

SECTION 1: PRODUCT IDENTIFICATION

Product Identifier: Stainless Steel (Bar, Rod, Wire, Wire Rod, Tube, Pipe, Rebar, Billet, Coil, Plate)

Other Means of Identification: Tri-Cut® Stainless Steel, Tri-Brite® Stainless Steel, Stainless Steel

Recommended Use of the Chemical and Restrictions of Use: Solid Stainless steel products, various forms and uses, for the manufacture of articles. Use in the manner in which the product is intended and appropriate.

MANUFACTURER:

Tri Star Metals, LLC
375 Village Drive
Carol Stream, IL 60188



CONTACT/TELEPHONE NUMBER:

800-541-2294 (non-emergency)
630-614-6918 (emergency contact – 6:00 a.m. to 10:00 p.m. Central Time)

SECTION 2: HAZARDS IDENTIFICATION

Hazard Classification: Stainless steel product as described may be used as supplied, but is general provided with the understanding that additional processing will be imparted on the product. Certain processes such as cutting, milling, grinding, melting or welding could result in some hazardous materials being emitted. The following classification information is for the hazardous elements which may be emitted during these processes.

Signal Word, Hazard Statements & Symbols: DANGER

SYMBOLS	HAZARD	GHS CLASSIFICATION	HAZARD STATEMENTS
	Carcinogenicity	Category – 1B	May cause cancer
	Respiratory Sensitizer	Category – 1	May cause allergy or asthma symptoms or breathing difficulties if inhaled
	STOT (repeated exposure)	Category – 1	Causes damage to organs through prolonged or repeated exposure.
	Toxic to Reproduction	Category – 1B	May damage fertility or the unborn child if dust/fume/gas/vapor/spray are breathed or ingested.
	Acute Oral Toxicity	Category – 4	Harmful if swallowed
	Skin Sensitizer	Category – 1	May cause allergic skin reaction
	STOT (single exposure)	Category – 3	May cause respiratory irritation
N/A	Eye Irritation	Category – 2B	Causes eye irritations.

PRECAUTIONARY STATEMENTS:

PREVENTION	FIRST AID RESPONSE
<p>Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.</p> <p>Do not breathe dust/fume/gas/mist/vapors/spray associated with processing stainless steel such as cutting, milling, grinding, melting, welding, ... etc.</p> <p>Use only outdoors or in a well-ventilated area. In case of inadequate ventilation, wear respiratory protection.</p> <p>Wear protective gloves / protective clothing / eye protection / face protection.</p> <p>Wash areas of body exposed to dust/fumes/gas/vapor/spray thoroughly after handling.</p>	<p>Eyes: If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.</p> <p>Skin: If on skin: Wash with plenty of water and mild soap. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse.</p> <p>Inhalation: If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a poison center or doctor.</p> <p style="text-align: right;"><i>Continued next page</i></p>

PREVENTION	FIRST AID RESPONSE
Do not eat, drink or smoke when handling this product. Obtain special instructions before use. Contaminated work clothing must not be allowed out of the workplace.	Ingestion: If swallowed: Call a poison center/doctor if you feel unwell. Dust may irritate mouth and gastrointestinal tract.
STORAGE	DISPOSAL
Store away from acids and incompatible materials. Store in accordance with federal/provincial/state or local regulations.	Dispose of in accordance with applicable federal/provincial/state or local regulations.

Hazards Not Otherwise Classified: N/A

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Substance	CAS #	Weight %
Iron	7439-89-6	25-90
Nickel	7440-02-0	0-30
Chromium	7440-47-3	0-30
Manganese	7439-96-5	0-20
Cobalt	7440-48-4	0-12
Molybdenum	7439-98-7	0-10
Vanadium	7440-62-2	0-10
Copper	7440-50-8	0-5
Tungsten	7440-33-7	0-5
Silicon	7440-21-3	0-4
Titanium	7440-32-6	0-4
Niobium	7440-03-1	0-4
Aluminum	7429-90-5	0-1
Phosphorus	7723-14-0	0-1
Sulfur	7704-34-9	0-1
Selenium	7782-49-2	0-1

SECTION 4: FIRST AID MEASURES

Eye Contact

Dust, fume, gas, mist, vapors, spray...etc. associated with downstream processing stainless steel; if in eyes: Rinse cautiously with water for several minutes. Carefully remove contact lenses if present. Continue rinsing. If eye irritation persists: Seek medical advice/attention.

Inhalation

If symptoms develop following exposure to fumes or dusts released from the processing of the product (e.g. machining, grinding, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting), immediately remove person from exposure to fresh air. Seek medical attention if symptoms persist.

