SAFETY DATA SHEET

Issue Date 28-Feb-2017
Revision Date 28-Feb-2017
Version 1

Section 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product Code PM022
Product Name Copper Nickel Alloy Compacts
Synonyms Copper Nickel Alloy Compacts: Cu-30Ni, UNS C71500
Contains Nickel

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Alloy product manufacture
Uses advised against

1.3. Details of the supplier of the safety data sheet

Manufacturer Address ATI, 1000 Six PPG Place, Pittsburgh, PA 15222 USA

1.4. Emergency telephone number

Emergency Telephone Chemtrec: +1-703-741-5970

Section 2: HAZARDS IDENTIFICATION

This product is an article and, as such, does not present a hazard to human health by inhalation or ingestion

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity - Oral</td>
<td>Category 4</td>
</tr>
<tr>
<td>Skin sensitisation</td>
<td>Category 1</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Category 2</td>
</tr>
<tr>
<td>Specific target organ toxicity (repeated exposure)</td>
<td>Category 1</td>
</tr>
</tbody>
</table>

2.2. Label elements

Emergency Overview

Danger

Hazard statements
Harmful if swallowed
May cause an allergic skin reaction
Suspected of causing cancer
Causes damage to the respiratory tract through prolonged or repeated exposure if inhaled
Precautionary Statements - Prevention
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wear protective gloves
If skin irritation or rash occurs: Get medical advice/attention
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

2.3 Hazards not otherwise classified (HNOC)
Not applicable

Other Information
When product is subjected to welding, burning, melting, sawing, brazing, grinding, buffing, polishing, or other similar heat-generating processes, the following potentially hazardous airborne particles and/or fumes may be generated: Zinc, copper, magnesium, or cadmium fumes may cause metal fume fever.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Synonyms
Copper Nickel Alloy Compacts: Cu-30Ni, UNS C71500.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>EC No</th>
<th>CAS No</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>231-159-6</td>
<td>7440-50-8</td>
<td>66 - 71</td>
</tr>
<tr>
<td>Nickel</td>
<td>231-111-4</td>
<td>7440-02-0</td>
<td>29 - 33</td>
</tr>
<tr>
<td>Manganese</td>
<td>231-105-1</td>
<td>7439-96-5</td>
<td>0.2 - 1.0</td>
</tr>
</tbody>
</table>

Section 4: FIRST AID MEASURES

4.1. Description of first aid measures

Inhalation
If excessive amounts of smoke, fume, or particulate are inhaled during processing, remove to fresh air and consult a qualified health professional.

Skin Contact
In the case of skin irritation or allergic reactions see a doctor.

Eye Contact
In the case of particles coming in contact with eyes during processing, treat as with any foreign object.

Ingestion
Not an expected route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms
May cause allergic skin reaction. May cause acute gastrointestinal effects if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

Note to doctors
Treat symptomatically.
Section 5: FIRE FIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media
None in massive form, flammable as finely divided particles.
- **Small Fire**: Smother with salt (NaCl) or class D dry powder fire extinguisher.
- **Large Fire**: Isolate fire and allow to burn out.

Unsuitable extinguishing media
Do not spray water on burning metal as an explosion may occur. This explosive characteristic is caused by the hydrogen and steam generated by the reaction of water with the burning material

5.2. Special hazards arising from the substance or mixture

Intense heat. **WARNING**: Fine particles resulting from grinding, buffing, polishing, or similar processes of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimise combustible dust hazard.

- **Hazardous combustion products**: Zinc, copper, magnesium, or cadmium fumes may cause metal fume fever.

5.3. Advice for firefighters

Wear self-contained breathing apparatus and protective suit. Use personal protective equipment as required.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

**Personal precautions**
Use personal protective equipment as required.

**For emergency responders**
Use personal protective equipment as required.

6.2. Environmental precautions

Not applicable to massive product.

6.3. Methods and material for containment and cleaning up

**Methods for containment**: Not applicable to massive product.

**Methods for cleaning up**: Not applicable to massive product.

6.4. Reference to other sections

See Section 12: ECOLOGICAL INFORMATION.

Section 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

**Advice on safe handling**
**WARNING**: Fine particles resulting from grinding, buffing, polishing, or similar processes of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimise combustible dust hazard.

**General Hygiene Considerations**
Handle in accordance with good industrial hygiene and safety practice.
7.2. Conditions for safe storage, including any incompatibilities

Storage Conditions
Keep chips, turnings, dust, and other small particles away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity).

Incompatible materials
Dissolves in hydrofluoric acid.

