



MATERION

1. Chemical and company identification

Name of chemical (Product name) Copper Beryllium Wrought Alloy

Company name Materion Brush Inc.

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Reference number A10

2. Hazards identification

GHS classification

Physical hazards The product is not classified according to GHS.

Health hazards

| | |
|---------------------------------------------------|---------------------------------|
| Sensitization, respiratory | Category 1 |
| Sensitization, skin | Category 1 |
| Carcinogenicity | Category 1 |
| Specific target organ toxicity, repeated exposure | Category 1 (Respiratory system) |

Environmental hazards The product is not classified according to GHS.

GHS label elements

Symbols



Signal words

Danger

Hazard statement

May cause cancer by inhalation. May cause allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause damage to organs (respiratory system) through prolonged or repeated exposure.

Precautionary statement

Prevention

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Minimize dust generation and accumulation. Do not breathe dust/fume. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation wear respiratory protection.

Response

If on skin: Wash with plenty of water. If inhaled: Remove person to fresh air and keep comfortable for breathing. If exposed or concerned: Call a poison center/doctor. If skin irritation or rash occurs: Get medical advice/attention. If experiencing respiratory symptoms: Call a poison center/doctor. Wash contaminated clothing before reuse.

Storage

Store locked up.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

Other hazards which do not result in classification

None known.

Supplemental information

Exposure to the elements listed in Section 3 by inhalation, ingestion, and skin contact can occur when melting, casting, dross handling, pickling, chemical cleaning, heat treating, abrasive cutting, welding, grinding, sanding, polishing, milling, crushing, or otherwise heating or abrading the surface of this material in a manner which generates particulate.

For further information, please contact the Product Stewardship Department at +1.216.383.4019.

Main symptoms and emergency overview

Main symptoms Discomfort in the chest. Shortness of breath. Coughing. Skin irritation. Rash. Sensitization. Prolonged exposure may cause chronic effects.

Emergency overview DANGER

Fatal if inhaled. Very toxic. Harmful if absorbed through skin. Harmful in contact with eyes. Cancer hazard. May cause an allergic skin reaction. May cause sensitization by inhalation and skin contact. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Possible reproductive hazard. Causes damage to organs. Danger of serious damage to health by prolonged exposure. Dangerous for the environment if discharged into watercourses.

3. Composition/information on ingredients

Substance or mixture Mixture

| Components | CAS Number | Gazette notification | | Concentration (%) |
|------------|------------|----------------------|----------|-------------------|
| | | ENCS no. | ISHL no. | |
| Copper | 7440-50-8 | | | 96.3 - 99.5 |
| Cobalt | 7440-48-4 | | | 0 - 2.7 |
| Nickel | 7440-02-0 | | | 0 - 2.2 |
| Beryllium | 7440-41-7 | | | 0.15 - 2 |
| Zirconium | 7440-67-7 | | | 0 - 0.3 |

Synonym(s) Beryllium Copper, Copper Beryllium, BeCu, CuBe, Alloy 10, Alloy 10X (C17500); Alloy 165 (17000); Alloy 170; Alloy 171 (C17450), Alloy C717 (C71700), Brush 60®, BrushForm® 47, BrushForm® 65 (C17460); Alloy 174 (C17400), (C17410), (C17420); Alloy 25, Alloy 190, BrushForm® 290 (C17200); Alloy 3 (C17510); Alloy 310; Alloy 390®; Alloy 390E, MoldMAX®, PROtherm®, WeldPak®

Chemical formula Cu (7440-50-8), Co (7440-48-4), Ni (7440-02-0), Be (7440-41-7), Zr (7440-67-7)

4. First aid measures

If inhaled If symptoms develop move victim to fresh air. For breathing difficulties, oxygen may be necessary. Breathing difficulty caused by inhalation of particulate requires immediate removal to fresh air. If breathing has stopped, perform artificial respiration and obtain medical help.

