

Section 1 – Chemical Product and Company Identification

Product/Chemical Name:	Carbon and Alloy Steel Rod or Bar	CAS Number:	Mixture
Intended Uses:	Machining, Creation of Hot or Cold Formed Parts, Manufacture of Steel Product		
Responsible Party:	Niagara LaSalle Corporation 1412 150 th Street Hammond, Indiana 46327	Manufacturer:	Various Manufacturers Inquire for Specific Details
General Information:	219-853-6000	Revision Number:	01
Emergencies:	219-853-6000 or Local Authorities	Revision Date:	02/05/2015

Section 2 – Hazards Identification
*******Emergency Overview*******

STEEL PRODUCTS, AS SOLD BY NIAGARA LASALLE CORPORATION, ARE NOT HAZARDOUS PER OSHA, GHS, 29CFR1910, 29CFR1915, OR 29CFR1926. This formed solid metal product poses little or no immediate health or fire hazard.

HOWEVER, when product is subjected to welding, burning, melting, sawing, brazing, grinding or other similar processes, potentially hazardous airborne particulate and fumes may be generated. These operations should be performed in well-ventilated areas. Avoid inhalation of metal dusts and fumes. Iron or steel foreign bodies imbedded in the cornea of the eye will product rust stains unless removed promptly. If appropriated, respiratory protection and other personal protective equipment should be used.

Potential Health Effects related to Fumes, Dust, and/or Particulate as a result of processing:

Primary Entry Routes: Inhalation and skin, if coated. Steel products in the natural state do not present an inhalation, ingestion or contact hazard. However operations such as burning, welding, sawing, brazing, machining and grinding may result in the following effects if exposures exceed recommended limits as listed in Section 2.

Target organs: Respiratory system

Acute Effects:

- **Inhalation:** Excessive exposure to high concentrations of dust may cause irritation to the eyes, skin and mucous membranes of the upper respiratory tract. Excessive inhalation of fumes of freshly formed metal oxide particles sized below 1.5 microns and usually between 0.02-0.05 microns from many metals can produce an acute reaction known as “metal fume fever”. Symptoms consist of chills and fever (very similar to and easily confused with flu symptoms), metallic taste in mouth, dryness and irritation of the throat followed by weakness and muscle pain. The symptoms come on in a few hours after excessive exposures and usually last from 12 to 48 hours. Long-term effects from metal fume fever have not been noted. Freshly formed oxide fumes of manganese have been associated with causing metal fume fever. Inhalation of chromium compounds may cause upper respiratory tract irritation. Sulfur compounds, present in generated fumes, may irritate the gastrointestinal tract.
- **Eye:** Particles of iron or iron compounds could become imbedded in the eye. Torching or burning operations on steel products with surface treatments, oil coatings, or acrylic films may produce emissions that can be irritating to the eyes. Sulfur compounds, present in generated fumes, may irritate the eyes.
- **Skin:** Skin contact with the metallic fumes and dusts may cause physical abrasion. Sulfur compounds, present in generated fumes, may irritate the skin. If applicable, repeated or prolonged contact with chemical surface treatments or oil residue may cause skin irritation, dermatitis, ulceration or allergic reactions in sensitized individuals.
- **Ingestion:** Ingestion of harmful amounts of this product as distributed is unlikely due to its solid insoluble form. Ingestions of dust may cause nausea or vomiting.

Chronic Effects: Chronic inhalation of metallic fumes and dusts are associated with the following conditions:

- **IRON OXIDE:** Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in the development of a benign pneumoconiosis, called siderosis, which is observable as an X-ray change. No physical impairment of lung

function has been associated with dieresis. Inhalation of excessive concentrations of ferric oxide may enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. Iron oxide is listed as a Group 3 (not classifiable) carcinogen by IARC (the International Agency for Research on Cancer).

