Safety Data Sheet

1. IDENTIFICATION

Product Name: GF-78 Low Fuming Bronze Brazing Alloy, RBCuZn-C
SDS #: GFM-010

Recommended use of the chemical and restrictions on use
Recommended Use: Brazing alloy.

Details of the supplier of the safety data sheet
Manufacturer Address: The Gasflux Company, 32 Hawthorne Street, P.O. Box 1170, Elyria, Ohio 44036 U.S.A.

Emergency Telephone Number
Company Phone Number: (440) 365-1941 (8am - 4:30pm EST M-F)
Emergency Telephone (24 hr): INFOTRAC 1-352-323-3500 (International) INFOTRAC 1-800-535-5053 (North America)

2. HAZARDS IDENTIFICATION

Appearance: Yellow to red solid
Physical State: Solid
Odor: No odor

This chemical does not meet the hazardous criteria set forth by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200). However, this Safety Data Sheet (SDS) contains valuable information critical to the safe handling and proper use of this product. This SDS should be retained and available for employees and other users of this product.

Other Hazards
Very toxic to aquatic life with long lasting effects

Unknown Acute Toxicity
58.95% of the mixture consists of ingredient(s) of unknown toxicity

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Family: Copper alloys

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>56-60</td>
</tr>
<tr>
<td>Zinc</td>
<td>7440-66-6</td>
<td>Balance</td>
</tr>
<tr>
<td>Tin</td>
<td>7440-31-5</td>
<td>0.80-1.10</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>0.25-1.20</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>0.01-0.50</td>
</tr>
<tr>
<td>Silicon</td>
<td>7440-21-3</td>
<td>0.04-0.15</td>
</tr>
</tbody>
</table>

4. FIRST-AID MEASURES

First Aid Measures

General Advice: If exposed or concerned: Get medical advice/attention.
Eye Contact: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek medical attention.
Skin Contact: Wash off immediately with soap and plenty of water. If skin irritation persists, call a physician.
Inhalation: Remove to fresh air. If not breathing, give artificial respiration. Call a physician immediately.
Ingestion: If large quantities are swallowed, get emergency medical help immediately.

Most important symptoms and effects

Symptoms: When brazing; Fumes or dust may irritate the respiratory tract and skin and eyes. This product will not irritate the skin or eyes in bulk form.

Indication of any immediate medical attention and special treatment needed

Notes to Physician: Treat symptomatically.
5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media
Never use water as an extinguishing agent around molten metal, violent reaction may occur.

Specific Hazards Arising from the Chemical
Non-flammable.

Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH(approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions
Use personal protective equipment as required.

Environmental Precautions
See Section 12 for additional Ecological Information.

Methods and material for containment and cleaning up

Methods for Containment
Not applicable: Product is a solid bar.

Methods for Clean-Up
Scrap metal may be reclaimed for reuse. Dispose of in accordance with federal, state and local regulations.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on Safe Handling
Wash thoroughly after handling. Use only in well-ventilated areas. Avoid breathing dust/fume/gas/mist/vapors/spray. Wear protective gloves/protective clothing.

Conditions for safe storage, including any incompatibilities

Storage Conditions
Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up.

Incompatible Materials
Acids, Bases, Oxidizers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper 7440-50-8</td>
<td>TWA: 0.2 mg/m³ fume TWA: 1 mg/m³ Cu dust and mist</td>
<td>TWA: 0.1 mg/m³ fume TWA: 1 mg/m³ dust and mist (vacated) TWA: 0.1 mg/m³ Cu dust, fume, mist</td>
<td>IDLH: 100 mg/m³ dust, fume and mist IDLH: 100 mg/m³ Cu dust and mist TWA: 1 mg/m³ dust and mist TWA: 0.1 mg/m³ fume TWA: 1 mg/m³ Cu dust and mist</td>
</tr>
<tr>
<td>Tin 7440-31-5</td>
<td>TWA: 2 mg/m³ TWA: 2 mg/m³ Sn except oxides (vacated) Sn except Tin hydride</td>
<td>TWA: 2 mg/m³ Sn except oxides (vacated) TWA: 2 mg/m³ (vacated) TWA: 2 mg/m³ Sn except oxides</td>
<td>IDLH: 100 mg/m³ TWA: 2 mg/m³ TWA: 2 mg/m³ except Tin oxides Sn</td>
</tr>
<tr>
<td>Manganese 7439-96-5</td>
<td>TWA: 0.2 mg/m³ TWA: 0.2 mg/m³ Mn</td>
<td>TWA: 1 mg/m³ fume (vacated) STEL: 3 mg/m³ fume (vacated) Ceiling: 5 mg/m³ Ceiling: 5 mg/m³ fume Ceiling: 5 mg/m³ Mn</td>
<td>IDLH: 500 mg/m³ TWA: 1 mg/m³ fume TWA: 1 mg/m³ Mn STEL: 3 mg/m³ STEL: 3 mg/m³ Mn</td>
</tr>
<tr>
<td>Silicon 7440-21-3</td>
<td>TWA: 15 mg/m³ total dust TWA: 5 mg/m³ respirable fraction (vacated) TWA: 10 mg/m³ total dust (vacated) TWA: 5 mg/m³ respirable fraction</td>
<td>TWA: 10 mg/m³ total dust TWA: 5 mg/m³ respirable dust</td>
<td></td>
</tr>
</tbody>
</table>
Legends
Exposure limits are for the metal oxides which may be released during melting operations

