MATERIAL SAFETY DATA SHEET

ISSUE DATE: 10/30/92
REVISED DATE: 04/26/19
Supersedes: Any Previous M.S.D.S. On This Product
EMERGENCY PHONE NUMBER: CHEM-TEL INC. 1-800-255-3924

I. IDENTIFICATION

PRODUCT NAME: Ductmate Aluminized Steel Products
PRODUCT CLASS: Steel

DUCTMATE INDUSTRIES, INC.
210 Fifth Street
Charleroi, PA 15022

II. HAZARDOUS INGREDIENTS

Material	% WEIGHT	CAS-Number	OSHA/PEL	ACGIH/TLV
Iron	80-99	7439-89-6	10 mg/M3 (as Fe_2O_3 fume)	5 mg/M3 (Iron oxide dust & fume)
Aluminum	1-20	7429-90-5	15 mg/M3 – Total dust 5 mg/M3 – Respirable fraction	10 mg/M3 – Metal Dust 5 mg/M3 – Welding fume
Silicon	0-2	7440-21-3	15 mg/M3 -Total dust 5 mg/M3 – Respirable fraction	10 mg/M3

Note: A thin coating of a mixture of rust preventative oil, mineral oil and solvents (<1% total weight of product) may be added as a surface treatment.

III. PHYSICAL DATA

APPEARANCE: Odorless solid with metallic luster
SPECIFIC GRAVITY: 8
MELTING POINT: 480° - 1500°C

IV. HEALTH HAZARD DATA

ROUTE OF EXPOSURE: Inhalation of fumes or dust and skin contact.
EFFECTS OF OVEREXPOSURE:
No toxic effects would be expected from its inert solid form. Prolonged, repeated exposures above the permissible limits to fumes or dusts generated during heating, cutting, brazing or welding may cause adverse health effects associated with the following constituents:

Inhalation:
Aluminum: No known health effects. Generally considered to be in the nuisance dust category. TDL0 = 506 gm/Kg
Iron: The inhalation of iron oxide fumes or dust may cause an apparent benign pneumoconiosis which is called siderosis. Can cause irritation of gastrointestinal tract, bleeding, changes in the pH of body fluids, and liver damage.
Silicon: Chronic overexposures can cause chronic bronchitis and narrowing of the airways. Studies with experimental animals by injection have found lesions of the lungs.
Oil Mist: Pulmonary effects including irritation and pneumonitis at high concentrations, TDL0 = 14 gm/Kg (intrapleural, rat).

Note: Some constituents pose more potential hazards than others, depending upon their inherent toxicity and concentration. Of special concern are iron and perhaps aluminum silicon, dH# oil mist.

Skin Contact: May cause irritation. Oil mist may cause dermatitis.
Eye Contact: May cause irritation.
Ingestion: May cause irritation of the mouth and throat.

V. EMERGENCY AND FIRST AID

INHALATION: If acute overexposure to dust or fumes occurs, remove victim from the adverse environment and seek medical attention.
SKIN CONTACT: Remove contaminated clothing and wash area of contact thoroughly with soap and water. If irritation persists, seek medical attention.
EYE CONTACT: Flush immediately with running water for fifteen minutes occasionally lifting the lower and upper lids. If irritation persists, seek medical attention.
INGESTION: Seek medical attention, if necessary.

VI. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: N/A
EXTINGUISHING MEDIA: Use dry powder for metal fires.
SPECIAL PROCEDURES: Firefighters should wear equipment to protect against noxious fumes.

VII. SPILL OR LEAK PROCEDURES

Minimal problems with spills of this product would occur because of its solid form. However, if there is a spill of dust, clean up using methods which avoid dust generation and the use of water, such as vacuum. If airborne dust is generated during the clean up, use an appropriate NIOSH-approved respirator.
Waste Disposal Method: Dispose of in accordance with appropriate federal, state and local regulations.

VIII. SPECIAL PROTECTION

VENTILATION: Ventilation, as described in the Industrial Ventilation Manual produced by the American Conference of Governmental Industrial Hygienists, shall be provided in areas where exposures are above the permissible exposure limits or threshold limit values specified by OSHA or other local, state, and federal regulations.
RESPIRATORY PROTECTION: Use NIOSH/MSHA approved organic vapor respirators when vapor concentrations exceed TLV or other recommended limits, in accordance with the OSHA Respiratory Protection Standard (29 CFR 1910.134).
EYE PROTECTION: Personal protective equipment should be worn when there is a reasonable probability of injury.
PROTECTIVE GLOVES: As needed

IX. CARCINOGENIC ASSESSMENT

The listed ingredients have NOT been identified as a suspect carcinogen by NTP, IARC, or OSHA.

X. REACTIVITY DATA

STABILITY: Stable under normal conditions of handling and use.
CONDITIONS TO AVOID: Poor ventilation.
INCOMPATIBILITY: Acids, bases and oxidizers.
HAZARDOUS DECOMPOSITION PRODUCT: Metal fumes and certain noxious gases, such as CO, may be produced during welding or burning operations.
HAZARDOUS POLYMERIZATION: Will not occur.

XI. SPECIAL PRECAUTIONS

HANDLING AND STORAGE: Use good housekeeping practices to avoid excessive dust accumulation.

This information is taken from sources or based upon data believed to be reliable; however, DUCTMATE INDUSTRIES, INC. makes no warranty as to the absolute correctness or sufficiency of any of the foregoing or that additional or other measures may not be required under particular conditions.

BRASS

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
BRASS

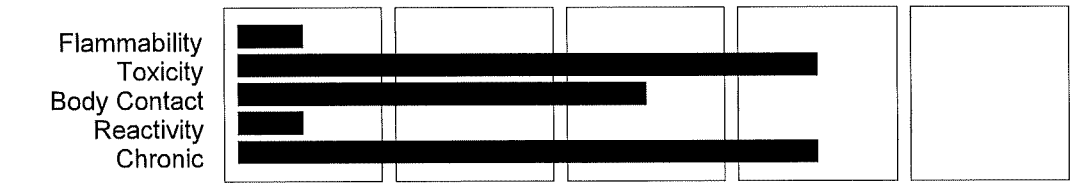
PRODUCT USE
Domestic plumbing, taps & cocks, condenser tubes, piping, hose nozzles, couplings, gauges, bearings, marine equipment, jewellery, fine arts.

SUPPLIER
Company: Metal Manufactures Technical Services
Contact
Address:
PO Box 21
Port Kembla
NSW, 2505
Australia
Telephone: +61 2 4223 5171
Telephone: +61 2 4223 5258
Fax: +61 2 4223 5251
Email: hzotter@kembla.com.au
Website: http://www.kembla.com.au/

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE
HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to NOHSC Criteria, and ADG Code.

CHEMWATCH HAZARD RATINGS



RISK
- Toxic by inhalation and if swallowed.
- Danger of cumulative effects.
- Limited evidence of a carcinogenic effect.
- Very toxic to aquatic organisms, may cause long- term adverse effects in the aquatic environment.

SAFETY
- Keep locked up.
- Avoid contact with skin.
- Avoid contact with eyes.
- Wear suitable protective clothing.

continued...

■ May cause harm to the unborn child.

■ Possible risk of impaired fertility.
■ May produce discomfort of the respiratory system and skin*.
■ Eye contact may produce serious damage*.
■ Possible skin sensitiser*.
* (limited evidence).

• In case of insufficient ventilation, wear suitable respiratory equipment.
• Wear suitable gloves.
• Wear eye/ face protection.

• Use only in well ventilated areas.
• Keep container in a well ventilated place.
• Avoid exposure - obtain special instructions before use.
• Do not empty into drains.
• To clean the floor and all objects contaminated by this material, use water and detergent.
• This material and its container must be disposed of in a safe way.
• Keep away from food, drink and animal feeding stuffs.
• Take off immediately all contaminated clothing.
• In case of contact with eyes, rinse with plenty of water and contact Doctor or Poisons Information Centre.
• Use appropriate container to avoid environment contamination.
• Avoid release to the environment. Refer to special instructions/ safety data sheets.
• In case of accident by inhalation: remove casualty to fresh air and keep at rest.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
copper	7440-50-8	> 60
zinc	7440-66-6	35 ap.
tin	7440-31-5	1-6
lead	7439-92-1	1-8 ^
aluminium	7429-90-5	0-4 ^
iron, powder	7439-89-6	0-4 ^
manganese	7439-96-5	0-4 ^
silicon	7440-21-3	0-4 ^
arsenic	7440-38-2	0-1 ^

Above composition is generic for all brass

Section 4 - FIRST AID MEASURES

SWALLOWED
■ Rinse mouth out with plenty of water.
• For advice, contact a Poisons Information Centre or a doctor at once.
• Urgent hospital treatment is likely to be needed.
• If swallowed do NOT induce vomiting.
• If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
• Observe the patient carefully.
• Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
• Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.

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• Transport to hospital or doctor without delay.

EYE
■ If this product comes in contact with the eyes:
• Wash out immediately with fresh running water.
• Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
• Seek medical attention without delay; if pain persists or recurs seek medical attention.
• Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN
■ If skin or hair contact occurs:
• Flush skin and hair with running water (and soap if available).
• Seek medical attention in event of irritation.

INHALED
• If fumes or combustion products are inhaled remove from contaminated area.
• Lay patient down. Keep warm and rested.
• Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
• Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
• Transport to hospital, or doctor.

NOTES TO PHYSICIAN
■ Copper, magnesium, aluminium, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, brazing, galvanising or smelting operations all give rise to thermally produced particulates of smaller dimension than may be produced if the metals are divided mechanically. Where insufficient ventilation or respiratory protection is available these particulates may produce "metal fume fever" in workers from an acute or long term exposure.
• Onset occurs in 4-6 hours generally on the evening following exposure. Tolerance develops in workers but may be lost over the weekend. (Monday Morning Fever)
• Pulmonary function tests may indicate reduced lung volumes, small airway obstruction and decreased carbon monoxide diffusing capacity but these abnormalities resolve after several months.
• Although mildly elevated urinary levels of heavy metal may occur they do not correlate with clinical effects.
• The general approach to treatment is recognition of the disease, supportive care and prevention of exposure.
• Seriously symptomatic patients should receive chest x-rays, have arterial blood gases determined and be observed for the development of tracheobronchitis and pulmonary edema.
[Ellenhorn and Barceloux: Medical Toxicology].

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
■ Non combustible.
• There is no restriction on the type of extinguisher which may be used.

FIRE FIGHTING
• Alert Fire Brigade and tell them location and nature of hazard.
• Wear breathing apparatus plus protective gloves for fire only.
• Prevent, by any means available, spillage from entering drains or water courses.
• Use fire fighting procedures suitable for surrounding area.
• DO NOT approach containers suspected to be hot.
• Cool fire exposed containers with water spray from a protected location.
• If safe to do so, remove containers from path of fire.
• Equipment should be thoroughly decontaminated after use.

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FIRE/EXPLOSION HAZARD
■ Non combustible.

HAZCHEM
None

Personal Protective Equipment
Breathing apparatus.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
• Clean up all spills immediately.
• Secure load if safe to do so.
• Bundle/collect recoverable product.
• Collect remaining material in containers with covers for disposal.

MAJOR SPILLS
• Clean up all spills immediately.
• Secure load if safe to do so.
• Bundle/collect recoverable product.
• Collect remaining material in containers with covers for disposal.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
• Limit all unnecessary personal contact.
• Wear protective clothing when risk of exposure occurs.
• Use in a well-ventilated area.
• When handling DO NOT eat, drink or smoke.
• Always wash hands with soap and water after handling.
• Avoid physical damage to containers.
• Use good occupational work practice.
• Observe manufacturer's storing and handling recommendations.

SUITABLE CONTAINER
• Packaging as recommended by manufacturer.
Store flat in load designed racking.

STORAGE INCOMPATIBILITY
■ Segregate from strong acids, ammonia.

STORAGE REQUIREMENTS
• Keep dry.
• Store under cover.
• Protect containers against physical damage.
• Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

X X + X X +

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+: *May be stored together*
O: *May be stored together with specific preventions*
X: *Must not be stored together*

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA mg/m³	Notes
Australia Exposure Standards	copper (Copper, dusts & mists (as Cu))	1	
Australia Exposure Standards	copper (Copper (fume))	0.2	
Australia Exposure Standards	copper (Inspirable dust (not otherwise classified))	10	
Australia Exposure Standards	tin (Tin, metal)	2	
Australia Exposure Standards	aluminium (Emery (dust) (a))	10	(see Chapter 14)
Australia Exposure Standards	aluminium (Aluminium (welding fumes) (as Al))	5	

EMERGENCY EXPOSURE LIMITS

Material	Revised	IDLH
copper|10072	100	
copper|10072	100	
tin|21900	25	
tin|21900	100	

MATERIAL DATA

TIN:
ZINC:

■ It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

BRASS:

■ None assigned. Refer to individual constituents.

ZINC:

■ Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be

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consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

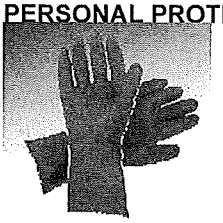
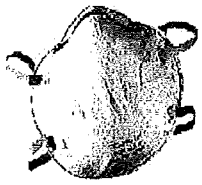
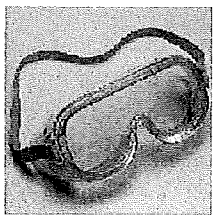
OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

TIN:

■ A TLV-TWA is recommended so as to minimise the risk of stannosis. The STEL (4.0 mg/m3) has been eliminated (since 1986) so that additional toxicological data and industrial hygiene experience may become available to provide a better base for quantifying on a toxicological basis what the STEL should in fact be.

PERSONAL PROTECTION


EYE

- Safety glasses with side shields; or as required,
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent].

HANDS/FEET

- Cotton gloves or • Heavy gloves, eg. leather or Welding Gloves

Safety footwear.

- When handling hot or molten liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

OTHER

- Overalls.
- Eyewash unit.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

■ Use in a well-ventilated area.

- Hazard relates to dust released by cutting, grinding, trimming or other shaping operations.

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

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The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
Employers may need to use multiple types of controls to prevent employee overexposure.

For brazing or soldering the nature of ventilation is determined by the location of the work.
- For outdoor work, natural ventilation is generally sufficient.
- For indoor work, conducted in either open or limited spaces , use mechanical (general exhaust or plenum) ventilation . (Open work spaces exceed 300 cubic meters per welder)

For work conducted in confined spaces, mechanical ventilation, using local exhaust systems, is required. (In confined spaces always check that oxygen has not been depleted by excessive rusting of steel or snowflake corrosion of aluminium) Mechanical or local exhaust ventilation may not be required where the process working time does not exceed 24 mins. (in an 8 hr. shift) provided the work is intermittent (a maximum of 5 mins. every hour). Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the worker, of 0.5 metre/sec. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
welding, brazing fumes (released at relatively low velocity into moderately still air)	0.5- 1, 0 m/s (100- 200 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of welding or brazing fumes generated 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Coppery red / yellow to brown metal; primarily a copper - zinc alloy.
Red brass (15% zinc), yellow brass (35% zinc; some harder alloys with minor amounts of tin. Brass with 0.5-3% lead used in antifriction bearings.
Insoluble in water. As billets, rod, tube, shapes, turnings, powder.
Rolled sheet and drawn tube may have surface film of forming lubricant.

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Special brasses are leaded brass, arsenical brass, aluminium brass.

PHYSICAL PROPERTIES
Does not mix with water.
Sinks in water.

State	Manufactured	Molecular Weight	Not applicable.
Melting Range (°C)	700- 1240	Boiling Range (°C)	Not available.
Solubility in water (g/L)	Immiscible	Flash Point (°C)	Non Flammable
pH (1% solution)	Not applicable.	Decomposition Temp (°C)	Not available.
pH (as supplied)	Not applicable	Autoignition Temp (°C)	Not available
Vapour Pressure (kPa)	Not applicable.	Upper Explosive Limit (%)	Not applicable
Specific Gravity (water=1)	7.4- 8.5	Lower Explosive Limit (%)	Not applicable
Relative Vapour Density (air=1)	Not applicable.	Volatile Component (%vol)	Negligible
Evaporation Rate	Non Volatile		

Section 10 - STABILITY AND REACTIVITY

CONDITIONS CONTRIBUTING TO INSTABILITY
• Presence of incompatible materials.
• Product is considered stable.
• Hazardous polymerisation will not occur.
For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
■ Considered an unlikely route of entry in commercial/industrial environments.
Not normally a hazard due to the physical form of product. The material is a physical irritant to the gastro-intestinal tract and may be harmful if swallowed.

EYE
■ Particulate/dust is discomforting and abrasive to the eyes.
Fumes from welding/brazing operations may be irritating to the eyes.

SKIN
■ The material may be abrasive and may cause laceration by sharp edges.
The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.
■ Irritation and skin reactions are possible with sensitive skin.

INHALED
■ Not normally a hazard due to non-volatile nature of product.
Inhalation hazard is increased at higher temperatures.
Inhalation of fumes (as from welding) may cause coughing, nasal irritation, mucous membrane irritation and is harmful if exposure is prolonged.
Inhalation of fume may aggravate a pre-existing respiratory condition such as asthma, bronchitis, emphysema.

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CHRONIC HEALTH EFFECTS
■ Principal routes of exposure are usually by inhalation of generated dust and inhalation of fumes from the heated material, skin contact with the molten material.

TOXICITY AND IRRITATION
■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

BRASS:
Data for brass powder only
Oral (rat) LD50: 1561 mg/kg Eye (rabbit): 100 mg - irritant
Skin (rabbit): 500 mg mild

COPPER:

TOXICITY	IRRITATION
Oral (human) TDLo: 0.12 mg/kg	Nil Reported
Oral (rat) LD50: 5800 mg/kg	

WARNING: Inhalation of high concentrations of copper fume may cause " metal
fume fever", an acute industrial disease of short duration. Symptoms are tiredness, influenza like respiratory tract irritation with fever.

ZINC:
■ The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

TIN:
■ No significant acute toxicological data identified in literature search.

SKIN

tin	Australia Exposure Standards - Skin	Notes	Sk

Section 12 - ECOLOGICAL INFORMATION

ZINC:
TIN:
COPPER:
■ DO NOT discharge into sewer or waterways.

ZINC:
COPPER:
■ The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l
* Classification of Substances as Ecotoxic (Dangerous to the Environment)
Appendix 8, Table 1
Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

COPPER:
■ Harmful to aquatic organisms.
Copper is unlikely to accumulate in the atmosphere due to a short residence time for airborne copper aerosols. Airborne coppers, however, may be transported over large distances. Copper accumulates significantly in the food chain.
Drinking Water Standards:
3000 ug/l (UK max)
2000 ug/l (WHO provisional Guideline)

continued...

