



CHROMEL

SAFETY DATA SHEET

1.0 PRODUCT AND COMPANY IDENTIFICATION

- 1.1 Product identifiers**
Product Name : **Wire Alloy (All Grades)**
- 1.2 Relevant identified uses of the substance or mixture and uses advised against**
Identified Uses : Industrial and commercial.
- 1.3 Details of the supplier of the safety data sheet**
Company Malin Co.
5400 Smith Road.
Brook Park, Ohio 44142
Phone (216) 267-9080
Fax (216) 267-9077
- 1.4 Emergency telephone number**
Emergency Phone # : +1 800-424-9300 (CHEMTREC)
+1 613-996-6666 (CANADA)

2.0 HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

OSHA Hazards: Acute Toxicant
Irritant
Target Organ Toxicity – Lungs, Central Nervous System
Carcinogen Reproductive Toxicant Mutagen
Skin/Respiratory Sensitizer

GHS Classification:	Acute Toxicity (oral)	– Category 3	Eye Damage/Irritation	– Category 2B
	Respiratory Sensitizer	– Category 1	Skin Sensitizer	– Category 1
	Germ Cell Mutagenicity	– Category 2	Carcinogenicity	– Category 1B
	Toxic to Reproduction	– Category 1A		
	Specific Target Organ Toxicity (Repeated Exposure)			– Category 1
	Hazardous to the Aquatic Environment - Acute Hazard			– Category 1
	Hazardous to the Aquatic Environment - Chronic Hazard			– Category 2

2.2 GHS Label elements, including precautionary statements

Pictogram(s)



Signal Word: **Danger**

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General Hazard Statement: Solid metallic brass products are generally classified as "articles" and do not constitute a hazardous material in solid form (as supplied) under the definitions of the OSHA Hazard Communication Standard (OSHA) or Global Harmonized System (GHS).

Any articles manufactured from these solid products would be generally classified as non-hazardous. However some hazardous constituents contained in these products (intentionally added or trace contaminants) can be emitted under certain processing conditions such as but not limited to: burning, melting, cutting, sawing, brazing, grinding, machining, milling, and welding. Products in the solid state present no fire or explosion hazard. Small chips, fines, and dust may ignite readily. The following classifications and SDS information are for the hazardous elements which may be released during processing.

Hazard Statement(s):

- H228 - Flammable solid.
- H301 - Toxic if swallowed.
- H317 - May cause an allergic skin reaction.
- H320 - Causes eye irritation.
- H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- H341 - Suspected of causing genetic defects.
- H350 - May cause cancer.
- H360 - May damage fertility or the unborn child.
- H372 - Causes damage to respiratory system through prolonged or repeated exposure.
- H400 - Very toxic to aquatic life.
- H410 - Toxic to aquatic life with long lasting effects.

Precautionary Statement(s):

- P201 - Obtain special instructions before use.
- P202 - Do not handle until all safety precautions have been read and understood.
- P210 - Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
- P241 - Use explosion proof electrical/ventilating/lighting equipment.
- P260 - Do not breathe dust/fume.
- 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.
- P273 - Avoid release to the environment.
- P280 - Wear protective gloves/protective clothing/eye protection/face protection.
- P284 - In case of inadequate ventilation wear respiratory protection

Response(s):

In case of dust fire: Use Class D agent to extinguish.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists get medical advice/attention.

IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms: Call a poison center/doctor.

IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse.

If exposed or concerned: Get medical advice/attention. Get medical advice/attention if you feel unwell. Collect spillage.

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- 2.3 **Hazards not otherwise classified (HNOC) or not covered by GHS**
DANGER! DUSTS AND FUMES HARMFUL IF INHALED. DUST AND FUMES MAY CAUSE SEVERE IRRITATION AND/OR ALLERGIC REACTION AND MAY CONTAIN TRACE CARCINOGENS, MUTAGENS, AND REPRODUCTIVE/DEVELOPMENTAL TOXICANTS. HOT MATERIAL MAY CAUSE BURNS. SEE SECTION 11.0 FOR DETAILED TOXICOLOGICAL INFORMATION.
- Potential Health Effects**
Primary routes of exposure: Eye and skin contact; inhalation.
- Eye Contact**
May be severely irritating to the eyes. Symptoms may include pain, tears, burns, sensitivity to light, swelling and possible corneal damage. Scratching of the cornea can also occur if eye is rubbed. Fumes from hot material may be irritating. Contact with the heated material may cause thermal burns.
- Skin Contact**
May be irritating to the skin. Repeated or prolonged skin contact may result in drying, reddening, itching, and cracking. May contain components that are capable of causing an allergic reaction. Contact with heated material may cause thermal burns.
- Inhalation**
Dusts may cause irritation of the nose, throat, and lungs. Excessive inhalation of metallic fumes or dusts may result in metal fume fever, an influenza-like illness. It is characterized by a sweet or metallic taste in the mouth, accompanied by dryness and irritation of the throat, cough, shortness of breath, pulmonary edema, general malaise, weakness, fatigue, muscle and joint pains, blurred vision, fever and chills. Typical symptoms last from 12 to 48 hours.
- Ingestion**
Swallowing large amounts may cause irritation of the digestive tract, resulting in nausea, and diarrhea.
- Chronic or Special Toxic Effects**
Repeated exposure to fine dusts may inflame the nasal mucosa and cause changes to the lung. The presence of trace components may cause cancer or reproductive effects. See Section 11.0 regarding toxicity.
- Target Organs**
Overexposure to specific components of this product may cause adverse effects to the following organs or systems: eyes, skin, liver, kidney, central nervous system, cardiovascular system, hematopoietic (blood) system, and respiratory system.
- Medical Conditions Aggravated by Exposure**
Diseases of the skin such as eczema may be aggravated by exposure. Also, disorders of the respiratory system including asthma, bronchitis, and emphysema may be aggravated. Long-term inhalation exposure to agents that cause pneumoconiosis (e.g. dust) may act synergistically with inhalation of oxide fumes or dusts of this product.

