

## Safety Data Sheet

### Inconel 625

<b>SECTION 1: Identification of the Substance/mixture and of the Company/Undertaking</b>	
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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.
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.

<b>SECTION 2: Hazards Identification</b>	
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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 3: Composition/Information on Ingredients**

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/m3 (\*Respirable Fraction)(\*\*Crystalline Silica) (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/m3)

3 - Threshold Limit Value (mg/m3), 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 4: 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 5: Firefighting 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 6: Accidental Release Measure**

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 7: 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 8: 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<sup>®</sup>, or other occupational exposure limit before reaching the TLV<sup>®</sup>-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 9: Physical and Chemical Properties**

MELTING POINT:	>2100°F <2600°F
VAPOR DENSITY (AIR=1):	Not Applicable
SUBLIMES @:	Not Applicable
SPECIFIC GRAVITY:	(H <sub>2</sub> O=1) 7-9
BOILING POINT:	Not Applicable
pH:	Not Applicable
EVAPORATION RATE:	Not Applicable
SOLUBILITY IN WATER:	None
VAPOR PRESSURE (mmHg):	Not Applicable
% VOLATILES BY VOLUME:	None
APPEARANCE AND COLOR:	Dark grey to silver in basic mill product forms such as bar, sheet, plate and pipe. Odorless.

**SECTION 10: 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 11: 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 12: 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 13: 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 14: 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 15: 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.