residues.

2.3 Concentrations and operating conditions

| | | Optimum | |
|--|-----------|---------|---------|
| Concentrate SLOTOPAS G 11 | 180 - 250 | 200 | ml/l |
| Temperature range | 40 - 60 | 50 | °C |
| Immersion time | 30 - 120 | 75 | seconds |
| The immersion time depends on the zinc process applied and the requested colour. | | | |
| pH value of zinc coatings deposited ... | | | |
| ... from alkaline zinc electrolytes | 1.8 - 2.0 | -- | |
| ... from acid zinc electrolytes | 2.1 - 2.3 | -- | |

During the initial production phase of a newly made up passivating solution the maximum immersion time should be applied. After a brief initial work-in period the passivation turns more active and the immersion time can be decreased by approximately 10 - 20 seconds. Rinsing in a static rinse with air injection is recommended upon completion of the passivating process. Losses through evaporation may be compensated by replenishment of the passivating solution with solution of the static rinse.

2.4 Consumption

Consumption is due to dragout and may be determined analytically.

2.5 Process Sequence

Alkaline zinc electrolytes

- Zinc plating
- Rinsing
- Activating in diluted nitric acid, make up 0.3 - 0.5 ltr/100 ltr water
- Rinsing
- Passivating
- Rinsing
- Drying

Acidic zinc electrolytes

- Zinc plating
- Static rinse
- Immersing in diluted hydrochloric acid, pH 1.5
- Rinsing
- Passivating
- Rinsing
- Drying

With sealant

- Passivating
- Rinsing
- Sealing
- Air blowing if required
- Drying

2.6 Pre-Treatment

Perfect zinc-plating is essential for a good passivating finish. Parts to be passivated should have been recently zinc-plated and rinsed.

Pre-dipping in strongly diluted nitric acid (0.3 - 0.5 ltr nitric acid per 100 ltr water) with subsequent rinsing is only required for zinc surfaces deposited from alkaline electrolytes. The brightness of the zinc coating must be maintained, it may turn lighter but under no circumstances turn darker. Darker zinc coatings indicate that the zinc electrolyte is contaminated with foreign metal ions.

Whereas parts that have been zinc plated in acidic bright zinc electrolytes must be pre-dipped in strongly diluted hydrochloric acid, followed by rinsing. The pH of the pre-dip solution must be 1.5. Without acid pre-dip the deposit colour will be pale yellow and discolouration may occur.

2.7 Passivating

Barrels should be moved up and down to ensure adequate electrolyte exchange on the inside. On wet surfaces the yellow colour can not be observed, the optical appearance of the passivated layer can only be verified after drying. Passivating must always be performed in one work-step, post-passivating is not possible.

2.8 Post-Treatment

The passivated parts must be rinsed in cold water and preferably dried with warm air at 80 - 100°C immediately after rinsing. Water displacement liquids may also be used for drying. Thick-walled parts or parts with high heat absorption capacity may be warmed up in hot water prior to drying in order to speed up drying. Unnecessarily long rinsing times after passivation or insufficiently dried parts that were stored in wet condition attack the conversion layer, resulting in discoloration and decreasing corrosion resistance during extended storage periods. Small parts may be dried using a centrifuge or barrel drying. We recommend to use our sealing product SLOTOFIN 10 for sealing of the passivated surface.

3.0 MAINTENANCE

3.1 Concentrate SLOTOPAS G 11

The Concentrate SLOTOPAS G 11 content should be 180 - 200 ml/l and may be monitored analytically.

3.2 Correction Additive SLOTOPAS G 12

Lack of Correction Additive SLOTOPAS G 12 is indicated by the deposition of pale deposits although the bath parameters are adjusted correctly. Correction is made by incremental additions of 100 - 500 ml SLOTOPAS G 12 per 100 litre bath.

3.3 pH value

Perfect operation of the Yellow Passivation SLOTOPAS G 10 mainly depends on the correct adjustment of the pH.

Depending on whether the zinc coatings were deposited from alkaline or acidic zinc electrolytes, the following pH values must be observed.

| | Zinc layers deposited from alkaline zinc electrolytes | Zinc layers deposited from acidic zinc electrolytes |
|----------|---|---|
| pH value | 1.8 - 2.0 | 2.1 - 2.3 |

The pH is controlled by pH indicator paper with pH range 1.0 - 2.8 (AN 29170001).

pH adjustment:

- The pH is increased with 20% sodium hydroxide solution.
- The pH is decreased with pure nitric acid.

The pH must be monitored on a regular basis after new make up, since the pH may increase during the initial production phase.

3.4 Contamination

Parts, which fall off jigs in the passivating bath, should be removed without delay to prevent the build up of metallic contamination in the bath.

3.4.1 Chrome(VI)

If the Yellow Passivation SLOTOPAS G 10 becomes contaminated with hexavalent chrome (Cr^{6+}), the bath becomes unusable and must be replaced.

3.4.2 Zinc

Other than lead, zinc concentrations up to 11 g/l do not affect the corrosion protection or appearance of the deposits.

3.4.3 Lead

Even minor traces of lead would result in dark spotted deposits. Air agitation systems should therefore not be weight with lead.

3.4.4 Iron

Iron contamination impairs the corrosion resistance. The operating temperature is decisive for the quantity of iron being removed. The removal rate increases as the temperature goes up.

3.5 Special correction

If despite dosing with Correction Additive SLOTOPAS G 12 the desired colour can no longer be achieved, the following special correction must be performed. Same applies in case of brown-spotted deposits from newly made-up passivations:

Decrease the pH to 1.0 with nitric acid. After 30 minutes of standing time increase the pH to recommended value (refer to 3.3) with sodium hydroxide solution.

4.0 ANALYSIS

4.1 Concentrate SLOTOPAS G 11

Required equipment

- Volumetric pipette, 3 ml
- Graduated pipette, 5 ml
- Graduated wide-necked Erlenmeyer flask, 300 ml
- Watch glass, Ø 70 mm
- Burette, 50 ml
- Measuring cylinder, 25 ml (2 each)
- Measuring cylinder, 50 ml
- Laboratory spatula
- Wash bottle, 1000 ml
- Timer
- Safety pipette filler
- Suitable heating source

Required chemicals

- 0.1 M (mol/l) sodium thiosulphate solution
- Hydrochloric acid (pure)
- Potassium hydroxide solution (300 g/l, aqueous)
- Potassium iodide solution (100 g/l, aqueous)
- Hydrogen peroxide, 30 %
- Starch according to Zulkowsky

Method of determination

- Pipette 3.0 ml of the test sample into an Erlenmeyer flask.
- Add 30 ml potassium hydroxide solution.
- Add 5 ml hydrogen peroxide (30%).
- Cover the flask and heat until slightly simmering.
- The reaction is completed if only very little water vapour bubbles are forming.
- Rinse the watch glass and flask edge with ~ 80 ml deionised water.
- Cool to room temperature.
- Add 20 ml hydrochloric acid.
- Cool again to room temperature.
- Add 15 ml potassium iodide.
- Allow to stand for 5 minutes. (Keep the solution out of direct sunlight or away from any sources of heat).
- Titrate with 0.1 M (mol/l) sodium thiosulphate solution until the colour of the solution is light brown.
- Add 2 - 3 spatula tips of starch according to Zulkowsky.
- Continue titrating until the solution becomes light green in colour.

Calculation

ml/l Concentrate SLOTOPAS G 11 = consumption of 0.1 mol/l sodium thiosulphate solution
x 20.3

Example

Consumption = 11.0 ml of 0.1 mol/l sodium thiosulphate solution
11.0 x 20.3 = 223.3 ml/l Concentrate SLOTOPAS G 11

5.0 TROUBLE SHOOTING

| Fault | Cause | Correction |
|---|---|---|
| Pale, yellowish conversion layer (under-passivated). | <ul style="list-style-type: none">• The immersion time is too short or the pH too high.• The SLOTOPAS G 11 concentration is too low.• The operating temperature is too low.• The SLOTOPAS G 12 concentration is too low. | <ul style="list-style-type: none">• Adjust pH according to directives in item 3.2.• Analyse and adjust to optimal value.• Increase operating temperature.• Add SLOTOPAS G 12 in increments of 1.0 - 5.0 ml/l.• Make special corrections (see section 3.3) |
| Formation of mud; spotted deposits. | <ul style="list-style-type: none">• The immersion time is too long or the pH too low.• The operating temperature is too high. | <ul style="list-style-type: none">• Decrease the immersion time and adjust the pH according to directives in item 3.2.• Decrease temperature to 40 - 50° C |
| Dull deposits. | <ul style="list-style-type: none">• The pH is too low. | <ul style="list-style-type: none">• Adjust the pH according to directives in item 3.2.. |
| Brown-dull conversion layer in the high current density range. | <ul style="list-style-type: none">• The pH is too low. | <ul style="list-style-type: none">• Adjust the pH according to directives in item 3.2.. |
| Strong haze, brown and muddy coating in the edges of the treated parts. | <ul style="list-style-type: none">• The operating temperature is below 40°C. | <ul style="list-style-type: none">• Increase the operating temperature to 40 - 50 °C.• Reduce part agitation. |

| Fault | Cause | Correction |
|---|---|---|
| Insufficient corrosion protection. | <ul style="list-style-type: none"> The conversion layer is too thin. | <ul style="list-style-type: none"> Optimise immersion time to 45 - 90 sec. Adjust concentration and bath temperature if required. |
| Brown spots after addition of SLOTOPAS G 12 | <ul style="list-style-type: none"> Newly made-up passivation. | <ul style="list-style-type: none"> Make special correction as described in section 3.5. |

6.0 EFFLUENT

Legal regulations must be observed for the disposal of the Yellow Passivation SLOTOPAS G 10. The following detoxification sequence is only considered to be an aid:

Yellow Passivation SLOTOPAS G 10 does not contain any hexavalent chrome (Cr^{6+}) compounds and can be directly neutralised. For fluoride precipitation the neutralisation needs to be carried out using lime solution.

