DESCRIPTION

The Copper Plater 400 is a liquid solution designed to produce ductile, crack-resistance, semi-bright copper electrodeposits. It has been specifically formulated for the plating of circuit boards up to a current density of 5 ASD. The solution consists of two components (Copper Sulfate =75g/l and Sulphuric Acid, 66° Electronic grade = 200 ml/l).

EQUIPMENT

Conveyor equipment should be made of Polypropylene or another suitable plastic material.

SOLUTION MAKE-UP

Fill the COPPER PLATER 400 in the tank
Add 2ml/l Shine

OPERATING PARAMETERS

Temperature ambiant ~ 24°C, completed with mechanical agitation.

BATH MAINTENANCE

In order to keep the P.C.B. surface shiny and smooth add Shine to the bath if they become granulated or dull. The chemical admix SHINE 400 is used up in dependence on the throughput. Fill up 10 ml SHINE after 100 ampere-hours.

SAFETY & HANDLING

It is recommended that the company/process operator reads and reviews the Material Safety Data Sheets for the appropriate health and safety warnings before use.

WASTE DISPOSAL

Prior to using any recommendation or suggestion by LPKF AG for waste treatment, the user is required to know the appropriate local and state regulations for on-site or off-site treatment. If there is any conflict regarding our recommendations, local and state regulations take precedent. EAK 110 105.

ORDER INFORMATION

<table>
<thead>
<tr>
<th>Product</th>
<th>Standard Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>COPPER PLATER 400</td>
<td></td>
</tr>
</tbody>
</table>
1. IDENTIFICATION OF SUBSTANCE OR PREPARATION

Product: Copper Plater 400
Application: A liquid used for through-hole plating.

Supplier:
LPKF Laser & Electronics AG
Osteriede 7
30827 Garbsen
Germany

2. COMPOSITION/INFORMATION ABOUT INGREDIENTS

Hazardous ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>%</th>
<th>Hazard symbol/Risk &amp; safety phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphuric acid (95-97%)</td>
<td>370g/l</td>
<td>C: R35 Cause severe burns. S2: Must not get into children’s hands.</td>
</tr>
<tr>
<td>CAS-No.:7664-93-9</td>
<td></td>
<td>S26: In case of contact with eyes, rinse immediately with plenty of water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and seek medical advice. S30 Never add water to this product. S36/37/39</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wear suitable clothing, gloves and eye/face protection.</td>
</tr>
<tr>
<td>Copper Sulfate</td>
<td>75g/l</td>
<td>Xn: R22 harmfull by swallow. R36/38: Irritating to eyes and skin.</td>
</tr>
<tr>
<td>CAS-No.:7758-98-7</td>
<td></td>
<td>S36/37/39 Wear suitable protective clothing and eye protection.</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Ingestion: CORROSIVE Burn lips, mouth and esophagus. Nausea, vomiting (maybe with blood), abdominal pain.

Eye contact: CORROSIVE Severe pain, intense watering and redness, progressing to corneal burns unless treated promptly.

Skin contact: CORROSIVE Pain followed by redness of skin blistering may occur. Symptoms may be delayed.

Inhalation: CORROSIVE. Shortness of breath, cough, soreness of chest. Symptoms may be delayed.

This information is given in good faith, being compiled from sources considered to be dependable. It is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. It does not constitute an assessment in use as required under COSHH regulations.
4. ECOLOGICAL EFFECTS

<table>
<thead>
<tr>
<th>Test type</th>
<th>Species</th>
<th>Low</th>
<th>Qua</th>
<th>High</th>
<th>Units</th>
<th>Time/Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>Not established.</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

5. FIRST AID PROCEDURES

Eyes : Flush continuously with clean running water, holding eyelids apart during flush. Do not stop for at least 20 minutes. Consult physician.

Skin : Flush with copious amounts of water while removing contaminated clothing. Seek medical advice.

Ingestion : Do not induce vomiting. Give several glasses of water to drink. Consult physician immediately.

