



Xylem Company

8126 Mallory Court • Chanhassen, MN 55317 • (952) 368-9040 • Fax (952) 368-9041

MATERIAL SAFETY DATA SHEET
316, 316L & 316LVM STAINLESS STEEL

UPDATED: JANUARY 2014

SECTION 1: COMPONENT DATA: Approximate concentrations for industrial hygiene purposes

INGREDIENTS	CAS NUMBER	PERCENT	PERMISSIBLE EXPOSURE LIMIT (PEL) OSHA	THRESHOLD LIMIT VALUE (TLV) ACGIH
Iron *	7439-89-6	60 - 72 %	10 mg/m ³	5 mg/m ³
Chromium	7440-47-3	16 - 19 %	0.5 mg/m ³	0.5 mg/m ³
Nickel	7440-02-2	10 - 15 %	1 mg/m ³	1 mg/m ³
Molybdenum	7429-98-7	2 - 3 %	5 mg/m ³ (SOL)	10 mg/m ³ (INSOL)
Manganese	7439-96-5	0 - 2 %	5 mg/m ³ C	0.2 mg/m ³
Copper	7440-50-8	0 - .5 %	1 mg/m ³ , 0.1 mg/m ³ (FUME)	1 mg/m ³ , 0.1 mg/m ³ (FUME)
Cobalt	7440-48-4	0 - 1 %	0.1 mg/m ³	.02 mg/m ³

* Regulated substance in oxide form

SECTION 2: PHYSICAL DATA:

Vapor Pressure:	Not Applicable (N/A)
Vapor Density:	N/A
Specific Gravity (H ₂ O=1):	7.5 to 8.5
Solubility in Water:	Insoluble in Water
Evaporation Rate:	N/A
Freezing Point:	N/A
Boiling Point:	N/A
Viscosity:	N/A
PH Information:	N/A
Appearance:	Silver/Gray/Metallic
Odor:	Odorless
Physical State:	Solid

SECTION 3: FIRE & EXPLOSION HAZARD DATA:

Flash Point (°F) and Method:	N/A
Flammability Limits:	N/A
Auto-Ignition Temperature (°F):	N/A
Melting Point:	2400-2800° Fahrenheit
General Hazard:	Not Combustible
Fire Fighting Instructions & Equipment:	No special equipment for product as shipped
Extinguishing Media:	No fire or explosion hazards
Hazardous Combustion Products	None expected in form shipped



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SECTION 4: HAZARD IDENTIFICATION:

Stainless Steel alloys are not considered hazardous in solid rod/bar, wire, tubing, strip and sheet form. However, if subsequent processing involves grinding, melting, welding, cutting, or any process that causes release of dust or fume, hazardous levels of dust or fumes of the constituents of these alloys can be generated.

The following list summarizes the potential health effects of the hazardous elements that may be contained in these alloys. It is the responsibility of the user to assess potential exposure based on processing of the product.

Welding: Fumes generated by the welding of Zinc, Magnesium and Copper are known to cause metal fume fever. Inhalation of Aluminum, Iron, Nickel, Manganese, Selenium, and Tin has also been reported to cause metal fume fever. Flu-like symptoms include shortness of breath, coughing, muscle pain, fever and chills. Generally, these symptoms resolve with rest within a few days.

Exposure Routes:

Inhalation: Primary route of exposure is steel dust or fume, which can cause irritation to the respiratory tract. Chronic exposure may aggravate pre-existing conditions.

Skin and Eye Contact: May cause irritation or skin sensitivity.

Ingestion: Certain constituents may be harmful if swallowed.

Specific Health Effects:

Aluminum: Metal dust and oxide is generally considered a nuisance particulate. May irritate the eyes and mucous membranes. Excessive concentrations have been known to cause fibrosis.

Boron Oxide: An eye and respiratory irritant. May cause eye irritation, dryness of mouth, nose and throat, or excessive coughing.

Chromium: The toxicity of Chromium is dependent on its' oxidation state. Chromium metal is relatively non-toxic. If metal is heated to high temperatures, as in welding, fumes produced may be toxic to the lungs. Under high temperatures, hexavalent chromium may be produced. If in insoluble form, it is designated a confirmed human carcinogen. Other health effects include nasal irritation and possible kidney and liver damage. Chromite dust may also cause skin ulceration, dermatitis and allergic skin reactions.

Cobalt: May cause interstitial fibrosis, pneumonitis, and sensitization of the respiratory tract and skin. Cobalt liberation during tungsten carbide machining is also associated with the development of hypersensitivity asthma. Hypersensitivity pneumonitis generally disappears when the exposure ceases. Cobalt is listed by the National Toxicological Program (NTP) as a 2B carcinogen, anticipated to be carcinogenic from studies in experimental animals.

Columbium (a.k.a. Niobium): Eye or skin irritant. May cause kidney damage.

Copper: May irritate the upper respiratory tract. May be characterized by a metallic or sweet taste. May also cause metal fume fever.

Iron Oxide: Repeated inhalation of iron oxide fume or dust causes benign pneumoconiosis (siderosis), but generally does not cause symptoms in the exposed person.



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Specific Health Effects (continued)

Manganese: Acute effects include skin and eye irritation and metal fume fever. Chronic exposure may lead to central nervous system symptoms such as headache, changes in motor activity and psychological disturbances.

