



**MATERIAL SAFETY DATA SHEET - NO. A17**

**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**COPPER BERYLLIUM MASTER ALLOY**

SYNONYMS Beryllium Copper Alloy

*24-HR. EMERGENCY ASSISTANCE*

**Transportation Emergency**

Call Chemtrec at: (800) 424-9300

**Other Emergency**

Call Brush Wellman at: (800) 862-4118

Revised: 10-01-96

Replaces: MSDS A100 (12-01-90)

Prepared By: Marc Kolanz, CIH  
David C. Deubner, M.D.

CHEMICAL FAMILY Copper Alloy

*CUSTOMER SERVICE*

Brush Wellman Inc.  
Environmental Control Department  
14710 W. Portage River S. Road  
Elmore, Ohio 43416-9502

Phone: (800) 862-4118

Telefax: (419) 862-4177

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

OCCUPATIONAL EXPOSURE LIMITS

CONSTITUENTS	OSHA (1995)*			ACGIH (1994-95)*		CAS NUMBER	NIOSH RTECS NUMBER
	PEL	CEILING	PEAK	TLV	TLV-STEL		
Beryllium	0.002	0.005	0.025	0.002	NA	7440-41-7	DS1750000
Copper Fume	0.1	NA	NA	0.2	NA	7440-50-8	GL5325000
Copper Dust & Mist	1.0	NA	NA	1.0	NA	7440-50-8	GL5325000

\*ALL CONCENTRATIONS ARE IN MILLIGRAMS PER CUBIC METER OF AIR  
(at the concentrations noted above, these constituents may not be visible to the human eye)

Brush Wellman recommends following good industrial hygiene practice which includes reducing airborne exposures to the lowest feasible level for all constituents in this product.

A leading scientific body recommending occupational standards is the American Conference of Governmental Industrial Hygienists (ACGIH). The ACGIH recommends standards for all listed substances. The ACGIH defines a threshold limit value (standard) as follows: "Threshold Limit Values refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. Because of wide variation in individual susceptibility, however, a small percentage of workers may experience discomfort from some substances at concentrations at or below the threshold limit; a smaller percentage may be affected more seriously by aggravation of a pre-existing condition or by development of an occupational illness." "Individuals may also be hypersusceptible or otherwise unusually responsive to some industrial chemicals because of genetic factors, age, personal habits (smoking, alcohol, or other drugs), medication, or previous exposures. Such workers may not be adequately protected from adverse health effects from certain chemicals at concentrations at or below the threshold limits."

ACGIH	=	American Conference of Governmental Industrial Hygienists
OSHA	=	Occupational Safety and Health Administration
PEL	=	Eight-Hour Average Permissible Exposure Limit (OSHA)
CEILING	=	Not To Be Exceeded Except For Peak Limit (OSHA)
PEAK	=	30-Minute Maximum Duration Concentration Above Ceiling Limit (OSHA)
TLV	=	Eight-Hour Average Threshold Limit Value (ACGIH)
TLV-STEL	=	15-Minute Short Term Exposure Limit (ACGIH)
CAS	=	Chemical Abstract Service
NIOSH	=	National Institute For Occupational Safety and Health
RTECS	=	Registry of Toxic Effects of Chemical Substances
NA	=	Not Applicable

### 3. HAZARDOUS IDENTIFICATION

#### EMERGENCY OVERVIEW

See label in Section 14. If the material is involved in a fire, pressure-demand self-contained breathing apparatus and protective clothing must be worn by persons potentially exposed to the metal fumes or airborne particulate.

#### *PRIMARY ROUTES OF EXPOSURE*

**INHALATION:** Airborne exposure to the elemental constituents listed in Section 2 in excess of the occupational standards can occur when melting, casting, gross handling, pickling, abrasive cutting, welding, grinding, sanding, polishing, milling, crushing, or otherwise abrading the surface of this material in a manner which generates finely divided particles.

Typical lathe machining, drilling, slitting, brazing, soldering or cold stamping of this material normally does not produce airborne concentrations in excess of the occupational standards. Cast or heat treated products which have surface scale or oxidation should have the scale, containing beryllium oxide, chemically removed from the surface prior to working the surface to prevent potential exposure in excess of the occupational standards.

Grinding or sanding operations conducted under a flood of liquid coolant may require local exhaust ventilation. The cycling through a machine of liquid lubricant/coolant containing finely divided particulate 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 if necessary.

The potential for exposures 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.

**INGESTION:** There are no known cases of illness resulting from ingestion of this material. 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. These products are not intended for internal consumption. As a standard hygiene practice, hands should be washed before eating or smoking.

