

# Nickel Alloys

## Safety Data Sheet

According To The Hazardous Products Regulation (February 11, 2015).

Date of Issue: 08/15/2023

Version: 1.0

### SECTION 1: IDENTIFICATION

#### 1.1. Product Identifier

**Product Form:** Mixture

**Product Name:** Nickel Alloys

**Synonyms:** Ni

#### 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 USA

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-CA Classification**

Not classified

#### 2.2. Label Elements

**GHS-CA Labeling**

No labeling applicable according to the Hazardous Products Regulations (HPR) SOR/2015-17.

#### 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. Exposure may aggravate pre-existing eye, skin, or respiratory conditions.

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

No additional information available

### SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1. Substance

Not applicable

#### 3.2. Mixture

Name	Synonyms	Product Identifier	% *	GHS Ingredient Classification
Nickel	Nickel metal / Nickel, elemental / Nickel, metallic / Nickel, metal / C.I. 77775	(CAS-No.) 7440-02-0	30 – 99	Skin Sens. 1, H317 Carc. 2, H351 STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Chronic 3, H412 Comb. Dust
Chromium	Chromium metal / Chromium, elemental / Chromium, metal / Chromium, metallic / Chrome, metal / Chrome	(CAS-No.) 7440-47-3	0.01 – 48	Comb. 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 – 45	Aquatic Acute 1, H400 Aquatic Chronic 3, H412 Comb. Dust
Iron	Iron, elemental / Direct reduced Iron / Iron, reduced / Elemental iron / IRON POWDER / iron	(CAS-No.) 7439-89-6	0.01 – 44	Flam. Sol. 1, H228 Self-heat. 1, H251 Comb. Dust
Molybdenum	Molybdenum, metallic / molybdenum / Molybdenum, metal / Molybdenum, elemental / Molybdenum metal	(CAS-No.) 7439-98-7	0.01 – 16	Comb. Dust

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Cobalt	Cobalt, elemental / Cobalt metal / C.I. 77320 / Cobalt metallic	(CAS-No.) 7440-48-4	0.01 – 13	Flam. Sol. 2, H228 Acute Tox. 4 (Oral), H302 Acute Tox. 1 (Inhalation:dust,mist), H330 Eye Irrit. 2A, H319 Resp. Sens. 1B, H334 Skin Sens. 1, H317 Muta. 2, H341 Carc. 1B, H350 Repr. 1B, H360 Aquatic Chronic 4, H413 Comb. Dust
Niobium	niobium	(CAS-No.) 7440-03-1	0.01 – 5	Comb. Dust Flam. Sol. 1, H228
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 – 5	Flam. Sol. 1, H228 Water-react. 2, H261 Comb. Dust
Manganese	Manganese, elemental / Manganese metal / manganese	(CAS-No.) 7439-96-5	0.01 – 5	Flam. Sol. 2, H228 STOT RE 1, H372 Aquatic Acute 2, H401 Aquatic Chronic 2, H411 Comb. Dust
Tantalum	Tantalum metal / Tantalum, elemental / Tantalum, metal / tantalum	(CAS-No.) 7440-25-7	0.01 – 5	Flam. Sol. 1, H228 Comb. Dust
Titanium	Titanium powder, dry / Titanium powder / Titanium powder, wetted / Titanium sponge powders / titanium	(CAS-No.) 7440-32-6	0.01 – 5	Flam. Sol. 1, H228 Comb. Dust
Tungsten	Tungsten, elemental / Tungsten, metal / Tungsten metal / Tungsten trioxide / tungsten	(CAS-No.) 7440-33-7	0 – 5	Flam. Sol. 1, H228 Self-heat. 2, H252 Comb. Dust
Silicon	Silicon powder / Silicon powder, amorphous / SILICON / silicon	(CAS-No.) 7440-21-3	0.01 – 2	Comb. Dust
Carbon	Carbon, activated / CARBON / Activated carbon / Carbon Black / Graphite / Active carbon	(CAS-No.) 7440-44-0	0.01 – 2	Self-heat. 2, H252 Eye Irrit. 2, H319 STOT SE 3, H335 Comb. Dust
Yttrium	Yttrium, metal / Yttrium, elemental / Yttrium metal	(CAS-No.) 7440-65-5	0 – 1	Not classified
Boron	boron	(CAS-No.) 7440-42-8	0.001 – 0.004	Comb. Dust

Full text of H- and EUH-statements: see section 16

\*Percentages are listed in weight by weight percentage (w/w%) for liquid and solid ingredients. Gas ingredients are listed in volume by volume percentage (v/v%).

## SECTION 4: FIRST AID MEASURES

### 4.1. Description of First-aid Measures

**General:** Never give anything by mouth to an unconscious person. If medical advice is needed, have product container or label at hand. If you feel unwell, seek medical advice (show the label where possible).

**Inhalation:** When symptoms occur: go into open air and ventilate suspected area. Obtain medical attention if breathing difficulty persists.

**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. *In molten form:* Cool skin rapidly with cold water after contact with molten product. Removal of solidified molten material from skin requires medical assistance.

