

# Copper/Copper Alloys

## Safety Data Sheet

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

Date of Issue: 08/15/2023

Version: 1.0

### SECTION 1: IDENTIFICATION

#### 1.1. Product Identifier

**Product Form:** Mixture

**Product Name:** Copper/Copper Alloys

**Synonyms:** Cu

#### 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

Distributor

ThyssenKrupp Materials NA, Inc.

22355 W. Eleven Mile Road

Southfield, Michigan 48034

TEL: 248-233-5681

#### 1.4. Emergency Telephone Number

**Emergency Number** : 248-233-5681

### SECTION 2: HAZARDS IDENTIFICATION

#### 2.1. Classification of the Substance or Mixture

##### GHS-US Classification

**Classification as delivered:**

Not classified

##### Classification Intended Use (Physical alteration resulting in dust, fines, and chips):

Flammable solids Category 1 H228

Substances and mixtures which in contact with water emit flammable gases Category 2 H261

Acute toxicity (oral) Category 3 H301

Acute toxicity (inhalation) Category 2 H330

Serious eye damage/eye irritation Category 2 H319

Respiratory sensitization, Category 1B H334

Skin sensitization, Category 1 H317

Germ cell mutagenicity Category 1B H340

Carcinogenicity Category 1A H350

Reproductive toxicity Category 1A H360

Reproductive toxicity, Additional category, Effects on or via lactation H362

Specific target organ toxicity (repeated exposure) Category 1 H372

Hazardous to the aquatic environment – Acute Hazard Category 1 H400

Hazardous to the aquatic environment – Chronic Hazard Category 1 H410

Combustible Dust

Full text of hazard classes and H-statements: see section 16

##### Classification Intended Use (Extreme heat resulting in fumes):

Acute toxicity (oral) Category 3 H301

Acute toxicity (inhalation) Category 2 H330

Serious eye damage/eye irritation Category 2 H319

Respiratory sensitization, Category 1B H334

Skin sensitization, Category 1 H317

Germ cell mutagenicity Category 1B H340

Carcinogenicity Category 1A H350

Reproductive toxicity Category 1A H360

Reproductive toxicity, Additional category, Effects on or via lactation H362

Specific target organ toxicity (repeated exposure) Category 1 H372

Full text of hazard classes and H-statements: see section 16

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## 2.2. Label Elements

### GHS-US Labeling

#### Classification as delivered:

Not classified

#### Classification Intended Use (Physical alteration resulting in dust, fines, and chips):

#### Hazard Pictograms (GHS-US)



#### Signal Word (GHS-US)

: Danger

#### Hazard Statements (GHS-US)

: May form combustible dust concentrations in air.  
H228 - Flammable solid.  
H261 - In contact with water releases flammable gas.  
H301 - Toxic if swallowed.  
H317 - May cause an allergic skin reaction.  
H319 - Causes serious eye irritation.  
H330 - Fatal if inhaled.  
H334 - May cause an allergy or asthma symptoms or breathing difficulties if inhaled.  
H340 - May cause genetic defects.  
H350 - May cause cancer.  
H360 - May damage fertility or the unborn child.  
H362 - May cause harm to breast-fed children.  
H372 - Causes damage to organs (central nervous system, blood, kidneys, lungs, bone) through prolonged or repeated exposure.  
H400 - Very toxic to aquatic life.  
H410 - Very toxic to aquatic life with long lasting effects.

#### Precautionary Statements (GHS-US)

: P201 - Obtain special instructions before use.  
P202 - Do not handle until all safety precautions have been read and understood.  
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.  
P223 - Do not allow contact with water.  
P231+P232 - Handle under inert gas. Protect from moisture.  
P240 - Ground/Bond container and receiving equipment.  
P241 - Use explosion-proof electrical, ventilating, and lighting equipment.  
P260 - Do not breathe dust.  
P263 - Avoid contact during pregnancy/while nursing.  
P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.  
P270 - Do not eat, drink or smoke when using this product.  
P271 - Use only outdoors or in a well-ventilated area.  
P272 - Contaminated work clothing must not be allowed out of the workplace.  
P273 - Avoid release to the environment.  
P280 - Wear protective gloves, protective clothing, and eye protection.  
P284 - [In case of inadequate ventilation] wear respiratory protection.  
P301+P310 - If swallowed: Immediately call a poison center or doctor.  
P302+P352 - If on skin: Wash with plenty of water.  
P304+P340 - If inhaled: Remove person to fresh air and keep at rest in a position comfortable for breathing.  
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P310 - Immediately call a poison center or doctor.  
P320 - Specific treatment is urgent (see section 4 on this SDS).  
P330 - Rinse mouth.  
P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.  
P335+P334 - Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.

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P337+P313 - If eye irritation persists: Get medical advice/attention.  
P342+P311 - If experiencing respiratory symptoms: Call a poison center or doctor.  
P363 - Wash contaminated clothing before reuse.  
P370+P378 - In case of fire: Use appropriate media (see section 5) to extinguish.  
P391 - Collect spillage.  
P402+P404 - Store in a dry place. Store in a closed container.  
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.  
P405 - Store locked up.  
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations.

### Classification Intended Use (Extreme heat resulting in fumes):

#### Hazard Pictograms (GHS-US)



#### Signal Word (GHS-US)

#### Hazard Statements (GHS-US)

: Danger  
: H301 - Toxic if swallowed.  
H317 - May cause an allergic skin reaction.  
H319 - Causes serious eye irritation.  
H330 - Fatal if inhaled.  
H334 - May cause an allergy or asthma symptoms or breathing difficulties if inhaled.  
H340 - May cause genetic defects.  
H350 - May cause cancer.  
H360 - May damage fertility or the unborn child.  
H362 - May cause harm to breast-fed children.  
H372 - Causes damage to organs (central nervous system, blood, kidneys, lungs, bone) through prolonged or repeated exposure.

#### Precautionary Statements (GHS-US)

: P201 - Obtain special instructions before use.  
P202 - Do not handle until all safety precautions have been read and understood.  
P260 - Do not breathe fumes.  
P263 - Avoid contact during pregnancy/while nursing.  
P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.  
P270 - Do not eat, drink or smoke when using this product.  
P271 - Use only outdoors or in a well-ventilated area.  
P272 - Contaminated work clothing must not be allowed out of the workplace.  
P280 - Wear protective gloves, protective clothing, and eye protection.  
P284 - [In case of inadequate ventilation] wear respiratory protection.  
P301+P310 - If swallowed: Immediately call a poison center or doctor.  
P302+P352 - If on skin: Wash with plenty of water.  
P304+P340 - If inhaled: Remove person to fresh air and keep at rest in a position comfortable for breathing.  
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P310 - Immediately call a poison center or doctor.  
P320 - Specific treatment is urgent (see section 4 on this SDS).  
P330 - Rinse mouth.  
P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.  
P337+P313 - If eye irritation persists: Get medical advice/attention.  
P342+P311 - If experiencing respiratory symptoms: Call a poison center or doctor.  
P363 - Wash contaminated clothing before reuse.  
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.  
P405 - Store locked up.  
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations.

