

**MATERIAL SAFETY DATA SHEET**

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**SECTION I PRODUCT IDENTIFICATION**

Product Class (Use): CONDUCTIVE COATING

Trade Name: **292 CuPro-Cote Copper Conductive Coating****SECTION II Composition**

| INGREDIENT NAME              | CAS#       | %           |
|------------------------------|------------|-------------|
| Water - for information only | 7732-18-5  | 40.01-50.00 |
| Copper                       | 7440-50-8  | 25.01-30.00 |
| Titanium Dioxide             | 13463-67-7 | 5.01-10.00  |

| INGREDIENT NAME | CAS#      | %         |
|-----------------|-----------|-----------|
| Silver          | 7440-22-4 | 1.01-5.00 |
| Carbon black    | 1333-86-4 | 1.01-5.00 |
| Cyclic Amide    | 872-50-4  | 1.01-5.00 |

**SECTION III HAZARDS IDENTIFICATION**

HMIS Information: Health- 2\* Flammability- 2 Reactivity- 0 Personal Protective Equipment- 0  
 HAZARD INDEX: 4=Severe 3=Serious 2=Moderate 1=Slight 0=Least \*=Chronic Health Effects

|                                   |  |
|-----------------------------------|--|
| Routes of Entry                   | Inhalation, skin contact, eye contact, ingestion, absorption   |
| Medical Conditions Aggravated     | Liver disease, Kidney disease, Eye disease, Skin disease including eczema and sensitization, Lung disease  |
| Immediate (Acute) Health Effects: |  |
| Inhalation                        | Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea, and headaches. This product may cause metal fume fever with resulting flu-like symptoms. Nasal perforation is possible from a single large or repeated smaller inhalation exposures. Harmful. Can cause systemic damage, see target organs below. |
| Skin contact                      | Can cause skin irritation, defatting and dermatitis. Not likely to cause permanent damage.   |
| Eye contact                       | Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue. Exposure may cause corneal injury.  |
| Skin absorption                   | Toxic if absorbed through the skin. Likely to cause significant systemic damage. The absorption of silver compounds through breaks in the skin may result in local pigmentation at the site of injury.   |
| Ingestion                         | Toxic if swallowed. May cause target organ failure and/or death. Can cause abdominal discomfort, nausea, vomiting and diarrhea.  |
| Target organ acute toxicity       | Respiratory system, Liver, Kidneys, Eyes, Skin, Bone marrow, Cardiovascular system, Lymphatic system   |

Long-Term (Chronic) Health Effects:

|              |   |
|--------------|---|
| Inhalation   | Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache. Avoid prolonged or repeated exposure. If sensitized, exposure below the TLV or PEL, or at low levels can result in respiratory irritation and shortness of breath. These asthma-type symptoms may develop immediately or be delayed up to several hours. |
| Skin contact | Upon prolonged and/or repeated exposure, can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.   |

|                               |   |
|-------------------------------|---|
| Eye contact                   | Upon prolonged and/or repeated exposure, can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.   |
| Skin absorption               | Upon prolonged and/or repeated exposure, toxic if absorbed through the skin. Like to cause systemic damage. Excessive absorption of silver compounds may cause argyria, a permanent gray discoloration of the skin, mucous membranes and/or eyes due to accumulation of reduced silver in the organs.   |
| Carcinogenicity               | IARC: Yes      NTP: No      OSHA: No  |
| Target Organ Chronic Toxicity | Respiratory system, Liver, Kidneys, Eyes, Skin, Lymphatic system<br><br>NOTICE: Reports have associated repeated and prolonged overexposure to solvents with brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.<br><br>This product contains pigments which may become a dust nuisance when removed by abrasive blasting, sanding, or grinding. |

#### SECTION IV FIRST AID

|              |  |
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| Inhalation   | Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have trained individual administer oxygen. Get medical attention immediately.   |
| Eyes         | Flush eyes with plenty of water for at least 20 minutes retracting the eyelids often. Remove contact lenses. Tilt the head to prevent the chemical from transferring to the uncontaminated eye. Get immediate medical attention.   |
| Skin contact | Wash with soap and water. Remove contaminated clothing and laundry. Get medical attention if irritation develops or persists.  |
| Ingestion    | Seek medical advice immediately. Provide ingredients from Section II of this MSDS to the medical care provider. Contact local Poison Control Center (listed in telephone book), or dial local emergence (911) number for additional information. Do not induce vomiting unless instructed to do so by a physician or other competent medical personnel. Never give anything by mouth to an unconscious person. |