Inhalation : Remove casualty to fresh air. Seek medical advice.

6. FIRE FIGHTING PROCEDURES

Extinguishing media : Material not flammable. Use as appropriate to surroundings.

Fire and explosion hazards :

Protective procedures : Wear full protection including self-contained breathing apparatus and fight fire from remote locations.

7. SPILL OR LEAK PROCEDURES - SEE ALSO (14) DISPOSAL CONSIDERATIONS

Personal precaution : Ensure adequate ventilation. Wear protection as detailed in (9).

Environmental precautions : If product has entered drains, advise local river authority.

Recovery : Mop up using inert media and plastic tools. Place waste in plastic containers and allow to stabilize prior to sealing lid.
8. STORAGE AND HANDLING (IN NORMAL USE)

Storage: Store in a cool, dry, well-ventilated area away from direct sunlight.

Handling: Wear protective clothing, footwear, hand/eye protection. Ensure adequate ventilation in use.

9. EXPOSURE CONTROLS/PERSONAL PROTECTION (NORMAL USE)

OCCUPATIONAL EXPOSURE LIMITS

<table>
<thead>
<tr>
<th>Name</th>
<th>8hr TWA (EH40)</th>
<th>10 min (EH40)</th>
<th>EEC No</th>
<th>CAS No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphuric acid</td>
<td>--</td>
<td>1 mg/m³</td>
<td>231-639-5</td>
<td>7664-93-9</td>
</tr>
<tr>
<td>Copper Sulfate</td>
<td></td>
<td>0,2mg/m³ (as Cu)</td>
<td>231-847-6</td>
<td>7758-98-7</td>
</tr>
</tbody>
</table>

ENGINEERING MEASURES: Provide local exhaust ventilation at point of use.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory: If mists or vapor are generated, suitable respiratory protection should be worn.

Hand: Suitable rubber gloves.

Eye: Safety glasses/face shield to BS 2092 or equivalent standard.

Other: Protective clothing and footwear.

10. PHYSICAL/CHEMICAL PROPERTIES

Appearance: Blue liquid
Odor: Slightly sulfurous
pH (as delivered): <0,1
Viscosity: N/A
Boiling point: >100°C
Flash point: N/A
Vapor pressure: N/A
Vapor density: N/A
Relative density (SG): N/A
Solubility: Complete in water

11. STABILITY AND REACTIVITY

Stability: Stable
Conditions to avoid: None known
Materials to avoid: Strong alkalis.
Hazardous decomposition products: Oxides of sulfur, Copper fume.

12. TOXICOLOGICAL INFORMATION

(Acute) short term effects:

Eyes: Corneal ulceration after eye contact.
Skin: Tissue loss and scarring.
Ingestion: Haematemesis and esophageal structure, gastric perforation.
Inhalation: Pulmonary edema after inhalation: treat by positive pressure ventilation.

(Chronic) long term effects:

13. ECOLOGICAL INFORMATION

Biodegradability: Not to cumulate
Bioaccumulative potential: Not considered to bioaccumulate
Aquatic toxicity: Toxic to fish and aquatic invertebrates
Other:

14. DISPOSAL CONSIDERATIONS


Do not empty into drains. Do not allow to enter waterways or sewers. Always check and comply with local and state regulations. Dispose of residues at an approved chemical treatment facility.
15. TRANSPORT

IMDG code: 8  IMDG page No: 4
UN No: 2796  ICAO/IATA: 8 UN 2796  Transport symbol: Corrosive diamond N°8
Packing group: II  RID/ADR: 8,1°(b)  Tremcard No:
Further information:

16. REGULATORY INFORMATION: Refer to the „Chemicals (Hazard Information & Packaging) Regulations“.


17. OTHER INFORMATION

Container type: High density polyethylene drum
DESCRIPTION

The **Shine** Additive is a formulation which produces ductile, crack-resistance, semi-bright copper electrodeposits, while exhibiting excellent levelling characteristics and unusually high throwing power. It has been specifically formulated for the plating of circuit boards up to a current density of 5 ASD. The outstanding advantage of Shine is its exceptional levelling ability coupled with its ductile deposit and resistance to cracking.

