



MATERIAL SAFETY DATA SHEET COMPLIES WITH 29 CFR 1910.1200. OSHA HAZARD COMMUNICATION RULE

DATE OF LAST REVISION: 02-15-01

CHEMICAL IDENTITY

CHEMICAL NAME/SYNONYMS	Beryllium, Glucinum, Metallic Beryllium		
CHEMICAL FAMILY	Beryllium		
FORMULA	Be		
CAS REGISTRY NUMBER	7440-41-7		
HAZARDOUS INGREDIENTS	Beryllium, 100%		
OSHA : PEL: 0.002	CEILING: 0.005	PEAK: 0.025	
ACGIH: TLV: 0.002	TLV-STEL: NA		

PHYSICAL AND CHEMICAL PROPERTIES

COLOR: Brass	PH: NA
ATOMIC NUMBER: 4	EVAPORATION RATE: NA
ATOMIC WEIGHT: 9.01	SOLUBILITY IN WATER: None
BOILING POINT: 5378°F	VAPOR DENSITY: NA
FREEZING POINT: NA	VAPOR PRESSURE: NA
ODOR: Odorless	% VOLATILE BY VOLUME: None
PHYSICAL STATE: Solid	MELTING POINT: 2345°F, 1285°C
RADIOACTIVITY: NA	DENSITY: 0.302
	SUBLIMES A (°F): NA

FIRE, EXPLOSION AND REACTIVITY DATA

FLASH POINT: **Not applicable to solids.**

EXPLOSIVE LIMITS: **Not applicable to solids.**

EXTINGUISHING MEDIA: **Only in powder or other finely divided form does beryllium present a special fire problem. To extinguish a metal powder fire, use Class D fire extinguisher powder.**

UNUSUAL FIRE AND EXPLOSION HAZARDS: **Do not use water to extinguish fires around operations involving molten metal due to the potential for steam explosions. In addition, water may disassociate when in contact with burning beryllium powder or chips releasing flammable hydrogen gas which could burn and result in an explosion.**

Ventilation duct work which has accumulated a fine coating of beryllium dust on its internal surface poses a potentially serious fire hazard. Extinguish using Class D fire extinguisher media and shut down or isolate the affected portion of the ventilation system. Because of this potential risk, sources of ignition such as flame, spark from machining of other materials, welding spark, etc. must not be allowed to enter the ventilation duct work. Also, duct work must be made of non-combustible material. See Protection section for more information.

SPECIAL FIRE FIGHTING PROCEDURES: **If this material becomes airborne as a respirable particulate during a fire situation, pressure-demand self-contained breathing apparatus must be worn by firefighters or any other persons potentially exposed to the metal fumes.**

GENERAL REACTIVITY: **This material is stable.**



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FIRE, EXPLOSION, AND REACTIVITY DATA CONTINUED

INCOMPATIBILITY MATERIALS: Avoid contact with mineral acids and oxidizing agents which may generate hydrogen gas. Hydrogen gas can be an explosion hazard.

HAZARDOUS DECOMPOSITION PRODUCTS: Melting and gross handling of powdering operations can emit airborne dusts or fumes. Refer to Section I for exposure limits.

HAZARDOUS POLYMERIZATION: Will not occur.

HEALTH HAZARD DATA

PRIMARY ROUTES OF EXPOSURE

INHALATION: An exposure to airborne beryllium in excess of the occupational standard can occur when machining, melting, casting, gross handling, pickling, welding, grinding, sanding, polishing, milling, crushing, or otherwise abrading the surface of sold beryllium in a manner which generates finely divided particles.

Machining operations conducted under a flood of liquid coolant usually require local exhaust ventilation. The cycling through a machine of liquid lubricant/coolant containing finely divided beryllium in suspension can result in the concentration building to a point where the particulate may become airborne during use. A filter, centrifuge, or settling chamber can be installed in-line if necessary.

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

INGESTION: There are no known cases of illness resulting from ingestion of beryllium. Ingestion can occur from hand, clothing, food and drink contact with metal dust, fume or powder during hand to mouth activities such as eating, drinking, smoking, nail biting, etc. This product is not intended for internal consumption. As a standard hygiene practice, hands should be washed before eating or smoking.