Skin

Dust, fume, gas, mist, vapors, spray...etc. associated with downstream processing stainless steel; Wash with plenty of water. If irritation or rash occurs: Seek medical attention. Take off and wash contaminated clothing before reuse.

Ingestion

Dust, fume, gas, mist, vapors, spray...etc. associated with downstream processing stainless steel, if swallowed: Call a poison center or doctor/physician if you feel unwell. Rinse mouth.

Most Important Symptoms and Effects, both Acute and Delayed

Eye: Dust, fume, gas, mist, vapors, spray...etc. associated with downstream processing stainless steel may cause irritation to the eyes.

Inhalation: Dust, fume, gas, mist, vapors, spray...etc. associated with downstream processing stainless steel may cause irritations, difficulty in breathing, coughing or wheezing.

Skin: Dust, fume, gas, mist, vapors, spray...etc. associated with downstream processing stainless steel may cause allergic skin reactions.

Ingestion: Dust, fume, gas, mist, vapors, spray...etc. associated with downstream processing stainless steel may irritate the mouth or gastrointestinal tract.



Further processing i.e. dust or fumes generated by machining, grinding, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding, thermal cutting, etc... of the product may produce airborne contaminants (see Sections 8 and 11) that are hazardous.

Indication of Immediate Medical Attention and Special Treatment Needs

Not applicable

SECTION 5: FIRE FIGHTING MEASURES

Suitable Extinguishing Media

Non-flammable. Will not support combustion. Not applicable for solid product. Use suitable extinguishing methods for surrounding fire. Do not use water on molten metal.

Special Hazards Arising from the Substance

Not applicable for solid product.

Hazardous Combustion Products

Not applicable for solid formed alloy. Toxic metal and metallic oxide fumes may be evolved from fires involving finely divided alloy.

Special Protective Actions for Fire Fighter

Self-contained NIOSH approved respiratory protection and full protective clothing should be worn when fumes and/or smoke from fire are present. Heat and flames cause emittance of acrid smoke and fumes. Do not release runoff from fire control methods to sewers or waterways. Firefighters should wear full face-piece self-contained breathing apparatus and chemical protective clothing with thermal protection.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

No special measures required

Environmental Precautions

Not applicable in solid state.

Methods and Material for Containment and Clean-up

Not applicable in solid state. For spills involving fine dusts, remove by vacuuming or wet sweeping methods to prevent spreading of dust. Avoid inhalation of dusts.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling

No special requirements in solid state. Operations with the potential for generating high concentrations of airborne particles should be evaluated and controlled as necessary. Practice good housekeeping. Avoid breathing metal fumes and/or dust.

Conditions for Safe Storage, Including Any Incompatibilities

Store away from acids and incompatible materials.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Occupational Exposure Limits

There are no exposure limits for stainless steel. The exposure limit for iron containing fumes has been established at 5 mg/m³ with ACGIH's TWA. The individual complex compounds with the fume may have lower exposure limits than the general fume. Dust or fumes generated by machining, grinding, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting of the product may produce airborne contaminants with the following Occupational Exposure Limits (OELs):

Ingredient	CAS #	OSHA PEL (mg/m³)	ACGIH TLV® (mg/m³)
Aluminum Metal & insoluble compounds	7429-90-5	15 (TWA) 5 (TWA)(R)	1 (TWA)(R)
Chromium Metal Hexavalent, insoluble*	7440-47-3	1 (TWA) 0.005 (TWA)	0.5 (TWA) 0.01 (TWA)
Cobalt	7440-48-4	0.1 (TWA)	0.02 (TWA)
Copper Dust Fume	7440-50-8	1 (TWA) 0.1 (TWA)	1 (TWA) 0.2 (TWA)
Iron	7439-89-6	10 (TWA) (iron oxide fume)	5 (TWA)(R)
Manganese	7439-96-5	5 (C)	0.02 (TWA)(R) 0.1 (TWA)(I)
Molybdenum Insoluble	7439-98-7	15 (TWA)	10 (I) 3 (R)
Nickel Elemental Insoluble	7440-02-0	1 (TWA) 1 (TWA)	1.5 (TWA)(I) 0.2 (TWA) (I)
Niobium	7440-03-1	NE	NE
Phosphorus	7723-14-0	NE	NE
Sulfur	7704-34-9	NE	NE
Selenium	7782-49-2	NE	0.2 (TWA)
Titanium (as titanium dioxide)	7440-32-6	15 (TWA)	10 (TWA)
Tungsten (elemental and insoluble compounds)	7440-33-7	NE	5 (TWA) 10 (STEL)
Vanadium (as vanadium pentoxide) Dust Fume	7440-62-2	NE NE	0.5 (C)(R) 0.1 (C)

* When chromium is heated to high temperatures such as those that occur in welding arcs, carbon arc gouging or plasma cutting, it may oxidize to form hexavalent chromium. In the product as sold, chromium is in the metallic form.