Other Information
Use of this product in fume producing operations (Brazing) may result in airborne metal particulates or fumes. The exposure levels in this section are relevant to fumes and dusts. Consult the latest NIOSH requirements and AWS/ANSI Standard Z49.1 (Safety in Welding and Cutting).

Appropriate engineering controls
Ventilation systems. Eyewash stations. Showers.

Individual protection measures, such as personal protective equipment
Chemical goggles or full face shield. Use appropriate shaded eye protection when brazing.

Skin and Body Protection
Rubber gloves.

Respiratory Protection
Use approved fume respirator or air-supplied respirator when brazing in a confined space or where local exhaust or ventilation does not keep exposure below the applicable TLV-TWA.

General Hygiene Considerations
Wash contaminated clothing before reuse.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melting Point/Freezing Point</td>
<td>882 °C / 1620 °F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boiling Point/Boiling Range</td>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash Point</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammability (Solid, Gas)</td>
<td>Non-flammable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Flammability Limits</td>
<td>Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Flammability Limit</td>
<td>Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>8.3-8.5 g/cc</td>
<td></td>
<td>(1=Water)</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>Insoluble in water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partition Coefficient</td>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto-ignition Temperature</td>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinematic Viscosity Dynamic</td>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explosive Properties</td>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxidizing Properties</td>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Reactivity
Not reactive under normal conditions.

Chemical Stability
Stable under recommended storage conditions.

Possibility of Hazardous Reactions
Wet material should never be charged into a molten bath.

Hazardous Polymerization
Hazardous polymerization does not occur.

Conditions to Avoid
Keep out of reach of children.

Incompatible Materials
Acids, Bases, Oxidizers.

Hazardous Decomposition Products
None known based on information supplied.
11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information
The alloy is a stable, non-hazardous solid at room temperature. Brazing may produce fumes and gases hazardous to human health.

Eye Contact
Avoid contact with eyes.

Skin Contact
Avoid contact with skin.

Inhalation
Not an expected route of exposure.

Ingestion
Do not taste or swallow.

Component Information

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc 7440-66-6</td>
<td>&gt; 8,437 mg/kg (rat)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Iron 7439-89-6</td>
<td>= 984 mg/kg (Rat)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Manganese 7439-96-5</td>
<td>= 9 g/kg (Rat)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Silicon 7440-21-3</td>
<td>= 3160 mg/kg (Rat)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Information on physical, chemical and toxicological effects

Symptoms
Please see section 4 of this SDS for symptoms.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Carcinogenicity
This product is not expected to present a carcinogenic hazard due to the form of the product.

Chronic toxicity
Chronic exposure to copper, zinc and manganese may cause metal fume fever. Symptoms of metal fever include: fever, fatigue, dryness of throat, head and body ache and chill. May affect central nervous system, leading to emotional disturbances, gait and balance difficulties and paralysis. Overexposure to copper may result in skin and hair discoloration. This product will not irritate the skin or eyes in bulk form. Particles from the product may cause dermatitis due to the mechanical irritation.

Numerical measures of toxicity
Not determined

Unknown Acute Toxicity
58.95% of the mixture consists of ingredient(s) of unknown toxicity.

12. ECOLOGICAL INFORMATION

Ecotoxicity
Very toxic to aquatic life with long lasting effects.

