1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: CuVerro I Antimicrobial Copper Alloy - EPA Reg. No. 85353-1
Chemical Name: Antimicrobial Copper
Synonyms: Antimicrobial Copper Alloys Group V, UNS Designations: C71520, C75200, C75700
Chemical Family: Copper based alloy
Formula: Not applicable - mixture
Product Use: Antimicrobial agent

Manufacturer:

SDS Control Group
Olin Brass
305 Lewis and Clark Blvd
East Alton, IL 62024-1197
www.olinbrass.com

Technical Information:

Emergency Information:

(618)258-5654
(618)258-5167

2. HAZARD IDENTIFICATION

In solid form, this material is not hazardous. Dust and fumes are hazardous materials.

OSHA HCS 2012
Flammability - 0
Health - 1
Physical - 0

Hazard Statements
Causes skin irritation - H315
May cause respiratory irritation - H335

Precautionary statements
 Avoid breathing dust or fumes - P261

Prevention
Avoid breathing dust or fumes - P261
Do not get in eyes, on skin, or on clothing - P262

Response
In case of inadequate ventilation wear respiratory protection - P285

EYE CONTACT:
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. - P305 + P351 + P338
If eye irritation develops, Get medical advice/attention - P313

SKIN CONTACT:
Rinse skin with water/shower - P353
Take off contaminated clothing and wash before reuse - P362
If skin irritation or rash develops, get medical advice/attention - P363
INHALATION: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing - P340
Get medical advice/attention - P313

INGESTION: Not a likely route of exposure for finished metal alloy.
If dust is ingested, immediately drink water to dilute.
Get medical advice/attention - P363

NOTE TO PHYSICIANS: There is no specific antidote to the active ingredients in this product; use symptomatic treatment.

Other Hazards

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Exposure to dust or fume may aggravate an existing dermatitis, asthma, emphysema, or other respiratory disease.

Canada According to WHMIS
Classification of the substance or mixture
WHMIS This product is considered to be a manufactured article and therefore not subject to WHMIS requirements.

Other Information
NFPA Not rated

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Components</th>
<th>% By Weight</th>
<th>EINECS/ ELINCS #</th>
<th>EU Classification</th>
<th>Symbol</th>
<th>R-Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>7440-50-8</td>
<td>Copper</td>
<td>63.1 - 69.8</td>
<td>231-159-6</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>7440-02-0</td>
<td>Nickel</td>
<td>1.0 - 33.0</td>
<td>231-111-4</td>
<td>Xn</td>
<td>R 40/43</td>
<td></td>
</tr>
<tr>
<td>7440-66-6</td>
<td>Zinc</td>
<td>0.0 - 24.4</td>
<td>231-175-3</td>
<td>F (as dust or powder)</td>
<td>R 15-17</td>
<td></td>
</tr>
<tr>
<td>7439-96-5</td>
<td>Manganese</td>
<td>0.0 - 2.5</td>
<td>231-105-1</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>7439-89-6</td>
<td>Iron</td>
<td>0.0 - 2.3</td>
<td>231-096-4</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

OSHA REGULATORY STATUS: In solid form, not hazardous. Dust or fume: carcinogen, irritant, lung and respiratory system toxicant, neurotoxicant, sensitizer.
In solid form, this material is not hazardous. Dust and fumes are hazardous materials.

4. FIRST AID MEASURES

EYE CONTACT: Immediately flush out fume and dust particles with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If eye irritation develops, call a physician at once.
SKIN CONTACT: If exposed to dust or fumes, wash skin with plenty of water. Remove contaminated clothing and shoes and launder before reuse. If skin irritation or rash develops and persists or recurs, get medical attention.

INHALATION: If symptoms of lung irritation occur (coughing, wheezing or breathing difficulty), remove from exposure area to fresh air immediately. If breathing has stopped, perform artificial respiration. Keep affected person warm and at rest. Get medical attention.

INGESTION: Not a likely route of exposure for finished metal alloy. If dust is ingested, immediately drink water to dilute. Consult a physician if symptoms develop.

NOTE TO PHYSICIANS: There is no specific antidote to the active ingredients in this product; use symptomatic treatment.

