Stainless Steel and Alloys of Stainless Steel

Safety Data Sheet

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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

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
Self-heating substances and mixtures Category 1	H251
Acute toxicity (oral) Category 3	H301
Acute toxicity (inhalation:dust,mist) Category 2	H330
Skin corrosion/irritation Category 2	H315
Serious eye damage/eye irritation Category 1	H318
Respiratory sensitization, Category 1	H334
Skin sensitization, Category 1	H317
Germ cell mutagenicity Category 2	H341
Carcinogenicity Category 1B	H350
Reproductive toxicity Category 1B	H360
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:dust,mist) Category 2	H330
Skin corrosion/irritation Category 2	H315
Serious eye damage/eye irritation Category 1	H318
Respiratory sensitization, Category 1	H334
Skin sensitization, Category 1	H317
Germ cell mutagenicity Category 2	H341
Carcinogenicity Category 1B	H350
Reproductive toxicity Category 1B	H360
Specific target organ toxicity (repeated exposure) Category 1	H372

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

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) :

GHS02 GHS05 GHS06 GHS08 GHS09

Signal Word (GHS-US) : Danger

Hazard Statements (GHS-US) : May form combustible dust concentrations in air.
H228 - Flammable solid.
H251 - Self-heating; may catch fire.
H301 - Toxic if swallowed.
H315 - Causes skin irritation.
H317 - May cause an allergic skin reaction.
H318 - Causes serious eye damage.
H330 - Fatal if inhaled.
H334 - May cause an allergy or asthma symptoms or breathing difficulties if inhaled.
H341 - Suspected of causing genetic defects.
H350 - May cause cancer.
H360 - May damage fertility or the unborn child.
H372 - Causes damage to organs (lung/respiratory system, central nervous system) through prolonged or repeated exposure.
H400 - Very toxic to aquatic life.
H410 - Very toxic to aquatic life with long lasting effects.

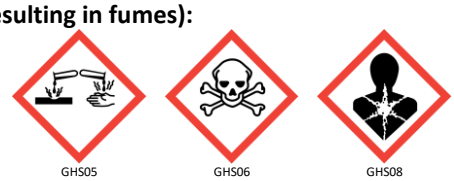
Precautionary Statements (GHS-US) : P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P235+P410 - Keep cool. Protect from sunlight.
P240 - Ground/Bond container and receiving equipment.
P241 - Use explosion-proof electrical, ventilating, and lighting equipment.
P260 - Do not breathe dust.
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.
P342+P311 - If experiencing respiratory symptoms: Call a poison center or doctor.
P362+P364 - Take off contaminated clothing and wash it before reuse.
P370+P378 - In case of fire: Use appropriate media (see section 5) to extinguish.
P391 - Collect spillage.
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P405 - Store locked up.
P407 - Maintain air gap between stacks/pallets.
P413 - Store bulk masses greater than …kg/…lbs at temperatures not exceeding …°C/…°F.

P420 - Store away from other materials.
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations.

Supplemental Information : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Proper grounding procedures to avoid static electricity should be followed. Prevent dust accumulation (to minimize explosion hazard). Avoid generating dust.

Classification Intended Use (Extreme heat resulting in fumes):

Hazard Pictograms (GHS-US) :



GHS05 GHS06 GHS08

Signal Word (GHS-US) : Danger

Hazard Statements (GHS-US) : H301 - Toxic if swallowed.
H315 - Causes skin irritation.
H317 - May cause an allergic skin reaction.
H318 - Causes serious eye damage.
H330 - Fatal if inhaled.
H334 - May cause an allergy or asthma symptoms or breathing difficulties if inhaled.
H341 - Suspected of causing genetic defects.
H350 - May cause cancer.
H360 - May damage fertility or the unborn child.
H372 - Causes damage to organs (lung/respiratory system, central nervous system) 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.
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.
P342+P311 - If experiencing respiratory symptoms: Call a poison center or doctor.
P362+P364 - Take off contaminated clothing and wash it 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.

Supplemental Information : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Proper grounding procedures to avoid static electricity should be followed. Prevent dust accumulation (to minimize explosion hazard). Avoid generating dust.