3.0 COMPOSITION AND INFORMATION ON INGREDIENTS

3.1 Substances

Formula:	Mixture
Molecular weight	Not Applicable
CAS-No.:	Not Applicable

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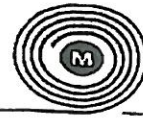


Hazardous Components Intentionally Added Components Only

ALLOY	Copper (7440-50-8) (Cu)	Iron (7439-89-6) (Fe)	Tin (7440-31-5) (Sn)	Nickel (7440-02-0) (Ni)	Manganese (7439-96-5) (Mn)	Phosphorus (7723-14-0) (P)	Silicon (7440-21-3) (Si)	Zinc (7440-66-6) (Zn)	Silver (7440-22-4) (Ag)	Aluminum (7429-90-5) (Al)	Electroplated Tin Version
10200	99.95								0.05		▲
11000	99.90								0.10		▲
12200	99.90					0.015-0.040					▲
18900	REM		0.70-0.90		0.10-0.30		0.15-0.40				▲
18901	REM		0.70-0.90		0.17-0.27		0.20-0.30				▲
18982	REM		0.35-0.45		0.35-0.45	0.15	0.35-0.45				▲
21000	94.0-96.0							REM			▲
22000	89.0-91.0							REM			▲
22002	89.0-91.0							9.35-10.35			▲
22003	89.0-91.0							REM			▲
22600	86.0-89.0							REM			▲
23000	84.0-86.0							REM			▲
23400	81.0-84.0							REM			▲
24000	78.5-81.5							REM		0.10	▲
26000	68.5-71.5							REM			▲
26001	69.0-71.0							REM			▲
26002	69.0-71.0							REM			▲
26011	69.0-71.0		0.1-5.0					REM			▲
27000	66.5-68.5							REM			▲
27001	66.5-68.5							REM			▲
27005	66.5-68.5							REM			▲
27400	62.0-64.0							REM			▲
41100	89.0-92.0		0.30-0.70					REM			▲
42000	88.0-91.0		1.5-2.0	0.10		0.25		REM			▲
42500	87.2-89.6		1.6-2.4					REM			▲
43600	80.0-83.0		0.20-0.50					REM			▲
50110	REM		0.50-0.80								▲
50200	REM		1.0-1.5	0.5							▲
50700	REM		1.5-2.0			0.30					▲
50900	REM	0.10	2.5-3.8					0.30			▲
51000	REM	0.10	4.2-5.8			0.10-0.35		0.30			▲
51002	REM	0.10	4.5-4.9			0.16-0.20		0.30			▲
51003	REM		4.5-5.1	0.10		0.06-0.10					▲
51004	REM		4.5-5.1			0.10-0.14		0.30			▲