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### 2.3. Other Hazards

This product is physiologically inert in its massive form. However, user-generated dust and/or fumes may pose a physiological hazard if inhaled or ingested. Avoid inhalation of metal dusts and fumes. May cause an influenza-like illness. Avoid skin and eye contact with dusts to prevent mechanical irritation. User-generated dust is easily ignited and difficult to extinguish.

### 2.4. Unknown Acute Toxicity (GHS-US)

No data available

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1. Substance

Not applicable

### 3.2. Mixture

Name	Synonyms	Product Identifier	%	GHS US classification
Copper	Copper, metallic / Pigment Metal 2 / Copper metal / CI 77400 / Copper, elemental / C.I. Pigment Metal 2 / C.I. 77400 / Granulated copper / copper	(CAS-No.) 7440-50-8	45 – 99	Aquatic Acute 1, H400 Aquatic Chronic 1, H410 Combustible Dust
Zinc oxide (ZnO)	Zinc oxide / C.I. 77947 / C.I. Pigment White 4 / Zinc White / CI 77947 / Pigment White 4	(CAS-No.) 1314-13-2	0 – 40	Aquatic Acute 1, H400 Aquatic Chronic 1, H410
Nickel	Nickel metal / Nickel, elemental / Nickel, metallic / Nickel, metal / C.I. 77775	(CAS-No.) 7440-02-0	0 – 33	Skin Sens. 1, H317 Carc. 2, H351 STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Chronic 3, H412 Combustible Dust
Lead	C.I. Pigment Metal 4 / Lead metal / Lead, elemental / C.I. 77575	(CAS-No.) 7439-92-1	0 – 16	Carc. 1B, H350 Lact., H362 Repr. 1A, H360 STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Chronic 1, H410 Combustible Dust
Aluminum	Aluminium / Aluminium metal / Aluminium, metal / Aluminum metal / Aluminum, elemental / Aluminum, metal / C.I. 77000 / CI 77000 / Aluminium powder (stabilised) / Aluminium powder (stabilized) / Aluminium powder / Pigment Metal 1 / Aluminum powder / Aluminium metal, powder / aluminum	(CAS-No.) 7429-90-5	0 – 13.5	Flam. Sol. 1, H228 Water-react. 2, H261 Combustible Dust
Tin	Tin metal / Tin, elemental / Tin, metal / TIN / tin / Organometallic tin	(CAS-No.) 7440-31-5	0 – 13	Combustible Dust
Iron oxide (Fe <sub>2</sub> O <sub>3</sub> )	C.I. 77491 / C.I. Pigment Red 101 / Diiron trioxide / Ferric oxide / Iron sesquioxide / Iron(III) oxide / Red Iron Oxide / Rouge / CI 77491 / Iron trioxide / Sienna / Pigment Red 101 / Red iron oxide / Red iron oxide pigment / Iron Oxide Red / Diiron(III) trioxide / Iron oxide / Ferric oxide red / Iron oxide, red	(CAS-No.) 1309-37-1	0 – 5.5	Combustible Dust
Manganese	Manganese, elemental / Manganese metal / manganese	(CAS-No.) 7439-96-5	0 – 5	Flam. Sol. 2, H228 STOT RE 1, H372 Aquatic Acute 2, H401 Aquatic Chronic 2, H411 Combustible Dust
Silicon	Silicon powder / Silicon powder, amorphous / SILICON / silicon	(CAS-No.) 7440-21-3	0.01 – 5	Combustible Dust

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Thallium	Thallium, elemental / thallium	(CAS-No.) 7440-28-0	0 – 3.4	Acute Tox. 2 (Oral), H300 Acute Tox. 2 (Inhalation:dust,mist), H330 Muta. 1B, H340 Repr. 1A, H360 STOT RE 2, H373 Aquatic Chronic 4, H413
Cobalt	Cobalt, elemental / Cobalt metal / C.I. 77320 / Cobalt metallic	(CAS-No.) 7440-48-4	0 – 2.7	Flam. Sol. 2, H228 Acute Tox. 4 (Oral), H302 Acute Tox. 1 (Inhalation:dust,mist), H330 Resp. Sens. 1B, H334 Skin Sens. 1, H317 Muta. 2, H341 Carc. 1B, H350 Repr. 1B, H360 Aquatic Chronic 4, H413 Combustible Dust
Beryllium	Beryllium, elemental / Beryllium metal / Beryllium, metal / Beryllium powder	(CAS-No.) 7440-41-7	0 – 2	Acute Tox. 3 (Oral), H301 Acute Tox. 2 (Inhalation), H330 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 Skin Sens. 1, H317 Carc. 1A, H350 STOT SE 3, H335 STOT RE 1, H372 Combustible Dust
Cadmium	Cadmium, elemental / Cadmium metal / Cadmium (non-pyrophoric) / C.I. 77180	(CAS-No.) 7440-43-9	0 – 1	Pyr. Sol. 1, H250 Acute Tox. 4 (Oral), H302 Acute Tox. 2 (Inhalation:dust,mist), H330 Muta. 2, H341 Carc. 1B, H350 Repr. 2, H361 STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Chronic 1, H410
Arsenic	Arsenic, elemental / Arsenic, inorganic	(CAS-No.) 7440-38-2	0 – 0.5	Acute Tox. 3 (Oral), H301 Acute Tox. 3 (Inhalation:dust,mist), H331 Skin Irrit. 2, H315 Eye Dam. 1, H318 Carc. 1A, H350 STOT SE 1, H370 Aquatic Acute 1, H400 Aquatic Chronic 1, H410
Sulfur dioxide	Sulphur dioxide / Sulphurous anhydride / Sulfur(IV) oxide / Sulfur dioxide, anhydrous / Sulfur oxide (SO <sub>2</sub> ) / sulfur dioxide	(CAS-No.) 7446-09-5	0 – 0.3	Press. Gas (Comp.), H280 Acute Tox. 3 (Inhalation:gas), H331 Skin Corr. 1B, H314 Eye Dam. 1, H318
Zirconium	Zirconium, elemental / Zirconium metal / Zirconium powder (pyrophoric) / Zirconium suspended in a flammable liquid / Zirconium powder, dry / Zirconium metallic	(CAS-No.) 7440-67-7	0 – 0.25	Flam. Sol. 1, H228 Combustible Dust

Full text of H-phrases: see section 16

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## SECTION 4: FIRST AID MEASURES

### 4.1. Description of First-aid Measures

Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible). Removal of solidified material from skin, eyes, or mouth requires medical assistance. The health effects listed below are not likely to occur unless dust or fumes are generated by processing.

**First-aid Measures After Inhalation:** First, take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate respiratory protective equipment, use the buddy system), then remove the exposed person to fresh air. Keep at rest in a position comfortable for breathing. Encourage exposed person to cough, spit out, and blow nose to remove dust. Give oxygen or artificial respiration if necessary. Immediately call a poison center or doctor/physician.