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
Iron	Iron, elemental / Direct reduced Iron / Iron, reduced / Elemental iron / IRON POWDER / iron	(CAS-No.) 7439-89-6	66 – 88	Flam. Sol. 1, H228 Self-heat. 1, H251 Combustible Dust
Chromium	Chromium metal / Chromium, elemental / Chromium, metal / Chromium, metallic / Chrome, metal / Chrome	(CAS-No.) 7440-47-3	0.01 – 30	Combustible Dust
Nickel	Nickel metal / Nickel, elemental / Nickel, metallic / Nickel, metal / C.I. 77775	(CAS-No.) 7440-02-0	0.01 – 27	Skin Sens. 1, H317 Carc. 2, H351 STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Chronic 3, H412 Combustible Dust
Manganese	Manganese, elemental / Manganese metal / manganese	(CAS-No.) 7439-96-5	0.01 – 6	Flam. Sol. 2, H228 STOT RE 1, H372 Aquatic Acute 2, H401 Aquatic Chronic 2, H411 Combustible Dust
Molybdenum	Molybdenum, metallic / molybdenum / Molybdenum, metal / Molybdenum, elemental / Molybdenum metal	(CAS-No.) 7439-98-7	0.01 – 6	Repr. 2, H361 Combustible Dust
Titanium	Titanium powder, dry / Titanium powder / Titanium powder, wetted / Titanium sponge powders / titanium	(CAS-No.) 7440-32-6	0.01 – 6	Flam. Sol. 1, H228 Combustible Dust
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	0.01 – 6	Aquatic Acute 1, H400 Aquatic Chronic 1, H410 Combustible Dust
Sulfur dioxide	Sulphur dioxide / Sulphurous anhydride / Sulfur(IV) oxide / Sulfur dioxide, anhydrous / Sulfur oxide (SO_2) / sulfur dioxide	(CAS-No.) 7446-09-5	0.01 – 2	Press. Gas (Comp.), H280 Acute Tox. 3 (Inhalation:gas), H331 Skin Corr. 1B, H314 Eye Dam. 1, H318
Phosphorus elemental	Phosphorus / Red phosphorus / Phosphorus, red / Phosphorus, amorphous / Phosphorus (amorphous, red) / Phosphorus amorphous / Phosphorus red / Phosphorus (red) / Phosphorus elemental (red) / Phosphorus (red, yellow, white) / Phosphorus (white) / Phosphorus (yellow) / Phosphorous (yellow) / Phosphorus, white / Red phosphorous / phosphorus / White phosphorus	(CAS-No.) 7723-14-0	0.01 – 2	Pyr. Sol. 1, H250 Acute Tox. 2 (Oral), H300 Acute Tox. 2 (Inhalation:dust,mist), H330 Skin Corr. 1A, H314 Eye Dam. 1, H318 Aquatic Acute 1, H400 Aquatic Chronic 1, H410

Cobalt	Cobalt, elemental / Cobalt metal / C.I. 77320 / Cobalt metallic	(CAS-No.) 7440-48-4	0.01 – 2	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
Carbon	Carbon, activated / CARBON / Activated carbon / Carbon Black / Graphite / Active carbon	(CAS-No.) 7440-44-0	0.01 – 2	Combustible Dust
Silicon	Silicon powder / Silicon powder, amorphous / SILICON / silicon	(CAS-No.) 7440-21-3	0.01 – 2	Combustible Dust
Tungsten	Tungsten, elemental / Tungsten, metal / Tungsten metal / Tungsten trioxide / tungsten	(CAS-No.) 7440-33-7	0 – 1.8	Flam. Sol. 1, H228 Self-heat. 2, H252 Combustible Dust
Niobium	niobium	(CAS-No.) 7440-03-1	0 – 1	Flam. Sol. 1, H228 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	0.01 – 0.5	Flam. Sol. 1, H228 Water-react. 2, H261 Combustible Dust
Tantalum	Tantalum metal / Tantalum, elemental / Tantalum, metal / tantalum	(CAS-No.) 7440-25-7	0.15 – 0.45	Flam. Sol. 1, H228 Combustible Dust
Selenium	Elemental selenium / Selenium, elemental / selenium	(CAS-No.) 7782-49-2	0.03 – 0.35	Acute Tox. 3 (Oral), H301 Acute Tox. 3 (Inhalation:dust,mist), H331 STOT RE 2, H373 Combustible Dust

Full text of H-phrases: see section 16

SECTION 4: FIRST AID MEASURES

4.1. Description of First-aid Measures

First-aid Measures General: 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: Using proper respiratory protection, move the exposed person to fresh air at once. 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, physician, or emergency medical service.

