MATERIAL SAFETY DATA SHEET **CuBe ALLOYS ™**

COPPER ALLOY C17200

IDENTITY

TRADE NAMES	CHEMICAL NAME	FORMULA	PRODUCT
Wrought High-Copper Alloy Number C17200 Alloy 25, C17200	Cu-Be-Co Alloys	Mixture (Alloy)	Ingot, Billet, Plate, Sheet, Rod, Bar & Tube

SECTION I

MANUFACTURER'S NAME
Copper Beryllium Alloys, Inc.
d.b.a. CuBe Alloys™

EMERGENCY TELEPHONE NUMBER
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SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

MATERIAL	ELEMENT	PERCENT BY WEIGHT	CAS NUMBER	HUMAN CARCINOGEN	FORM	OSHA [a] 8-HR PEL mg/m^3	OSHA 8-HR TWA (15-MIN STEL) mg/m^3	ACGIH 8-HR TLV (15-MIN STEL) mg/m^3
Aluminum	Al	0.20	7429-90-5	NO	Dust	15 [C]	15 [C]	10
					Dust	5 [D]	5 [D]	----------[B]
					Fume	----------[B]	5	----------[B]
Beryllium	Be	1.80 - 2.00	7440-41-7	YES [A]	All	0.002 [C]	0.005 [E]	0.002
Cobalt	Co	** (See Below)	7440-48-4	YES [A]	Dust & Fume	0.1	----------[B]	0.02 BEI
Copper	Cu	Remainder	7440-50-8	NO	Dust & Mist	1	1	1
					Fume	0.1	----------	0.2
Iron	Fe	** (See Below)	7439-89-6	NO	All	----------[B]	----------[B]	----------[B]
Iron Oxide	Fe	** (See Below)	1309-37-1	NO	Dust & Fume	10	----------[B]	5
Lead	Pb	0.05 Max.	7439-92-1	YES [A]	All	0.05 [E]	----------	0.05 BEI
Nickel	Ni	** (See Below)	7440-02-0	YES [A]	All	1	----------	1.5
Silicon	Si	0.20	7440-21-3	NO	All	15 [C]	10 [C]	10
						5 [D]	5 [D]	----------

Notes:

** Ni + Co = 0.20 percent minimum, Ni + Fe + Co = 0.60 percent maximum

[A] Identified as a potential human carcinogen
[B] For dusts without an explicit OSHA PEL, a nuisance dust PEL applies 15 mg/m^3 total dust, 5 mg/m^3 respirable dust.
[C] TD = Total Dust
[D] RF = Respirable Fraction of Dust
[E] C = Ceiling Limit
BEI = An ACGIH Biological Exposure Index exists

Section III - Physical/Chemical Characteristics

BOILING POINT	4,653^{O}F (2,567^{O}C)	SPECIFIC GRAVITY (H_2O = 1)	8.82
VAPOR PRESSURE	0 mm Hg	MELTING POINT	1,982^{O}F (1,083^{O}C)
VAPOR DENSITY (Air = 1)	NA	EVAPORATION RATE (Butyl Acetate = 1)	NA
SOLUBILITY IN WATER (at 20^{O}C)	Insoluble	APPEARANCE AND ODOR	Reddish, lustrous, malleable, odorless solid

Section IV - Fire and Explosion Data

FLASH POINT	FLAMMABLE LIMITS	LEL	UEL
Not Applicable	Nonflammable	Not Applicable	Not Applicable

In Solid Bulk Form there is no fire or explosion hazard.

EXTINGUISHING MEDIA
Copper alloys will not burn in the solid state. Like other metallic and organic dust and fine powder, fire or explosion may occur if this material in the form of dust or powder is exposed to heat, flames, sparks, chemical reaction, or contact with powerful oxidizers. To extinguish, use Class D Agents (Lith X). DO NOT USE WATER OR MOIST SAND.

