


SAFETY DATA SHEET

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| <p>MATERIAL IDENTIFICATION AND USE</p> <p>MATERIAL NAME: COPPER & ALLOYS</p> <p>SYNONYMS: COPPER, COPPER ALLOY ASTM UNS C11000, C12200, C14500, C22000, C26000, C36000, C51000, C54400, C65000, C70400, C70600, C71000, C71500, C93200 AND C95400.</p> |  | <p>SUPPLIER: RUSSEL METALS INC.</p> <p>ADDRESS: 6600 FINANCIAL DRIVE, MISSISSAUGA, ONTARIO. CANADA. L5N 7J6.</p> <p>TEL: 905-819-7295 FAX: 905-819-7262</p> <p>FORM #: SDS-03-2014 DATE: DECEMBER 19, 2017</p> |
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1. PRODUCT INFORMATION

GHS PRODUCT IDENTIFIER: **COPPER AND COPPER ALLOYS**

OTHER MEANS OF IDENTIFICATION: Includes all copper and copper alloys

RECOMMENDED USE OF THE CHEMICAL AND RESTRICTIONS ON USE:
Solid copper & alloy products, various forms and uses. Manufacture of articles.




SUPPLIER'S DETAILS: RUSSEL METALS INC., 6600 FINANCIAL DRIVE, MISSISSAUGA, ONTARIO. CANADA. L5N 7J6

EMERGENCY PHONE NUMBER: 905-819-7295

2. HAZARDOUS INGREDIENTS

CLASSIFICATION: Copper and copper alloys are considered an "article" and not hazardous in its solid form. However, certain process such as cutting, milling, grinding, melting and welding could result in some hazardous materials being emitted. The GHS Classification below pertains to these emitted products during these processes.

SIGNAL WORD, HAZARD STATEMENTS & SYMBOLS: **WARNING**

| SYMBOLS | HAZARD | GHS CLASSIFICATION | HAZARD STATEMENTS |
|---|--|---|---|
|  | Carcinogenicity Respiratory Sensitizer Toxic to Reproduction STOT (repeated exposure) | Category – 2 Category – 1 Category – 1B Category – 1 | May cause cancer May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause genetic effects. Causes damage to organs through prolonged or repeated exposure. |
|  | Skin Sensitizer STOT (single exposure) | Category – 1 Category – 1 | May cause allergic skin reaction. May cause respiratory irritation. |
|  | Acute Toxic to Aquatic Life Chronic Toxic to Aquatic Life | Category – 1 Category – 1 | Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects. |
| N/A | Eye Irritation | Category – 2B | Causes eye irritations. |

PRECAUTIONARY STATEMENTS:

| PREVENTION | FIRST AID RESPONSE |
|---|--|
| <p>Do not breathe dust/fume/gas/vapour/spray.</p> <p>Use in a well- ventilated area.</p> <p>Avoid generating dust.</p> <p>Dusts and fines from processing may be ignitable.</p> <p>Use personal protective equipment as required.</p> <p>Wash thoroughly after handling.</p> <p>Do not eat, drink or smoke when using this product.</p> <p>Obtain special instructions before use.</p> <p>Do not handle until all safety precautions have been read & understood.</p> <p>Contaminated work clothing should not be allowed out of the workplace.</p> | <p>EYES: Flush eyes with plenty of water for at least 15 minutes. Seek medical attention if eye irritation persists.</p> <p>SKIN: Wash affected area with mild soap and water. Seek medical attention if skin irritation persists.</p> <p>INHALATION: Remove to fresh air. Check for clear airway, breathing and presence of pulse. If necessary administer CPR. Consult a physician immediately.</p> <p>INGESTION: Dust may irritate mouth and gastrointestinal tract. If ingested, seek medical attention.</p> |
| STORAGE | DISPOSAL |
| <p>Store away from strong acids, alkalis and oxidizers.</p> <p>Store away from mercury, acetylene and halogens.</p> <p>Store in accordance with federal/ provincial/state or local regulations.</p> | <p>Copper should be recycled whenever possible.</p> <p>Otherwise, dispose of in accordance with applicable federal/ provincial/state or local regulations.</p> |

HAZARD NOT OTHERWISE CLASSIFIED (HNOC): Not applicable.

