



SAFETY DATA SHEET

MATERION

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Name of the substance	Silver powder
Identification number	231-131-3 (EC number)
Synonyms	Silver-metal
Document number	1ZN
Materion Code	1ZN
Issue date	02-March-2016
Version number	02
Revision date	15-January-2018
Supersedes date	02-March-2016

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Not available.
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

Supplier

Company name	Materion Advanced Chemicals Inc.
Address	407 N. 13th Street 1316 W. St. Paul Avenue Milwaukee, WI 53233 United States
Division	Milwaukee
Telephone	414.212.0257
e-mail	advancedmaterials@materion.com
Contact person	Noreen Atkinson

1.4. Emergency telephone number

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The substance has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Regulation (EC) No 1272/2008 as amended

Environmental hazards

Hazardous to the aquatic environment, acute aquatic hazard	Category 1 M-factor = 1000.	H400 - Very toxic to aquatic life.
Hazardous to the aquatic environment, long-term aquatic hazard	Category 1 M-factor = 1000.	H410 - Very toxic to aquatic life with long lasting effects.

Hazard summary

WARNING

Harmful in contact with eyes. May be harmful in contact with skin. Causes damage to organs. Causes eye irritation. Exposure to powder or dusts may be irritating to eyes, nose and throat. Irritating to skin. Prolonged exposure may cause chronic effects. Not classified for health hazards. However, occupational exposure to the mixture or substance(s) may cause adverse health effects. Dangerous for the environment if discharged into watercourses. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains: Silver powder

Hazard pictograms



Signal word Warning

Hazard statements

H313 May be harmful in contact with skin.
H370 Causes damage to organs ().
H320 Causes eye irritation.
H370 Causes damage to organs.
H372 Causes damage to organs () through prolonged or repeated exposure.
H372 Causes damage to organs through prolonged or repeated exposure.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statements

Prevention

P260 Do not breathe dust.
P264 Wash thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P280 Wear protective gloves.
P272 Contaminated work clothing should not be allowed out of the workplace.

Response

P391 Collect spillage.

Storage

Store away from incompatible materials.

Disposal

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Supplemental label information

For further information, please contact the Product Stewardship Department at +1.800.862.4118.

2.3. Other hazards None known.

SECTION 3: Composition/information on ingredients

3.1. Substances

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Silver powder	90 - 100	7440-22-4 231-131-3	-	-	# M=1000
Classification:	STOT SE 1;H370, STOT RE 1;H372, Aquatic Acute 1;H400, Aquatic Chronic 1;H410				

List of abbreviations and symbols that may be used above

M: M-factor
vPvB: very persistent and very bioaccumulative substance.
PBT: persistent, bioaccumulative and toxic substance.
#: This substance has been assigned Community workplace exposure limit(s).

Composition comments The full text for all H-statements is displayed in section 16.

SECTION 4: First aid measures

General information

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

4.1. Description of first aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact Do not rub eyes. Rinse with water. Get medical attention if irritation develops and persists.
Ingestion Rinse mouth. Get medical attention if symptoms occur.

4.2. Most important symptoms and effects, both acute and delayed

Dusts may irritate the respiratory tract, skin and eyes.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

General fire hazards

No unusual fire or explosion hazards noted.

5.1. Extinguishing media

Suitable extinguishing media Water fog. Foam. Dry chemical powder. Carbon dioxide (CO₂).

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

5.2. Special hazards arising from the substance or mixture During fire, gases hazardous to health may be formed.

5.3. Advice for firefighters

Special protective equipment for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Special firefighting procedures Use water spray to cool unopened containers.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

For emergency responders Keep unnecessary personnel away. Use personal protection recommended in Section 8 of the SDS.

6.2. Environmental precautions

Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

6.3. Methods and material for containment and cleaning up

Avoid the generation of dusts during clean-up. Collect dust using a vacuum cleaner equipped with HEPA filter. The product is immiscible with water and will spread on the water surface. Prevent product from entering drains. Stop the flow of material, if this is without risk.

Large Spills: Wet down with water and dike for later disposal. Shovel the material into waste container. Following product recovery, flush area with water.

Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal.

6.4. Reference to other sections

For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Minimise dust generation and accumulation. Provide appropriate exhaust ventilation at places where dust is formed. Avoid prolonged exposure. Wear appropriate personal protective equipment. Avoid release to the environment. Observe good industrial hygiene practices.

7.2. Conditions for safe storage, including any incompatibilities

Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

7.3. Specific end use(s) Not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

Austria. MAK List, OEL Ordinance (GwV), BGBl. II, no. 184/2001

Material	Type	Value	Form
Silver powder (CAS 7440-22-4)	MAK	0,1 mg/m ³	Inhalable fraction.
	STEL	0,1 mg/m ³	Inhalable fraction.

Belgium. Exposure Limit Values.

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Bulgaria. OELs. Regulation No 13 on protection of workers against risks of exposure to chemical agents at work

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Croatia. Dangerous Substance Exposure Limit Values in the Workplace (ELVs), Annexes 1 and 2, Narodne Novine, 13/09

Material	Type	Value
Silver powder (CAS 7440-22-4)	MAC	0,1 mg/m ³

Czech Republic. OELs. Government Decree 361

Material	Type	Value
Silver powder (CAS 7440-22-4)	Ceiling	0,3 mg/m ³
	TWA	0,1 mg/m ³

Denmark. Exposure Limit Values

Material	Type	Value	Form
Silver powder (CAS 7440-22-4)	TLV	0,01 mg/m ³	Dust.

Estonia. OELs. Occupational Exposure Limits of Hazardous Substances. (Annex of Regulation No. 293 of 18 September 2001)

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Finland. Workplace Exposure Limits

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

France. Threshold Limit Values (VLEP) for Occupational Exposure to Chemicals in France, INRS ED 984

Material	Type	Value
Silver powder (CAS 7440-22-4)	VME	0,1 mg/m ³

Germany. DFG MAK List (advisory OELs). Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (DFG)

Material	Type	Value	Form
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³	Inhalable fraction.

Germany. TRGS 900, Limit Values in the Ambient Air at the Workplace

Material	Type	Value	Form
Silver powder (CAS 7440-22-4)	AGW	0,1 mg/m ³	Inhalable fraction.

Greece. OELs (Decree No. 90/1999, as amended)

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Hungary. OELs. Joint Decree on Chemical Safety of Workplaces

Material	Type	Value
Silver powder (CAS 7440-22-4)	STEL	0,4 mg/m ³
	TWA	0,1 mg/m ³

Iceland. OELs. Regulation 154/1999 on occupational exposure limits

Material	Type	Value	Form
Silver powder (CAS 7440-22-4)	TWA	0,01 mg/m ³	Dust.

Ireland. Occupational Exposure Limits

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Italy. Occupational Exposure Limits

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Latvia. OELs. Occupational exposure limit values of chemical substances in work environment

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Lithuania. OELs. Limit Values for Chemical Substances, General Requirements

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Malta. OELs. Occupational Exposure Limit Values (L.N. 227. of Occupational Health and Safety Authority Act (CAP. 424), Schedules I and V)

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Netherlands. OELs (binding)

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Norway. Administrative Norms for Contaminants in the Workplace

Material	Type	Value	Form
Silver powder (CAS 7440-22-4)	TLV	0,1 mg/m ³	Dust and fume.

Poland. MACs. Regulation regarding maximum permissible concentrations and intensities of harmful factors in the work environment, Annex 1

Material	Type	Value	Form
Silver powder (CAS 7440-22-4)	TWA	0,05 mg/m ³	Inhalable fraction.

Portugal. VLEs. Norm on occupational exposure to chemical agents (NP 1796)

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Romania. OELs. Protection of workers from exposure to chemical agents at the workplace

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Slovakia. OELs. Regulation No. 300/2007 concerning protection of health in work with chemical agents

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Slovenia. OELs. Regulations concerning protection of workers against risks due to exposure to chemicals while working (Official Gazette of the Republic of Slovenia)

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,01 mg/m ³

Spain. Occupational Exposure Limits

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Sweden. OELs. Work Environment Authority (AV), Occupational Exposure Limit Values (AFS 2015:7)

Material	Type	Value	Form
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³	Total dust.

