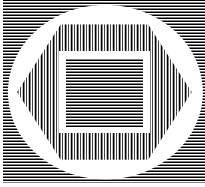


## MATERIAL SAFETY DATA SHEET

<b>MATERIAL IDENTIFICATION AND USE</b>  <b>MATERIAL NAME: COPPER &amp; ALLOYS</b>  SYNONYMS: COPPER, COPPER ALLOY ASTM UNS C11000, C12200, C14500, C22000, C26000, C36000, C51000, C54400, C65000, C70400, C70600, C71000, C71500, C93200 AND C95400.  WHMIS CLASS: D2A, D2B		SUPPLIER: RUSSEL METALS INC. ADDRESS: 1900 MINNESOTA COURT, SUITE 210, MISSISSAUGA, ONTARIO., CANADA. L5N 3C9.  PHONE: 905-567-8500 FAX: 905-819-7262. E-MAIL: www.russelmetals.com  FORM #: MSDS-03-2006. DATE: FEBRUARY 2006
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## 1. PRODUCT INFORMATION

MATERIAL NAME: COPPER AND COPPER ALLOYS

FORM #: MSDS-03-2006

DATE: FEBRUARY 2006

MATERIAL USE: MANUFACTURE OF ARTICLES

## 2. HAZARDOUS INGREDIENTS

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

COMPONENT	C.A.S. NUMBER	TLV (ACGIH - mg/m <sup>3</sup> )	LD <sub>50</sub>	% WEIGHT
COPPER	7440-50-8	1.0 (dust), 0.2 (fume)	U	70-99.9
IRON	7439-89-6	5.0 (oxide)	30,000 mg/kg Oral-Rat	up to 4.0
LEAD	7439-92-1	0.05 (elemental)	U	up to 9.0
MANGANESE	7439-96-5	0.2	9,000 mg/kg Oral-Rat	up to 1.0
NICKEL	7440-02-0	1.5 (elemental) 0.2 (insoluble) 0.1 (soluble)	>9,000 mg/kg Oral-Rat	up to 30.0
PHOSPHORUS	7723-14-0	0.1 (yellow or white)	U	up to 0.25
SILICON	7440-21-3	10.0	3,160 mg/kg Oral-Rat	up to 3.0
TIN	7440-31-5	2.0	U	up to 3.0
ZINC	7440-66-6	2.0 (as zinc oxide)	U	up to 34.0
TELLURIUM	13494-80-9	0.1	20 mg/kg Oral-Mouse	0.50
ALUMINUM	7429-90-5	10.0(dust & oxide) 5.0 (welded fume)	U	up to 11.0

## NOTES:

- Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH - 2005) are 8-hour Time Weighted Average concentrations unless otherwise noted.
- Ingredients listed as required by the WHMIS Ingredient Disclosure List of the Hazardous Products Act (Canada).
- For exact composition, refer to analysis or specifications.

## 3. HAZARDS IDENTIFICATION

<b>ROUTES OF ENTRY:</b>	None in its 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.
<b>EYES:</b>	High concentrations of dust may cause irritation to the eyes. Fumes can cause eye irritations.
<b>SKIN:</b>	May cause skin irritations. Prolonged skin contact with coated copper may cause skin irritation in sensitive individuals. Workers with anemia, kidney damage, digestive disease/problem, respiratory disease/problem, nervous systems disease/problem, pregnant women and fertile females warrant particular attention.
<b>INHALATION:</b>	Dust may irritate nose and throat. If heated, copper fumes may cause metal fume fever, a delayed, benign, transient flu-like condition.
<b>TARGET ORGANS:</b>	Respiratory system, reproductive system, skin, liver & kidneys.
<b>ACUTE EFFECTS:</b>	<b>COPPER &amp; ZINC:</b> 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. <b>TELLURIUM:</b> Poison by ingestion.
<b>CHRONIC EFFECTS:</b>	<b>IRON:</b> May cause a benign pneumoconiosis (siderosis). <b>LEAD:</b> Chronic exposures may cause lead poisoning that can affect the digestive system, nervous system, reproductive systems, muscles and joints. <b>MANGANESE:</b> Existing studies are inadequate to assess its carcinogenicity. Susceptible to Parkinson's disease, metal fume fever and kidney damage.

**NICKEL:** IARC reports that the "evidence for carcinogenicity to humans" is "sufficient". "This evidence applies to the group of chemicals as a whole and not necessarily to all individual chemicals within the group" and that "exposure to metallic nickel or concentrate dust", did not indicate an increased risk of cancer". Nickel may cause skin sensitivity.