Another advantage of the Shine is exceptional throwing power. A 1:1 ratio can be maintained on conventional panels plated, provided that the equipment and cell geometry are optimized.

**BATH MAINTENANCE OF COPPER PLATER 400**

If the concentration of **Shine** is low, which will be indicated by a dull copper plating over the total surface of the panel, **Shine** should be added at the rate of 0.4 ml per one liter **COPPER PLATER** until the return of the former brightness. Alternatively add 10 ml SHINE 400 after every 100 ampere-hours in operation (keep a lab diary)

**SAFETY & HANDLING**

It is recommended that the company/process operator reads and reviews the Material Safety Data Sheets for the appropriate health and safety warnings before use.

**WASTE DISPOSAL**

Prior to using any recommendations or suggestions for waste treatment, the user is required to know the appropriate local and state regulations for on-site or off-site treatment which may require permits. If there is any conflict regarding our recommendations, local and state regulations take precedent.

**ORDER INFORMATION**

<table>
<thead>
<tr>
<th>Product</th>
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<tbody>
<tr>
<td>Shine 400</td>
<td></td>
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</tbody>
</table>
SHINE 400
Additive to Copper Plater 400
1. IDENTIFICATION OF SUBSTANCE OR PREPARATION

Product: SHINE 400
Application: A liquid used in the manufacture of printed circuit boards.

Supplier:
LPKF Laser & Electronics AG
Osteriede 7
30827 Garbsen
Germany

2. COMPOSITION/INFORMATION ABOUT INGREDIENTS

Hazardous ingredients

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<th>%</th>
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</thead>
<tbody>
<tr>
<td>Sulphuric acid</td>
<td>0.6 %by wt.</td>
<td>Xi: R36/38: Irritating to eyes and skin. S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.</td>
</tr>
<tr>
<td>CAS-No.:7664-93-9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>0.1 % by wt.</td>
<td>Xn: R40: Irreversible damage possible R43: May cause sensitization by skin contact. S24 Avoid contact with skin, S23: Do not breathe vapor. S27: Remove sodden, dirty clothing immediately.</td>
</tr>
<tr>
<td>CAS-No.:50-00-0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Ingestion: IRRITANT: Will irritate the throat, and stomach. Sickness and nausea may occur.
Eye contact: IRRITANT: Intense watering and soreness. Prolonged contact may cause visual impairment.
Skin contact: IRRITANT: Prolonged contact will cause skin cracking, leading to dermatitis.
Inhalation: IRRITANT: Prolonged inhalation will cause irritation and sneezing.

This information is given in good faith, being compiled from sources considered to be dependable. It is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. It does not constitute an assessment in use as required under COSHH regulations.
4. ECOLOGICAL EFFECTS

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</tbody>
</table>

Not established.

5. FIRST AID PROCEDURES

**Eyes:**
Flush continuously with clean running water, holding eyelids apart during flush. Do not stop for at least 20 minutes. Consult physician.

**Skin:**
Flush with copious amounts of water while removing contaminated clothing. Seek medical advice.

**Ingestion:**
Do not induce vomiting. Give several glasses of water to drink. Consult physician immediately.

**Inhalation:**
Remove casualty to fresh air. Seek medical advice.

6. FIRE FIGHTING PROCEDURES

**Extinguishing media:**
Material not flammable. Use as appropriate to surroundings.

**Fire and explosion hazards:**
Gives off flammable vapors of formaldehyde.

**Protective procedures:**
Wear full protection including self-contained breathing apparatus and fight fire from remote locations.