SKIN: This product is in an insoluble form and does not pose a potential for an allergic dermal response or skin absorption and can be safely handled with bare hands. Skin abrasion may cause irritation. See the end of this section for more information.

EYES: Injury to the eyes can result from particulate irritation or mechanical injury to the cornea or conjunctiva by dust or particulate. Exposure may result from direct contact with airborne particulate (chips, dust or powder) or contact to the eye of contaminated hands or clothing.



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HEALTH HAZARD DATA CONTINUED

EFFECTS OF OVEREXPOSURE:

ACUTE (immediate or near-term health effects): **This product is insoluble and does not cause acute health effects.**

CHRONIC (long-term health effects): **Overexposure to airborne beryllium particulate may cause a serious lung disease, in certain sensitive individuals, called chronic beryllium disease (chronic berylliosis). Chronic beryllium disease is a condition in which the tissues of the lungs become inflamed, restricting the exchange of oxygen between the lungs and the bloodstream. Symptoms may include cough, chest pain, shortness of breath, weight loss, weakness, fatigue. Long-term effects may include loss of lung function, fibrosis, or subsequent secondary effects on the heart with eventual permanent impairment.**

CARCINOGEN REFERENCES: **Hazard communication regulations of the U.S. Occupational Safety & Health Administration require that caution labels for materials listed as potential carcinogens in either the International Agency for Cancer Research Monograph Series or the National Toxicology Program Annual Report on carcinogens must contain a cancer warning. Beryllium has been so listed principally on animal tests and therefore, this material bears a label identifying it as a potential cancer hazard.**

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: **Persons with impaired pulmonary function, airway diseases, or conditions such as asthma, emphysema, chronic bronchitis, etc. may incur further impairment if excessive concentrations of dust or fume are inhaled. If prior damage or disease to the neurologic (nervous), circulatory, hematological (blood), or urinary (kidney) systems has occurred, proper screening or examinations should be conducted on individuals who may be exposed to further risk where handling and use of this material may cause excessive exposure.**

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: **Breathing difficulty caused by inhalation of dust or fume requires immediate removal to fresh air. Although no cases in which a person stopped breathing as a result of exposure are known, if breathing has stopped, perform artificial respiration and obtain medical help.**

INGESTION: **Swallowing metal powder or dust can be treated by having the affected person drink large quantities of water and attempting to induce vomiting if conscious. Obtain medical help.**



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EMERGENCY AND FIRST AID PROCEDURES CONTINUED

SKIN: Skin cuts and abrasions can be treated by standard first aid. Skin contamination with dust or powder can be removed by washing with soap and water. If irritation persists obtain medical help. Accidental implantation of this material beneath the skin requires it be removed to prevent infection or development of a corn-like lesion.

EYES: Dust or powder should be flushed from the eyes with copious amounts of clean water. If irritation persists obtain medical help. Contact lenses should not be worn when working with metal dust and powders because the contact lens must be removed to provide adequate treatment.

OCCUPATIONAL CONTROL MEASURES

VENTILATION AND ENGINEERING CONTROLS: Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Where utilized, pickups on flexible ventilation lines should be positioned as close to the source of airborne contamination as possible. Disruption of the airflow in the area of a local exhaust inlet, such as by a man cooling fan, should be avoided. Ventilation equipment should be checked regularly to ensure it is functioning properly. Ventilation is recommended for all users.

RESPIRATORY PROTECTION: When potential exposures are above the occupational limits, approved respirators must be used as specified by an Industrial Hygienist or other qualified professional. Respirator users should be medically evaluated to determine if they are physically capable of wearing a respirator. Quantitative and/or qualitative fit testing and respirator training must be satisfactorily completed by all personnel prior to respirator use in an environment where concentrations of airborne fumes or dusts may exceed the occupational standards. Users of any style respirator must be clean shaven to those areas of the face where the respirator seal contacts the face. Exposure to unknown concentrations of fumes or dusts requires the wearing of a pressure demand airline respirator or pressure demand self-contained breathing apparatus. Pressure demand airline respirators are recommended for jobs when high potential exposures such as changing bags in a bag-house air cleaning device.