SPECIAL FIRE FIGHTING PROCEDURES
Confine metal powder dust fire, avoid spreading. Apply Class D (Lith X) powder in heavy quantities. DO NOT USE WATER OR MOIST SAND. Fire Fighters should wear self-contained breathing apparatus and protective clothing.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Fire or explosion may occur when material is in the form of dust and exposed to heat or flames, chemical reaction or contact with powerful oxidizers. NEVER PUT WATER ON MOLTEN METAL - IT WILL EXPLODE. This material or its dust can react with strong oxidizing agents, which can liberate hydrogen gas (H_2) which may be explosive. Gases produced as a result of hydrolysis (acetylene, ammonia, hydrogen or methane) are explosive and highly flammable.

Section V - Reactivity Data

STABILITY	Stable at room temperature.
INCOMPATIBILITY (MATERIALS TO AVOID)	**NEVER** PUT WATER ON MOLTEN METAL - IT WILL EXPLODE. Copper reacts violently with acetylene (C_2H_2), ammonium nitrate ($NH_4 NO_3$) bromates, chlorates, iodates, chlorine (Cl_2), chlorine trifluoride (ClF_3), Cl_2 with fluorine oxide (F_2O), ethylene oxide (C_2H_4O), fluorine (F_2), hydrogen peroxide (H_2O_2), hydrazine mononitrate ($N_2H_4HNO_3$), hydrazoic acid (HN_3), hydrogen sulfide (H_2S), potassium peroxide (K_2O_2), sodium azide (NaN_3) and sodium peroxide ($Na_2 O_2$). Cobalt reacts violently strong oxidizers or NH_4NO_3. Iron reacts violently with Cl_2, ClF_3, F_2, $H_2 O_2$, nitrous oxide (NO_2), phosporus (P), sodium carbide ($Na2C_2$) or $H_2 SO_2$. Nickel reacts violently with F_2, NH_4NO_3, hydrazine (NH_2NH_2), (HN_3), H_2 with dioxine ($C_4H_8O_2$), acid, P, selenium (Se), sulfur (S) or titanium with $KClO_3$. Avoid contact with acids, bases and oxidizing agents. For additional information consult Material Safety Data Sheets for component materials.
HAZARDOUS DECOMPOSITION OR BY-PRODUCTS	Evolved hydrogen in confined areas may be an explosive hazard (see directly above). Potentially hazardous oxides of metals may be produced when this material is heated, welded or in molten state.
HAZARDOUS POLYMERIZATION	Will not occur.

Section VI - Health Hazard Data

ROUTES OF ENTRY: Inhalation? Yes Skin? No Ingestion? No

HEALTH HAZARDS (ACUTE AND CHRONIC)

Copper and copper alloys are not generally regarded as industrial toxins. In normal use, few health hazards occur.

No health hazard or toxicity information exists specifically for this material. Data for major components are given instead. For each component in this material, the percent by weight can be used as a rough guide to the component's likely significance.

Inhalation

Cutting, melting or welding may produce dusts or fumes containing the component elements and their oxides. Breathing these dust or fumes may present potentially significant health hazards. These may include mucous membrane irritation and lung changes in workers, potentially leading to pulmonary diseases.

Inhalation of finely divided beryllium powder may cause pulmonary fibrosis (berylliosis). Symptoms include anorexia, shortness of breath, dry cough, chest pain on respiration and epigastric abdominal pain.

Fumes of copper, iron and nickel may cause metal fume fever with flu-like symptoms.

Beryllium, cobalt and nickel compounds have been associated with allergic reactions, rashes and lung changes. Nickel is a respiratory irritant and may cause pneumonitis.

Skin

Dusts or fumes containing component elements of copper alloys may cause skin or mouth irritation. Copper may cause skin and hair discoloration. Copper, cobalt and nickel may cause dermatitis (“nickel itch” for nickel).

Eyes

Dusts or fumes containing component elements of copper alloys may cause eye irritation.

Ingestion

Ingestion of significant amounts of material is unlikely.

Unusual Chronic Toxicity

Lead, beryllium, cobalt and nickel have been identified as potential human carcinogens.

CARCINOGENITY	NTP?	IARC Monographs?	OSHA Regulated?
(Copper):	No	No	No
(Beryllium):	Yes	Yes	Yes
(Cobalt):	Yes	Yes	Yes

SIGNS AND SYMPTOMS OF EXPOSURE

Irritation of skin and mucous membranes; cough; difficulty in breathing.

Symptoms of copper toxicity are irritation of eyes, nose and respiratory tract, perforation of nasal septum, metal fume fever and dermatitis.

Lung diseases caused by beryllium are characterized by shortness of breath, cough, fatigue and may ultimately lead to respiratory and cardiac failure.

Exposure to dust or fume may cause irritation of skin and mucous membranes, cough, difficulty in breathing and lung changes in workers, potentially leading to pulmonary diseases.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

None reported.

EMERGENCY AND FIRST AID PROCEDURES

Eyes

If this dust or fume contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately.

Skin

If this dust or fume contacts the skin, brush or vacuum off excess dust and promptly wash the contaminated skin with soap and water. skin cuts and abrasion can be treated with standard first aid. If material is molten, treat as a burn.

Inhalation

If a person breathes large amounts of this dust or fume move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible.

SIGNS AND SYMPTOMS OF EXPOSURE	Irritation of skin and mucous membranes; cough; difficulty in breathing. Symptoms of copper toxicity are irritation of eyes, nose and respiratory tract, perforation of nasal septum, metal fume fever and dermatitis. Lung diseases caused by beryllium are characterized by shortness of breath, cough, fatigue and may ultimately lead to respiratory and cardiac failure. Exposure to dust or fume may cause irritation of skin and mucous membranes, cough, difficulty in breathing and lung changes in workers, potentially leading to pulmonary diseases.
Ingestion	Ingestion of significant amounts of material is unlikely. If large quantities of this material are swallowed, induce vomiting in conscious individual. Get medical attention immediately.
NFPA Ratings (HMIS)	Health: 1 Fire: 0 Reactivity: 0

Section VII - Precautions For Safe Handling And Use

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	No special precautions are necessary for spills of bulk material. Wear gloves to prevent metal cuts. If quantities of dust are spilled, remove by vacuuming or wet sweeping to prevent heavy concentrations of airborne dust. Do not use compressed air for cleaning. Cleanup personnel should wear approved respirators and protective clothing. Place all collected metal or particulates in a labeled container. Molten metal spills can cause concrete to explode. Spilled molten metal can be reclaimed for reuse.
CERCLA Reportable Quantity (RQ)	Copper: 5,000 pounds. Beryllium: 10 pounds. Lead: 100 pounds. (Only applies to material smaller than 100 micrometers in diameter).
WASTE DISPOSAL METHOD	Sell waste material for scrap with notice of beryllium content. In the United States, this product must be disposed of in accordance with applicable federal, state and local solid waste labeling, shipping and disposal laws and regulations.
RCRA Classification	None established
RCRA Hazardous Waste Number	None established
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING	Use good housekeeping practices to prevent accumulations of dust and keep airborne dust concentrations at a minimum. Avoid breathing dust or fumes. Store metal in a dry area away from incompatible materials. Keep dust away from sources of ignition. Sows and ingots may have shrink cavities that contain moisture. Ice, snow, grease, oil or moisture can cause explosions if charged into a melting furnace. Remove these contaminants before charging ingot to melting furnace. Preheat metal when required to evaporate moisture prior to melting.
OTHER PRECAUTIONS	Handling molten metal presents special hazards.
SARA TITLE III THRESHOLD PLANNING QUANTITY (TPQ)	None established.

Section VIII - Control Measures

RESPIRATORY PROTECTION	Employees may wear NIOSH or MSHA approved respirators as specified by an Industrial Hygienist or qualified Safety Engineer for protection against airborne dusts or fumes.
VENTILATION	Local exhaust ventilation is required when dust or fumes are generated. Use general and local exhaust ventilation to keep airborne concentrations of dust or fume below the OSHA PEL and TWA shown in Section II.