**First-aid Measures After Skin Contact:** *Normal handling:* Remove contaminated clothing. Drench affected area with water for at least 5 minutes. Obtain medical attention if irritation develops or persists. *Contact with product dusts:* Immediately remove contaminated clothing. Brush off loose particles from skin. Wash affected area with soap and water for at least 15 minutes. Obtain medical attention if irritation/rash develops or persists. *In molten form:* Cool skin rapidly with cold water after contact with molten product. Removal of solidified molten material from skin requires medical assistance.

**First-aid Measures After Eye Contact:** *Contact with solid product or product dusts:* 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. Removal of solidified molten material from the eyes requires medical assistance.

**First-aid Measures After Ingestion:** Rinse mouth. Immediately call a POISON CENTER or doctor. Do NOT induce vomiting.

### 4.2. Most Important Symptoms and Effects Both Acute and Delayed

**Symptoms/Injuries:** Fatal if inhaled. Toxic if swallowed. Causes damage to organs (central nervous system, blood, kidneys, lungs, bone) through prolonged or repeated exposure. Causes serious eye irritation. Skin sensitization. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause cancer. May cause genetic defects. May damage fertility. May damage the unborn child. May cause harm to breast-fed children. Welding, cutting, or processing this material may release dust or fumes that are hazardous. Risk of thermal burns on contact with molten product.

**Symptoms/Injuries After Inhalation:** Inhalation of this material can cause serious health effects in small amounts, leading to unconsciousness and death. Exposure may produce cough, mucous secretions, shortness of breath, chest tightness or other symptoms indicative of an allergic/sensitization reaction. During processing, the most significant route of exposure is by the inhalation (breathing) of dust or fumes. If fumes or dust are inhaled, they can cause a condition commonly known as metal fume fever with symptoms which resemble influenza. Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse sweating, excessive urination, diarrhea and prostration may also occur.

**Symptoms/Injuries After Skin Contact:** May cause an allergic skin reaction. Contact with fumes or metal powder will irritate skin. Contact with hot, molten metal will cause thermal burns.

**Symptoms/Injuries After Eye Contact:** During metal processing, dusts caused from physical alteration will likely cause eye irritation. Fumes from thermal decomposition or molten material will likely be irritating to the eyes. Risk of thermal burns on contact with molten product.

**Symptoms/Injuries After Ingestion:** This material is toxic in small amounts orally, and can cause adverse health effects or death. Ingestion of the molten product may cause severe thermal burns.

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**Chronic Symptoms:** None expected when handled in massive form. *If physically altered to present slivers, ribbons, dusts or fumes from molten material:* Causes damage to organs (central nervous system, blood, kidneys, lungs, bone) through prolonged or repeated exposure. May cause cancer. May cause genetic defects. May damage fertility. May damage the unborn child. May produce an allergic reaction. 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. Zinc: Prolonged exposure to high concentrations of zinc fumes may cause "zinc shakes", an involuntary twitching of the muscles. Otherwise, zinc is non-toxic. 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. Lead: Exposure can result in lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; encephalopathy; kidney disease; hypertension. Aluminum: Inhalation of finely divided aluminum powder may cause pulmonary fibrosis. Tin: Has been shown to increase incidence of sarcoma in animal tests. Chronic exposure to tin dusts and fume may result in "stannosis", a mild form of pneumoconiosis. Repeated inhalation of iron oxide dust can cause siderosis a benign condition. Manganese: Chronic exposure can cause inflammation of the lung tissue, scarring the lungs (pulmonary fibrosis). Chronic exposure to excessive manganese levels can lead to a variety of psychiatric and motor disturbances, termed manganism. Silicon: Can cause chronic bronchitis and narrowing of the airways. Cobalt: Chronic exposure to cobalt-containing hard metal (dust or fume) can result in a serious lung disease called "hard metal lung disease", which is a type of pneumoconiosis (lung fibrosis). Over time inhalation of dust and fumes from this product in certain individuals may cause Chronic Beryllium Disease. This causes allergic reactions in sensitized individuals in the lungs, possibly resulting in pulmonary fibrosis, and can even be fatal. Beryllium is a known carcinogen. Take appropriate precautions for workers exposure to Beryllium compounds, avoid breathing dust, and fumes from this product. Overexposure to metal fumes may result metal fume fever (chills, muscle aches, nausea, fever, dry throat, cough, weakness, lassitude), disturbances in smell and/or taste, and possible discoloration of skin, hair and mucous membranes; discoloration may become permanent.

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

If exposed or concerned, get medical advice and attention. If medical advice is needed, have product container or label at hand.

## SECTION 5: FIRE-FIGHTING MEASURES

### 5.1. Extinguishing Media

**Suitable Extinguishing Media:** Use Class D extinguishing agents on dusts, fines or molten metal. Use coarse water spray on chips and turnings. *As shipped:* Use extinguishing media appropriate for surrounding fire.

**Unsuitable Extinguishing Media:** Do not use water when molten material is involved, contact of hot product with water will result in a violent expansion as the water turns to steam causing explosion with massive force. Do not use halogenated extinguishing agents on small chips or fines.

### 5.2. Special Hazards Arising From the Substance or Mixture

**Fire Hazard:** In massive form: Not flammable. Dust generated from processing may present a dust explosion hazard. Chips, fines, and dust can react with water forming explosive/flammable hydrogen gas. Molten material may react violently with water forming explosive or flammable reactions. Small chips, turnings, dust and fines from processing may be readily ignitable.

**Explosion Hazard:** Dust generated from processing may present a dust explosion hazard. Chips, fines, and dust can react with water forming explosive/flammable hydrogen gas. Molten material may react violently with water forming explosive or flammable reactions.

**Reactivity:** Dust and other forms of product formed from processing might react with water producing a flammable/explosive environment, especially in confined spaces. Molten material will react violently with water.

### 5.3. Advice for Firefighters

**Precautionary Measures Fire:** Exercise caution when fighting any chemical fire. Under fire conditions, hazardous fumes will be present.

**Firefighting Instructions:** Do not breath fumes from fires or vapors from decomposition.

**Protection During Firefighting:** Firefighters must use full bunker gear including NIOSH-approved positive-pressure self-contained breathing apparatus to protect against potential hazardous combustion and decomposition products. Do not enter fire area without proper protective equipment, including respiratory protection.

**Hazardous Combustion Products:** Metal oxides.

**Other Information:** Do not allow run-off from fire fighting to enter drains or water courses. Risk of dust explosion.

## 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. Remove ignition sources. Use only non-sparking tools. Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking. Where possible allow molten material to solidify naturally. Do not breathe fumes from molten product. Do not breathe dust. Do not get in eyes, on skin, or on clothing.

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## 6.1.1. For Non-Emergency Personnel

**Protective Equipment:** Use appropriate personal protective equipment (PPE).

**Emergency Procedures:** Evacuate unnecessary personnel. Stop leak if safe to do so.

## 6.1.2. For Emergency Personnel

**Protective Equipment:** Equip cleanup crew with proper protection.

**Emergency Procedures:** Eliminate ignition sources first, then ventilate the area. Upon arrival at the scene, a first responder is expected to recognize the presence of dangerous goods, protect oneself and the public, secure the area, and call for the assistance of trained personnel as soon as conditions permit.