**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.

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**Ingestion:** Rinse mouth. Immediately call a POISON CENTER or doctor/physician. Do NOT induce vomiting.

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

**General:** Risk of thermal burns on contact with molten product. Prolonged contact with large amounts of dust may cause mechanical irritation. This product contains lead and nickel. Exposure to small chips, fine turnings, and dust from processing may cause cancer.

**Inhalation:** During processing, the most significant route of exposure is by the inhalation (breathing) of 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.

**Skin Contact:** Direct contact may cause irritation by mechanical abrasion. Contact with hot, molten metal will cause thermal burns.

**Eye Contact:** During metal processing. Dusts caused from milling and physical alteration will likely cause eye irritation. Fumes from thermal decomposition or molten material will likely be irritating to the eyes. Mechanical damage via flying particles and chipped slag is possible.

**Ingestion:** Ingestion may cause adverse effects.

**Chronic Symptoms:** None expected when handled in massive form. *In dust and/or fume form:* 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. 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. 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. Inhalation of iron oxide fumes undergoing decomposition may cause irritation and flu-like symptoms, otherwise iron oxide is not hazardous. . 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. 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). Aluminum: Inhalation of finely divided aluminum powder may cause pulmonary fibrosis. 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. Tantalum: Repeated exposure to tantalum alloys may cause fibrosis, chronic rhinitis and "hard metal pneumoconiosis". Silicon: Can cause chronic bronchitis and narrowing of the airways.

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

If you feel unwell, seek medical advice (show the label where possible). 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.

**Unsuitable Extinguishing Media:** Do not use water when molten material is involved, as it may react violently or explosively on contact with water. Use of Halons may result in the product of toxic gases.

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

**Fire Hazard:** 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. Not considered flammable but may burn at high temperatures.

**Explosion Hazard:** Product itself is not explosive but if dust is generated, dust clouds suspended in air can be explosive.

**Reactivity:** Stable at ambient temperature and under normal conditions of use.

### 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 breathe fumes from fires or vapours from decomposition. Use water spray or fog for cooling exposed containers.

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**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:** Metallic oxides.

**Other Information:** No additional information available.

### 5.4. Reference to Other Sections

Refer to Section 9 for flammability properties.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1. Personal Precautions, Protective Equipment and Emergency Procedures

**General Measures:** Where possible allow molten material to solidify naturally. Avoid breathing dust, fumes.

#### 6.1.1. For Non-Emergency Personnel

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

**Emergency Procedures:** Avoid creating or spreading dust. Evacuate unnecessary personnel.

#### 6.1.2. For Emergency Personnel

**Protective Equipment:** Equip cleanup crew with proper protection. Wear suitable protective clothing, gloves and eye/face protection.

**Emergency Procedures:** Eliminate ignition sources. Evacuate unnecessary personnel, isolate, and ventilate 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. If metal is in solid form collect for re-melting purposes. Contain solid 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. *In molten form:* Cool molten material to limit spreading. *For dust spills:* Clean up immediately by sweeping or vacuum. Use explosion proof vacuum during cleanup, with appropriate filter. Contact competent authorities after a large spill.

### 6.4. Reference to Other Sections

See Section 8 for Exposure Controls and Personal Protection and Section 13 for Disposal Considerations. 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:** Avoid prolonged contact with eyes, skin and clothing. Avoid breathing dust or fumes.

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**Hygiene Measures:** Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Do not eat, drink or smoke when using this product.

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

**Technical Measures:** 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. Store in a dry, cool place. Keep/Store away from direct sunlight, extremely high or low temperatures and incompatible materials.

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

**Special Rules on Packaging:** Store in a closed container.

### 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), OSHA (PEL), or Canadian provincial governments.

Nickel (7440-02-0)		
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 OSHA	OSHA PEL (TWA) [1]	1 mg/m <sup>3</sup>
USA NIOSH	NIOSH REL (TWA)	0.015 mg/m <sup>3</sup>
USA IDLH	IDLH	10 mg/m <sup>3</sup>
Alberta	OEL TWA	1.5 mg/m <sup>3</sup>
British Columbia	OEL TWA	0.05 mg/m <sup>3</sup>
Manitoba	OEL TWA	1.5 mg/m <sup>3</sup> (inhalable particulate matter)
New Brunswick	OEL TWA	1 mg/m <sup>3</sup>
Newfoundland & Labrador	OEL TWA	1.5 mg/m <sup>3</sup> (inhalable particulate matter)
Nova Scotia	OEL TWA	1.5 mg/m <sup>3</sup> (inhalable particulate matter)
Nunavut	OEL STEL	3 mg/m <sup>3</sup> (inhalable fraction)
Nunavut	OEL TWA	1.5 mg/m <sup>3</sup> (inhalable fraction)
Northwest Territories	OEL STEL	3 mg/m <sup>3</sup> (inhalable fraction)
Northwest Territories	OEL TWA	1.5 mg/m <sup>3</sup> (inhalable fraction)
Ontario	OEL TWA	1 mg/m <sup>3</sup> (inhalable fraction)
Prince Edward Island	OEL TWA	1.5 mg/m <sup>3</sup> (inhalable particulate matter)
Québec	VEMP (OEL TWA)	1.5 mg/m <sup>3</sup> (inhalable dust)
Saskatchewan	OEL STEL	3 mg/m <sup>3</sup> (inhalable fraction)
Saskatchewan	OEL TWA	1.5 mg/m <sup>3</sup> (inhalable fraction)
Yukon	OEL STEL	3 mg/m <sup>3</sup>
Yukon	OEL TWA	1 mg/m <sup>3</sup>
Chromium (7440-47-3)		
USA ACGIH	ACGIH OEL TWA	0.5 mg/m <sup>3</sup> (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 OSHA	OSHA PEL (TWA) [1]	1 mg/m <sup>3</sup>
USA NIOSH	NIOSH REL (TWA)	0.5 mg/m <sup>3</sup>
USA IDLH	IDLH	250 mg/m <sup>3</sup>
Alberta	OEL TWA	0.5 mg/m <sup>3</sup>