First-aid Measures After Skin Contact: *Normal handling:* Remove contaminated clothing. 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 30 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: Do NOT induce vomiting. Rinse mouth. Immediately call a POISON CENTER or doctor.

4.2. Most Important Symptoms and Effects Both Acute and Delayed

Symptoms/Injuries: Fatal if inhaled. Toxic if swallowed. Causes serious eye damage. Causes skin irritation. Causes damage to organs (lung/respiratory system, central nervous system) through prolonged or repeated exposure. May cause cancer. Suspected of causing genetic defects. May damage fertility. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Skin sensitization. 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 fumes and dust. 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: Causes permanent damage to the cornea, iris, or conjunctiva. Risk of thermal burns on contact with molten product.

Symptoms/Injuries After Ingestion: Ingestion may cause adverse effects. Ingestion of the molten product may cause severe thermal burns.

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 (lung/respiratory system, central nervous system) through prolonged or repeated exposure. May cause cancer. Suspected of causing genetic defects. May damage fertility. May produce an allergic reaction. Inhalation of iron oxide fumes undergoing decomposition may cause irritation and flu-like symptoms, otherwise iron oxide is not hazardous. 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. Nickel: May cause a form of dermatitis known as nickel itch and intestinal irritation, which may cause disorders, convulsions and asphyxia. 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. 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. Molybdenum: Chronic exposure to molybdenum compounds is suspected of causing cancer. Compounds are also known to cause irritation to the skin, eyes, and respiratory tract. 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. 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). Silicon: Can cause chronic bronchitis and narrowing of the airways. Aluminum: Inhalation of finely divided aluminum powder may cause pulmonary fibrosis. Tantalum: Repeated exposure to tantalum alloys may cause fibrosis, chronic rhinitis and "hard metal pneumoconiosis". Overexposure to selenium (selenium poisoning) can cause central nervous system effects, and other intoxication effects. Chronic exposure can lead to anemia, pallor, liver/spleen damage, garlic breath, dermatitis, depression and other effects.

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. Heated 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 decompostion.

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.

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. 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. 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 (at elevated temperature):* water.

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

Chromium (7440-47-3)		
USA ACGIH	ACGIH OEL TWA	0.5 mg/m³ (inhalable particulate matter)
USA ACGIH	BEI (BLV)	0.7 µg/l Parameter: Total chromium - Medium: urine - Sampling time: end of shift at end of workweek (population based)
USA NIOSH	NIOSH REL (TWA)	0.5 mg/m³
USA IDLH	IDLH	250 mg/m³
USA OSHA	OSHA PEL (TWA) [1]	1 mg/m³

Nickel (7440-02-0)		
USA ACGIH	ACGIH OEL TWA	1.5 mg/m³ (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/m³
USA IDLH	IDLH	10 mg/m³
USA OSHA	OSHA PEL (TWA) [1]	1 mg/m³

Manganese (7439-96-5)		
USA ACGIH	ACGIH OEL TWA	0.02 mg/m³ (respirable particulate matter)

		0.1 mg/m³ (inhalable particulate matter)
USA ACGIH	ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA NIOSH	NIOSH REL (TWA)	1 mg/m³ (fume)
USA NIOSH	NIOSH REL (STEL)	3 mg/m³
USA IDLH	IDLH	500 mg/m³
USA OSHA	OSHA PEL (Ceiling)	5 mg/m³ (fume)

Molybdenum (7439-98-7)		
	Internal OEL Value(s)	5 mg/m³ (Molybdenum (as Mo), Soluble Compounds)
USA ACGIH	ACGIH OEL TWA	10 mg/m³ (inhalable particulate matter) 3 mg/m³ (respirable particulate matter)
USA NIOSH	NIOSH REL (TWA)	5 mg/m³ (Molybdenum (as Mo), Soluble Compounds)
USA IDLH	IDLH	5000 mg/m³
USA OSHA	OSHA PEL (TWA) [1]	5 mg/m³ (Molybdenum (as Mo), Soluble Compounds) 15 mg/m³ (Molybdenum (as Mo), Insoluble Compounds (Total dust)

Copper (7440-50-8)		
USA ACGIH	ACGIH OEL TWA	0.2 mg/m³ (fume)
USA NIOSH	NIOSH REL (TWA)	1 mg/m³ (dust and mist) 0.1 mg/m³ (fume)
USA IDLH	IDLH	100 mg/m³ (dust, fume and mist)
USA OSHA	OSHA PEL (TWA) [1]	0.1 mg/m³ (fume) 1 mg/m³ (dust and mist)