## 6.2. Environmental Precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

## 6.3. Methods and Materials for Containment and Cleaning Up

**For Containment:** Contain and collect as any solid. Avoid generation of dust during clean-up of spills. If metal is in molten form allow to cool and collect as a solid. Contain spills with appropriate barriers and prevent migration and entry into sewers or streams.

**Methods for Cleaning Up:** Clean up spills immediately and dispose of waste safely. *For dust spills:* Use only non-sparking tools. Use explosion proof vacuum during cleanup, with appropriate filter. Do not mix with other materials. *In molten form:* Allow product to completely solidify, then scrape product from hard surface (avoid generating dust). Place solidified product in appropriate waste container. Contact competent authorities after a spill.

## 6.4. Reference to Other Sections

See Section 8 for exposure controls and personal protection and Section 13 for disposal considerations.

## SECTION 7: HANDLING AND STORAGE

### 7.1. Precautions for Safe Handling

**Additional Hazards When Processed:** Product dust is combustible. Use care during processing to minimize generation of dust. Warning! Contains lead. When immersed in furnace, splashing of molten metal can occur. Molten metal and water can be an explosive combination. The risk is greatest when there is sufficient molten metal to entrap or seal off the water. Water and other forms of contamination on or contained in scrap or remelt ingot are known to have caused explosions in melting operations. While the products may have minimal surface roughness and internal voids, there remains the possibility of moisture contamination or entrapment. If confined, even a few drops of water can lead to violent explosions. All tooling and containers which come in contact with molten metal must be preheated or specially coated and rust free. Molds and ladles must be preheated or oiled prior to casting. Any surfaces that may contact molten metal (e.g. concrete) should be specially coated. Drops of molten metal in water (e.g. from plasma arc cutting), while not normally an explosion hazard, can generate enough flammable hydrogen gas to present an explosion hazard. Vigorous circulation of the water and removal of the particles minimize the hazards.

During melting operations, the following minimum guidelines should be observed:

-Inspect all materials prior to furnace charging and completely remove surface contamination such as water, ice, snow, deposits of grease and oil or other surface contamination resulting from weather exposure, shipment, or storage.

-Store materials in dry, heated areas with any cracks or cavities pointed downwards.

-Preheat and dry large or heavy items such as ingot adequately before charging into a furnace containing molten metal. This is typically done by use of a drying oven or homogenizing furnace. The drying cycle should bring the internal metal temperature of the coldest item of the batch to 400 °F (204 °C) and then hold at that temperature for 6 hours.

**Precautions for Safe Handling:** Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid creating or spreading dust. Do not breathe dust. Do not breathe fumes from molten product. Do not get in eyes, on skin, or on clothing. Avoid contact during pregnancy/while nursing. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

**Hygiene Measures:** Handle in accordance with good industrial hygiene and safety procedures.

### 7.2. Conditions for Safe Storage, Including Any Incompatibilities

**Technical Measures:** Avoid creating or spreading dust. Use explosion-proof electrical, ventilating, lighting equipment. Proper grounding procedures to avoid static electricity should be followed. Take action to prevent static discharges. Use explosion-proof electrical, ventilating, and lighting equipment. Comply with applicable regulations.

**Storage Conditions:** Store in original container. Store in dry protected location to prevent any moisture contact. Keep away from heat and flame. Keep container closed when not in use. Keep/Store away from Incompatible materials.

**Incompatible Materials:** Corrosive substances in contact with metals may produce flammable hydrogen gas. Strong acids, strong bases, strong oxidizers. *When molten:* water. *Dust, fines, and chips:* water

### 7.3. Specific End Use(s)

No use is specified.



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### 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), AIHA (WEEL), NIOSH (REL), or OSHA (PEL).

<b>Copper (7440-50-8)</b>		
USA ACGIH	ACGIH OEL TWA	0.2 mg/m <sup>3</sup> (fume)
USA NIOSH	NIOSH REL (TWA)	1 mg/m <sup>3</sup> (dust and mist) 0.1 mg/m <sup>3</sup> (fume)
USA IDLH	IDLH	100 mg/m <sup>3</sup> (dust, fume and mist)
USA OSHA	OSHA PEL (TWA) [1]	0.1 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dust and mist)
<b>Zinc oxide (ZnO) (1314-13-2)</b>		
USA ACGIH	ACGIH OEL TWA	2 mg/m <sup>3</sup> (respirable particulate matter)
USA ACGIH	ACGIH OEL STEL	10 mg/m <sup>3</sup> (respirable particulate matter)
USA NIOSH	NIOSH REL (TWA)	5 mg/m <sup>3</sup> (dust and fume)
USA NIOSH	NIOSH REL (STEL)	10 mg/m <sup>3</sup> (fume)
USA NIOSH	NIOSH REL (Ceiling)	15 mg/m <sup>3</sup> (dust)
USA IDLH	IDLH	500 mg/m <sup>3</sup>
USA OSHA	OSHA PEL (TWA) [1]	5 mg/m <sup>3</sup> (fume) 15 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable fraction)
<b>Nickel (7440-02-0)</b>		
USA ACGIH	ACGIH OEL TWA	1.5 mg/m <sup>3</sup> (inhalable particulate matter)
USA ACGIH	ACGIH chemical category	Not Suspected as a Human Carcinogen
USA ACGIH	BEI (BLV)	5 µg/l Parameter: Nickel - Medium: urine - Sampling time: post-shift at end of workweek (background)
USA NIOSH	NIOSH REL (TWA)	0.015 mg/m <sup>3</sup>
USA IDLH	IDLH	10 mg/m <sup>3</sup>
USA OSHA	OSHA PEL (TWA) [1]	1 mg/m <sup>3</sup>
<b>Lead (7439-92-1)</b>		
USA ACGIH	ACGIH OEL TWA	0.05 mg/m <sup>3</sup>
USA ACGIH	ACGIH chemical category	Confirmed Animal Carcinogen with Unknown Relevance to Humans
USA ACGIH	BEI (BLV)	200 µg/l Parameter: Lead - Medium: blood - Sampling time: not critical (Note: Persons applying this BEI are encouraged to counsel female workers of child-bearing age about the risk of delivering a child with a PbB (lead in blood level) over the current CDC reference value.)
USA NIOSH	NIOSH REL (TWA)	0.05 mg/m <sup>3</sup>
USA IDLH	IDLH	100 mg/m <sup>3</sup>
USA OSHA	OSHA PEL (TWA) [1]	50 µg/m <sup>3</sup>
USA OSHA	OSHA Action Level/Excursion Limit	30 µg/m <sup>3</sup> (Action Level, see 29 CFR 1910.1025)
<b>Aluminum (7429-90-5)</b>		
USA ACGIH	ACGIH OEL TWA	1 mg/m <sup>3</sup> (respirable particulate matter)
USA ACGIH	ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA NIOSH	NIOSH REL (TWA)	10 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable dust)
USA OSHA	OSHA PEL (TWA) [1]	15 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable fraction)
<b>Tin (7440-31-5)</b>		
USA ACGIH	ACGIH OEL TWA	2 mg/m <sup>3</sup> (inhalable particulate matter)
USA NIOSH	NIOSH REL (TWA)	2 mg/m <sup>3</sup>
USA IDLH	IDLH	100 mg/m <sup>3</sup>
<b>Manganese (7439-96-5)</b>		
USA ACGIH	ACGIH OEL TWA	0.02 mg/m <sup>3</sup> (respirable particulate matter)