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<b>British Columbia</b>	OEL TWA	0.5 mg/m <sup>3</sup> (total)
<b>Manitoba</b>	OEL TWA	0.5 mg/m <sup>3</sup> (inhalable particulate matter)
<b>New Brunswick</b>	OEL TWA	0.5 mg/m <sup>3</sup>
<b>Newfoundland &amp; Labrador</b>	OEL TWA	0.5 mg/m <sup>3</sup> (inhalable particulate matter)
<b>Nova Scotia</b>	OEL TWA	0.5 mg/m <sup>3</sup> (inhalable particulate matter)
<b>Nunavut</b>	OEL STEL	1.5 mg/m <sup>3</sup> (metal)
<b>Nunavut</b>	OEL TWA	0.5 mg/m <sup>3</sup> (metal)
<b>Northwest Territories</b>	OEL STEL	1.5 mg/m <sup>3</sup> (metal)
<b>Northwest Territories</b>	OEL TWA	0.5 mg/m <sup>3</sup> (metal)
<b>Ontario</b>	OEL TWA	0.5 mg/m <sup>3</sup>
<b>Prince Edward Island</b>	OEL TWA	0.5 mg/m <sup>3</sup> (inhalable particulate matter)
<b>Québec</b>	VEMP (OEL TWA)	0.5 mg/m <sup>3</sup>
<b>Saskatchewan</b>	OEL STEL	1.5 mg/m <sup>3</sup>
<b>Saskatchewan</b>	OEL TWA	0.5 mg/m <sup>3</sup>
<b>Yukon</b>	OEL STEL	3 mg/m <sup>3</sup>
<b>Yukon</b>	OEL TWA	0.1 mg/m <sup>3</sup>
<b>Copper (7440-50-8)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	0.2 mg/m <sup>3</sup> (fume)
<b>USA OSHA</b>	OSHA PEL (TWA) [1]	0.1 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dust and mist)
<b>USA NIOSH</b>	NIOSH REL (TWA)	1 mg/m <sup>3</sup> (dust and mist) 0.1 mg/m <sup>3</sup> (fume)
<b>USA IDLH</b>	IDLH	100 mg/m <sup>3</sup> (dust, fume and mist)
<b>Alberta</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dust and mist)
<b>British Columbia</b>	OEL TWA	1 mg/m <sup>3</sup> (dust and mist) 0.2 mg/m <sup>3</sup> (fume)
<b>Manitoba</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume)
<b>New Brunswick</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dust and mist)
<b>Newfoundland &amp; Labrador</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume)
<b>Nova Scotia</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume)
<b>Nunavut</b>	OEL STEL	3 mg/m <sup>3</sup> (dust and mist) 0.6 mg/m <sup>3</sup> (fume)
<b>Nunavut</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dust and mist)
<b>Northwest Territories</b>	OEL STEL	3 mg/m <sup>3</sup> (dust and mist) 0.6 mg/m <sup>3</sup> (fume)
<b>Northwest Territories</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dust and mist)
<b>Ontario</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dust and mist)
<b>Prince Edward Island</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume)
<b>Québec</b>	VEMP (OEL TWA)	0.2 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dust and mist)
<b>Saskatchewan</b>	OEL STEL	0.6 mg/m <sup>3</sup> (fume) 3 mg/m <sup>3</sup> (dust and mist)
<b>Saskatchewan</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dust and mist)
<b>Yukon</b>	OEL STEL	0.2 mg/m <sup>3</sup> (fume) 2 mg/m <sup>3</sup> (dust and mist)
<b>Yukon</b>	OEL TWA	0.2 mg/m <sup>3</sup> (fume)

