



## =====PHYSICAL DATA=====

Physical State: Solid	Specific Gravity: 7.6-7.8
Appearance and Odor: Gray metal; odorless	Vapor Pressure: NA
Boiling Point: NA	Vapor Density: NA
Melting Point: 2800 F	Evaporation Rate: NA
Solubility in Water: NA	% Volatile by Volume: NA
pH: NA	

## =====FIRE AND EXPLOSION HAZARD DATA=====

Not Applicable

## =====REACTIVITY DATA=====

**Stability:**

Stable

**Incompatibilities (Materials to avoid):**

Acids

**Hazardous Decomposition Products:**

Welding and burning on this product may cause the generation of a variety of noxious fumes and gases (e.g., carbon monoxide, chromium fume, etc.)

**Polymerization:**

Will not occur.

## =====HEALTH HAZARD DATA=====

**Health Effects/Signs and Symptoms:**

NOTE: Steel products in their usual physical form do not pose any health hazards. However, when subjected to welding, burning, grinding, cutting, abrasive blasting, heat treatment, pickling, or similar operations, potentially hazardous fumes or dusts may be emitted. Despite the fact that the welding, burning, etc. of steel in this category may produce fumes containing manganese, silicon, aluminum, and copper, the air concentrations generated of these components are expected to be extremely low. Particular attention should be directed to the other constituents which may be present at substantial levels. The following is a list of fumes or dusts that may be generated from this steel product category and the health effects associated with overexposure to them:

Iron (Fe) Carcinogenicity: NA NTP: No IARC: No OSHA Regulated: No  
Subjecting iron and alloys containing iron to high temperatures (such as occurs during welding) will cause the formation of iron oxide. Long-term exposure to iron oxide fumes or dusts has been associated with a benign lung condition known as siderosis which is observable as an X-ray change. No physical impairment of lung function has been linked to siderosis.

Chromium (Cr) Carcinogenicity: Yes NTP: Yes IARC: Yes OSHA Regulated: No  
The toxicity and health hazards of chromium are heavily dependent upon its oxidation state. The elemental (as in the metal), divalent, and trivalent forms are of very low toxicity. The hexavalent form (such as occurs in chromates and chromic acid) is very toxic and can produce both acute and chronic effects. Adverse effects on the skin may include ulcerations, irritative dermatitis, and allergic skin reactions. Adverse effects on the respiratory system may include bronchospasms, edema, hypersecretion, bronchitis, irritation, allergic asthmatic reactions, and ulceration and perforation of the nasal septum. Respiratory symptoms may include coughing and wheezing, shortness of breath, and nasal itch. Eye irritation or inflammation can also be produced. Exposure to some hexavalent chromium compounds have also been shown to be associated with an increased risk of lung cancer.

Molybdenum (Mo) Carcinogenicity: NA NTP: No IARC: No OSHA Regulated: No  
Mo and its compounds generally exhibit a low order of toxicity; however soluble compounds (such as Mo trioxide) are considerably more toxic. Molybdenum trioxide may produce irritation of the eyes, nose, and throat. In animals, soluble Mo compounds have also caused weight loss, diarrhea, loss of coordination, pneumoconiosis (accumulation of particles in the lungs), breathing difficulties, anemia, and colic. Animal data also suggests that repeated exposures might be associated with gout. Pneumoconiosis with x-ray findings and subjective symptoms has been observed in a small number of workers exposed to metallic molybdenum and Mo trioxide; however, no physical impairment of lung function has been linked to this condition.

Cobalt (Co) Carcinogenicity: NA NTP: No IARC: No OSHA Regulated: No  
Cobalt dust and fume is mildly irritating to the eyes, skin, and upper respiratory tract. An allergic dermatitis may be produced especially in skin areas subject to friction such as the creases of the elbow, knee, neck, and ankles. Inhalation to Co dust and fume may result in an asthma-like respiratory disease with symptoms such as cough and shortness of breath. In some instances, this condition progresses to interstitial pneumonia with marked fibrosis. As a result, permanent disability or even death may occur.

Vanadium (V) Carcinogenicity: NA NTP: No IARC: No OSHA Regulated: No  
Vanadium compounds (especially V pentoxide) are irritants to the eyes, respiratory tract, and, to a less frequent extent, the skin. Eye symptoms may include excessive tearing and a burning sensation. Skin rashes (which may be allergic in nature) resemble eczema and may itch intensely. Excessive inhalation exposures even after brief periods may result in inflammation of the nasal passages, sore throat, cough, tracheitis, bronchitis, wheezing, and chest pain. Excessive long-term

or repeated exposures may result in more severe effects such as pulmonary edema, pneumonia, chronic bronchitis, and recurring episodes of labored breathing. Workers exposed to excessive levels of vanadium often show a greenish discoloration of the tongue.

Nickel (Ni) Carcinogenicity: Yes NTP: Yes IARC: Yes OSHA Regulated: No  
Ni fumes and dusts are respiratory irritants and may cause a severe pneumonitis. Skin contact with nickel and its compounds may cause an allergic dermatitis. The resulting skin rash is often referred to as "nickel itch." Ni and its compounds may also produce eye irritation, particularly on the inner surfaces of the eyelids (i.e., the conjunctiva). Animal and/or epidemiology studies have linked nickel and certain nickel compounds to an increased incidence of cancer of the lungs and nasal passages.