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		0.1 mg/m <sup>3</sup> (inhalable particulate matter)
<b>USA ACGIH</b>	ACGIH chemical category	Not Classifiable as a Human Carcinogen
<b>USA NIOSH</b>	NIOSH REL (TWA)	1 mg/m <sup>3</sup> (fume)
<b>USA NIOSH</b>	NIOSH REL (STEL)	3 mg/m <sup>3</sup>
<b>USA IDLH</b>	IDLH	500 mg/m <sup>3</sup>
<b>USA OSHA</b>	OSHA PEL (Ceiling)	5 mg/m <sup>3</sup> (fume)
<b>Silicon (7440-21-3)</b>		
<b>USA NIOSH</b>	NIOSH REL (TWA)	10 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable dust)
<b>USA OSHA</b>	OSHA PEL (TWA) [1]	15 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable fraction)
<b>Thallium (7440-28-0)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	0.02 mg/m <sup>3</sup> (inhalable particulate matter)
<b>USA ACGIH</b>	ACGIH chemical category	Skin - potential significant contribution to overall exposure by the cutaneous route
<b>Cobalt (7440-48-4)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	0.02 mg/m <sup>3</sup> (inhalable particulate matter)
<b>USA ACGIH</b>	ACGIH chemical category	Confirmed Animal Carcinogen with Unknown Relevance to Humans, dermal sensitizer
<b>USA ACGIH</b>	BEI (BLV)	15 µg/l Parameter: Cobalt - Medium: urine - Sampling time: end of shift at end of workweek (nonspecific)
<b>USA NIOSH</b>	NIOSH REL (TWA)	0.05 mg/m <sup>3</sup> (dust and fume)
<b>USA IDLH</b>	IDLH	20 mg/m <sup>3</sup> (dust and fume)
<b>USA OSHA</b>	OSHA PEL (TWA) [1]	0.1 mg/m <sup>3</sup> (dust and fume)
<b>Beryllium (7440-41-7)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	0.0005 mg/m <sup>3</sup> (inhalable particulate matter)
<b>USA ACGIH</b>	ACGIH chemical category	Confirmed Human Carcinogen, respiratory sensitizer
<b>USA NIOSH</b>	NIOSH REL (Ceiling)	0.0005 mg/m <sup>3</sup>
<b>USA IDLH</b>	IDLH	4 mg/m <sup>3</sup>
<b>USA OSHA</b>	OSHA PEL (TWA) [1]	0.2 µg/m <sup>3</sup>
<b>USA OSHA</b>	OSHA PEL (STEL) [1]	2 µg/m <sup>3</sup> (See 29 CFR 1910.1024)
<b>USA OSHA</b>	OSHA PEL (Ceiling)	2 µg/m <sup>3</sup>
<b>USA OSHA</b>	Acceptable Maximum Peak Above The Acceptable Ceiling Concentration For An 8-Hr Shift	25 µg/m <sup>3</sup> Peak (30 minutes)
<b>USA OSHA</b>	OSHA Action Level/Excursion Limit	0.1 µg/m <sup>3</sup> (Action Level, see 29 CFR 1910.1024)
<b>Cadmium (7440-43-9)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	0.01 mg/m <sup>3</sup> 0.002 mg/m <sup>3</sup> (respirable particulate matter)
<b>USA ACGIH</b>	ACGIH chemical category	Suspected Human Carcinogen
<b>USA ACGIH</b>	BEI (BLV)	5 µg/g Kreatinin Parameter: Cadmium - Medium: urine - Sampling time: not critical (background) 5 µg/l Parameter: Cadmium - Medium: blood - Sampling time: not critical (background)
<b>USA IDLH</b>	IDLH	9 mg/m <sup>3</sup> (dust)
<b>USA OSHA</b>	OSHA PEL (TWA) [1]	5 µg/m <sup>3</sup>
<b>USA OSHA</b>	OSHA PEL (Ceiling)	0.3 mg/m <sup>3</sup> (applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect-fume) 0.6 mg/m <sup>3</sup> (applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect-dust)
<b>USA OSHA</b>	OSHA Action Level/Excursion Limit	2.5 µg/m <sup>3</sup> (Action Level, see 29 CFR 1910.1027)
<b>Arsenic (7440-38-2)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	0.01 mg/m <sup>3</sup>
<b>USA ACGIH</b>	ACGIH chemical category	Confirmed Human Carcinogen
<b>USA ACGIH</b>	BEI (BLV)	35 µg As/L Parameter: Inorganic arsenic plus methylated

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		metabolites - Medium: urine - Sampling time: end of workweek (background)
<b>USA NIOSH</b>	NIOSH REL (Ceiling)	0.002 mg/m <sup>3</sup>
<b>USA IDLH</b>	IDLH	5 mg/m <sup>3</sup>
<b>Sulfur dioxide (7446-09-5)</b>		
<b>USA ACGIH</b>	ACGIH OEL STEL [ppm]	0.25 ppm
<b>USA ACGIH</b>	ACGIH chemical category	Not Classifiable as a Human Carcinogen
<b>USA NIOSH</b>	NIOSH REL (TWA)	5 mg/m <sup>3</sup>
<b>USA NIOSH</b>	NIOSH REL TWA [ppm]	2 ppm
<b>USA NIOSH</b>	NIOSH REL (STEL)	13 mg/m <sup>3</sup>
<b>USA NIOSH</b>	NIOSH REL STEL [ppm]	5 ppm
<b>USA IDLH</b>	IDLH [ppm]	100 ppm
<b>USA OSHA</b>	OSHA PEL (TWA) [1]	13 mg/m <sup>3</sup>
<b>USA OSHA</b>	OSHA PEL (TWA) [2]	5 ppm
<b>Zirconium (7440-67-7)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	5 mg/m <sup>3</sup>
<b>USA ACGIH</b>	ACGIH OEL STEL	10 mg/m <sup>3</sup>
<b>USA ACGIH</b>	ACGIH chemical category	Not Classifiable as a Human Carcinogen
<b>USA NIOSH</b>	NIOSH REL (TWA)	5 mg/m <sup>3</sup>
<b>USA NIOSH</b>	NIOSH REL (STEL)	10 mg/m <sup>3</sup>
<b>USA IDLH</b>	IDLH	50 mg/m <sup>3</sup>
<b>Iron oxide (Fe<sub>2</sub>O<sub>3</sub>) (1309-37-1)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	5 mg/m <sup>3</sup> (respirable particulate matter)
<b>USA ACGIH</b>	ACGIH chemical category	Not Classifiable as a Human Carcinogen
<b>USA NIOSH</b>	NIOSH REL (TWA)	5 mg/m <sup>3</sup> (dust and fume)
<b>USA IDLH</b>	IDLH	2500 mg/m <sup>3</sup> (dust and fume)
<b>USA OSHA</b>	OSHA PEL (TWA) [1]	10 mg/m <sup>3</sup> (fume) 15 mg/m <sup>3</sup> (total dust (Rouge)) 5 mg/m <sup>3</sup> (respirable fraction (Rouge))