1000 ug/l (WHO level where individuals complain)
Soil Guidelines: Dutch Criteria
36 mg/kg (target)
190 mg/kg (intervention)
Air Quality Standards: no data available.
The toxic effect of copper in the aquatic biota depends on the bio-availability of copper in water which, in turn, depends on its physico-chemical form (ie.speciation). Bioavailability is decreased by complexation and adsorption of copper by natural organic matter, iron and manganese hydrated oxides, and chelating agents excreted by algae and other aquatic organisms. Toxicity is also affected by pH and hardness. Total copper is rarely useful as a predictor of toxicity. In natural sea water, more than 98% of copper is organically bound and in river waters a high percentage is often organically bound, but the actual percentage depends on the river water and its pH.
Copper exhibits significant toxicity in some aquatic organisms. Some algal species are very sensitive to copper with EC50 (96 hour) values as low as 47 ug/litre dissolved copper whilst for other algal species EC50 values of up to 481 ug/litre have been reported. However many of the reportedly high EC50 values may arise in experiments conducted with a culture media containing copper-complexing agents such as silicate, iron, manganese and EDTA which reduce bioavailability.
Toxic effects arising following exposure by aquatic species to copper are typically:

Algae EC50 (96 h)	Daphnia magna LC50 (48- 96 h)	Amphipods LC50 (48- 96 h)	Gastropods LC50 (48- 96 h)	Crab larvae LC50 (48- 96 h)
47- 481 *	7- 54 *	37- 183 *	58- 112 *	50- 100 *

* ug/litre

Exposure to concentrations ranging from one to a few hundred micrograms per litre has led to sublethal effects and effects on long-term survival. For high bioavailability waters, effect concentrations for several sensitive species may be below 10 ug Cu/litre.

In fish, the acute lethal concentration of copper ranges from a few ug/litre to several mg/litre, depending both on test species and exposure conditions. Where the value is less than 50 ug Cu/litre, test waters generally have a low dissolved organic carbon (DOC) level, low hardness and neutral to slightly acidic pH. Exposure to concentrations ranging from one to a few hundred micrograms per litre has led to sublethal effects and effects on long-term survival. Lower effect concentrations are generally associated with test waters of high bioavailability.

In summary:

Responses expected for high concentration ranges of copper *

Total dissolved Cu concentration range (ug/litre)	Effects of high availability in water
1- 10	Significant effects are expected for diatoms and sensitive invertebrates, notably cladocerans. Effects on fish could be significant in freshwaters with low pH and hardness.
10- 100	Significant effects are expected on various species of microalgae, some species of macroalgae, and a range of invertebrates, including crustaceans, gastropods and sea urchins. Survival of sensitive fish will be affected and a variety of fish show sublethal effects.
100- 1000	Most taxonomic groups of macroalgae and invertebrates will be severely affected. Lethal levels for most fish species will be reached.

continued...

>1000	Lethal concentrations for most tolerant organisms are reached.

* Sites chosen have moderate to high bioavailability similar to water used in most toxicity tests.
In soil, copper levels are raised by application of fertiliser, fungicides, from deposition of highway dusts and from urban, mining and industrial sources. Generally, vegetation rooted in soils reflects the soil copper levels in its foliage. This is dependent upon the bioavailability of copper and the physiological requirements of species concerned.

Typical foliar levels of copper are:

Uncontaminated soils (0.3- 250 mg/kg)	Contaminated soils (150- 450 mg/kg)	Mining/smelting soils
6.1- 25 mg/kg	80 mg/kg	300 mg/kg

Plants rarely show symptoms of toxicity or of adverse growth effects at normal soil concentrations of copper. Crops are often more sensitive to copper than the native flora, so protection levels for agricultural crops range from 25 mg Cu/kg to several hundred mg/kg, depending on country. Chronic and or acute effects on sensitive species occur at copper levels occurring in some soils as a result of human activities such as copper fertiliser addition, and addition of sludge.

When soil levels exceed 150 mg Cu/kg, native and agricultural species show chronic effects. Soils in the range 500-1000 mg Cu/kg act in a strongly selective fashion allowing the survival of only copper-tolerant species and strains. At 2000 Cu mg/kg most species cannot survive. By 3500 mg Cu/kg areas are largely devoid of vegetation cover. The organic content of the soil appears to be a key factor affecting the bioavailability of copper.

On normal forest soils, non-rooted plants such as mosses and lichens show higher copper concentrations. The fruiting bodies and mycorrhizal sheaths of soil fungi associated with higher plants in forests often accumulate copper to much higher levels than plants at the same site. International Programme on Chemical Safety (IPCS): Environmental Health Criteria 200.

ZINC:
■ Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.
Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
For zinc and its compounds:
Environmental fate:
Zinc is capable of forming complexes with a variety of organic and inorganic groups (ligands). Biological activity can affect the mobility of zinc in the aquatic environment, although the biota contains relatively little zinc compared to the sediments. Zinc bioconcentrates moderately in aquatic organisms; bioconcentration is higher in crustaceans and bivalve species than in fish. Zinc does not concentrate appreciably in plants, and it does not biomagnify significantly through terrestrial food chains.
However biomagnification may be of concern if concentration of zinc exceeds 1632 ppm in the top 12 inches of soil.
Zinc can persist in water indefinitely and can be toxic to aquatic life. The threshold concentration for fish is 0.1 ppm. Zinc may be concentrated in the aquatic food chain; it is concentrated over 200,000 times in oysters. Copper is synergistic but calcium is antagonistic to zinc toxicity in fish. Zinc can accumulate in freshwater animals at 5 -1,130 times the concentration present in the water. Furthermore, although zinc actively bioaccumulates in aquatic systems, biota appears to represent a relatively minor sink compared to sediments. Steady-state zinc bioconcentration factors (BCFs) for 12 aquatic species range from 4 to 24,000. Crustaceans and fish can accumulate zinc from both water and food. A BCF of 1,000 was reported for both aquatic plants and fish, and a value of 10,000 was reported for aquatic invertebrates. The order of enrichment of zinc in different aquatic organisms was as follows (zinc concentrations in µg/g dry weight appear in parentheses): fish (25), shrimp (50), mussel (60), periphyton (260), zooplankton (330), and oyster (3,300). The high enrichment in oysters may be due to their ingestion of particulate matter containing higher concentrations of zinc than ambient water. Other investigators have also indicated that organisms associated with sediments have higher zinc concentrations than organisms living in the aqueous layer. With respect to

continued...

bioconcentration from soil by terrestrial plants, invertebrates, and mammals, BCFs of 0.4, 8, and 0.6, respectively, have been reported. The concentration of zinc in plants depends on the plant species, soil pH, and the composition of the soil.
Plant species do not concentrate zinc above the levels present in soil.
In some fish, it has been observed that the level of zinc found in their bodies did not directly relate to the exposure concentrations. Bioaccumulation of zinc in fish is inversely related to the aqueous exposure. This evidence suggests that fish placed in environments with lower zinc concentrations can sequester zinc in their bodies.
The concentration of zinc in drinking water may increase as a result of the distribution system and household plumbing. Common piping materials used in distribution systems often contain zinc, as well as other metals and alloys. Trace metals may enter the water through corrosion products or simply by the dissolution of small amounts of metals with which the water comes in contact. Reactions with materials of the distribution system, particularly in soft low-pH waters, very often have produced concentrations of zinc in tap water much greater than those in the raw or treated waters at the plant of origin. Zinc gives water a metallic taste at low levels. Overexposures to zinc also have been associated with toxic effects. Ingestion of zinc or zinc-containing compounds has resulted in a variety of systemic effects in the gastrointestinal and hematological systems and alterations in the blood lipid profile in humans and animals. In addition, lesions have been observed in the liver, pancreas, and kidneys of animals.
Environmental toxicity of zinc in water is dependent upon the concentration of other minerals and the pH of the solution, which affect the ligands that associate with zinc.
Zinc occurs in the environment mainly in the +2 oxidation state. Sorption is the dominant reaction, resulting in the enrichment of zinc in suspended and bed sediments. Zinc in aerobic waters is partitioned into sediments through sorption onto hydrous iron and manganese oxides, clay minerals, and organic material. The efficiency of these materials in removing zinc from solution varies according to their concentrations, pH, redox potential (Eh), salinity, nature and concentrations of complexing ligands, cation exchange capacity, and the concentration of zinc. Precipitation of soluble zinc compounds appears to be significant only under reducing conditions in highly polluted water. Generally, at lower pH values, zinc remains as the free ion.
The free ion (Zn+2) tends to be adsorbed and transported by suspended solids in unpolluted waters.
Zinc is an essential nutrient that is present in all organisms. Although biota appears to be a minor reservoir of zinc relative to soils and sediments, microbial decomposition of biota in water can produce ligands, such as humic acids, that can affect the mobility of zinc in the aquatic environment through zinc precipitation and adsorption.
The relative mobility of zinc in soil is determined by the same factors that affect its transport in aquatic systems (i.e., solubility of the compound, pH, and salinity)
The redox status of the soil may shift zinc partitioning. Reductive dissolution of iron and manganese (hydr)oxides under suboxic conditions release zinc into the aqueous phase; the persistence of suboxic conditions may then lead to a repartitioning of zinc into sulfide and carbonate solids. The mobility of zinc in soil depends on the solubility of the speciated forms of the element and on soil properties such as cation exchange capacity, pH, redox potential, and chemical species present in soil; under anaerobic conditions, zinc sulfide is the controlling species.
Since zinc sulfide is insoluble, the mobility of zinc in anaerobic soil is low. In a study of the effect of pH on zinc solubility: When the pH is <7, an inverse relationship exists between the pH and the amount of zinc in solution. As negative charges on soil surfaces increase with increasing pH, additional sites for zinc adsorption are activated and the amount of zinc in solution decreases. The active zinc species in the adsorbed state is the singly charged zinc hydroxide species (i.e., Zn[OH]+). Other investigators have also shown that the mobility of zinc in soil increases at lower soil pH under oxidizing conditions and at a lower cation exchange capacity of soil. On the other hand, the amount of zinc in solution generally increases when the pH is >7 in soils high in organic matter. This is a result of the release of organically complexed zinc, reduced zinc adsorption at higher pH, or an increase in the concentration of chelating agents in soil. For calcareous soils, the relationship between zinc solubility and pH is nonlinear. At a high pH, zinc in solution is precipitated as Zn(OH)2, zinc carbonate ($ZnCO_3$), or calcium zincate. Clay and metal oxides are capable of sorbing zinc and tend to retard its mobility in soil. Zinc was more mobile at pH 4 than at pH 6.5 as a consequence of sorption
Zinc concentrations in the air are relatively low, except near industrial sources such as smelters. No estimate for the atmospheric lifetime of zinc is available at this time, but the fact that zinc is transported long distances in air indicates that its lifetime in air is at least on the order of days. There are few data regarding the speciation of zinc released to the atmosphere. Zinc is removed from the air by dry and wet deposition, but zinc particles with small diameters and low densities suspended in the atmosphere travel long distances from emission sources.

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The product has no effect on the environment unless in finely divided form. In this form it can be harmful to aquatic life.
Acute toxicity data in the form of 96 hour LC50s for Australian freshwater animals are:
fish - 0.14 to 38 mg Zn/L; and crustaceans 0.43 to 32 mg Zn/L.

TIN:
■ Metal-containing inorganic substances generally have negligible vapour pressure and are not expected to partition to air. Once released to surface waters and moist soils their fate depends on solubility and dissociation in water. Environmental processes (such as oxidation and the presence of acids or bases) may transform insoluble metals to more soluble ionic forms. Microbiological processes may also transform insoluble metals to more soluble forms. Such ionic species may bind to dissolved ligands or sorb to solid particles in aquatic or aqueous media. A significant proportion of dissolved/ sorbed metals will end up in sediments through the settling of suspended particles. The remaining metal ions can then be taken up by aquatic organisms.
When released to dry soil most metals will exhibit limited mobility and remain in the upper layer; some will leach locally into ground water and/ or surface water ecosystems when soaked by rain or melt ice. Environmental processes may also be important in changing solubilities.
Even though many metals show few toxic effects at physiological pHs, transformation may introduce new or magnified effects.
A metal ion is considered infinitely persistent because it cannot degrade further.
The current state of science does not allow for an unambiguous interpretation of various measures of bioaccumulation.
The counter-ion may also create heath and environmental concerns once isolated from the metal. Under normal physiological conditions the counter-ion may be essentially insoluble and may not be bioavailable. Environmental processes may enhance bioavailability.
Tin may exist in either divalent (Sn2+) or tetravalent (Sn4+) cationic (positively charged) ions under environmental conditions. Tin(II) dominates in reduced (oxygen-poor) water, and will readily precipitate as a sulfide (SnS) or as a hydroxide (Sn(OH)2) in alkaline water. Tin(IV) readily hydrolyses, and can precipitate as a hydroxide. The solubility product of Sn(OH)4 has been measured at approximately 10 exp(-56) g/L at 25 °C. In general, tin(IV) would be expected to be the only stable ionic species in the weathering cycle.
Tin in water may partition to soils and sediments. Cations such as Sn2+ and Sn4+ will generally be adsorbed by soils to some extent, which reduces their mobility. Tin is generally regarded as being relatively immobile in the environment. However, tin may be transported in water if it partitions to suspended sediments, but the significance of this mechanism has not been studied in detail. Transfer coefficients for tin in a soil-plant system were reported to be 0.01-0.1.
A bioconcentration factor (BCF) relates the concentration of a chemical in plants and animals to the concentration of the chemical in the medium in which they live. It was estimated that the BCFs of inorganic tin were 100, 1,000, and 3,000 for marine and freshwater plants, invertebrates, and fish, respectively.
Marine algae can bioconcentrate tin(IV) ion by a factor of 1,900.
Inorganic tin cannot be degraded in the environment, but may undergo oxidation-reduction, ligand exchange, and precipitation reactions. It has been established that inorganic tin can be transformed into organometallic forms by microbial methylation . Inorganic tin may also be converted to stannane (H4Sn) in extremely anaerobic (oxygen-poor) conditions by macroalgae.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
brass	No Data Available	No Data Available		
copper	No Data Available	No Data Available	LOW	
zinc	No Data Available	No Data Available	LOW	
tin	No Data Available	No Data Available		

continued...

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM:
None (ADG7)

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: ADG7, UN, IATA, IMDG

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE None

REGULATIONS

Regulations for ingredients

copper (CAS: 7440-50-8) is found on the following regulatory lists;
"Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (AQUA/1 to 6 - inorganic chemicals)","Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (Domestic water supply - inorganic chemicals)","Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (IRRIG - inorganic chemicals)","Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (STOCK - inorganic chemicals)","Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Aquatic habitat)","Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Domestic water supply quality)","Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (IRRIG)","Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Agricultural uses (Stock)","Australia ADI list - Acceptable daily intakes for agricultural and veterinary chemicals","Australia Hazardous Substances","Australia High Volume Industrial Chemical List (HVICL)","Australia Inventory of Chemical Substances (AICS)","International Maritime Dangerous Goods Requirements (IMDG Code) - Marine Pollutants","International Maritime Dangerous Goods Requirements (IMDG Code) - Substance Index","WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water"

zinc (CAS: 7440-66-6) is found on the following regulatory lists;
"Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (AQUA/1 to 6 - inorganic chemicals)","Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (Domestic water supply - inorganic chemicals)","Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (IRRIG - inorganic chemicals)","Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (STOCK - inorganic chemicals)","Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Aquatic habitat)","Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Domestic water supply quality)","Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (IRRIG)","Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Agricultural uses (Stock)","Australia Hazardous Substances","Australia High Volume Industrial Chemical List (HVICL)","Australia Inventory of Chemical Substances (AICS)","WHO Guidelines for Drinking-water Quality - Chemicals for which guideline values have not been established"

tin (CAS: 7440-31-5) is found on the following regulatory lists;
"Australia - Western Australia Hazardous Substances Prohibited for Specified Uses or Methods of Handling","Australia Exposure Standards","Australia Inventory of Chemical Substances (AICS)","WHO Guidelines for Drinking-water Quality - Chemicals for which guideline values have not been established"

No data for brass (CW: 21662)

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Section 16 - OTHER INFORMATION

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Issue Date: 15-Oct-2010
Print Date: 26-Oct-2011

This is the end of the MSDS.

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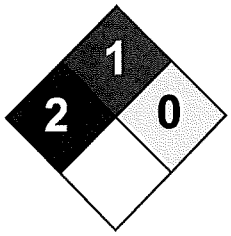

Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Copper MSDS

Section 1: Chemical Product and Company Identification

Product Name: Copper

Catalog Codes: SLC4939, SLC2152, SLC3943, SLC1150, SLC2941, SLC4729, SLC1936, SLC3727, SLC5515

CAS#: 7440-50-8

RTECS: GL5325000

TSCA: TSCA 8(b) inventory: Copper

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Cu

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Copper	7440-50-8	100

Toxicological Data on Ingredients: Copper LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with a emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH [1990] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 63.54 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 2595°C (4703°F)

Melting Point: 1083°C (1981.4°F)

Critical Temperature: Not available.