If on skin Take off contaminated clothing and wash before reuse. Thoroughly wash skin cuts or wounds to remove all particulate debris from the wound. Seek medical attention for wounds that cannot be thoroughly cleansed. Treat skin cuts and wounds with standard first aid practices such as cleansing, disinfecting and covering to prevent wound infection and contamination before continuing work. Obtain medical help for persistent irritation. Material accidentally implanted or lodged under the skin must be removed.

If in eyes Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention if symptoms persist.

If swallowed If swallowed, seek medical advice immediately and show this container or label. Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

Most important symptoms/effects, acute and delayed May cause allergic skin reaction. May cause allergic respiratory reaction. Prolonged exposure may cause chronic effects.

Protection of first-aid responders If exposed or concerned: get medical attention/advice. Get medical attention if symptoms occur. Wash contaminated clothing before reuse. As supplied, there is no immediate medical risk with beryllium products in article form. First aid measures provided are related to particulate containing beryllium.

Notes to physician

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 can be effective in diminishing 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. 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. Other treatment, such as oxygen, inhaled steroids or bronchodilators, may be prescribed by some physicians and can be effective in selected cases. In general, treatment is reserved for cases with significant symptoms and/or significant loss of lung function. The decision about when and with what medication to treat is a judgment situation for individual physicians.

In their 2014 official statement on the Diagnosis and Management of Beryllium Sensitivity and Chronic Beryllium Disease, the American Thoracic Society states that "it seems prudent for workers with BeS to avoid all future occupational exposure to beryllium."

5. Fire-fighting measures

Extinguishing media

The product is non-combustible. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Extinguishing media to avoid

Do not use water to extinguish fires around operations involving molten metal due to the potential for steam explosions.

Special fire fighting procedures

Move containers from fire area if you can do so without risk. Water runoff can cause environmental damage.

Protection of fire-fighters

Firefighters should wear full protective clothing including self contained breathing apparatus. Wear suitable protective equipment.

Specific methods

Pressure-demand self-contained breathing apparatus must be worn by firefighters or any other persons potentially exposed to the particulate released during or after a fire.

6. Accidental release measures

Personal precautions, protective equipment and emergency measures

In solid form this material poses no special clean-up problems.

Environmental precautions

Avoid release to the environment. In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

Methods or materials for containment and cleaning up

Clean up in accordance with all applicable regulations.

7. Handling and storage

Handling

Technical measures (e.g. Local and general ventilation)

Provide appropriate exhaust ventilation at places where dust is formed.

Safe handling advice

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Minimize dust generation and accumulation. Provide appropriate exhaust ventilation at places where dust is formed. Do not breathe dust. Avoid prolonged exposure. Should be handled in closed systems, if possible. When using, do not eat, drink or smoke. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices.

Hygiene measures

Handle in accordance with good industrial hygiene and safety practice.

Storage

Safe storage conditions

Store locked up. Keep container tightly closed. Store in a well-ventilated place.

Safe packaging materials

Store in original tightly closed container.

8. Exposure controls/personal protection

Occupational exposure limits

Japan. OELs - ISHL. (Workplace Environment Assessment Standards)

| Components | Type | Value |
|---------------------------|------|-------------|
| Beryllium (CAS 7440-41-7) | TLV | 0.001 mg/m3 |
| Cobalt (CAS 7440-48-4) | TLV | 0.02 mg/m3 |
| Nickel (CAS 7440-02-0) | TLV | 0.1 mg/m3 |

Japan. OELs - JSOH (Japan Society of Occupational Health: Recommendation of Occupational Exposure Limits)

| Components | Type | Value |
|---------------------------|------|-------------|
| Beryllium (CAS 7440-41-7) | TWA | 0.002 mg/m3 |
| Cobalt (CAS 7440-48-4) | TWA | 0.05 mg/m3 |
| Nickel (CAS 7440-02-0) | TWA | 1 mg/m3 |