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ALLOY	Copper (7440-50-8) (Cu)	Iron (7439-89-6) (Fe)	Tin (7440-31-5) (Sn)	Nickel (7440-02-0) (Ni)	Manganese (7439-96-5) (Mn)	Phosphorus (7723-14-0) (P)	Silicon (7440-21-3) (Si)	Zinc (7440-66-6) (Zn)	Silver (7440-22-4) (Ag)	Aluminum (7429-90-5) (Al)	Electroplated Tin Version
51900	REM	0.10	4.2-5.8			0.03-0.35		0.30			▲
51901	REM	0.10	6.0-6.6	0.10		0.06-0.10		0.20			▲
51904	REM	0.10	5.6-6.2	0.10		0.18-0.24		0.20			▲
52100	REM	0.10	7.0-8.0			0.20-0.30		0.20			▲
52101	REM	0.10	7.6-8.0			0.06-0.10		0.20			▲
52103	REM		7.5-8.10	0.10		0.12-0.18		0.20			▲
52104	REM		7.8-8.2	0.10		0.20-0.26		0.20			▲
61000	REM				0.50		0.10	0.20		6.5-7.5	
64900	REM	0.10	1.2-1.6	0.10			0.80-1.20	0.20		0.10	▲
65100	REM	0.25	0.20		0.70		0.80-2.0	1.5			▲
65101	REM				0.70		1.5-2.0	1.5			▲
65103	REM	0.25	0.20		0.20-0.40		1.75-1.95	1.5			▲
65130	REM	0.25	0.20		0.70		1.5-2.0	0.40 - 1.25			▲
65300	REM	0.25	0.20		0.20-0.40		2.2-2.4				▲
65502	REM	0.25	0.30	0.15	0.8-1.05		2.8-3.05	0.50			▲
65600	REM	0.25	0.30	0.15	1.5		2.8-4.0	0.50			▲
65601	REM	0.20	0.20	0.10	0.75-1.2		2.8-3.25	0.20			▲
65605	REM				0.80-1.2		3.3-3.5				▲
70260	REM		0.05-0.10	1.9-2.2			0.4-0.5	0.10-0.40			▲
70500	REM	0.10		5.0-6.1	0.30-0.35						▲
70600	REM	1.0-1.8		9.0-11.0	1.0			0.10			▲
70700	REM			9.5-10.1	0.35-0.40						▲
71100	REM	0.10		22.0-24.0	0.55-0.60			0.20			▲
72500	REM	0.25	1.8-2.8	8.5-10.5	0.12-0.20			0.50			▲
74000	69.0-73.5	0.25		9.0-11.0	0.50			REM			▲
74500	63.5-66.5	0.25		9.0-11.0	0.50			REM			▲
75200	64.0-66.0	0.25		16.5-19.5	0.20-0.50			REM			▲
75700	63.5-66.5	0.25		11.0-13.0	0.50			REM			▲
76000	60.0-63.0	0.25		7.0-9.0	0.50			REM			▲
76400	58.5-61.5	0.25		16.5-19.5	0.50			REM			▲
CAC60	REM		0.05-0.150	1.7-1.9			0.37-0.43	1.0-1.2			▲
LA 001	REM	1.75-2.75			2.0-4.0			2.75-4.0			

REM = Remainder

NOTE (▲): Add an additional 0.2% tin for electroplated tin products and adjust other component concentrations accordingly. Consult product technical specifications for more detailed information.

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The above listing is a summary of elements used in alloying brass. Various grades will contain different combinations of these elements. Other trace elements may also be present in minute amounts. These small quantities (less than 0.1%) are frequently referred to as "trace" or "residual" elements; generally they originate in the raw material used. Such elements may include lead (Pb), arsenic (As), trivalent chromium (Cr), Molybdenum (Mo), cadmium (Cd), barium (Ba), mercury (Hg), nitrogen (N), and oxygen (O). Various byproducts of processing from these trace elements may include nitric oxide, nitrogen dioxide, and ozone, and these byproducts may also be considered trace. If listed in the above table, the ingredient is considered to be a component rather than trace.

4.0 FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

If the exposed person has been overcome, notify response personnel and place established emergency rescue procedures into effect. Remove to fresh air. Get immediate medical attention if symptoms described in this SDS develop. If not breathing, begin rescue breathing. If breathing is difficult, ensure that airway is clear and give oxygen.

In case of skin contact

Wash skin with large amounts of water. Get medical attention if irritation develops or persists. If thermal burn occurs, flush area with cold water and get immediate medical attention. If widespread contamination occurs, remove contaminated clothing under safety shower and wash exposed areas with soap and large quantities of water. Obtain medical attention immediately.

In case of eye contact

In case of overexposure to dusts or fumes, immediately flush eyes with plenty of water for at least 20 minutes occasionally lifting the eye lids. Get medical attention. Thermal burns should be treated as medical emergencies.

If swallowed

Rinse mouth. DO NOT INDUCE VOMITING. Give plenty of water to drink. Obtain medical attention immediately. Never give anything by mouth to an unconscious person. Treat symptomatically and supportively. Get medical attention.

4.2 Most important symptoms and effects, both acute and delayed

Inhalation of metal fume or metal oxides may produce an acute febrile state, with cough, chills, weakness, and general malaise, nausea, vomiting, muscle cramps, and remarkable leukocytosis. Treatment is symptomatic, and condition is self-limited in 24-48 hours. Chronic exposure to dusts may result in pneumoconiosis of mixed type. Nickel is reasonably anticipated to be a human carcinogen. See Section 11.0 for more toxicological information.

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5.0 FIREFIGHTING MEASURES

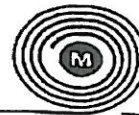
5.1 Extinguishing media

Suitable extinguishing media

Product as supplied in solid form is noncombustible. Use firefighting measures for surrounding materials. Use Class D fire extinguisher for fires involving metal dusts. Do not use water on product if it has become molten.