7. SPILL OR LEAK PROCEDURES - SEE ALSO (14) DISPOSAL CONSIDERATIONS

**Personal precaution:**
Ensure adequate ventilation. Wear protection as detailed in (9).

**Environmental precautions:**
If product has entered drains, advise local river authority.

**Recovery:**
Mop up using inert media and plastic tools. Place waste in plastic containers and allow to stabilize prior to sealing lid.
SHINE 400
Additive to Copper Plater 400

8. STORAGE AND HANDLING (IN NORMAL USE)

Storage: Store in a cool, dry, well-ventilated area away from direct sunlight.
Stage temp.: minimum: 7°C maximum: 38°C
Handling: Wear protective clothing, footwear, hand/eye protection. Ensure adequate ventilation in use.

9. EXPOSURE CONTROLS/PERSONAL PROTECTION (NORMAL USE)

OCCUPATIONAL EXPOSURE LIMITS

<table>
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<tr>
<th>Name</th>
<th>8hr TWA (EH40)</th>
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<tbody>
<tr>
<td>Sulphuric acid</td>
<td>1 mg/m³</td>
<td>--</td>
<td>231-639-5</td>
<td>7664-93-9</td>
</tr>
<tr>
<td>Formaldehyde*</td>
<td>2 ppm maximum</td>
<td>2 ppm maximum</td>
<td>200-001-8</td>
<td>50-00-0</td>
</tr>
</tbody>
</table>

*LD50 oral (rat) = 800 mg/kg

ENGINEERING MEASURES: Provide local exhaust ventilation at point of use.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory: If mists or vapor are generated, suitable respiratory protection should be worn.
Hand: Suitable rubber gloves.
Eye: Safety glasses/face shield to BS 2092 or equivalent standard.
Other: Protective clothing, footwear and barrier creams.

10. PHYSICAL/CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Pale yellow liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>Slightly sulfurous</td>
</tr>
<tr>
<td>pH (as delivered)</td>
<td>2.8</td>
</tr>
<tr>
<td>Viscosity</td>
<td>N/A</td>
</tr>
<tr>
<td>Boiling point</td>
<td>&gt;100°C</td>
</tr>
<tr>
<td>Flash point</td>
<td>N/A</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>N/A</td>
</tr>
<tr>
<td>Vapor density</td>
<td>N/A</td>
</tr>
<tr>
<td>Relative density (SG)</td>
<td>1.013</td>
</tr>
<tr>
<td>Solubility</td>
<td>Complete in water</td>
</tr>
</tbody>
</table>
11. STABILITY AND REACTIVITY

Stability : Stable
Conditions to avoid : None known
Materials to avoid : Strong oxidizing agents.
Hazardous decomposition products: Oxides of sulfur and carbon.

12. TOXICOLOGICAL INFORMATION

(Acute) short term effects :
Eyes : Prolonged contact will result in corneal damage.
Skin : Prolonged contact will result in dermatitis.
Ingestion : Prolonged contact will result in gastrointestinal impairment.
Inhalation : Deliberate or prolonged inhalation will result in degreasing and drying of the mucous membranes.

(Chronic) long term effects : Lung, liver and kidney impairment if ingested in significant quantities, and sensitivity.
                               Formaldehyde is a category 3 carcinogen.

13. ECOLOGICAL INFORMATION

Biodegradability : Complete
Bioaccumulative potential : Not considered to bioaccumulate
Aquatic toxicity : Toxic to fish and aquatic invertebrates.
Other :

14. DISPOSAL CONSIDERATIONS

Control of Substances Hazardous to Health Regulations.
Do not empty into drains. Do not allow to enter waterways or sewers. Always check and comply with local and state regulations. Dispose of residues at an approved chemical treatment facility.
15. TRANSPORT

IMDG code: NR  IMDG page No: NR  Marine pollutant: No
UN No: NR  ICAO/IATA: NR  Transport symbol: NR
Packing group: NR  RID/ADR: NR  Tremcard No: 80 G 20 C modified
Further information: Corrosive liquid, n.o.s., (Formaldehyde solution, Sulphuric acid).

16. REGULATORY INFORMATION: Refer to the „Chemicals (Hazard Information & Packaging) Regulations“.


17. OTHER INFORMATION

Container type: High density polyethylene drum
SHINE 400
Additive to Copper Plater 400