SLOTOPAS G 10 is treated by simple neutralisation to a pH of 8.5 - 9.5 and the resulting chromium hydroxide is filtered through a filter press.

In order to reduce waste water, the rinse waters may be transferred back into the Yellow Passivation SLOTOPAS G 10 via ion exchanger. Please note that Cr(III) strongly accumulates on the cation as well as on the anion exchanger.

Regeneration:

- Cation exchanger:**
 The cation exchanger resin (eg Lewatit Mono Plus 112) must be regenerated with 15 % hydrochloric acid instead of the commonly used 10% hydrochloric acid.
- Anion exchanger:**
 The anion exchanger resin (eg Lewatit Mono Plus MP 64) is first regenerated with approximately 15 % hydrochloric acid (elution of the strongly bound anionic Cr-complexes). After usual backflushing, regeneration follows with approximately 4 % sodium hydroxide solution (re-transferring the exchanger into the OH-status).

NB

Any regeneration process should be in accordance with the instructions of the respective plant and resin supplier (resin resistance) !

7.0 SAFETY

When handling the solution safety measures i.e. protective clothing, gloves and goggles must be observed at all times.

7.1 Toxicological and ecological reaction; additives, processes

| Product name | AOX | Sym- bol | Kind of danger | WGK | Carc. Cat. | Repro. Cat. | Muta. Cat. | R- Phrase | S- Phrase |
|--|-----|-------------|--|-----|---------------|----------------|---------------|--------------|--------------|
| Concentrate SLOTOPAS G 11 | -- | T N | Toxic Harmful to the environ- ment | 2 | -- | -- | -- | R 22 | S 23.4 |
| | | | | | | | | R 36/38 | S 24/25 |
| | | | | | | | | R 42/43 | S 36 |
| | | | | | | | | R 49 | S 45 |
| | | | | | | | | R 51/53 | S 53 |
| Correction Additive SLOTOPAS G 12 | -- | -- | -- | 1 | -- | -- | -- | S 61 | S 26 |

R – Phrases:

| | |
|---------|---|
| R 49 | May cause cancer by inhalation. |
| R 22 | Harmful if swallowed. |
| R 36/38 | Irritating to eyes and skin |
| R 42/43 | May cause sensitisation by inhalation and in contact with skin. |
| R 51/53 | Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment. |

S – Phrases:

| | |
|---------|---|
| S 23.4 | Do not breathe spray |
| S 24/25 | Avoid contact with skin and eyes. |
| S 26 | In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. |
| S 36 | Wear suitable protective clothing. |
| S 53 | Avoid exposure – obtain special instructions before use. |
| S 61 | Avoid release to the environment. Refer to special instructions/safety data sheets. |
| S 45 | In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). |

Due to the different concentrations of the various substances contained in the electrolyte, the following classification results:

| Yellow Passivation SLOTOPAS G 10 | | | | | | | | | |
|----------------------------------|-------------|-------------------|-----|---|---------------|----------------|---------------|---------------|--------------------------------|
| AOX | Sym- bol | Kind of danger | WGK | German Waste Code Number | Carc. Cat. | Repro. Cat. | Muta. Cat. | R- Phrases | S- Phrases |
| -- | T | Toxic | 2 | 06 03 13 Solid salts and solutions containing heavy metals. | 2 | -- | -- | R 49 | S 25 S 23.4 S 53 S 45 |

| | |
|---------------------|---|
| R – Phrases: | |
| R 49 | May cause cancer by inhalation. |
| S – Phrases: | |
| S 25 | Avoid contact with eyes. |
| S 23.4 | Do not breathe spray. |
| S 53 | Avoid exposure – obtain special instructions before use. |
| S 45 | In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). |

| | |
|---|----------------------|
| German UN Number | |
| Required for postal delivery of bath samples only (LQ: limited quantity 3 litres): | |
| UN | 3287 KI.6.1 T4 VG II |

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The user must verify the designated purpose of the bath. Previous experience has shown that not all metal surfaces are suitable for a trouble-free electroplating.

Consistent operation of the working solution requires appropriate maintenance using Schlötter products. Use of other chemicals will impair quality and invalidate our technical responsibilities.

Yellow Passivation SLOTOPAS G 10 is a development of Dr. Ing. Max Schlötter GmbH & Co KG.

The hazards of the working solution may differ from those of its components. A risk assessment should be carried out as required by current regulations using information given in the individual EG-Material Safety Data Sheets.

Every endeavour has been made to ensure that the information contained in this data is reliable, but we cannot accept liability for any loss, injury or damage which may result from its use. No information given by us shall be deemed to be a recommendation to use any product in conflict with any existing patent rights, except as herein provided all warranties and conditions whether express or implied and whether by statute or common law as to quality or fitness for any purpose are excluded and no responsibility is accepted for goods which have suffered or have been subjected to undue wear and tear accident misuse improper application modification neglect or overloading and in no circumstances shall the seller be liable for loss or damage of any kind directly caused by or arising from goods supplied or from any accident or injury to personnel or damage to property however arising from or in the course of using such goods.

Supplementary information on Passivate SLOTOPAS Z20 BLUE

A chrome (VI) free passivate layer with very good corrosion resistance may be applied to zinc plated product using Passivate SLOTOPAS Z20 BLUE with minimum change to the process operating parameters. This passivate displays excellent corrosion resistance and meets or exceeds the DIN 50961 standard for yellow passivate (C).

The passivated part may be heat treated (up to 200°C) without causing damage to the surface. Yellow passivate using Chrome (VI) would be damaged by this process. Heat treating changes the colour of the finish to reddish green.

Additional Technical and Equipment Requirements:

Heating: PTFE Immersion heater

Requirements for a 100 litre bath

| Product name | Product no. | SG | Quantity | Optimum | |
|-------------------------------|-------------|------|----------|---------|------|
| Slotopas Z21 Blue Concentrate | 090421 | 1.32 | 15 - 30 | (20) | ltrs |
| Concentrated nitric acid | | 1.4 | 150 | | mls |

Concentrations and working conditions

| | Rack | | Barrel | | |
|--------------------------------|-----------|-------|-----------|-------|------|
| | Optimum | | Optimum | | |
| Slotopas Z21 Blue Concentrate: | 150 - 300 | (200) | 150 - 300 | (200) | mls |
| Temperature range: | 40 - 60 | | 40 - 60 | | °C |
| Immersion time: | 60 - 90 | | 45 - 90 | | secs |
| pH Value: | 1.8 - 2.2 | (1.9) | 1.8 - 2.2 | (1.9) | |

Important :

Please read these instructions carefully and follow recommendations given.

We reserve the right to make technical changes as necessary.

In the interests of safety, please pay attention to the R- and S- phrases on the drum label.

The shelf life of the additives is generally 18 months.

The date of production is taken from the first part of the batch-number which shows the year and month. The final four figures are the specific batch code.

The colour of the passivate layer is dependent on the immersion time. If the immersion time is short the passivate will be pale yellow while a longer immersion time yields a violet-greenish finish.

After passivation it is recommended to use a stationary rinse with air agitation. This can be recycled and used to replenish the passivate solution.

Parts, which are to be heat treated, should be passivated for the maximum period of time.

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Every endeavour has been made to ensure that the information contained in this data is reliable, but we cannot accept liability for any loss, injury or damage which may result from its use. As the actual use of our products by others is beyond our control, no guarantee, expressed or implied, is made as to the effects of such use. All products are sold on condition that purchasers make their own tests to determine the quality and suitability of the product. No information given by us shall be deemed to be a recommendation to use any product in conflict with any existing patent rights, except as herein provided all warranties and conditions whether express or implied and whether by statute or common law as to quality or fitness for any purpose are excluded and no responsibility is accepted for goods which have suffered or have been subjected to undue wear and tear accident misuse improper application modification neglect or overloading and in no circumstances shall the seller be liable for loss or damage of any kind directly caused by or arising from goods supplied or from any accident or injury to personnel or damage to property however arising from or in the course of using such goods.

Degreaser SLOTOCLEAN AK 160 - q pulse rev 3

The Degreaser SLOTOCLEAN AK 160 is an alkaline process for immersion degreasing of steel, copper and their alloys, with good wetting and rinsing behaviour. The treatment time for copper or copper alloys should not be too long in order to avoid discoloration.

The Degreaser SLOTOCLEAN AK 160 is operated with two components which allow specific application and replenishment of the individual components. One component is the Degreaser Salt SLOTOCLEAN AK 161 and depending on the task, the other one is either SLOTOCLEAN US, SLOTOCLEAN VF 100, SLOTOCLEAN VF 200, SLOTOCLEAN VF 300 or SLOTOCLEAN VF 400.

- Degreaser Salt AK 161 and Degreaser Additive SLOTOCLEAN US is a strongly emulsifying cleaner used with ultrasound.
- Degreaser Salt AK 161 and Degreaser Additive SLOTOCLEAN VF 100 or VF 300 is an exceptionally good emulsifying cleaner.
- Degreaser Salt AK 161 and Degreaser Additive SLOTOCLEAN VF 200 is a moderate foaming demulsifying cleaner which can be improved with air agitation.

The excellent conductivity of Degreaser Salt AK 161 allows cathodic or anodic degreasing of steel or non-ferrous metals.

The Degreaser SLOTOCLEAN AK 160 does not contain any alkylphenol ethoxylate and is AOX free.

The information in this data sheet is based on laboratory as well as practical experience. Figures quoted for operating limits and replenishment quantities are for guidance. Actual values necessary will depend on the components being plated (material and geometry), their application and plating plant conditions.

Important:

Please read these instructions carefully and follow recommendations given.

We reserve the right to make technical changes as necessary.

In the interests of safety, please pay attention to the R- and S- phrases on the drum label.

The shelf life of the additives is generally 18 months.