NOTES:

- STOT – Specific Target Organ Toxicity

3. COMPOSITION/INFORMATION ON INGREDIENTS**BASE METAL**

(ALL VALUES ARE EXPRESSED AS WEIGHT PERCENT AND ARE APPROXIMATES)

| CHEMICAL NAME | CAS NUMBER | % BY WEIGHT |
|---------------|------------------|----------------|
| Copper | 7440-50-8 | 70-99.9 |
| Zinc | 7440-66-6 | 0-34.0 |
| Nickel | 7440-02-0 | 0-30.0 |
| Aluminum | 7429-90-5 | 0-11.0 |
| Lead | 7439-92-1 | 0-9.0 |
| Iron | 7439-89-6 | 0-4.0 |
| Silicon | 7440-21-3 | 0-3.0 |
| Tin | 7440-31-5 | 0-3.0 |
| Manganese | 7439-96-5 | 0-1.0 |
| Tellurium | 13494-80-9 | 0.50 |
| Phosphorus | 7723-14-0 | 0-0.25 |

NOTES:

- For exact composition, refer to analysis or specifications.

4. FIRST AID MEASURES**DESCRIPTION OF NECESSARY FIRST AID MEASURES:**

EYE CONTACT: DUST ACTS AS A FOREIGN BODY. FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. SEEK MEDICAL ATTENTION IF EYE IRRITATION PERSISTS.

SKIN CONTACT: MAINTAIN GOOD PERSONAL HYGIENE. WASH AFFECTED AREA WITH MILD SOAP AND WATER. SEEK MEDICAL ATTENTION IF SKIN IRRITATION PERSISTS.

INHALATION: REMOVE TO FRESH AIR. CHECK FOR CLEAR AIRWAY, BREATHING AND PRESENCE OF PULSE. IF NECESSARY ADMINISTER CPR. CONSULT A PHYSICIAN IMMEDIATELY.

INGESTION: RARE IN INDUSTRY. DUST MAY IRRITATE MOUTH AND GASTROINTESTINAL TRACT. IF INGESTED, SEEK MEDICAL ATTENTION PROMPTLY.

MOST IMPORTANT SYMPTOMS/EFFECTS, ACUTE AND DELAYED:

Copper and copper alloys as sold and shipped is not likely to present an acute or chronic health effects. However, during processing (cutting, milling, grinding, melting or welding) emitted byproducts may cause irritations, difficulty in breathing, coughing or wheezing. May cause allergic skin reactions.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY:

Notes to physician: May cause sensitization by skin contact or inhalation. Treat symptomatically.

5. FIRE FIGHTING MEASURES

SUITABLE EXTINGUISHING MEDIA: Non-flammable. Not applicable for solid product. Use Class D extinguishing agents or sand on fires involving dusts or fines. Use extinguishers appropriate for surrounding materials.

Do NOT use water on molten metal. Do NOT use water on dust, powder or fume fires.

SPECIFIC HAZARDS ARISING FROM MATERIAL: Dusts from grinding operation may burn if they are ignited. Dust, powder and fumes are flammable when exposed to flame or by chemical reaction with oxidizing agents.

HAZARDOUS COMBUSTION PRODUCTS: At temperatures above the melting point, fumes containing copper oxides and smaller amounts of other alloying elements may be liberated.

SPECIAL PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIRE FIGHTERS:

Firefighters should wear self-contained NIOSH-approved breathing apparatus and full protective clothing.

EXPLOSION DATA: Molten metal in contact with water may be explosive.

SENSITIVITY TO MECHANICAL IMPACT: None.

SENSITIVITY TO STATIC DISCHARGE: N/A.

6. ACCIDENTAL RELEASE MEASURES**PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES:**

Not applicable to copper in solid state. Avoid dust formation. Ensure adequate ventilation. Clean-up personnel should be protected against contact with eyes and skin protection.