Specific Gravity: 8.94 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Copper Massachusetts RTK: Copper TSCA 8(b) inventory: Copper CERCLA: Hazardous substances.: Copper

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 04:58 PM

Last Updated: 05/21/2013 12:00 PM

MATERIAL SAFETY DATA SHEET

ISSUE DATE: 05/20/88
REVISED DATE: 04/26/19
Supersedes Any Previous M.S.D.S. On This Product.
EMERGENCY TELEPHONE NUMBER: CHEM-TEL, INC. 1-800-255-3924

I. IDENTIFICATION

PRODUCT NAME: Carbon Steel Products
PRODUCT CLASS: Steel

DUCTMATE INDUSTRIES, INC.
210 Fifth Street
Charleroi, PA 15022

II. HAZARDOUS INGREDIENTS

MATERIAL:	% WEIGHT	OSHA PEL	ACGIH TLV
Iron	>97.0	10 mg/M3 (Iron oxide fume)	5 mg/M3 (Iron oxide dust & fume)
Aluminum	0.01 – 0.5	15 mg/M3 – Total dust 5 mg/M3 – Respirable fraction	10 mg/M3 – Metal Dust 5 mg/M3 – Welding fume
Boron	≤0.003 (Max)	15 mg/M3 – Total dust (as Boron oxide)	10 mg/M3 – Boron oxide
Calcium	0.10 (Max)	5 mg/M3 Calcium oxide	2 mg/M3 – Calcium oxide
Carbon	0.60 (Max)	15 mg/M3 – Total dust (PNOR)[3] 5mg/M3 – Respirable fraction (PNOR)	10 mg/M3 – Inhalable fraction[4] (PNOR)[5] 3 mg/M3 – Respirable fraction[6] (PNOS)
Chromium*	≤ 0.5 (Max)	1.0 mg/M3 (Chromium metal)	0.5 mg/M3 - Chromium metal & Cr III compounds
Columbium	≤ 0.15 (Max)	15 mg/M3 – Total dust (PNOR) 5 mg/M3 – Respirable fraction (PNOR)	10 mg/M3 - Inhalable fraction (PNOS) 3 mg/M3 – Respirable fraction (PNOS)
Copper	0.50 (Max)	0.1 mg/M3 – Fume (as Cu) 1 mg/M3 – Dusts & mists (as Cu)	0.1 mg/M3 – Fume 1 mg/M3 – Dusts & mists (as Cu)
Manganese	2.0 (Max)	5 mg/M3 (C) - Fume & Mn compounds	0.2 mg/M3
Molybdenum	≤ 0.25 (Max)	15 mg/M3 – Total dust (as Mo)	10 mg/M3 – Metal and insoluble compounds (Inhalable fraction) 3 mg/M3 – Metal & insoluble fraction (Respirable fraction)
Nickel*	≤ 0.3 (Max)	1.0 mg/M3 – Metal & insoluble compounds (as Ni)	1.5 mg/M3 – Elemental nickel (as Ni) 0.2 mg/M3 – Insoluble compounds (NOS)[7]
Phosphorus	0.15 (Max)	0.1 mg/M3	0.1 mg/M3
Silicon	≤ 1.00 (Max)	15 mg/M3 -Total dust 5 mg/M3 – Respirable fraction	10 mg/M3
Sulfur	≤ 0.04 (Max)	15 mg/M3 Total dust (PNOR) 5 mg/M3 – Respirable fraction (PNOR)	10 mg/M3 – Inhalable fraction (PNOS) 3 mg/M3 – Respirable fraction (PNOS)
Tin	≤ 0.01 (Max)	2 mg/M3 – Tin metal (as Sn)	2 mg/M3 – Inorganic compounds (except oxides) (as Sn)
Titanium	≤ 0.15 (Max)	15 mg/M3 – total dust (PNOR) 5 mg/M3 – Respirable fraction (PNOR)	10 mg/M3 (Titanium dioxide)
Vanadium	≤ 0.15 (Max)	0.5 mg/M3 (C) – Respirable fractions as V_2O_5 0.1 mg/M3 (C) - Fume (as V_2O_5)	0.05 mg/M3 – Dust or fume (as V_2O_5)

Notes:
All commercial steel products contain small amounts of various elements in addition to those specified. These small quantities frequently referred to as "trace" or "residual" elements, generally originate in the raw materials used. Individual trace elements vary in concentration by weight, and may include antimony, arsenic, cadmium, cobalt, lead, and zirconium.
OSHA Permissible Exposure Limits (PELs) are 8-hours TWA (time-weighted average) concentrations unless otherwise noted. A ("C") designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted.
Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted.
PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic or organic, not listed specifically by substance name are covered by PNOR limit which is the same as the inter or nuisance dust limit of 15 mg/M3 for total dust and 5 mg/M3 for the respirable fraction.
Inhalable fraction. The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH TLVs and BELs Appendix D, paragraph A.
PNOS (Particulates Not Otherwise Specified). Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos and <1% crystalline silica. A TWA-TLV of 10 mg/M3 for inhalable particulate and 3 mg/M3 for respirable particulate has been recommended.
Respirable fraction. The concentration of respirable dust for the application of this limit is to be determined from the reaction passing a size-selector with the characteristics defined in the ACGIH TLVs and BELs Appendix D, paragraph C.
*Suspect Carcinogen by NTP and IARC

III. PHYSICAL DATA

APPEARANCE: Metallic Gray, Odorless
SPECIFIC GRAVITY: 7.85
MELTING POINT: 2750° F

IV. HEALTH HAZARD DATA

ROUTE OF EXPOSURE: Inhalation of dusts or fumes.
EFFECTS OF OVEREXPOSURE:

Acute Effect: Excessive exposure to high concentrations of dust may cause irritation of the eyes skin and mucous membranes of the upper respiratory tract. Excessive inhalation of metal fumes can produce an acute reaction known as "metal fume fever". Symptoms consist of chills and fever (very similar to and easily confused with flu symptoms) which come on a few hours after large exposures and usually last 12 to 48 hours.

Chronic Effects: Only after six to ten years of exposure to iron dust or fume does one present any signs of pneumoconiosis (i.e. siderosis). Physical examinations of those exposed to iron dust have not indicated any disability.

Excessive and repeated inhalation of chromium fume or dust may cause severe irritation, ulceration or cancer in the respiratory system. It is generally believed that the hexavalent forms of chromium (Cr + 6) are responsible for these effects. It is uncertain whether metallic chromium in dust form can cause the same effects noted above.

Excessive and prolonged inhalation of manganese (generally over two years exposure) can cause damage to the central nervous system. The pathology resembles Parkinson Disease. Also, workers routinely exposed to high concentrations of manganese display an unusually high incidence of respiratory disease.

Molybdenum has caused eye, skin, nose, and throat irritation in animals.

Excessive inhalation of nickel fumes have been associated with respiratory cancer. Nickel is a potential sensitizer and may cause allergic reactions.

Boron oxide dusts and fumes may cause upper respiratory tract and eye irritation, dryness of the mouth, nose or throat, and sore throat and productive cough.

Repeated and prolonged inhalation of calcium may cause inflammation of the respiratory passages, ulcers of the mucous membranes, and possible perforation of the nasal septum. Repeated or prolonged skin contact may cause dermatitis.

Chronic inhalation of high concentrations of carbon may cause pulmonary disorders.

Chronic inhalation of copper dust has caused, in animals, hemolysis of the red blood cells, deposition of hemofuscin in the liver and pancreas, injury to lung cells and gastrointestinal symptoms.

Exposure to dust and fume of tin (oxide) is recognized to result in a benign pneumoconiosis called stannosis.

Vanadium dusts cause a persistent cough, which can develop after five hours of exposure and may last up to ten days.

Pulmonary irritation also results from vanadium, but there are no deviations in pulmonary function or other laboratory tests.

V. EMERGENCY AND FIRST AID

INHALATION: If acute overexposure to dusts or fumes occurs, remove victim from the adverse environment and seek medical attention.
SKIN CONTACT: Remove contaminated clothing. Wash area of contact thoroughly with soap and water. If irritation persists, seek medical attention.
EYE CONTACT: Flush immediately with running water for fifteen minutes. If irritation persists, seek medical attention.
INGESTION: N/A

VI. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: N/A
EXTINGUISHING MEDIA: Not applicable for solid product. Use extinguishers appropriate for surrounding material.
SPECIAL PROCEDURES: Firemen should wear equipment to protect against noxious fumes.

VII. SPILL OR LEAK PROCEDURES

Minimal problems with spills of this product would occur because of its solid form. However, if there is a spill of dust, clean up using methods which avoid dust generation and the use of water, such as vacuum. If airborne dust is generated during the cleanup, use an appropriate NIOSH- approved respirator.
Waste Disposal Method: Dispose of in accordance with appropriate federal, state and local regulations.

VIII. SPECIAL PROTECTION

VENTILATION: Local exhaust ventilation should be provided to keep worker exposures within allowable limits.
RESPIRATORY PROTECTION: Use NIOSH/MSHA approved organic vapor respirators when vapor concentrations exceed the TLV.
EYE PROTECTION: Personal protective equipment should be worn when there is a reasonable probability of injury.
PROTECTIVE GLOVES: As needed.

IX. CARCINOGENIC ASSESSMENT

IARC, NTP and OSHA do not list steel products as carcinogens. The International Agency for Research on Cancer (IARC) identifies nickel, certain nickel compounds and welding fumes as Group 2B carcinogens that are possibly carcinogenic to humans. IARC lists chromium metal and trivalent chromium compounds as Group 3 carcinogens, not classifiable as to their human carcinogenicity. Hexavalent chromium compounds are listed by IARC as Group 1 carcinogens that are carcinogenic to humans.

X. REACTIVITY DATA

STABILITY: Stable under normal conditions of handling and use.
CONDITIONS TO AVOID: Poor ventilation. Storage with strong acids or calcium hypochlorite.
INCOMPATIBILITY: Strong acids (produce hydrogen gas). Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.
HAZARDOUS DECOMPOSITION PRODUCT: Thermal oxidative decomposition of steel products can produce fumes containing oxides of iron and manganese as well as other elements. If present, the resin on the product line may yield noxious gases such as oxides of carbon upon thermal oxidative decomposition.
HAZARDOUS POLYMERIZATION: Will not occur.

XI. SPECIAL PRECAUTIONS

HANDLING AND STORAGE: Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Practice good housekeeping Avoid breathing metal fumes and/or dust.
Store away from acids and incompatible materials.

This information is taken from sources or based upon data believed to be reliable; however, DUCTMATE INDUSTRIES, INC. makes no warranty as to the absolute correctness or sufficiency of any of the foregoing or that additional or other measures may not be required under particular conditions.

SAFETY DATA SHEET

ISSUE DATE: 6/10/2009
REVISED DATE: 02/05/16
Supersedes: Any Previous M.S.D.S. On This Product
EMERGENCY PHONE NUMBER: INFOTRAC (800)-535-5053

I. IDENTIFICATION

PRODUCT NAME: **Elgen Galvanized Steel Products**
PRODUCT CLASS: Steel

Elgen Manufacturing Company, INC.
10 Railroad Ave.
Closter, NJ 07624

II. HAZARDOUS INGREDIENTS

MATERIAL:	CAS	% WEIGHT	OSHA PEL (mg/m3)	ACGIH TLV (mg/m3)
Iron	7439-89-6	94.00 – 99.66	10 (oxide fume)	5 (oxide fume)
Zinc	7440-66-6	1.00-4.50	15 (oxide dust)	15 (oxide dust)
Aluminum	7429-90-5	.00-.4	15 (dust)	10 (dust)
Antimony	7440-36-0	<.9	0.5	0.5
Arsenic	7440-38-2	<.09	.01	.01
Beryllium	7440-41-7	<.09	.002	.002
Boron	7440-42-8	<.9	15	10
Cadmium	7440-43-9	<.09	.005	.01
Calcium	1305-78-8	<.9	5	2
Carbon	7440-44-0	.04-1.0	15	10
Chromium*	7440-47-3	0.01-1.5	0.5	0.06
Cobalt	7440-48-4	<.09	.1	.02
Manganese	7439-96-5	0.05-2.0	5 (dust) 5 (fume)	5 (dust) 1 (fume)
Phosphorous	8049-19-2	.001-.020	15	10
Molybdenum	7439-98-7	0.00-.010	15	10
Nickel	7440-02-0	0.01-.30	1	1
Silicon	7440-21-3	.015-.220	15	10
Sulfur	7704-34-9	.001-.020	15	10

This product contains the following ingredient at levels subject to reporting requirements of:
SARA 313 (40CFR372): Manganese, Chromium Nickel
OSHA HAZARADOUS COMMUNICATIONS STANDARD, (29CFR1910.1200): Manganese, Chromium, Nick el, Silicon, A luminum metallic powder
CALIFORNIA PROPOSITION 65: This product contains the following trace amounts of chemicals known to the state of California to be a cancer hazard: Nickel

III. PHYSICAL DATA

APPEARANCE: Metallic Color
BOILING POINT: N/A
SPECIFIC GRAVITY: 8 g/cm3
SOLUBILITY IN WATER: Not Soluble
SOFTENING POINT Of Zing Coating: 850°F
MELTING POINT OF BASE METAL: 2750°F

IV. HEALTH HAZARD DATA

ROUTE OF EXPOSURE: Inhalation, skin, eye, ingestion.
EFFECTS OF OVEREXPOSURE:

Effects: Chronic inhalation concentrations of iron oxide fumes or dusts may lead to a benign pneumoconiosis (siderosis). Inhalation of high concentrations of ferric oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. Chronic inhalation concentrations of aluminum fumes or dusts may lead to a fibrotic lung condition known as Shaver's Disease; however, evidence for this is not conclusive since affected workers were exposed to other substances (silica) as well. The inhalation of high concentrations of dust from manganese, copper, lead and/or zinc in the respirable particle size range can cause an influenzalike illness termed metal fume fever. Typical symptoms last 12 to 48 hours and are characterized by metallic taste in mouth, dryness and irritation of the throat, followed by weakness, muscle pain, fever, and chills. Continuous exposures to high concentrations of manganese can cause central nervous system disorders and manganese pneumonia. Fibrosis of lung tissue from manganese exposure has also been reported for products containing manganese only. Overexposure to aluminum dust can cause shortness of breath. Long term inhalation exposure to high concentrations (overexposure) to pneumoconiotic agents may act synergistically with inhalation of oxides, fumes or dusts of this product to cause toxic effects. Prolonged or repeated contact with unprotected skin may result in skin irritation. Torching or burning operations on steel products with oil or organic coating may produce emissions which can be irritating to the eyes and respiratory tract.

V. EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove to fresh air; if condition continues, consult a physician.
SKIN CONTACT: Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.
EYE CONTACT: Flush thoroughly with running water to remover particulate, obtain medical attention.
INGESTION: If significant amounts of metal are ingested, consult physician. If condition is voluntary, psychotherapy is advised.

VI. FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASS:
FLASH POINT: N/A
EXTINGUISHING MEDIA: Media Suitable For Surrounding Fire (Fp N).
FIRE FIGHTING PROCEDURES: Wear full protective clothing including helmet, self-contained positive pressure-demand breathing apparatus, protective clothing, and a face mask.
SPECIAL PROCEDURES: Use Niosh Approved Scba Full Protective Equipment.

VII. SPILL OR LEAK PROCEDURES

PROCEDURE TO FOLLOW IF MATERIAL IS RELEASE OR SPILLED: N/A

Waste Disposal Method: Any excess product can be recycled for futher use, disposed in a permitted hazardous waste landfill, or disposed by other methods which are in accordance with local, state, and federal regulations.

VIII. SPECIAL PROTECTION

RESPIRATORY: NIOSH/MSHA approved dust and fume respirators should be used to avoid excessive inhalation of particulates.
EYE PROTECTION: Provided when welding, burning, sawing, brazing, grinding or machining to prevent excessive dust or fume exposure.
HAND PROTECTION: Gloves recommended
OTHER: Additional protective equipment and/or clothing may be required

IX. CARCINOGENIC ASSESSMENT

Minimize and control operations producing airborn dust and fume. Provide adequate local and general exhaust ventilation.

X. REACTIVITY DATA

STABILITY: Stable under normal conditions of use, storage and transporation.
CONDITIONS TO AVOID: Generation of airborn fume and dust.
INCOMPATIBILITY: Strong acids (produce hydrogen gas)
HAZARDOUS DECOMPOSITION PRODUCT: Metallic oxide.
HAZARDOUS POLYMERIZATION: Will not occur

XI. SPECIAL PRECAUTIONS

HANDLING AND STORAGE: Use good housekeeping practices.

SAFETY DATA SHEET

ISSUE DATE: 6/10/2009
REVISED DATE: 02/05/16
Supersedes: Any Previous M.S.D.S. On This Product
EMERGENCY PHONE NUMBER: INFOTRAC (800)-535-5053

I. IDENTIFICATION

PRODUCT NAME: **Elgen Galvanized Steel Products**
PRODUCT CLASS: Aluminum

Elgen Manufacturing Company, INC.
10 Railroad Ave.
Closter, NJ 07624

II. HAZARDOUS INGREDIENTS

MATERIAL:	CAS	% WEIGHT	OSHA PEL (mg/m3)
Aluminum	7429-90-5	100%	15mg. Total Dust

III. PHYSICAL DATA

APPEARANCE: Silvery ductile metal
BOILING POINT: N/A
SPECIFIC GRAVITY: 2.5+
SOLUBILITY IN WATER: Not Soluble
MELTING POINT OF BASE METAL: 480-649°C

IV. HEALTH HAZARD DATA

ROUTE OF EXPOSURE: Inhalation, skin, eye, ingestion.
EFFECTS OF OVEREXPOSURE:

Effects: Chronic inhalation concentrations of iron oxide fumes or dusts may lead to a benign pneumoconiosis (siderosis). Inhalation of high concentrations of ferric oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. Chronic inhalation concentrations of aluminum fumes or dusts may lead to a fibrotic lung condition known as Shaver's Disease; however, evidence for this is not conclusive since affected workers were exposed to other substances (silica) as well. The inhalation of high concentrations of dust from manganese, copper, lead and/or zinc in the respirable particle size range can cause an influenzalike illness termed metal fume fever. Typical symptoms last 12 to 48 hours and are characterized by metallic taste in mouth, dryness and irritation of the throat, followed by weakness, muscle pain, fever, and chills. Continuous exposures to high concentrations of manganese can cause central nervous system disorders and manganese pneumonia. Fibrosis of lung tissue from manganese exposure has also been reported for products containing manganese only. Overexposure to aluminum dust can cause shortness of breath. Long term inhalation exposure to high concentrations (overexposure) to pneumoconiotic agents may act synergistically with inhalation of oxides, fumes or dusts of this product to cause toxic effects. Prolonged or repeated contact with unprotected skin may result in skin irritation. Torching or burning operations on steel products with oil or organic coating may produce emissions which can be irritating to the eyes and respiratory tract.

V. EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove to fresh air; if condition continues, consult a physician.
SKIN CONTACT: Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.
EYE CONTACT: Flush thoroughly with running water to remover particulate, obtain medical attention.
INGESTION: If significant amounts of metal are ingested, consult physician. If condition is voluntary, psychotherapy is advised.

VI. FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASS:
FLASH POINT: N/A
EXTINGUISHING MEDIA: Media Suitable For Surrounding Fire (Fp N).
FIRE FIGHTING PROCEDURES: Wear full protective clothing including helmet, self-contained positive pressure-demand breathing apparatus, protective clothing, and a face mask.
SPECIAL PROCEDURES: Use Niosh Approved Scba Full Protective Equipment.

VII. SPILL OR LEAK PROCEDURES

PROCEDURE TO FOLLOW IF MATERIAL IS RELEASE OR SPILLED: N/A

Waste Disposal Method: Any excess product can be recycled for futher use, disposed in a permitted hazardous waste landfill, or disposed by other methods which are in accordance with local, state, and federal regulations.