The date of production is taken from the first 3 figures of the batch number.

Figure 1 = year; figures 2-3 = month; figures 4-7 = batch number; (UK labels use a 4 digit year code).

For the storage of chemical products only the Hazardous Substances Regulation must be followed.

The Hazardous Goods Regulation (ADR/GGVS) are only valid for transportation and must not be applied to storage.

1.0 TECHNICAL INFORMATION AND EQUIPMENT REQUIREMENTS

| | |
|-----------------------------|--|
| Tanks: | Steel, rubber-lined steel. |
| Local Exhaust Ventilation: | Required. |
| Part/electrolyte Agitation: | Stirring device or air agitation, surface cleaning. |
| Ultrasound: | Capacity > 5 W/l. |
| Electrodes/Anodes: | Cathode: steel sheets Anode: thick nickel-plated steel sheets |
| Heating/Cooling: | Electric immersion heaters or cooling coils made of stainless steel. |

2.0 MAKE UP AND OPERATING CONDITIONS

List of products required for Degreaser SLOTOCLEAN AK 160

| Product Name | Product Number (AN) | SG |
|--------------------------------------|-----------------------|------|
| Degreaser Salt SLOTOCLEAN AK 161 | 020161 | -- |
| Degreaser Additive SLOTOCLEAN US | 020022 | 1.02 |
| Degreaser Additive SLOTOCLEAN VF 100 | 020100 | 1.05 |
| Degreaser Additive SLOTOCLEAN VF 200 | 020105 | 1.01 |
| Degreaser Additive SLOTOCLEAN VF 300 | 020110 | 1.12 |
| Wetting Agent AZN | 080900 | 1.01 |

2.1 Composition

| Product name | Composition | Suitable for oil separator |
|---------------------------------------|---|----------------------------|
| Degreaser Salt SLOTOCLEAN AK 161: | Sodium hydroxide, silicate and polyphosphate (complexant). | |
| Degreaser Additive SLOTOCLEAN US: | Mixture of non-ionic and anionic surfactants.. Strongly emulsifying surfactant mixture with ultrasound support. | - |
| Degreaser Additive SLOTOCLEAN VF 100: | Mixture of non-ionic and anionic surfactants. Emulsifying surfactant mixture, not very suitable for installations with gravity-type oil separators. | - |
| Degreaser Additive SLOTOCLEAN VF 200: | Mixture of non-ionic and anionic surfactants. Demulsifying surfactant mixture, suitable for installations with gravity-type oil separators. | + |

| Product name | Composition | Suitable for oil separator |
|---------------------------------------|--|----------------------------|
| Degreaser Additive SLOTOCLEAN VF 300: | Mixture of non-ionic and anionic surfactants. Emulsifying surfactant mixture, not very suitable for installations with gravity-type oil separators. | - |
| Wetting Agent AZN | Mixture of anionic surfactants. Prevents spraying of the degreaser solution during electrolytic degreasing. | - |

2.2 Requirements for a 100 litre bath

| | AN | SG | Ultra-sound | Immersion degreasing Agitation | | | Electrolytic Degreasing | |
|--------------------------------------|--------|------|-------------|--------------------------------|-------|-----------|-------------------------|-----|
| | | | | Mechanical | Air | | | |
| Degreaser Salt SLOTOCLEAN AK 161 | 020161 | -- | 2 - 4 | 2 - 4 | 2 - 4 | 2 - 4 | 5 - 10 | kg |
| Degreaser Additive SLOTOCLEAN US | 020022 | 1.02 | 0.4 - 1.0 | -- | -- | -- | -- | ltr |
| Degreaser Additive SLOTOCLEAN VF 100 | 020100 | 1.05 | -- | 1 - 2 | -- | -- | -- | ltr |
| Degreaser Additive SLOTOCLEAN VF 200 | 020105 | 1.01 | -- | -- | -- | 0.2 - 0.4 | -- | ltr |
| Degreaser Additive SLOTOCLEAN VF 300 | 020110 | 1.12 | -- | -- | 2 - 4 | -- | -- | ltr |
| Wetting Agent AZN | 080900 | 1.01 | -- | -- | -- | -- | 0 - 0.1 | ltr |

The make up concentration depends on the given task.

0.1 - 1 ml/l Wetting Agent AZN should be added to prevent spraying. Wetting Agent AZN is a liquid surfactant mixture that forms a thin foam layer during the electrolytic degreasing process.

2.3 Make up sequence for a 100 litre bath

All tanks and equipment to be used should be thoroughly cleaned prior to use.

- Fill 70 litres of water into the tank.
- Add the required quantity of Degreaser Salt SLOTOCLEAN AK 161 and dissolve.
- Add the required quantity of Degreaser Additive SLOTOCLEAN US; Degreaser Additive SLOTOCLEAN VF 100, SLOTOCLEAN VF 200, SLOTOCLEAN VF 300 or Wetting Agent AZN.
- Mix well.
- Make up to final volume with water.
- Mix well.

The electrolyte is ready for use when the operating temperature has been reached.

2.4 Concentrations and operating conditions

| Immersion degreasing with agitation | | | | |
|---|--------------|--------------|---------------|------|
| | ultrasound | mechanical | air agitation | |
| Degreaser Salt SLOTOCLEAN AK 161 | 20 - 40 (30) | 20 - 40 (30) | 20 - 40 (30) | g/l |
| Degreaser Additive SLOTOCLEAN US | 4 - 10 (5) | - | - | ml/l |
| Degreaser Additive SLOTOCLEAN VF 100 | - | 10 - 20 (15) | - | ml/l |
| Degreaser Additive SLOTOCLEAN VF 200 | - | - | 2 - 4 (3) | ml/l |
| Degreaser Additive SLOTOCLEAN VF 300 | - | 20 - 40 (30) | - | ml/l |
| Treatment time | 2 - 15 | 2 - 15 | 2 - 15 | min. |
| Temperature range | 50 - 80 | 50 - 80 | 50 - 80 | °C |

| Electrolytic degreasing | | | | |
|----------------------------------|------------------------------------|--------------|---------------------------|-------------------|
| | Steel, non-ferrous metals cathodic | Steel anodic | Non-ferrous metals anodic | |
| Degreaser Salt SLOTOCLEAN AK 161 | 50 - 100 (75) | | | g/l |
| Wetting Agent AZN | 0 - 0.1 | | | ml/l |
| Treatment time | 1 - 3 min | 1 - 3 min | 15 - 30 sec | |
| Temperature range | 25 - 50 | | | °C |
| Current density | 6 - 8 | | | A/dm ² |

Cloud point:

Solubility of the surfactant combination decreases with increasing concentration of Degreaser Salt SLOTOCLEAN AK 161, which results in cloudiness of the electrolyte and declining decreasing effect at the same time.

| Degreaser Salt SLOTOCLEAN AK 161 | Degreaser Additive SLOTOCLEAN US | | | | |
|----------------------------------|----------------------------------|-----|----|---|------|
| | 5 | 7.5 | 10 | - | ml/l |
| 20 g/l | 91 | 86 | 85 | - | °C |
| 30 g/l | 62 | 62 | 62 | - | °C |
| 40 g/l | 49 | 49 | 49 | - | °C |
| 50 g/l | 39 | 39 | 39 | - | °C |

| Degreaser Salt SLOTOCLEAN AK 161 | Degreaser Additive SLOTOCLEAN VF 100 | | | | |
|----------------------------------|--------------------------------------|------|------|------|------|
| | 5 | 10 | 15 | 20 | ml/l |
| 20 g/l | 91 | > 95 | > 95 | > 95 | °C |
| 30 g/l | 85 | 94 | > 95 | > 95 | °C |
| 40 g/l | 80 | 87 | 92 | 94 | °C |
| 50 g/l | 75 | 80 | 82 | 85 | °C |

| Degreaser Salt SLOTOCLEAN AK 161 | Degreaser Additive SLOTOCLEAN VF 200 | | | | |
|----------------------------------|--------------------------------------|----|----|----|------|
| | 1 | 2 | 4 | 6 | ml/l |
| 20 g/l | 75 | 82 | 84 | 85 | °C |
| 30 g/l | 66 | 72 | 80 | 84 | °C |
| 40 g/l | 59 | 66 | 72 | 77 | °C |
| 50 g/l | 54 | 60 | 66 | 71 | °C |

| Degreaser Salt SLOTOCLEAN AK 161 | Degreaser Additive SLOTOCLEAN VF 300 | | | | |
|----------------------------------|--------------------------------------|-----|-----|-----|------|
| | 10 | 20 | 30 | 40 | ml/l |
| 20 g/l | >95 | >95 | >95 | >95 | °C |
| 30 g/l | >95 | >95 | >95 | >95 | °C |
| 40 g/l | >95 | >95 | >95 | >95 | °C |
| 50 g/l | 76 | 95 | >95 | >95 | °C |

3.0 MAINTENANCE

3.1 Degreaser Salt SLOTOCLEAN AK 161

The Degreaser Salt SLOTOCLEAN AK 161 may be determined by acidimetric titration. The difference between the required value and the value determined by analysis is directly replenished by additions of Degreaser Salt SLOTOCLEAN AK 161 (see section 4.0).

4.0 ANALYSIS

4.1 Analysis of Degreaser Salt SLOTOCLEAN AK 161

Required equipment

- Volumetric pipette, 10 ml
- Graduated wide-necked Erlenmeyer flask, 300 ml
- Measuring cylinder, 50 ml
- Burette, 50 ml
- Wash bottle, 1000 ml
- Peleus ball

Required chemicals

- 1.0 M (mol/l) hydrochloric acid
- Barium chloride solution (100 g/l, aqueous)
- Phenolphthalein solution (1 g/l in ethanol)

Method of determination

- Pipette 10 ml of the test sample (20°C) into an Erlenmeyer flask.
- Add approximately 50 ml deionised water.
- Add 50 ml barium chloride solution.
- Add 2 - 3 drops of phenolphthalein solution.
- Titrate with 1.0 mol/l hydrochloric acid until the pink colour turns colourless.

