



MATERIAL SAFETY DATA SHEET

MATERION

1. Chemical product and company identification

A. Product name M-25 and M-65 Alloys

B. Recommended use and Limitations on use

Recommended use Industrial uses: Uses of substances as such or in preparations at industrial sites
 Offshore industries
 Manufacture of basic metals, including alloys
 Manufacture of computer, electronic and optical products, electrical equipment
 General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment
 Electricity, steam, gas water supply and sewage treatment
 Scientific research and development
 Other: Manufacture of medical and defense equipment Manufacture of fabricated metal products, except machinery and equipment

C. Supplier information

Company name Materion Brush Inc.
Address 6070 Parkland Boulevard
 Mayfield Heights OH 44124
 United States

Email ehs@materion.com

Contact person Theodore Knudson

Emergency telephone number 1.800.862.4118

MSDS number A01

2. Hazards identification

A. Hazard category/Classification

Physical hazards Not classified.

Health hazards

Acute toxicity, oral	Category 4
Acute toxicity, inhalation	Category 4
Sensitization, respiratory	Category 1
Sensitization, skin	Category 1
Carcinogenicity	Category 1B
Reproductive toxicity	Category 2
Specific target organ toxicity, repeated exposure	Category 1 (Respiratory system)

Environmental hazards Not classified.

B. Warning label items including precautionary statement

• Pictogram



• Signal word Danger

• Hazard statement

H302 Harmful if swallowed.
 H317 May cause an allergic skin reaction.
 H332 Harmful if inhaled.
 H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
 H350i May cause cancer by inhalation.
 H361 Suspected of damaging fertility or the unborn child by inhalation.

H372

Causes damage to organs (respiratory system) through prolonged or repeated exposure by inhalation.

• **Precautionary statement**

Prevention

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P264	Wash thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P272	Contaminated work clothing should not be allowed out of the workplace.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P285	In case of inadequate ventilation wear respiratory protection.

Response

P302 + P350	If on skin: Wash with plenty of water.
P308 + P311	If exposed or concerned: Call a poison center/doctor.
P333 + P313	If skin irritation or rash occurs: Get medical advice/attention.
P342 + P311	If experiencing respiratory symptoms: Call a poison center/doctor.

Storage

P405	Store locked up.
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Disposal

P501	Dispose of contents/container in accordance with local/regional/national/international regulations.
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C. Other hazards not included in the hazard category criteria (e.g. dust explosion hazard)

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.

3. Composition/information on ingredients

Chemical identity	Common and alternative names	CAS number	ID number	Content in percent (%)
Copper		7440-50-8	KE-08896	97.1 - 98.6
Beryllium		7440-41-7	KE-02829	0.2 - 2.0
Nickel		7440-02-0	KE-25818	0.0 - 1.4
Lead		7439-92-1	KE-21887, 97-1-9	0.2 - 0.6
Cobalt		7440-48-4	KE-06060	0.0 - 0.35

4. First aid measures

A. In case of eye contact

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

B. In case of skin contact

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.

C. In case of inhalation

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.

D. In case of swallowing

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.

E. Note 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."

General advice

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

A. Suitable (and unsuitable) extinguishing media

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.

B. Specific hazards arising from the chemical (example: hazardous combustion products)

Not available.

C. Specific methods of fire-fighting

Special protective equipment for firefighters

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

Special fire fighting procedures

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

A. Personal precautions, protective equipment and emergency measures

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

B. 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.

C. Methods and materials for containment and cleaning up

Clean up in accordance with all applicable regulations.

7. Handling and storage

A. 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.

B. Conditions for safe storage (including any incompatibilities)

Keep locked up. Avoid contact with acids and alkalis. Avoid contact with oxidizing agents.