### 5. FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosive</td>
<td>No</td>
<td>Flammable</td>
<td>No</td>
</tr>
<tr>
<td>Combustible</td>
<td>No</td>
<td>Pyrophoric</td>
<td>No</td>
</tr>
<tr>
<td>Flash Point (°C):</td>
<td>Not Applicable</td>
<td>Burning Rate of Material:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Lower Explosive Limit:</td>
<td>Not Applicable</td>
<td>Auto Ignition Temp:</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** Dust may cause an ignitable and/or an explosive atmosphere.

**EXTINGUISHING MEDIA:** For localized powder fires, smother with dry sand, dry dolomite, sodium chloride or soda ash. Use fire-extinguishing media appropriate to fight surrounding fire.

**SPECIAL FIREFIGHTING PROCEDURES:** None required.

### 6. ACCIDENTAL RELEASE MEASURES

**FOR ALL TRANSPORTATION ACCIDENTS, CALL (618)258-5167.**

In dust form, this product may be an explosion hazard. Remove all sources of ignition. Dust of fume may be suppressed by the use of a local exhaust system. Dispose of per guidelines under Section 13, WASTE DISPOSAL.

### 7. HANDLING AND STORAGE

<table>
<thead>
<tr>
<th>HANDLING:</th>
<th>Avoid dispersion of dust in air.</th>
</tr>
</thead>
<tbody>
<tr>
<td>STORAGE:</td>
<td>No Special Requirements</td>
</tr>
</tbody>
</table>

**Shelf Life Limitations:** None known

**Incompatible Materials for Packaging:** None known

**Incompatible Materials for Storage or Transport:** None known

**OTHER PRECAUTIONS:** Do not shake clothing, rags or other items to remove dust. Dust should be removed by washing or HEPA vacuuming.

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Olin Brass SDS No.: CuVerro I Antimicrobial Copper Alloy

Revision Date: 6/1/15  Review Date: 1/1/17
**Safety Data Sheet**

**Olin Brass SDS No.: CuVerro I Antimicrobial Copper Alloy**

**Revision Date: 6/1/15**

**Review Date: 1/1/17**

<table>
<thead>
<tr>
<th>CAS #</th>
<th>CHEMICAL</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>INTERNATIONAL OELs</th>
</tr>
</thead>
</table>
| 7440-50-8| Copper       | 0.2 mg/m³ (fume); 1 mg/m³ (dusts and mists) | 0.1 mg/m³ (fume); 1 mg/m³ (dusts and mists) | Austria, Belgium, Canada: 0.2 mg/m³ (fumes), 1 mg/m³ (dusts)  
Denmark: 1.0 mg/m³ (dust and powder)  
Germany (MAK): 0.1 mg/m³ (fume), 1 mg/m³ (dusts and mists) |
| 7440-02-0| Nickel       | 0.2 mg/m³ (inhalable): A1 | 1 mg/m³ | Germany (MAK): 1 mg/m³ (Sah)  
Canada (B.C.), Czechoslovakia, Denmark, Norway: 0.05 mg/m³, K1, sensitizer  
Poland: 0.25 mg/m³  
Ireland, Sweden, Switzerland, U.K.: 0.5 mg/m³  
Belgium, Canada (Alberta & others), Finland, Japan, Mexico, Netherlands: 1 mg/m³  
Portugal: 1.5 mg/m³ |
| 7440-66-6| Zinc         | None established | None established | None established |
| 7439-96-5| Manganese    | 0.2 mg/m³ | 5 mg/m³ (Ceiling) | Belgium, Denmark, Finland, France, Switzerland, U.K.: 1 mg/m³  
Sweden: 2.5 mg/m³  
Germany (MAK): 0.5 mg/m³ |
| 7439-89-6| Iron         | None established | None established | None established |

**ENGINEERING CONTROLS:**

Local exhaust ventilation is recommended if significant dusting occurs or fumes are generated. Otherwise, use general exhaust ventilation.

**EYE / FACE PROTECTION:**

Use safety glasses.

**SKIN PROTECTION:**

Wear impervious (cut-resistant) gloves and other protective clothing (aprons, coveralls) as appropriate to prevent skin contact when using this product. If generating a dust, wash thoroughly after handling, especially before eating, drinking, or smoking.

**RESPIRATORY PROTECTION:**

Respiratory protection not normally needed. If dusting occurs or fumes are generated above the PEL/TLV, use a NIOSH-approved half-face or full-face respirator equipped with High Efficiency Particulate (HEPA) filter cartridges.