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		1 mg/m <sup>3</sup> (dust and mist)
<b>Molybdenum (7439-98-7)</b>		
	Internal OEL Value(s)	5 mg/m <sup>3</sup> (Molybdenum (as Mo), Soluble Compounds)
<b>USA ACGIH</b>	ACGIH OEL TWA	10 mg/m <sup>3</sup> (inhalable particulate matter) 3 mg/m <sup>3</sup> (respirable particulate matter)
<b>USA OSHA</b>	OSHA PEL (TWA) [1]	5 mg/m <sup>3</sup> (Molybdenum (as Mo), Soluble Compounds) 15 mg/m <sup>3</sup> (Molybdenum (as Mo), Insoluble Compounds (Total dust))
<b>USA NIOSH</b>	NIOSH REL (TWA)	5 mg/m <sup>3</sup> (Molybdenum (as Mo), Soluble Compounds)
<b>USA IDLH</b>	IDLH	5000 mg/m <sup>3</sup>
<b>Alberta</b>	OEL TWA	10 mg/m <sup>3</sup> (total) 3 mg/m <sup>3</sup> (respirable)
<b>British Columbia</b>	OEL TWA	3 mg/m <sup>3</sup> (respirable) 10 mg/m <sup>3</sup> (inhalable)
<b>Manitoba</b>	OEL TWA	10 mg/m <sup>3</sup> (inhalable particulate matter) 3 mg/m <sup>3</sup> (respirable particulate matter)
<b>Newfoundland &amp; Labrador</b>	OEL TWA	10 mg/m <sup>3</sup> (inhalable particulate matter) 3 mg/m <sup>3</sup> (respirable particulate matter)
<b>Nova Scotia</b>	OEL TWA	10 mg/m <sup>3</sup> (inhalable particulate matter) 3 mg/m <sup>3</sup> (respirable particulate matter)
<b>Nunavut</b>	OEL STEL	20 mg/m <sup>3</sup> (metal-inhalable fraction) 6 mg/m <sup>3</sup> (metal-respirable fraction)
<b>Nunavut</b>	OEL TWA	10 mg/m <sup>3</sup> (metal-inhalable fraction) 3 mg/m <sup>3</sup> (metal-respirable fraction)
<b>Northwest Territories</b>	OEL STEL	20 mg/m <sup>3</sup> (metal-inhalable fraction) 6 mg/m <sup>3</sup> (metal-respirable fraction)
<b>Northwest Territories</b>	OEL TWA	10 mg/m <sup>3</sup> (metal-inhalable fraction) 3 mg/m <sup>3</sup> (metal-respirable fraction)
<b>Ontario</b>	OEL TWA	10 mg/m <sup>3</sup> (metal-inhalable particulate matter) 3 mg/m <sup>3</sup> (metal-respirable particulate matter)
<b>Prince Edward Island</b>	OEL TWA	10 mg/m <sup>3</sup> (inhalable particulate matter) 3 mg/m <sup>3</sup> (respirable particulate matter)
<b>Québec</b>	VEMP (OEL TWA)	10 mg/m <sup>3</sup> (inhalable dust) 3 mg/m <sup>3</sup> (respirable dust)
<b>Saskatchewan</b>	OEL STEL	20 mg/m <sup>3</sup> (inhalable fraction) 6 mg/m <sup>3</sup> (respirable fraction)
<b>Saskatchewan</b>	OEL TWA	10 mg/m <sup>3</sup> (inhalable fraction) 3 mg/m <sup>3</sup> (respirable fraction)
<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 OSHA</b>	OSHA PEL (TWA) [1]	0.1 mg/m <sup>3</sup> (dust and fume)
<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>Alberta</b>	OEL TWA	0.02 mg/m <sup>3</sup>
<b>British Columbia</b>	OEL TWA	0.02 mg/m <sup>3</sup> (total)
<b>Manitoba</b>	OEL TWA	0.02 mg/m <sup>3</sup> (inhalable particulate matter)
<b>New Brunswick</b>	OEL TWA	0.02 mg/m <sup>3</sup>
<b>Newfoundland &amp; Labrador</b>	OEL TWA	0.02 mg/m <sup>3</sup> (inhalable particulate matter)

