SAFETY DATA SHEET

1. Identification
Product identifier: Copper Beryllium Wrought Alloy
Other means of identification
SDS number: A10
Synonyms: 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®, EtchMet™

Manufacturer/Importer/Supplier/Distributor information
Manufacturer
Company name: Materion Brush Inc.
Address: 6070 Parkland Boulevard
Mayfield Heights, OH 44124
United States
Telephone: 1.800.862.4118
Website: www.materion.com
E-mail: ehs@materion.com
Contact person: Theodore Knudson
Emergency phone number: 1.800.862.4118

2. Hazard(s) Identification
Physical hazards: Not classified.
Health hazards: Sensitization, skin
Carcinogenicity
Specific target organ toxicity, repeated exposure
Category 1
Category 1
Category 1 (Respiratory system)
Environmental hazards: Not classified.
OSHA defined hazards: Not classified.
Label elements

Signal word: Danger
Hazard statement: May cause cancer by inhalation. May cause allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Causes 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.
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.”

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.

5. Fire-fighting measures

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

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

Specific hazards arising from the chemical
Not applicable.

Special protective equipment and precautions for firefighters
Firefighters should wear full protective clothing including self contained breathing apparatus. Wear suitable protective equipment.

Fire fighting equipment/instructions
Move containers from fire area if you can do so without risk. Water runoff can cause environmental damage.

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 procedures
In solid form this material poses no special clean-up problems. Wear appropriate protective equipment and clothing during clean-up.

Methods and materials for containment and cleaning up
Clean up in accordance with all applicable regulations.

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.

7. Handling and storage

Precautions for safe handling
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. Wear protective gloves/protective clothing/eye protection/face protection. Wear respiratory protection. Wash thoroughly after handling. When using, do not eat, drink or smoke. Contaminated work clothing must not be allowed out of the workplace.

Conditions for safe storage, including any incompatibilities
Keep locked-up. Avoid contact with acids and alkalies. Avoid contact with oxidizing agents.
Biological limit values

<table>
<thead>
<tr>
<th>ACGIH Biological Exposure Indices</th>
<th>Value</th>
<th>Determinant</th>
<th>Specimen</th>
<th>Sampling Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cobalt (CAS 7440-48-4)</td>
<td>15 µg/l</td>
<td>Cobalt</td>
<td>Urine</td>
<td>*</td>
</tr>
</tbody>
</table>

* For sampling details, please see the source document.

Exposure guidelines

Based on joint research conducted with the National Institute for Occupational Safety and Health (NIOSH), Materion adopted an 8 element Beryllium Worker Protection Model (BWPM) which includes the use of a recommended exposure guideline (REG) for airborne beryllium of 0.2 µg/m³ as a time-weighted average (TWA) limit for an 8-hour work day. Subsequent NIOSH studies have shown that the BWPM has reduced but not eliminated the risk of beryllium sensitization and chronic beryllium disease (CBD) in workers. Information on the BWPM can be found at www.berylliumsafety.com or by contacting Materion at +1 800.862.4118. In January 2017, OSHA issued a comprehensive occupational health standard for beryllium which includes a Permissible Exposure Limit (PEL) of 0.2 µg/m³ as an 8-hour TWA. In its evaluation, OSHA concluded that "despite the reduction in risk expected with the new PEL, the risks of CBD and cancer to workers with average exposure levels of 0.2 µg/m³ are still clearly significant." (Preamble to Final Rule, Occupational Exposure to Beryllium, Docket #OSHA-H005C-2006-0870, at 316.) Therefore, Materion recommends that beryllium users not only comply with the OSHA Beryllium Standard and carefully apply all elements of the BWPM, but reduce airborne exposures to the lowest feasible level.