#### 4. FIRST AID MEASURES

<b>EYES:</b>	DUST ACTS AS A FOREIGN BODY. FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. SEEK MEDICAL ATTENTION IF EYE IRRITATION PERSISTS.
<b>SKIN:</b>	MAINTAIN GOOD PERSONAL HYGIENE. WASH AFFECTED AREA WITH MILD SOAP AND WATER. SEEK MEDICAL ATTENTION IF SKIN IRRITATION PERSISTS.
<b>INHALATION:</b>	REMOVE TO FRESH AIR. CHECK FOR CLEAR AIRWAY, BREATHING AND PRESENCE OF PULSE. IF NECESSARY ADMINISTER CPR. CONSULT A PHYSICIAN IMMEDIATELY.
<b>INGESTION:</b>	RARE IN INDUSTRY. DUST MAY IRRITATE MOUTH AND GASTROINTESTINAL TRACT. IF INGESTED, SEEK MEDICAL ATTENTION PROMPTLY.

#### 5. FIRE FIGHTING MEASURES

<b>FLAMMABILITY CLASSIFICATION:</b>	No, not flammable.		
<b>MEANS OF EXTINCTION:</b>	None. Use extinguishers appropriate for surrounding materials.		
<b>FLASH POINT (°C):</b>	N/A	<b>AUTO-IGNITION TEMP (°C):</b>	N/A
<b>UPPER FLAMMABLE LIMIT % BY VOL.:</b>	N/A	<b>LOWER FLAMMABLE LIMIT % BY VOL.:</b>	N/A
<b>SENSITIVITY TO STATIC DISCHARGE:</b>	N/A	<b>EXPLOSION DATA (SENSITIVITY TO IMPACT):</b>	No
<b>HAZARDOUS COMBUSTION PRODUCTS:</b>	Copper oxide and smaller amounts of other metallic oxides.		
<b>UNUSUAL FIRE HAZARDS:</b>	None for this product. 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.		
<b>SPECIAL FIRE FIGHTING:</b>	None for this product. Dry powder for metal fires. Do not use water on dust, powder or fume fires.		

#### 6. ACCIDENTAL RELEASE MEASURES

<b>LEAK AND SPILL PROCEDURES:</b>	Solid metal does not pose any problems. Dust spills should be cleaned up avoiding dust generation. Collect and recycle to process. Wash down with water if in contact with acids. Avoid inhalation of dusts.
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#### 7. HANDLING AND STORAGE

<b>HANDLING:</b>	Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Practice good housekeeping. Avoid breathing metal fumes and/or dust. Eating, drinking or smoking should not be allowed in areas where this alloy is processed, handled or stored.
<b>STORAGE:</b>	Store away from corrosive chemicals, such as acids.

#### 8. EXPOSURE CONTROLS

<b>ENGINEERING CONTROLS:</b> (e.g. ventilation, enclosures, specify)	General or local exhaust during welding or grinding operations.		
<b>PERSONAL PROTECTIVE EQUIPMENT:</b>	Dependent upon process being performed on material each operation must be addressed for suitable equipment.		
<b>GLOVES (Specify):</b>	Leather - faced	<b>EYES (Specify):</b>	N/A
<b>CLOTHING (Specify):</b>	N/A	<b>FOOTWEAR (Specify):</b>	N/A
<b>RESPIRATOR (Specify):</b>	If concentrations exceed established limits use NIOSH/MSHA approved particulate respirators (dust & fume or high efficiency dust fume) when grinding or welding.		
<b>OTHER (Specify):</b>	With molten metal, use full body cover clothing suitably treated to prevent burns.		

#### 9. CHEMICAL AND PHYSICAL PROPERTIES

<b>PHYSICAL STATE:</b> Solid	<b>APPEARANCE:</b> Reddish metallic solid	<b>ODOUR:</b>	Not Applicable
<b>BOILING POINT:</b> 2324°C (4215°F)	<b>VAPOUR PRESSURE:</b> Not Applicable	<b>VAPOUR DENSITY:</b>	Not Applicable
<b>MELTING POINT:</b> 1150°C	<b>DENSITY:</b> 8.90	<b>pH:</b>	Not Applicable
<b>EVAPORATION RATE:</b> Not Applicable	<b>SOLUBILITY:</b> Not Applicable		
<b>COEFFICIENT WATER/OIL DISTRIBUTION:</b>	Not Applicable		