HOUSEKEEPING: Vacuum or wet cleaning methods are recommended for dust removal. Be certain to de-energize electrical systems as necessary before beginning wet cleaning. Vacuum cleaners with high efficiency particulate air (HEPA) filters are the recommended type. The use of compressed air to remove dusts should be avoided as such an activity can result in unnecessary short-term elevated exposures to dusts.

MAINTENANCE: During repair or maintenance activities the potential exists for exposures to beryllium in excess of the occupational standard. Under these circumstances, protecting workers can require the use of specific work practices or procedures involving the combined



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use of ventilation, wet methods, respiratory protection, decontamination, special protective clothing, and when necessary, restricted work zones.

OCCUPATIONAL CONTROL MEASURES CONTINUED

WELDING: In accordance with OSHA regulation 29 CFR 1910.252 welding of beryllium is regulated as follows: Welding or cutting indoors, outdoors, or in confined spaces involving beryllium-containing base or filler metals shall be done using local exhaust ventilation and airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the acceptable concentrations defined by 29 CFR 1910.1000. In all cases, workers in the immediate vicinity of the welding or cutting operations shall be protected as necessary by local exhaust ventilation or airline respirators. Please note: Metallic Beryllium is normally welded. Satisfactory welds are only achieved using electron beam welding.

OTHER PROTECTIVE EQUIPMENT: No protective equipment or clothing is required when handling solid forms. Protective clothing such as fire retardant clothing, and molten metal splash resistant garments (ie: coats, hats, hoods, pants, shoes and gloves) should be worn as necessary to protect from accidental molten metal splash. Protective over-garments or work clothing should be worn by person who may become contaminated with dust or powders during activities such as furnace rebuilding, air cleaning equipment bag changes, furnace tending etc. Contaminated work clothing and over-garments should be managed in such a manner so as to prevent secondary exposure to person such as laundry operators and to prevent contamination to personal clothing. Never use compressed air to clean work clothing.

PROTECTIVE GLOVES: Wear gloves to prevent metal cuts and skin abrasions particularly during handling.

EYE PROTECTION: Wear safety glasses, goggles, face shield or welders helmet when risk of eye injury is present particularly during melting, casting, machining, grinding, welding, powder handling, etc.

RECOMMENDED MONITORING PROCEDURES

ENVIRONMENTAL SURVEILLANCE: Exposures to beryllium should be determined by having air samples taken in the employee breathing zone, work area, and department. The frequency and type of air sampling should be as specified by an Industrial Hygienist or other qualified professional. Air sample results should be made available to employees.

MEDICAL SURVEILLANCE: Periodic lung function tests, chest x-rays, and physical examinations should be used to monitor the potential effects of dust or fume exposure.



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ENVIRONMENTAL PROTECTION DATA

STEPS TO BE TAKEN IF MATERIAL IS SPILLED OR RELEASED: In solid form this material poses no health or environmental risk. If this material is in powder or dust form, establish a restricted entry zone based on the severity of the spill. Persons entering the restricted zone must wear adequate respiratory protection and protective clothing appropriate for the severity of the spill. Cleanup should be conducted with a vacuum system utilizing a high efficiency particular air filtration systems followed by wet cleaning methods. Special care must be taken when changing filters on HEPA vacuum cleaners when used to clean up potentially toxic materials. Caution should be taken to minimize airborne generation of powder or dust spills to environment may require reporting to the National Response Center at (800) 424-8802 as well as the State Emergency Response Commission and Local Emergency Planning Committee.

SOLID WASTE MANAGEMENT: The U.S. Environmental Protection Agency has classified beryllium dust (P015) as a hazardous waste under the Resource Conservation and Recovery Act (RCRA). In section 40 CFR 261.33(e) of RCRA, beryllium dust is considered hazardous when it is in the form of a “discarded commercial chemical product, off-specification species, container residue and spill residue, thereof.” “It is our understanding this designation only applies to commercially pure products or manufacturing intermediates in which beryllium is the “sole active ingredient.” Due to the limited scope of this definition, we believe the only form of beryllium to which it applies is waste metallic beryllium dust in the form of commercially pure metallic beryllium powder.