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<b>Nova Scotia</b>	OEL TWA	0.02 mg/m <sup>3</sup> (inhalable particulate matter)
<b>Nunavut</b>	OEL STEL	0.06 mg/m <sup>3</sup>
<b>Nunavut</b>	OEL TWA	0.02 mg/m <sup>3</sup>
<b>Northwest Territories</b>	OEL STEL	0.06 mg/m <sup>3</sup>
<b>Northwest Territories</b>	OEL TWA	0.02 mg/m <sup>3</sup>
<b>Ontario</b>	OEL TWA	0.02 mg/m <sup>3</sup>
<b>Prince Edward Island</b>	OEL TWA	0.02 mg/m <sup>3</sup> (inhalable particulate matter)
<b>Québec</b>	VEMP (OEL TWA)	0.02 mg/m <sup>3</sup>
<b>Saskatchewan</b>	OEL STEL	0.06 mg/m <sup>3</sup>
<b>Saskatchewan</b>	OEL TWA	0.02 mg/m <sup>3</sup>
<b>Yukon</b>	OEL STEL	0.15 mg/m <sup>3</sup> (dust and fume)
<b>Yukon</b>	OEL TWA	0.05 mg/m <sup>3</sup> (dust and fume)
<b>Aluminum (7429-90-5)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	1 mg/m <sup>3</sup> (respirable particulate matter)
<b>USA ACGIH</b>	ACGIH chemical category	Not Classifiable as a Human Carcinogen
<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>USA NIOSH</b>	NIOSH REL (TWA)	10 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable dust)
<b>Alberta</b>	OEL TWA	10 mg/m <sup>3</sup> (dust)
<b>British Columbia</b>	OEL TWA	1 mg/m <sup>3</sup> (respirable)
<b>Manitoba</b>	OEL TWA	1 mg/m <sup>3</sup> (respirable particulate matter)
<b>New Brunswick</b>	OEL TWA	10 mg/m <sup>3</sup> (metal dust)
<b>Newfoundland &amp; Labrador</b>	OEL TWA	1 mg/m <sup>3</sup> (respirable particulate matter)
<b>Nova Scotia</b>	OEL TWA	1 mg/m <sup>3</sup> (respirable particulate matter)
<b>Nunavut</b>	OEL STEL	20 mg/m <sup>3</sup> (metal-dust)
<b>Nunavut</b>	OEL TWA	10 mg/m <sup>3</sup> (metal-dust)
<b>Northwest Territories</b>	OEL STEL	20 mg/m <sup>3</sup> (metal-dust)
<b>Northwest Territories</b>	OEL TWA	10 mg/m <sup>3</sup> (metal-dust)
<b>Ontario</b>	OEL TWA	1 mg/m <sup>3</sup> (respirable particulate matter)
<b>Prince Edward Island</b>	OEL TWA	1 mg/m <sup>3</sup> (respirable particulate matter)
<b>Québec</b>	VEMP (OEL TWA)	10 mg/m <sup>3</sup>
<b>Saskatchewan</b>	OEL STEL	20 mg/m <sup>3</sup> (dust)
<b>Saskatchewan</b>	OEL TWA	10 mg/m <sup>3</sup> (dust)
<b>Manganese (7439-96-5)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	0.02 mg/m <sup>3</sup> (respirable particulate matter) 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 OSHA</b>	OSHA PEL (Ceiling)	5 mg/m <sup>3</sup> (fume)
<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>Alberta</b>	OEL TWA	0.2 mg/m <sup>3</sup>
<b>British Columbia</b>	OEL TWA	0.2 mg/m <sup>3</sup> (total) 0.02 mg/m <sup>3</sup> (respirable)
<b>Manitoba</b>	OEL TWA	0.02 mg/m <sup>3</sup> (respirable particulate matter) 0.1 mg/m <sup>3</sup> (inhalable particulate matter)
<b>New Brunswick</b>	OEL TWA	0.2 mg/m <sup>3</sup>
<b>Newfoundland &amp; Labrador</b>	OEL TWA	0.02 mg/m <sup>3</sup> (respirable particulate matter) 0.1 mg/m <sup>3</sup> (inhalable particulate matter)
<b>Nova Scotia</b>	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>Nunavut</b>	OEL STEL	0.6 mg/m <sup>3</sup>
<b>Nunavut</b>	OEL TWA	0.2 mg/m <sup>3</sup>
<b>Northwest Territories</b>	OEL STEL	0.6 mg/m <sup>3</sup>
<b>Northwest Territories</b>	OEL TWA	0.2 mg/m <sup>3</sup>
<b>Ontario</b>	OEL TWA	0.2 mg/m <sup>3</sup>
<b>Prince Edward Island</b>	OEL TWA	0.02 mg/m <sup>3</sup> (respirable particulate matter) 0.1 mg/m <sup>3</sup> (inhalable particulate matter)
<b>Québec</b>	VEMP (OEL TWA)	0.2 mg/m <sup>3</sup> (total dust and fume)
<b>Saskatchewan</b>	OEL STEL	0.6 mg/m <sup>3</sup>
<b>Saskatchewan</b>	OEL TWA	0.2 mg/m <sup>3</sup>
<b>Yukon</b>	OEL C	5 mg/m <sup>3</sup>
<b>Tantalum (7440-25-7)</b>		
<b>USA OSHA</b>	OSHA PEL (TWA) [1]	5 mg/m <sup>3</sup>
<b>USA NIOSH</b>	NIOSH REL (TWA)	5 mg/m <sup>3</sup> (dust)
<b>USA NIOSH</b>	NIOSH REL (STEL)	10 mg/m <sup>3</sup> (dust)
<b>USA IDLH</b>	IDLH	2500 mg/m <sup>3</sup> (dust)
<b>Alberta</b>	OEL TWA	5 mg/m <sup>3</sup> (dust)
<b>British Columbia</b>	OEL TWA	5 mg/m <sup>3</sup>
<b>New Brunswick</b>	OEL TWA	5 mg/m <sup>3</sup> (dust)
<b>Nunavut</b>	OEL STEL	10 mg/m <sup>3</sup> (metal)
<b>Nunavut</b>	OEL TWA	5 mg/m <sup>3</sup> (metal)
<b>Northwest Territories</b>	OEL STEL	10 mg/m <sup>3</sup> (metal)
<b>Northwest Territories</b>	OEL TWA	5 mg/m <sup>3</sup> (metal)
<b>Québec</b>	VEMP (OEL TWA)	5 mg/m <sup>3</sup> (dust)
<b>Saskatchewan</b>	OEL STEL	10 mg/m <sup>3</sup>
<b>Saskatchewan</b>	OEL TWA	5 mg/m <sup>3</sup>
<b>Yukon</b>	OEL STEL	10 mg/m <sup>3</sup>
<b>Yukon</b>	OEL TWA	5 mg/m <sup>3</sup>
<b>Tungsten (7440-33-7)</b>		
<b>USA ACGIH</b>	ACGIH OEL TWA	3 mg/m <sup>3</sup> (respirable particulate matter)
<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>Alberta</b>	OEL STEL	10 mg/m <sup>3</sup>
<b>Alberta</b>	OEL TWA	5 mg/m <sup>3</sup>
<b>British Columbia</b>	OEL STEL	10 mg/m <sup>3</sup>
<b>British Columbia</b>	OEL TWA	5 mg/m <sup>3</sup>
<b>Manitoba</b>	OEL TWA	3 mg/m <sup>3</sup> (respirable particulate matter)
<b>Newfoundland &amp; Labrador</b>	OEL TWA	3 mg/m <sup>3</sup> (respirable particulate matter)
<b>Nova Scotia</b>	OEL TWA	3 mg/m <sup>3</sup> (respirable particulate matter)
<b>Nunavut</b>	OEL STEL	10 mg/m <sup>3</sup>
<b>Nunavut</b>	OEL TWA	5 mg/m <sup>3</sup>
<b>Northwest Territories</b>	OEL STEL	10 mg/m <sup>3</sup>
<b>Northwest Territories</b>	OEL TWA	5 mg/m <sup>3</sup>
<b>Ontario</b>	OEL TWA	3 mg/m <sup>3</sup> (in the absence of Cobalt-respirable particulate matter)
<b>Prince Edward Island</b>	OEL TWA	3 mg/m <sup>3</sup> (respirable particulate matter)
<b>Saskatchewan</b>	OEL STEL	10 mg/m <sup>3</sup>
<b>Saskatchewan</b>	OEL TWA	5 mg/m <sup>3</sup>
<b>Yukon</b>	OEL STEL	10 mg/m <sup>3</sup>
<b>Yukon</b>	OEL TWA	5 mg/m <sup>3</sup>