7.3. Specific end use(s)

Risk Management Methods (RMM)
The information required is contained in this Safety Data Sheet.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>European Union</th>
<th>United Kingdom</th>
<th>France</th>
<th>Spain</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td></td>
<td>STEL: 0.6 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
</tr>
<tr>
<td>7440-50-8</td>
<td></td>
<td>STEL: 2 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 1 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA: 0.2 mg/m³</td>
<td>STEL: 2 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 0.1 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA: 1 mg/m³</td>
<td>STEL: 2 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>Ceiling / Peak: 0.2 mg/m³</td>
</tr>
<tr>
<td>Nickel</td>
<td>-</td>
<td>STEL: 1.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>Skin</td>
</tr>
<tr>
<td>7440-02-0</td>
<td></td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manganese</td>
<td>-</td>
<td>STEL: 1.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
<td></td>
</tr>
<tr>
<td>7439-96-5</td>
<td></td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Name</td>
<td>Italy</td>
<td>Portugal</td>
<td>Netherlands</td>
<td>Finland</td>
<td>Denmark</td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 0.1 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 1.0 mg/m³</td>
</tr>
<tr>
<td>7440-50-8</td>
<td></td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 0.1 mg/m³</td>
<td>TWA: 0.1 mg/m³</td>
<td>TWA: 1 mg/m³</td>
</tr>
<tr>
<td>Nickel</td>
<td>-</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.25 mg/m³</td>
<td>TWA: 0.05 mg/m³</td>
<td>TWA: 0.05 mg/m³</td>
</tr>
<tr>
<td>7440-02-0</td>
<td></td>
<td>TWA: 0.25 mg/m³</td>
<td>TWA: 0.1 mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manganese</td>
<td>-</td>
<td>STEL 2 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
</tr>
<tr>
<td>7439-96-5</td>
<td>STEL 2 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.3 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
</tr>
<tr>
<td></td>
<td>TWA: 0.1 mg/m³</td>
<td>STEL 2 mg/m³</td>
<td>TWA: 0.1 mg/m³</td>
<td>STEL: 3 ppm</td>
<td>STEL: 3 mg/m³</td>
</tr>
</tbody>
</table>

Derived No Effect Level (DNEL) No DNELs are available for this product as a whole

Predicted No Effect Concentration (PNEC) No PNECs are available for this product as a whole.

8.2. Exposure controls

Engineering Controls Avoid generation of uncontrolled particles.

Personal protective equipment

Eye/face protection When airborne particles may be present, appropriate eye protection is recommended. For example, tight-fitting goggles, foam-lined safety glasses or other protective equipment that shield the eyes from particles.

Skin and body protection Wear fire/flame resistant/retardant clothing. Cut-resistant gloves and/or protective clothing
Respiratory protection may be appropriate when sharp surfaces are present. When particulates/fumes/gases are generated and if exposure limits are exceeded or irritation is experienced, proper approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminate concentrations. Respiratory protection must be provided in accordance with current local regulations.

Environmental exposure controls Section 6: ACCIDENTAL RELEASE MEASURES.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>Various massive product forms</td>
<td>Odour</td>
</tr>
<tr>
<td>Colour</td>
<td>metallic, grey or Silver</td>
<td>Odour threshold</td>
</tr>
<tr>
<td>pH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melting point/ freezing point</td>
<td>1215 °C / 2220 °F</td>
<td></td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaporation rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper flammability limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower flammability limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapour pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapour density</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>8.9</td>
<td></td>
</tr>
<tr>
<td>Water solubility</td>
<td>Insoluble</td>
<td>Insoluble</td>
</tr>
<tr>
<td>Solubility(ies)</td>
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<td></td>
</tr>
<tr>
<td>Partition coefficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic viscosity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

9.2. Other information

Softening point                  -                             |
Molecular weight                 -                             |
VOC Content (%)                  Not applicable              |
Density                         -                             |
Bulk density                    -                             |

Section 10: STABILITY AND REACTIVITY

10.1. Reactivity

Not applicable

10.2. Chemical stability

Stable under normal conditions.

Explosion data
Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

10.3. Possibility of hazardous reactions
Hazardous polymerisation
Hazardous polymerisation does not occur.

Possibility of Hazardous Reactions
None under normal processing.

10.4. Conditions to avoid
Dust formation and dust accumulation;

10.5. Incompatible materials
Dissolves in hydrofluoric acid.

10.6. Hazardous decomposition products
Not applicable.

Section 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information

Inhalation Not an expected route of exposure for product in massive form.
Eye contact Not an expected route of exposure for product in massive form.
Skin Contact May cause sensitisation by skin contact.
Ingestion Not an expected route of exposure for product in massive form.

Unknown Acute Toxicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>481 mg/kg bw</td>
<td>&gt;2000 mg/kg bw</td>
<td>&gt;5.11 mg/L</td>
</tr>
<tr>
<td>Nickel</td>
<td>&gt; 9000 mg/kg bw</td>
<td>-</td>
<td>&gt; 10.2 mg/L</td>
</tr>
<tr>
<td>Manganese</td>
<td>&gt;2000 mg/kg bw</td>
<td>-</td>
<td>&gt;5.14 mg/L</td>
</tr>
</tbody>
</table>

Information on toxicological effects

Symptoms May cause sensitisation by skin contact. May cause acute gastrointestinal effects if swallowed.