US. ACGIH Threshold Limit Values

| Components | Type | Value | Form |
|---------------------------|------|------------------------------|---------------------|
| Beryllium (CAS 7440-41-7) | TWA | 0.00005 mg/m3 (as beryllium) | Inhalable fraction. |
| Copper (CAS 7440-50-8) | TWA | 1 mg/m3 | Dust and mist. |
| | | 0.2 mg/m3 | Fume. |
| Zirconium (CAS 7440-67-7) | TWA | 5 mg/m3 | |

Biological limit values

Japan. BELs - JSOH (Japan Society of Occupational Health: Recommendation of Occupational Exposure Limits Based on Biological Monitoring)

| Components | Value | Determinant | Specimen | Sampling Time |
|------------------------|---------|-------------|----------|---------------|
| Cobalt (CAS 7440-48-4) | 35 µg/l | Cobalt | Urine | * |
| | 3 µg/l | Cobalt | Blood | * |

* - For sampling details, please see the source document.

Engineering measures

VENTILATION: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Ensure adequate ventilation, especially in confined areas.

Whenever possible, the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne particulate. Where utilized, exhaust inlets to the ventilation system must be positioned as close as possible to the source of airborne generation. Avoid disruption of the airflow in the area of a local exhaust inlet by equipment such as a man-cooling fan. Check ventilation equipment regularly to ensure it is functioning properly. Provide training on the use and operation of ventilation to all users. Use qualified professionals to design and install ventilation systems.

WET METHODS: Machining operations are usually performed under a liquid lubricant/coolant flood which assists in reducing airborne particulate. However, the cycling through of machine coolant containing finely divided particulate in suspension can result in the concentration building to a point where the particulate may become airborne during use. Certain processes such as sanding and grinding may require complete hooded containment and local exhaust ventilation. Prevent coolant from splashing onto floor areas, external structures or operators' clothing. Utilize a coolant filtering system to remove particulate from the coolant.

WORK PRACTICES: Develop work practices and procedures that prevent particulate from coming in contact with worker skin, hair, or personal clothing. If work practices and/or procedures are ineffective in controlling airborne exposure or visual particulate from deposition on skin, hair, or clothing, provide appropriate cleaning/washing facilities. Procedures should be written that clearly communicate the facility's requirements for protective clothing and personal hygiene. These clothing and personal hygiene requirements help keep particulate from being spread to non-production areas or from being taken home by the worker. 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.

HOUSEKEEPING: Use vacuum and wet cleaning methods for particulate removal from surfaces. Be certain to de-energize electrical systems, as necessary, before 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. Follow the manufacturer's instructions when performing maintenance on HEPA filtered vacuums used to clean hazardous materials.

Personal protective equipment

Respiratory protection

When airborne exposures exceed or have the potential to exceed the occupational exposure limits, 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 tight fitting respirators must be clean shaven on those areas of the face where the respirator seal contacts the face. Use pressure-demand airline respirators when performing jobs with high potential exposures such as changing filters in a baghouse air cleaning device.

Hand protection

Wear gloves to prevent contact with particulate or solutions. Wear gloves to prevent metal cuts and skin abrasions during handling.

Eye protection

Wear approved safety glasses, goggles, face shield and/or welder's helmet when risk of eye injury is present, particularly during operations that generate dust, mist or fume.

Skin and body protection

Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. Protective overgarments or work clothing must be worn by persons who may become contaminated with particulate during activities. Skin contact with this material may cause, in some sensitive individuals, an allergic dermal response. Particulate that becomes lodged under the skin has the potential to induce sensitization and skin lesions.