Exposure Limit Abbreviations

NE= None Established

ACGIH TLV= American Conference of Governmental Industrial Hygienists Threshold Limit Value[®], 2015 Edition

OSHA PEL= Occupational Health and Safety Administration Permissible Exposure Limit

TWA= Time Weighted Average

STEL= Short Term Exposure Limit

C= Ceiling Limit

mg/m³= milligram of substance per cubic meter of air

R= Respirable fraction of particulate sampled

I= Inhalable fraction of particulate sampled

Appropriate Engineering Controls

In the solid state, no special requirements are necessary. If processes such as machining, grinding, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting are used on the product, local exhaust ventilation may be required to maintain concentrations of airborne hazardous ingredients below the applicable exposure limits.

Personal Protective Equipment

Eye Protection

Wear safety glasses with side-shields if there is a risk of particles getting in eyes

Skin protection

No chemical protective clothing is required. If material is processed, use appropriate protective clothing and gloves for the application.

Respiratory Protection

In the solid state, no special requirements are necessary. Airborne dust or fumes can be generated by machining, grinding, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting of the product. Respiratory protection may be necessary if concentrations of these hazardous ingredients exceed the applicable exposure limits. In these cases a NIOSH approved respirator should be selected based on the form and concentration of the contaminant in air.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Solid, gray colored material
Odor	Odorless
Odor threshold	Not applicable
pH	Not applicable
Melting Point	2500-2800° F (1371-1538° C)
Initial boiling point & boiling range	Not applicable
Flash Point	Not applicable
Evaporation Rate	Not applicable
Flammability	Not applicable
Upper/Lower flammability or explosive limits	Not applicable
Vapor Pressure	Not applicable
Vapor Density	Not applicable
Relative Density	Not applicable
Solubility in Water	Not applicable
Partition Coefficient	Not applicable
Auto-Ignition Temperature	Not applicable
Decomposition Temperature	Not applicable
Viscosity	Not applicable

SECTION 10: STABILITY AND REACTIVITY

Reactivity

No dangerous reaction known under condition of normal use.

Chemical Stability

Stable

Possibility of Hazardous Reactions

Will not occur.

Conditions to avoid

Contacts with mineral acids will release flammable hydrogen gas. Avoid contact with calcium hypochlorite.

Incompatible Materials

Oxidizers, reacts with strong acids to form explosive hydrogen gas. Iron dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.

Hazardous Decomposition Products

During certain operations such as welding, burning, melting or hot rolling; metal fumes may be generated. Hexavalent chromium which is a suspect carcinogen may result from pickling stainless.

SECTION 11: TOXICOLOGICAL INFORMATION

The following toxicity data has been determined for stainless steel when further processed using the information available for its components and potential forms resulting from processing (e.g. machining, grinding, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding, thermal cutting...etc.) of the product that may release hazardous substances. Information about these components and forms is supplied.

Acute Toxicity

Copper: Eye and respiratory irritation may occur. High exposure to copper dust may cause gastrointestinal effects due to oral ingestion.

Chromium: Eye and respiratory irritation may occur.

Nickel: One study showed severe lung and kidney damage following exposure to extremely high levels of nickel powder.

Selenium: High brief exposures to fumes may cause irritation of the eyes, nose and throat and headaches

Vanadium pentoxide: Human studies report upper respiratory tract irritation

Respiratory or Skin Sensitization

Cobalt: May cause allergy or asthma symptoms or breathing difficulties if inhaled. Contact allergic dermatitis may occur.

Nickel: Contact allergic dermatitis may occur.

Germ Cell Mutagenicity

Nickel: Chromosomal aberrations and in vitro and in vivo testing has shown that nickel is genotoxic (ASTDR)

Vanadium: Chromosomal aberrations and in vitro and in vivo testing has shown that vanadium pentoxide is genotoxic.

Carcinogenicity

Aluminum: Not listed by IARC, NTP or OSHA

Cobalt: Listed by IARC (possibly carcinogenic to humans-Group 2B). Not listed by NTP or OSHA.