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

Acute toxicity Harmful if swallowed.
Skin corrosion/irritation Product not classified.
Serious eye damage/eye irritation Product not classified.
Sensitisation May cause sensitisation by skin contact.
Germ cell mutagenicity Product not classified.
Carcinogenicity May cause cancer by inhalation.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td></td>
<td>Group 1</td>
<td>Known</td>
<td>X</td>
</tr>
<tr>
<td>7440-02-0</td>
<td></td>
<td>Group 2B</td>
<td>Reasonably Anticipated</td>
<td></td>
</tr>
</tbody>
</table>

Reproductive toxicity Product not classified.
STOT - single exposure Product not classified.
STOT - repeated exposure
Causes disorder and damage to the: Respiratory System.

Aspiration hazard
Product not classified.

Section 12: ECOLOGICAL INFORMATION

12.1. Toxicity
This product as shipped is not classified for aquatic toxicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to Micro-organisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>The 72 h EC50 values of copper chloride to Pseudokirchneriella subcapitata ranged between 30 µg/L (pH 7.02, hardness 250 mg/L CaCO3, DOC 1.95 mg/L) and 824 µg/L (pH 6.22, hardness 100 mg/L CaCO3, DOC 15.8 mg/L).</td>
<td>The 96-hr LC50 for Pimephales promelas exposed to Copper sulfate ranged from 256.2 to 38.4 µg/L with water hardness increasing from 45 to 255.7 mg/L.</td>
<td>The 24 h NOEC of copper chloride for activated sludge ranged from 0.32 to 0.64 mg of Cu/L.</td>
<td>The 48 h LC50 values for Daphnia magna exposed to copper in natural water ranged between 33.8 µg/L (pH 6.1, hardness 12.4 mg/L CaCO3, DOC 2.34 mg/L) and 792 µg/L (pH 7.35, hardness 139.7 mg/L CaCO3, DOC 22.8 mg/L).</td>
</tr>
<tr>
<td>Nickel</td>
<td>NOEC/EC10 values range from 12.3 µg/L for Scenedesmus accuminatus to 425 µg/l for Pseudokirchneriella subcapitata.</td>
<td>The 96h LC50s values range from 0.4 mg Ni/L for Pimephales promelas to 320 mg Ni/L for Brachydanio rerio.</td>
<td>The 30 min EC50 of nickel for activated sludge was 33 mg Ni/L.</td>
<td>The 48h LC50s values range from 0.013 mg Ni/L for Ceriodaphnia dubia to 4970 mg Ni/L for Daphnia magna.</td>
</tr>
<tr>
<td>Manganese</td>
<td>The 72 h EC50 of manganese to Desmodesmus subspicatus was 2.8 mg of Mn/L.</td>
<td>The 96 h LC50 of manganese to Oncorhynchus mykiss was greater than 3.6 mg of Mn/L.</td>
<td>The 3 h EC50 of manganese for activated sludge was greater than 1000 mg/L.</td>
<td>The 48 h EC50 of manganese to Daphnia magna was greater than 1.6 mg/L.</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability

12.3. Bioaccumulative potential

12.4. Mobility in soil

12.5. Results of PBT and vPvB assessment
The PBT and vPvB criteria do not apply to inorganic substances.

12.6. Other adverse effects
This product as shipped is not classified for environmental endpoints. However, when subjected to sawing or grinding, particles may be generated that are classified for aquatic acute or aquatic chronic toxicity

Section 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods
Waste from residues/unused products
Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging
None anticipated.

Section 14: TRANSPORT INFORMATION
Section 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>French RG number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>-</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>RG 37ter</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>-</td>
</tr>
</tbody>
</table>

European Union

Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents
Authorisations and/or restrictions on use:
This product does not contain substances subject to authorisation (Regulation (EC) No. 1907/2006 (REACH), Annex XIV). This product does not contain substances subject to restriction (Regulation (EC) No. 1907/2006 (REACH), Annex XVII).

International Inventories

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Complies</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSCA</td>
<td></td>
</tr>
<tr>
<td>DSL/NDSL</td>
<td></td>
</tr>
<tr>
<td>EINECS/ELINCS</td>
<td></td>
</tr>
<tr>
<td>ENCS</td>
<td></td>
</tr>
<tr>
<td>IECSC</td>
<td></td>
</tr>
<tr>
<td>KECL</td>
<td></td>
</tr>
<tr>
<td>PICCS</td>
<td></td>
</tr>
<tr>
<td>AICS</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

15.2. Chemical safety assessment

No chemical safety assessment has been performed for this product.

Section 16: OTHER INFORMATION

Issue Date 28-Feb-2017
Revision Date 28-Feb-2017
Revision Note Updated to comply with GHS.

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Note:
The information provided in this Material 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.

Additional information available from: Safety data sheets and labels available at ATImetals.com

End of Safety Data Sheet