Beryllium scrap, chips, and powder are normally recycled. In cases where this is not justified, we recommend any off-specification metallic beryllium dust or powder be sealed within two plastic bags and then placed within a DOT container approved for flammable solids. The outer container must be labeled with the appropriate EPA hazardous waste management facility. We suggest the above procedure, with the exception of the hazardous waste manifest and hazardous waste container label, also be followed when disposing of dust collector filters contaminated with metallic beryllium dust.

AMBIENT AIR EMISSIONS: Beryllium users involving outplant emissions are subject to the National Emission Standard for Beryllium as promulgated by EPA (40 CFR 61, Subpart C). The National Emission standard for beryllium is 0.01 micrograms per cubic meter (30 day average) in ambient air for those production facilities which have been qualified to be regulated through ambient air monitoring. Other facilities must meet a 10gram per 24-hour total site emission limit. Most process air emission sources exhausting outside a production building will require an air permit from a local and/or state air pollution control agency. The use of air cleaning equipment may be necessary to achieve the desired level of control. Tempered makeup air should be provided to prevent excessive negative pressure in a building. Direct recycling of cleaned process exhaust air is not recommended. Plant exhausts should be located so as not to re-enter the plant through makeup air or other inlets. Regular maintenance, inspection and



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monitoring of air cleaning equipment operating parameters is important to ensure adequate efficiency is maintained.

ENVIRONMENTAL PROTECTION DATA CONTINUED

WASTEWATER: Wastewater regulations can vary considerably. Contact your local and state governments to determine what conditions apply.

TOXIC SUBSTANCES CONTROL ACT: Beryllium is listed on the TSCA Chemical Substance Inventory of Existing Chemical Substances.

SARA TITLE III REPORTING REQUIREMENTS

On February 16, 1988 the U.S. Environmental Protection Agency (EPA) issued a final rule that implements the requirements of the Superfund Amendments and Reauthorization Act (SARA) Title III, Section 313(53) Federal Register 4525. Title III is the portion of SARA concerning emergency planning and community right to know issues. Section 313 covers annual emission reporting on defined chemicals which are manufactured, processed or used at certain U.S. Industrial facilities.

Beryllium is reportable under Section 313. The Chemical Abstracts Services number is provided in this Material Safety Data Sheet.

You may obtain additional information by calling the EPA SARA Title III Hotline at 1-800-535-0202 or {(202) 555-1411}.

PACKAGING AND LABELING REQUIREMENTS

There are no hazardous material regulations of the U.S. Department of Transportation which apply to the packaging and labeling of this material.

Hazard communication regulations of the U.S. Occupational Safety and Health Administration require that this material be labeled. Following is the label text which is shipped with material in this Material Data Sheet.

THE ABOVE INFORMATION IS ACCURATE TO THE BEST OF OUR KNOWLEDGE. HOWEVER, SINCE DATA, SAFETY STANDARDS AND GOVERNMENT REGULATIONS ARE SUBJECT TO CHANGE THE CONDITIONS OF HANDLING AND USE, OR MISUSE ARE BEYOND OUR CONTROL, **ANGSTROM SCIENCES** MAKE NO WARRANTY, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN AND DISCLAIMS ALL LIABILITY FOR THE RELIANCE THEREON. USER SHOULD SATISFY HIMSELF THAT HE HAS ALL CURRENT DATA RELEVANT TO HIS PARTICULAR USE.

NA= NOT APPLICABLE

ND= NO DATA FOUND

NR=NOT RECORDED



BERYLLIUM PRODUCT

**DANGER-INHALATION OF DUST OR FUMES MAY CAUSE
SERIOUS CHRONIC LUNG DISEASE**

POTENTIAL CANCER HAZARD BASED PRINCIPALLY ON ANIMAL TESTING

This product contains Beryllium. Overexposure to beryllium by inhalation may cause berylliosis, a serious chronic lung disease. Hazard Communication Regulations of the Occupational Safety & Health Administration require that caution labels for materials listed as potential carcinogens in either the International Agency for Cancer Research Monograph Series or the National Toxicology Program Annual Report on Carcinogens must contain a cancer warning. Beryllium has been so listed.

- If processing procedures dust or fumes, use only with exhaust ventilation or other controls designed to meet OSHA standards.
- Sold for manufacturing purposes only.

See Material Safety Data Sheets included with this label for further details concerning OSHA standards and precautionary measures.