9. Physical and chemical properties

Appearance

| | |
|---------------------------------------------------------|--------------------------------------------------------|
| Physical state | Solid. |
| Form | Various shapes. |
| Color | Copper. |
| Odor | Not applicable. |
| Odor threshold | Not applicable. |
| pH | Not applicable. |
| Melting point/Freezing point | 1600 - 1960 °F (871.11 - 1071.11 °C) / Not applicable. |
| Boiling point, initial boiling point, and boiling range | Not applicable. |
| Flash point | Not applicable. |
| Upper/lower flammability or explosive limits | |
| Flammability limit - lower (%) | Not applicable. |
| Flammability limit - upper (%) | Not applicable. |
| Explosive limit - lower (%) | Not applicable. |
| Explosive limit - upper (%) | Not applicable. |
| Vapor pressure | 0.77 hPa estimated |
| Vapor density | Not applicable. |
| Evaporation rate | Not applicable. |
| Specific gravity | 8.8 estimated |
| Solubility(ies) | |
| Solubility (water) | Not applicable. |
| Partition coefficient (n-octanol/water) | Not available. |
| Auto-ignition temperature | Not applicable. |
| Decomposition temperature | Not applicable. |
| Viscosity (Coefficient of viscosity) | Not applicable. |
| Other information | |
| Density | 8.80 g/cm ³ estimated |
| Flammability | Not applicable. |
| Relative density | Not applicable. |

10. Stability and reactivity

| | |
|------------------------------------|-----------------------------------------------------------------------------------------------|
| Reactivity | The product is stable and non-reactive under normal conditions of use, storage and transport. |
| Chemical stability | Material is stable under normal conditions. |
| Possibility of hazardous reactions | No dangerous reaction known under conditions of normal use. |
| Conditions to avoid | Contact with incompatible materials. |
| Incompatible materials | Strong oxidizing agents. |
| Hazardous decomposition products | No hazardous decomposition products are known. |

11. Toxicological information

| | |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Acute toxicity | May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction. |
| Skin corrosion/irritation | Not likely, due to the form of the product. |
| Serious eye damage/eye irritation | Not likely, due to the form of the product. |

Respiratory or skin sensitization

ACGIH sensitization

HARD METALS CONTAINING COBALT AND
TUNGSTEN CARBIDE, THORACIC FRACTION, AS CO
(CAS 7440-48-4) Respiratory sensitization

Japan Society for Occupational Health: Respiratory sensitizer

Beryllium (CAS 7440-41-7) 1 Known respiratory sensitizer.
Cobalt (CAS 7440-48-4) 1 Known respiratory sensitizer.
Nickel (CAS 7440-02-0) 2 Probable respiratory sensitizer.

Japan Society for Occupational Health: Skin sensitizer

Beryllium (CAS 7440-41-7) 2 Probable skin sensitizer.
Cobalt (CAS 7440-48-4) 1 Known skin sensitizer.
Copper (CAS 7440-50-8) 2 Probable skin sensitizer.
Nickel (CAS 7440-02-0) 1 Known skin sensitizer.

Respiratory sensitization May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Skin sensitization May cause an allergic skin reaction.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity May cause cancer.

ACGIH Carcinogens

Cobalt (CAS 7440-48-4) A2 Suspected human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

Beryllium (CAS 7440-41-7) 1 Carcinogenic to humans.
Cobalt (CAS 7440-48-4) 2B Possibly carcinogenic to humans.
Nickel (CAS 7440-02-0) 2B Possibly carcinogenic to humans.

Japan Society for Occupational Health: Carcinogen

Beryllium (CAS 7440-41-7) 1 Carcinogenic to humans.
Cobalt (CAS 7440-48-4) 2B Possibly carcinogenic to humans.
Nickel (CAS 7440-02-0) 1 Carcinogenic to humans.

NTP Report on Carcinogens

Cobalt (CAS 7440-48-4) Reasonably Anticipated to be a Human Carcinogen.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - repeated exposure May cause damage to organs (respiratory system) through prolonged or repeated exposure.

Aspiration hazard Not an aspiration hazard.