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5.2 Special hazards arising from the substance or mixture

Vapors and fumes containing metals (or their oxides) may be formed at temperatures above the melting point. Exposure to unknown concentrations of fumes and vapors require the wearing of a pressure-demand airline respirator or pressure-demand self-contained breathing apparatus (SCBA).

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

This product as supplied in solid form is not classified as a U.S. Department of Transportation hazardous material.

6.0 ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Avoid inhalation, eye, or skin contact of dusts by using appropriate precautions outlined in this SDS (see Section 8.0). Keep unauthorized personnel away.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Vacuum type equipment is effective for control and cleanup. Vacuum and ventilation equipment should have HEPA type filters where appropriate. Material should be swept or vacuumed and placed into appropriate disposable containers. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see Section 13.

7.0 HANDLING AND STORAGE

7.1 Precautions for safe handling

Stable under normal temperatures and pressures. Do not store on the ground. Avoid breathing dusts or fumes. Use confined space entry procedures when entering baghouses, vessels, tanks, or other confined areas that contain furnace dust. Dust must be stored in approved containers located in approved areas.

7.2 Conditions for safe storage, including any incompatibilities

Store away from strong acids and oxidizers.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8.0 EXPOSURE CONTROLS AND PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Applicable OSHA and ACGIH Permissible Exposure Limits (PELs) and Threshold Limit Values (TLVs) are indicated for intentionally added components only. PELs and TLVs listed as 8-Hour Time Weighted Averages (TWA). Consult appropriate workplace regulatory exposure requirements for trace metal contaminants based on the type of product processing or use and metal or metallic oxides produced in the form of dust, mists and fumes.

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OCCUPATIONAL EXPOSURE LIMITS Intentionally Added Components Only	OSHA TWA mg/m ³	ACGIH TWA mg/m ³	IDLH mg/m ³
Aluminum (total dust)	15.0	10.0	500.0
Aluminum (respirable fraction)	5.0	5.0	-
Copper (fume)	0.1	0.2	100.0
Copper (dust and mists)	1.0	1.0	100.0
Iron (oxide fume)	10.0	5.0	2,500.0
Manganese (compounds and fume)	5.0	0.2	500.0
Nickel (metal and insoluble compounds)	1.0	1.5 (as Ni)	10.0
Phosphorus (yellow)	0.1	0.1	5.0
Silicon (total dust)	15.0	10.0	-
Silicon (respirable fraction)	5.0	-	-
Silver (metal dust as Ag)	0.01	0.01	-
Tin (inorganic compounds except tin oxide)	2.0	2.0	100.0
Tin (oxide)	-	2.0	100.0
Zinc (oxide fume)	5.0	5.0	500.0
Zinc (oxide total dust)	15.0	10.0	500.0
Zinc (oxide dust respirable fraction)	5.0	-	500.0

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good hygiene practices. Wash and dry hands after use.

Body Protection

Choose body protection in relation to its type, to the concentration and amount of hazardous substances, and to the specific work-place. The type of protective equipment must be selected according to the concentration and amount of the hazardous substance at the specific workplace.

Respiratory protection

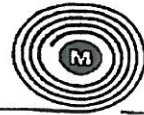
Where protection from nuisance levels of dusts, mists or fumes are desired or the product's use is expected to exceed applicable exposure limits for individual material components, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

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Other

The following work practices should be employed when wire product is processed in a manner that generates metal or metallic oxides in the form of dusts, mists or fumes.

Work Practices

Develop work practices and procedures that prevent particulates, dusts and fumes from coming into contact with worker skin, hair, or personal clothing. If work practices and/or procedures are ineffective in controlling airborne exposures or visual particulates from deposition onto skin, hair, or clothing, provide appropriate cleaning/washing facilities. Never use compressed air to clean work clothing or other surfaces. Fabrication processes may leave a residue of particulates or dust on the surface of parts, products or equipment that could result in employee exposure during subsequent material handling activities. As necessary, clean loose particulates and dusts from parts between processing steps. As a standard hygiene practice, wash hands before eating or smoking. To prevent exposure, remove surface scale or oxidation formed on cast or heat treated products in an adequately ventilated process prior to working the surface.

Wet Methods

Machining operations are usually performed under a liquid lubricant/coolant flood which assists in reducing airborne particulates and dusts. However, the cycling through of machine coolant containing finely divided particulates or dusts in suspension can result in the concentration building to a point where the metal 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 particulates from the coolant.

Respiratory Protection

When airborne exposures exceed or have the potential to exceed occupational exposure limits, NIOSH (US) or CEN (EU) 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. Exposure to unknown concentrations of particulates, dusts and/or fumes requires the wearing of a pressure-demand airline respirator or pressure-demand self-contained breathing apparatus (SCBA). Use pressure-demand airline respirators when performing jobs with high potential exposures such as changing filters in a baghouse air cleaning device.