8. Exposure controls/personal protection

A. Exposure limit values, biological limit values, etc

Korea. OELs. Standards for Exposure to Chemical Substances and Physically Hazardous Factors

Components	Type	Value	Form
Beryllium (CAS 7440-41-7)	STEL	0.01 mg/m ³	
	TWA	0.002 mg/m ³	
Cobalt (CAS 7440-48-4)	TWA	0.02 mg/m ³	Dust and fume.
Copper (CAS 7440-50-8)	STEL	2 mg/m ³	Dust and mist.
	TWA	1 mg/m ³	Dust and mist.
		0.1 mg/m ³	Fume.
Lead (CAS 7439-92-1)	TWA	0.05 mg/m ³	
Nickel (CAS 7440-02-0)	TWA	1 mg/m ³	

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Beryllium (CAS 7440-41-7)	TWA	0.00005 mg/m ³	Inhalable fraction.
Cobalt (CAS 7440-48-4)	TWA	0.02 mg/m ³	
Copper (CAS 7440-50-8)	TWA	1 mg/m ³	Dust and mist.
		0.2 mg/m ³	Fume.
Lead (CAS 7439-92-1)	TWA	0.05 mg/m ³	
Nickel (CAS 7440-02-0)	TWA	1.5 mg/m ³	Inhalable fraction.

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
Cobalt (CAS 7440-48-4)	15 µg/l	Cobalt	Urine	*
Lead (CAS 7439-92-1)	300 µg/l	Lead	Blood	*

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

Exposure guidelines

Korea OELs: Skin designation

Beryllium (CAS 7440-41-7)

Substance can be absorbed through membrane, eye and skin and can cause whole body effects (It does not mean skin irritant).

B. Appropriate engineering controls

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.

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.

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.

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.

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.

C. 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.

• 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.

• Hand protection

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

- **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.

Hygiene measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

A. Appearance

Physical state	Solid.
Form	Various shapes.
Color	Copper.

B. Odor Not applicable.

C. Odor threshold Not applicable.

D. pH Not applicable.

E. Melting point/freezing point

Melting point 1981.4 °F (1083 °C) estimated

Freezing point 1981.4 °F (1083 °C) estimated

F. Boiling point, initial boiling point, and boiling range 4703 °F (2595 °C) estimated

G. Flash point Not applicable.

H. Evaporation rate Not applicable.

I. Flammability (solid, gas) Not available.

J. Upper/lower limit on flammability or explosive limits

Flammability limit - lower (%) Not applicable.

Flammability limit - upper (%) Not applicable.

Explosive limit - lower (%) Not applicable.

Explosive limit - upper (%) Not applicable.

K. Vapor pressure 0.79 hPa estimated

L. Solubility

Solubility (water) Not applicable.

M. Vapor density Not applicable.

N. Specific gravity 8.82 estimated

O. n-octanol/water partition coefficient Not available.

P. Auto-ignition temperature Not applicable.

Q. Decomposition temperature Not applicable.

R. Viscosity Not applicable.

S. Molecular weight Not available.

Other data

Density 8.82 g/cm³ estimated

Flammability Not applicable.

Relative density Not applicable.

10. Stability and reactivity

A. Stability and hazardous reaction potential

Stability Material is stable under normal conditions.

Hazardous reaction potential Hazardous polymerization does not occur.

B. Conditions to avoid (e.g. static discharge, shock or vibration, etc) Avoid dust formation. Contact with acids. Contact with alkalis.

C. Incompatible materials Do not mix with other chemicals. None known.

D. Hazardous decomposition products No hazardous decomposition products are known.

11. Toxicological information

A. Information on likely routes of exposure

- **Respiratory organs** 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** May cause an allergic skin reaction.
- **Eyes** Not likely, due to the form of the product.
- **Mouth** Not likely, due to the form of the product. Lead is absorbed into the body by ingestion.

B. Information on health hazards

- **Acute toxicity (list all possible routes of exposure)** May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause allergic skin reaction.
- **Corrosivity or irritation to the skin** Not likely, due to the form of the product.
- **Serious eye damage/eye irritation** Harmful in contact with eyes.
- **Respiratory sensitization** May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- **Skin sensitization** May cause an allergic skin reaction.
- **Carcinogenic properties /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.
Lead (CAS 7439-92-1)	2B Possibly carcinogenic to humans.
Nickel (CAS 7440-02-0)	2B Possibly carcinogenic to humans.