**SKIN:** Skin contact with this material may cause, in some sensitive individuals, an allergic dermal response from copper present in the form of metal dust or powder. Skin abrasion may cause irritation. See Section 4 for additional information. The beryllium in this alloy is in an insoluble form and does not pose a potential for an allergic dermal response.

**EYES:** Injury can result from particulate irritation or mechanical injury to the eyes 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.

*EFFECTS OF OVEREXPOSURE*

**The potential health effects listed below are confined to constituents which are in sufficient concentrations within the product to be significant.**

**ACUTE** (*immediate or near-term health effects*): The beryllium fraction of this product is insoluble and does not cause acute beryllium disease. Excessive inhalation of copper can cause respiratory irritation, cough, bronchitis, chills, "metal fume fever," decreased pulmonary function, and asthma-like symptoms. Contact with copper may cause allergic skin reactions. The beryllium in this product does not pose a potential for an allergic skin reaction

**CHRONIC** (*long-term health effects*): Exposure to airborne particulate containing beryllium may cause long-term health effects including loss of lung function, fibrosis, or subsequent secondary effects on the heart with eventual permanent impairment. Inhaling dust or fumes containing beryllium may cause serious, chronic lung disease called Chronic Beryllium Disease (CBD) in some individuals. Over time lung disease can be fatal. Chronic beryllium disease is a hypersensitivity or allergic condition in which the tissue of the lungs become inflamed with a cellular nodular reaction. This inflammation, sometimes with accompanying fibrosis, may restrict the exchange of oxygen between the lungs and the bloodstream. This allergic response to beryllium is limited to susceptible persons. Medical science suggests this susceptibility is related to genetic factors. Exposure to airborne beryllium does not cause a chronic reaction in most people.

**CARCINOGENIC REFERENCES:** The question of whether occupational exposure to beryllium materials cause human cancer has been examined extensively for over 30 years without producing any study which clearly demonstrates an association after taking into account effects of smoking and other work place carcinogen exposure. However, based on the few existing epidemiological studies and animal experimentation, the International Agency for Research on Cancer and the National Toxicology Program lists beryllium as a carcinogen.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Individuals who may have had allergic reaction or sensitivity to copper may encounter skin rash or dermatitis if skin contact with this product occurs. Persons with impaired pulmonary function, airway diseases, or conditions such as asthma, emphysema, chronic bronchitis, etc. may incur further impairment if dust or fume are inhaled. If prior damage or disease to the neurologic (nervous), circulatory, hematologic (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 exposure.

**4. FIRST AID MEASURES**

**INHALATION:** Breathing difficulty caused by inhalation of dust or fume requires immediate removal to fresh air. There are no known cases in which a person stopped breathing as a result of exposure. 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.

**SKIN:** Skin cuts and abrasions should be treated by standard first aid. Skin contamination with dust or powder can be removed by washing with soap and water. Obtain medical help if irritation persists. 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 a lot of clean water. Obtain medical help if irritation persists. Contact lenses should not be worn when working with metal dusts and powders because the contact lens must be removed to provide adequate treatment.

**TREATMENT OF CHRONIC BERYLLIUM DISEASE:** There is no known treatment which will cure chronic beryllium disease. Prednisone or other corticosteroids are the most specific treatment currently available. They are directed at suppressing the immunological reaction and have been effective in diminishing many signs and symptoms of chronic beryllium disease. In cases where steroid therapy has had only partial or minimal effectiveness, other immunosuppressive agents, such as cyclophosphamide, cyclosporine, or methotrexate, have been used. These latter agents remain investigational. Further, in view of the potential side effects of all the immunosuppressive medications, including steroids such as prednisone, they should be used only under the direct care of a physician. In general, these medications should be reserved for cases with significant symptoms and/or significant loss of lung function. Other symptomatic treatment, such as oxygen, inhaled steroids or bronchodilators, may be used by some physicians and are effective in selected cases.

The decision about when and with what medication to treat is a judgment situation for individual physicians. For the most part, treatment is reserved for those persons with symptoms and measurable loss of lung function. The value of starting oral steroid treatment, before signs or symptoms are evident, remains a medically unresolved issue currently under study. Some physicians are concerned that their patients may develop a resistance to medication if it is started too soon.

The effects of continued low exposure to beryllium are unknown for individuals who are sensitized to beryllium or who have a diagnosis of chronic beryllium disease. This uncertainty leads some physicians to advise a reduction or elimination of further exposure to beryllium. However, some individuals have developed CBD or have gradually become worse after removal from further exposure. Others have continued to work in the beryllium industry without any additional, or accelerated, loss of lung function.