Housekeeping

Use vacuum and wet cleaning methods for particulate and dust 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) filters when cleaning up nickel containing dusts. Do not use compressed air, brooms, or conventional vacuum cleaners to remove particulates and dusts from surfaces if the dust contains nickel. Follow the manufacturer's instructions when performing maintenance on HEPA filtered vacuums used to clean nickel containing dusts or particulates.

Maintenance

During repair or maintenance activities, the potential exists for exposures to particulates and dusts in excess of the occupational standards. Under these circumstances, 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.

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Welding/Cutting/Brazing/Soldering/Grinding

Welding or cutting indoors, outdoors, or in confined spaces should be done using local exhaust ventilation and pressure-demand airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the acceptable concentrations for each metallic element contained in the alloy. In all cases, workers in the immediate vicinity of welding or cutting operations should be protected as necessary by local exhaust ventilation.

Ventilation and Engineering Controls

Whenever possible, the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposures to airborne particulates, dusts mists and fumes to within acceptable OSHA Permissible Exposure Limits (PELs) or ACGIH Threshold Limit Values (TLVs). 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 cooling fans. 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.

Exposure Characterization

Determine exposures to airborne particulates, dusts and fumes by air sampling in the employee breathing zone and work area. Utilize an Industrial Hygienist or other qualified professional to specify the frequency and type of air sampling to be performed. Develop and utilize a sampling strategy which identifies the extent of exposure variation to provide statistical confidence in the results. Conduct an exposure risk assessment of processes to determine if conditions or situations exist which dictate the need for additional controls or improved work practices beyond those described in this SDS.

Medical Surveillance

There are no medical surveillance requirements applicable to the use of this product.

Risk Factors

Persons with Wilson's disease are at increased risk for exposures to copper as their bodies allow small amounts of copper to accumulate and buildup within their systems. This buildup of copper can lead to damage in the kidneys, brain, and eyes.

9.0 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance and Odor:	Golden Yellow to Brown/Bronze Solid
Boiling Point:	Not available
Melting Point:	880 °C – 1,150 °C
pH:	Not applicable
Specific Gravity:	8.33 – 8.94
Density:	Not available
Vapor Pressure:	Not applicable
Vapor Density (air = 1):	Not available
% Volatile, by Volume:	None
Solubility in Water:	Insoluble.
Evaporation Rate (Butyl Acetate = 1):	<1
Other Physical and Chemical Data:	None

9.2 Other safety information

None

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10.0 STABILITY AND REACTIVITY

10.1 Reactivity

Non-reactive unless in contact with incompatible materials. Molten heated metal will react violently and may explode if in contact with water.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

Do not let molten material come into contact with water.

10.4 Incompatible materials

Do not let molten material come into contact with water. Reacts with strong acids and may form hydrogen gas. Do not store near strong oxidizers. Reacts with some acids and caustic solutions to produce hydrogen gas. Hydrogen gas can be an explosion hazard. Avoid contact with oxidizers. Reacts violently with acetylene, ammonium nitrate, bromates, chlorates, iodates, chlorine, chlorine trifluoride, ethylene oxide, fluorine, hydrogen peroxide, hydrazine mononitrate, hydrogen sulfide, hydrazoic acid, lead azide, potassium peroxide, sodium azide and sodium peroxide.

10.6 Hazardous decomposition products

Fumes containing metals (or their oxides) may be formed at temperatures above the melting point. Refer to ANSI Z49.1 for more information.

11.0 TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitization

No data available

Germ cell mutagenicity

No data available

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Carcinogenicity

Nickel – NTP Reasonably Anticipated To Be Human Carcinogen
Nickel – IARC Group 2B (Possibly Carcinogenic to Humans)

The following constituents are listed by the State of California as substances known to the State of California to cause cancer under Proposition 65, as of June 1, 2015.

Nickel

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

No specific toxicological information for this product as a whole is available. Breathing dusts, mists or fumes may result in metal fume fever, which is an illness produced by inhaling metal oxides. These oxides are produced by heating various metals. The most common metals that can cause metal fume fever are zinc and copper. When fumes are generated because of high heat, they may be different in composition from the product. Chronic health effects (including cancer and reproductive effects) have been associated with the fumes and dusts of individual component metals.

The primary components of this product are copper and zinc. Long-term exposure to metal dusts or fumes can result in pneumoconiosis or other illnesses and/or diseases. Symptoms may include chronic bronchitis, emphysema, and shortness of breath upon exertion.

Note: This material has not been evaluated as a whole. The following hazards are described for individual constituents only and were obtained from the National Institute of Occupational Safety and Health (NIOSH). The concentration of each metal constituent should be taken into consideration when evaluating the hazards associated with this product. Consult additional information sources for trace metal contaminants if processing of this product generates excessive dusts, mists or fumes.

Aluminum

Exposure Route(s): Inhalation, ingestion, skin and/or eye contact.

Symptoms: Irritation skin, respiratory system; pulmonary fibrosis.