12. Ecological information

Ecotoxicological data

| Product | Species | Test Results |
|--------------------------------|--------------|---------------------------------|
| Copper Beryllium Wrought Alloy | | |
| Aquatic | | |
| Crustacea | EC50 Daphnia | 0.1746 mg/l, 48 hours estimated |
| Fish | LC50 Fish | 2.5673 mg/l, 96 hours estimated |

Ecotoxicity The product is not classified as environmentally hazardous.

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulation No data available.

Mobility in soil No data available for this product.

Hazardous to the ozone layer No data available.

Other hazardous effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Residual waste Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

Local disposal regulations Material should be recycled if possible. Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

14. Transport information

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not available.

National regulations Follow regulation in section 15 for domestic transportation.

15. Regulatory information

Industrial Safety and Health Act

Specified substances regulation

Class 1 designated chemical substances

BERYLLIUM AND ITS COMPOUNDS

Class 2 designated chemical substances

COBALT

Cobalt and its inorganic compounds

NICKEL COMPOUNDS (POWDER, EXCLUDING

NICKEL CARBONYL (ITEM NO. 24))

Notifiable substances

BERYLLIUM AND ITS COMPOUNDS

Table 9 Ordinance No. VI 0.15 - 2.0 %

COBALT AND COBALT COMPOUNDS

Table 9 Ordinance No. 172 0 - 2.7 %

COPPER AND COPPER COMPOUNDS

Table 9 Ordinance No. 379 96 - 100 %

NICKEL

Table 9 Ordinance No. 418 0 - 2.2 %

Labeling substances

BERYLLIUM AND ITS COMPOUNDS

0.15 - 2.0 %

COBALT (POWDER)

0 - 2.7 %

COBALT AND COBALT COMPOUNDS

0 - 2.7 %

COPPER (POWDER)

96 - 100 %

COPPER AND COPPER COMPOUNDS

96 - 100 %

Poisonous and Deleterious Substances Control Act

Specified poisonous substances

Not regulated.

Poisonous substances

Not regulated.

Deleterious substances

Not regulated.

Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.

Class I specified chemical substances

Not regulated.

Class II specified chemical substances

Not regulated.

Monitoring chemical substances

Not regulated.

Priority Assessment Chemical Substances (PACs)

Not regulated.

Reporting Exempted Substances

Not regulated.

Law concerning Pollutant Release and Transfer Register

Specified class 1 substances (substance name, ordinance number and content)

BERYLLIUM AND ITS COMPOUNDS

Ordinance No. 394 2.0 %

(Beryllium)

| | | | |
|--------------------------------------------------------------------------|-------------------|-------|----------|
| NICKEL COMPOUNDS | Ordinance No. 309 | 2.2 % | (Nickel) |
| Class 1 substances (substance name, ordinance number and content) | | | |
| COBALT AND ITS COMPOUNDS | Ordinance No. 132 | 2.7 % | (Cobalt) |
| NICKEL | Ordinance No. 308 | 2.2 % | (Nickel) |
| Class 2 substances (substance name, ordinance number and content) | | | |
| Not regulated. | | | |

Ship Safety Law, Dangerous Goods Marine Transport and Storage Rule Not regulated.

Air Law, Enforcement Rule Not regulated.

Explosives Control Act
Not regulated.

Water Pollution Control Act
COPPER

Sewage Act
COPPER AND ITS COMPOUNDS (AS CU) 3 MG/L

16. Other information

Bibliography

HSDB® - Hazardous Substances Data Bank
IARC Monographs. Overall Evaluation of Carcinogenicity
Japan Society for Occupational Health, Recommendation of Occupational Exposure Limits
Japan Chemical Industry Association (JCIA) GHS Guideline, June 2012
JIS Z 7252:2014 Classification of chemicals based on "Globally Harmonized System of Classification and Labelling of Chemicals (GHS)"
JIS Z 7253:2012 Hazard communication of chemicals based on GHS – Labelling and Safety Data Sheet (SDS)

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Other information Date change.