Sulfur dioxide (7446-09-5)		
USA ACGIH	ACGIH OEL STEL [ppm]	0.25 ppm
USA ACGIH	ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA NIOSH	NIOSH REL (TWA)	5 mg/m³
USA NIOSH	NIOSH REL TWA [ppm]	2 ppm
USA NIOSH	NIOSH REL (STEL)	13 mg/m³
USA NIOSH	NIOSH REL STEL [ppm]	5 ppm
USA IDLH	IDLH [ppm]	100 ppm
USA OSHA	OSHA PEL (TWA) [1]	13 mg/m³
USA OSHA	OSHA PEL (TWA) [2]	5 ppm

Cobalt (7440-48-4)		
USA ACGIH	ACGIH OEL TWA	0.02 mg/m³ (inhalable particulate matter)
USA ACGIH	ACGIH chemical category	Confirmed Animal Carcinogen with Unknown Relevance to Humans,dermal sensitizer
USA ACGIH	BEI (BLV)	15 µg/l Parameter: Cobalt - Medium: urine - Sampling time: end of shift at end of workweek (nonspecific)
USA NIOSH	NIOSH REL (TWA)	0.05 mg/m³ (dust and fume)
USA IDLH	IDLH	20 mg/m³ (dust and fume)
USA OSHA	OSHA PEL (TWA) [1]	0.1 mg/m³ (dust and fume)

Silicon (7440-21-3)		
USA NIOSH	NIOSH REL (TWA)	10 mg/m³ (total dust) 5 mg/m³ (respirable dust)
USA OSHA	OSHA PEL (TWA) [1]	15 mg/m³ (total dust) 5 mg/m³ (respirable fraction)

Tungsten (7440-33-7)		
USA ACGIH	ACGIH OEL TWA	3 mg/m³ (respirable particulate matter)
USA NIOSH	NIOSH REL (TWA)	5 mg/m³
USA NIOSH	NIOSH REL (STEL)	10 mg/m³

Aluminum (7429-90-5)		
USA ACGIH	ACGIH OEL TWA	1 mg/m³ (respirable particulate matter)
USA ACGIH	ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA NIOSH	NIOSH REL (TWA)	10 mg/m³ (total dust) 5 mg/m³ (respirable dust)

USA OSHA	OSHA PEL (TWA) [1]	15 mg/m³ (total dust) 5 mg/m³ (respirable fraction)

Tantalum (7440-25-7)		
USA NIOSH	NIOSH REL (TWA)	5 mg/m³ (dust)
USA NIOSH	NIOSH REL (STEL)	10 mg/m³ (dust)
USA IDLH	IDLH	2500 mg/m³ (dust)
USA OSHA	OSHA PEL (TWA) [1]	5 mg/m³

Selenium (7782-49-2)		
USA ACGIH	ACGIH OEL TWA	0.2 mg/m³
USA NIOSH	NIOSH REL (TWA)	0.2 mg/m³
USA IDLH	IDLH	1 mg/m³

8.2. Exposure Controls

Appropriate Engineering Controls : Suitable eye/body wash equipment should be available in the vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas. Ensure all national/local regulations are observed. Proper grounding procedures to avoid static electricity should be followed. Proper grounding procedures to avoid static electricity should be followed. Gas detectors should be used when toxic gases may be released. 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.

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. When needed, wear protective gloves to protect against thermal and/or mechanical hazards. If material is hot, wear thermally resistant protective gloves.

Eye and Face Protection : Chemical safety goggles.

Skin and Body Protection : Wear suitable protective clothing.

Respiratory Protection : 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.

Thermal Hazard Protection : When working with hot material, use suitable thermally protective clothing.

Other Information : When using, do not eat, drink or smoke.

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 aplicable

pH : No data available

Evaporation Rate : No data available

Melting Point : 1300 °C (2372 °F)

Freezing Point : No data available

Boiling Point : No data available

Flash Point : No data available

Auto-ignition Temperature : No data available

Decomposition Temperature	:	No data available
Flammability (solid, gas)	:	Flammable solid
Vapor Pressure	:	No data available
Relative Vapor Density at 20°C	:	No data available
Relative Density	:	No data available
Specific Gravity	:	7.9 (Water = 1)
Solubility	:	Insoluble in water.
Partition Coefficient: N-Octanol/Water	:	No data available
Viscosity	:	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

Fine particles may be self-heating: may catch fire. Flammable solid. 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.