ENVIRONMENTAL PRECAUTIONS:

Not applicable to copper in solid state. Do not flush into surface water or sanitary sewer system.

METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP:

Solid metal does not pose any problems. Dust spills should be cleaned up avoiding dust generation. Wash down with water if in contact with acids. Avoid inhalation of dusts. Collect scrap copper for recycling.

7. HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING:

Not applicable to copper in solid state. Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Practice good housekeeping. Avoid generating dusts. Avoid breathing metal fumes and/or dust. Avoid contact with sharp edges or heated metal. Eating, drinking or smoking should not be allowed in areas where this alloy is processed, handled or stored.

CONDITIONS FOR SAFE STORAGE:

Other than incompatibles, no special storage conditions for copper in solid state.

INCOMPATIBLE PRODUCTS:

Store away from strong acids, alkalis and oxidizers. Store away from mercury, acetylene and halogens.

8. EXPOSURE CONTROLS /PERSONAL PROTECTION**CONTROL PARAMETERS:**

The exposure limit for copper and copper alloy dusts has been established at 1 mg/m³ and metal fumes at 0.2 mg/m³ with ACGIH's TWA. The individual complex compounds within the fume may have lower exposure limits than the general fume.

| CHEMICAL NAME | CAS NUMBER | TLV ACGIH (mg/m ³) | | |
|---------------|------------|---|--|--|
| Copper | 7440-50-8 | 1.0 (Dust) 0.2 (Fume) | | |
| Iron | 7439-89-6 | 5.0 (Respirable) | | |
| Lead | 7439-92-1 | 0.05 (Elemental) | | |
| Manganese | 7439-96-5 | 0.2 (as inorganic Mn) | | |
| Nickel | 7440-02-0 | 1.5 (Metal) 0.2 (Insoluble) 0.1 (Soluble) | | |
| Phosphorus | 7723-14-0 | 0.1 (yellow or white) | | |
| Silicon | 7440-21-3 | 10.0 (Inhalable) 3.0 (Respirable) | | |
| Tin | 7440-31-5 | 2.0 | | |
| Zinc | 7440-66-6 | 2.0 (As zinc oxide - respirable) | | |
| Tellurium | 13494-80-9 | 0.1 | | |
| Aluminum | 7429-90-5 | 1.0 (Respirable) | | |

NOTES:

- Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH - 2011) are 8-hour Time Weighted Average concentrations unless otherwise noted.

APPROPRIATE ENGINEERING CONTROLS:

Provide general or local exhaust to minimize airborne concentrations during milling, grinding, melting and welding operations.

INDIVIDUAL PROTECTIVE MEASURES:

Dependent upon process being performed on material each operation must be addressed for suitable equipment.

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|------------------------------|--|----------------------------|--|
| GLOVES (Specify): | Wear gloves as required | EYES (Specify): | Safety glasses or goggles as required. |
| CLOTHING (Specify): | N/A | FOOTWEAR (Specify): | N/A |
| RESPIRATOR (Specify): | If concentrations exceed established limits use NIOSH/MSHA approved particulate respirators (dust & fume or high efficiency dust fume) when grinding or welding. | | |
| OTHER (Specify): | With molten metal, use full body cover clothing suitably treated to prevent burns. | | |