Calculation

g/l Degreaser Salt SLOTOCLEAN AK 161 = consumption 1.0 M hydrochloric acid x 7.41

Example

Consumption = 9.7 ml 1.0 M (mol/l) hydrochloric acid
9.7 x 7.41 = 71.88 g/l Degreaser Salt SLOTOCLEAN AK 161

5.0 EFFLUENT

Legal regulations must be observed for the disposal of Degreaser SLOTOCLEAN AK 160. The following detoxification sequence is only considered to be an aid:

Spent Degreaser SLOTOCLEAN AK 160 should be batch detoxified together with the resulting rinse waters. The solution should be diluted in ratio > 1:5 (better would be 1:10) to ensure good sedimentation during neutralisation.

Further steps to be taken are:

- pH adjustment to < 2 (e.g. by adding hydrochloric acid)
- Addition of calcium chloride (related to a make up with 4 kg Degreaser Salt SLOTOCLEAN AK 161 per 100 litre) 1 - 1.5 kg CaCl₂.
- Neutralisation with sodium and/or calcium hydroxide (to pH 9 - 9.5).
- If required, treatment of the filtrates with selective ion exchanger.

Alternatively Precipitant AW 10 (12011) can be used for the disposal of Degreaser SLOTOCLEAN AK 160.

If you require any further toxicological or ecological information related to the disposal of this product, please refer to the individual safety data sheets.

6.0 SAFETY

Alkaline cleaners are naturally corrosive. When handling the solution protective clothing, gloves and goggles should be worn. Splashes on the skin or eyes should be washed out with water for 10 - 15 minutes. If irritation becomes apparent seek medical advice.

6.1 Toxicological and ecological reaction; additives, processes

| Product name | AOX | Symbol | Type of danger | WGK | Carc. Cat. | Repro. Cat. | Muta. Cat. | R-Phrase | S-Phrase |
|---|-----|--------|----------------|-----|------------|-------------|------------|--------------|---------------------------|
| Degreaser Salt SLOTOCLEAN AK 161 | -- | C | Corrosive | 1 | -- | -- | -- | R 35 | S 36/37/39 S 45 |
| Degreaser Additive SLOTOCLEAN US | -- | Xn | Harmful | 2 | -- | -- | -- | R 22 R 41 | S 26 S 39 |
| Degreaser Additive SLOTOCLEAN VF 100 | -- | Xi | Irritating | 2 | -- | -- | -- | R 36/38 | S 24/25 S 26 S 28.2 |
| Degreaser Additive SLOTOCLEAN VF 200 | -- | Xi | Irritating | 2 | -- | -- | -- | R 36/38 | S 24/25 S 26 S 28.2 |
| Degreaser Additive SLOTOCLEAN VF 300 | -- | -- | -- | 2 | -- | -- | -- | -- | S 25 |
| Wetting Agent AZN | -- | -- | -- | 2 | -- | -- | -- | R 36 | S 26 |

| R - Phrases: | |
|--------------|---------------------------------|
| R 22 | Harmful if swallowed. |
| R 35 | Causes severe burns. |
| R 36 | Irritating to eyes. |
| R 36/38 | Irritating to eyes and skin |
| R 41 | Risk of serious damage to eyes. |

| S - Phrases: | |
|--------------|---|
| S 24/25 | Avoid contact with skin and eyes. |
| S 25 | Avoid contact with eyes. |
| S 26 | In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. |
| S 28.2 | After contact with skin, wash immediately with plenty of water and soap. |
| S 36/37/39 | Wear suitable protective clothing, eye/face protection and gloves. |
| S 39 | Wear eye/face protection. |
| S 45 | In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). |

Due to the different concentrations of the various substances contained in the electrolyte, the following classification results:

| Degreaser SLOTOCLEAN AK 160 | | | | | | | | | |
|-----------------------------|--------|----------------|-----|---|------------|------------|-----------|----------|----------------------------|
| AOX | Symbol | Type of danger | WGK | German Waste Code Number | Carc. Cat. | Repro. Cat | Muta. Cat | R-Phrase | S-Phrase |
| -- | C | Corrosive | 1 | 11 01 13 Waste from the degreaser containing hazardous substances. | -- | -- | -- | R 35 | S 26 S 36/37/39 S 45 |

| | |
|---------------------|----------------------|
| R - Phrases: | |
| R 35 | Causes severe burns. |

| | |
|---------------------|---|
| S - Phrases: | |
| S 26 | In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. |
| S 36/37/39 | Wear suitable protective clothing, eye/face protection and gloves. |
| S 45 | In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). |

| | |
|--|----------------------|
| German UN Number | |
| Required for postal delivery of bath samples only (LQ: limited quantity 1 litre): | |
| UN | UN 3266 Kl.8 C5 VGII |

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The user must verify the designated purpose of the bath. Previous experience has shown that not all metal surfaces are suitable for a trouble-free electroplating.

Consistent operation of the working solution requires appropriate maintenance using Schlötter products. Use of other chemicals will impair quality and invalidate our technical responsibilities.

The Degreaser SLOTOCLEAN AK 160 is a development of Dr. Ing. Max Schlötter GmbH & Co KG.

The hazards of the working solution may differ from those of its components. A risk assessment should be carried out as required by current regulations using information given in the individual EG-Material Safety Data Sheets.

Every endeavour has been made to ensure that the information contained in this data is reliable, but we cannot accept liability for any loss, injury or damage which may result from its use. No information given by us shall be deemed to be a recommendation to use any product in conflict with any existing patent rights, except as herein provided all warranties and conditions whether express or implied and whether by statute or common law as to quality or fitness for any purpose are excluded and no responsibility is accepted for goods which have suffered or have been subjected to undue wear and tear accident misuse improper application modification neglect or overloading and in no circumstances shall the seller be liable for loss or damage of any kind directly caused by or arising from goods supplied or from any accident or injury to personnel or damage to property however arising from or in the course of using such goods.

Degreaser SLOTOCLEAN EL 30

The Degreaser SLOTOCLEAN EL 30 is a universal cleaning process for electrolytic degreasing of steel and non-ferrous metals in rack, barrel or continuous plating lines.

Steel parts may be degreased cathodic-anodically or anodically only. Periodic pole reverse (cathodic-anodic) clearly improves the cleaning effect on steel parts. If operated with periodic pole reverse, the cleaning must end with the anodic phase. Copper brazings on steel parts are only inconsiderably attacked during the brief anodic plating break and do not change the colour.

Copper can be cleaned both - anodically and cathodically. Brass is cleaned cathodically only.

Schlötter offers a wide range of additives to enhance cleaning. Please refer to operating data sheet no. 02300 for an additive summary and their different possible combinations.

The information in this data sheet is based on laboratory as well as practical experience. Figures quoted for operating limits and replenishment quantities are for guidance. Actual values necessary will depend on the components being plated (material and geometry), their application and plating plant conditions.

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Important:

Please read these instructions carefully and follow recommendations given.

We reserve the right to make technical changes as necessary.

In the interests of safety, please pay attention to the R- and S- phrases on the drum label.

The shelf life of the additives is generally 18 months.

The date of production is taken from the first 3 figures of the batch number.

Figure 1 = year; figures 2-3 = month; figures 4-7 = batch number; (UK labels use a 4 digit year code).

For the storage of chemical products only the Hazardous Substances Regulation must be followed.

The Hazardous Goods Regulation (ADR/GGVS) are only valid for transportation and must not be applied to storage.

1.0 TECHNICAL INFORMATION AND EQUIPMENT REQUIREMENTS

| | |
|-----------------------------|---|
| Tanks: | Rubber-lined steel. |
| Local Exhaust Ventilation: | Required. |
| Part/electrolyte Agitation: | Surface cleaning with dirt collection compartment. |
| Electrodes: | Cathode: steel sheet. Anode: strongly nickel-plated steel sheet. |
| Heating/Cooling: | Electric immersion heaters or stainless steel heating coils. |

2.0 MAKE UP AND OPERATING CONDITIONS

List of products required for Degreaser SLOTOCLEAN EL 30

| Product Name | Product Number (AN) | SG |
|--|-----------------------|----|
| Degreaser Salt SLOTOCLEAN EL 31 | 020007 | -- |
| Degreaser additive depending on application, refer to operation data 02300 | | |

2.1 Composition

| | |
|---------------------------------|--|
| Degreaser Salt SLOTOCLEAN EL 31 | sodium hydroxide, phosphate, silicate, surfactants. No complexing agents. |
|---------------------------------|--|

2.2 Requirements for a 100 litre bath

| Product name | Product No. (AN) | Steel | Optimum | |
|--|------------------|--------|---------|----|
| Degreaser Salt SLOTOCLEAN EL 31 | 020007 | 8 - 16 | 12 | kg |
| Degreaser additive depending on application, refer to operation data 02300 | | | | |

| Product name | Product No. (AN) | Non-ferrous metals | Optimum | |
|--|------------------|--------------------|---------|----|
| Degreaser Salt SLOTOCLEAN EL 31 | 020007 | 8 - 12 | 10 | kg |
| Degreaser additive depending on application, refer to operation data 02300 | | | | |

| Product name | Product No. (AN) | Continuous plating lines | Optimum | |
|--|------------------|--------------------------|---------|----|
| Degreaser Salt SLOTOCLEAN EL 31 | 020007 | 8 - 12 | 10 | kg |
| Degreaser additive depending on application, refer to operation data 02300 | | | | |

The make-up concentration depends on the given task.

NB

The Degreaser SLOTOCLEAN EL 30 forms a thin foam layer during operation. Therefore the use of an additive to prevent spraying is usually not required (refer to operation data 02300).

2.3 Make up sequence for a 100 litre bath

All tanks and equipment to be used should be thoroughly cleaned prior to use.