Manganese (Mn) Carcinogenicity: NA NTP: No IARC: No OSHA Regulated: No  
Mn intoxication is usually due to the oxide or salts of Mn, elemental Mn exhibits very low toxicity. The dusts and fumes can act as minor irritants to the eyes and respiratory tract. Both acute and chronic exposures may adversely affect the central nervous system (CNS) but symptoms are more likely to occur after at least 1 or 2 years of prolonged or repeated exposures. Early symptoms may include weakness in lower extremities, sleepiness, salivation, nervousness, and apathy. In more advanced stages, severe muscular incoordination, impaired speech, spastic walking, mask-like facial expression and uncontrollable laughter may occur. Manganese fumes have also been reported to result in metal fume fever, a flu-like syndrome with symptoms such as dizziness, chills, fever, headache, and nausea. An increased incidence of pneumonia, bronchitis, and pneumonitis has been reported in some worker populations exposed to manganese. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections.

Silicon (Si) Carcinogenicity: NA NTP: No IARC: No OSHA Regulated: No  
This is considered to be a nuisance particulate by ACGIH.

Aluminum (Al) Carcinogenicity: NA NTP: No IARC: No OSHA Regulated: No  
Particles of aluminum deposited in the eye may cause irreversible tissue damage of the cornea. Al salts may cause dermatitis, eczema, conjunctivitis, and irritation of the mucous membranes of the upper respiratory tract. Long-term inhalation exposure to Al dusts or fumes has been associated with a fibrotic lung condition known as Shaver's disease; however, the evidence for this is not conclusive since affected workers were exposed to other substances (such as silica) as well. Symptoms of this condition may include shortness of breath, cough, and fatigue.

Copper (Cu) Carcinogenicity: NA NTP: No IARC: No OSHA Regulated: No  
Inhalation of Cu fume may cause irritation of the eyes, nose, and throat and a flu-like illness called metal fume fever. Signs and symptoms of metal fume fever include fever, muscle aches, nausea, chills, dry throat, cough, and weakness. Cu fume may also produce a metallic or sweet taste. Repeated or prolonged exposure to Cu fume may cause discoloration of the skin and hair.

Tungsten Carcinogenicity: NA NTP: No IARC: No OSHA Regulated: No

Chronic exposure to tungsten dust has caused respiratory disorders characterized by cough, labored breathing, and wheezing. There is no correlation between the onset of symptoms, length of exposure and the development of scarring in the lung tissue. Dermatitis (inflammation of the skin), primarily on the sides of the neck, inner forearm, and the backs of the hands, was also detected. Dusts of tungsten pose a hazard considered to be somewhat greater than that of nuisance dust.

**Usual Route(s) of Entry:**

Inhalation

**Medical Conditions Possibly Aggravated:**

Chronic diseases or disorders of the respiratory system

**Carcinogen Information:**

NTP and IARC consider (1) chromium and certain chromium compounds to be known human carcinogens and (2) nickel and certain nickel compounds to be probable human carcinogens.

=====FIRST AID AND MEDICAL EMERGENCY PROCEDURES=====

**Eye Contact:**

Not anticipated to pose a significant eye hazard.

**Skin Contact:**

Not anticipated to pose a significant skin hazard.

**Inhalation:**

Remove from excessive exposure levels unless proper respiratory protection is worn.

**Ingestion:**

Not considered an ingestion hazard.

=====OCCUPATIONAL EXPOSURE CONTROL MEASURES=====

**Engineering Controls (Ventilation, etc.):**

Ventilation should be sufficient to maintain exposure levels below the applicable exposure limit.

**Work Practices (Handling and Storage, etc.):**

Arc or spark generated when welding or burning on these products could be a source of ignition for combustible or flammable materials.

**Eye Protection:**

Not anticipated to pose a significant eye hazard.

**Skin Protection:**

Not anticipated to pose a significant skin hazard.

**Respiratory Protection:**

When engineering controls are not sufficient to lower exposure levels below the applicable exposure limit, use a NIOSH-approved respirator for dusts and metal fume within the use limits of the respirator.

=====SPILL, LEAK, AND DISPOSAL INFORMATION=====

**Procedures to Follow if Material is Released or Spilled:**

N/A

**Waste Disposal Method(s):**

Any excess product can be recycled for further use, disposed in a permitted hazardous waste landfill, or disposed by other methods which are in accordance with local, state, and federal regulations.

=====ADDITIONAL OR MISCELLANEOUS INFORMATION=====

None

## Footnotes:

- (1) Concentrations may vary somewhat between batches or lots. Where possible a concentration range is indicated. Occasionally, however, levels may even fall outside of the usual concentration ranges.
- (2) Common names, if applicable, appear in parentheses following the chemical names.
- (3) All values, unless otherwise specified, refer to 8-hour time-weighted average concentrations and units are in mg/M<sup>3</sup>.
- (4) As iron oxide fume.
- (5) As hexavalent chromium compounds.
- (6) As vanadium pentoxide fume.
- (7) As vanadium pentoxide respirable dust and fume.
- (8) As nickel metal.
- (9) Ceiling value.
- (10) As manganese fume.
- (11) As aluminum welding fumes.
- (12) As copper fume.
- (13) As copper mist or dust.
- (14) OSHA STEL

## Abbreviations:

NA = Not Applicable  
NE = Not Established  
UK = Unknown (No applicable information was found)  
GT = Greater Than  
LT = Less Than

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