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Silicon (7440-21-3)		
USA OSHA	OSHA PEL (TWA) [1]	15 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable fraction)
USA NIOSH	NIOSH REL (TWA)	10 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable dust)
British Columbia	OEL TWA	10 mg/m <sup>3</sup> (total dust) 3 mg/m <sup>3</sup> (respirable fraction)
New Brunswick	OEL TWA	10 mg/m <sup>3</sup>
Nunavut	OEL STEL	20 mg/m <sup>3</sup>
Nunavut	OEL TWA	10 mg/m <sup>3</sup>
Northwest Territories	OEL STEL	20 mg/m <sup>3</sup>
Northwest Territories	OEL TWA	10 mg/m <sup>3</sup>
Québec	VEMP (OEL TWA)	10 mg/m <sup>3</sup> (containing no Asbestos and <1% Crystalline silica-total dust)
Saskatchewan	OEL STEL	20 mg/m <sup>3</sup>
Saskatchewan	OEL TWA	10 mg/m <sup>3</sup>
Yukon	OEL STEL	20 mg/m <sup>3</sup>
Yukon	OEL TWA	30 mppcf 10 mg/m <sup>3</sup>
Yttrium (7440-65-5)		
USA ACGIH	ACGIH OEL TWA	1 mg/m <sup>3</sup>
USA OSHA	OSHA PEL (TWA) [1]	1 mg/m <sup>3</sup>
USA NIOSH	NIOSH REL (TWA)	1 mg/m <sup>3</sup>
USA IDLH	IDLH	500 mg/m <sup>3</sup>
Alberta	OEL TWA	1 mg/m <sup>3</sup>
British Columbia	OEL TWA	1 mg/m <sup>3</sup>
Manitoba	OEL TWA	1 mg/m <sup>3</sup>
New Brunswick	OEL TWA	1 mg/m <sup>3</sup>
Newfoundland & Labrador	OEL TWA	1 mg/m <sup>3</sup>
Nova Scotia	OEL TWA	1 mg/m <sup>3</sup>
Nunavut	OEL STEL	3 mg/m <sup>3</sup>
Nunavut	OEL TWA	1 mg/m <sup>3</sup>
Northwest Territories	OEL STEL	3 mg/m <sup>3</sup>
Northwest Territories	OEL TWA	1 mg/m <sup>3</sup>
Ontario	OEL TWA	1 mg/m <sup>3</sup>
Prince Edward Island	OEL TWA	1 mg/m <sup>3</sup>
Québec	VEMP (OEL TWA)	1 mg/m <sup>3</sup>
Saskatchewan	OEL STEL	3 mg/m <sup>3</sup>
Saskatchewan	OEL TWA	1 mg/m <sup>3</sup>
Yukon	OEL STEL	3 mg/m <sup>3</sup>
Yukon	OEL TWA	1 mg/m <sup>3</sup>

## 8.2. Exposure Controls

**Appropriate Engineering Controls:** Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas. Avoid dust production. Avoid creating or spreading dust. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment). Ensure all national/local regulations are observed.

**Personal Protective Equipment:** Safety glasses. Gloves. Insufficient ventilation: wear respiratory protection. Protective clothing. Protective goggles.



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

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

**Eye and Face Protection:** Chemical goggles or face shield.

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

**Environmental Exposure Controls:** Do not allow the product to be released into the environment.

**Consumer Exposure Controls:** Not applicable

**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	: Silver to Grayish Black
Odor	: Odorless
Odor Threshold	: Not applicable
pH	: No data available
Evaporation Rate	: No data available
Melting Point	: 1260 °C (2300 °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)	: No data available
Lower Flammable Limit	: No data available
Upper Flammable Limit	: No data available
Vapor Pressure	: No data available
Relative Vapor Density at 20°C	: No data available
Relative Density	: No data available
Specific Gravity	: 7.6 - 7.8 (Water = 1)
Solubility	: Insoluble in water.
Partition Coefficient: N-Octanol/Water	: No data available
Viscosity	: No data available

## SECTION 10: STABILITY AND REACTIVITY

### 10.1. Reactivity:

Stable at ambient temperature and under normal conditions of use.

### 10.2. Chemical Stability:

Stable under recommended handling and storage conditions (see section 7).

### 10.3. Possibility of Hazardous Reactions:

Hazardous polymerization will not occur.

### 10.4. Conditions to Avoid:

Incompatible materials. Direct sunlight, extremely high or low temperatures, and incompatible materials.

### 10.5. Incompatible Materials:

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

### 10.6. Hazardous Decomposition Products:

None expected under normal conditions of use.

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## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1. Information on Toxicological Effects - Product

**Acute Toxicity (Oral):** Not classified.

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

**Acute Toxicity (Inhalation):** Not classified.

**LD50 and LC50 Data:**

No additional information available

**Skin Corrosion/Irritation:** Not classified

**Eye Damage/Irritation:** Not classified.

**Respiratory or Skin Sensitization:** Not classified. Not classified.

**Germ Cell Mutagenicity:** Not classified.

**Carcinogenicity:** Not classified.

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

**Reproductive Toxicity:** Not classified.

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

**Aspiration Hazard:** Not classified

**Symptoms/Injuries After Inhalation:** During processing, the most significant route of exposure is by the inhalation (breathing) of 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:** Direct contact may cause irritation by mechanical abrasion. Contact with hot, molten metal will cause thermal burns.

**Symptoms/Injuries After Eye Contact:** *During metal processing:* Dusts caused from milling and physical alteration will likely cause eye irritation. Fumes from thermal decomposition or molten material will likely be irritating to the eyes. Mechanical damage via flying particles and chipped slag is possible.

**Symptoms/Injuries After Ingestion:** Ingestion may cause adverse effects.

**Chronic Symptoms:** None expected when handled in massive form. *In dust and/or fume form:* 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. 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. 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. Inhalation of iron oxide fumes undergoing decomposition may cause irritation and flu-like symptoms, otherwise iron oxide is not hazardous. . 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. 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). Aluminum: Inhalation of finely divided aluminum powder may cause pulmonary fibrosis. 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. Tantalum: Repeated exposure to tantalum alloys may cause fibrosis, chronic rhinitis and "hard metal pneumoconiosis". Silicon: Can cause chronic bronchitis and narrowing of the airways..

### 11.2. Information on Toxicological Effects - Ingredient(s)

**LD50 and LC50 Data:**

Nickel (7440-02-0)	
LD50 Oral Rat	> 9000 mg/kg
LC50 Inhalation Rat	> 10.2 mg/l (Exposure time: 1 h)
Chromium (7440-47-3)	
LD50 Oral Rat	> 5000 mg/kg
LC50 Inhalation Rat	> 5.41 mg/l/4h