- Fill the plating tank with 70 litres of water.
- Add the required amount of Degreaser Salt SLOTOCLEAN EL 31 and dissolve.
- Optional addition of degreaser additive.
- Make up to final volume with water.
- Mix thoroughly.
- The electrolyte is ready for use when the operating temperature has been reached.

The electrolyte is ready for use when the operating temperature has been reached.

2.4 Concentrations and operating conditions

| Base material steel | | | | |
|---------------------------------|----------|----------|---------|-------------------|
| | anodic | cathodic | optimum | |
| Degreaser Salt SLOTOCLEAN EL 31 | 80 - 160 | 80 - 160 | 120 | g/l |
| Treatment time | 1 - 5 | 1 - 5 | -- | min |
| Temperature range | 20 - 50 | 20 - 50 | 40 | °C |
| Current density | 10 | 10 | -- | A/dm ² |

| Base material brass, copper | | | | |
|---------------------------------|----------|-------|---------|-------------------|
| | cathodic | | optimum | |
| Degreaser Salt SLOTOCLEAN EL 31 | 80 | - 120 | 100 | g/l |
| Treatment time | 1 | - 5 | -- | min |
| Temperature range | 20 | - 50 | 40 | °C |
| Current density | 6 | - 8 | -- | A/dm ² |

| Base material copper | | | | | |
|------------------------------------|---------------|---|-----|----------------|-------------------|
| | anodic | | | optimum | |
| Degreaser Salt SLOTOCLEAN EL 31 | 80 | - | 120 | 100 | g/l |
| Treatment time | 3 | - | 30 | -- | sec |
| Temperature range | 20 | - | 50 | 40 | °C |
| Current density | 6 | - | 8 | -- | A/dm ² |

| Continuous plating lines | | | | | |
|------------------------------------|-----------------|---|-----|----------------|-------------------|
| | cathodic | | | optimum | |
| Degreaser Salt SLOTOCLEAN EL 31 | 80 | - | 120 | 100 | g/l |
| Treatment time | 5 | - | 20 | -- | sec |
| Temperature range | 20 | - | 50 | 40 | °C |
| Current density | < | | 5 | -- | A/dm ² |

3.0 MAINTENANCE

3.1 Degreaser Salt SLOTOCLEAN EL 31

Degreaser Salt SLOTOCLEAN EL 31 can be determined by acidimetric titration. The difference between the required value and the value determined by analysis is directly for replenishment of Degreaser Salt SLOTOCLEAN EL 31. The analysis description is provided upon request.

3.2 Degreaser additives

Degreaser additives are only consumed due to drag-out. Analysis with justifiable methods is not possible. They are proportionately replenished with degreaser salts or concentrates, or according to requirement.

4.0 EFFLUENT

Legal regulations must be observed for the disposal of Degreaser SLOTOCLEAN EL 31. Different regulations normally apply for the additives and the ready-made electrolyte. Please refer to section 13 of the appropriate Material Safety Data Sheet for disposal code and recommendations.

The following detoxification sequence is only considered to be an aid:

Resulting concentrates should be either static detoxified or slowly fed into the neutralisation step of the effluent plant.

If you require any further toxicological or ecological information related to the disposal of this product, please refer to the individual safety data sheets.

5.0 SAFETY

Reasonable care is required when handling Schlötter chemical products. Only personnel specially trained on working with chemicals should be deployed with their handling.

EC Material Safety Data Sheets must be made available to all personnel dealing with the chemicals to ensure they have all required information about product composition, hazards identification, first-aid measures, handling and storage, exposure controls, toxicological and ecological information, etc.

Alkaline cleaners are naturally corrosive. When handling the solution protective clothing, gloves and goggles should be worn. Splashes on the skin or eyes should be washed out with water for 10 - 15 minutes. If irritation becomes apparent seek medical advice.

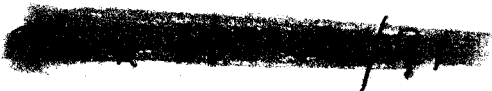
The user must verify the designated purpose of the bath. Previous experience has shown that not all metal surfaces are suitable for a trouble-free electroplating.

Consistent operation of the working solution requires appropriate maintenance using Schlötter products. Use of other chemicals will impair quality and invalidate our technical responsibilities.

Degreaser SLOTOCLEAN EL 30 is a development of Dr. Ing. Max Schlötter GmbH & Co KG.

The hazards of the working solution may differ from those of its components. A risk assessment should be carried out as required by current regulations using information given in the individual EG-Material Safety Data Sheets.

Every endeavour has been made to ensure that the information contained in this data is reliable, but we cannot accept liability for any loss, injury or damage which may result from its use. No information given by us shall be deemed to be a recommendation to use any product in conflict with any existing patent rights, except as herein provided all warranties and conditions whether express or implied and whether by statute or common law as to quality or fitness for any purpose are excluded and no responsibility is accepted for goods which have suffered or have been subjected to undue wear and tear accident misuse improper application modification neglect or overloading and in no circumstances shall the seller be liable for loss or damage of any kind directly caused by or arising from goods supplied or from any accident or injury to personnel or damage to property however arising from or in the course of using such goods.



| | |
|---------|----------|
| DATE | 29.05.02 |
| PAGE: | 1 OF 1 |
| REF NO. | HA36002 |

| | |
|------------------------------|---|
| PRODUCT SPECIFICATION | HYDROCHLORIC ACID 36% COMMERCIAL GRADE |
|------------------------------|---|

Appearance: Clear colourless to pale yellow liquid

| | <u>Units</u> | <u>Specification</u> |
|-------------------------------|---------------------|----------------------|
| Hydrochloric Acid | % w/w | 36 ± 1 |
| Specific Gravity at 20°C | | 1.18 nominally |
| Residue on Evaporation | % w/w | <0.05 |
| Oxidising Substances | ppm Cl ₂ | <100 |
| Reducing Substances | ppm SO ₂ | <100 |
| Iron | ppm Fe | <50 |
| Arsenic | ppm As | <2 |
| Copper | ppm Cu | <2 |
| Lead | ppm Pb | <2 |
| Sulphated Residue on Ignition | % w/w | <0.2 |

Methods of Analysis

Methods of test can be found in BS3993

Manufacture

Commercial grade Hydrochloric Acid is a co-product from chlorination processes and can contain impurities such as chlorinated organics. Samples can be supplied to determine the most acceptable quality. This product meets BS3993 Type 2 Hydrochloric Acid.

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SAFETY DATA SHEET

Sodium Cyanide

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY:

PRODUCT NAME: Sodium Cyanide
PART No.: 601824
SUPPLIER: Schlötter Ireland
 Newbridge Industrial Estate
 Newbridge
 Co. Kildare.
TELEPHONE: +353 (0)45 447400
FAX: +353 (0)45 447477

2. COMPOSITION/INFORMATION ON INGREDIENTS:

| INGREDIENT NAME: | EINECS | CAS No.: | CONTENT | SYMBOL | RISK: |
|------------------|-----------|----------|----------|--------|---------------------|
| Sodium Cyanide | 205-599-4 | 143-33-9 | 60-100 % | T+,N | 26/27/28, 32, 50/53 |

The full text for all R-phrases are shown in section 16

3. HAZARDS IDENTIFICATION:

Very toxic by inhalation, in contact with skin and if swallowed. Contact with acid liberates very toxic gas. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

4. FIRST AID MEASURES:

GENERAL: CAUTION! First aid personnel must be aware of own risk during rescue!

SPECIFIC FIRST AID TREATMENT:

SPECIFIC NOTES FOR CYANIDE TREATMENT: If the casualty is breathing, break 2 amyl nitrite tablets under the casualty's nose so the vapour is inhaled. Kelo-cyanor should only be used by trained personnel. Kelo-cyanor is extremely dangerous when administered to casualties NOT suffering from cyanide poisoning.

INHALATION: Provide rest, warmth and fresh air. CAUTION! First aid personnel must be aware of own risk during rescue! Administer oxygen as quickly as possible. When unconscious, loosen tight clothing and position in secured sideposition. If victim is not breathing, do not use mouth to mouth or mouth to nose ventilation because of the danger to the rescuer. Use a resuscitation bag and mask instead. Immediately to hospital.

INGESTION: As for inhalation.

- SKIN:** Immediately remove contaminated clothing. Wash the skin immediately with soap and water. Get medical attention immediately.
- EYES:** Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes and get medical attention.

5. FIRE FIGHTING MEASURES:

EXTINGUISHING MEDIA:

This material is not flammable. Use extinguishing media appropriate for surrounding fire. Water spray, fog or mist. Carbon dioxide (CO₂). Foam. Dry chemicals, sand, dolomite etc.

SPECIAL FIRE FIGHTING PROCEDURES:

Fight advanced or massive fires from safe distance or protected location. Keep run-off water out of sewers and water sources. Dike for water control. Move container from fire area if it can be done without risk. Ventilate closed spaces before entering them. Use water spray to reduce vapours. Do not scatter spilled material with more water than needed to fight the fire. If risk of water pollution occurs, notify appropriate authorities.

UNUSUAL FIRE & EXPLOSION HAZARDS:

May develop highly toxic or corrosive fumes if heated.

HAZARDOUS COMBUSTION PRODUCTS:

Hydrogen cyanide (HCN).

PROTECTIVE MEASURES IN FIRE:

Suitable protective clothing and breathing apparatus

6. ACCIDENTAL RELEASE MEASURES:

SPILL CLEANUP METHODS:

Wear necessary protective equipment. Do not contaminate water sources or sewer. Scoop or shovel the mixture into buckets and add water carefully. Avoid generation and spreading of dust. Neutralise with Sodium Hypochlorite Solution. Require specialist contractor to remove and treat.

7. HANDLING AND STORAGE:

USAGE PRECAUTIONS:

Avoid spilling, skin and eye contact. Provide good ventilation. Ventilate well, avoid breathing vapours. Use approved respirator if air contamination is above accepted level. Antidote must be found in place of work.