9. CHEMICAL AND PHYSICAL PROPERTIES

| | | | |
|---------------------------------|-----------------|-----------------------------------|------------------------|
| PHYSICAL STATE: | Solid | APPEARANCE: | Reddish metallic solid |
| ODOUR: | Not Applicable | ODOUR THRESHOLD: | Not Applicable |
| pH: | Not Applicable | MELTING POINT: | 1150°C (2102°F) |
| BOILING POINT: | 2324°C (4215°F) | FLASH POINT (°C): | N/A |
| EVAPORATION RATE: | Not Applicable | FLAMMABILITY (solid, Gas): | Not flammable |
| UPPER FLAMMABLE LIMIT %: | Not Applicable | LOWER FLAMMABLE LIMIT %: | Not Applicable |
| VAPOUR PRESSURE: | Not Applicable | VAPOUR DENSITY: | Not Applicable |
| RELATIVE DENSITY: | 8.90 | SPECIFIC GRAVITY: | No data |
| SOLUBILITY: | Not soluble | PARTITION COEFFICIENT: | No data |
| AUTO-IGNITION TEMP (°C): | Not Applicable | DECOMPOSITION TEMPERATURE: | No data |
| VISCOSITY: | Not Applicable | | |
| OTHER INFORMATION: | Not Applicable | | |

10. STABILITY AND REACTIVITY**REACTIVITY:**

Not determined for product in solid form.

CHEMICAL STABILITY:

Yes. Copper and its alloys are stable under normal storage and handling conditions.

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| POSSIBILITY OF HAZARDOUS REACTIONS: | Hazardous polymerization cannot occur. |
| CONDITIONS TO AVOID: | Reacts violently with hydrogen peroxide and other oxidizers. Reaction with acids could produce noxious gases. In contact with acids, hydrogen gas may evolve. Avoid dust formation. Molten metal can react violently with water or moisture. |
| INCOMPATIBLE MATERIALS: | Yes, strong acids, alkalis and oxidizers. Also, mercury, acetylene and halogens. |
| HAZARDOUS DECOMPOSITION PRODUCTS: | None. Products other than fire or explosion – does not decompose. Toxic metal oxides, COx & NOx may be produced during a fire involving copper and copper alloys. |

11. TOXICOLOGICAL INFORMATION

TOXICITY:

| COMPONENT | LD ₅₀ ORAL | LD ₅₀ DERMAL | LD ₅₀ INHALATION | OTHER |
|---------------|-----------------------|-------------------------|-----------------------------|-------|
| Copper | Unknown | - | - | - |
| Iron | 30,000 mg/kg Oral-Rat | - | - | - |
| Lead | Unknown | - | - | - |
| Manganese | 9,000 mg/kg Oral-Rat | - | - | - |
| Nickel | >9,000 mg/kg Oral-Rat | - | - | - |
| Phosphorus | Unknown | - | - | - |
| Silicon | 3,160 mg/kg Oral-Rat | - | - | - |
| Tin | Unknown | - | - | - |
| Zinc | Unknown | - | - | - |
| Tellurium | 20 mg/kg Oral-Mouse | - | - | - |
| Aluminum | Unknown | - | - | - |

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| LIKELY ROUTES OF ENTRY: | None for copper & alloys in their natural solid form. Inhalation of metal particulate or elemental oxide fumes generated during welding, burning, grinding or machining may pose acute or chronic health effects. In finely divided form, skin contact may produce localized irritation and/or contact dermatitis. |
| EYES: | High concentrations of dust may cause irritation to the eyes. Fumes can cause eye irritations. |
| SKIN: | May cause skin irritations. Prolonged skin contact with coated copper may cause skin irritation in sensitive individuals. Workers with anemia, kidney damage, digestive, respiratory, nervous systems, pregnant women and fertile females warrant particular attention. |
| INHALATION: | Dust may irritate nose and throat. If heated, copper fumes may cause metal fume fever, a delayed, benign, transient flu-like condition. |

SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS:
None for copper & copper alloys in their natural solid state.

EFFECTS OF ACUTE EXPOSURE TO MATERIAL: **COPPER & ZINC:** Can cause metal fume fever, a metallic taste in the mouth, dryness or irritation of the throat, and coughing. After 4-48 hours symptoms can include sweating, shivering, headache, fever, muscle aches, nausea, vomiting, weakness, and tiredness.
TELLURIUM: Poison by ingestion.