Copper: Not listed by IARC, NTP or OSHA

Chromium (metal): Not listed by IARC, NTP or OSHA

(When chromium is heated to high temperatures such as those that occur in welding arcs, carbon arc gouging or plasma cutting, it may oxidize to form hexavalent chromium. In the product as sold, chromium is in the metallic form. Hexavalent chromium is listed as a carcinogen by IARC 1 (Carcinogenic to Humans), NTP (Known to be a human carcinogen) and OSHA. It can cause lung cancer).

Iron: Not listed by IARC, NTP or OSHA

Manganese: Not listed by IARC, NTP or OSHA

Molybdenum: Not listed by IARC, NTP or OSHA

Nickel: Listed by IARC (possibly carcinogenic to humans-Group 2BA) and NTP (known to be a human carcinogen).

The strongest evidence for carcinogenicity is for sulfidic nickel forms and the evidence for oxidic forms of nickel are the weakest. There is no evidence that metallic nickel is associated with nasal or lung cancer (ASTDR).

Niobium: Not listed by IARC, NTP or OSHA



Selenium: Not listed by IARC, NTP or OSHA

Titanium (metallic): Not listed by IARC, NTP or OSHA

Tungsten: Not listed by IARC, NTP or OSHA

Vanadium: Not listed by IARC, NTP or OSHA. Vanadium pentoxide is listed by IARC (possibly carcinogenic to humans-Group 2BA).

Specific Target Organ Toxicity-Single Exposure

Nickel: One study showed severe lung and kidney damage following exposure to extremely high levels of nickel powder.

Specific Target Organ Toxicity-Repeated Exposure

Aluminum: There is some evidence that aluminum may accumulate in the body with long-term exposure. Lung changes have been reported in workers exposed to high levels of aluminum dust. Some studies have indicated that there may be subtle neurological effects following long-term exposure to aluminum.

Cobalt: Animal studies have shown respiratory effects following inhalation exposure (lung edema, decreased pulmonary function). Transient myocardial changes have also been reported. Studies have shown asthma and pulmonary function changes in workers in the cemented tungsten carbide industry and cobalt is thought to play a significant role in these effects.

Copper: A few studies have shown copper to cause metal fume fever, a condition characterized by chills, fever, muscular pain, nausea, and vomiting but these are limited in number and details. Studies have reported upper respiratory tract irritation, metallic taste sensation and nausea.

Iron: Prolonged exposure may lead result in iron deposits in the lung, a condition known as siderosis.

Manganese: Inflammatory changes in the lung were found in monkeys exposed to manganese dioxide via inhalation for 10 months. At high exposure levels (greater than 5 mg/m³), manganism (chronic manganese poisoning) has been reported in workers. Symptoms of manganism include sleepiness, weakness in the legs, a mask-like facial appearance, emotional disturbances and a spastic gait. High levels of pneumonia have also been reported in workers inhaling large amounts of manganese dust and fume. In some studies, manganese has been associated with longer reaction times, hand steadiness and eye-hand coordination. Effects appear to be more pronounced with exposures to respirable sized particles.

Nickel (elemental and nickel oxide): Animal studies have shown lung changes and inflammation.

Selenium: Human studies have shown humans exposed to selenium may develop a garlic odor of the breath

Tungsten: Studies have shown asthma and pulmonary function changes in workers in the cemented tungsten carbide industry but cobalt is thought to play a more significant role in these effects than tungsten.

Vanadium pentoxide: Inflammatory changes in the lung and nasal cavity and decreased pulmonary function have been reported in animal studies. Human studies report inflammatory changes in nasal mucosa.

Skin Corrosion/Irritation

Acute (Immediate): Prolonged skin contact with dust may cause skin irritation to sensitive individuals. May cause mechanical irritation. Symptoms include redness, pain and skin rash.

Chronic (Delayed): No data available.

Serious Eye Damage or Irritation

Acute (Immediate): Exposure to dust may cause mechanical irritation. Excessive concentrations of nuisance dust in the workplace may reduce visibility and cause unpleasant deposits in eyes.

Chronic (Delayed): No data available

Reproductive Toxicity

Repeated and prolonged exposure may cause reproductive effects.

Aspiration Hazard

Based on the physical form, the product is not expected to be an aspiration hazard.

- Acute (Immediate): Processes such as cutting, grinding, crushing...etc. may result in generation of excessive amounts of airborne dusts in the workplace. Nuisance dust may affect the lungs but reaction are typically reversible. May cause respiratory irritation.
- Chronic (delayed): Repeated and prolonged exposure to dust may cause lung effects including pneumoconiosis. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Prolonged exposure to manganese fumes and dusts have resulted in a progressive deterioration of the Central Nervous System. Symptoms resemble late Parkinson's disease and include weakness in the legs, increased muscle tone, hand tremor, slurred speech, muscle cramps, spastic gate, fixed facial expression and mental deterioration.