STORAGE PRECAUTIONS:

Keep in cool, dry, ventilated storage and closed containers. Keep in original container. Keep containers tightly closed.

STORAGE CRITERIA:

Toxic storage. Store away from acids

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION:

| INGREDIENT NAME: | CAS No.: | STD: | LT EXP. 8 HRS: | ST EXP. 15 MIN: |
|------------------|----------|------|---------------------|-----------------|
| Sodium Cyanide | 143-33-9 | OES | 5 mg/m ³ | No std. |
| Sodium Cyanide | 143-33-9 | OES | 5 mg/m ³ | No std. |

PROTECTIVE EQUIPMENT:**PROCESS CONDITIONS:**

Use engineering controls to reduce air contamination to permissible exposure level.

VENTILATION: Provide adequate general and local exhaust ventilation. Must not be handled in confined space without sufficient ventilation.

RESPIRATORS: Respiratory protection must be used if air concentration exceeds acceptable level. SCBA, Self-contained breathing apparatus.

PROTECTIVE GLOVES:

Use protective gloves.

EYE PROTECTION:

Wear approved safety goggles.

OTHER PROTECTION:

Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station and safety shower.

HYGIENIC WORK PRACTICES:

Wash at the end of each work shift and before eating, smoking and using the toilet. Wash promptly if skin becomes contaminated. Change work clothing daily if there is any possibility of contamination. Promptly remove non-impervious clothing that becomes contaminated.

9. PHYSICAL AND CHEMICAL PROPERTIES:

| | | |
|---|--------------------------|------------------------------|
| APPEARANCE: | Solid. Granular. | |
| COLOUR: | White. to Off-white. | |
| ODOUR/TASTE: | Mild (or faint). Almond. | |
| SOLUBILITY DESCRIPTION: | Soluble in water. | |
| SOLUBILITY VALUE (g/100g H₂O 20°C): | 58.00 | |
| MOL. WEIGHT: | 49.01 | |
| BOILING POINT (°C, interval): | ~1500 | PRESSURE: |
| MELT./FREEZ. POINT (°C, interval): | -560 | TEMPERATURE (°C): 817 |
| VAPOUR PRESSURE: | 1.00 | |

10. STABILITY AND REACTIVITY:

STABILITY: Normally stable. Avoid: Shocks and physical damage. Contact with acids.

CONDITIONS TO AVOID:

Avoid excessive heat for prolonged periods of time. Avoid contact with acids.

MATERIALS TO AVOID:

Strong acids. Excessive heat

HAZARDOUS DECOMP. PRODUCTS:

Toxic gases/vapours/fumes of: Hydrogen cyanide (HCN).

11. TOXICOLOGICAL INFORMATION:**TOXIC DOSE - LD 50:**

6440 µg/kg (oral-rat)

INHALATION:

Very toxic by inhalation. Unconsciousness, possibly death.

INGESTION:

Very toxic if swallowed. Very toxic: danger of very serious irreversible effects if swallowed. Ingestion of even small quantities may be fatal.

SKIN: Very toxic in contact with skin. May be absorbed through injured skin and cause poisoning.

EYES: Causes burns.

HEALTH WARNINGS:

Exposure; This chemical has poor warning properties! Gas or vapour is toxic or extremely irritating even on brief exposure. This chemical can be hazardous when inhaled and/or touched. Toxic through skin absorption (percutaneous). Repeated exposure may cause chronic eye irritation. May cause chemical eye burns. Asphyxiation. Acute eczematous dermatitis, contact type erythema, oedema, papules, vesicles, bullae, crusts, desquamation). Contact with concentrated chemical may cause severe skin damage. Swallowing concentrated chemical may cause severe internal injury. Unconsciousness, death. Coughing and shortness of breath. Unconsciousness/cessation of breathing. Inhalation may cause: Coughing. Pressure in the chest. Irritation of nose, throat and airway. Ingestion may cause: Severe abdominal pain. Diarrhoea.

ROUTE OF ENTRY:

Inhalation. Ingestion. Skin and/or eye contact.

TARGET ORGANS:

Blood. Central nervous system. Heart & cardiovascular system. Kidneys. Liver. Respiratory system, lungs. Skin.

MEDICAL SYMPTOMS:

Extreme irritation of eyes and mucous membranes, including burning and tearing. Upper respiratory irritation. Respiratory failure, death. Severe skin irritation. Cyanosis (blue tissue condition, nails, lips, and/or skin). Nausea, vomiting. Unconsciousness, possibly death. Headache. Dizziness.

MEDICAL CONSIDERATIONS:

Skin disorders and allergies. Pre-existing eye problems. Convulsive disorders, CNS problems. Chronic respiratory and obstructive airway diseases.

12. ECOLOGICAL INFORMATION:

ECOLOGICAL INFORMATION:

Dangerous for the environment: May cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHODS:

Dispose of in accordance with Local Authority requirements.

14. TRANSPORT INFORMATION:

LABEL FOR CONVEYANCE:



ROAD TRANSPORT:

| | |
|-------------------------|---------------------------------|
| UN No. ROAD: | 1689 |
| ADR CLASS No.: | Division 6.1: Toxic substances. |
| ADR CLASS: | 6.1 |
| ADR PACK GR. | I |
| HAZARD No. (ADR) | 66 Highly toxic substance. |
| HAZARD No. (ADR) | 66 |
| ADR LABEL No.: | 6.1 |
| HAZCHEM CODE: | 2X |
| PROPER SHIPPING NAME I: | SODIUM CYANIDE |

RAIL TRANSPORT:

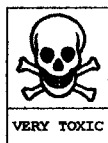
RID CLASS No.: 6.1
RID PACK GR. I

SEA TRANSPORT:

UN No. SEA: 1689
IMDG CLASS: 6.1
IMDG PACK GR.: I
EmS No.: F-A, S-B
MFAG TABLE No.: 18
MARINE POLLUTANT: Yes.
SEA TRANSPORT NOTES: Category B, "separate from" acids

AIR TRANSPORT:

ICAO CLASS: 6.1
AIR PACK GR.: I

15. REGULATORY INFORMATION:**LABEL FOR SUPPLY:****RISK PHRASES:**

R-26/27/28 Very toxic by inhalation, in contact with skin and if swallowed.
 R-32 Contact with acids liberates very toxic gas.
 R-50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

SAFETY PHRASES:

S-7 Keep container tightly closed.
 S-28 After contact with skin, wash immediately with plenty of water.
 S-29 Do not empty into drains.
 S-45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
 S-60 This material and its container must be disposed of as hazardous waste.
 S-61 Avoid release to the environment. Refer to special instructions/ Safety Data Sheets.

EU DIRECTIVES:

Complied in accordance with Directive 2001/58/EC

APPROVED CODE OF PRACTICE:

Classification and Labelling of Substances and Preparations Dangerous for Supply.

GUIDANCE NOTES:

CHIP for everyone HSG(108). 2002 CODE OF PRACTICE for the Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001.

16. OTHER INFORMATION:**INFORMATION SOURCES:**

Croner's: Dangerous Substances. Croner's: Emergency Spillage Guide. Croner's: Emergency First Aid Guide. Croner's: Substances Hazardous to Health. Dangerous Properties of Industrial Materials Report, N.Sax et.al.

REVISION DATE:

08/2003 Rev 0

REV. No./REPL. SDS GENERATED:

Rev 0

R-PHRASES (Full Text)

R-32 Contact with acids liberates very toxic gas.
 R-26/27/28 Very toxic by inhalation, in contact with skin and if swallowed.
 R-50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

DATE:

27/8/03

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[REDACTED] (ALSO TANK 10)



Schlötter

SAFETY DATA SHEET

Caustic Soda Pearl

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY

PRODUCT NAME: Sodium Hydroxide

PART No.: 600202

SYNONYMS, TRADE NAMES: Caustic Soda Pearl

SUPPLIER: Schlötter Ireland
Newbridge Industrial Estate
Newbridge
Co. Kildare.

TEL: 045 447400

FAX: 045 447477

2 COMPOSITION/INFORMATION ON INGREDIENTS

| INGREDIENT NAME | CAS No. | CONTENTS | HEALTH (class) | RISK (R No.) |
|------------------|-----------|----------|----------------|--------------|
| SODIUM HYDROXIDE | 1310-73-2 | 60-100 % | C | 35 |

3 HAZARDS IDENTIFICATION

Causes severe burns.

4 FIRST AID MEASURES

INHALATION: Move the exposed person to fresh air at once. Perform artificial respiration if breathing has stopped. Keep the affected person warm and at rest. Get prompt medical attention.

INGESTION: NEVER MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK FLUIDS! DO NOT induce vomiting. Get medical attention immediately. Promptly get affected personnel to drink large volumes of water to dilute the swallowed chemical.

SKIN: Remove affected person from source of contamination. Promptly flush contaminated skin with water. Promptly remove clothing if soaked through and flush the skin with water. Get medical attention immediately.

EYES: Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes and get medical attention.

5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Water.

SPECIAL FIRE FIGHTING PROCEDURES: Keep run-off water out of sewers and water sources. Dike for water control. Cool containers exposed to flames with water until well after the fire is out. Move container from fire area if it can be done without risk. If risk of water pollution occurs, notify appropriate authorities.

UNUSUAL FIRE & EXPLOSION HAZARDS: May develop highly toxic or corrosive fumes if heated. May ignite other combustible materials.

HAZARDOUS DECOMPOSITION PRODUCTS: Fire or high temperatures create: Carbon monoxide (CO). Sulphurous gases (SOx).