EFFECTS OF CHRONIC EXPOSURE TO MATERIAL: **NICKEL:** IARC lists metallic nickel under its Group 2B category - "possibly carcinogenic to humans". Nickel may cause skin sensitivity
COBALT: Cobalt dust may result in an asthma-like condition (cough, shortness of breath). IARC lists metallic cobalt under its Group 2B category - "possibly carcinogenic to humans".
IRON: Inhalation overexposures may cause a benign pneumoconiosis (siderosis) with few or no symptoms.
MANGANESE: Existing studies are inadequate to assess its carcinogenicity. Susceptible to Parkinson's disease, metal fume fever and kidney damage.
LEAD: May damage kidneys, liver, blood system and reproductive system. IARC lists lead under its Group 2B category - "possibly carcinogenic to humans".

STOT (Single Exposure): Causes damage to organs (kidneys, respiratory system).
STOT (Repeated Exposures): Respiratory system. Allergic skin reactions. Reproductive system.
MUTAGENICITY OF MATERIAL: Suspected of causing genetic effects.
REPRODUCTIVE EFFECTS: Lead is suspected as causing damage to the reproductive system.
TERATOGENICITY OF MATERIAL: N/A
CARCINOGENICITY OF MATERIAL: **NICKEL:** IARC lists metallic nickel under its Group 2B category - "possibly carcinogenic to humans".
COBALT: IARC lists metallic cobalt under its Group 2B category - "possibly carcinogenic to humans".
LEAD: IARC lists lead under its Group 2B category - "possibly carcinogenic to humans".

SYNERGISTIC MATERIALS: N/A

ASPIRATION HAZARD: No data.

SENSITIZATION OF MATERIAL: N/A

LD₅₀ (of Material): Not established **LC₅₀ (of Material):** Not established

NOTES:

- STOT – Specific Target Organ Toxicity
- International Agency for Research on Cancer (IARC) - Summaries & Evaluations (2008).
- 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP).

12. ECOLOGICAL INFORMATION

ECOTOXICITY: No data available for copper & alloys in their natural solid state. However, individual components of the material have been found to be toxic to the environment. Metal dusts may migrate into soil and groundwater and be ingested by wildlife.

| COMPONENT | TOXICITY TO FISH | TOXICITY TO ALGAE | TOXICITY TO MICROORGANISMS |
|-----------|--|--|--|
| Copper | LC50 Fathead Minnow 96 hr. 0.0068-0.0156 mg/l | EC50 Freshwater Algae 72 hr. 0.0426-0.0535 mg/l | EC50 Water Flea 48 hr. 0.03 mg/l |
| Iron | LC50 Common Carp 96 hr. 0.56 mg/l | - | - |
| Lead | LC50 Common Carp 96 hr. 0.44 mg/l | - | EC50 Water Flea 48 hr. 0.0006 mg/l |
| Manganese | - | - | EC50 Water Flea 48 hr. 40 mg/l |
| Nickel | LC50 Common Carp 96 hr. 1.3 mg/l | EC50 Freshwater Algae 72 hr. 0.18 mg/l | EC50 Water Flea 48 hr. 1.0 mg/l |
| Zinc | LC50 Fathead Minnow 96 hr. 2.16-3.05 mg/l | EC50 Freshwater Algae 72 hr. 0.09-0.125 mg/l | EC50 Water Flea 48 hr. 0.139-0.908 mg/l |
| Aluminum | LC50 Rainbow Trout 96 hr. 0.16 mg/l | - | EC50 Water Flea 24 hr. 3.5 mg/l |

PERSISTENCE AND DEGRADABILITY: No data available.

BIOACCUMULATIVE POTENTIAL: No data available.

MOBILITY IN SOIL: No data available for copper & alloys in their natural solid state. Individual metal dusts may migrate into soil and groundwater and be absorbed by plants.

OTHER ADVERSE EFFECTS: None known.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHODS: Recover copper for recycling.

CONTAINER CLEANING & DISPOSAL: Dispose of in accordance with applicable federal, provincial/state or local regulations.

14. TRANSPORTATION INFORMATION

GENERAL SHIPPING INFORMATION: Material not regulated for shipping.