- **BISMUTH:** Bismuth absorption through intact skin is considered negligible with minor absorption through broken skin. Bismuth is poorly absorbed through the intestinal tract but chronic ingestion or inhalation may lead to symptoms manifested as irritation of the mouth, excessive salivation; a foul breath odor; skin lesions; headache; appetite loss; abdominal pain; diarrhea; vomiting; or damage to the nervous system, liver or kidneys.
- **CARBON:** Chronic inhalation of high concentrations to carbon may cause pulmonary disorders.
- **CHROMIUM:** The health hazards associated with exposure to chromium are dependent upon its oxidation state. The metal form (chromium as it exists in this product) is of very low toxicity. The hexavalent form is very toxic. Repeated or prolonged exposure to hexavalent chromium compounds may cause respiratory irritation, nosebleed, ulceration and perforation of the nasal septum. Industrial exposure to certain forms of hexavalent chromium has been related to an increased incidence of cancer. The National Toxicology Program (NTP) Fourth Annual report on Carcinogens cites "certain Chromium compounds" as human carcinogens. ACGIH has review the toxicity data and concluded that chromium metal is not classifiable as a human carcinogen.
- **LEAD:** Lead compounds can be toxic when ingested or inhaled. Lead is a cumulative poison. The predominant effects of excessive exposure are anemia, nervous system disorders, and kidney damage. Nervous systems disorders may be displayed as irritability, headaches, insomnia, convulsions, and muscular tremors, or pals of the extremities. Excessive exposure can have adverse effects on human reproduction. IARC concludes that there is inadequate evidence to list lead or lead compounds as a human carcinogen. Acute exposure to lead can be manifested as abdominal pain, nausea, constipation, anorexia, or vomiting; and, in severe cases coma or death.
- **MANGANESE:** Chronic exposure to high concentrations of manganese fumes and dusts may adversely affect the central nervous system with symptoms including languor, sleepiness, weakness, emotional disturbances, spastic gait, masklike facial expression and paralysis. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections.
- **MOLYBDENUM;** Certain handling operation, such as burning and welding, may generate both insoluble molybdenum compounds (metal and molybdenum dioxide) and soluble molybdenum compounds (molybdenum trioxide). Molybdenum compounds generally exhibit a low order of toxicity with the trioxide the more toxic. However, some reports indicate that the dust of the molybdenum metal, molybdenum, dioxide and molybdenum trioxide may cause eye, skin, nose and throat irritation in animals.
- **NICKEL:** Inhalation may result in inflammation of the respiratory tract that may be accompanied by fever. Nickel compounds are known sensitizers. The National Toxicology Program (NTP) and the International Agency for Research on Cancer (IARC) report they possess limited evidence for human cancer for nickel and certain nickel compounds.
- **SELENIUM:** Selenium itself is relatively no-reactive. Some compounds may cause skin irritations, blisters or rash. Exposure is usually through inhalation, although ingestion and skin absorption are routes of entry for some selenium compounds. Possible metallic taste in the mouth, metal fume fever, garlic odor breath, or indigestion is possible. Potential liver or kidney damage from high exposure.
- **SILICON:** Silicon dusts are a low health risk by inhalation and should be treated as a nuisance dust. Eye contact with pure material can cause particulate irritation. Skin contact with silicon dusts may cause physical abrasion.
- **SULFUR (sulfur dioxide):** Inhalation of sulfur dioxide gas can cause nose and throat irritation resulting in sneezing or coughing with possible lacrimation. Sulfur dioxide affects the respiratory tract, causing bronchial irritation, difficulty in breathing, and pulmonary edema.
- **TELLURIUM:** Inhalation of tellurium has reportedly resulted in loss of appetite, nausea, dryness of the mouth and metallic taste, and garlic odor of the breath and sweat.
- **VANADIUM:** Inhalation of vanadium oxides may result in metallic taste, throat irritation, cough and/or bronchitis. Contact may cause local irritation.

Long-term inhalation exposure to high concentrations (over-exposure) to pneumoconiosis agents may act synergistically with inhalation of oxides, fumes or dusts of this product to cause toxic effects.

- **Carcinogenicity:** IARC, NTP, AND OSHA DO NOT LIST STEEL PRODUCTS AS CARCINOGENS. IARC identifies nickel and certain nickel compounds and welding fumes as Group 2B carcinogens that are possible carcinogenic to humans. ACGIH lists insoluble nickel compounds as confirmed human carcinogens. IARC lists chromium metal and trivalent chromium compounds as Group 3 carcinogens, not classifiable as to their human carcinogenicity. Hexavalent chromium compounds are listed by IARC as Group 1 carcinogens that are carcinogenic to humans. NTP Fourth Annual report on Carcinogens cites "certain Chromium compounds" as human carcinogens. ACGIH has review the toxicity data and concluded that chromium metal is not classifiable as a human carcinogen.

Medical Conditions Aggravated by Long-Term Exposure: Individuals with chronic respiratory disorders (i.e., asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.

SARA Potential Hazard Categories: Immediate Acute Health Hazard, Delayed Chronic Health Hazards.

Section 3 – Composition / Information on Ingredients

Ingredient Name	CAS Number	Percentage by Wt.
Iron	7439-89-6	95 – 99
Bismuth*	7440-69-9	0 – 0.5
Carbon	7440-44-0	0 – 1.0
Chromium	7440-47-3	0 – 1.2
Copper	7440-50-8	0.005 – 0.5
Lead (inorganic)*	7439-92-1	0.001 – 0.35
Manganese	7439-96-5	0 – 2.5
Molybdenum	7439-98-7	0 – 1.0
Nickel	7440-02-0	0.004 – 2.1
Selenium	7782-49-2	0 – 0.06
Silicon	7440-21-3	0 – 1.6
Sulfur (SO ₂)	74404-34-9	0 – 0.5
Tellurium*	13494-80-9	0 – 0.1
Vanadium (V ₂ O ₅)	7440-62-2	0.001 – 0.5