## 5. FIRE FIGHTING MEASURES

Flash Point	Non-combustible as a solid. No ignition as layer of sub 44 micron particles of nominal 98% CuBe.
Explosive Limits	Not applicable to solids. No ignition as cloud of sub 44 micron particles of nominal 98% CuBe.
Extinguishing Media	This material is non-combustible. Use extinguishing media appropriate to the surrounding fire.
Unusual Fire and Explosion Hazards	Do not use water to extinguish fires around operations involving molten metal due to the potential for steam explosions.
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.

**6. ACCIDENTAL RELEASE MEASURES**

**STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:** In solid form, this material poses no special 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 particulate air (HEPA) filtration system followed by wet cleaning methods. Special precautions must be taken when changing filters on HEPA vacuum cleaners used to clean up potentially toxic materials. Caution should be taken to minimize airborne generation of powder or dust and avoid contamination of air and water. Depending upon the quantity of material released, fine powder or dust spills to the 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.

**7. HANDLING AND STORAGE**

Wear gloves when handling parts with sharp edges. Store in a dry area.

**8. EXPOSURE CONTROLS, PERSONAL PROTECTION**

**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. 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 training is recommended for all users. Ventilation systems should be designed and installed by qualified professionals.

**RESPIRATORY PROTECTION:** When potential exposures are above the occupational limits shown in Section 2, approved respirators must be used as specified by an Industrial Hygienist or other qualified professional. Respirator users must 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. Users of any style respirator must be clean shaven on 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 when performing jobs with high potential exposures such as changing filters in a baghouse air cleaning device.

**HOUSEKEEPING:** Vacuum and 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 or brooms to remove dusts must be avoided as such an activity can result in unnecessary short-term elevated exposures to airborne dusts.

**MAINTENANCE:** During repair or maintenance activities the potential exists for exposures to constituents in excess of the occupational standards. Under these circumstances, protecting workers can require the use of specific work practices or procedures involving the combined use of ventilation, wet and vacuum cleaning methods, respiratory protection, decontamination, special protective clothing, and when necessary, restricted work zones.

**WELDING:** In accordance with OSHA regulation 29 CFR 1910.252 welding of materials containing 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.

**OTHER PROTECTIVE EQUIPMENT:** No special protective equipment or clothing is required when handling solid forms. Protective clothing such as fire retardant clothing and molten metal splash resistant garments (i.e., coats, hats, hoods, pants, shoes, gloves) should be worn as necessary to protect from accidental molten metal splash. Protective overgarments or work clothing must be worn by persons who may become contaminated with dusts or powders during activities such as machining, furnace rebuilding, air cleaning equipment filter changes, maintenance, furnace tending, etc. Contaminated work clothing and overgarments should be managed in such a manner so as to prevent secondary exposure to family and persons 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 during handling.

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

#### *RECOMMENDED MONITORING PROCEDURES*

**ENVIRONMENTAL SURVEILLANCE:** Exposure to airborne materials 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:** Persons exposed to airborne concentrations of this material should be included in a periodic medical surveillance program. The program should include examination of the skin and respiratory system. Non-specific findings of skin rash, skin granulomata, or respiratory signs or symptoms may indicate a reaction to this material. A minimum medical surveillance program should include (1) skin examination, (2) respiratory history, (3) auscultation of the lungs, (4) spirometry (FVC and FEV<sub>1</sub>), and (5) periodic chest x-ray. In addition, a specialized, specific, immunological blood test, the beryllium blood lymphocyte proliferation test (BLPT), is available [on a limited basis to assist in the diagnosis] to screen beryllium-exposed persons for beryllium reactions. Note: It should be recognized that the BLPT has limited sensitivity for chronic beryllium disease. Individuals who have an abnormal BLPT are normally referred to a lung specialist for additional specific tests to determine if chronic beryllium disease is present.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### CHEMICAL COMPOSITION (Percent by Weight)

BRUSH WELLMAN ALLOY NUMBER (UNS ALLOY NUMBER)	
CONSTITUENT	4% MASTER
Beryllium (Be)	3.5 - 4.5
Copper (Cu)	Balance
Titanium (Ti)	*

\*Titanium is optional for this alloy. The letter T is added to the Brush Wellman Alloy Number when titanium is included.

### PHYSICAL PROPERTIES

Boiling Point:	Not applicable	Radioactivity:	Not applicable
Evaporation Rate:	Not applicable	Solubility:	None
Freezing Point:	Not applicable	Sublimes At:	Not applicable
Odor:	None	Vapor Density (Air = 1):	Not applicable
pH:	Not applicable	Vapor Pressure (mmHg):	Not applicable
Physical State:	Solid	% Volatiles By Volume:	None
Color:	Gold	Melting Point (°F):	1616
		Density (lb/in <sup>3</sup> ):	0.290

## 10. STABILITY AND REACTIVITY

General Reactivity	This material is stable.
Incompatibility (materials to avoid)	Avoid contact with mineral acids and oxidizing agents which may generate hydrogen gas. Hydrogen gas can be an explosion hazard.
Hazardous Decomposition Products	None under normal conditions of use.
Hazardous Polymerization	Will not occur.