SHIPPING NAME AND DESCRIPTION: N/A
UN NUMBER: N/A
HAZARD CLASS: N/A
PACKING GROUP/RISK GROUP: N/A

TRANSPORT REGULATIONS:

Canadian Transportation of Dangerous Goods Regulations (TDG) March 2011.
 US Department of Transport (DOT) Hazardous Materials shipping information (Title 49 - Transportation March 2011).

15. REGULATORY INFORMATION

REGULATORY INFORMATION: *The following listing of regulations relating to a Russel Metals Inc. product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.*

ADDITIONAL CANADIAN REGULATIONS:

WHMIS CLASSIFICATION: Class D2A/D2B: Materials Causing Other Toxic Effects.
DOMESTIC SUBSTANCES LIST: The components of this material are on the federal DSL Inventory.
OTHER CANADIAN REGULATIONS: N/A

ADDITIONAL U.S. REGULATIONS:

SARA: The components of this material are subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA – Oct. 2006), as follows:

| CHEMICAL NAME | SARA 302 (40 CFR 355, Appendix A) | SARA 304 (40 CFR Table 302.4) | SARA 313 (40 CFR 372.65) | CERCLA Reportable Quantities |
|---------------|--------------------------------------|----------------------------------|-----------------------------|---------------------------------|
| Aluminum | No | No | Yes | None listed |
| Copper | No | No | Yes | 5,000 lb. |
| Lead | No | No | Yes | 10 lb. |
| Manganese | No | No | Yes | None listed |
| Nickel | No | No | Yes | 100 lb. |
| Phosphorus | Yes | Yes | Yes | 1 lb. |
| Zinc | No | No | No | 1,000 lb. |

SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the components of this material. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb. (4,540 kg) therefore applies, per 40 CFR 370.20.

TSCA INVENTORY STATUS: The components of this material are listed on the Toxic Substances Control Act Inventory.

CERCLA REPORTABLE QUANTITY (RQ):

RQ's for Hazardous Substances in the Comprehensive Environmental Response, Compensation, and Liability Act are: Copper = 5000 lb. (2270 kg); Zinc = 1000 lb. (454 kg); Nickel = 100 lb. (45 kg).

CALIFORNIA (PROPOSITION 65):

The Lead component of this material is known in the State of California to cause cancer, and/or birth defects (or other reproductive harm).

The Nickel component of this material is known in the State of California to cause cancer.

The Cobalt component of this material is known in the State of California to cause cancer.

OTHER U.S. FEDERAL REGULATIONS:

Lead is regulated under 29 CFR 1910.1025.

ADDITIONAL EUROPEAN UNION REGULATIONS:**RoHS & WEEE:**

This SDS follows the European Union Directive "Restriction on the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment" (2002/95/EC) and the "Waste Electrical and Electronic Equipment (WEEE)" Directive (2002/96/EC).

Lead (Pb):

Lead is present in this copper alloy at levels above the EU Directive limit of 0.1%.

Note, the EU Directive has a lead exemption limit of up to 4.0% as an alloying element in copper.

Chromium VI (Cr +6):

The hexavalent oxidation state of chromium does not normally exist as part of a metal or alloy.

16. OTHER INFORMATION**COPPER & COPPER ALLOYS****HAZARD LABEL RATING SYSTEMS:**

NATIONAL FIRE PROTECTION CODE:

NFPA CODE: H=0 F=0 R=0

**HAZARDOUS MATERIALS IDENTIFICATION SYSTEM:**

HMIS CODE: H=1* F=0 R=0 PPE: See Section 8

| | |
|---------------------|----------|
| HEALTH | 1 |
| FLAMMIBILITY | 0 |
| REACTIVITY | 0 |
| OTHER | * |

* Denotes possible chronic hazard if airborne dusts or fumes are generated.

PREPARED BY: RUSSEL METALS INC. AND ENVIROTEST INC.

DATE: AUGUST 2014 (Reviewed Dec 19, 2017 - RMI)

TELEPHONE: 905-819-7295

NOTE: CONTACT SUPPLIER FOR ADDITIONAL PRODUCT INFORMATION

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