## 8.2. Exposure Controls

### Appropriate Engineering Controls

: Ensure adequate ventilation, especially in confined areas. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use explosion-proof equipment. 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. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen-deficient environment. Proper grounding procedures to avoid static electricity should be followed. Ensure all national/local regulations are observed.

### Personal Protective Equipment

: Gloves. Protective clothing. Protective goggles. Insufficient ventilation: wear respiratory protection.



### Materials for Protective Clothing

: Chemically resistant materials and fabrics. Thermal protection required when working with hot material.

### Hand Protection

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

### Eye and Face Protection

: Chemical goggles or face shield.

### Skin and Body Protection

: Wear suitable protective clothing.

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<b>Respiratory Protection</b>	: If exposure limits are exceeded or irritation is experienced, approved respiratory protection should be worn. In case of inadequate ventilation, oxygen deficient atmosphere, or where exposure levels are not known wear approved respiratory protection.
<b>Thermal Hazard Protection</b>	: When working with hot material, use suitable thermally protective clothing.
<b>Other Information</b>	: When using, do not eat, drink or smoke.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1. Information on Basic Physical and Chemical Properties

<b>Physical State</b>	: Solid
<b>Appearance</b>	: Metallic
<b>Odor</b>	: Odorless
<b>Odor Threshold</b>	: Not applicable
<b>pH</b>	: No data available
<b>Evaporation Rate</b>	: No data available
<b>Melting Point</b>	: 440 – 1215 °F (226.67 – 657.22 °C)
<b>Freezing Point</b>	: No data available
<b>Boiling Point</b>	: No data available
<b>Flash Point</b>	: Not applicable
<b>Auto-ignition Temperature</b>	: No data available
<b>Decomposition Temperature</b>	: No data available
<b>Flammability (solid, gas)</b>	: Flammable solid
<b>Vapor Pressure</b>	: No data available
<b>Relative Vapor Density at 20°C</b>	: No data available
<b>Relative Density</b>	: No data available
<b>Specific Gravity</b>	: 2.5 - 2.9
<b>Solubility</b>	: Insoluble in water
<b>Partition Coefficient: N-Octanol/Water</b>	: No data available
<b>Viscosity</b>	: No data available

### 9.2. Other Information

No additional information available

## SECTION 10: STABILITY AND REACTIVITY

### 10.1. Reactivity

Dust and other forms of product formed from processing might react with water producing a flammable/explosive environment, especially in confined spaces. Molten material will react violently with water.

### 10.2. Chemical Stability

Metallic dusts may ignite or explode.

### 10.3. Possibility of Hazardous Reactions

In contact with water releases flammable gas. Hazardous polymerization will not occur.

### 10.4. Conditions to Avoid

Dust accumulation (to minimize explosion hazard). Protect from moisture. Dust, chips, or ribbons can be ignited more easily, by an ignition source, by improper machining, or by spontaneous combustion if finely divided and damp.

### 10.5. Incompatible Materials

Corrosive substances in contact with metals may produce flammable hydrogen gas. Strong acids, strong bases, strong oxidizers.  
*When molten: water. Dust, fines, and chips: water.*

### 10.6. Hazardous Decomposition Products

Thermal decomposition may produce: Metal oxides.

## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1. Information on Toxicological Effects

**Acute Toxicity (Oral):** Toxic if swallowed.

**Acute Toxicity (Dermal):** Not classified

**Acute Toxicity (Inhalation):** Fatal if inhaled. Not classified.

Copper/Copper Alloys	
<b>ATE (Oral)</b>	140.38 mg/kg body weight
<b>ATE (Gases)</b>	100.00 ppmV/4h
<b>ATE (Vapors)</b>	0.50 mg/l/4h

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ATE (Dust/Mist)	0.05 mg/l/4h
<b>Copper (7440-50-8)</b>	
LC50 Inhalation Rat	> 5.11 mg/l/4h
<b>Zinc oxide (ZnO) (1314-13-2)</b>	
LD50 Oral Rat	> 5000 mg/kg
LD50 Dermal Rat	> 2000 mg/kg (no deaths)
LC50 Inhalation Rat	> 5700 mg/m <sup>3</sup> (Exposure time: 4 h)
<b>Nickel (7440-02-0)</b>	
LD50 Oral Rat	> 9000 mg/kg
LC50 Inhalation Rat	> 10.2 mg/l (Exposure time: 1 h)
<b>Aluminum (7429-90-5)</b>	
LD50 Oral Rat	> 15900 mg/kg
<b>Tin (7440-31-5)</b>	
LD50 Dermal Rat	> 2000 mg/kg
<b>Manganese (7439-96-5)</b>	
LD50 Oral Rat	> 2000 mg/kg
LC50 Inhalation Rat	> 5.14 mg/l/4h
<b>Silicon (7440-21-3)</b>	
LD50 Oral Rat	3160 mg/kg
<b>Thallium (7440-28-0)</b>	
ATE (Oral)	5.00 mg/kg body weight
ATE (Dust/Mist)	0.05 mg/l/4h
<b>Cobalt (7440-48-4)</b>	
LD50 Oral Rat	550 mg/kg (Species: Sprague Dawley)
LC50 Inhalation Rat	< 0.05 mg/l/4h
<b>Beryllium (7440-41-7)</b>	
ATE (Oral)	100.00 mg/kg body weight
ATE (Gases)	100.00 ppmV/4h
ATE (Vapors)	0.50 mg/l/4h
ATE (Dust/Mist)	0.05 mg/l/4h
<b>Cadmium (7440-43-9)</b>	
LD50 Oral Rat	1140 mg/kg
LC50 Inhalation Rat	25 mg/m <sup>3</sup> (Exposure time: 30 min)
ATE (Vapors)	0.03 mg/l/4h
ATE (Dust/Mist)	0.03 mg/l/4h
<b>Arsenic (7440-38-2)</b>	
ATE (Oral)	100.00 mg/kg body weight
ATE (Dust/Mist)	0.50 mg/l/4h
<b>Sulfur dioxide (7446-09-5)</b>	
LC50 Inhalation Rat	965 – 1168 ppm/4h
ATE (Gases)	1,250.00 ppmV/4h
<b>Iron oxide (Fe<sub>2</sub>O<sub>3</sub>) (1309-37-1)</b>	
LD50 Oral Rat	> 10000 mg/kg

**Skin Corrosion/Irritation:** Not classified

**Serious Eye Damage/Irritation:** Causes serious eye irritation.

**Respiratory or Skin Sensitization:** May cause an allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction.

**Germ Cell Mutagenicity:** May cause genetic defects.

**Carcinogenicity:** May cause cancer.

<b>Nickel (7440-02-0)</b>	
IARC group	2B
National Toxicology Program (NTP) Status	Reasonably anticipated to be Human Carcinogen.
OSHA Hazard Communication Carcinogen List	In OSHA Hazard Communication Carcinogen list.