Target Organ(s): Skin, respiratory system.

Copper

Exposure Route(s): Inhalation, ingestion, skin and/or eye contact.

Symptoms: Can cause irritation to the upper respiratory system, metal fume fever, chills, muscle ache, nausea, fever, dry throat, cough, lassitude (weakness, exhaustion), metallic or sweet taste, and/or discoloration the skin and hair. Persons with Wilson's disease are at increased risk for exposures to copper as their bodies allow small amounts of copper to accumulate and buildup within the kidneys, brain, and eyes.

Target Organ(s): Eyes, skin, respiratory system, liver, and kidneys.

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Iron

Exposure Route(s): Inhalation, ingestion, skin and/or eye contact.

Symptoms: Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis).

Target Organ(s): Respiratory system.

Manganese

Exposure Route(s): Inhalation, ingestion.

Symptoms: Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage.

Target Organs: respiratory system, central nervous system, blood, kidneys.

Nickel

Exposure Route(s): Inhalation, ingestion, skin and/or eye contact.

Symptoms: Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen].

Target Organ(s): Nasal cavities, lungs, skin [lung and nasal cancer].

Phosphorus

Exposure Route(s): Inhalation, ingestion, skin and/or eye contact.

Symptoms: Irritation eyes, respiratory tract; eye, skin burns; abdominal pain, nausea, jaundice; anemia; cachexia; dental pain, salivation, jaw pain, swelling.

Target Organs: Eyes, skin, respiratory system, liver, kidneys, jaw, teeth, and blood.

Silicon

Exposure Route(s): Inhalation, ingestion, skin and/or eye contact.

Symptoms: Irritation eyes, skin, upper respiratory system; cough.

Target Organ(s): Eyes, skin, respiratory system.

Silver

Exposure Route(s): Inhalation, ingestion, skin and/or eye contact.

Symptoms: Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance.

Target Organ(s): Nasal septum, skin, eyes.

Tin

Exposure Route(s): Inhalation, skin and/or eye contact.

Symptoms: Irritation eyes, skin, respiratory system.

Target Organ(s): Eyes, skin, respiratory system.

Zinc

Exposure Route(s): Inhalation, ingestion, skin and/or eye contact.

Symptoms: Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function.

Target Organ(s): Respiratory system.

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EFFECTS OF OVER EXPOSURE:

ACUTE

Metal dusts, mists and fumes can cause irritation to the skin, eyes and mucous membranes. Contact with copper and other metals may cause allergic skin reactions. As a dust, powder or fume, exposure which abrades the skin can cause irritation and dermatitis. Injury to the eyes is generally a result of particulate irritation or mechanical injury to the cornea or conjunctiva by dust or particulate. Excessive inhalation of copper or other metals can cause respiratory irritation, cough, bronchitis, chills, "metal fume fever" and asthma-like symptoms. Persons with Wilson's Disease are at increased risks for copper exposures. See the individual hazards associated with each metal constituent for more detailed information.

CHRONIC

Respiratory disease with symptoms ranging from shortness of breath and cough to permanent disability due to loss of lung function, fibrosis or subsequent effects on the heart may be caused by excessive or over-exposures to metal dusts or fumes containing nickel and other metallic elements. Nickel has been linked to nasal, bronchial and lung cancers. Chronic health effects specific to an element(s) may be difficult to detect due to the numerous elemental constituents in this material. Some of the constituents of this product have been identified as being carcinogenic. See the individual hazards associated with each metal constituent for more detailed information.

CARCINOGENIC REFERENCES

The following intentionally added constituents have been identified as being carcinogenic by NTP and IARC.

NTP Reasonably Anticipated to be a Human Carcinogen

Nickel

IARC Group 2B (Possibly Carcinogenic to Humans)

Nickel

The following constituents are listed by the State of California as substances known to the State of California to cause cancer under Proposition 65, as of June 1, 2015.

Nickel

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Individuals who may have had allergic reactions or sensitivity to metals may encounter skin rash or dermatitis if skin contact with this product occurs. Persons with impaired pulmonary function, airway diseases and conditions such as asthma, emphysema, chronic bronchitis, etc. may incur further disability if excessive concentrations of dust, mists or fumes are inhaled. If prior damage or disease to the Neurologic (nervous), Circulatory, Hematologic (blood) or Renal (kidney) systems has occurred, proper screening or examinations should be conducted on individuals who may be exposed to further risk if handling and use of this material causes excessive exposures. Persons with Wilson's Disease are at higher risk for exposures to copper.

12.0 ECOLOGICAL INFORMATION

Copper is very toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

Most heavy metals can affect microorganisms at concentrations found in the environment. However, the toxicity of a metal depends on the physiochemical characteristics of the environment where it is deposited. Abiotic factors such as pH, temperature, pressure, and ionic strength affect the ability of metals to complex with various ligands and can also affect the environmental toxicity of a metal. Toxicity profiles for the following metals were derived from USEPA's ecological risk assessment database and are current as to the date of this SDS. Additional information on these constituents can be obtained from publicly available sources of USEPA information.