#### SECTION V FIRE FIGHTING MEASURES

|                               |   |
|-------------------------------|---|
| Flammability Summary          | Combustible at sufficiently elevated temperatures   |
| Autoignition Temperature      | N/A   |
| Fire Hazards                  | Material may be ignited only if preheated to temperatures above flashpoint, for example in a fire.  |
| Extinguishing methods         | Use alcohol resistant foam, carbon dioxide, or dry chemical when fighting fires. Water or foams may cause frothing of liquid is burning but still may be a useful extinguishing agent if carefully applied to the surface of the fire. Do not direct a stream of water into the burning liquid. |
| Hazardous combustion products | Carbon dioxide, Carbon monoxide, Nitrogen contained gases   |

#### SECTION VI ACCIDENTAL RELEASE MEASURES

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|--|--|
| Health considerations for spill response | Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section VIII of this MSDS. Additional precautions may be necessary based on special circumstances created by the spill including: the material spilled, the quantity of the spill, and the area in which the spill occurred. Also consider the expertise of the employees in the area. Isolate area. Keep unnecessary personnel away. Persons not wearing protective equipment should be excluded from the area until cleanup has been completed. |
| Spill mitigating procedures              |  |
| General methods                          | Prevent the spread of any spill to minimize harm to human health and the environment. Wear complete and proper personal protective equipment following the recommendations of Section VIII at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.   |

|               |  |
|---------------|--|
| Air release   | Ventilate the area by opening doors/windows and/or running fans and blowers. |
| Water release | Retain all contaminated water for treatment                                  |
| Land spills   | Avoid runoff into storm sewers and ditches that lead to waterways.           |

### SECTION VII HANDLING AND STORAGE

|          |  |
|----------|--|
| Handling | Harmful or irritating. Avoid overexposure to the material. Use only in a well ventilated area. As with all chemicals, good industrial hygiene practices should be followed when handling this material. Do not get in eyes, on skin or clothing. Use spark-proof tools and explosion proof equipment. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. |
| Storage  | Store in a cool dry place. Isolate from incompatible materials. Keep container closed when not in use. Keep away from food and drinking water. Keep away from heat, sparks and flame.  |

### SECTION VIII ENGINEERING CONTROLS, PERSONAL PROTECTIVE EQUIPMENT, AND EXPOSURE LIMITS

|                      |  |
|----------------------|--|
| Engineering Controls | Local exhaust ventilation, process enclosures, or other engineering controls are necessary when handling or using this product to avoid overexposure, and control airborne levels below recommended exposure limits. Explosion proof exhaust ventilation should be used. Facilities storing or using this material should be equipped with eye wash and safety shower. Vapor concentrations should be monitored and controlled in accordance with 29 CFR 1910.1000 |
| Protective equipment |  |
| Respiratory tract    | If exhaust ventilation is not available or sufficient to reduce exposure below acceptable levels, then respiratory protection is required to avoid overexposure when handling this product.  |
| Eyes                 | Wear safety glasses with side shields when handling this product. Do not wear contact lenses. Wear chemical splash goggles if splashing or high-pressure system is used.   |
| Skin                 | Wear protective gloves. Inspect gloves for chemical break-through and repeat at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work.   |
| Protective clothing  | Wear chemically resistant gloves and apron.  |

| CHEMICAL NAME    | CAS #      | ACGHI TLV  | OSHA PEL  | IDLH  |
|------------------|------------|--|---|---|
| Water            | 7732-18-5  | No TLV   | No PEL established  | Not determined                                    |
| Copper           | 7440-50-8  | fume: 0.2 mg/m <sup>3</sup> TWA; dusts and mists, as Cu: 1 mg/m <sup>3</sup> TWA | 0.1 mg/m <sup>3</sup> TWA (fume); 1 mg/m <sup>3</sup> TWA (dusts & mists) | dusts and mists as Cu: 100 mg/m <sup>3</sup> IDLH |
| Titanium Dioxide | 13463-67-7 | 10 mg/m <sup>3</sup> TWA   | 15 mg/m <sup>3</sup> TWA (total dust)                                     | 5000 mg/m <sup>3</sup> IDLH                       |
| Silver           | 7440-22-4  | metal: 0.1 mg/m <sup>3</sup> TWA   | 0.01 mg/m <sup>3</sup> TWA  | as Ag: 10 mg/m <sup>3</sup> IDLH                  |
| Carbon Black     | 1333-86-4  | 3.5 mg/m <sup>3</sup> TWA  | 3.5 mg/m <sup>3</sup> TWA.  | 1750 mg/m <sup>3</sup> IDLH                       |
| Cyclic Amine     | 872-50-4   | No TLV   | No PEL established  | Not determined                                    |