Sodium Hydroxide

6 ACCIDENTAL RELEASE MEASURES

SPILL CLEANUP METHODS: Wear necessary protective equipment. DO NOT touch spilled material. Collect for reclamation or absorb in vermiculite, dry sand or similar material. Absorb in vermiculite, dry sand or earth and place into containers. Ventilate well. Dilute with water and neutralize with 6 molar HCL. Provide ventilation and confine spill. Do not allow runoff to sewer.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS: Avoid spilling, skin and eye contact. Ventilate well, avoid breathing vapours. Use approved respirator if air contamination is above accepted level. Avoid acids, moisture, and combustible materials. Wear full protective clothing for prolonged exposure and/or high concentrations.

STORAGE PRECAUTIONS: May attack some plastics, rubber and coatings. Keep in cool, dry, ventilated storage and closed containers. Keep containers tightly closed.

STORAGE CRITERIA: Corrosive storage.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

| INGREDIENT NAME | CAS No | STD | LT EXP | ST EXP |
|------------------|-----------|-----|--------------------|---------------------|
| SODIUM HYDROXIDE | 1310-73-2 | OES | (8 hrs) No std. | (15 min) 2 mg/m3 |

PROTECTIVE EQUIPMENT:



VENTILATION: No specific ventilation requirements noted, but forced ventilation may still be required if air contamination exceeds acceptable level.

RESPIRATORS: None noted.

PROTECTIVE GLOVES: Protective gloves must be used if there is a risk of direct contact or splash.

EYE PROTECTION: Use approved safety goggles or face shield.

OTHER PROTECTION: Use engineering controls to reduce air contamination to permissible exposure level. Provide eyewash station and safety shower. Wear appropriate clothing to prevent any possibility of skin contact. Impervious clothing, gloves and minimum 8 inches face shield.

HYGIENIC WORK ROUTINES: Wash at the end of each work shift and before eating, smoking and using the toilet. Wash promptly if skin becomes wet or contaminated. Change work clothing daily if contamination is reasonably probable. Promptly remove non-impervious clothing that becomes contaminated. Contaminated clothing to be placed in closed container until disposal or decontamination. Warn cleaning personnel of chemical's hazardous properties. Eating, smoking and water fountains prohibited in immediate work area.

9 PHYSICAL AND CHEMICAL PROPERTIES

| | | | |
|---|------------------------------------|----------------------------|------------|
| APPEARANCE: | Pellets. | COLOUR: | White. |
| SOLUBILITY DESCRIPTION: | Soluble in water. | | |
| SOLUBILITY VALUE (g/100g H₂O/20°C): | 52/100 | BOILING POINT (°C): | 1385 @ kPa |
| SPECIFIC GRAVITY (Water=1): | 2.13 - Kg/m ³ @ 20 C °C | | |

10 STABILITY AND REACTIVITY

STABILITY: Normally stable.

CONDITIONS TO AVOID: The solution is strongly alkaline and reacts with strong acids with heat generation. In contact with metals generates hydrogen gas, which together with air can form explosive mixtures.

11 TOXICOLOGICAL INFORMATION

TOXIC DOSE1- LD50: 500mg/kg (oral-rbt)

INGESTION: Causes severe burns.

SKIN: Causes severe burns. May cause sensitisation by skin contact. May cause allergic contact eczema.

Sodium Hydroxide

EYES: Causes severe burns. Risk of serious damage to eye.
HEALTH WARNINGS: This substance is corrosive. Causes severe burns. May cause severe internal injury.
ROUTE OF ENTRY: Skin and/or eye contact. Ingestion.
MEDICAL CONSIDERATIONS: Skin disorders and allergies.

12 ECOLOGICAL INFORMATION

ENVIRONMENTAL HAZARDS: Dangerous for the environment if discharged into watercourses.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS: Dispose of in accordance with Local Authority requirements.

14 TRANSPORT INFORMATION

LABEL FOR CONVEYANCE:



ROAD:
UN No: 1823
HAZARD CLASS (ADR): Class 8: Corrosive substances. **ADR CLASS No:** 8
ADR ITEM No: 41(II) **MARGINAL:** 2801
ADR LABEL No: 8 **HAZCHEM CODE:** 2R

RAIL:
SEA:
SEA TRANSPORT CLASS No: 8 **MARINE POLLUTANT:** No.

AIR:

15 REGULATORY INFORMATION

LABEL FOR SUPPLY:



CORROSIVE

RISK PHRASES: R-35 Causes severe burns.

SAFETY PHRASES: S-26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S-27 Take off immediately all contaminated clothing.
S-45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S-24/25 Avoid contact with skin and eyes.
S-36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S-60 This material and its container must be disposed of as hazardous waste.

16 OTHER INFORMATION

REVISION DATE: 02/2003
REVISION No. /REPLACES SDS ISSUED: 0

Sodium Hydroxide

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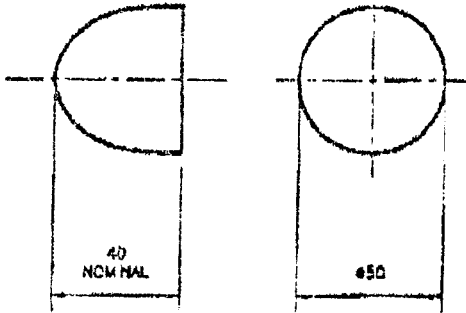
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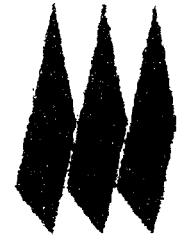
16 OTHER INFORMATION

REVISION DATE: 02/2003
REVISION No. /REPLACES SDS ISSUED: 0

Dome anodes



Susan Murray
10/12/02



ZINC BULLET PLATING ANODE

BS 2658: 1972

| PHYSICAL PROPERTIES | |
|-----------------------|---------------|
| Relative density | 7.1 g/cc |
| Boiling point / range | Zinc 907°C |
| Melting point / range | 375°C - 484°C |

| PACKING DETAILS | |
|--------------------|--|
| Standard packaging | Nominal 25 kg bags 40 bags per 1 tonne pallet |

| CHEMICAL ANALYSIS | AS CAST BULLETS |
|-------------------|-----------------|
| Lead | 0.005% Max |
| Cadmium | 0.005% Max |
| Iron | 0.005% Max |
| Tin | 0.001% Max |
| Thallium | 0.001% Max |
| Indium | 0.001% Max |
| Aluminium | 0.005% Max |
| Zinc | Remainder |



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0772754

Iridite NCP

**Chrome Free Conversion Coating for
Aluminium. Spray and Immersion
Applications**
#110561, #110544, #110562

DESCRIPTION

The Iridite NCP, Non Chrome Passivate has been developed in response to the ELV, RoHS and WEEE directives. The Iridite NCP does not contain Lead, Cadmium, Chromium (hexavalent or trivalent), Mercury or PBB / PBDE compounds. Iridite NCP is an environmentally friendly chemical process that produces a protective conversion coating on aluminium and its alloys. This coating exhibits bare, unpainted, corrosion resistance that is equal to hexavalent chromates on many aluminium alloys. The coating can be used as a final finish and can also serve as a base for paints, high performance topcoats, powdercoats, lacquers, or as a base for rubber bonding. When the application is for a paint base only, then Iridite NCP – Prepaint (110563) may be considered.

The Iridite NCP process is composed of Iridite NCP Start (110561) and Iridite NCP Replenish (110544). Iridite NCP Start is formulated to build a new bath that does not require any break-in to produce a conversion coating that will provide excellent NSS corrosion resistance. Iridite NCP Replenish is the maintenance additive that has been formulated to maintain the bath in the correct operating range.

The working range of Iridite NCP is very flexible. Suitable adjustments of the concentration can accommodate wide variations in immersion time, the corrosion protection desired and the alloy to be treated.



FEATURES

- Elimination of the use of hazardous hexavalent and trivalent chromium.
- Provides corrosion protection that rivals conventional chromate conversion coatings when tested in accordance with ASTM B 117.
- The conversion coating passes the requirement of MIL-C-5541 for electrical contact resistance for Class 3 coatings.
- Wide operating range for time, temperature and concentration.
- Provides an excellent primer or paint base, or for other subsequent organic treatments when tested in accordance with ASTM D 3359.
- No aging or curing required before topcoat application.
- Baking of treated parts up to 350°C does not affect the coating as with traditional yellow chromates.
- Rinsing the Iridite NCP coated aluminium in hot water does not compromise the corrosion resistance of the coating.
- Reduced waste treatment costs when compared to chromates.

TYPICAL PROCESS CYCLE

1. Clean
2. Warm or cold overflowing rinse
3. Deoxidise
4. Cold overflowing rinse
5. Cold overflowing rinse
6. Iridite NCP treatment
7. Cold overflowing deionised rinse
8. Dry

Note: Specific process details are described in the process cycles section of this technical data sheet.



EQUIPMENT

Tank

Use mild steel lined with polyethylene, Koroseal or similar. 304 & 316 series stainless steel may also be used.

Heating

Use Teflon coated heating coils.

Agitation

Agitation is not needed except for mixing a bath after chemical additions. Mild Air agitation may be beneficial in large tank sizes to keep bath temperature and concentration constant. Slow and continuous movement of the components during processing by the use of mechanical means (moving work bar) can be advantageous particularly when processing large flat areas.

Ventilation

Adequate local ventilation is required.

Filtration

It is recommended that the Iridite NCP bath be filtered using a 5 micron filter with one turn over per hour. All filtering equipment that contacts Iridite NCP solution should be made of polypropylene or polyethylene. Mild or stainless steel are not recommended.

Spray Application

All spray nozzles should be made of a non reactive plastic and be of the flood or whirl type. Strong impingement is not recommended.

SOLUTION MAKEUP

1. Fill tank $\frac{3}{4}$ full with deionised or reverse osmosis (R.O.) water.
2. Add required quantity of Iridite NCP Start (110561) liquid while stirring.
3. Add remaining deionised or R.O. water.
4. Adjust working solution to required operating temperature.

Note: Deionised water should be used to account for evaporation loss.