Switzerland. SUVA Grenzwerte am Arbeitsplatz

Material	Type	Value	Form
Silver powder (CAS 7440-22-4)	STEL	0,8 mg/m ³	Inhalable dust.
	TWA	0,1 mg/m ³	Inhalable dust.

UK. EH40 Workplace Exposure Limits (WELs)

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU

Material	Type	Value
Silver powder (CAS 7440-22-4)	TWA	0,1 mg/m ³

Biological limit values No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures Follow standard monitoring procedures.

Derived no effect levels (DNELs) Not available.

Predicted no effect concentrations (PNECs) Not available.

8.2. Exposure controls

Appropriate engineering controls 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. If engineering measures are not sufficient to maintain concentrations of dust particulates below the OEL (occupational exposure limit), suitable respiratory protection must be worn. If material is ground, cut, or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits.

Individual protection measures, such as personal protective equipment

General information Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

- Hand protection Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.

- Other Wear suitable protective clothing.

Respiratory protection Wear respirator with dust filter.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

Hygiene measures Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Environmental exposure controls Inform appropriate managerial or supervisory personnel of all environmental releases.

SECTION 9: Physical and chemical properties**9.1. Information on basic physical and chemical properties****Appearance**

Physical state Solid.

Form Powder.

Colour Not available.

Odour Not available.

Odour threshold Not available.

pH Not available.

Melting point/freezing point 960,5 °C (1760,9 °F)

Initial boiling point and boiling range 2000 °C (3632 °F)

Flash point Not available.

Evaporation rate Not available.

Flammability (solid, gas) Not available.

Upper/lower flammability or explosive limits**Flammability limit - lower (%)** Not available.**Flammability limit - upper (%)** Not available.**Vapour pressure** < 0,0000001 kPa at 25 °C**Vapour density** Not available.**Relative density** Not available.**Solubility(ies)****Solubility (water)** Insoluble**Partition coefficient (n-octanol/water)** Not available.**Auto-ignition temperature** Not available.**Decomposition temperature** Not available.**Viscosity** Not available.**Explosive properties** Not explosive.**Oxidising properties** Not oxidising.**9.2. Other information****Density** 10,49 g/cm³ estimated at 15 °C**Molecular formula** Ag**Molecular weight** 107,86 g/mol**Specific gravity** 10,49 at 15 °C**SECTION 10: Stability and reactivity****10.1. Reactivity** The product is stable and non-reactive under normal conditions of use, storage and transport.**10.2. Chemical stability** Material is stable under normal conditions.**10.3. Possibility of hazardous reactions** No dangerous reaction known under conditions of normal use.**10.4. Conditions to avoid** Contact with incompatible materials.**10.5. Incompatible materials** Ammonia. Chlorine.**10.6. Hazardous decomposition products** No hazardous decomposition products are known.**SECTION 11: Toxicological information****General information** Occupational exposure to the substance or mixture may cause adverse effects.**Information on likely routes of exposure****Inhalation** Dust may irritate respiratory system. Prolonged inhalation may be harmful.**Skin contact** Dust or powder may irritate the skin.**Eye contact** Dust may irritate the eyes.**Ingestion** May cause discomfort if swallowed. However, ingestion is not likely to be a primary route of occupational exposure.**Symptoms** Dusts may irritate the respiratory tract, skin and eyes.**11.1. Information on toxicological effects****Acute toxicity**

Product	Species	Test results
Silver powder (CAS 7440-22-4)		
Acute		
Dermal		
LD50	Rat	> 2000 mg/kg
Oral		
LD50	Rat	> 5000 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation Due to partial or complete lack of data the classification is not possible.**Serious eye damage/eye irritation** Due to partial or complete lack of data the classification is not possible.

Respiratory sensitisation	Due to partial or complete lack of data the classification is not possible.
Skin sensitisation	Due to partial or complete lack of data the classification is not possible.
Germ cell mutagenicity	Due to partial or complete lack of data the classification is not possible.
Carcinogenicity	Due to partial or complete lack of data the classification is not possible.