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12.1 INDIVIDUAL INGREDIENTS

12.11 Aluminum

Toxicity	No data available
Persistence and degradability	No data available
Bioaccumulative potential	No data available
Mobility in soil	No data available
Results of PBT and vPvB assessment	PBT/vPvB assessment not available as chemical safety assessment not required/not conducted
Other adverse effects	No data available

12.12 Copper

Toxicity	Toxicity to fish mortality LOEC - Oncorhynchus mykiss (rainbow trout) - 0.022 mg/l - 96 h Toxicity to daphnia and other aquatic invertebrates mortality NOEC - Daphnia (water flea) - 0.004 mg/l - 24 h EC50 - Daphnia magna (Water flea) - 0.04 - 0.05 mg/l - 48 h Biodegradability Result: - Readily biodegradable.
Persistence and degradability	Bioaccumulation Cyprinus carpio (Carp) - 40 d - 200 mg/l
Bioaccumulative potential	Bioconcentration factor (BCF): 108
Mobility in soil	No data available
Results of PBT and vPvB assessment	PBT/vPvB assessment not available as chemical safety assessment not required/not conducted
Other adverse effects	An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life. Avoid release to the environment.

12.13 Iron

Toxicity	Toxicity to fish Static test LC50 - Morone saxatilis - 13.6 mg/l - 96 h (OECD Test Guideline 203)
Persistence and degradability	No data available
Bioaccumulative potential	No data available
Mobility in soil	No data available
Results of PBT and vPvB assessment	PBT/vPvB assessment not available as chemical safety assessment not required/not conducted
Other adverse effects	No data available

12.14 Manganese

Toxicity	Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 40 mg/l - 48 h
Persistence and degradability	No data available
Bioaccumulative potential	No data available
Mobility in soil	No data available
Results of PBT and vPvB assessment	PBT/vPvB assessment not available as chemical safety assessment not required/not conducted
Other adverse effects	An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life.

12.15 Silver

Toxicity	No data available
Persistence and degradability	No data available
Bioaccumulative potential	No data available
Mobility in soil	No data available
Results of PBT and vPvB assessment	PBT/vPvB assessment not available as chemical safety assessment not required/not conducted
Other adverse effects	No data available

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12.16 Nickel

Toxicity

Toxicity to fish LC50 - Cyprinus carpio (Carp) - 1.3 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates

EC50 - Daphnia magna (Water flea) - 1 mg/l - 48 h

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Results of PBT and

vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life.

12.17 Silicon

Toxicity

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Results of PBT and

vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

Other adverse effects

No data available

12.18 Phosphorus

Toxicity

Toxicity to fish static test LC50 - Danio rerio (zebra fish) - 33.2 mg/l - 96 h
(OECD Test Guideline 203)

Toxicity to daphnia and other aquatic invertebrates

static test EC50 - Daphnia magna (Water flea) - 10.5 mg/l - 48 h

(OECD Test Guideline 202)

Toxicity to algae static test EC50 - Desmodesmus subspicatus

(green algae) - 18.3 mg/l - 72 h

(OECD Test Guideline 201)

Toxicity to bacteria Respiration inhibition EC50 -

Sludge Treatment - > 1,000 mg/l - 3 h

(OECD Test Guideline 209)

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Results of PBT and

vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life with long lasting effects.

12.19 Tin

Toxicity

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Results of PBT and

vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

Other adverse effects

No data available

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12.20 Zinc

Toxicity	Toxicity to fish LC50 - Cyprinus carpio (Carp) - 450 µg/l - 96 h Toxicity to daphnia and other aquatic invertebrates LC50 - Daphnia magna (Water flea) - 0.068 mg/l - 48 h Mortality NOEC - Daphnia (water flea) - 0.101 - 0.14 mg/l - 7 d
Persistence and degradability	The methods for determining the biological degradability are not applicable to inorganic substances.
Bioaccumulative potential	Bioaccumulation Algae - 7 d at 16 °C - 5 µg/l Bioconcentration factor (BCF): 466
Mobility in soil	No data available
Results of PBT and vPvB assessment	PBT/vPvB assessment not available as chemical safety assessment not required/not conducted
Other adverse effects	An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects.

12.3 PERSISTENCE AND DEGRADABILITY

No data available for product as a whole. See individual ingredient information.

12.4 BIOACCUMULATIVE POTENTIAL

No data available for product as a whole. See individual ingredient information.

12.5 MOBILITY IN SOIL

No data available for product as a whole. See individual ingredient information.

12.6 RESULTS OF PBT AND VPVB ASSESSMENT

No data available for product as a whole. See individual ingredient information.

12.7 OTHER ADVERSE EFFECTS

No data available for product as a whole. See individual ingredient information.