Stainless Steel and Alloys of Stainless Steel	
ATE (Oral)	245.24 mg/kg body weight
ATE (Dust/Mist)	0.23 mg/l/4h
Iron (7439-89-6)	
LD50 Oral Rat	98.6 g/kg
Chromium (7440-47-3)	
LD50 Oral Rat	> 5000 mg/kg
LC50 Inhalation Rat	> 5.41 mg/l/4h
Nickel (7440-02-0)	
LD50 Oral Rat	> 9000 mg/kg
LC50 Inhalation Rat	> 10.2 mg/l (Exposure time: 1 h)
Manganese (7439-96-5)	
LD50 Oral Rat	> 2000 mg/kg
LC50 Inhalation Rat	> 5.14 mg/l/4h
Molybdenum (7439-98-7)	
LD50 Oral Rat	> 2000 mg/kg
LD50 Dermal Rat	> 2000 mg/kg
LC50 Inhalation Rat	> 3.92 mg/l/4h
Copper (7440-50-8)	
LC50 Inhalation Rat	> 5.11 mg/l/4h
Sulfur dioxide (7446-09-5)	
LC50 Inhalation Rat	965 – 1168 ppm/4h

ATE (Gases)	1,250.00 ppmV/4h
Phosphorus elemental (7723-14-0)	
LD50 Oral Rat	> 15000 mg/kg
LC50 Inhalation Rat	1.5 mg/l/4h (Exposure time: 1 h)
ATE (Oral)	5.00 mg/kg body weight
ATE (Vapors)	1.50 mg/l/4h
ATE (Dust/Mist)	0.05 mg/l/4h
Cobalt (7440-48-4)	
LD50 Oral Rat	550 mg/kg (Species: Sprague Dawley)
LC50 Inhalation Rat	< 0.05 mg/l/4h
ATE (Dust/Mist)	0.01 mg/l/4h
Carbon (7440-44-0)	
LD50 Oral Rat	> 10000 mg/kg
Silicon (7440-21-3)	
LD50 Oral Rat	3160 mg/kg
Tungsten (7440-33-7)	
LD50 Dermal Rat	> 2000 mg/kg
Niobium (7440-03-1)	
LD50 Oral Rat	> 10 g/kg
LD50 Dermal Rat	> 2000 mg/kg
LC50 Inhalation Rat	> 5.45 mg/l/4h
Aluminum (7429-90-5)	
LD50 Oral Rat	> 15900 mg/kg
Tantalum (7440-25-7)	
LD50 Oral Rat	> 2000 mg/kg
LD50 Dermal Rat	> 2000 mg/kg
LC50 Inhalation Rat	> 5.18 mg/l/4h
Selenium (7782-49-2)	
LD50 Oral Rat	6700 mg/kg
ATE (Dust/Mist)	0.50 mg/l/4h

Skin Corrosion/Irritation: Causes skin irritation.

Serious Eye Damage/Irritation: Causes serious eye damage.

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: Suspected of causing genetic defects.

Carcinogenicity: May cause cancer.

Chromium (7440-47-3)	
IARC group	3
Nickel (7440-02-0)	
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.
Sulfur dioxide (7446-09-5)	
IARC group	3
Cobalt (7440-48-4)	
IARC group	2B
National Toxicology Program (NTP) Status	Reasonably anticipated to be Human Carcinogen, Evidence of Carcinogenicity.
OSHA Hazard Communication Carcinogen List	In OSHA Hazard Communication Carcinogen list.
Selenium (7782-49-2)	
IARC group	3

Reproductive Toxicity: May damage fertility.

Specific Target Organ Toxicity (Single Exposure): Not classified

Specific Target Organ Toxicity (Repeated Exposure): Causes damage to organs (lung/respiratory system, central nervous system) 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 fumes and dust. 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: Causes permanent damage to the cornea, iris, or conjunctiva. Risk of thermal burns on contact with molten product.

Symptoms/Injuries After Ingestion: Ingestion may cause adverse effects. Ingestion of the molten product may cause severe thermal burns.

