



This material Safety Data Sheet (SDS) provides information on a specific group of manufactured metal products. Since these metal products share a common physical nature and constituents, the data presented are applicable to all alloys identified. This document was prepared to meet the requirements of OSHA's Hazard Communication Standard, 29 CFR 1910.1200.

## **Section I - PRODUCT IDENTIFICATION & COMPANY INFORMATION**

**Product name:** Various grades of stainless steel, nickel and titanium alloys carrying various trade names and alloy designations in basic mill product forms such as bar, sheet, plate, and pipe.

**Other/generic names:** A list of alloys is provided in the Appendix.

**Product use:** These materials are utilized in a wide variety of applications that typically involve fabrication of the alloys into useful components offering corrosion resistance, strength and a broad range of beneficial characteristics.

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## **Section II – HAZARDS IDENTIFICATION**

Solid metal alloys are not normally considered hazardous as shipped. Ends and edges can be sharp and gloves should be worn when handling.

### **POTENTIAL HEALTH HAZARDS**

**Skin:** Although not normally hazardous, some individuals can develop allergic skin reactions to nickel and other metallic ingredients. Ends of wire and edges of strips may be sharp and can cause cuts. During welding and spraying - Fumes generated may be irritating to the skin. UV radiation produced can cause burns (ray burn). Hot metal can cause burns.

**Eyes:** As shipped, product does not pose a hazard to the eyes however ends of wire and edges of strip are sharp and can cause cuts. During welding and spraying - Fumes generated can be irritating to the eye. Ends of wire may be sharp and can cause cuts or hot and cause burns. UV radiation produced can cause burns (arc eye).

**Inhalation:** Fumes generated by welding and spraying processes can be irritating and toxic.

**Ingestion:** Not a likely route of entry. Metal ingestion can cause toxic effects.

**Delayed effects:** Inhalation of welding or spraying fumes may cause damage to the lungs and respiratory tract including but not limited to fibrosis of the lung which can reduce lung capacity and produce difficulty breathing.



Cobalt and Nickel are animal carcinogens and inhalation of fumes and dusts should be avoided. Prolonged inhalation of Manganese fumes and dusts may cause irreversible damage to the nervous system resulting in Parkinson's Disease-like symptoms (tremors, weakness, paralysis, etc.)

### Section III – COMPOSITION / INGREDIENTS<sup>1</sup>

**IMPORTANT** – This section lists hazardous ingredients in the as-shipped products.

INGREDIENT	Max Wt. %	PEL <sup>2</sup>	TLV <sup>3</sup>	CAS# <sup>4</sup>
Aluminum (Al)	6	15	10	7429-90-5
Chromium (Cr) (metal)	33	1	0.5	7440-47-3
Cobalt (Co)	66	0.1	0.02	7440-48-4
Copper (Cu)	34	1	1	7440-50-8
Iron (Fe) as Dust or Fume	99	10	5	7439-89-6
Manganese (Mn)	16	C5	0.2	7439-96-5
Molybdenum (Mo)	30	15	10	7439-98-7
Nickel (Ni)	99	1	1.5*	7440-02-0
Niobium (Nb)	6	15	10	03/01/7440
Silicon	4	15(5*)	10	7440-21-3
Titanium (Ti) as Dust or fume	90	15(5*)	10	7440-32-6
Tungsten (W)	5	5(STEL-10)	5	7440-33-7
Vanadium (V)	4	C0.5	0.05	7440-62-2

Nuisance particulates as respirable dust at 5mg/m<sup>3</sup> (\*Respirable Fraction) (C = Ceiling Limit) (STEL - Short Term Exposure Limit)

1 - Composition of HAZARDOUS INGREDIENTS (as defined by OSHA – 29CFR1910.1200 and PA TITLE 34) – 1% or greater by weight, except 0.01% or greater for nickel and chromium.

2 - OSHA Permissible Exposure Limits (mg/m<sup>3</sup>)

3 - Threshold Limit Value (mg/m<sup>3</sup>), American Conference of Governmental Industrial Hygienist (ACGIH)

Both PEL and TLV are 8 hour Time Weighted Averages (TWA), unless designated as C (ceiling limits)

4 - Chemical Abstract Services Number

### Section IV – FIRST AID MEASURES

**Skin:** Wash skin with soap and water to remove any metallic particles. If a rash or burn develops, seek medical attention.

**Eyes:** Flush particles from eyes with clean water for at least 15 minutes. If irritation persists or burn develops, seek medical attention.

**Inhalation:** Remove from exposure. If respiratory irritation persists, seek medical attention.

**Ingestion:** If metallic particles are swallowed, seek medical assistance.

**Advice to physician:** Treat symptomatically



## Section V – FIRE FIGHTING MEASURES

As shipped, these products are nonflammable and non-explosive. If subjected to fabrication by welding, however, welding arcs and sparks can ignite combustibles, and can initiate fires and explosions. Be sure you read and understand American National Standard Institute standard ANSI Z49.1 "Safety in Welding and Cutting" and National Fire Protection Association standard 51B for fire prevention in "Cutting and Welding Processes" before using these products.