Component Information

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to microorganisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper 7440-50-8</td>
<td>0.0426 - 0.0535: 72 h Pseudokirchneriella subcapitata mg/L EC50 static 0.031 - 0.054: 96 h Pseudokirchneriella subcapitata mg/L EC50 static</td>
<td>0.0068 - 0.0156: 96 h Pimephales promelas mg/L LC50 0.3: 96 h Pimephales promelas mg/L LC50 static 0.2: 96 h Pimephales promelas mg/L LC50 flow-through 0.052: 96 h Oncorhynchus mykiss mg/L LC50 flow-through 1.25: 96 h Lepomis macrochirus mg/L LC50 static 0.3: 96 h Cyprinus carpio mg/L LC50 semi-static 0.8: 96 h Cyprinus carpio mg/L LC50 static 0.112: 96 h Poecilia reticulata mg/L LC50 flow-through</td>
<td>0.03: 48 h Daphnia magna mg/L EC50 Static</td>
<td></td>
</tr>
</tbody>
</table>
Zinc 7440-66-6 | 0.11 - 0.271: 96 h Pseudokirchneriella subcapitata mg/L EC50 static 0.09 - 0.125: 72 h Pseudokirchneriella subcapitata mg/L EC50 static | 2.16 - 3.05: 96 h Pimephales promelas mg/L LC50 flow-through 0.211 - 0.269: 96 h Pimephales promelas mg/L LC50 semi-static 2.66: 96 h Pimephales promelas mg/L LC50 static 30: 96 h Cyprinus carpio mg/L LC50 static 0.45: 96 h Cyprinus carpio mg/L LC50 semi-static 7.8: 96 h Cyprinus carpio mg/L LC50 static 3.5: 96 h Lepomis macrochirus mg/L LC50 static 0.24: 96 h Oncorhynchus mykiss mg/L LC50 flow-through 0.59: 96 h Oncorhynchus mykiss mg/L LC50 semi-static 0.41: 96 h Oncorhynchus mykiss mg/L LC50 static | 0.139 - 0.908: 48 h Daphnia magna mg/L EC50 Static

Iron 7439-89-6 | 13.6: 96 h Morone saxatilis mg/L LC50 static 0.56: 96 h Cyprinus carpio mg/L LC50 semi-static

Persistence/Degradability
Not determined.

Bioaccumulation
Not determined.

Mobility
Not determined

Other Adverse Effects
Not determined

13 DISPOSAL CONSIDERATIONS.

Waste Treatment Methods

Disposal of Wastes
Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated Packaging
Disposal should be in accordance with applicable regional, national and local laws and regulations.

California Hazardous Waste Status

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>California Hazardous Waste Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper 7440-50-8</td>
<td>Toxic</td>
</tr>
<tr>
<td>Zinc 7440-66-6</td>
<td>Ignitable powder Toxic</td>
</tr>
<tr>
<td>Manganese 7439-96-5</td>
<td>Ignitable powder</td>
</tr>
</tbody>
</table>

14. TRANSPORT INFORMATION

Note
Please see current shipping paper for most up to date shipping information, including exemptions and special circumstances.

DOT
Not regulated

IATA
Not regulated

IMDG
Not regulated

15. REGULATORY INFORMATION

International Inventories
Not determined

US Federal Regulations

CERCLA

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA/SARA RQ</th>
<th>Reportable Quantity (RQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper 7440-50-8</td>
<td>5000 lb</td>
<td>RQ 5000 lb final RQ</td>
<td></td>
</tr>
<tr>
<td>Zinc 7440-66-6</td>
<td>1000 lb</td>
<td>RQ 454 kg final RQ</td>
<td></td>
</tr>
</tbody>
</table>

SDS: GFM-010
01-May-2015
SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>Weight-%</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper - 7440-50-8</td>
<td>7440-50-8</td>
<td>56-60</td>
<td>1.0</td>
</tr>
<tr>
<td>Zinc - 7440-66-6</td>
<td>7440-66-6</td>
<td>Balance</td>
<td>1.0</td>
</tr>
<tr>
<td>Manganese - 7439-96-5</td>
<td>7439-96-5</td>
<td>0.01-0.50</td>
<td>1.0</td>
</tr>
</tbody>
</table>

CWA (Clean Water Act)
This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

<table>
<thead>
<tr>
<th>Component</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
<th>CWA - Hazardous Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper 7440-50-8 (56-60)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Zinc 7440-66-6 (Balance)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

US State Regulations
California Proposition 65
This product contains no Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper 7440-50-8</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Zinc 7440-66-6</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Tin 7440-31-5</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Manganese 7439-96-5</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Silicon 7440-21-3</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

16. OTHER INFORMATION

NFPA
Health Hazards: Not determined
Flammability: Not determined
Instability: Not determined
Special Hazards: Not determined

HMIS
Health Hazards: Not determined
Flammability: Not determined
Physical Hazards: Not determined
Personal Protection: Not determined

Issue Date: 28-Feb-2011
Revision Date: 01-May-2015
Revision Note: New format

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet