MATERIAL SAFETY DATA SHEET

Copper Beryllium Wrought Alloys

I. PRODUCT IDENTIFICATION

SYNONYMS:	**CHEMICAL FAMILY:**
Beryllium Copper Alloy Copper Beryllium Alloy	Copper Alloy

II. COMPOSITION OF INGREDIENTS

ALLOY DESIGNATIONS[1]	**BERYLLIUM**	**COBALT**	**COPPER**	**NICKEL**
C17000	1.60 – 1.79	.20 - .60	Balance	-
C17200	1.80 - 2.00	.20 - .60	Balance	-
C17300	.20 - .60	.20 - .60	Balance	-
C17500	0.40 – 0.70	2.40 – 2.70	Balance	-
C17510	0.20 – 0.60	-	Balance	1.40 – 2.20

*Percent beryllium varies depending on customer specifications. The product's specifications have been attached for the customer's information.

	BERYLLIUM	**COBALT**	**COPPER**	**NICKEL**
CAS#	7440-41-7	7440-48-4	7440-50-8	7440-02-0
NIOSH RTECS #	DS1750000	GF8750000	GL5325000	QR5950000
EXPOSURE LIMITS (mg/m^3)[2]				
OSHA PEL	0.002 (TWA) .005 (Ceiling) .025 (Peak)	0.1	1 (Dust) 0.1 (Fume)	1 (TWA)
ACGIH TLV	.002 (TWA)	0.02 (TWA)	1 (Dust) 2 (STEL)	1.5 (TWA)

1. Nominal percent content of elemental constituents for alloy designations as shown. No Lead, Cadmium, Hexavalent Chromium, or Mercury has been added to this product per CONEG requirements.
2. Many substances do not have a unique exposure limit. The absence of an exposure limit does not lessen consideration for exposure risk. In the absence of specific information, professional judgment may be required.

Note: This product is subject to the Hazard Communication Requirements of OSHA.

ALLOY DESIGNATIONS	DENSITY (LB/INCH^3)	MELTING POINT (°F)
C17000	0.302	1825
C17200	0.300	1800
C17300	0.300	1800
C17500	0.312	1950
C17510	0.318	1960

III. HEALTH HAZARD

Exposure to the constituents of this product by inhalation, ingestion, and skin contact may occur when heating or abrading the surface of this material in a manner, which generates particulate (i.e., heat treating, abrasive cutting, welding, grinding, sanding, polishing, milling, crushing, melting, casting, dross handling, pickling, chemical cleaning, etc.).

Exposure may also occur during repair or maintenance activities on contaminated equipment such as: furnace rebuilding, maintenance or repair of air cleaning equipment, structural renovation, welding, etc.

Particulate depositing on hands, gloves, and clothing, can be transferred to the breathing zone and inhaled during normal hand to face motions such as rubbing of the nose or eyes, sneezing, coughing, etc.

Primary Routes Of Exposure	**INHALATION:** Inhalation of metal dust, fume or powder may cause irritation of the nose, throat, lungs, and mucous membranes. Inhalation of this particulate may cause metal fume fever (high temperature, metallic taste, nausea, coughing, general weakness, muscle aches, and exhaustion), bronchitis, chills, decreased pulmonary function, and asthma-like symptoms. Cobalt may cause asthma and shortness of breath as well as headache, coughing, fever, weight loss, and pneumoconiosis. Nickel can cause headaches, dizziness, and difficult breathing. Inhalation of nickel compounds is associated with nasal and lung damage and cancer. Symptoms may include coughing, sore throat, and shortness of breath.
	INGESTION: Hand, clothing, food and drink contact with metal dust, fume or powder can cause ingestion of the particulate during hand-to-mouth activities such as eating, drinking, smoking, nail biting, etc. Cobalt and nickel may cause gastrointestinal irritation. Copper ingestion causes nausea, vomiting, abdominal pain, metallic taste, and diarrhea.
	SKIN: Skin contact with this material may cause, in some sensitive individuals an allergic response if elements such as beryllium, cobalt, copper and nickel are present. In the form of metal dust or powder, skin contact or abrasion may also cause irritation, pain or dermatitis. Prolonged and/or repeated contact with cobalt may cause dermatitis. Copper particulate may cause a greenish-black skin discoloration. Nickel is a contact allergen and sensitizer.
	EYES: Particulate metal (dust, fume or powder) may be dangerous to the eye and surrounding tissue. Airborne particulates (chips, dust or powder) are always a potential problem as well as inserting fingers into the eye socket if the hand or clothing is contaminated with metal particulate. Copper may cause discoloration.

Effects Of Overexposure	**ACUTE:** The metal dust and fumes of the constituents of this product can cause irritation to the skin, eye and mucous membranes. Contact with beryllium and aluminum may cause allergic skin reactions. As dust, powder or fume, exposure, which abrades the skin, can cause irritation and dermatitis. Injury to the eyes is generally a result of particulate irritation or mechanical injury to the cornea or conjunctiva by dust or particulate. Excessive inhalation of this product can cause upper respiratory tract irritation (i.e., cough, bronchitis, chills, "fume fever" and asthma-like symptoms).
	CHRONIC: Beryllium: Respiratory disease with symptoms ranging from shortness of breathe and cough to permanent disability due to loss of lung function, fibrosis or subsequent effects on the heart may be caused by excessive exposure to dust or fumes containing beryllium. Beryllium metal and certain compounds have been linked to nasal, bronchial and lung cancers. Inhalation of beryllium in excess concentrations can cause a serious chronic lung disease: Berylliosis also known as Chronic Beryllium Disease (CBD). Signs and symptoms of berylliosis are cough, chest pain, shortness of breath, weight loss, weakness and fatigue. Chronic health effects specific to an element(s) may be difficult to detect due to the numerous elemental constituents in this alloy. Cobalt: Chronic inhalation of cobalt may cause pulmonary function and lung scarring while ingestion may result in heart damage or failure, vomiting, convulsions and thyroid enlargement. Chronic ingestion of cobalt may result in heart damage and/or failure, vomiting, convulsions and thyroid enlargement. Repeated exposure may cause sensitization dermatitis. Copper: Prolonged or repeated exposure to copper can discolor skin and hair and irritate the skin; may cause mild dermatitis, runny nose, and irritation of the mucous membranes. Repeated ingestion may damage the liver and kidneys. Repeated Inhalation can cause chronic respiratory disease. Nickel: Prolonged exposure to excessive concentrations of nickel may cause chronic pulmonary disorders. Nickel and certain nickel compounds are considered carcinogenic and noted for producing nasal and lung cancer. Prolonged or repeated skin contact may cause sensitization dermatitis and possible destruction and/or ulceration.
Carcinogenic References	The National Toxicology Program (NTP) lists beryllium as a Group 1-Know Human Carcinogen. The International Agency for Research on Cancer (IARC) lists beryllium as reasonably anticipated to be a carcinogen. ACGIH lists beryllium as an A1-Confirmed Human Carcinogen. Detailed information from these sources may be obtained from the following: IARC Monographs on the Evaluation of the Carcinogenic Risk to Humans **http://www.iarc.fr/**. NTO information can be found at **http://ntp-server.niehs.nih.gov/**. ACGIH Information can be found at **http://www.acgih.org/home.htm**. IARC lists cobalt as a Group 2B – Possibly Carcinogenicity to humans. OSHA lists cobalt as a possible select carcinogen. IARC lists nickel as a Group 2B - Possibly Carcinogenic to humans. NTP lists nickel as reasonably anticipated to be a human carcinogen. The ACGIH lists nickel as an A5 - Not suspected as a human carcinogen and insoluble nickel compounds as an A1 - Confirmed human carcinogen.

Medical Conditions Aggravated By Exposure	Individuals who may have had allergic reaction or sensitivity to metals such as copper and beryllium, may encounter skin rash or dermatitis if skin contact with this product occurs. Persons with impaired pulmonary function, airway diseases and conditions such as asthma, emphysema, chronic bronchitis, etc. may incur further disability if excessive concentrations of dust or fume are inhaled. If prior damage or disease to the Neurological (nervous), Circulatory, Hematological (blood) or Renal (kidney) systems has occurred, proper screening or examinations should be conducted on individuals who may be exposed to further risk if handling and use of this material causes excessive exposure.
IV. FIRST AID MEASURES	
Inhalation	Breathing difficulty caused by inhalation of dust or fume requires removal to fresh air. If breathing has stopped, perform artificial respiration and obtain medical assistance at once.
Ingestion	Swallowing metal powder or dust can be treated by having the affected person swallow large quantities of water and attempting to induce vomiting if conscious. Obtain medical assistance at once. Never give anything by mouth to an unconscious individual.
Skin	Skin cuts and abrasions can be treated by standard first aid (i.e., cleansing, disinfecting and covering the wound). Skin contamination with dust or power can be removed by thoroughly washing with soap and water for at least 15 minutes. If irritation persists, obtain medical assistance. Material accidentally implanted or injected under the skin must be removed.
Eyes	Dust or powder should be flushed from the eyes with a copious amount of clean water for at least 15 minutes. If irritation persists, obtain medical assistance. Contact lenses should not be worn if working with metal dusts and powders.
V. FIRE FIGHTING MEASURES	
Flash Point	Not applicable to solids.
Flammable (Explosive) Limits	Not applicable to solids.
Extinguishing Media	Smother powder fires with dry sand, graphite powder, sodium chloride, or a class "D" fire extinguisher. DO NOT USE water or a carbon dioxide extinguisher.
Special Firefighting Procedures	Wear a NIOSH approved pressure-demand self-contained breathing apparatus (SCBA) and full protective equipment to protect against airborne constituents.
Unusual Fire and Explosion Hazards	Molten metal and water can be an explosive combination. If the possibility of moisture contamination or entrapment exists, ensure solids or ingots are thoroughly dry prior to being placed in the furnace.
VI. ACCIDENTAL RELEASE MEASURES	
Steps To Be Taken If Product Is Released Or Spilled	In solid form, this material poses no special clean-up problems. If this material is in powder or dust form, clean up should be conducted with a vacuum system utilizing a high efficiency particulate air filtration system. Caution should be taken to minimize airborne generation of powder or dust and avoid contamination of air and water. If in a molten form, contain the flow using dry sand or salt flux as a dam. Do not use shovels or hand tools to halt the flow of molten metal. Allow the spill to cool before remelting as scrap. Properly label all materials collected in waste container.

VII. SPECIAL PRECAUTIONS – HANDLING AND STORAGE	
Handling Precautions	This product must be handled according to the size, shape and quantity of the material involved. Solid metal may require use of hoists, cranes, etc. Powders should be moved or transported to minimize spill or release potential. Wear gloves when handling parts with loose surface particulate or sharp edges.
Storage Precautions	In solid form, this material poses no special storage requirements. Store metal and metal powder in a dry area. Cover and reseal partially empty container. Do not store adjacent to mineral acids. Fine metal powder should be kept away from flames and sources of ignition.
VIII. PERSONAL PROTECTION / EXPOSURE CONTROL	
Work Practices	Establish effective work practices and procedures that prevent particulate from coming in contact with worker's skin, hair, or personal clothing. Ensure procedures are written clearly and communicate the facility's requirements for protective clothing and personal hygiene. Never use compressed air to clean work clothing or other surfaces. Fabrication processes may leave a residue of particulate on the surface of parts, products or equipment that could result in employee exposure during subsequent material handling activities. As necessary, clean loose particulate from parts between processing steps. As a standard hygiene practice, wash hands before eating or smoking.

Ventilation	Local exhaust ventilation should be used to control exposure to airborne dust and fume whenever possible to maintain potential exposure, to airborne fumes, dust, etc., below the PEL. Inspect ventilation equipment periodically to ensure it is functioning properly. Train employees on the use and operation of ventilation. Use qualified professionals to design and install ventilation systems.
Respiratory Protection	When airborne levels exceed or have the potential to exceed allowable limits as listed in Section II, use NIOSH approved respirators as specified by an Industrial Hygienist or qualified Safety Professional. Respirator users must be medically qualified to use a respirator. Fit testing and respirator training must be satisfactorily completed by all personnel prior to respirator use. Users of tight fitting respirators must be clean-shaven so a tight seal may form around the users face. Exposure to unknown concentrations of particulate requires the wearing of a pressure-demand airline respirator or pressure-demand SCBA.
Protective Gloves	Wear gloves to prevent metal cuts and skin abrasions particularly during handing of wrought forms, solid metal sheet, strip or tube. Wear gloves to prevent contact with particulate.
Eye Protection	Wear safety goggles, welder's helmet or face shield when the risk of eye injury is present particularly during machining, grinding, welding, powder handling, etc.
Other Protective Equipment	Protective clothing such as uniforms, disposable coveralls, safety shoes, etc. may be required during metal handling operations as appropriate to the circumstances of exposure. Uniforms should be used preferably for one day if exposed to particulate then laundered as appropriate.
Housekeeping	To remove particulate from surfaces, utilize vacuum and wet cleaning methods. Ensure electrical systems are de-energized prior to beginning wet cleaning. Use vacuum cleaners with high efficiency particulate air (HEPA). Do not use compressed air, brooms, or conventional vacuum cleaners to remove particulate from surfaces as this activity can result in elevated exposures to airborne particulate.
Air Sampling	Conduct air sampling in the employee breathing zone, work area, and department to determine exposure to airborne particulate using an Industrial Hygienist or other qualified professional. Make air sample results available to employees.
Welding	Use local exhaust ventilation and pressure-demand airline respirators in accordance

	with OSHA regulation 29 CFR 1910.252 when welding materials containing beryllium (i.e., welding or cutting indoors, outdoors, or in confined spaces involving beryllium containing base or filler metals). Ensure workers in the immediate vicinity of the welding or cutting operations are protected as necessary by local exhaust ventilation or airline respirators.
Medical Surveillance	Lung function tests, chest x-rays, and routine physical examinations may be useful to determine effects of dust or fume exposure.
IX. PHYSICAL / CHEMICAL PROPERTIES	
Freezing Point: Not Applicable	Vapor Pressure (mmHg): Not Applicable
Melting Point: See Section II	Vapor Density (AIR=1): Not Applicable
Boiling Point: Not Applicable	Solubility in Water = None
Sublimes @: Not Applicable	% Volatiles by Volume: None
Evaporation Rate: Not Applicable	Radioactivity: Not Applicable
Appearance and Odor: Solid, silver color comparable to stainless steel with no discernible odor.	
X. STABILITY AND REACTIVITY	
General Reactivity	This alloy is a stable material under normal conditions of use, storage, and transportation.
Incompatibility	Avoid contact with mineral acids and oxidizing agents which may generate hydrogen gas; the evolution of hydrogen maybe an explosion hazard. Chlorinated hydrocarbons and powdered aluminum may cause an explosive reaction.
Hazardous Decomposition Products	Various elemental metals and metal oxides may be generated from melting or dross handling operations. Refer to Section II for PELs.
Hazardous Polymerization	Will not occur.

XI. TOXICOLOGY	
1. Type Of Test	LD50 – Lethal dose 50
Route Of Exposure	Intravenous
Species Observed	Rodent – rat
Dose/Duration	496 ug/kg (beryllium)
Toxic Effects	Liver – hepatitis, zonal
Reference	LAINAW Laboratory Investigation. (Williams & Wilkins Co., 428 E. Preston St., Baltimore, MD 21202) V.I-1952-Volume (issue)/page/year: 15, 176, 1966
2. Type Of Test	TDLo – Lowest published toxic dose
Route Of Exposure	Intratracheal
Species Observed	Rodent – rat
Dose/Duration	13 mg/kg (beryllium)
Toxic Effects	Tumorigenic – equivocal tumorigenic agent by RTECS criteria Lungs, Thorax, or Respiration – tumors Blood – lymphoma, including Hodgkin's disease
Reference	ENVRAL Environmental Research. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1-1967-Volume (issue)/page/year: 21, 63, 1980
3. Type Of Test	TDLo – Lowest published toxic dose
Route Of Exposure	Intratracheal
Species Observed	Rodent – rat
Dose/Duration	20 mg/kg (beryllium)
Toxic Effects	Tumorigenic – equivocal tumorigenic agent by RTECS criteria Musculoskeletal – tumors
Reference	LLANCAO Lancet. (7 Adam St., London WC2N 6AD, UK) V.1-1823- Volume (issue)/page/year: 1, 463, 1950
XII. ECOLOGICAL INFORMATION	
Recycle Information	This material can be recycled. Please contact ALB ALLOYS for specific recycling information.
XIII. ENVIRONMENTAL PROTECTION / DISPOSAL INFORMATION	
Waste Disposal Method	Prior to disposal, consider if the material has recovery value. State or federal regulations may require specific labeling, packing, storage, transportation and disposal procedures.
Environmental Hazards	In solid form, this material poses no special environmental problems. Metal powders or dusts may have significant impact on air and water quality. Airborne emissions, spills and releases to the environment (discharge to streams, sewer systems, ground water, surface soil, etc.) should be controlled immediately. If potential for a spill or release exists, it is advisable to develop an emergency spill response plan.
XIV. TRANSPORTATION REQUIREMENTS	
	There are no Transportation hazardous material regulations which apply to the packaging and labeling of this product.
XV. OTHER INFORMATION	
N/M	