Extinguishing	Media Flash Point (Method Used)
N/A	N/A
Unusual Fire and Explosive Hazards	Flammable Limit
N/A	N/A
Special Fire Fighting Procedures	
N/A	

## Section VI – ACCIDENTAL RELEASE MEASURES

In solid form this material poses no special clean-up problems. If this material is in powder or dust form, notify safety personnel, isolate the area and deny entry. Do not sweep. Clean-up should be conducted with a vacuum system utilizing a high efficiency particulate air (HEPA) filtration system. Caution should be taken to minimize airborne generation of powder or dust and avoid contamination of air and water. Cleanup personnel should protect against exposure. Properly label all materials collected in waste container. Follow applicable emergency response regulations, such as OSHA (29CFR 1910.120).

## Section VII – HANDLING AND STORAGE

HANDLING PRECAUTIONS - Dust and welding fume should be moved or transported to minimize spill or release potential.

STORAGE PRECAUTIONS - In solid form, these materials pose no hazards.

## Section VIII – EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS - Local exhaust ventilation should be used to control exposure to airborne dust and fume emissions near the source (during welding, plasma arc cutting, sawing, grinding, etc.) below the exposure limits cited in Section 2.

RESPIRATORY PROTECTION - Use a fume respirator or an air supplied



respirator where local exhaust or general ventilation does not keep exposure below the exposure limits for air contamination. Use NIOSH approved respirators as specified by an industrial hygienist or qualified safety professional. Lung function tests are recommended for users of negative pressure devices.

GLOVES/ARMS - Wear suitable protection while handling solid metal alloys in mill product forms to protect against physical injury.

EYE PROTECTION – Wear safety glasses or goggles when there is a reasonable probability of flying particles or high levels of airborne dust. If welding these materials be aware that welding arcs produce ultraviolet and infrared radiation.

RECOMMENDED MONITORING PROCEDURES - The welding fumes of most of these welding products contain certain ingredients which either may, or will, reach their PEL TLV ®, or other occupational exposure limit before reaching the TLV ®-TWA of 5 mg/m<sup>3</sup> for respirable particulate not otherwise specified (NOS). Monitoring the welding fume for these ingredients is recommended. Monitoring for respirable particulate (NOC) is also recommended for all products. Seek professional advice from an industrial hygienist or qualified safety professional for recommended monitoring procedures.

### Section IX – PHYSICAL AND CHEMICAL PROPERTIES

MELTING POINT: >2100°F <2600°F  
Applicable

VAPOR DENSITY (AIR=1): Not

SUBLIMES @: Not Applicable  
9

SPECIFIC GRAVITY: (H<sub>2</sub>O=1) 7-

BOILING POINT: Not Applicable

pH: Not Applicable

EVAPORATION RATE: Not Applicable

SOLUBILITY IN WATER: None

VAPOR PRESSURE (mmHg): Not Applicable  
None

% VOLATILES BY VOLUME:

APPEARANCE AND COLOR: Dark grey to silver in basic mill product forms such as bar, sheet, plate and pipe. Odorless.

### Section X – STABILITY AND REACTIVITY

Stability: Solid metal alloys in mill product forms are stable under normal conditions.

Reactivity: May react in contact with strong acids to release gaseous acid decomposition products. Fume is produced during welding. Expected fume constituents include oxides of metal as iron, manganese, nickel and chromium. Expected gaseous products would include carbon oxides, nitrogen oxides and ozone. Contamination, dirt, surface



protections, paint or primer on the base material can affect the composition of the fumes.

## Section XI – TOXICOLOGICAL INFORMATION

Nickel and cobalt are classified as Category 3 carcinogens. The exposure route of concern is inhalation.

As shipped, these complex alloys in massive form have no known toxicological properties other than causing allergic reactions in individuals sensitive to the metal(s) contained in the alloys. However, dust from flux or user-generated dusts and fumes may on contact with the skin or eyes produce mechanical irritation. Chronic exposures coupled with sweat could cause dermatitis (skin) or conjunctivitis (eyes).

Excessive inhalation of dust or user-generated fumes from welding or metal spraying may, depending on the specific features of the process used, pose a long-term health hazard. The International Agency for Research on Cancer (IARC) has concluded that welding fumes are possibly carcinogenic to humans. The ingredients of fumes and gases generated in welding, metals spraying and grinding will depend on the base metal and the details of the specific process being used. Ingredients may include metals, metal oxides, chromates, fluorides, carbon monoxide, ozone, and oxides of nitrogen.

### DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

*Chromium* - The International Agency for Research on Cancer (IARC) considers hexavalent chromium to be a carcinogen (lung, nasal) but does not have adequate evidence for chromium metal and trivalent chromium. Fumes have been associated with lung fibrosis.

*Iron* - Prolonged inhalation of iron oxide fumes can lead to siderosis, which presents as a benign pneumoconiosis.

*Molybdenum* - Repeated inhalation of fumes has caused kidney damage, respiratory irritation and liver damage in animals.