- **Mutagenic properties /Mutagenicity** Due to lack of data the classification is not possible.
- **Reproductive toxicity** May damage fertility or the unborn child.
- **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.

12. Ecological information

A. Ecotoxicity

Hazardous to the aquatic environment, acute hazard Very toxic to aquatic life.

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

C. Bioaccumulative potential Not available.

D. Mobility in soil Not available.

E. Other adverse effects Not available.

13. Disposal considerations

A. Method of disposal

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.

**B. Disposal considerations
(including disposal of
contaminated containers or
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.

14. Transport information

IATA

- A. UN number** Not applicable.
B. UN proper shipping name Not applicable.
C. Transport hazard class(es)
 Class Not applicable.
 Subsidiary risk -
D. Packing group Not available.
E. Environmental hazards No.
F. Special precautions for user Not applicable.

IMDG

- A. UN number** Not applicable.
B. UN proper shipping name Not applicable.
C. Transport hazard class(es)
 Class Not applicable.
 Subsidiary risk -
D. Packing group Not available.
E. Environmental hazards
 Marine pollutant No.
EmS Not applicable.
F. Special precautions for user Not applicable.

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

15. Regulatory information

A. Restrictions under the Industrial Safety and Health Law

Harmful Substances Prohibited from Manufacturing

Not regulated.

Harmful Substances Requiring Permission for Manufacture or Use

Beryllium (CAS 7440-41-7)

Controlled Hazardous Substances

Copper (CAS 7440-50-8)

Lead (CAS 7439-92-1)

Nickel (CAS 7440-02-0)

Harmful Substances Requiring Special Medical Examination

Beryllium (CAS 7440-41-7)

Copper (CAS 7440-50-8)

Nickel (CAS 7440-02-0)

Workplace Environmental Monitoring Harmful Materials

Beryllium (CAS 7440-41-7)

Copper (CAS 7440-50-8)

Nickel (CAS 7440-02-0)

Occupational Exposure Limit

Beryllium (CAS 7440-41-7)

Cobalt (CAS 7440-48-4)

Copper (CAS 7440-50-8)

Lead (CAS 7439-92-1)

Nickel (CAS 7440-02-0)

B. Restrictions under the Chemicals Control Law (Previously Toxic Chemicals Control Law)

Accidental Release Prevention Substances

Not regulated.

Observational Chemicals (Revoked)

Not regulated.

C. Restrictions under the Dangerous Substance Safety Management Act

D. Restrictions under the Wastes Control Act

Halogenated Materials in Waste Organic Solvents

Not regulated.

Hazardous Substances

Copper (CAS 7440-50-8)

Hazardous substances in slag, dust, waste molding sand & sand from sand blast, waste refractories & ceramic pieces, residues of incineration, materials treated for stabilization, & waste catalysts 3 MG/L

Hazardous substances in sludge, waste absorbers and absorbers 3 MG/L

E. Restrictions under other foreign or domestic laws

Clean Air Conservation Act

Air Pollutants

Beryllium (CAS 7440-41-7)

Copper (CAS 7440-50-8)

Lead (CAS 7439-92-1)

Nickel (CAS 7440-02-0)

Specific Air Pollutants

Beryllium (CAS 7440-41-7)

Lead (CAS 7439-92-1)

Nickel (CAS 7440-02-0)

Act on the Registration and Evaluation of Chemicals

Banned Toxic Chemicals

Not regulated.

Designated Existing Chemicals Subject to Registration (PEC) (MoE No. 2015-92)

Lead (CAS 7439-92-1)

Restricted Chemical Substances

Lead (CAS 7439-92-1)

LEAD

Toxic Chemicals

Not regulated.

Further information

This material safety data sheet was prepared in accordance with Article 41 of the Industrial Safety and Health Law.

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Korea	Existing Chemicals List (ECL)	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information

- A. Source of information** Not available.
- B. Issue date** 08-11-2015
- C. Number of revisions and date of most recent revision** 10-09-2017 (03 revision)
- D. Other** Revised information in Section 2.
Revised information in Section 4.
Revised information in Section 8.

Further information

Transportation Emergency
Call Chemtrec at:
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