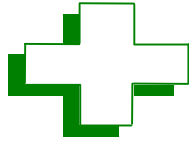


Safety Facts



BRUSHWELLMAN
ENGINEERED MATERIALS

Processing Copper Beryllium Alloys

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Copper beryllium (CuBe), in solid form and as contained in finished products, presents no special health risks. Most manufacturing operations conducted properly on well-maintained equipment are capable of safely processing copper beryllium containing materials. However, like many industrial materials, copper beryllium may present a health risk if handled improperly. The inhalation of dust, mist or fume containing beryllium can cause a serious lung condition in some individuals. The degree of hazard varies, depending on the form of the product, how it is processed and handled, as well as the amount of beryllium in the product. Read the product specific Material Safety Data Sheet (MSDS) for additional environmental, health, and safety information before working with copper beryllium alloys.

Potential for exposure to beryllium-containing particulate should be determined by conducting a workplace exposure characterization which includes air sampling in the worker's breathing zone, work area and throughout the department. Use an industrial hygienist or other qualified professional to establish the frequency and type of air sampling necessary. Develop and implement a sampling approach that identifies the extent of potential exposure variation and provides statistical confidence in the results. Make air sample results available to workers.

Facilities handling beryllium-containing materials in ways which generate particulate are encouraged to use engineering and work practice controls, including personal protective equipment, to control potential worker exposure. Use exposure controls to keep beryllium work areas clean and keep beryllium particulate out of the lungs, off the skin, off of clothing, in the work process, in the work area and on the plant site. It remains the best practice to maintain levels of all forms of beryllium exposure as low as reasonably achievable, and continue to work to improve exposure control practices and procedures.

SOURCES OF EXPOSURE

The following table provides a summary of those copper beryllium processes that typically present low inhalation concern (green).

Low Inhalation Concern Operations			
Adhesive Bonding	Drawing	Milling	Shipping
Age Hardening (<950°F)	Drilling	Packaging	Sizing
Assembly	Dry Tumbling	Painting	Skiving
Bending	Electroless Plating	Physical Testing	Slitting
Blanking	Electroplating	Piercing	Stamping
Bonding	Extrusion	Pilger	Straightening
Boring	Filing by Hand	Plating	Stretch Bend Leveling
Broaching	Gun Drilling	Pressing	Stretcher Leveling
CNC Machining	Hand Solvent Cleaning	Radiography/X-ray	Tapping
Cold Forging	Handling	Reaming	Tensile Testing
Cold Heading	Heading	Ring Forging	Thread Rolling
Cold Pilger	Heat Treating (inert atmosphere)	Ring Rolling	Trepanning
Cold Rolling	Inspection	Roll Bonding	Tumbling
Cutting	Machining	Rotary forging	Turning
Deburring (non-grinding)	Metallography	Sawing (tooth blade)	Ultrasonic Cleaning
Deep Hole Drilling		Shearing	Ultrasonic Testing
			Upsetting
Notes:			
1) Operations in the "Low Inhalation Concern" category represent operations that typically release non-respirable (>10 micrometer) particles, are not expected to generate significant ultra-fine particulate, and/or are not expected to result in exposures in excess of the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL).			
2) This list is not all-inclusive and variation can exist within specific processes. To verify the adequacy of engineering and work practice controls,			

- conduct an exposure characterization of all copper beryllium processing operations.
- 3) Age hardening, as included in this table, is a heat treatment process conducted at <950°F.
 - 4) When evaluating operations, consideration must be given to potential exposures from activities in support of these operations such as setup, preparation, cleanup and maintenance.

The following table provides a summary of those copper beryllium processes that may present a likely inhalation hazard (yellow).

Likely Inhalation Hazard Operations			
Abrasive Blasting	Dross Handling	Laser Cutting	Sanding
Abrasive Processing	Electrical Chemical Machining (ECM)	Laser Machining	Scrap Management (Clean)
Abrasive Sawing	Electrical Discharge Machining (EDM)	Laser Scribing	Sectioning
Annealing	Electron Beam Welding (EBW)	Laser Marking	Slab Milling
Brazing	Forging	Laser Welding	Soldering
Bright Cleaning	Grinding	Laundrying	Solution Management
Brushing	Heat Treating (in air)	Melting	Spot Welding
Buffing	High Speed Machining (>10,000 rpm)	Photo-Etching	Sputtering
Burnishing	Honing	Pickling	Swaging
Casting	Hot Forging	Point and Chamfer	Torch cutting (i.e., oxy-acetylene)
Centerless Grinding	Hot Rolling	Polishing	Water-jet Cutting
Chemical Cleaning	Investment Casting	Process Ventilation	Welding (ARC, TIG, MIG, etc.)
Chemical Etching	Lapping	Maintenance	Wire Electrical Discharge Machining (WEDM)
Chemical Milling		Resistance Welding	
Coolant Management		Roller Burnishing	
Deburring (grinding)		Sand Blasting	
Destructive Testing		Sand Casting	

Notes:

- 1) Operations in the "Likely Inhalation Hazard" category represent those operations which may release respirable (<10 micrometer) particles, may generate ultra-fine particulate, may generate beryllium oxide and/or may result in exposures in excess of the OSHA PEL.
- 2) This list is not all-inclusive and variation can exist within specific processes. Determine, then verify, the adequacy of engineering and work practice controls by conducting an exposure characterization of all copper beryllium processing operations.
- 3) Effective ventilation, work practices and personal protective equipment use can control a "Likely Inhalation Hazard".
- 4) When evaluating operations, consideration must be given to potential exposures from activities in support of these operations such as setup, preparation, cleanup and maintenance.
- 5) High temperature annealing (>1000°F) conducted in air can generate a loose beryllium-containing oxide scale that can flake off during processing and become airborne. Annealing in an inert or reducing atmosphere can minimize the formation of surface metal oxides.
- 6) Pickling, as included in this table, involves the use of strong acid and/or caustic solutions to remove metal oxides from the surface of beryllium-containing alloys. Other chemical cleaning or surface preparation operations should be characterized to determine potential exposure risk.
- 7) The use of the term "may generate ultra-fine particulate" to categorize the hazard of particular operations addresses the hypothesis that exposure to a large number of beryllium-containing particles with low mass and an aerodynamic diameter of 1 micrometer or less increases the risk of developing CBD.

ADDITIONAL INFORMATION

If there are concerns about potential beryllium exposure in your workplace, contact an industrial hygienist to perform a workplace exposure characterization. Brush Wellman has provided training to nearly 100 industrial hygiene consultants across the U.S. in hazard recognition and control of beryllium manufacturing operations. To obtain a list of consultants, contact the Brush Wellman Product Safety Hotline at (800) 862-4118 or website at www.brushwellman.com.

The information contained in this Safety Facts applies only to the subject referenced in the title. Read the MSDS specific to the products in use at your facility for more detailed environmental, health and safety guidance. MSDSs can be obtained by contacting the Brush Wellman Product Safety Hotline at (800) 862-4118 or website at www.brushwellman.com.

Additional information can also be obtained by contacting a Brush Wellman Sales Representative or:

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