VIII. SPECIAL PROTECTION

RESPIRATORY: NIOSH/MSHA approved dust and fume respirators should be used to avoid excessive inhalation of particulates.
EYE PROTECTION: Provided when welding, burning, sawing, brazing, grinding or machining to prevent excessive dust or fume exposure.
HAND PROTECTION: Gloves recommended
EXPOSURE LIMITS: TWA:5(mg(Al)/m) from ACGIH (TLV) (United States) Inhalation (pyro-powders, welding fumes
TWA: 10 (mg(Al)/m) from ACGIH (TLV) (United States) Inhalation (metal dust)
OTHER: Additional protective equipment and/or clothing may be required

IX. CARCINOGENIC ASSESSMENT

Minimize and control operations producing airborn dust and fume. Provide adequate local and general exhaust ventilation.

X. REACTIVITY DATA

STABILITY: Stable under normal conditions of use, storage and transporation.
CONDITIONS TO AVOID: Generation of airborn fume and dust.
INCOMPATIBILITY: Reactive with oxiding agents, acids, alkalies
SPECIAL REMARKS ON REACTIVITY: Moisture sensitive. Aluminum reacts vigorously with Sodium Hydroxide. Aluminum is also incompatible with strong oxidizers, acids, chromic anhydride, iodine, carbon disulfide, methyl chloride, and halogenated hydrocarbons, acid chlorides, ammonium nitrate, ammonium persulfate, antimony, arsenic oxides, barium bromate, barium chlorate, barium iodate, metal salts.
HAZARDOUS POLYMERIZATION: Will not occur

XI. SPECIAL PRECAUTIONS

HANDLING AND STORAGE: Use good housekeeping practices.

MATERIAL SAFETY DATA SHEET

ISSUE DATE: 10/30/92
REVISED DATE: 7/13/05
Supersedes: Any Previous M.S.D.S. On This Product

I. IDENTIFICATION

PRODUCT NAME: Galvanized Products
PRODUCT CLASS: Steel

CL WARD & Family, Inc.
1502 Industrial Drive, Unit 2
Monongahela, PA 15063

II. HAZARDOUS INGREDIENTS

MATERIAL:	CAS	% WEIGHT	OSHA PEL (mg/m3)	ACGIH TLV (mg/m3)
Zinc	7440-66-6	1.00-4.50	15 (oxide dust)	15 (oxide dust)
Aluminum	7429-90-5	.01-.08	15 (dust)	10 (dust)
Antimony	7440-36-0	<.00 -.02	0.5	0.5
Iron	7439-89-6	94.00 – 99.66	10 (oxide fume)	5 (oxide fume)
Carbon	7440-44-0	.001-.15	15	10
Chromium*	7440-47-3	0.01-.2	0.5	0.06
Manganese	7439-96-5	0.05-2.0	5 (dust) 5 (fume)	5 (dust) 1 (fume)
Phosphorous	8049-19-2	.001-.020	15	10
Molybdenum	7439-98-7	0.00-.010	15	10
Nickel	7440-02-0	0.01-.30	1	1
Silicon	7440-21-3	.015-.220	15	10
Sulfur	7704-34-9	.001-.020	15	10

This product contains the following ingredient at levels subject to reporting requirements of:
SARA 313 (40CFR372): Manganese, Chromium Nickel
OSHA HAZARADOUS COMMUNICATIONS STANDARD, (29CFR1910.1200): Manganese, Chromium, Nickel, Silicon, Aluminum metallic powder
CALIFORNIA PROPOSITION 65: This product contains the following trace amounts of chemicals known to the state of California to be a cancer hazard: Nickel

III. PHYSICAL DATA

APPEARANCE: Metallic Color
BOILING POINT: N/A
SPECIFIC GRAVITY: 7.5-8.5 g/cm3
SOLUBILITY IN WATER: Not Soluble
SOFTENING POINT: 2400 F
MELTING POINT: 2750°F

IV. HEALTH HAZARD DATA

ROUTE OF EXPOSURE: Inhalation of dusts or fumes.
EFFECTS OF OVEREXPOSURE:

Acute Effect: Excessive inhalation of metal fumes can produce an acute reaction known as "metal fume fever". Symptoms consist of chills and fever (very similar to and easily confused with flu symptoms) which come on a few hours after large exposures.

Chronic Effects: Only after six to ten years of exposure to iron dust or fume does on e present any signs of pneumoconiosis (i.e. siderosis). Physical examinations of those exposed to iron dust have not indicated any disability.

Excessive and repeated inhalation of chromium fume or dust may cause severe irritation, ulceration or cancer in the respiratory system. It is generally believed that the hexavalent form of chromium (Cr+6) are responsible for these effects. It is uncertain whether metallic chromium in dust form can cause the same effects noted above.

Excessive and prolonged inhalation of manganese (generally over two years exposure) can cause damage to the central nervous system. The pathology resembles Parkinson's Disease. Also, workers routinely exposed to high concentrations of manganese display an unusually high incidence of respiratory disease.

Molybdenum has caused toxicity (anemia and poor growth) in farm animals, but there are no data documenting toxicity to humans due to industrial exposure.

Excessive inhalation of nickel fumes has been associated with respiratory cancer. Nickel is a potential sensitizer and may cause allergic reactions.

Chronic exposure to tungsten dust has caused respiratory disorders characterized by cough, dyspnea and wheezing.

There is no correlation between the onset of symptoms, the length of exposure and the development of interstitial fibrosis. Dermatitis, primarily on the side of the neck, flexor parts of the forearm and the back of the hand were also detected. Vanadium dusts cause a persistent cough which can develop after five hours of exposure and may last up to ten days. Pulmonary irritation also results from vanadium, but there are no deviations in pulmonary function or other laboratory tests.
Zinc dust is a skin and respiratory tract irritant. It is relatively nontoxic. However, if oxidation occurs prior to inhalation, one must deal with toxicities associated with zinc oxide such as metal fume fever, gastrointestinal disorders and hepatic dysfunction.

V. EMERGENCY AND FIRST AID PROCEDURES

INHALATION: If acute overexposure to dust or fumes occurs, remove victim from the adverse environment and seek medical attention..
SKIN CONTACT: Wash area of contact thoroughly with soap and water. If irritation persists, seek medical attention.
EYE CONTACT: Flush immediately with running water for fifteen minutes. If irritation persists, seek medical attention.
INGESTION: N/A

VI. FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASS:
FLASH POINT: N/A
EXTINGUISHING MEDIA: As for the surrounding fire, use dry powder for metal fires.
UNUSUAL FIRE HAZARD: Contact of molten product with water can cause an explosion hazard.
FIRE FIGHTING PROCEDURES: Wear full protective clothing including helmet, self-contained positive pressure-demand breathing apparatus, protective clothing, and a face mask.
SPECIAL PROCEDURES: Firefighters should wear equipment to protect against noxious fumes.
PRODUCT OF COMBUSTION: Material will begin softening at approximately 2400 F, will proceed to a liquid and form irritating and toxic gaseous metallic oxides at extremely high temperatures.

VII. SPILL OR LEAK PROCEDURES

LARGE/SMALL SPILL: Avoid creating dusts when cleaning spill. Small pieces may be collected using a broom and shovel. Particulates and dust may be collected by using a vacuum with a HEPA filter. Place collected material in a closed container. Minimal problems with spills of this product would occur because of its solid form. However, if there is a spill of dust, clean up using methods which avoid dust generation and the use of water, such as vacuum. If airborne dust is generated during the clean up, use an appropriate NIOSH-approved respirator.
Waste Disposal Method: Dispose of in accordance with appropriate federal, state and local regulations.

VIII. SPECIAL PROTECTION

VENTILATION: Local exhaust ventilation should be provided to keep workers exposures within allowable limits. Whenever dusts, particulates, or fumes are generated, use appropriate local exhaust ventilation to keep exposures below the regulated limits.
RESPIRATORY PROTECTION: Use NIOSH/NSHA approved organic vapor respirators when vapor concentrations exceed the TLV.
EYE PROTECTION: Personal protective equipment should be worn when there is a reasonable probability of injury. Wear safety glasses with side shields.
HAND PROTECTION: Wear leather or other appropriate work gloves, if necessary for type of operation.
OTHER: Protective clothing coveralls.

IX. CARCINOGENIC ASSESSMENT

Nickel and Chromium have been identified as suspect carcinogens by NTP and IARC.

X. REACTIVITY DATA

STABILITY: Stable under normal conditions of handling and use.
CONDITIONS TO AVOID: Poor ventilation.
INCOMPATIBILITY: Strong acids (produce hydrogen gas)
HAZARDOUS DECOMPOSITION PRODUCT: Metallic oxide.
HAZARDOUS POLYMERIZATION: Will not occur

XI. SPECIAL PRECAUTIONS

HANDLING AND STORAGE: Use good housekeeping practices to avoid excessive dust accumulation. As supplied, this product does not present a health hazard. Processing of the product for final uses can include formation of dusts, particulates, or fumes, some of which may present health hazards.

This information is taken from sources or based upon data believed to be reliable; however, C.L.WARD & FAMILY INC. makes no warranty as to the absolute correctness or sufficiency of any of the foregoing or that additional or other measures may not be required under particular conditions.

Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Printing date: August 22, 2018 Revision: August 22, 2018

1 Identification

· **Product identifier**

· **Trade name:** Galvanized Metal

· **Other means of identification:** No other identifiers

· **Recommended use and restriction on use**
· **Recommended use:**
Manufactured article.
Industrial uses.
· **Restrictions on use:** No relevant information available.

· **Details of the supplier of the Safety Data Sheet**
· **Manufacturer/Supplier:**
Ductmate Industries, Inc.
210 5th St.
Charleroi, PA 15022
Phone: 800-990-8459

· **Emergency telephone number:**
ChemTel Inc.
(800)255-3924 (North America)
+1 (813)248-0585 (International)

2 Hazard(s) identification

· **Classification of the substance or mixture**
The product is not classified as hazardous according to the Globally Harmonized System (GHS).

· **Label elements**
· **GHS label elements**
The product is not classified as hazardous according to OSHA GHS regulations within the United States.
· **Hazard pictograms:** Not regulated.
· **Signal word:** Not regulated.
· **Hazard statements:** Not regulated.
· **Precautionary statements:** Not regulated.

· **Other hazards** There are no other hazards not otherwise classified that have been identified.

3 Composition/information on ingredients

· **Chemical characterization: Mixtures**

· **Components:**		
7439-89-6	Iron	>80%
7664-38-2	Phosphoric acid	<2%
	Met. Corr.1, H290; Skin Corr. 1B, H314; Eye Dam. 1, H318	
1333-82-0	Chromium (VI) trioxide	<2%
	Ox. Sol. 1, H271 Acute Tox. 3, H301; Acute Tox. 3, H311; Acute Tox. 2, H330 Resp. Sens. 1, H334; Muta. 1B, H340; Carc. 1A, H350; Repr. 2, H361; STOT RE 1, H372 Skin Corr. 1A, H314	

(Cont'd. on page 2)

Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Printing date: August 22, 2018 Revision: August 22, 2018

Trade name: Galvanized Metal

(Cont'd. of page 1)

	◇ Skin Sens. 1, H317	
7439-96-5	Manganese	<1%
7440-50-8	Copper	<1%
7440-44-0	Carbon	<1%
7440-02-0	Nickel	<1%
7440-47-3	Chromium	<1%
7429-90-5	Aluminum	<1%
7440-62-2	Vanadium	<1%
7440-32-6	Titanium	<1%
7439-98-7	Molybdenum	<1%
7440-03-1	Niobium	<1%
7704-34-9	Sulfur ◇ Skin Irrit. 2, H315	<1%
7723-14-0	Phosphorus ◇ Flam. Sol. 1, H228	<1%
7440-31-5	Tin	<1%
7727-37-9	Nitrogen	<1%
7440-21-3	Silicon	<1%

· **Additional information:**
For the wording of the listed Hazard Statements, refer to section 16.
There is no exposure to hazardous ingredients during normal use.

4 First-aid measures

· **Description of first aid measures**
· **General information:** Adverse health effects are not reasonably expected from normal use of product.
· **After inhalation:**
Move to fresh air if breathing is difficult. If breathing has stopped, perform artificial respiration and obtain medical assistance at once.
· **After skin contact:**
Wash with soap and water.
If skin irritation or rash occurs: Get medical advice/attention.
In case of minor burns, flush with cool water.
Seek medical treatment if any skin damage has occurred.
· **After eye contact:**
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
· **After swallowing:**
Unlikely route of exposure.
Seek medical treatment in case of complaints.
· **Most important symptoms and effects, both acute and delayed:**
Short-term (acute) overexposure to metal fumes may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema).

Long-term (chronic) overexposure to metal fumes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects. Refer to Section 11 for more information.

(Cont'd. on page 3)

Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Printing date: August 22, 2018 Revision: August 22, 2018

Trade name: Galvanized Metal

(Cont'd. of page 2)

· **Danger:**
Suspected of damaging fertility or the unborn child.
May cause cancer.
May cause genetic defects.
Causes damage to organs through prolonged or repeated exposure.
· **Indication of any immediate medical attention and special treatment needed:** Treat symptomatically.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:**
As shipped, the product will not burn. In case of fire in the surroundings: use appropriate extinguishing agent.
· **For safety reasons unsuitable extinguishing agents:** For metal fires: Use specific agents only.
· **Special hazards arising from the substance or mixture** Heated product may release toxic fumes.
· **Advice for firefighters**
· **Protective equipment:**
Wear self-contained respiratory protective device.
Wear fully protective suit.
· **Additional information:**
In case of fire involving large quantities, evacuate area and fight fire from the upwind side.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
If airborne dust and/or fume is present, use adequate engineering controls and, if needed, personal protection to prevent overexposure. Refer to recommendations in Section 8.
· **Environmental precautions** Avoid release to the environment.
· **Methods and material for containment and cleaning up**
Pick up mechanically.
Send for recovery or disposal in suitable receptacles.
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

· **Handling**
· **Precautions for safe handling:** Handle with care.
· **Information about protection against explosions and fires:** No special measures required.

· **Conditions for safe storage, including any incompatibilities**
· **Requirements to be met by storerooms and receptacles:**
Storage area should be dry and well-ventilated.
Avoid storage near extreme heat.
· **Information about storage in one common storage facility:** No special requirements.

(Cont'd. on page 4)

Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Printing date: August 22, 2018 Revision: August 22, 2018

Trade name: Galvanized Metal

(Cont'd. of page 3)

· **Specific end use(s)** No relevant information available.

8 Exposure controls/personal protection

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**	
7439-89-6 Iron	
EV (Canada)	Long-term value: 1* 5** mg/m³ as iron;*salts, water-soluble;**welding fume
LMPE (Mexico)	Long-term value: 1 mg/m³
7664-38-2 Phosphoric acid	
PEL (USA)	Long-term value: 1 mg/m³
REL (USA)	Short-term value: 3 mg/m³ Long-term value: 1 mg/m³
TLV (USA)	Short-term value: 3 mg/m³ Long-term value: 1 mg/m³
EL (Canada)	Short-term value: 3 mg/m³ Long-term value: 1 mg/m³
EV (Canada)	Short-term value: 3 mg/m³ Long-term value: 1 mg/m³
LMPE (Mexico)	Short-term value: 3 mg/m³ Long-term value: 1 mg/m³
1333-82-0 Chromium (VI) trioxide	
PEL (USA)	Long-term value: 0.005* mg/m³ Ceiling limit value: 0.1** mg/m³ *as Cr(VI) **as CrO3; see 29 CFR 1910.1026
REL (USA)	Long-term value: 0.0002 mg/m³ as Cr; See Pocket Guide Apps. A and C
TLV (USA)	Short-term value: 0.0005 mg/m³ Long-term value: 0.0002 mg/m³ as Cr; inhalable, Skin; BEI, DSEN, RSEN
EL (Canada)	Long-term value: 0.025 mg/m³ Ceiling limit value: 0.1 mg/m³ as Cr; ACGIH A1, IARC 1
LMPE (Mexico)	Long-term value: 0.05 mg/m³ A1, IBE; como Cr
7439-96-5 Manganese	
PEL (USA)	Ceiling limit value: 5 mg/m³ as Mn
REL (USA)	Short-term value: 3 mg/m³ Long-term value: 1 mg/m³ fume, as Mn
TLV (USA)	Long-term value: 0.02* 0.1** mg/m³ as Mn; *respirable **inhalable fraction

(Cont'd. on page 5)

Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Printing date: August 22, 2018 Revision: August 22, 2018

Trade name: Galvanized Metal

(Cont'd. of page 4)

EL (Canada)	Long-term value: 0.2; 0.02* mg/m³ as Mn; R, *respirable
EV (Canada)	Long-term value: 0.2 mg/m³ as manganese
LMPE (Mexico)	Long-term value: 0.2 mg/m³ como Mn
7440-50-8 Copper	
PEL (USA)	Long-term value: 1* 0.1** mg/m³ as Cu *dusts and mists **fume
REL (USA)	Long-term value: 1* 0.1** mg/m³ as Cu *dusts and mists **fume
TLV (USA)	Long-term value: 1* 0.2** mg/m³ *dusts and mists; **fume; as Cu
EL (Canada)	Long-term value: 1* 0.2** mg/m³ *dusts and mists; **fume, as Cu
EV (Canada)	Long-term value: 0.2* 1** mg/m³ as copper, *fume;**dust and mists
LMPE (Mexico)	Long-term value: 0.2* 1** mg/m³ *humo (como Cu);**polvo y niebla (como Cu)
7440-02-0 Nickel	
PEL (USA)	Long-term value: 1 mg/m³
REL (USA)	Long-term value: 0.015 mg/m³ as Ni; See Pocket Guide App. A
TLV (USA)	Long-term value: 1.5* mg/m³ elemental, *inhalable fraction
EL (Canada)	Long-term value: 0.05 mg/m³ ACGIH A1, IARC 2B
EV (Canada)	Long-term value: 1 mg/m³ Inhalable fraction
LMPE (Mexico)	Long-term value: 1.5* mg/m³ *elemental:A5, fracción inhalable
7440-47-3 Chromium	
PEL (USA)	Long-term value: 1 mg/m³
REL (USA)	Long-term value: 0.5* mg/m³ *metal+inorg.compds.as Cr;See Pocket Guide App. C
TLV (USA)	Long-term value: 0.003* 0.5** mg/m³ inh. fraction, *as Cr(III),**metal
EL (Canada)	Long-term value: 0.5 mg/m³ as metal
EV (Canada)	Long-term value: 0.05 mg/m³
LMPE (Mexico)	Long-term value: 0.5 mg/m³ A4
7429-90-5 Aluminum	
PEL (USA)	Long-term value: 15*; 5** mg/m³ *Total dust; ** Respirable fraction