*Nickel* - Nickel metal is “reasonably anticipated to be a human carcinogen” (National Toxicology Program’s 10th Report). IARC states that nickel metal is possibly carcinogenic to humans. Epidemiological studies of workers exposed to nickel powders, dusts and fumes in the nickel alloy and stainless steel producing industries do not indicate a significant respiratory cancer hazard. Inhalation of nickel powder produced malignant tumors in rodent studies. Single intratracheal installations of nickel powder at levels close to the LD50 have caused malignancies in hamsters. Nickel can cause skin sensitization in susceptible individuals through prolonged contact with skin.



## Section XII – **ECOLOGICAL INFORMATION**

Solid metal alloys in mill product forms products are not considered toxic to aquatic species. It is believed that finely divided product, based on its components, will be hazardous to fish, animals, plants and the environment if released, the degree of which would depend on the particle size and quantity released. In addition, if particles are small enough, material may be ingested by wildlife, with possible toxic effects. The solid product is not expected to migrate easily into soil or groundwater based upon its insoluble form, however, finely divided material can become mobile in water and contaminate soil and groundwater.

## Section XIII – **DISPOSAL CONSIDERATIONS**

If as shipped products become solid waste, they would not be classified as a hazardous waste and are normally collected to recover metal values. Dispose of dust, fume, and grinding and cutting residues from the work area, or from filters, in accordance with local, state and federal regulations. Refer to this SDS for information on the possible contents of the collected fumes and other materials.

## Section XIV – **TRANSPORT INFORMATION**

No international regulations or restrictions are applicable.

SHIPPING NAME -	Not Applicable
IDENTIFICATION NUMBER -	Not Applicable
HAZARD CLASS -	Not Applicable
LABEL(S) REQUIRED -	Not Applicable

## Section XV – **REGULATORY INFORMATION**

Alloys containing less than 1% of nickel or cobalt are not classified as "dangerous for supply". Alloys containing more than 1% of either metal are classified as the metals themselves. However, in recognition of their essentially non-hazardous nature, these alloys in the massive form are not required to be labeled as hazardous.

## Section XVI – **OTHER INFORMATION**

**Current Issue Date:** Jan 2016

**Previous Issue Date:** May 2015

**Changes:** Removed incorrect data on Crystalline Silica

**Previous Changes:** Added 13-8 and Monel 400



This SDS was prepared by Rolled Alloys technical personnel to be in compliance with OSHA's Hazard Communication Standard, 29 CFR 1910.1200 and is provided in good faith based upon the experience and knowledge of the company. Rolled Alloys does not manufacture solid metal alloys, but causes products to be made under their label by internationally known and recognized producers. In addition, Rolled Alloys distributes products of these companies and has relied, in part, on information contained in SDS documents provided by these manufacturers. Users should make their own assessment of workplace risks as required by other health and safety legislation. As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any material described herein. Information contained herein is believed to be true and accurate, but all statements or suggestions are made without warranty, expressed or implied, regarding accuracy of the information, the hazards connected with the use of the material or the results to be obtained from the use thereof. Compliance with all applicable Federal, State, and local laws and regulations remain the responsibility of the user.



## APPENDIX

This listing of alloys represents the common or trade name of the materials commonly supplied by Rolled Alloys. Rolled Alloys may, from time to time, supply similar alloys that are not included on this list. The composition of these other materials will fall within the compositions ranges shown in Section II of the SDS.

### Titanium Alloys

6-4 UNS: R56400 UNS: R56400	6-4 ELI UNS: R56401	6-4 STA
6-2-4-2 UNS: R54620 R56410	6-6-2 UNS: R56620	10-2-3 UNS:

### Duplex Stainless Steels

ZERON® 100 UNS: S32760	ZERON® 100 FG UNS: S32760
2205 UNS: S31803, S32205	LDX 2101® UNS: S32101

### Nickel Alloys

RA330® UNS: N08330 UNS: N04400	RA333® UNS: N06333	400
RA 602 CA® UNS: N06025 UNS: N06601	600 UNS: N06600	601
800H/AT UNS: N08810, N08811 625 UNS: N06625 UNS: N07718	AL-6XN® UNS: N08367 Alloy 20 UNS: N08020	718
718 NACE UNS: N07718 UNS: N06230	X UNS: N06002	230®
W UNS: N10004	INVAR 36 UNS: K93600, K93603	

### Cobalt Alloys

188 UNS: R30188 UNS: N07041	L-605 UNS: R30605	René 41
Waspaloy UNS: N07001 TRIBALLOY® T-800®	C263 UNS: N07263	694 (CM-64)

### Stainless Steels

RA 253 MA® UNS: S30815 S30908	310 UNS: S31008, S31009	309 UNS:
321 UNS: S32100 S41000	347 UNS: S34700	410 UNS:





410S UNS: S41008  
S31703

446 UNS: S44600

317L UNS:

303\* UNS: S30300

304/304H UNS: S30400, S30409

304/304L\* UNS: S30400, S30403  
S31603

316/316L\* UNS: S31600,

17-4 UNS: S17400  
S66286

15-5 UNS: S15500

A-286 UNS:

Zeron®100 S32760

13-8 UNS: S13800

\* 303, 304/304L, 316/316L are also featured as Rolled Alloys Machining Quality Bar, also known as RAM

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