12.8 COMPONENT MARINE POLLUTANTS

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Copper (7440-50-8)

Severe marine pollutant (metal powder only)

13.0 DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

This material is not classified as a hazardous waste under U.S. laws (RCRA) when this product, as supplied is disposed. Material should be recycled in lieu of disposal and recycling may be required by local laws, rules and regulations.

Depending on the end user's processing of this product, dusts, sludges and other process wastes should be tested using the TCLP test method to determine if such wastes may be hazardous under RCRA and managed as such.

Contaminated packaging

Dispose of as unused product.

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14.0 TRANSPORT INFORMATION DOT (US)

Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	
Copper	7440-50-8	DOT regulated severe marine pollutant (powder)

DOT Information

Shipping Name: Not Regulated

IATA Information

Shipping Name: Not Regulated

ICAO Information

Shipping Name: Not Regulated

IMDG Information

Shipping Name: Not Regulated

15.0 REGULATORY INFORMATION

NOTE: The regulatory information contained in this Safety Data Sheet (SDS) is not intended to be comprehensive. Consult country, federal, state and local laws, rule and regulations before use.

California Proposition 65: This product contains chemicals (nickel) known to the State of California to cause cancer.

Massachusetts Substance List: Aluminum, Copper, Iron oxide dust, Manganese, Nickel, Phosphorus, Silicon, Tin, and Zinc.

Pennsylvania Hazardous Substance List: Aluminum, Copper, Iron oxide dust, Manganese, Nickel, Phosphorus, Silicon, Tin, and Zinc.

New Jersey Hazardous Substance List: Aluminum, Copper, Iron oxide dust, Manganese, Nickel, Phosphorus, Silicon, Tin and Zinc.

The Resource Conservation and Recovery Act (RCRA)

Product is NOT a Hazardous Waste when disposed.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

USEPA allows a reporting exception for massive forms of certain solid metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, and zinc) when the diameter of the released metal equals or exceeds 100 micrometers (0.004 inches) (50 FR 13461, April 4, 1985). The Agency deliberately set the cutoff size 10 times larger than the maximum size considered by EPA to be respirable dust to ensure that the government would be notified of releases containing small, inhalable particles of metals.

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III

SECTION 311/312 HAZARD CATEGORIES: Immediate Health Effect (acute), Delayed Health Effect (chronic)

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Section 313 Supplier Notification

This product contains EPCRA Section 313 chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (40 CFR 372) as indicated below. Consult Section 3.1 for the weight percent of each reportable substance.

Chemical Name	CAS Number	Concentration (% by weight)
Aluminum	7429-90-5	See Section 3.0
Copper	7440-50-8	See Section 3.0
Manganese	7439-96-5	See Section 3.0
Nickel	7440-02-0	See Section 3.0
Phosphorus	7723-14-0	See Section 3.0
Zinc	7440-66-6	See Section 3.0

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Chemical Name	CAS Number	Minimum Concentration
Aluminum	7429-90-5	1%
Copper	7440-50-8	1%
Iron	7439-89-6	1%
Manganese	7439-96-5	1%
Nickel	7440-02-0	0.1%
Phosphorus	7723-14-0	1%
Silicon	7440-21-3	1%
Silver	7440-66-6	1%
Tin	7440-31-5	1%
Zinc	7440-66-6	1%

Component Analysis – Inventory

The following components are identified under the following inventory lists:

Chemical Name	CAS Number	TSCA	CAN	EEC
Aluminum	7429-90-5	Yes	DSL	EINECS
Copper	7440-50-8	Yes	DSL	EINECS
Iron	7439-89-6	Yes	DSL	EINECS
Manganese	7439-96-5	Yes	DSL	EINECS
Nickel	7440-02-0	Yes	DSL	EINECS
Phosphorus	7723-14-0	Yes	DSL	EINECS
Silicon	7440-21-3	Yes	DSL	EINECS
Silver	7440-66-6	Yes	DSL	EINECS
Tin	7440-31-5	Yes	DSL	EINECS
Zinc	7440-66-6	Yes	DSL	EINECS

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International Regulations

Canadian Environmental Protection Act: All of the components of this product are included on the Canadian Domestic Substances list (DSL).

Canadian Workplace Hazardous Materials Information System (WHMIS – 2015), Hazardous Products Act (HPA) and Hazardous Product Regulations (HPR):

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

European Inventory of Existing Chemicals (EINECS): All of the components of this product are included on EINECS.

16.0 OTHER INFORMATION

The presence of phosphorus does not present any physical or reactivity hazards that are normally associated with pure elemental phosphorus. This product as supplied is not hazardous according to OSHA and GHS product and product shipping container labeling requirements. The hazards described in this Safety Data Sheet include but are not limited to the hazards that can be foreseen by end uses of this product that result in the generation and/or exposure to metal dusts, fumes, mists, powders and other forms generated by a particular end user's processing methods of this product.

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

LIMITATIONS ON USE AND LIABILITY

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