

⁴Be Responsible

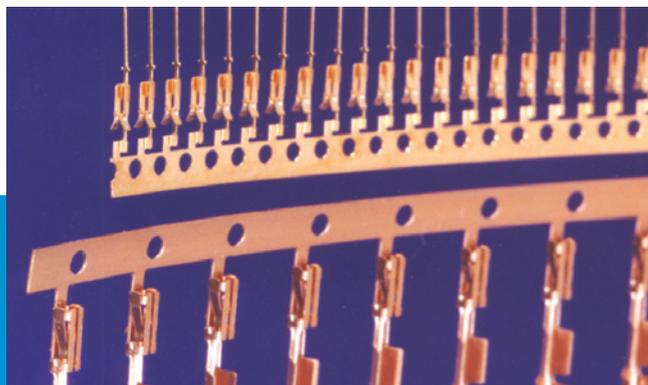
Beryllium Product Stewardship

BERYLLIUM-CONTAINING MATERIALS STAMPING OPERATIONS



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BERYLLIUM (BE) – CONTAINING ALLOYS

Beryllium-containing alloys, in solid form and as contained in finished products present no special health risks.



Beryllium containing alloys are stamped into a variety of shapes, sizes and designs for use in electrical and electronic equipment. The manufacturing operations commonly associated with precision stamping can safely process beryllium containing alloys. Scientific evidence indicates that airborne beryllium levels generated by precision stamping operations are unlikely to generate exposures known to adversely affect health. Special controls are not required during the precision stamping, die repair, and inert atmosphere heat treating of beryllium containing alloys.

The inhalation of beryllium-containing dust, mist or fume can cause a serious lung condition in some individuals. The degree of hazard varies depending on the form of the product and how the material is processed and handled. You must read the product specific Safety Data Sheet (SDS) for additional environmental, health and safety information before working with any beryllium-containing alloys.



TYPICAL PUNCH PRESS

PRECISION STAMPING CASE STUDY

In an effort to quantify the potential for worker exposure to airborne beryllium, a case study was conducted at four US precision stamping facilities processing beryllium containing alloys. These facilities performed a variety of mechanical and thermal activities during the manufacture of beryllium containing alloy components for the electronic industry.

The study found that one hundred percent (100%) of the 145 samples collected during mechanical/thermal processing and support operations were below the BeST Recommended Exposure Guideline (REG) of 0.6 microgram of beryllium per cubic meter of air ($\mu\text{g}/\text{m}^3$) (Inhalable), measured as an 8-hour time weighted average (TWA), or the occupational exposure limit (OEL) applicable to the Member State for airborne beryllium.

The following table summarizes the results:

PRECISION STAMPING CASE STUDY SUMMARY OF AIRBORNE BERYLLIUM EXPOSURES

Process Category	Number of Sample Observations	Number of Samples Greater than 0.2 $\mu\text{g}/\text{m}^3$
Mechanical		
Stamping Press Operators	49	0
Die Repair	27	0
Assembly	14	0
Dry Tumble Deburr	4	
Thermal		
Heat Treating (inert atmosphere)	9	0
Resistance Welding	8	0
Support		
Inspection	17	0
Shipping/Packaging	17	0

Note: The above Precision Stamping Case Study data represents airborne beryllium exposures as determined by the Closed Face Cassette (CFC) air sampling method. Air samples collected using the Inhalable method are estimated to be 3 times higher than air samples collected using the CFC sampling method.

There are no special controls required for stamping beryllium containing alloys under typical mechanical, thermal, and support operations.

CHEMICAL PROCESSING OF SMALL BERYLLIUM CONTAINING ALLOY PARTS

Beryllium containing alloy stamped parts can be further processed in secondary finishing and chemical operations such as cleaning, etching and plating. Copper beryllium alloys can be safely processed using the methods and controls commonly utilized in these secondary finishing and chemical operations.

Where beryllium containing alloys are chemically cleaned by corrosive processes using acids or bases, local exhaust ventilation must be installed to minimize the escape of mists or vapors into the workplace. The discharge of air from an air cleaning system into the work place air is not recommended due to the potential for exposure if there were a failure of the filtration system. The system should be designed and operated in accordance with commonly accepted ventilation principles and pertinent environmental regulations.

Chemical solutions used in the cleaning and processing of beryllium containing alloys must be contained to prevent splashing onto floor areas, external structures or operators' clothing. Chemical solutions that splash outside process containers should be cleaned up and must not be allowed to dry because it may carry with it particulate containing beryllium which can later become airborne or attach to clothing or shoes.

HOUSEKEEPING

Fabricated parts should be kept clean between processing steps to avoid potential re-suspension of fine particles into the air. The use of compressed air or brooms for cleaning should be prohibited. Wet cleaning and vacuuming are effective methods for cleaning. Disposable rags, towels or wipes should be used to wet clean, not be allowed to dry out and must be kept in a closed container. Rags and towels should not be reused.



MAINTENANCE

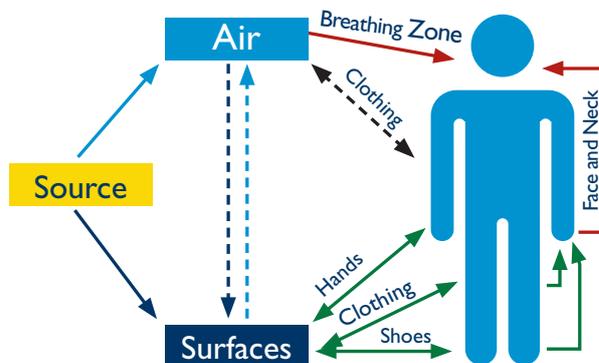
Under certain conditions, the repair or maintenance of equipment can generate airborne particles. Protecting workers can require the use of specific work practices or procedures involving the combined use of ventilation, wet and vacuum cleaning methods, respiratory protection, decontamination, special protective clothing and when necessary, restricted work zones. Detailed procedures for safely maintaining the process equipment and ventilation systems should be developed.



All operators and maintenance personnel need to be trained in the established procedures prior to performing maintenance or service activities. Stamping dies should be wet wiped to remove any visible particulate prior to servicing.

WORKPLACE EXPOSURE CHARACTERIZATION

In accordance with good industrial hygiene practice, a characterization of worker exposure, including air monitoring, should be conducted for operations where a potential for beryllium exposure exists.



RECYCLING / DISPOSAL

Beryllium-containing scrap is a valuable material and should be recycled whenever possible. Beryllium-containing scrap should be kept segregated from other metals to retain its higher value as a recyclable material.



If not recyclable, materials containing beryllium are considered waste and must be disposed in accordance with applicable EU and Member State regulations. Beryllium-containing wastes should be maintained in a moist condition during collection, storage and disposal, double bagged in plastic and sealed in an appropriate container to minimize the potential for release and exposure.

ADDITIONAL INFORMATION

Additional worker protection guidance can be obtained online at www.beryllium.eu or by contacting the Beryllium Science & Technology Association (BeST) at: Rue Belliard 40, 1040 Brussels, Tel: +32 (0)2 213 74 20 | Email: info@beryllium.eu

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