Other Information

Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

Ecotoxicity is expected to be minimal since the product is a solid with low water solubility.

Persistence and Degradation

No data available for stainless steel in sold form as sold/shipped.

Bioaccumulation

No data available for stainless steel in sold form as sold/shipped.

Mobility in Soil

No data available for stainless steel in sold form as sold/shipped.

Environmental Fate

No data available for stainless steel in sold form as sold/shipped.

SECTION 13: DISPOSAL INFORMATION

Stainless steel scrap should be recycled whenever possible. This product is not considered to be hazardous waste according to US RCRA and Canadian regulations. Dispose of according to federal, state and local regulations. Dust collected from product processing operations (e.g. machining, grinding, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting) may be classified as a hazardous waste. Consult federal, state and local regulations.

SECTION 14: TRANSPORTATION INFORMATION

U.S. Department of Transportation (DOT)

Product is not regulated

International Maritime Dangerous Goods (IMDG)

Product is not regulated

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Product is not regulated

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

Product is not regulated

SECTION 15: REGULATORY INFORMATION

If this product is further processed, the regulatory status of the components listed in the composition section of this sheet may be altered. The following regulatory information may not be complete and should not be relied upon as the sole source of information regarding regulatory responsibilities.

Occupational Health and Safety Administration

Dust or fumes generated by machining, grinding, casting, sawing, blasting, polishing, buffing, brazing, soldering, welding or thermal cutting of the product may produce airborne contaminants that are regulated by OSHA.

Other Regulatory Information

Chemical	CAS #	EINECS	CERCLA RQ (lbs)	Section 313	NPRI Threshold Category	California Prop 65
Aluminum (fume or dust)	7429-90-5	231-072-3		313	1A	
Chromium	7440-47-3	231-157-5	5,000	313	1A	
Cobalt	7440-48-4	231-158-0		313	1A	Carcinogen



Copper	7440-50-8	231-159-6	5,000	313	1A	
Iron	7439-89-6	231-096-4				
Manganese	7439-96-5	231-105-1		313	1A	
Molybdenum	7439-98-7	231-107-2				
Nickel	7440-02-0	231-111-4	100	313	1A	Carcinogen
Niobium	7440-03-1	231-113-5				
Selenium	7782-49-2	231-957-4	100	313		
Titanium	7440-32-6	231-142-3				
Tungsten	7440-33-7	231-143-9				
Vanadium (except when contained in an alloy)	7440-62-2	231-171-1		313	1A	

CAS- Chemical Abstract Service- Registry Number

EINECS - European Inventory of Existing Commercial Chemical Substances

CERCLA RQ (reportable quantity) -- if a value is listed then releases of particles, $\leq 100 \mu\text{m}$ in size, to the environment may require reporting under CERCLA Sections 102-103 (40 CFR Part 302)

Section 313 - if '313' is listed then may be subject to the reporting requirements found under EPCRA Section 313 (40 CFR Part 372)

NPRI (National Pollutant Release Inventory) Threshold Category - if 1A or 1B is listed, may be subject to reporting under the Canadian Environmental Protection Act, 1999

California Prop 65 - if listed **WARNING:** This product contains chemicals known to the State of California to cause cancer.

These products are not believed to contain any substances that meet the notification requirements found under EPCRA Sections 302 or 304 (40 CFR Part 355) nor subject to the accidental release prevention requirements under CAA 112(r) (40 CFR Part 68).

SECTION 16: OTHER INFORMATION

DATE PREPARED: August 18, 2015 (Rev. 1)

PREPARER: Kay Rowntree, CIH
Industrial Hygiene Sciences, LLC

DATE REVISED: November 7, 2016 (Rev 3)

REVISED BY: Daniel K. Wells
Tri Star Metals, LLC

This SDS is intended to be used as a guide to the appropriate handling, storage, and use of this product by an adequately trained person. TriStar Metals, LLC and Industrial Hygiene Sciences, LLC are not responsible for the misuse, mishandling or improper storage of this material by the user. TRI STAR METALS, LLC. AND INDUSTRIAL HYGIENE SCIENCES, LLC NEITHER MAKES, NOR OFFERS NOR SHALL BE HELD LIABLE FOR ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE USE OF THE INFORMATION PROVIDED.

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