**GENERAL HYGIENE CONSIDERATIONS:**

Do not eat, drink, or smoke while using this product in dust form.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES**

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Dependent on final form</td>
<td>Vapor Density (air = 1)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Odor</td>
<td>None</td>
<td>Boiling Point (°F)</td>
<td>No data</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>Not applicable - Mixture</td>
<td>Melting point:</td>
<td>1976 - 1981°F</td>
</tr>
<tr>
<td>Physical State</td>
<td>Solid</td>
<td>Specific gravity (g/cc)</td>
<td>8.94</td>
</tr>
</tbody>
</table>

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*Olin Brass SDS No.: CuVerro I Antimicrobial Copper Alloy*  
*Revision Date: 6/1/15*  
*Review Date: 1/1/17*
10. STABILITY AND REACTIVITY

STABILITY:

Stable under normal temperatures and pressure

CONDITIONS TO AVOID:

Avoid contact with carbon monoxide, particularly at temperatures between 50°C and 300°C, to prevent formation of nickel carbonyl which is toxic and a carcinogen.

MATERIALS TO AVOID:

Acetylene, chlorine

HAZARDOUS DECOMPOSITION PRODUCTS:

When heated to decomposition, may produce metal oxides and fumes. Inhalation of high concentrations of metal fumes may cause a condition known as “metal fume fever” which is characterized by flu-like symptoms.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. TOXICOLOGICAL INFORMATION

POTENTIAL EXPOSURE ROUTES: For dust: ingestion, inhalation, and eye contact. For fume: inhalation and eye contact. The finished alloy metal is not hazardous.

ACUTE ANIMAL TOXICITY DATA:

<table>
<thead>
<tr>
<th>FOR PRODUCT</th>
<th>FOR COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Copper</td>
</tr>
<tr>
<td>Oral LD₅₀</td>
<td>Believed to be &gt; 5 g/kg</td>
</tr>
<tr>
<td></td>
<td>(mouse, Ip)</td>
</tr>
<tr>
<td>Dermal LD₅₀</td>
<td>Believed to be &gt; 2 g/kg</td>
</tr>
<tr>
<td></td>
<td>(rabbit, subcut)</td>
</tr>
<tr>
<td>Inhalation LC₅₀</td>
<td>Believed to be slightly to</td>
</tr>
</tbody>
</table>

Olin Brass SDS No.: CuVerro I Antimicrobial Copper Alloy
Revision Date: 6/1/15 Review Date: 1/1/17
Safety Data Sheet

<table>
<thead>
<tr>
<th></th>
<th>moderately toxic</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritation</td>
<td>Eye and Resp. Irritation</td>
<td>Respiratory Irritation</td>
<td>Respiratory Irritation</td>
<td>Eye Irritation</td>
<td>Eye irritation</td>
</tr>
<tr>
<td>Sensitization</td>
<td>No Data</td>
<td>No data</td>
<td>Skin sensitization</td>
<td>No data</td>
<td>No data</td>
</tr>
</tbody>
</table>

**SUBCHRONIC/ CHRONIC TOXICITY:**
No information for product. Subchronic and chronic exposure to beryllium via inhalation has caused lung damage in laboratory animals.

**CARCINOGENICITY:**
In laboratory animal studies, chronic exposure to high concentrations of nickel has caused an increase in lung and nasal tumors. The International Agency for Research on Cancer (IARC) has classified nickel as possibly carcinogenic to humans, Group 2B.

**MUTAGENICITY:**
This product is not known or reported to be mutagenic. Nickel has been shown to be mutagenic in in vitro studies.

**REPRODUCTIVE, TERATOGENICITY, OR DEVELOPMENTAL EFFECTS:**
This product is not known or reported to cause reproductive or developmental effects. Exposure of male rats to high concentrations of nickel caused testicular degeneration. However, symptoms of systemic toxicity, including severe weight loss, were also observed at the same concentrations indicating that the testicular effects may have been secondary to frank toxicity.

**NEUROLOGICAL EFFECTS:**
This product is not known or reported to cause neurological effects. Chronic exposure to very high concentrations of manganese dust has caused nervous system effects including muscle weakness, tremors, and behavioral changes in humans.