Chronic Symptoms: None expected when handled in massive form. In dust and/or fume form: Causes damage to organs (lung/respiratory system, central nervous system) through prolonged or repeated exposure. May cause cancer. Suspected of causing genetic defects. May damage fertility. May produce an allergic reaction. Inhalation of iron oxide fumes undergoing decomposition may cause irritation and flu-like symptoms, otherwise iron oxide is not hazardous. 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. Nickel: May cause a form of dermatitis known as nickel itch and intestinal irritation, which may cause disorders, convulsions and asphyxia. 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. 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. Molybdenum: Chronic exposure to molybdenum compounds is suspected of causing cancer. Compounds are also known to cause irritation to the skin, eyes, and respiratory tract. 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. 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). Silicon: Can cause chronic bronchitis and narrowing of the airways. Aluminum: Inhalation of finely divided aluminum powder may cause pulmonary fibrosis. Tantalum: Repeated exposure to tantalum alloys may cause fibrosis, chronic rhinitis and "hard metal pneumoconiosis". Overexposure to selenium (selenium poisoning) can cause central nervous system effects, and other intoxication effects. Chronic exposure can lead to anemia, pallor, liver/spleen damage, garlic breath, dermatitis, depression and other effects.

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.

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])
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)
Molybdenum (7439-98-7)	
LC50 Fish 1	800 – 1320 mg/l

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])

Phosphorus elemental (7723-14-0)	
LC50 Fish 1	33.2 mg/l Red Phosphorous (Exposure time: 96 h - Species Danio rerio [static])
EC50 - Crustacea [1]	0.03 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 Fish 2	0.001 – 0.004 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])
EC50 - Crustacea [2]	0.025 – 0.037 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])

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

Selenium (7782-49-2)	
LC50 Fish 1	> 100 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [semi-static])

12.2. Persistence and Degradability

Stainless Steel and Alloys of Stainless Steel	
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.

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)

Phosphorus elemental (7723-14-0)	
BCF Fish 1	(200 dimensionless)

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

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

Stainless Steel and Alloys of Stainless Steel	
SARA Section 311/312 Hazard Classes	Physical hazard - Self-heating Health hazard - Carcinogenicity Health hazard - Specific target organ toxicity (single or repeated exposure) Health hazard - Respiratory or skin sensitization Health hazard - Skin corrosion or Irritation Physical hazard - Flammable (gases, aerosols, liquids, or solids) Health hazard - Germ cell mutagenicity Health hazard - Reproductive toxicity Health hazard - Acute toxicity (any route of exposure) Health hazard - Serious eye damage or eye irritation Physical hazard - Combustible dust

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

Chromium (7440-47-3)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	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
SARA Section 313 - Emission Reporting	1 %

Nickel (7440-02-0)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	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 - Status: Active Subject to reporting requirements of United States SARA Section 313	
SARA Section 313 - Emission Reporting	1 %

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

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

Copper (7440-50-8)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	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
SARA Section 313 - Emission Reporting	1 %

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

Phosphorus elemental (7723-14-0)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Listed on the United States SARA Section 302 Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	1 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	100 lb (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 % (yellow or white)

Cobalt (7440-48-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of 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 - Status: Active

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

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

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

Aluminum (7429-90-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
SARA Section 313 - Emission Reporting	1 % (dust or fume only)

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

Selenium (7782-49-2)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	100 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
SARA Section 313 - Emission Reporting	1 %

15.2. US State Regulations

Chromium (7440-47-3)
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

Nickel (7440-02-0)
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

Manganese (7439-96-5)
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

Molybdenum (7439-98-7)

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

Titanium (7440-32-6)

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

Copper (7440-50-8)

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

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

Phosphorus elemental (7723-14-0)

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

Cobalt (7440-48-4)

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

Silicon (7440-21-3)

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

Tungsten (7440-33-7)

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

Aluminum (7429-90-5)

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

Tantalum (7440-25-7)

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

Selenium (7782-49-2)

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) - Environmental Hazard List

California Proposition 65

WARNING: This product can expose you to Nickel, which is known to the State of California to cause cancer, and Sulfur dioxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Chemical Name (CAS No.)	Carcinogenicity	Developmental Toxicity	Female Reproductive Toxicity	Male Reproductive Toxicity
Nickel (7440-02-0)	X			
Sulfur dioxide (7446-09-5)		X		
Cobalt (7440-48-4)	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
H251	Self-heating; may catch fire
H252	Self-heating in large quantities; may catch fire
H261	In contact with water releases flammable gas
H280	Contains gas under pressure; may explode if heated
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
H330	Fatal if inhaled
H331	Toxic if inhaled
H334	May cause an allergy or asthma symptoms or breathing difficulties if inhaled
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
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)