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Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

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Trade name: Galvanized Metal

(Cont'd. of page 5)

REL (USA)	Long-term value: 10* 5** mg/m³ as Al*Total dust**Respirable/pyro powd./welding f.
TLV (USA)	Long-term value: 1* mg/m³ as Al; *as respirable fraction
EL (Canada)	Long-term value: 1.0 mg/m³ respirable, as Al
EV (Canada)	Long-term value: 5 mg/m³ aluminium-containing (as aluminium)
LMPE (Mexico)	Long-term value: 1* mg/m³ A4, *fracciòn respirable
7439-98-7 Molybdenum	
PEL (USA)	Long-term value: 15* mg/m³ *Total dust, as Mo
TLV (USA)	Long-term value: 10* 3** mg/m³ as Mo; *inhalable fraction ** respirable fraction
EL (Canada)	Long-term value: 3* 10** mg/m³ as Mo; *respirable **inhalable
EV (Canada)	Long-term value: 10* 3** 0.5*** mg/m³ metal,insol.compd.:*inh;**resp;sol.compd.:***resp
LMPE (Mexico)	Long-term value: 10* 3** mg/m³ *fracción inhalable **respirable; como Mo
7723-14-0 Phosphorus	
REL (USA)	Long-term value: 0.1 mg/m³
LMPE (Mexico)	Short-term value: 0.3 mg/m³ Long-term value: 0.1 mg/m³
7440-31-5 Tin	
PEL (USA)	Long-term value: 2 mg/m³ metal
REL (USA)	Long-term value: 2 mg/m³
TLV (USA)	Long-term value: 2 mg/m³ metal
EL (Canada)	Long-term value: 2 mg/m³ metal
EV (Canada)	Long-term value: 2* 0.1** mg/m³ *metal, oxide, inorg. compds.;**org. compds.: Skin
LMPE (Mexico)	Long-term value: 2* mg/m³ *metal
7727-37-9 Nitrogen	
TLV (USA)	withdrawn TLV, see App. F; simple asphyxiant
EL (Canada)	Simple asphyxiant
LMPE (Mexico)	Asfixiante simple

· **Ingredients with biological limit values:**

1333-82-0 Chromium (VI) trioxide	
BEI (USA)	25 µg/L

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Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

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Trade name: Galvanized Metal

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	Medium: urine Time: end of shift at end of workweek Parameter: Total chromium (fume) 10 µg/L Medium: urine Time: increase during shift Parameter: Total chromium (fume)

· **Exposure controls**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Do not breathe dust.
Do not breathe fume.
· **Engineering controls:** Provide adequate ventilation.
· **Breathing equipment:**
Use respiratory protection when grinding or cutting material.
Wear appropriate NIOSH respirator when ventilation is inadequate and occupational exposure limits are exceeded.
· **Protection of hands:**
Wear gloves for the protection against mechanical hazards according to OSHA and NIOSH rules.
· **Eye protection:** Follow relevant national guidelines concerning the use of protective eyewear.
· **Body protection:** Protective work clothing
· **Limitation and supervision of exposure into the environment**
No relevant information available.
· **Risk management measures** No relevant information available.

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **Appearance:**	
Form:	Solid
Color:	According to product specification
· **Odor:**	Odorless
· **Odor threshold:**	Not determined.
· **pH-value:**	Not applicable.
· **Melting point/Melting range:**	Not determined.
· **Boiling point/Boiling range:**	Not determined.
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Not determined.
· **Auto-ignition temperature:**	Not determined.
· **Decomposition temperature:**	Not determined.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits**	

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acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

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Trade name: Galvanized Metal

(Cont'd. of page 7)

Lower:	Not determined.
Upper:	Not determined.
· **Oxidizing properties:**	Non-oxidizing.
· **Vapor pressure:**	Not applicable.
· **Density:**	
Relative density:	Not determined.
Vapor density:	Not applicable.
Evaporation rate:	Not applicable.
· **Solubility in / Miscibility with**	
Water:	Insoluble.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
· **Other information**	No relevant information available.

10 Stability and reactivity

· **Reactivity:** The product is non-reactive under normal conditions of use, storage and transport.
· **Chemical stability:** Stable under normal temperatures and pressures.
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used and stored according to specifications.
Avoid extreme heat.
· **Possibility of hazardous reactions** Reacts with strong acids and alkali.
· **Conditions to avoid**
Moisture.
Excessive heat.
· **Incompatible materials**
Strong acids
Alkalis
· **Hazardous decomposition products** Toxic metal compounds

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:** Harmful if inhaled.

· **LD/LC50 values that are relevant for classification:**		
1333-82-0 Chromium (VI) trioxide		
Oral	LD50	80 mg/kg (rat)
Dermal	LD50	57 mg/kg (rabbit)
Inhalative	LC50/4h	217 mg/m3 (rat)

· **Primary irritant effect:**

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· **On the skin:** Irritant to skin and mucous membranes.
· **On the eye:** Causes eye irritation.
· **Sensitization:** May cause sensitisation by inhalation and skin contact.
· **Subacute to chronic toxicity:**
Chromates may cause ulceration, perforation of the nasal septum, and severe irritation of the bronchial tubes and lungs. Liver damage and allergic reactions, including skin rash, have been reported. Asthma has been reported in some sensitized individuals. Skin contact may result in irritation, ulceration, sensitization, and contact dermatitis. Chromates contain the hexavalent form of chromium. Hexavalent chromium and its compounds are on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans.

· **IARC (International Agency for Research on Cancer):**		
7440-02-0	Nickel	2B
1333-82-0	Chromium (VI) trioxide	1

· **NTP (National Toxicology Program):**		
1333-82-0	Chromium (VI) trioxide	K
7440-02-0	Nickel	R

· **OSHA-Ca (Occupational Safety & Health Administration):**
None of the ingredients are listed.

· **Probable route(s) of exposure:** Skin contact.
· **Germ cell mutagenicity:** May cause genetic defects.
· **Carcinogenicity:** May cause cancer.
· **Reproductive toxicity:** Suspected of damaging fertility or the unborn child.
· **STOT-single exposure:** May cause respiratory irritation.
· **STOT-repeated exposure:** Causes damage to organs through prolonged or repeated exposure.
· **Aspiration hazard:** Based on available data, the classification criteria are not met.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity** No relevant information available.
· **Persistence and degradability**
Inorganic product, is not eliminable from water by means of biological cleaning processes.
· **Bioaccumulative potential:** No relevant information available.
· **Mobility in soil:** No relevant information available.
· **Additional ecological information**
· **General notes:** Avoid release to the environment.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**

(Cont'd. on page 10)

Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

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Contact waste processors for recycling information.
The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.

· **Uncleaned packagings**
· **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· **UN-Number**	
· **DOT, ADR, IMDG, IATA**	Not regulated.
· **UN proper shipping name**	
· **DOT, ADR, IMDG, IATA**	Not regulated.
· **Transport hazard class(es)**	
· **DOT, ADR, IMDG, IATA**	
· **Class**	Not regulated.
· **Packing group**	
· **DOT, ADR, IMDG, IATA**	Not regulated.
· **Environmental hazards**	
· **Marine pollutant:**	No
· **Special precautions for user**	Not applicable.
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **United States (USA)**
· **SARA**

· **Section 302 (extremely hazardous substances):**
None of the ingredients are listed.

· **Section 355 (extremely hazardous substances):**

7723-14-0	Phosphorus

· **Section 313 (Specific toxic chemical listings):**

1333-82-0	Chromium (VI) trioxide

· **TSCA (Toxic Substances Control Act)**
All ingredients are listed.

· **Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)**
None present or none present in regulated quantities.

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Safety Data Sheet

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Trade name: Galvanized Metal

(Cont'd. of page 10)

· **Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):**
None present or none present in regulated quantities.

· **Proposition 65 (California)**

· **Chemicals known to cause cancer:**	
1333-82-0	Chromium (VI) trioxide
7440-02-0	Nickel

· **Chemicals known to cause developmental toxicity for females:**	
1333-82-0	Chromium (VI) trioxide

· **Chemicals known to cause developmental toxicity for males:**	
1333-82-0	Chromium (VI) trioxide

· **Chemicals known to cause developmental toxicity:**	
1333-82-0	Chromium (VI) trioxide

· **EPA (Environmental Protection Agency):**		
1333-82-0	Chromium (VI) trioxide	A(inh), D(oral), K/L(inh), CBD(oral)
7439-96-5	Manganese	D
7440-50-8	Copper	D
7440-47-3	Chromium	D
7723-14-0	Phosphorus	D

· **IARC (International Agency for Research on Cancer):**		
1333-82-0	Chromium (VI) trioxide	1
7440-02-0	Nickel	2B

· **Canadian Domestic Substances List (DSL) (Substances not listed.):**
All ingredients are listed.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Abbreviations and acronyms:**
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistant, Bio-accumulable, Toxic
vPvB: very Persistent and very Bioaccumulative
OSHA: Occupational Safety & Health Administration
Flam. Sol. 1: Flammable solids – Category 1
Ox. Sol. 1: Oxidizing solids – Category 1
Met. Corr.1: Corrosive to metals – Category 1
Acute Tox. 3: Acute toxicity – Category 3
Acute Tox. 2: Acute toxicity – Category 2
Skin Corr. 1A: Skin corrosion/irritation – Category 1A
Skin Corr. 1B: Skin corrosion/irritation – Category 1B

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Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Printing date: August 22, 2018 Revision: August 22, 2018

Trade name: Galvanized Metal

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Skin Irrit. 2: Skin corrosion/irritation – Category 2
Eye Dam. 1: Serious eye damage/eye irritation – Category 1
Resp. Sens. 1: Respiratory sensitisation – Category 1
Skin Sens. 1: Skin sensitisation – Category 1
Muta. 1B: Germ cell mutagenicity – Category 1B
Carc. 1A: Carcinogenicity – Category 1A
Repr. 2: Reproductive toxicity – Category 2
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1

· **Sources**

Website, European Chemicals Agency (echa.europa.eu)
Website, US EPA Substance Registry Services (ofmpub.epa.gov/sor internet/registry/substreg/home/overview/home.do)
Website, Chemical Abstracts Registry, American Chemical Society (www.cas.org)
Patty's Industrial Hygiene, 6th ed., Rose, Vernon, ed. ISBN: 978-0-470-07488-6
Casarett and Doull's Toxicology: The Basic Science of Poisons, 8th Ed., Klaasen, Curtis D., ed., ISBN: 978-0-07-176923-5.
Safety Data Sheets, Individual Manufacturers

SDS Prepared by:
ChemTel Inc.
1305 North Florida Avenue
Tampa, Florida USA 33602-2902
Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573
Website: www.chemtelinc.com

MATERIAL SAFETY DATA SHEET

ISSUE DATE: 2/14/97
REVISED DATE: 5/12/09
Supersedes: Any Previous M.S.D.S. On This Product
DUCTMATE INDUSTRIES INC.
EMERGENCY PHONE NUMBER: CHEM-TEL, INC. 1-800-255-3924

I. IDENTIFICATION

PRODUCT NAME: Galvanneal Steel Products

CHEMICAL FAMILY: N/A
FORMULA: N/A

DUCTMATE INDUSTRIES, INC.
210 Fifth Street
Charleroi, PA 15022

II. HAZARDOUS INGREDIENTS

MATERIAL:	C.A.S. Number	OSHA/PEL	ACGIH/TLV
Iron	7439-89-6	10 mg/M3 (as Fe_2O_3 fume)	5 mg/M3 (Iron oxide dust & fume)
Zinc	7440-66-6	5mg/M3 (as ZnO fume)	5mg/M3 (as ZnO fume)

III. PHYSICAL DATA

APPEARANCE: Metallic Gray, Odorless
BOILING POINT: N/A
SPECIFIC GRAVITY: Approx. 8
SOLUBILITY IN WATER: Not Soluble
MELTING POINT OF ZINC COATING: 850° F
MELTING POINT OF BASE METAL: 2750° F

IV. HEALTH HAZARD DATA

Acute and Chronic: Exposure to high concentrations of fumes of zinc may create flu-like illness termed Metal Fume Fever. Symptoms can last 12 to 48 hours and may include metallic taste, dryness in the mouth, dizziness, weakness, muscle pain and fever.
CAUTION: Respiratory disorders may be aggravated by exposure to metallic dusts or fumes.

V. EMERGENCY AND FIRST AID

IN EYES: For contact with dust or particulates, flush eyes with large amounts of water. Eye injuries from solid particles should be treated by a physician immediately.
ON SKIN: Remove contaminated clothing. Wash area of contact thoroughly with soap and water. If irritation persists, seek medical attention.
INGESTED: N/A
INHALATION: If acute overexposure to dusts or fumes occurs, remove victim from the adverse environment and seek medical attention.

VI. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: N/A
EXTINGUISHING MEDIA: No fire or explosion hazard
UNUSUAL FIRE HAZARD: None
FIRE FIGHTING PROCEDURES: None
PRODUCT OF COMBUSTION: Metal fumes and certain noxious gases, such as CO, may be produced during welding or burning.

VII. SPILL OR LEAK PROCEDURES

Large/Small Spill: Avoid creating dusts when cleaning spill. Small pieces may be collected using a broom and shovel. Particulates and dust may be collected by using a vacuum with a HEPA filter. Place collected material in a closed container.

VIII. SPECIAL PROTECTION

VENTILATION: Whenever dusts, particulates, or fumes are generated, use appropriate local exhaust ventilation to keep exposures below the regulated limits.
EYE PROTECTION: Wear safety glasses with side shields.
HAND PROTECTION: Wear leather or other appropriate work gloves, if necessary for type of operation.
RESPIRATORY PROTECTION: A NIOSH – Approved, dust/fume respirator should be worn during welding or burning.

OTHER: Use appropriate protective clothing when welding or burning.

IX. REACTIVITY DATA

STABILITY: Stable
INCOMPATIBILITY: Contact with strong acids and alkalis may produce hydrogen gas.
CONDITIONS TO AVOID: None know.
HAZARDOUS DECOMPOSITION: Metal fumes and certain noxious gases, such as CO, may be produced during welding or burning.
HAZARDOUS POLYMERIAZTION: Will not occur.

X. SPECIAL PRECAUTIONS

As supplied, this product does not present a health hazard. Processing of the product for final uses can include formation of dusts, particulates, or fumes, some of which may present health hazards.

This information is taken from sources or based upon data believed to be reliable; however, DUCTMATE INDUSTRIES, INC. makes no warranty as to the absolute correctness or sufficiency of any of the foregoing or that additional or other measures may not be required under particular conditions.

SAFETY DATA SHEET

ISSUE DATE: 6/10/2009
REVISED DATE: 02/05/16
Supersedes: Any Previous M.S.D.S. On This Product
EMERGENCY PHONE NUMBER: INFOTRAC (800)-535-5053

I. IDENTIFICATION

PRODUCT NAME: **Elgen Galvaneal Products**
PRODUCT CLASS: Steel

Elgen Manufacturing Company, INC.
10 Railroad Ave.
Closter, NJ 07624

II. HAZARDOUS INGREDIENTS

MATERIAL:	CAS	% WEIGHT	OSHA PEL (mg/m3)	ACGIH TLV (mg/m3)
Iron	7439-89-6		10 (TWA as fume)	5 (TWA as fume)
Zinc	7440-66-6		5 (As ZnO Fume)	5 (As ZnO Fume)

III. PHYSICAL DATA

APPEARANCE: Metallic Color
BOILING POINT: N/A
SPECIFIC GRAVITY: 8 g/cm3
SOLUBILITY IN WATER: Not Soluble
SOFTENING POINT OF Zinc Coating: 850F
MELTING POINT OF BASE METAL: 2750F

IV. HEALTH HAZARD DATA

ROUTE OF EXPOSURE: Inhalation, skin, eye, ingestion.
EFFECTS OF OVEREXPOSURE:

Effects: Chronic inhalation concentrations of iron oxide fumes or dusts may lead to a benign pneumoconiosis (siderosis). Inhalation of high concentrations of ferric oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. Chronic inhalation concentrations of aluminum fumes or dusts may lead to a fibrotic lung condition known as Shaver's Disease; however, evidence for this is not conclusive since affected workers were exposed to other substances (silica) as well. The inhalation of high concentrations of dust from manganese, copper, lead and/or zinc in the respirable particle size range can cause an influenzalike illness termed metal fume fever. Typical symptoms last 12 to 48 hours and are characterized by metallic taste in mouth, dryness and irritation of the throat, followed by weakness, muscle pain, fever, and chills. Continuous exposures to high concentrations of manganese can cause central nervous system disorders and manganese pneumonia. Fibrosis of lung tissue from manganese exposure has also been reported for products containing manganese only. Overexposure to aluminum dust can cause shortness of breath. Long term inhalation exposure to high concentrations (overexposure) to pneumoconiotic agents may act synergistically with inhalation of oxides, fumes or dusts of this product to cause toxic effects. Prolonged or repeated contact with unprotected skin may result in skin irritation. Torching or burning operations on steel products with oil or organic coating may produce emissions which can be irritating to the eyes and respiratory tract.

V. EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove to fresh air; if condition continues, consult a physician.
SKIN CONTACT: Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.
EYE CONTACT: Flush thoroughly with running water to remover particulate, obtain medical attention.
INGESTION: If significant amounts of metal are ingested, consult physician. If condition is voluntary, psychotherapy is advised.

VI. FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASS:
FLASH POINT: N/A
EXTINGUISHING MEDIA: Media Suitable For Surrounding Fire (Fp N).
FIRE FIGHTING PROCEDURES: Wear full protective clothing including helmet, self-contained positive pressure-demand breathing apparatus, protective clothing, and a face mask.
SPECIAL PROCEDURES: Use Niosh Approved Scba Full Protective Equipment.

VII. SPILL OR LEAK PROCEDURES

PROCEDURE TO FOLLOW IF MATERIAL IS RELEASE OR SPILLED: N/A

Waste Disposal Method: Any excess product can be recycled for futher use, disposed in a permitted hazardous waste landfill, or disposed by other methods which are in accordance with local, state, and federal regulations.

VIII. SPECIAL PROTECTION

RESPIRATORY: NIOSH/MSHA approved dust and fume respirators should be used to avoid excessive inhalation of particulates.
EYE PROTECTION: Provided when welding, burning, sawing, brazing, grinding or machining to prevent excessive dust or fume exposure.
HAND PROTECTION: Gloves recommended
OTHER: Additional protective equipment and/or clothing may be required

IX. CARCINOGENIC ASSESSMENT

Minimize and control operations producing airborn dust and fume. Provide adequate local and general exhaust ventilation.