Hungary. 26/2000 EüM Ordinance on protection against and preventing risk relating to exposure to carcinogens at work (as amended)

Not listed.

Reproductive toxicity	Due to partial or complete lack of data the classification is not possible.
Specific target organ toxicity - single exposure	Due to partial or complete lack of data the classification is not possible.
Specific target organ toxicity - repeated exposure	Due to partial or complete lack of data the classification is not possible.
Aspiration hazard	Due to partial or complete lack of data the classification is not possible.
Mixture versus substance information	No information available.
Other information	Not available.

SECTION 12: Ecological information

12.1. Toxicity Very toxic to aquatic life with long lasting effects.

Product	Species	Test results
Silver powder (CAS 7440-22-4)		
Aquatic		
Crustacea	EC50	Water flea (Daphnia magna) 0,0002 mg/l, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas) 0,0023 - 0,0033 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

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

12.3. Bioaccumulative potential No data available.

Partition coefficient n-octanol/water (log Kow) Not available.

Bioconcentration factor (BCF) Not available.

12.4. Mobility in soil No data available.

12.5. Results of PBT and vPvB assessment Not available.

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

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste Dispose of in accordance with local regulations. 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 Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

EU waste code The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Disposal methods/information Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Special precautions Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR

14.1. UN number UN3077

14.2. UN proper shipping name Environmentally hazardous substance, solid, n.o.s. (Silver powder)

14.3. Transport hazard class(es)

Class 9

Subsidiary risk -

Label(s) 9

Hazard No. (ADR) 90

Tunnel restriction code E

14.4. Packing group III

14.5. Environmental hazards No.

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

RID

14.1. UN number UN3077

14.2. UN proper shipping name Environmentally hazardous substance, solid, n.o.s. (Silver powder)

14.3. Transport hazard class(es)

Class 9

Subsidiary risk -

Label(s) 9

14.4. Packing group III

14.5. Environmental hazards No.

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

ADN

14.1. UN number UN3077

14.2. UN proper shipping name Environmentally Hazardous Solid, N.o.s. (Silver powder)

14.3. Transport hazard class(es)

Class 9

Subsidiary risk -

Label(s) 9

14.4. Packing group III

14.5. Environmental hazards No.

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IATA

14.1. UN number UN3077

14.2. UN proper shipping name Environmentally hazardous substance, solid, n.o.s. (Silver powder)

14.3. Transport hazard class(es)

Class 9

Subsidiary risk -

14.4. Packing group III

14.5. Environmental hazards No.

ERG Code 9L

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Other information

Passenger and cargo aircraft Allowed with restrictions.

Cargo aircraft only Allowed with restrictions.

IMDG

14.1. UN number UN3077

14.2. UN proper shipping name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Silver powder)

14.3. Transport hazard class(es)

Class 9

Subsidiary risk -

14.4. Packing group III

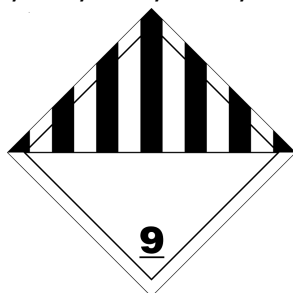
14.5. Environmental hazards

Marine pollutant No.

EmS F-A, S-F

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

ADN; ADR; IATA; IMDG; RID



SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work, as amended.

Not listed.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

Not listed.

Other regulations

The product is classified and labelled in accordance with EC directives or respective national laws. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006, as amended.

National regulations

Follow national regulation for work with chemical agents.

15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations Not available.

Information on evaluation method leading to the classification of mixture Not applicable.

Disclaimer

Materion Advanced Chemicals Inc. cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. This document has been prepared using data from sources considered to be technically reliable and the information is believed to be correct. Materion makes no warranties, expressed or implied, as to the accuracy of the information contained herein. Materion cannot anticipate all conditions under which this information and its products may be used and the actual conditions of use are beyond its control. The user is responsible to evaluate all available information when using this product for any particular use and to comply with all Federal, State, Provincial and Local laws, statutes and regulations.