RESPIRATORY PROTECTION	Employees may wear NIOSH or MSHA approved respirators as specified by an Industrial Hygienist or qualified Safety Engineer for protection against airborne dusts or fumes.
PROTECTIVE GLOVES	Advisable to avoid cuts and skin abrasions. Gloves and barrier creams may be necessary to prevent skin sensitization and dermatitis
EYE PROTECTION	Approved safety glasses or goggles should be worn when exposed to dusty or hot material. Face shields should be worn around hot metal. Safety eyewash stations should be provided near work areas.
OTHER PROTECTIVE CLOTHING OR EQUIPMENT	Full protective clothing should be worn by workers exposed to heavy concentrations of dust or high heat and during alloying operations to prevent injury from molten metal splashing, spilling, etc.
WORK/HYGIENIC PRACTICES	Do not eat, drink or use tobacco products in work areas. Wash thoroughly after skin contact and before eating, drinking, use of tobacco products or using restrooms. Take a shower and change clothes at the end of the shift. All protective and contaminated clothing must be left at the plant. Launder all work clothing separately from other household laundry. Pre-employment medical evaluations should be provided. Attention should be directed to skin, eyes, respiratory tract, blood, kidneys, pulmonary function and neurological health. Chest x-rays should be included if symptoms are present.

Section IX - SARA Section 313 Supplier Notification

This product contains the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and 40 CFR 372:

CAS NUMBER	CHEMICAL NAME	PERCENT BY WEIGHT
7429-90-5	Aluminum (fume or dust only)	[a] [b]
7440-41-7	Beryllium	[a]
None	Beryllium Compounds	[a]
7440-48-4	Cobalt	[a]
None	Cobalt Compounds	[a]
7440-50-8	Copper	[a] [b]
None	Copper Compounds	[a]
7439-92-1	Lead	[a] [b] [c]
7440-02-0	Nickel	[a] [b]
None	Nickel Compounds	[a]

[a] See Section II, Hazardous Ingredients/Identity Information, for percentage by weight.
[b] Must be adjusted by the fraction of the material that exists as fume or dust.
[c] Effective with 2001 TRI (Form R reporting) total lead processed in excess of 100 pounds per year must be reported.

THIS INFORMATION MUST BE INCLUDED IN ALL MSDS' THAT ARE COPIED AND DISTRIBUTED FOR THIS MATERIAL.

Section X - Additional Information

THIS MATERIAL SAFETY DATA SHEET SHOULD BE MADE AVAILABLE BY THE BUYER TO EACH OF THE BUYER'S PLANT WORKERS. CHANGES MADE TO THIS DOCUMENT TOTALLY VOID THE VALIDITY OF THIS MSDS. THIS DOCUMENT IS COPYRIGHTED © 2001.

REFERENCES

American Conference of Governmental Industrial Hygienists, *Threshold Limit Values and Biological Exposure Indices for 2001*, Cincinnati, 2001

Bretherick, *Handbook of Reactive Chemical Hazards*, Butterworths, 1995.

Merck & Co., Inc., *The Merck Index*, 11th Edition, Rahway, NJ, 1989.

Lewis, Richard J., Sr., *Hazardous Chemicals Desk Reference*, 3rd Edition, Van Nostrand Reinhold. New York, 1993.

National Fire Protection Association, National Fire Codes, *Manual of Hazardous Chemical Reactions*, Quincy, Ma, 1991.

Plunkett, E.R., *Handbook of Industrial Toxicology*, Chemical Publishing Co., New York, 1976.

Sax, M. Irving, *Dangerous Properties of Industrial Materials*, 9th (CDROM) Edition, John Wiley, New York, 1999.

U.S. Dept. Of Health and Human Services, NIOSH, *Pocket Guide to Chemical Hazards*, Pub. No. 90-117, Cincinnati, June 1990.

U.S. Dept. Of Health and Human Services, NIOSH, *Registry of Toxic Effects of Chemical Substances, 2000*

Hawley's *Condensed Chemical Dictionary*, 13th (CDROM) Edition, John Wiley, New York, 1998.

U.S. Dept. Of Labor, *OSHA Regulations 29 CFR 1910.1000 Through 29 CFR 1910.1200, 1999.*

U.S. Environmental Protection Agency, *Title III List of Lists*, Pub. EPA 560/4-88-003, Washington, D.C., 1999.

NOTICE

The buyer assumes all risk in connection with the use of the material. The information contained in this sheet is developed from what are believed to be accurate and reliable sources. **CuBe Alloys ™** and Charles Licht Engineering Associates make no warranties, expressed or implied and assume no responsibility for the accuracy or completeness of the data contained in this Material Safety Data Sheet.

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