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<b>Lead (7439-92-1)</b>	
<b>IARC group</b>	2A
<b>National Toxicology Program (NTP) Status</b>	Reasonably anticipated to be Human Carcinogen.
<b>OSHA Hazard Communication Carcinogen List</b>	In OSHA Hazard Communication Carcinogen list.
<b>Cobalt (7440-48-4)</b>	
<b>IARC group</b>	2B
<b>National Toxicology Program (NTP) Status</b>	Reasonably anticipated to be Human Carcinogen, Evidence of Carcinogenicity.
<b>OSHA Hazard Communication Carcinogen List</b>	In OSHA Hazard Communication Carcinogen list.
<b>Beryllium (7440-41-7)</b>	
<b>IARC group</b>	1
<b>National Toxicology Program (NTP) Status</b>	Known Human Carcinogens.
<b>OSHA Hazard Communication Carcinogen List</b>	In OSHA Hazard Communication Carcinogen list.
<b>OSHA Specifically Regulated Carcinogen List</b>	In OSHA Specifically Regulated Carcinogen list.
<b>Cadmium (7440-43-9)</b>	
<b>IARC group</b>	1
<b>National Toxicology Program (NTP) Status</b>	Known Human Carcinogens.
<b>OSHA Hazard Communication Carcinogen List</b>	In OSHA Hazard Communication Carcinogen list.
<b>OSHA Specifically Regulated Carcinogen List</b>	In OSHA Specifically Regulated Carcinogen list.
<b>Arsenic (7440-38-2)</b>	
<b>IARC group</b>	1
<b>National Toxicology Program (NTP) Status</b>	Known Human Carcinogens.
<b>OSHA Hazard Communication Carcinogen List</b>	In OSHA Hazard Communication Carcinogen list.
<b>Sulfur dioxide (7446-09-5)</b>	
<b>IARC group</b>	3
<b>Iron oxide (Fe<sub>2</sub>O<sub>3</sub>) (1309-37-1)</b>	
<b>IARC group</b>	3

**Reproductive Toxicity:** May damage fertility. May damage the unborn child. May cause harm to breast-fed children. (This material or its emissions may appear in breast milk of nursing mothers.)

**Specific Target Organ Toxicity (Single Exposure):** Not classified

<b>Arsenic (7440-38-2)</b>	
<b>LOAEL (oral,rat)</b>	5 mg/kg body weight
<b>LOAEL (dermal,rat/rabbit)</b>	300 mg/kg body weight

**Specific Target Organ Toxicity (Repeated Exposure):** Causes damage to organs (central nervous system, blood, kidneys, lungs, bone) through prolonged or repeated exposure.

**Aspiration Hazard:** Not classified

**Symptoms/Injuries After Inhalation:** Inhalation of this material can cause serious health effects in small amounts, leading to unconsciousness and death. Exposure may produce cough, mucous secretions, shortness of breath, chest tightness or other symptoms indicative of an allergic/sensitization reaction. During processing, the most significant route of exposure is by the inhalation (breathing) of dust or fumes. If fumes are inhaled, they can cause a condition commonly known as metal fume fever with symptoms which resemble influenza; Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse sweating, excessive urination, diarrhea and prostration may also occur.

**Symptoms/Injuries After Skin Contact:** May cause an allergic skin reaction. Contact with fumes or metal powder will irritate skin. Contact with hot, molten metal will cause thermal burns.

**Symptoms/Injuries After Eye Contact:** During metal processing, dusts caused from physical alteration will likely cause eye irritation. Fumes from thermal decomposition or molten material will likely be irritating to the eyes. Risk of thermal burns on contact with molten product.

**Symptoms/Injuries After Ingestion:** This material is toxic in small amounts orally, and can cause adverse health effects or death. Ingestion of the molten product may cause severe thermal burns.

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**Chronic Symptoms:** Causes damage to organs (central nervous system, blood, kidneys, lungs, bone) through prolonged or repeated exposure. May cause cancer. May cause genetic defects. May damage fertility. May damage the unborn child. May produce an allergic reaction. Overexposure to metal fumes may result metal fume fever (chills, muscle aches, nausea, fever, dry throat, cough, weakness, lassitude), disturbances in smell and/or taste, and possible discoloration of skin, hair and mucous membranes; discoloration may become permanent.

## SECTION 12: ECOLOGICAL INFORMATION

### 12.1. Toxicity

#### Ecology - General

: *Massive form:* Not hazardous. *Dust, fines, and chips:* Very toxic to aquatic life with long lasting effects.

Copper (7440-50-8)	
LC50 Fish 1	0.0068 – 0.0156 mg/l (Exposure time: 96 h - Species: Pimephales promelas)
EC50 - Crustacea [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])
LC50 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])
Zinc oxide (ZnO) (1314-13-2)	
LC50 Fish 1	1.793 mg/l (Exposure time: 96 h - Species: Zebrafish)
EC50 - Crustacea [1]	0.154 mg/l (Desmodesmus subspicatus 48 h)
ErC50 (Algae)	3.35 mg/l (Desmodesmus subspicatus 72 h)
NOEC Chronic Fish	0.026 mg/l (Jordanella floridae)
NOEC Chronic Crustacea	0.04 mg/l (Daphnia magna 21 d semi-static reproduction)
Nickel (7440-02-0)	
LC50 Fish 1	100 mg/l (Exposure time: 96 h - Species: Brachydanio rerio)
EC50 - Crustacea [1]	121.6 µg/l (Exposure time: 48h - Species: Ceriodaphnia dubia [static])
LC50 Fish 2	15.3 mg/l
EC50 - Crustacea [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])
Lead (7439-92-1)	
LC50 Fish 1	0.44 mg/l (Exposure time: 96 h - Species: Cyprinus carpio [semi-static])
EC50 - Crustacea [1]	600 µg/l (Exposure time: 48 h - Species: water flea)
LC50 Fish 2	1.17 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [flow-through])
Manganese (7439-96-5)	
LC50 Fish 1	> 3.6 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [semi-static])
NOEC Chronic Fish	3.6 mg/l (Exposure time: 96h; Species: Oncorhynchus mykiss)
Cobalt (7440-48-4)	
LC50 Fish 1	> 100 mg/l (Exposure time: 96 h - Species: Brachydanio rerio [static])
Cadmium (7440-43-9)	
LC50 Fish 1	0.003 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [flow-through])
EC50 - Crustacea [1]	0.0244 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
LC50 Fish 2	0.006 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [static])
ErC50 (Algae)	0.07 mg/l
NOEC Chronic Fish	0.008 mg/l
Iron oxide (Fe2O3) (1309-37-1)	
LC50 Fish 1	100000 mg/l (Exposure time: 96 h - Species: Danio rerio [static])

### 12.2. Persistence and Degradability

Copper/Copper Alloys	
Persistence and Degradability	May cause long-term adverse effects in the environment. Inorganic product which cannot be eliminated from water by biological purification processes.
Copper (7440-50-8)	
Persistence and Degradability	Not readily biodegradable.