## 11. TOXICOLOGICAL INFORMATION

For questions concerning toxicological information write to: Medical Director, Brush Wellman Inc., 14710 West Portage River South Road, Elmore, Ohio 43416-9502.

## 12. ECOLOGICAL INFORMATION

This material is insoluble in water. This material can be recycled; contact your Sales Representative.

## 13. DISPOSAL CONSIDERATIONS

**BYPRODUCT RECYCLING:** When recycled (used in a process to recover metals), this material is not classified as hazardous waste under federal law. Dusty or dust-like materials should be sealed inside two plastic bags, placed in a DOT approved container, and appropriately labeled.

**SOLID WASTE MANAGEMENT:** When spent products are declared solid wastes (no longer recyclable), they must be labeled, managed and disposed of, in accordance with federal, state and local requirements. This material is not classified a hazardous waste under federal law.

#### 14. TRANSPORT INFORMATION

There are no U.S. Department of Transportation hazardous material regulations which apply to the packaging and labeling of this product as shipped by Brush Wellman. Hazard Communication regulations of the U.S. Occupational Safety and Health Administration require this product be labeled.

Following is the label which accompanies this product during shipment.

<b><u>A17</u></b>	<b>COPPER BERYLLIUM MASTER ALLOY (4% MASTER)</b>
<b>DANGER - INHALING DUST OR FUMES MAY CAUSE SERIOUS, CHRONIC LUNG DISEASE IN SOME INDIVIDUALS. OVER TIME, LUNG DISEASE CAN BE FATAL.</b>	
<b>WARNING - POTENTIAL CANCER HAZARD</b>	
Read the Material Safety Data Sheet (MSDS) on file with your employer before working with this material. This product contains beryllium. Overexposure to beryllium by inhalation may cause chronic beryllium disease, a serious chronic lung disease.	
<ul style="list-style-type: none"> <li>• If processing or recycling produces airborne dust, fumes, or mists, use exhaust ventilation or other controls designed to prevent exposure to workers. Examples of such activities include melting, welding, grinding, abrasive sawing, sanding and polishing. Any activity which abrades the surface of this material can generate airborne dust.</li> <li>• The Occupational Safety and Health Administration (OSHA) has set mandatory limits on occupational exposures.</li> <li>• In solid form this product presents no special hazards.</li> <li>• Sold for manufacturing purposes only. This product can be recycled; contact your sales representative.</li> </ul>	
The Occupational Safety and Health Administration requires employers provide training in the proper use of this product.	
For further information, please telephone or write to: Environmental Control Department, Brush Wellman Inc., 14710 W. Portage River South Road, Elmore, Ohio 43416-9502, telephone: (800) 862-4118. For transportation emergency call Chemtrec at (800) 424-9300.	
<b>A17</b>	

\*Label may vary in size

\*Label color (light blue edge with black lettering)

#### 15. REGULATORY INFORMATION

**OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200:** Components of these products are considered hazardous ingredients.

**AMBIENT AIR EMISSIONS:** Foundries melting alloys containing beryllium are subject to the National Emission Standard for Beryllium as promulgated by EPA (40 CFR 61, Subpart C). Facilities machining alloys containing greater than 5% beryllium also are subject to the National Emission Standard for beryllium. 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 10 gram per 24-hour total site emission limit. Most process air emission sources 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 permissible emission. 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 and inspection of air cleaning equipment and monitoring of operating parameters is recommended to ensure adequate efficiency is maintained.

**WASTEWATER:** Wastewater regulations can vary considerably. Contact your local and state governments to determine their requirements.

**TOXIC SUBSTANCES CONTROL ACT:** This material is a mixture. Components of this material are 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 specific chemicals which are manufactured, processed or used at certain U.S. Industrial facilities.

Brush Wellman's products are reportable under the Section 313 category of "Compounds and/or Mixtures." These mixtures contain one or more of the following reportable constituents: Beryllium and Copper. The specific chemical makeup, concentration by weight and the Chemical Abstracts Services number for each of our products is provided in Sections 2 and 9 of 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).**

**16. OTHER INFORMATION**

This MSDS has been revised following the guidelines outlined in the American National Standard for Hazardous Chemicals Z400.1-1993 "Material Safety Data Sheets - Preparation."

**IMPORTANT: If you have any questions or require additional information regarding the materials described in this Material Safety Data Sheet, please telephone or write to the Environmental Control Department at the location given on page 1.**