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<b>Copper (7440-50-8)</b>	
LC50 Inhalation Rat	> 5.11 mg/l/4h
<b>Iron (7439-89-6)</b>	
LD50 Oral Rat	98.6 g/kg
<b>Molybdenum (7439-98-7)</b>	
LD50 Oral Rat	> 2000 mg/kg
LD50 Dermal Rat	> 2000 mg/kg
LC50 Inhalation Rat	> 3.92 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
ATE CA (dust,mist)	0.01 mg/l/4h
<b>Niobium (7440-03-1)</b>	
LD50 Oral Rat	> 10 g/kg
LD50 Dermal Rat	> 2000 mg/kg
LC50 Inhalation Rat	> 5.45 mg/l/4h
<b>Aluminum (7429-90-5)</b>	
LD50 Oral Rat	> 15900 mg/kg
<b>Manganese (7439-96-5)</b>	
LD50 Oral Rat	> 2000 mg/kg
LC50 Inhalation Rat	> 5.14 mg/l/4h
<b>Tantalum (7440-25-7)</b>	
LD50 Oral Rat	> 2000 mg/kg
LD50 Dermal Rat	> 2000 mg/kg
LC50 Inhalation Rat	> 5.18 mg/l/4h
<b>Tungsten (7440-33-7)</b>	
LD50 Dermal Rat	> 2000 mg/kg
<b>Silicon (7440-21-3)</b>	
LD50 Oral Rat	3160 mg/kg
<b>Carbon (7440-44-0)</b>	
LD50 Oral Rat	> 10000 mg/kg
<b>Yttrium (7440-65-5)</b>	
ATE CA (oral)	500.00 mg/kg body weight
ATE CA (Dermal)	1,100.00 mg/kg body weight
ATE CA (dust,mist)	1.50 mg/l/4h
<b>Boron (7440-42-8)</b>	
LD50 Oral Rat	> 2000 mg/kg
LC50 Inhalation Rat	> 5.08 mg/l/4h
<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.
<b>Chromium (7440-47-3)</b>	
IARC Group	3
<b>Cobalt (7440-48-4)</b>	
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.

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### SECTION 12: ECOLOGICAL INFORMATION

#### 12.1. Toxicity

Ecology - General: Not classified.

Nickel (7440-02-0)	
LC50 Fish 1	100 mg/l (Exposure time: 96 h - Species: Brachydanio rerio)
EC50 - Crustacea [1]	100 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 Fish 2	15.3 mg/l
EC50 - Crustacea [2]	1 mg/l (Exposure time: 48 h - Species: Daphnia magna [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])
LC50 Fish 2	< 0.3 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static])
Vanadium oxide (V2O5) (1314-62-1)	
LC50 Fish 1	4.46 mg/l
NOEC chronic fish	0.073 mg/l
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])

#### 12.2. Persistence and Degradability

Carbon Steel Alloy Steel	
Persistence and Degradability	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

Carbon Steel Alloy Steel	
Bioaccumulative Potential	Bioaccumulation of metals cannot be excluded.
Sulfur dioxide (7446-09-5)	
BCF Fish 1	(no bioaccumulation expected)
Phosphorus elemental (7723-14-0)	
BCF Fish 1	(200 dimensionless)

#### 12.4. Mobility in Soil

Carbon Steel Alloy Steel	
Ecology - Soil	Adsorption to solid soil phase is not expected.

#### 12.5. Other Adverse Effects

Other Adverse Effects: None known.

Other Information: Avoid release to the environment.

### SECTION 13: DISPOSAL CONSIDERATIONS

#### 13.1. Waste treatment methods

**Waste Treatment Methods:** Dispose of waste material in accordance with all local, regional, national, provincial, territorial and international regulations.

**Sewage Disposal Recommendations:** Do not dispose of waste into sewer. Do not empty into drains.

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Safety Data Sheet

According To The Hazardous Products Regulation (February 11, 2015).

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

**Additional Information:** Recycle the material as far as possible.

**Ecology - Waste Materials:** Avoid release to the environment.

## 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

### 14.4. In Accordance with TDG

Not regulated for transport

## SECTION 15: REGULATORY INFORMATION

### 15.1. Canadian Regulations

<b>Nickel (7440-02-0)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Chromium (7440-47-3)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Copper (7440-50-8)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Iron (7439-89-6)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Molybdenum (7439-98-7)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Cobalt (7440-48-4)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Niobium (7440-03-1)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Aluminum (7429-90-5)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Manganese (7439-96-5)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Tantalum (7440-25-7)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Titanium (7440-32-6)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Tungsten (7440-33-7)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Silicon (7440-21-3)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Carbon (7440-44-0)</b>
Listed on the Canadian DSL (Domestic Substances List)
<b>Yttrium (7440-65-5)</b>
Listed on the Canadian DSL (Domestic Substances List)

# Nickel Alloys

Safety Data Sheet

According To The Hazardous Products Regulation (February 11, 2015).

## Boron (7440-42-8)

Listed on the Canadian DSL (Domestic Substances List)

### 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 Canada's Hazardous Products Regulations (HPR) SOR/2015-17.

#### GHS Full Text Phrases:

H228	Flammable solid
H251	Self-heating; may catch fire
H252	Self-heating in large quantities; may catch fire
H261	In contact with water releases flammable gas
H302	Harmful 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
H335	May cause respiratory irritation
H341	Suspected of causing genetic defects
H350	May cause cancer
H351	Suspected of causing cancer
H360	May damage fertility or the unborn child
H372	Causes damage to organs through prolonged or repeated exposure
H400	Very toxic to aquatic life
H401	Toxic to aquatic life
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.*

CA GHS SDS