The American Conference of Governmental Industrial Hygienists (ACGIH®) is a scientific body that has developed guidelines for all listed substances. In its development documents, the ACGIH® states that "Threshold Limit Values and Biological Exposure Indices represent conditions under which ACGIH® believes that nearly all workers may be repeatedly exposed without adverse health effects. They are not fine lines between safe and dangerous exposures, nor are they a relative index of toxicology."

Specific genetic factors have been identified and shown to increase an individual's susceptibility to CBD. Medical testing is available to detect those genetic factors in individuals.

Appropriate engineering controls

Ensure adequate ventilation, especially in confined areas.

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.

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.

Individual protection measures, such as personal protective equipment

Eye/face 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 protection

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

Other
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.
11. Toxicological information

Information on likely routes of exposure

**Inhalation**
May cause sensitization by inhalation. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause damage to organs (respiratory system) through prolonged or repeated exposure.

**Skin contact**
May cause an allergic skin reaction.

**Eye contact**
Not likely, due to the form of the product.

**Ingestion**
Not likely, due to the form of the product.

Symptoms related to the physical, chemical and toxicological characteristics

Respiratory disorder.

Information on toxicological effects

**Acute toxicity**
May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause allergic skin reaction.

**Skin corrosion/irritation**
Not likely, due to the form of the product.

**Serious eye damage/eye irritation**
Harmful in contact with eyes.

Respiratory or skin sensitization

ACGIH sensitization

BERYLLIUM AND COMPOUNDS, SOLUBLE AND INSOLUBLE COMPOUNDS, AS BE, INHALABLE FRACTION (CAS 7440-41-7)
Respiratory sensitization

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

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

**Skin sensitization**
May cause an allergic skin reaction.

**Germ cell mutagenicity**
Due to lack of data the classification is not possible.

**Carcinogenicity**
Cancer hazard.

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.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Beryllium (CAS 7440-41-7) Cancer

US. National Toxicology Program (NTP) Report on Carcinogens

Beryllium (CAS 7440-41-7) Known To Be Human Carcinogen.
Cobalt (CAS 7440-48-4) Reasonably Anticipated to be a Human Carcinogen.
Nickel (CAS 7440-02-0) Known To Be Human Carcinogen.

Reasonably Anticipated to be a Human Carcinogen.

**Reproductive toxicity**
Not classified.

**Specific target organ toxicity - single exposure**
May cause allergy or asthma symptoms or breathing difficulties if inhaled.

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

**Aspiration hazard**
Due to lack of data the classification is not possible.

**Chronic effects**
Hazardous by OSHA criteria. May cause damage to organs through prolonged or repeated exposure.

**Further information**
Symptoms may be delayed.
SARA 313 (TRI reporting)

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS number</th>
<th>% by wt.</th>
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<tbody>
<tr>
<td>Beryllium</td>
<td>7440-41-7</td>
<td>0.15 - 2</td>
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<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>0 - 2.7</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>96.3 - 99.5</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>0 - 2.2</td>
</tr>
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</table>

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
- Beryllium (CAS 7440-41-7)
- Cobalt (CAS 7440-48-4)
- Nickel (CAS 7440-02-0)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
- Not regulated.

Safe Drinking Water Act (SDWA)
- Contains component(s) regulated under the Safe Drinking Water Act.

US state regulations
- WARNING: This product contains a chemical known to the State of California to cause cancer.

California Proposition 65

WARNING: This product can expose you to chemicals including Cobalt, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

California Proposition 65 - CRT: Listed date/Carcinogenic substance
- Beryllium (CAS 7440-41-7) Listed: October 1, 1987
- Cobalt (CAS 7440-48-4) Listed: July 1, 1992
- Nickel (CAS 7440-02-0) Listed: October 1, 1989

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))
- Beryllium (CAS 7440-41-7)
- Cobalt (CAS 7440-48-4)
- Copper (CAS 7440-50-8)
- Nickel (CAS 7440-02-0)

16. Other information, including date of preparation or last revision

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<tr>
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| Other information | Revised information in Section 9.
Revised information in Section 15. |