X. REACTIVITY DATA

STABILITY: Stable under normal conditions of use, storage and transporation.
CONDITIONS TO AVOID: Generation of airborn fume and dust.
INCOMPATIBILITY: Strong acids (produce hydrogen gas)
HAZARDOUS DECOMPOSITION PRODUCT: N/A
HAZARDOUS POLYMERIZATION: Will not occur

XI. SPECIAL PRECAUTIONS

HANDLING AND STORAGE: Use good housekeeping practices.

DUCTMATE Industries, Inc.

SAFETY DATA SHEET

Hot Dipped Galvanneal Sheet

Section 1: Identification

Ductmate Industries Inc
210 5th Street
Charleroi, PA
15022

Emergency Telephone Number - ChemTel Inc:
1-800-255-3924, +1 (813)-248-0585

Information Number:
1-800-245-3188

Date Prepared/Date of Revision: 1/12/17

Section 2: Hazard(s) Identification

Potential Acute Health Effects: Non-hazardous under normal use.
Potential Chronic Health Effects: Not available

Section 3: Composition/Information on Ingredients

C.A.S. Number	Chemical Name	OSHA PEL	ACGIH TLV	Weight/%
7439-89-6	Iron	10mg/m^3 (as Fe_2O_3 fume)	5mg/m^3 (as $Fe_2O_{3\,Fume}$)	N/A
7440-66-6	Zinc	5mg/m^3 (as ZnO fume)	5mg/m^3 (as ZnO fume)	N/A

Section 4: First Aid Measure

INHALATION: If acute overexposure to dust or fumes occurs, remove victim from the adverse environment and seek medical attention.

SKIN CONTACT: Remove contaminated clothing and wash area of contact thoroughly with soap and water. If irritation persists, seek medical attention.

EYE CONTACT: Flush immediately with running water for fifteen minutes occasionally lifting the lower and upper lids. If irritation persists, seek medical attention.

INGESTION: Seek medical attention, if necessary.

Section 5: Fire-fighting Measures

FLASH POINT: N/A

EXTINGUISHING MEDIA: N/A

SPECIAL PROCEDURES: Firefighters should wear equipment to protect against noxious fumes.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None

Section 6: Accidental Release Measures

Minimal problems with spills of this product would occur because of its solid form. However, if there is a spill of dust, clean up using methods which avoid dust generation and the use of water, such as vacuum. If airborne dust is generated during the clean up, use an appropriate NIOSH-approved respirator.

Section 7: Handling and Storage

Keep away from incompatibles such as oxidizing agents, acids, alkalis.
Use good housekeeping and handling practices.

Section 8: Exposure Controls/ Personal Protection

Wear NIOSH approved, dust/fume respirator when elding or burning.
Use eye protection and protective gloves when handling.
Use appropiate protective clothing when welding or burning.

Section 9: Physical and Chemical Properties

Boiling Point: N/A Specific Gravity: Approx. 8 Vapor Pressure: N/A
Vapor Density: N/A Solubility in Water: N/A Evaporation Rate: N/A
Melting Point: Zn Coating 850º F, Base Metal 2750º F
Appearance and Odor: Odorless solid with metal luster

Section 10: Stability and Reactivity

Stability: Stable – Yes Conditions to avoid:
N/A Incompatibility (materials to avoid): Contact with strong acids or alkalis may produce hydrogen gas.
Hazardous Polymerization: Will not occur Conditions to avoid: N/A

Section 11: Toxicological Information

Health Hazards (acute and chronic): N/A
Not regulated by OSHA
Carcinogenicity: No
Medical conditions generally aggravated by exposure: N/A
Signs and Symptoms of Exposure: Irrition of the nose, eyes and skin. Nausea, coughing and wheezing upon prolonged exposure at excessive levels during welding or burning.
Emergency and First Aid Procedures: For overexposure to airborne fumes and particulates, remove exposed person to fresh air. Seek medical attention.

Section 12: Ecological Information:

Not determined

Section 13: Disposal Condiderations

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material.
Identification: N/A
Special provisions for transport: N/A

Section 15: Regulatory Information

Not a regulated material.

Section 16: Other Information

Disclaimer: This information is taken from sources or based upon data believed to be reliable. Our objective in sending this information is to help you protect the health and safety of your personnel and to comply with the OSHA Hazard Communication Standard and Title III of the Superfund Amendment and Reauthorization Act of 1986. Wheeling-Nisshin Inc. makes no warranty as to the absolute correctness, completeness, or sufficiency of any of the foregoing, or that any additional or other measures may not be required under particular conditions.

Ductmate Industries Inc
210 5th Street
Charleroi, PA
15022

Emergency Telephone Number - ChemTel Inc:
1-800-255-3924, +1 (813)-248-0585

Information Number:
1-800-245-3188

Date Prepared/Date of Revision: 1/12/17

DUCTMATE Industries, Inc.

ainless Steel and Alloys of Stainless Steel

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

Revision Date: 12/15/2014 Date of issue: 10/30/2014 Version: 1.0

SECTION 1: IDENTIFICATION

1.1. Product Identifier

Product Form: Mixture

Product Name: Stainless Steel and Alloys of Stainless Steel

Synonyms: Alloy #200; Alloy #900; Alloy #STAGCG57; Alloy #342; Alloy #2SA

1.2. Intended Use of the Product

Use of the Substance/Mixture: No use is specified.

1.3. Name, Address, and Telephone of the Responsible Party

Ductmate Industries Inc
210 5th Street
Charleroi, PA
15022
TEL: 1-800-245-3188

1.4. Emergency Telephone Number

Emergency Number: ChemTel Inc: 1-800-255-3924, +1 (813)-248-0585

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the Substance or Mixture

Classification (GHS-US)

Not classified

2.2. Label Elements

HS-US Labeling No labeling applicable

2.3. Other Hazards

This product is present in a massive form as an alloy. It does not present the same hazards when the individual components are in their powdered forms. The materials present in this product in their powdered forms present aquatic toxicity to the environment, pyrophoricity, flammability, self-heating capabilities, carcinogenicity, water reactivity, and acute toxicity. When processed or where dust is generated a combustible dust hazard may be present. Avoid generating dust, generating sparks, ignition sources, and take all precautions.

Inhalation of dusts and fumes can cause metal fume fever. Symptoms can include a metallic or sweet taste in the mouth, sweating, shivering, headache, throat irritation, fever, chills, thirstiness, muscle aches, nausea, vomiting, weakness, fatigue, and shortness of breath.

Under normal use and handling of the solid form of this material there are few health hazards. Cutting, welding, melting, grinding etc. of these materials will produce dust, fume or particulate containing the component elements of these materials. Exposure to the dust, fume or particulate of these materials may present significant health hazards. Exposure to dust or fume may cause irritation of the eyes, skin and respiratory tract. Fine particulates dispersed in air may present an explosion hazard.

2.4. Unknown Acute Toxicity (GHS-US) No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Not applicable

Name	Product Identifier	% (w/w)	Classification (GHS-US)
Iron	(CAS No) 7439-89-6	66 - 88	Not classified
Chromium	(CAS No) 7440-47-3	< 0.1, 0.1 - 1, 1 - 5, 5 - 10, 10 - 30	Comb. Dust
ickel	(CAS No) 7440-02-0	< 0.1, 0.1 - 1, 1 - 5, 5 - 10, 10 - 27	Skin Sens. 1, H317 Carc. 2, H351 STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Chronic 3, H412
Manganese	(CAS No) 7439-96-5	< 0.1, 0.1 -	Comb. Dust

		1, 1 - 5, 5 - 6	
Molybdenum	(CAS No) 7439-98-7	< 0.1, 0.1 - 1, 1 - 5, 5 - 6	Comb. Dust
Titanium	(CAS No) 7440-32-6	< 0.1, 0.1 - 1, 1 - 5, 5 - 6	Flam. Sol. 1, H228
Copper	(CAS No) 7440-50-8	< 0.1, 0.1 - 1, 1 - 5, 5 - 6	Comb. Dust Aquatic Acute 1, H400 Aquatic Chronic 3, H412
Sulfur dioxide	(CAS No) 7446-09-5	< 0.1, 0.1 - 1, 1 - 2	Compressed gas, H280 Acute Tox. 3 (Inhalation:gas), H331 Skin Corr. 1B, H314 Eye Dam. 1, H318
Phosphorus elemental	(CAS No) 7723-14-0	< 0.1, 0.1 - 1, 1 - 2	Not classified
Cobalt	(CAS No) 7440-48-4	< 0.1, 0.1 - 1, 1 - 2	Acute Tox. 4 (Oral), H302 Acute Tox. 1 (Inhalation:dust,mist), H330 Eye Irrit. 2A, H319 Resp. Sens. 1B, H334 Skin Sens. 1, H317 Carc. 2, H351 Repr. 2, H361 Aquatic Acute 3, H402 Aquatic Chronic 1, H410
Carbon	(CAS No) 7440-44-0	< 0.1, 0.1 - 1, 1 - 2	Comb. Dust
Silicon	(CAS No) 7440-21-3	< 0.1, 0.1 - 1, 1 - 2	Comb. Dust
Tungsten	(CAS No) 7440-33-7	< 0.1, 0.1 - 1, 1 - 2	Flam. Sol. 1, H228 Self-heat. 2, H252
Niobium	(CAS No) 7440-03-1	< 0.1, 0.1 - 1, 1 - 2	Flam. Sol. 1, H228
Aluminum	(CAS No) 7429-90-5	< 0.1, 0.1 - 0.5	Comb. Dust Flam. Sol. 1, H228 Water-react. 2, H261
Tantalum	(CAS No) 7440-25-7	0.15 - 0.45	Flam. Sol. 1, H228
Selenium	(CAS No) 7782-49-2	< 0.1, 0.1 - 0.35	Acute Tox. 3 (Oral), H301 Acute Tox. 3 (Inhalation:dust,mist), H331 STOT RE 2, H373 Aquatic Chronic 4, H413

Full text of H-phrases: see section 16

More than one of the ranges of concentration prescribed by Controlled Products Regulations has been used where necessary due to varying composition.

SECTION 4: FIRST AID MEASURES

4.1. Description of First Aid Measures

General: IF exposed or concerned: Get medical advice/attention. Never give anything by mouth to an unconscious person.

Inhalation: When symptoms occur: go into open air and ventilate suspected area. Keep at rest and in a position comfortable for breathing. Obtain medical attention if breathing difficulty persists.

In Contact: Cool skin rapidly with cold water after contact with molten product. Removal of solidified molten material from skin requires medical assistance. Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Wash with plenty of soap and water. Wash contaminated clothing before reuse. Obtain medical attention if irritation persists.

Eye Contact: Removal of solidified molten material from the eyes requires medical assistance. Immediately rinse with water for a prolonged period (at least 15 minutes) while holding the eyelids wide open. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention if irritation develops or persists.

Ingestion: Rinse mouth. Do NOT induce vomiting. Call a POISON CENTER/doctor/physician if you feel unwell.

4.2. Most Important Symptoms and Effects Both Acute and Delayed

General: Welding, cutting, or processing this material may release dust or fumes that are hazardous.

Inhalation: Inhalation of dusts and fumes can cause metal fume fever. Symptoms can include a metallic or sweet taste in the mouth, sweating, shivering, headache, throat irritation, fever, chills, thirstiness, muscle aches, nausea, vomiting, weakness, fatigue, and shortness of breath.

Skin Contact: May cause an allergic skin reaction. Dust from physical alteration of this product causes skin irritation. Causes severe skin burns. Contact with fumes or metal powder will irritate skin. Contact with hot, molten metal will cause thermal burns. Dust may cause irritation in skin folds or by contact in combination with tight clothing. Mechanical damage via flying particles and chipped slag is possible.

Eye Contact: Dust may cause mechanical irritation to eyes, nose, throat, and lungs.

Ingestion: Ingestion is likely to be harmful or have adverse effects.

Chronic Symptoms: In massive form, no hazard exists. If physically altered to present slivers, ribbons, dusts or fumes from molten material: Aluminum: Inhalation of finely divided aluminum powder may cause pulmonary fibrosis. Inhalation of iron oxide fumes undergoing decomposition may cause irritation and flu-like symptoms, otherwise iron oxide is not hazardous. Inhalation of Nickel compounds has been shown in studies to provide an increased incidence of cancer of the nasal cavity, lung and possibly larynx in nickel refinery workers. Nickel: May cause a form of dermatitis known as nickel itch and intestinal irritation, which may cause disorders, convulsions and asphyxia. Chromium: Certain hexavalent chromium compounds have been demonstrated to be carcinogenic on the basis of epidemiological investigations on workers and experimental studies in animals. Increased incidences of respiratory cancer have been found in chromium (VI) workers.There is an increased incidence of lung cancer in industrial workers exposed to chromium (VI) compounds. Please refer to IARC volume 23 for a more detailed discussion. Manganese : Chronic exposure can cause inflammation of the lung tissue, scarring the lungs (pulmonary fibrosis). Copper: Overexposure to fumes may cause metal fume fever (chills, muscle aches, nausea, fever, dry throat, cough, weakness, lassitude); metallic or sweet taste; discoloration of skin and hair. Tissue damage of mucous membranes may follow chronic dust exposure. Silicon : Can cause chronic bronchitis and narrowing of the airways.

4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention.

SECTION 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing Media

Suitable Extinguishing Media: Use extinguishing media appropriate for surrounding fire. Dry sand; Class D Extinguishing Agent (for metal powder fires).

Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire. Do not use water when molten material is involved, may react violently or explosively on contact with water.

5.2. Special Hazards Arising From the Substance or Mixture

Fire Hazard: A non-combustible material, not considered flammable but will melt above 1300 °C (2372 °F).

Explosion Hazard: In molten state: reacts violently with water (moisture).

Reactivity: Hazardous reactions will not occur under normal conditions.

5.3. Advice for Firefighters

Precautionary Measures Fire: Under fire conditions, hazardous fumes will be present.

Firefighting Instructions: Exercise caution when fighting any chemical fire.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Hazardous Combustion Products: Oxides of nickel. Oxides of copper. Chromium oxides. Oxides of silicone and carbon. Oxides of aluminum. Phosphorus oxides. Molybdenum oxides. Sulfur compounds. Cobalt oxide. Oxides of Tantalum.

Reference to Other Sections

Refer to section 9 for flammability properties.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Do not handle until all safety precautions have been read and understood. Do not breathe vapors from molten product.

6.1.1. For Non-Emergency Personnel

Protective Equipment: Use appropriate personal protection equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

6.1.2. For Emergency Personnel

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Ventilate area.

6.2. Environmental Precautions

Prevent entry to sewers and public waters.

6.3. Methods and Material for Containment and Cleaning Up

For Containment: Contain and collect as any solid.

Methods for Cleaning Up: Clear up spills immediately and dispose of waste safely. For particulates and dust: Avoid actions that cause dust to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE described in Section 8. Vacuum must be fitted with HEPA filter to prevent release of particulates during clean-up.

6.4. Reference to Other Sections

See heading 8, Exposure Controls and Personal Protection. Concerning disposal elimination after cleaning, see item 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for Safe Handling

Additional Hazards When Processed: May generate flammable/explosive dusts or turnings when brushed, machined or ground. Use care during processing to minimize generation of dust. Where excessive dust may result, use approved respiratory protection equipment. Heating of product can release toxic or irritating fumes; ensure proper ventilation is employed, proper precautions are enforced, and applicable regulations are followed. Inhalation of fumes may cause metal fume fever.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and again when leaving work. Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse.

7.2. Conditions for Safe Storage, Including Any Incompatibilities

Storage Conditions: Store in a dry, cool and well-ventilated place.

Incompatible Materials: Strong acids, strong bases, strong oxidizers. Alkalis. Metal oxides. Water, humidity. Corrosive substances in contact with metals may produce flammable hydrogen gas.

7.3. Specific End Use(s)

No use is specified.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control Parameters

For substances listed in section 3 that are not listed here, there are no established Exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), NIOSH (REL), OSHA (PEL), Canadian provincial governments, or the Mexican government.