Molybdenum: Insoluble compounds of Molybdenum have a low order of toxicity. Molybdenum trioxide is an irritant to the eyes and mucous membranes.

Nickel: Known to cause contact dermatitis and a respiratory irritant. Nickel refining and specific compounds are considered respiratory carcinogens to humans. The International Agency for Research on Cancer lists elemental nickel as a possible 2B carcinogenic to humans. The National Toxicological Program (NTP) lists Nickel as reasonably anticipated to be carcinogenic from studies in experimental animals. The American Conference of Governmental Industrial Hygienists recommends that nickel compounds be differentiated according to solubility for their carcinogenic effects.

Selenium: Selenium dust vapors and fumes are irritants of the eyes, mucous membranes and skin. Chronic exposure may cause central nervous system effects and gastrointestinal disturbances. Selenium is listed by the National Toxicological Program (NTP) as a 2B, anticipated to be carcinogenic from studies in experimental animals.

Tantalum: Considered to have a low order of toxicity. As surgical implant material, it has demonstrated its' physiological inertness.

Titanium: A mild pulmonary irritant generally regarded as a nuisance dust.

Tungsten: Both Tungsten and Tungsten Carbide pose an extremely low order of toxicity. Tungsten is considered an inert dust.

Vanadium: The oxides of Vanadium are toxic. May cause irritation to eyes or respiratory tract. May cause bronchitis with wheezing and chest pain. Repeated exposure may cause more severe respiratory symptoms.

Zirconium: Considered to have a low order of toxicity. Skin rash has been associated with exposure to deodorants containing Zirconium.

SECTION 6: HAZARD RATINGS:

	<u>NFPA</u>	<u>HMIS</u>
<u>Health:</u>	0 (as shipped) 2 (ground, welded or melted)	0 (as shipped) 2 (ground, welded or melted)
<u>Flammability:</u>	0	0
<u>Reactivity:</u>	0	0



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SECTION 7: FIRST AID MEASURES:

The likelihood of hazardous consequences through eye or skin contact, inhalation or ingestion is minimal as shipped

Inhalation: Remove person from exposure area. If breathing difficulty occurs, get prompt medical attention.

Skin and Eye Contact: Flush eye with plenty of water for 15 minutes. Seek medical attention if irritation persists. Wash skin with soap and water. If rash develops, seek medical attention.

Ingestion: Seek medical attention.

SECTION 8: ACCIDENTAL RELEASE MEASURES:

Land/Water Spill: This product does not pose a hazard to the environment in the as-shipped form.

SECTION 9: EXPOSURE CONTROL / PERSONAL PROTECTION:

Engineering Controls: The use of local exhaust ventilation is recommended to control emissions near the source of the metal being cut, ground, welded or melted.

Personal Protection: When handling, leather gloves are recommended. Additional personal protective equipment is dependent on the operation performed. Safety Glasses and a Face Shield are recommended when grinding.

If industrial hygiene monitoring reveals an overexposure during processing, engineering controls are required to be installed to reduce exposures below OSHA permissible exposure limits. In the absence of feasible engineering controls, wear a NIOSH approved respirator for protection for the type of particulate generated.

SECTION 10: STABILITY & REACTIVITY:

The product is stable and hazardous polymerization will not occur.
Incompatible materials and conditions to avoid: Acids, bases, and oxidizers.
Hazardous Decomposition: None for product in as-shipped form.

SECTION 11: TOXICOLOGICAL INFORMATION: SEE SECTION 4 (HAZARD IDENTIFICATION)

SECTION 12: ECOLOGICAL INFORMATION: NO DATA AVAILABLE

SECTION 13: HANDLING & STORAGE:

Storage Temperature:	Not Applicable
Storage Pressure:	Not Applicable
General:	Store away from acids and oxidizers

SECTION 14: DISPOSAL CONSIDERATIONS:

Recycling of all metallic byproducts as scrap is strongly encouraged. If byproducts need to be treated and/or disposed of as wastes, hazardous waste characterizations must be performed prior to treating and/or disposing. Contact appropriate parties to ensure compliance with all federal, state and local rules and regulations related to waste treatment and disposal.



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SECTION 15: TRANSPORTATION INFORMATION:

For Hazardous Wastes: DOT (Department of Transportation)
Proper Shipping Name: Hazardous Waste Solid, n.o.s. (Component A, Component B)
Hazard Class: 9
Identification Number: NA3077
Packing Group: III
Emergency Response Guide Number: 171

SECTION 16: REGULATORY INFORMATION:

TSCA (Toxic Substances Control Act) Not Applicable
CERCLA (Comprehensive Response Compensation and Liability Act): Not Applicable

SARA Title III (Superfund Amendments and Reauthorization Act):

311/312 Hazardous Categories: Not applicable for storage of items as shipped.
End product may require reporting if processed.

313: Product ingredients subject to reporting requirements may include:
Chromium, Nickel, Manganese, Cobalt or Copper

Regulations such as Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act may apply to the handling of steel grindings and particulates from processing.

California Safe Drinking Water Act (Proposition 65) listing:

<u>Component</u>	<u>CAS Number</u>
Nickel	7440-02-0
Cobalt	7440-48-4

Governors list of chemicals known to cause cancer and reproductive toxicity includes hexavalent compounds of Chromium and Nickel dust from pyrometallurgical processing.