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## 12.3. Bioaccumulative Potential

<b>Copper/Copper Alloys</b>	
<b>Bioaccumulative Potential</b>	Not established.
<b>Cobalt (7440-48-4)</b>	
<b>BCF Fish 1</b>	(no bioaccumulation)
<b>Sulfur dioxide (7446-09-5)</b>	
<b>BCF Fish 1</b>	(no bioaccumulation expected)

## 12.4. Mobility in Soil

No additional information 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:** Material should be recycled if possible.

**Waste Disposal Recommendations:** Dispose of contents/container in accordance with local, regional, national, and international regulations.

**Additional Information:** Recover or recycle if possible.

**Ecology - Waste Materials:** Avoid release to the environment. This material is hazardous to the aquatic environment. Keep out of sewers and waterways.

## SECTION 14: TRANSPORT INFORMATION

The shipping description(s) stated herein were prepared in accordance with certain assumptions at the time the SDS was authored, and can vary based on a number of variables that may or may not have been known at the time the SDS was issued.

### 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

\*The shipping descriptions above do not apply to forms of this product that may result from further processing, such as dust, fines, and chips. Shipping classifications must be reassessed if the form of the product is altered.

## SECTION 15: REGULATORY INFORMATION

### 15.1. US Federal Regulations

<b>Copper/Copper Alloys</b>	
<b>SARA Section 311/312 Hazard Classes</b>	Health hazard - Carcinogenicity Health hazard - Specific target organ toxicity (single or repeated exposure) Health hazard - Respiratory or skin sensitization Physical hazard - In contact with water emits flammable gas Physical hazard - Flammable (gases, aerosols, liquids, or solids) Health hazard - Serious eye damage or eye irritation Health hazard - Germ cell mutagenicity Health hazard - Reproductive toxicity Health hazard - Acute toxicity (any route of exposure) Physical hazard - Combustible dust
<b>Copper (7440-50-8)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
<b>CERCLA RQ</b>	5000 lb no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm
<b>SARA Section 313 - Emission Reporting</b>	1 %
<b>Zinc oxide (ZnO) (1314-13-2)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active	



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<b>Nickel (7440-02-0)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
<b>CERCLA RQ</b>	100 lb (only applicable if particles are < 100 µm)
<b>SARA Section 313 - Emission Reporting</b>	0.1 %
<b>Lead (7439-92-1)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
<b>CERCLA RQ</b>	10 lb no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm
<b>SARA Section 313 - Emission Reporting</b>	0.1 %
<b>Aluminum (7429-90-5)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
<b>SARA Section 313 - Emission Reporting</b>	1 % (dust or fume only)
<b>Tin (7440-31-5)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active	
<b>Manganese (7439-96-5)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
<b>SARA Section 313 - Emission Reporting</b>	1 %
<b>Silicon (7440-21-3)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active	
<b>Thallium (7440-28-0)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
<b>CERCLA RQ</b>	1000 lb no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm
<b>SARA Section 313 - Emission Reporting</b>	1 %
<b>Cobalt (7440-48-4)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
<b>SARA Section 313 - Emission Reporting</b>	0.1 %
<b>Beryllium (7440-41-7)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
<b>CERCLA RQ</b>	10 lb no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm
<b>SARA Section 313 - Emission Reporting</b>	0.1 %
<b>Cadmium (7440-43-9)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
<b>CERCLA RQ</b>	10 lb no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm
<b>SARA Section 313 - Emission Reporting</b>	0.1 %
<b>Arsenic (7440-38-2)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
<b>CERCLA RQ</b>	1 lb no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm
<b>SARA Section 313 - Emission Reporting</b>	0.1 %
<b>Sulfur dioxide (7446-09-5)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active	

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Listed on the United States SARA Section 302	
<b>SARA Section 302 Threshold Planning Quantity (TPQ)</b>	500 lb
<b>Zirconium (7440-67-7)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active	
<b>Iron oxide (Fe2O3) (1309-37-1)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active	

### 15.2. US State Regulations

<b>Copper (7440-50-8)</b>
U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
<b>Zinc oxide (ZnO) (1314-13-2)</b>
U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
<b>Nickel (7440-02-0)</b>
U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
<b>Lead (7439-92-1)</b>
U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
<b>Aluminum (7429-90-5)</b>
U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
<b>Tin (7440-31-5)</b>
U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List
<b>Manganese (7439-96-5)</b>
U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
<b>Silicon (7440-21-3)</b>
U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List
<b>Thallium (7440-28-0)</b>
U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
<b>Cobalt (7440-48-4)</b>
U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List

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

### Beryllium (7440-41-7)

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

### Cadmium (7440-43-9)

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

### Arsenic (7440-38-2)

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

### Sulfur dioxide (7446-09-5)

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


### Zirconium (7440-67-7)

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

### Iron oxide (Fe<sub>2</sub>O<sub>3</sub>) (1309-37-1)

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

### California Proposition 65

 **WARNING:** This product can expose you to Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

Chemical Name (CAS No.)	Carcinogenicity	Developmental Toxicity	Female Reproductive Toxicity	Male Reproductive Toxicity
Nickel (7440-02-0)	X			
Lead (7439-92-1)	X	X	X	X
Cobalt (7440-48-4)	X			
Beryllium (7440-41-7)	X			
Cadmium (7440-43-9)	X	X		X
Sulfur dioxide (7446-09-5)		X		

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

**Date of Preparation or Latest Revision** : 08/15/2023  
**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:

H228	Flammable solid
H250	Catches fire spontaneously if exposed to air
H261	In contact with water releases flammable gas
H280	Contains gas under pressure; may explode if heated

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H300	Fatal if swallowed
H301	Toxic if swallowed
H302	Harmful if swallowed
H314	Causes severe skin burns and eye damage
H315	Causes skin irritation
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 an allergy or asthma symptoms or breathing difficulties if inhaled
H335	May cause respiratory irritation
H340	May cause genetic defects
H341	Suspected of causing genetic defects
H350	May cause cancer
H351	Suspected of causing cancer
H360	May damage fertility or the unborn child
H361	Suspected of damaging fertility or the unborn child
H362	May cause harm to breast-fed children
H370	Causes damage to organs
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
H401	Toxic to aquatic life
H410	Very toxic to aquatic life with long lasting effects
H411	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

*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.*

SDS US (GHS HazCom)