#### 10. STABILITY AND REACTIVITY

<b>CHEMICAL STABILITY:</b>	Yes. Copper and its alloys are stable under normal storage and handling conditions.
<b>HAZARDOUS POLYMERIZATION:</b>	Hazardous polymerization cannot occur.
<b>INCOMPATIBILITY TO OTHER SUBSTANCES:</b>	Yes
<b>CONDITIONS OF REACTIVITY:</b>	Copper reacts violently with acetylene, ammonium nitrate, bromates, chlorates, iodates. Copper foil burns spontaneously in gaseous chlorine. Avoid contact with chlorine and oxygen difluoride, ethylene oxide, fluorine, hydrogen peroxide, hydrazine mononitrate, hydrazoic acid. Incompatible with hydrogen sulfide, lead azide,

potassium peroxide.  
May turn green on prolonged contact with air, due to formation of cupric carbonate.

**CONDITIONS TO AVOID:** Reacts violently with hydrogen peroxide.  
Reaction with acids could produce noxious gases. In contact with acids, hydrogen gas may evolve.

**HAZARDOUS DECOMPOSITION PRODUCTS:** None.  
Products other than fire or explosion – does not decompose.  
Reaction with acids other than fire and explosion – does not decompose.

## 11. TOXICOLOGICAL INFORMATION

**IRRITANCY OF MATERIAL:** See Section 3.      **SENSITIZATION OF MATERIAL:** Workers with skin sensitivity warrant particular attention.

**LD<sub>50</sub> (of Material):** Unknown for copper.      **LC<sub>50</sub> (of Material):** Not established

**MUTAGENICITY OF MATERIAL:** N/A

**REPRODUCTIVE EFFECTS:** LEAD: Clinical studies on test animals exposed to lead indicate adverse reproductive effects.  
TELLURIUM: Reproductive effects reported.

**TERATOGENICITY OF MATERIAL:** N/A

**CARCINOGENICITY OF MATERIAL:** MANGANESE: Existing studies are inadequate to assess its carcinogenicity.  
NICKEL: IARC lists nickel and certain nickel compounds under its Group 2A category - "suspected human carcinogens".

**SYNERGISTIC MATERIALS:** N/A

**NOTE:** Prolonged skin contact may cause reddening and drying of skin or dermatitis in sensitive individuals due to chromium content in the copper alloys.

## 12. ECOLOGICAL INFORMATION

**ECOTOXICITY:** No data available for the material as a whole. 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.

**ENVIRONMENTAL FATE:** No data available.

**ENVIRONMENTAL DEGRADATION:** No data available.

## 13. DISPOSAL INFORMATION

**WASTE DISPOSAL:** Recover copper for recycling.

**GENERAL INFORMATION:** 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  
**CLASS:** N/A  
**PACKING GROUP/RISK GROUP:** N/A

**TRANSPORT REGULATIONS:**  
Canadian Transportation of Dangerous Goods Regulations (TDG) June 2005.  
US Department of Transport (DOT) Hazardous Materials shipping information (Title 49 - Transportation July 2004).

## 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), as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Aluminum	No	No	Yes
Copper	No	Yes	Yes
Lead	No	Yes	Yes
Manganese	No	No	Yes
Phosphorus	Yes	Yes	Yes
Zinc	No	Yes	Yes

**SARA THRESHOLD PLANNING QUANTITY:** Threshold Planning Quantities for Phosphorous is 100 lb. (45.4 kg), 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); Lead = 10 lb. (4.45 kg); Phosphorous 1 lb. (0.454 kg); Zinc = 1000 lb. (454 kg).  
**CALIFORNIA (PROPOSITION 65):** The Chromium component of this material is known in the State of California to cause cancer.

**OTHER U.S. FEDERAL REGULATIONS:** The Lead component of this material is known in the State of California to cause cancer, and/or birth defects (or other reproductive harm).  
Lead is regulated under 29 CFR 1910.1025.

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

### HAZARD LABEL RATING SYSTEMS:

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

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

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

**PREPARED BY:** RUSSEL METALS INC. AND ENVIROTEST INC.      **DATE:** FEBRUARY 2006

**TELEPHONE:** 905-567-8500      **NOTE:** CONTACT SUPPLIER FOR ADDITIONAL PRODUCT INFORMATION

**DISCLAIMER:** THE INFORMATION CONTAINED HEREIN BASED ON DATA CONSIDERED ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS OBTAINED FROM THE USE THEREOF.