OPERATING CONDITIONS

| | Immersion Application | Spray Application |
|--------------------|-----------------------|---------------------|
| Iridite NCP | 4.0 – 6.0% / Volume | 4.0 – 7.5% / Volume |
| Temperature | 28° - 45°C | 28° - 45°C |
| Time | 4 – 6 Minutes | 1 – 3 Minutes |
| pH range | 3.5 – 5.5 | 4.0 – 5.5 |

SOLUTION CONTROL & MAINTENANCE

Control by pH & titration

The pH of the Iridite NCP is the most critical factor in solution control. In extreme cases, a very high pH may cause the bath to precipitate, while a too low value of pH may yield no coating at all. Iridite NCP Replenish (110544) is the only material that should be added back in order to lower the pH of the working solution in the range of 4.0 – 5.5. Typically a fresh bath will yield a pH near 3.5 and will rise as the solution is worked.

For spray applications, the initial pH must be adjusted upwards to a minimum of 4.0 in order to obtain satisfactory bare corrosion resistance. Typically, the addition of 100g of Iridite NCP pH Additive per 100 litres Iridite NCP bath will raise the pH from the starting pH (3.2 – 3.5) to a pH of approximately 4.0. Dilute Ammonium Hydroxide (2-3% v/v) may also be used. Concentrated ammonium hydroxide should never be added to the operating bath since it will cause precipitation of the Iridite NCP components.

Should the drag-in of an acid occur lowering the pH to an unacceptable range, Iridite NCP pH Additive should be used to raise it back into the correct working range.

Iridite NCP Start & Replenish contain fluoride – pH probes should not remain immersed longer than necessary to obtain a reading.



Titration**Apparatus Required**

- 50 & 100 ml pipettes
- 10 ml self-leveling acrylic burette
- 250 ml Erlenmeyer flasks
- 50 ml graduated cylinders x 2
- Spatula

Reagents Required

- 0.1 N sulphuric acid
- 0.1 N sodium hydroxide
- Saturated boric acid solution: 60 gpl AR grade boric acid in DI water
- Methyl alcohol
- Potassium chloride – AR grade
- Iridite NCP reagent (100% Iridite NCP Start from the drum)
- Phenolphthalein indicator
- Bromophenol blue indicator (BPB)
- Methyl red-bromocresol green indicator (MRBCG)

There are two titration methods for determining the concentration of an Iridite NCP bath. The titration procedure for a working bath is much more accurate and can be used for both the initial make up and used baths.

The new bath titration should only be used to check the initial make-up concentration, to determine if enough Iridite NCP Start has been added. Do not use this titration for used baths since it will give inaccurate results.

NEW BATH TITRATION

- A. Pipette a 100 ml sample of Iridite NCP working solution into an Erlenmeyer flask.
- B. Add 3 – 6 drops of methyl red-bromocresol green indicator.
If the colour is red, the pH is below 4.5 and in the proper range. If the colour is green, titrate with Iridite NCP reagent until the solution changes from green to red.
- C. The number of mls of Iridite NCP reagent required to adjust the sample to a red end point is the percent by volume of Iridite NCP required to adjust the product to the mid to low end of the operating pH range.



For example, if 1.5 mls are required to change the colour from green to red, then an addition of 1.5 percent by volume of Iridite NCP Start concentrate will be required to adjust the pH to the desired range.

WORKING BATH TITRATION

1. Pipette a 50 ml sample of the Iridite NCP working solution into an Erlenmeyer flask.
2. Add 3 – 5 drops of phenolphthalein indicator.
3. Titrate with 0.1 N sodium hydroxide to a faint pink endpoint, which should persist for at least 15 seconds.
4. To this sample, add just enough 0.1 N sulphuric acid to remove any pink colour from the above sample. Add drop by drop to avoid an over addition.
5. Add 40 mls of saturated boric acid solution, 40 mls of methyl alcohol and 8 grams of potassium chloride.
6. Mix to dissolve the potassium chloride. Slight heating increases the solubility and speeds up the reaction.
7. Add 4 – 6 drops of bromophenol blue indicator.
8. Titrate with 0.1 N sulphuric acid to a definite yellow endpoint. The color change will be from blue to green to yellow. **Record the mls. used as A.**
9. A **blank value** is determined by analysing a 50 ml sample of DI water with the entire procedure and recording as **B**. The blank value is then subtracted from the **A** value in order to calculate the **% Concentration**. This blank value should be determined for each new batch of analytical reagents used in the test. This does not include indicators.

$$\%VOL. \text{ Iridite NCP} = (A - B) \times 0.51$$



SPOT TESTING

Production parts may be quickly analysed for presence and relative quality of coating utilizing the ARP 70 Spot Test (178671). Different parts, alloys, process cycles, conditions, etc. all contribute towards coating quality. For meaningful results the testing must be comparative. Testing should be done on the same parts of the same age after finishing (due to aged parts exhibiting higher readings). Normally the test is performed on parts within an hour of when they are processed, no longer than 24 hours should lapse. Typically the longer the spot test takes to react equates to greater corrosion resistance. Comparison of the spot tested parts with the same parts that have been corrosion tested will allow better correlation between the ARP 70 results and the expected performance of any given parts.

BATH LIFE

It is normal for the pH of the Iridite NCP bath to increase with use. If after the bath is brought back to working concentration with Iridite NCP Replenish, the bath remains at a pH of 5.5 or higher, the entire bath should be discarded and made up fresh with Iridite NCP Start.

PROCESS REQUIREMENTS

CLEANING

A uniformly clean surface is of prime importance in securing satisfactory adhesion and complete coverage by subsequent surface treatments. Failure to follow this rule results in costly rejections of finished products, and even more costly failures in service.

When alkaline cleaners are used, it is mandatory to follow the cleaning step with an acidic deoxidizer to insure the alkali film is removed from the metal surface prior to treatment with Iridite NCP.

DEOXIDIZING

The deoxidizing step is critical for good bare corrosion resistance. The deoxidizer will remove alloying elements and oxide layers that are impervious to the cleaning step. Also the deoxidizer will acidify the aluminium surface lowering the acid demand for the Iridite NCP thus extending the Iridite NCP bath life.

PROCESS CYCLES

The following cleaning cycles are for typical applications and may have to be modified or combined for your particular requirements. Major considerations are the form and type of aluminium alloy, the amount and kind of surface contamination, the required appearance of the finished surface and the equipment available. Please consult your MacDermid representative for additional product information regarding process chemistry.



IMMERSION EXAMPLE

1. **Oxidite 76 or Minco** (see relevant data sheet)
2. Water rinse - 1 minute
3. **Isoprep 184 or Alprep 290** - 20%, 27°C , 1 minute
4. Water rinse - 1 minute
5. Water rinse* - 1 minute
6. **Iridite NCP** - 5%, 32°C , 5 Minutes
7. Deionised water rinse - 1 minute
8. Dry

SPRAY EXAMPLE

1. **Koolspray 140L or Aluclean 245-SA** (see relevant data sheet)
2. Water rinse - 30 seconds
3. **Isoprep 184 or Alprep 290** - 5%, 27°C, 1 minute
4. Water rinse - 30 seconds
5. Water rinse* - 30 seconds
6. **Iridite NCP** - 5%, 37 - 54°C, 2 minutes
7. Deionised water rinse - 30 seconds
8. Dry

*This 2nd Water rinse is important (possibly a 3rd will be necessary), to reduce any drag-in which would decrease bath performance and life. If cast aluminium is being processed, a warm water rinse prior to Iridite NCP is recommended to remove contamination from the pores that are associated with the surface of most castings. This rinse should be made up with deionised water. The deionized water used in the second post rinsing stages can be counter flowed to the previous rinse.

RINSING & DRYING PROCEDURES

Rinsing before Iridite NCP treatment

Maintenance of the rinses prior to the Iridite NCP is mandatory if the bath is to be maintained in a condition that will produce maximum corrosion resistance on the processed aluminium. Drag-in of acid or alkali is detrimental to the Iridite NCP bath. Consequently, rinsing between the cleaning and Iridite NCP operations must be particularly thorough. A clean overflowing immersion or spray rinse is desirable.



Rinsing after Iridite NCP treatment

Rinsing after the Iridite NCP treatment should be thorough in order to flush off any unreacted bath component. Deionised water is recommended for all rinses after the Iridite NCP bath. This is particularly important if conversion coating precedes painting.

Final hot rinse

A final clean hot rinse may be helpful to facilitate drying – This will not be detrimental to the corrosion resistance of the coating. Deionised water is recommended.

Drying

Drying may be accomplished by air blast, centrifuge or warm circulating air.

Appearance

The Iridite NCP coating is normally clear at low coating weights, to a light blue colour at its highest coating weight. There are times when the coating is iridescent due to refraction of light by the conversion coating. The colour is very dependent on the chemical processing conditions, substrate alloy and its surface condition. Because of this, the colour should not be used to determine the quality of the film.

STRIPPING IRIDITE NCP COATINGS FOR REPROCESSING WORK**Stripping procedure**

Iridite NCP may be stripped by immersion in Isoprep 184 or Alprep 290 at a concentration of 20% by volume for 5 minutes. Strip until the coating is removed. Excess time in the stripping solution has been found to decrease the corrosion resistance of the reprocessed aluminum. Concentrated nitric acid may be used to strip the coating, however the corrosion resistance of the reprocessed work will be inferior to work stripped with Isoprep 184 or Alprep 290.

SAFETY IN HANDLING AND USE

Refer to relevant Material Safety Data Sheets.



EFFLUENT

It recommended that waste water treatment is carried out to conform to the specific requirements of the local authority. Advice on how to meet these requirements, once known, can be obtained from MacDermid plc.

Disclaimer

Any information given here relating to Health & Safety should be regarded as general advice and is not to be regarded as comprehensive or definitive.

Every user should also be in possession of Safety Data Sheets for each individual product/chemical used. These are available for all products sold by MacDermid plc.

The Safety Data Sheet contains the definitive advice.

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REVISED 14/06/2006

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YES WE CAN

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