### IX PHYSICAL DATA

|                           |   |                        |              |
|---------------------------|---|------------------------|--------------|
| Appearance                | Beige liquid  | Solubility in water    | partial      |
| Color                     | Beige   | Initial boiling point  | 100°C; 212°F |
| pH                        | N/A   | Initial freezing point | 0°C; 32°F    |
| Octanol/Water coefficient | Not determined  |                        |              |
| Vapor density             | Heavier than air. Vapors that evolve from this product will tend to settle and accumulate near floor. |                        |              |
| Evaporation rate          | Slower than n-Butyl Acetate   |                        |              |

|                          |  |
|--------------------------|--|
| Specific Gravity/Density | 1.318 / 11.00 lbs/gal  |
| V.O.C.                   | 0.7 lbs/gal less water and exempt solvent; 84 g/l less water and exempt solvent<br>0.3 lbs/gal as packed |

The VOC content is determined by using a percent solids basis, less water and exempt solvents.

#### SECTION X STABILITY AND REACTIVITY

|                                  |  |
|----------------------------------|--|
| Stability Information            | Stable under normal conditions   |
| Conditions to avoid              | Temperatures above flash point in combination with sparks, open flames or other sources of ignition. Contamination. Do not freeze. |
| Chemical incompatibility         | Chlorine, strong oxidizing agents, Ammonia, peroxides, acids, chlorinated compounds  |
| Hazardous decomposition products | Carbon dioxide, carbon monoxide, metal fumes, nitrogen containing gases  |

#### SECTION XI TOXICOLOGICAL INFORMATION

|                           |   |
|---------------------------|---|
| Chemical name             | LD50/LC50   |
| Carbon black              | Oral LD50 Rat: >15400 mg/kg; dermal LD50 Rabbit: >3 gm/kg                           |
| 2-pyrrolidinone, 1-methyl | Oral LD50 Rat: 3914 mg/kg; Oral LD%) Mouse: 5130 mg/kg; dermal: LD50 Rabbit: 8mg/kg |

#### SECTION XII ECOLOGICAL INFORMATION

|          |   |
|----------|---|
| Overview | Care should be taken to minimize release of any industrial chemicals into the environment |
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#### SECTION XIII DISPOSAL CONSIDERATIONS

|                                 |  |
|---------------------------------|--|
| Waste disposal of spent product | spent or discarded material is probably a hazardous waste  |
| Disposal methods                | Information in this MSDS is provided only as a guide. Consult with competent authority to determine proper waste disposal procedures. Clean up and dispose of waste and clean-up materials in accordance with all federal, state and local environmental regulations |
| Potential EPS Waste Codes       | Not determined   |

Some components possibly subjected to USEPA land disposal restrictions: When disposing of unused products or waste, the preferred options are to send to a licensed reclaimer or to permitted incinerators. There may be some other ingredients subject to LDR categories. Silver 7440-22-4

#### SECTION XIV TRANSPORTATION INFORMATION

|                     |  |
|---------------------|--|
| Agency              | Basic description and label  |
| DOT                 | Not regulated per DOT  |
| Hazardous substance |  |
| Copper              | final RQ - 5000 pounds (no reporting of releases of this hazardous substance is required is the diameter of the pieces of the solid metal released is equal to or exceeds 0.004 inches). |
| Silver              | final RQ - 1000 pounds (no reporting of releases of this hazardous substance is required is the diameter of the pieces of the solid metal released is equal to or exceeds 0.004 inches). |

#### XV REGULATORY INFORMATION

|                           |  |
|---------------------------|--|
| Regulation                |  |
| SARA 313 Reportable       | Copper, Silver, N-Methyl-2-pyrrolidinone   |
| TSCA Inventory            | All components of this product are listed in, or exempt from the TSCA 8(b) Inventory   |
| California Proposition 65 | The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986 Proposition 65: "WARNING This product contains chemical(s) known to the State f California to cause cancer and birth defects or other reproductive harm." |

THE INFORMATION CONTAINED HEREIN IS BASED ON INFORMATION RECEIVED FROM OUR RAW MATERIAL SUPPLIERS AND OTHER SOURCES AND IS BELIEVED TO BE RELIABLE. THIS INFORMATION IS NOT TO BE TAKEN AS A WARRANTY OR REPRESENTATION FOR WHICH LESS EMF INC. ASSUMES LEGAL RESPONSIBILITY. INFORMATION ON THIS FORM IS TO BE USED TO COMPLY WITH OSHA AND HEALTH REGULATIONS ONLY AND MAY NOT BE USED OR DISSEMINATED FOR OTHER PURPOSES.