**INTERACTIONS WITH OTHER CHEMICALS WHICH ENHANCE TOXICITY:**
None known or reported.

12. ECOLOGICAL INFORMATION

**ECOTOXICITY:**
No data is available on this product. Individual constituents are as follows:
Copper: The toxicity of copper to aquatic organisms varies significantly not only with the species, but also with the physical and chemical characteristics of the water, such as its temperature, hardness, turbidity and carbon dioxide content. Copper concentrations varying from 0.1 to 1.0 mg/l have been found by various investigators to be not toxic for most fish. However, concentrations of 0.015 to 3.0 mg/l have been reported as toxic, particularly in soft water to many kinds of fish, crustaceans, mollusks, insects, and plankton.
Nickel: 96 hr LC50, rainbow trout =31.7 mg/L; 96 hr LC50, fathead minnow = 3.1 mg/L; 72 hr EC50, freshwater algae (4 species): = 0.1 mg/L; 96 hr LC50, Daphnia = 0. 51 mg/L

**MOBILITY:**
No Data

**PERSISTANCE/DEGRADABILITY:**
Not biodegradable

**BIOACCUMULATION:**
No Data

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it DOES NOT meet the criteria of a hazardous waste as defined under 40 CFR 261, in that it does not exhibit the characteristics of hazardous waste of Subpart C, nor is it listed as a hazardous waste under Subpart D. Care must be taken to prevent environmental contamination from the use of this material. The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and non-hazardous wastes. This product may be a candidate for metal reclamation.
14. TRANSPORTATION INFORMATION

<table>
<thead>
<tr>
<th>PROPER SHIPPING NAME:</th>
<th>U.S. DOT</th>
<th>RID/ADR</th>
<th>IMDG</th>
<th>IATA</th>
<th>IMO</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZARD CLASS:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UN NO.:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PACKING GROUP:</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>LABEL:</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>REPORTABLE QUANTITY:</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Not regulated

US FEDERAL

TSCA

The components of this product are listed on the Toxic Substance Control Act inventory.

CERCLA:

Copper, R.Q. = 5000 lbs.; Nickel, R.Q. = 100 lbs.; Zinc, R.Q. = 1000 lbs.; Beryllium, R.Q. = 10 lbs.

No reporting is required if diameter of the pieces of metal is equal to or exceeds 100 micrometers (0.004 inches).

SARA 313:

Copper, Nickel, Zinc (dust or fume), Manganese, Beryllium

SARA 313 Hazard Class:

Health: For dust or fume only

Acute - Yes, Chronic - Yes

Fire: None

Reactivity: None

Release of Pressure: None

SARA 302 EHS List:

None of the components of this product are listed.

*RQ = Reportable Quantity

15. REGULATORY INFORMATION

This product is regulated by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

EPA Reg. Number: 85353-1

US FEDERAL

*WARNING: This product contains detectable amounts of a chemical(s) known to the State of California to cause cancer and/or birth defects or other reproductive harm.*

STATE RIGHT-TO-KNOW STATUS

<table>
<thead>
<tr>
<th>Component</th>
<th>*CA Prop. 65</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Massachusetts</th>
<th>Michigan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>Not listed</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Nickel</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Zinc</td>
<td>Not</td>
<td>X</td>
<td>Not listed</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Manganese</td>
<td>Not</td>
<td>X</td>
<td>X</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Iron</td>
<td>Not</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

* “WARNING: This product contains detectable amounts of a chemical(s) known to the State of California to cause cancer and/or birth defects or other reproductive harm.”

EUROPEAN REGULATIONS

Because this material contains beryllium at > 0.1% this material is classified as: T+, Very Toxic. However, this material in its massive solid form is not required to be labeled under EC regulations.

German WGK Classification: Unknown
CANADIAN REGULATIONS

DSL LIST: The components of this product are on the DSL or are exempt from reporting under the New Substances Notification Regulations.

IDL: Copper, Nickel, Tin, Manganese and Beryllium

WHMIS: This product is considered to be a manufactured article and therefore not subject to WHMIS requirements.

16. OTHER INFORMATION

REVISIONS: Update to composition 1/1/04, revised format 6/1/15

PREPARED BY: Olin Brass

NOTICE: THE INFORMATION IN THIS SDS SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. OLIN BRASS BELIEVES THIS INFORMATION TO BE RELIABLE AND CURRENT AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS. This document reviewed annually.