Chromium (7440-47-3)		
Mexico	OEL TWA (mg/m³)	0.5 mg/m³
USA ACGIH	ACGIH TWA (mg/m³)	0.5 mg/m³
USA OSHA	OSHA PEL (TWA) (mg/m³)	1 mg/m³
USA NIOSH	NIOSH REL (TWA) (mg/m³)	0.5 mg/m³
USA IDLH	US IDLH (mg/m³)	250 mg/m³
Alberta	OEL TWA (mg/m³)	0.5 mg/m³
British Columbia	OEL TWA (mg/m³)	0.5 mg/m³
Manitoba	OEL TWA (mg/m³)	0.5 mg/m³

New Brunswick	OEL TWA (mg/m³)	0.5 mg/m³
Newfoundland & Labrador	OEL TWA (mg/m³)	0.5 mg/m³
Nova Scotia	OEL TWA (mg/m³)	0.5 mg/m³
Nunavut	OEL STEL (mg/m³)	1.5 mg/m³
Nunavut	OEL TWA (mg/m³)	0.5 mg/m³
Northwest Territories	OEL STEL (mg/m³)	1.5 mg/m³
Northwest Territories	OEL TWA (mg/m³)	0.5 mg/m³
Ontario	OEL TWA (mg/m³)	0.5 mg/m³
Prince Edward Island	OEL TWA (mg/m³)	0.5 mg/m³
Québec	VEMP (mg/m³)	0.5 mg/m³
Saskatchewan	OEL STEL (mg/m³)	1.5 mg/m³
Saskatchewan	OEL TWA (mg/m³)	0.5 mg/m³
Yukon	OEL STEL (mg/m³)	3.0 mg/m³
Yukon	OEL TWA (mg/m³)	0.1 mg/m³

Nickel (7440-02-0)		
Mexico	OEL TWA (mg/m³)	1 mg/m³
USA ACGIH	ACGIH TWA (mg/m³)	1.5 mg/m³ (inhalable fraction)
USA OSHA	OSHA PEL (TWA) (mg/m³)	1 mg/m³
USA NIOSH	NIOSH REL (TWA) (mg/m³)	0.015 mg/m³
USA IDLH	US IDLH (mg/m³)	10 mg/m³
Alberta	OEL TWA (mg/m³)	1.5 mg/m³
British Columbia	OEL TWA (mg/m³)	0.05 mg/m³
Manitoba	OEL TWA (mg/m³)	1.5 mg/m³ (inhalable fraction)
New Brunswick	OEL TWA (mg/m³)	1 mg/m³
Newfoundland & Labrador	OEL TWA (mg/m³)	1.5 mg/m³ (inhalable fraction)
Nova Scotia	OEL TWA (mg/m³)	1.5 mg/m³ (inhalable fraction)
Nunavut	OEL STEL (mg/m³)	2 mg/m³
Nunavut	OEL TWA (mg/m³)	1 mg/m³
Northwest Territories	OEL STEL (mg/m³)	2 mg/m³
Northwest Territories	OEL TWA (mg/m³)	1 mg/m³
Ontario	OEL TWA (mg/m³)	1 mg/m³ (inhalable)
Prince Edward Island	OEL TWA (mg/m³)	1.5 mg/m³ (inhalable fraction)
Québec	VEMP (mg/m³)	1 mg/m³
Saskatchewan	OEL STEL (mg/m³)	3 mg/m³ (inhalable fraction)
Saskatchewan	OEL TWA (mg/m³)	1.5 mg/m³ (inhalable fraction)
Yukon	OEL STEL (mg/m³)	3 mg/m³
Yukon	OEL TWA (mg/m³)	1 mg/m³

Manganese (7439-96-5)		
Mexico	OEL TWA (mg/m³)	0.2 mg/m³ 1 mg/m³ (fume)
Mexico	OEL STEL (mg/m³)	3 mg/m³ (fume)
USA ACGIH	ACGIH TWA (mg/m³)	0.02 mg/m³ (respirable fraction) 0.1 mg/m³ (inhalable fraction)
USA OSHA	OSHA PEL (Ceiling) (mg/m³)	5 mg/m³ (fume)
USA NIOSH	NIOSH REL (TWA) (mg/m³)	1 mg/m³ (fume)
USA NIOSH	NIOSH REL (STEL) (mg/m³)	3 mg/m³
USA IDLH	US IDLH (mg/m³)	500 mg/m³
Alberta	OEL TWA (mg/m³)	0.2 mg/m³
British Columbia	OEL TWA (mg/m³)	0.2 mg/m³
Manitoba	OEL TWA (mg/m³)	0.02 mg/m³ (respirable fraction)
New Brunswick	OEL TWA (mg/m³)	0.2 mg/m³

Newfoundland & Labrador	OEL TWA (mg/m^3)	0.02 mg/m^3 (respirable fraction)
Nova Scotia	OEL TWA (mg/m^3)	0.02 mg/m^3 (respirable fraction)
Nunavut	OEL Ceiling (mg/m^3)	5 mg/m^3
Nunavut	OEL STEL (mg/m^3)	3 mg/m^3 (fume)
Nunavut	OEL TWA (mg/m^3)	1 mg/m^3 (fume)
Northwest Territories	OEL Ceiling (mg/m^3)	5 mg/m^3
Northwest Territories	OEL STEL (mg/m^3)	3 mg/m^3 (fume)
Northwest Territories	OEL TWA (mg/m^3)	1 mg/m^3 (fume)
Ontario	OEL TWA (mg/m^3)	0.2 mg/m^3
Prince Edward Island	OEL TWA (mg/m^3)	0.02 mg/m^3 (respirable fraction)
Québec	VEMP (mg/m^3)	0.2 mg/m^3 (total dust and fume)
Saskatchewan	OEL STEL (mg/m^3)	0.6 mg/m^3
Saskatchewan	OEL TWA (mg/m^3)	0.2 mg/m^3
Yukon	OEL Ceiling (mg/m^3)	5 mg/m^3

Molybdenum (7439-98-7)		
USA ACGIH	ACGIH TWA (mg/m^3)	10 mg/m^3 (inhalable fraction) 3 mg/m^3 (respirable fraction)
USA IDLH	US IDLH (mg/m^3)	5000 mg/m^3
Alberta	OEL TWA (mg/m^3)	10 mg/m^3 (total)
British Columbia	OEL TWA (mg/m^3)	3 mg/m^3 (respirable)
Manitoba	OEL TWA (mg/m^3)	10 mg/m^3 (inhalable fraction)
Newfoundland & Labrador	OEL TWA (mg/m^3)	10 mg/m^3 (inhalable fraction)
Nova Scotia	OEL TWA (mg/m^3)	10 mg/m^3 (inhalable fraction)
Ontario	OEL TWA (mg/m^3)	10 mg/m^3 (metal-inhalable)
Prince Edward Island	OEL TWA (mg/m^3)	10 mg/m^3 (inhalable fraction)
Saskatchewan	OEL STEL (mg/m^3)	20 mg/m^3 (inhalable fraction)
Saskatchewan	OEL TWA (mg/m^3)	10 mg/m^3 (inhalable fraction)

Copper (7440-50-8)		
Mexico	OEL TWA (mg/m^3)	0.2 mg/m^3 (fume) 1 mg/m^3 (dust and mist)
Mexico	OEL STEL (mg/m^3)	2 mg/m^3 (fume) 2 mg/m^3 (dust and mist)
USA ACGIH	ACGIH TWA (mg/m^3)	0.2 mg/m^3 (fume)
USA OSHA	OSHA PEL (TWA) (mg/m^3)	0.1 mg/m^3 (fume) 1 mg/m^3 (dust and mist)
USA NIOSH	NIOSH REL (TWA) (mg/m^3)	1 mg/m^3 (dust and mist) 0.1 mg/m^3 (fume)
USA IDLH	US IDLH (mg/m^3)	100 mg/m^3 (dust, fume and mist)
Alberta	OEL TWA (mg/m^3)	0.2 mg/m^3 (fume)
British Columbia	OEL TWA (mg/m^3)	1 mg/m^3 (dust and mist)
Manitoba	OEL TWA (mg/m^3)	0.2 mg/m^3 (fume)
New Brunswick	OEL TWA (mg/m^3)	0.2 mg/m^3 (fume)
Newfoundland & Labrador	OEL TWA (mg/m^3)	0.2 mg/m^3 (fume)
Nova Scotia	OEL TWA (mg/m^3)	0.2 mg/m^3 (fume)
Nunavut	OEL STEL (mg/m^3)	0.6 mg/m^3 (fume)
Nunavut	OEL TWA (mg/m^3)	0.2 mg/m^3 (fume)
Northwest Territories	OEL STEL (mg/m^3)	0.6 mg/m^3 (fume)
Northwest Territories	OEL TWA (mg/m^3)	0.2 mg/m^3 (fume)
Ontario	OEL TWA (mg/m^3)	0.2 mg/m^3 (fume)
Prince Edward Island	OEL TWA (mg/m^3)	0.2 mg/m^3 (fume)
Québec	VEMP (mg/m^3)	0.2 mg/m^3 (fume)

Saskatchewan	OEL STEL (mg/m³)	0.6 mg/m³ (fume)
Saskatchewan	OEL TWA (mg/m³)	0.2 mg/m³ (fume)
Yukon	OEL STEL (mg/m³)	0.2 mg/m³ (fume)
Yukon	OEL TWA (mg/m³)	0.2 mg/m³ (fume)

Sulfur dioxide (7446-09-5)		
Mexico	OEL TWA (mg/m³)	5 mg/m³
Mexico	OEL TWA (ppm)	2 ppm
Mexico	OEL STEL (mg/m³)	10 mg/m³
Mexico	OEL STEL (ppm)	5 ppm
USA ACGIH	ACGIH STEL (ppm)	0.25 ppm
USA OSHA	OSHA PEL (TWA) (mg/m³)	13 mg/m³
USA OSHA	OSHA PEL (TWA) (ppm)	5 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m³)	5 mg/m³
USA NIOSH	NIOSH REL (TWA) (ppm)	2 ppm
USA NIOSH	NIOSH REL (STEL) (mg/m³)	13 mg/m³
USA NIOSH	NIOSH REL (STEL) (ppm)	5 ppm
USA IDLH	US IDLH (ppm)	100 ppm
Alberta	OEL STEL (mg/m³)	13 mg/m³
Alberta	OEL STEL (ppm)	5 ppm
Alberta	OEL TWA (mg/m³)	5.2 mg/m³
Alberta	OEL TWA (ppm)	2 ppm
British Columbia	OEL STEL (ppm)	5 ppm
British Columbia	OEL TWA (ppm)	2 ppm
Manitoba	OEL STEL (ppm)	0.25 ppm
New Brunswick	OEL STEL (mg/m³)	13 mg/m³
New Brunswick	OEL STEL (ppm)	5 ppm
New Brunswick	OEL TWA (mg/m³)	5.2 mg/m³
New Brunswick	OEL TWA (ppm)	2 ppm
Newfoundland & Labrador	OEL STEL (ppm)	0.25 ppm
Nova Scotia	OEL STEL (ppm)	0.25 ppm
Nunavut	OEL STEL (mg/m³)	13 mg/m³
Nunavut	OEL STEL (ppm)	5 ppm
Nunavut	OEL TWA (mg/m³)	5 mg/m³
Nunavut	OEL TWA (ppm)	2 ppm
Northwest Territories	OEL STEL (mg/m³)	13 mg/m³
Northwest Territories	OEL STEL (ppm)	5 ppm
Northwest Territories	OEL TWA (mg/m³)	5 mg/m³
Northwest Territories	OEL TWA (ppm)	2 ppm
Ontario	OEL STEL (mg/m³)	10.4 mg/m³
Ontario	OEL STEL (ppm)	5 ppm
Ontario	OEL TWA (mg/m³)	5.2 mg/m³
Ontario	OEL TWA (ppm)	2 ppm
Prince Edward Island	OEL STEL (ppm)	0.25 ppm
Québec	VECD (mg/m³)	13 mg/m³
Québec	VECD (ppm)	5 ppm
Québec	VEMP (mg/m³)	5.2 mg/m³
Québec	VEMP (ppm)	2 ppm
Saskatchewan	OEL STEL (ppm)	5 ppm
Saskatchewan	OEL TWA (ppm)	2 ppm
Yukon	OEL STEL (mg/m³)	13 mg/m³
Yukon	OEL STEL (ppm)	5 ppm

Yukon	OEL TWA (mg/m^3)	13 mg/m^3
Yukon	OEL TWA (ppm)	5 ppm

Phosphorus elemental (7723-14-0)		
Alberta	OEL TWA (mg/m^3)	0.1 mg/m^3 (yellow)
New Brunswick	OEL TWA (mg/m^3)	0.1 mg/m^3 (yellow)
New Brunswick	OEL TWA (ppm)	0.02 ppm (yellow)
Québec	VEMP (mg/m^3)	0.1 mg/m^3 (yellow)

Cobalt (7440-48-4)		
Mexico	OEL TWA (mg/m^3)	0.1 mg/m^3 (dust and fume)
USA ACGIH	ACGIH TWA (mg/m^3)	0.02 mg/m^3
USA OSHA	OSHA PEL (TWA) (mg/m^3)	0.1 mg/m^3 (dust and fume)
USA NIOSH	NIOSH REL (TWA) (mg/m^3)	0.05 mg/m^3 (dust and fume)
USA IDLH	US IDLH (mg/m^3)	20 mg/m^3 (dust and fume)
Alberta	OEL TWA (mg/m^3)	0.02 mg/m^3
British Columbia	OEL TWA (mg/m^3)	0.02 mg/m^3
Manitoba	OEL TWA (mg/m^3)	0.02 mg/m^3
New Brunswick	OEL TWA (mg/m^3)	0.02 mg/m^3
Newfoundland & Labrador	OEL TWA (mg/m^3)	0.02 mg/m^3
Nova Scotia	OEL TWA (mg/m^3)	0.02 mg/m^3
Nunavut	OEL STEL (mg/m^3)	0.3 mg/m^3 (dust and fume)
Nunavut	OEL TWA (mg/m^3)	0.1 mg/m^3 (metal-dust and fume)
Northwest Territories	OEL STEL (mg/m^3)	0.3 mg/m^3 (dust and fume)
Northwest Territories	OEL TWA (mg/m^3)	0.1 mg/m^3 (dust and fume)
Ontario	OEL TWA (mg/m^3)	0.02 mg/m^3
Prince Edward Island	OEL TWA (mg/m^3)	0.02 mg/m^3
Québec	VEMP (mg/m^3)	0.02 mg/m^3
Saskatchewan	OEL STEL (mg/m^3)	0.06 mg/m^3
Saskatchewan	OEL TWA (mg/m^3)	0.02 mg/m^3
Yukon	OEL STEL (mg/m^3)	0.15 mg/m^3 (dust and fume)
Yukon	OEL TWA (mg/m^3)	0.05 mg/m^3 (dust and fume)

Carbon (7440-44-0)		
Mexico	OEL TWA (mg/m^3)	2 mg/m^3 (dust)

Silicon (7440-21-3)		
Mexico	OEL TWA (mg/m^3)	10 mg/m^3 (inhalable fraction)
Mexico	OEL STEL (mg/m^3)	20 mg/m^3
USA OSHA	OSHA PEL (TWA) (mg/m^3)	15 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)
USA NIOSH	NIOSH REL (TWA) (mg/m^3)	10 mg/m^3 (total dust) 5 mg/m^3 (respirable dust)
British Columbia	OEL TWA (mg/m^3)	10 mg/m^3 (total dust)
New Brunswick	OEL TWA (mg/m^3)	10 mg/m^3
Nunavut	OEL TWA (mg/m^3)	5 mg/m^3 (respirable mass)
Northwest Territories	OEL TWA (mg/m^3)	5 mg/m^3 (respirable mass)
Ontario	OEL TWA (mg/m^3)	10 mg/m^3 (total dust)
Québec	VEMP (mg/m^3)	10 mg/m^3 (containing no Asbestos and <1% Crystalline silica-total dust)
Saskatchewan	OEL STEL (mg/m^3)	20 mg/m^3
Saskatchewan	OEL TWA (mg/m^3)	10 mg/m^3
Yukon	OEL STEL (mg/m^3)	20 mg/m^3
Yukon	OEL TWA (mg/m^3)	30 mppcf

ungsten (7440-33-7)		
USA ACGIH	ACGIH TWA (mg/m³)	5 mg/m³
USA ACGIH	ACGIH STEL (mg/m³)	10 mg/m³
USA NIOSH	NIOSH REL (TWA) (mg/m³)	5 mg/m³
USA NIOSH	NIOSH REL (STEL) (mg/m³)	10 mg/m³
Alberta	OEL STEL (mg/m³)	10 mg/m³
Alberta	OEL TWA (mg/m³)	5 mg/m³
British Columbia	OEL STEL (mg/m³)	10 mg/m³
British Columbia	OEL TWA (mg/m³)	5 mg/m³
Manitoba	OEL STEL (mg/m³)	10 mg/m³
Manitoba	OEL TWA (mg/m³)	5 mg/m³
Newfoundland & Labrador	OEL STEL (mg/m³)	10 mg/m³
Newfoundland & Labrador	OEL TWA (mg/m³)	5 mg/m³
Nova Scotia	OEL STEL (mg/m³)	10 mg/m³
Nova Scotia	OEL TWA (mg/m³)	5 mg/m³
Nunavut	OEL STEL (mg/m³)	10 mg/m³
Nunavut	OEL TWA (mg/m³)	5 mg/m³
Northwest Territories	OEL STEL (mg/m³)	10 mg/m³
Northwest Territories	OEL TWA (mg/m³)	5 mg/m³
Ontario	OEL STEL (mg/m³)	10 mg/m³
Ontario	OEL TWA (mg/m³)	5 mg/m³
Prince Edward Island	OEL STEL (mg/m³)	10 mg/m³
Prince Edward Island	OEL TWA (mg/m³)	5 mg/m³
Saskatchewan	OEL STEL (mg/m³)	10 mg/m³
askatchewan	OEL TWA (mg/m³)	5 mg/m³
Yukon	OEL STEL (mg/m³)	10 mg/m³
Yukon	OEL TWA (mg/m³)	5 mg/m³

Aluminum (7429-90-5)		
Mexico	OEL TWA (mg/m³)	10 mg/m³ (dust)
USA ACGIH	ACGIH TWA (mg/m³)	1 mg/m³ (respirable fraction)
USA OSHA	OSHA PEL (TWA) (mg/m³)	15 mg/m³ (total dust) 5 mg/m³ (respirable fraction)
USA NIOSH	NIOSH REL (TWA) (mg/m³)	10 mg/m³ (total dust) 5 mg/m³ (respirable dust)
Alberta	OEL TWA (mg/m³)	10 mg/m³ (dust)
British Columbia	OEL TWA (mg/m³)	1.0 mg/m³ (respirable)
Manitoba	OEL TWA (mg/m³)	1 mg/m³ (respirable fraction)
New Brunswick	OEL TWA (mg/m³)	10 mg/m³ (metal dust)
Newfoundland & Labrador	OEL TWA (mg/m³)	1 mg/m³ (respirable fraction)
Nova Scotia	OEL TWA (mg/m³)	1 mg/m³ (respirable fraction)
Nunavut	OEL STEL (mg/m³)	20 mg/m³
Nunavut	OEL TWA (mg/m³)	10 mg/m³
Northwest Territories	OEL STEL (mg/m³)	20 mg/m³
Northwest Territories	OEL TWA (mg/m³)	10 mg/m³
Ontario	OEL TWA (mg/m³)	1 mg/m³ (respirable)
Prince Edward Island	OEL TWA (mg/m³)	1 mg/m³ (respirable fraction)
Québec	VEMP (mg/m³)	10 mg/m³
Saskatchewan	OEL STEL (mg/m³)	20 mg/m³ (dust)
askatchewan	OEL TWA (mg/m³)	10 mg/m³ (dust)

Tantalum (7440-25-7)		
Mexico	OEL TWA (mg/m³)	5 mg/m³

Mexico	OEL STEL (mg/m³)	10 mg/m³
USA OSHA	OSHA PEL (TWA) (mg/m³)	5 mg/m³
USA NIOSH	NIOSH REL (TWA) (mg/m³)	5 mg/m³ (dust)
USA NIOSH	NIOSH REL (STEL) (mg/m³)	10 mg/m³ (dust)
USA IDLH	US IDLH (mg/m³)	2500 mg/m³ (dust)
Alberta	OEL TWA (mg/m³)	5 mg/m³ (dust)
British Columbia	OEL TWA (mg/m³)	5 mg/m³
New Brunswick	OEL TWA (mg/m³)	5 mg/m³ (dust)
Nunavut	OEL STEL (mg/m³)	10 mg/m³
Nunavut	OEL TWA (mg/m³)	5 mg/m³
Northwest Territories	OEL STEL (mg/m³)	10 mg/m³
Northwest Territories	OEL TWA (mg/m³)	5 mg/m³
Québec	VEMP (mg/m³)	5 mg/m³ (dust)
Saskatchewan	OEL STEL (mg/m³)	10 mg/m³
Saskatchewan	OEL TWA (mg/m³)	5 mg/m³
Yukon	OEL STEL (mg/m³)	10 mg/m³
Yukon	OEL TWA (mg/m³)	5 mg/m³

Selenium (7782-49-2)		
USA ACGIH	ACGIH TWA (mg/m³)	0.2 mg/m³
USA NIOSH	NIOSH REL (TWA) (mg/m³)	0.2 mg/m³
USA IDLH	US IDLH (mg/m³)	1 mg/m³
Alberta	OEL TWA (mg/m³)	0.2 mg/m³
British Columbia	OEL TWA (mg/m³)	0.1 mg/m³
Manitoba	OEL TWA (mg/m³)	0.2 mg/m³
New Brunswick	OEL TWA (mg/m³)	0.2 mg/m³
Newfoundland & Labrador	OEL TWA (mg/m³)	0.2 mg/m³
Nova Scotia	OEL TWA (mg/m³)	0.2 mg/m³
Ontario	OEL TWA (mg/m³)	0.2 mg/m³
Prince Edward Island	OEL TWA (mg/m³)	0.2 mg/m³
Québec	VEMP (mg/m³)	0.2 mg/m³
Saskatchewan	OEL STEL (mg/m³)	0.6 mg/m³
Saskatchewan	OEL TWA (mg/m³)	0.2 mg/m³

8.2. Exposure Controls

Appropriate Engineering Controls: Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits. Power equipment should be equipped with proper dust collection devices. Ensure all national/local regulations are observed.

Personal Protective Equipment: Protective clothing. Gloves. Safety glasses. Dust formation: dust mask. Insufficient ventilation: wear respiratory protection.

Materials for Protective Clothing: Chemically resistant materials and fabrics. With molten material wear thermally protective clothing.

Hand Protection: Wear chemically resistant protective gloves. If material is hot, wear thermally resistant protective gloves.

Eye Protection: Chemical goggles or safety glasses.

Skin and Body Protection: Wear suitable protective clothing. Wash contaminated clothing before reuse.

Respiratory Protection: Use a NIOSH-approved respirator or self-contained breathing apparatus whenever exposure may exceed established Occupational Exposure Limits.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on Basic Physical and Chemical Properties

Physical State	:	Solid
Appearance	:	Metallic
Odor	:	Odorless
Odor Threshold	:	Not available
pH	:	Not available
Evaporation Rate	:	Not available
Melting Point	:	1300 °C (2372 °F)
Freezing Point	:	Not available
Boiling Point	:	Not available
Flash Point	:	Not applicable
Auto-ignition Temperature	:	Not available
Decomposition Temperature	:	Not available
Flammability (solid, gas)	:	Not available
Lower Flammable Limit	:	Not available
Upper Flammable Limit	:	Not available
Vapor Pressure	:	Not available
Relative Vapor Density at 20 °C	:	Not available
Relative Density	:	Not available
Specific Gravity	:	7.9
Solubility	:	Insoluble in water
Partition Coefficient: N-octanol/water	:	Not available
Viscosity	:	Not available
Explosion Data – Sensitivity to Mechanical Impact	:	Not expected to present an explosion hazard due to mechanical impact.
Explosion Data – Sensitivity to Static Discharge	:	Not expected to present an explosion hazard due to static discharge.

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity: Hazardous reactions will not occur under normal conditions.

10.2. Chemical Stability: Stable under recommended handling and storage conditions (see section 7).

10.3. Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

10.4. Conditions to Avoid: Avoid creating or spreading dust. Sparks, heat, open flame and other sources of ignition.

10.5. Incompatible Materials: When molten: water. Strong acids, strong bases, strong oxidizers. Alkalis. Metal oxides. Moisture. Corrosive substances in contact with metals may produce flammable hydrogen gas.

10.6. Hazardous Decomposition Products: Oxides of iron and carbon. Organic acid vapors. Chromium (VI) compounds. Sulfur compounds.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on Toxicological Effects - Product

Acute Toxicity: Not classified. Not classified.

LD50 and LC50 Data: Not available

Skin Corrosion/Irritation: Not classified.

Serious Eye Damage/Irritation: Not classified.

Respiratory or Skin Sensitization: Not classified. Not classified.

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not classified

Carcinogenicity: Not classified.

Specific Target Organ Toxicity (Repeated Exposure): Not classified.

Reproductive Toxicity: Not classified.

Specific Target Organ Toxicity (Single Exposure): Not classified

Aspiration Hazard: Not classified

Symptoms/Injuries After Inhalation: Inhalation of dusts and fumes can cause metal fume fever. Symptoms can include a metallic or sweet taste in the mouth, sweating, shivering, headache, throat irritation, fever, chills, thirstiness, muscle aches, nausea, vomiting, weakness, fatigue, and shortness of breath.

Symptoms/Injuries After Skin Contact: May cause an allergic skin reaction. Dust from physical alteration of this product causes skin irritation. Causes severe skin burns. Contact with fumes or metal powder will irritate skin. Contact with hot, molten metal will cause thermal burns. Dust may cause irritation in skin folds or by contact in combination with tight clothing. Mechanical damage via flying particles and chipped slag is possible.

Symptoms/Injuries After Eye Contact: Dust may cause mechanical irritation to eyes, nose, throat, and lungs.

Symptoms/Injuries After Ingestion: Ingestion is likely to be harmful or have adverse effects.

Chronic Symptoms: In massive form, no hazard exists. If physically altered to present slivers, ribbons, dusts or fumes from molten material: Aluminum: Inhalation of finely divided aluminum powder may cause pulmonary fibrosis. Inhalation of iron oxide fumes undergoing decomposition may cause irritation and flu-like symptoms, otherwise iron oxide is not hazardous. Inhalation of Nickel compounds has been shown in studies to provide an increased incidence of cancer of the nasal cavity, lung and possibly larynx in nickel refinery workers. Nickel: May cause a form of dermatitis known as nickel itch and intestinal irritation, which may cause disorders, convulsions and asphyxia. Chromium: Certain hexavalent chromium compounds have been demonstrated to be carcinogenic on the basis of epidemiological investigations on workers and experimental studies in animals. Increased incidences of respiratory cancer have been found in chromium (VI) workers.There is an increased incidence of lung cancer in industrial workers exposed to chromium (VI) compounds. Please refer to IARC volume 23 for a more detailed discussion. Manganese : Chronic exposure can cause inflammation of the lung tissue, scarring the lungs (pulmonary fibrosis). Copper: Overexposure to fumes may cause metal fume fever (chills, muscle aches, nausea, fever, dry throat, cough, weakness, lassitude); metallic or sweet taste; discoloration of skin and hair. Tissue damage of mucous membranes may follow chronic dust exposure. Silicon : Can cause chronic bronchitis and narrowing of the airways.

11.2. Information on Toxicological Effects - Ingredient(s)

LD50 and LC50 Data:

Chromium (7440-47-3)	
LD50 Oral Rat	> 5000 mg/kg
Nickel (7440-02-0)	
LD50 Oral Rat	> 9000 mg/kg
Manganese (7439-96-5)	
LD50 Oral Rat	> 2000 mg/kg
Molybdenum (7439-98-7)	
LD50 Oral Rat	> 2000 mg/kg
LD50 Dermal Rat	> 2000 mg/kg
Sulfur dioxide (7446-09-5)	
LC50 Inhalation Rat	2500 ppm/1h
ATE US (gases)	1,250.00 ppmV/4h
Phosphorus elemental (7723-14-0)	
LD50 Oral Rat	3.03 mg/kg
LD50 Dermal Rat	100 mg/kg
LC50 Inhalation Rat	4.3 mg/l (Exposure time: 1 h)
Cobalt (7440-48-4)	
LD50 Oral Rat	215.9 - 1140 mg/kg
LC50 Inhalation Rat	> 10 mg/l (Exposure time: 1 h)
ATE US (dust, mist)	0.01 mg/l/4h
Carbon (7440-44-0)	
LD50 Oral Rat	> 10000 mg/kg
Niobium (7440-03-1)	
LD50 Oral Rat	> 10 g/kg

Selenium (7782-49-2)	
ATE US (oral)	100.00 mg/kg body weight
ATE US (dust, mist)	0.50 mg/l/4h

Chromium (7440-47-3)	
IARC Group	3

Nickel (7440-02-0)	
IARC Group	2B
National Toxicity Program (NTP) Status	Reasonably anticipated to be Human Carcinogen.

Sulfur dioxide (7446-09-5)	
IARC Group	3

Cobalt (7440-48-4)	
IARC Group	2B

Selenium (7782-49-2)	
IARC Group	3

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity No additional information available

Nickel (7440-02-0)	
LC50 Fish 1	100 mg/l (Exposure time: 96 h - Species: Brachydanio rerio)
EC50 Daphnia 1	13 (13 - 200) µg/l (Exposure time: 48h - Species: Ceriodaphnia dubia [static])
LC 50 Fish 2	1.3 mg/l (Exposure time: 96 h - Species: Cyprinus carpio [semi-static])
EC50 Daphnia 2	1 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
EC50 Other Aquatic Organisms 2	0.174 (0.174 - 0.311) mg/l (Exposure time: 96 h - Species: Pseudokirchneriella subcapitata [static])

Manganese (7439-96-5)	
NOEC chronic fish	3.6 mg/l (Exposure time: 96h; Species: Oncorhynchus mykiss)

Copper (7440-50-8)	
LC50 Fish 1	<= 0.0068 (0.0068 - 0.0156) mg/l (Exposure time: 96 h - Species: Pimephales promelas)
EC50 Daphnia 1	0.03 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
EC50 Other Aquatic Organisms 1	0.0426 (0.0426 - 0.0535) mg/l (Exposure time: 72 h - Species: Pseudokirchneriella subcapitata [static])
LC 50 Fish 2	0.3 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static])
EC50 Other Aquatic Organisms 2	0.031 (0.031 - 0.054) mg/l (Exposure time: 96 h - Species: Pseudokirchneriella subcapitata [static])

Cobalt (7440-48-4)	
LC50 Fish 1	100 mg/l (Exposure time: 96 h - Species: Brachydanio rerio [static])

Persistence and Degradability

Stainless Steel and Alloys of Stainless Steel	
Persistence and Degradability	Not established.

Copper (7440-50-8)	
Persistence and Degradability	Not readily biodegradable.

12.3. Bioaccumulative Potential

Stainless Steel and Alloys of Stainless Steel	
Bioaccumulative Potential	Not established.

Sulfur dioxide (7446-09-5)	
BCF Fish 1	(no bioaccumulation expected)

Cobalt (7440-48-4)	
BCF Fish 1	(no bioaccumulation)

12.4. Mobility in Soil Not available

12.5. Other Adverse Effects

Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste Treatment Methods: Recycle product or dispose properly.

Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, and international regulations.

SECTION 14: TRANSPORT INFORMATION

14.1. In Accordance with DOT Not regulated for transport

14.2. In Accordance with IMDG Not regulated for transport

14.3. In Accordance with IATA Not regulated for transport

14.4. In Accordance with TDG Not regulated for transport

SECTION 15: REGULATORY INFORMATION

15.1. US Federal Regulations

Stainless Steel and Alloys of Stainless Steel	
SARA Section 311/312 Hazard Classes	Delayed (chronic) health hazard

Iron (7439-89-6)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Chromium (7440-47-3)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on United States SARA Section 313	
SARA Section 313 - Emission Reporting	1.0 %

Nickel (7440-02-0)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on United States SARA Section 313	
RQ (Reportable Quantity, Section 304 of EPA's List of Lists):	100 lb (only applicable if particles are < 100 µm)
SARA Section 313 - Emission Reporting	0.1 %

Manganese (7439-96-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on United States SARA Section 313	
SARA Section 313 - Emission Reporting	1.0 %

Molybdenum (7439-98-7)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Titanium (7440-32-6)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Copper (7440-50-8)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on United States SARA Section 313	
SARA Section 313 - Emission Reporting	1.0 %

Sulfur dioxide (7446-09-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on the United States SARA Section 302	
SARA Section 302 Threshold Planning Quantity (TPQ)	500

Phosphorus elemental (7723-14-0)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on the United States SARA Section 302	
Listed on United States SARA Section 313	
SARA Section 302 Threshold Planning Quantity (TPQ)	100 (This material is a reactive solid. The TPQ does not default to 10000 pounds for non-powder, non-molten, non-solution form)

SARA Section 313 - Emission Reporting	1.0 % (yellow or white)

Cobalt (7440-48-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on United States SARA Section 313	
SARA Section 313 - Emission Reporting	0.1 %

Carbon (7440-44-0)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Silicon (7440-21-3)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Tungsten (7440-33-7)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Niobium (7440-03-1)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Aluminum (7429-90-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on United States SARA Section 313	
SARA Section 313 - Emission Reporting	1.0 % (dust or fume only)

Tantalum (7440-25-7)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Selenium (7782-49-2)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on United States SARA Section 313	
SARA Section 313 - Emission Reporting	1.0 %

15.2. US State Regulations

Nickel (7440-02-0)	
U.S. - California - Proposition 65 - Carcinogens List	WARNING: This product contains chemicals known to the State of California to cause cancer.

Sulfur dioxide (7446-09-5)	
U.S. - California - Proposition 65 - Developmental Toxicity	WARNING: This product contains chemicals known to the State of California to cause birth defects.

Cobalt (7440-48-4)	
U.S. - California - Proposition 65 - Carcinogens List	WARNING: This product contains chemicals known to the State of California to cause cancer.

Chromium (7440-47-3)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances
U.S. - Pennsylvania - RTK (Right to Know) List

Nickel (7440-02-0)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances
U.S. - Pennsylvania - RTK (Right to Know) List

Manganese (7439-96-5)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List

U.S. - Pennsylvania - RTK (Right to Know) List

Molybdenum (7439-98-7)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

Titanium (7440-32-6)

U.S. - New Jersey - Right to Know Hazardous Substance List

Copper (7440-50-8)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) List

Sulfur dioxide (7446-09-5)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) List

Phosphorus elemental (7723-14-0)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) List

Cobalt (7440-48-4)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) List

Silicon (7440-21-3)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

Tungsten (7440-33-7)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

Aluminum (7429-90-5)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) List

Tantalum (7440-25-7)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

Selenium (7782-49-2)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) List

15.3. Canadian Regulations

Stainless Steel and Alloys of Stainless Steel

WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

Iron (7439-89-6)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Class B Division 4 - Flammable Solid

Chromium (7440-47-3)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 0.1 %	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

Nickel (7440-02-0)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 0.1 %	
WHMIS Classification	Class D Division 2 Subdivision B - Toxic material causing other toxic effects

Manganese (7439-96-5)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

Molybdenum (7439-98-7)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

Titanium (7440-32-6)
Listed on the Canadian DSL (Domestic Substances List)

Copper (7440-50-8)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

Sulfur dioxide (7446-09-5)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Class A - Compressed Gas Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects Class E - Corrosive Material

Phosphorus elemental (7723-14-0)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Class B Division 4 - Flammable Solid Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class E - Corrosive Material

Cobalt (7440-48-4)
Listed on the Canadian DSL (Domestic Substances List)

Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 0.1 %	
WHMIS Classification	Class D Division 2 Subdivision A - Very toxic material causing other toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects

Carbon (7440-44-0)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

Silicon (7440-21-3)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

Tungsten (7440-33-7)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

Niobium (7440-03-1)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

Aluminum (7429-90-5)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Class B Division 6 - Reactive Flammable Material Class B Division 4 - Flammable Solid

Tantalum (7440-25-7)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

Selenium (7782-49-2)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 0.1 %	
WHMIS Classification	Class D Division 1 Subdivision B - Toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects

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

SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Revision Date : 12/15/2014

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

GHS Full Text Phrases:

Acute Tox. 1 (Inhalation:dust,mist)	Acute toxicity (inhalation:dust,mist) Category 1
Acute Tox. 3 (Inhalation:dust,mist)	Acute toxicity (inhalation:dust,mist) Category 3
Acute Tox. 3 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 3
Acute Tox. 3 (Oral)	Acute toxicity (oral) Category 3

Acute Tox. 4 (Oral)	Acute toxicity (oral) Category 4
Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Aquatic Acute 3	Hazardous to the aquatic environment - Acute Hazard Category 3
Aquatic Chronic 1	Hazardous to the aquatic environment - Chronic Hazard Category 1
Aquatic Chronic 3	Hazardous to the aquatic environment - Chronic Hazard Category 3
Aquatic Chronic 4	Hazardous to the aquatic environment - Chronic Hazard Category 4
Carc. 2	Carcinogenicity Category 2
Comb. Dust	Combustible Dust
Compressed gas	Gases under pressure Compressed gas
Eye Dam. 1	Serious eye damage/eye irritation Category 1
Eye Irrit. 2A	Serious eye damage/eye irritation Category 2A
Flam. Sol. 1	Flammable solids Category 1
Repr. 2	Reproductive toxicity Category 2
Resp. Sens. 1B	Respiratory sensitisation Category 1B
Self-heat. 2	Self-heating substances and mixtures Category 2
Skin Corr. 1B	Skin corrosion/irritation Category 1B
Skin Sens. 1	Skin sensitization Category 1
STOT RE 1	Specific target organ toxicity (repeated exposure) Category 1
STOT RE 2	Specific target organ toxicity (repeated exposure) Category 2
Water-react. 2	Substances and mixtures which in contact with water emit flammable gases Category 2
H228	Flammable solid
	May form combustible dust concentrations in air
H252	Self-heating in large quantities; may catch fire
H261	In contact with water releases flammable gases
H280	Contains gas under pressure; may explode if heated
H301	Toxic if swallowed
H302	Harmful if swallowed
H314	Causes severe skin burns and eye damage
H317	May cause an allergic skin reaction
H318	Causes serious eye damage
H319	Causes serious eye irritation
H330	Fatal if inhaled
H331	Toxic if inhaled
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled
H351	Suspected of causing cancer
H361	Suspected of damaging fertility or the unborn child
H372	Causes damage to organs through prolonged or repeated exposure
H373	May cause damage to organs through prolonged or repeated exposure
H400	Very toxic to aquatic life
H402	Harmful to aquatic life
H410	Very toxic to aquatic life with long lasting effects
H412	Harmful to aquatic life with long lasting effects
H413	May cause long lasting harmful effects to aquatic life

Party Responsible for the Preparation of This Document

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This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

North America GHS US 2012 & WHMIS 2