***Certain Products**

Notes:

All commercial steel products contain small amounts of various elements in addition to those listed. These small quantities are frequently referred to as “trace” or “residual” elements that generally originate in the raw materials used. Steel products may contain the following trace or residual elements including typical percentages for the elements identified: Aluminum (typically <0.1), boron (≤0.005 max, typically 0.001%), calcium (≤0.005 max, typically 0.0003%), columbium (≤0.15 max, typically 0.002%), phosphorous (≤0.1 max, typically 0.01%) sulfur (≤0.05 max, typically, 0.007%), tin (≤0.03 max.), titanium (≤0.15 max, typically 0.002%). Other trace elements not frequently identified, may include antimony, arsenic, cadmium, cobalt, and zirconium.

- **Percentages are expressed as typical ranges or maximum concentrations of trace elements for the purpose of communicating the potential hazards of the finished product. Consult product specifications for specific composition information.**
- Product surfaces may be treated with small amounts of corrosion-inhibiting oil that may contain mineral oil or petroleum distillates, or paints, epoxies, laminates, etc., generally applied at the customer’s request. Refer to the coating manufacturer’s MSDS for hazards associated with coatings.

Section 4 – First Aid Measures

Inhalation: For over-exposure to airborne fumes and particulate, remove exposed person to fresh air. If breathing is difficult or has stopped, administer artificial respiration or oxygen as indicated. Seek medical attention promptly.

Eye Contact: Flush with large amounts of clean water to remove particles. Seek medical attention if irritation persists.

Skin Contact: Remove contaminated clothing. Wash affected areas with soap or mild detergent and water. If thermal burn has occurred, flush are with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention. If cut, clean the area and seek a tetanus shot if one has not received one in the last 10 years.

Ingestion: Not a probable route of industrial exposure. However, if ingested, obtain medical advice.

Section 5 – Fire-Fighting Measures

Flash Point: Not Applicable

LEL: Not Applicable

Flash Point Method: Not Applicable

UEL: Not Applicable

Burning Rate: Not Applicable

Auto-ignition Temperature: Not Applicable

Flammability Classification: Non –Flammable, Non-Combustible.

Extinguishing Media: Not applicable for solid product. Use extinguishers appropriate for surrounding materials. Don't use water on molten metals.

Unusual Fire or Explosion Hazards: High concentrations of airborne metallic fines may present an explosion hazard. Not applicable for solid product.

Hazardous Combustion Products: At temperatures above the melting point, fumes containing metal oxides and other alloying elements may be liberated. If present, surface treatments such as corrosion-inhibiting oils, resin, or coatings on the product may yield noxious gases such as oxides of carbon.

Fire-Fighting Instructions: Do not release runoff from fire control methods to sewers or waterways.

Fire-Fighting Equipment: Wear a self-contained breathing apparatus (SCBA) with a full face piece operated in pressure-demand or positive pressure mode and full protective clothing.

Section 6 – Accidental Release Measures

Spill/Leak Procedures: Not applicable to metal in solid state. For spills involving finely divided particles, personnel should be protected against contact with eyes and skin. If material is in a dry state, avoid inhalation of dust. Fine, Dry material should be removed by vacuuming or wet sweeping methods to prevent spreading of dust. Avoid using compressed air. Do not release into sewers or waterways. Collect material in appropriate, labeled containers for recovery or disposal in accordance with Federal, state, and local regulations.

Regulatory Requirements: Follow applicable OSHA regulation (29 CFR 1910.120) and all other pertinent state and Federal requirements.

Section 7 – Handling and Storage

Handling Precautions: Use lifting and work devices, within rated capacities and in accordance with manufacturer's instructions when handling these products. Operations with the potential for generating high concentrations of airborne particles should be evaluated and controlled as needed. Minimize generation of airborne dust and fume. Avoid breathing metal dust or fumes. Practice good housekeeping.

Storage Requirements: Store away from acids and incompatible materials.

Section 8 – Exposure Controls/Personal Protection

Engineering Controls: Use controls as appropriate to minimize exposure to metal fumes and dusts during handling operations. Ventilation: Provide general or local exhaust ventilation systems to minimize airborne concentrations. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls: do not use compressed air to clean-up accumulated material or dust. Minimize generation of airborne emissions.

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen.

Protective Clothing/Equipment: For operations which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use protective clothing, gloves and safety glasses to prevent skin and eye contact. Contact lenses should not be worn where industrial exposures to this material are likely. Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations. Protective gloves should

be worn as required for welding, burning or handling operations. Where oil coating is applied to the product, wear gloves when handling, do not continue to use gloves or work clothing that has become saturated or soaked through with oil coating. Wash skin that has been exposed to oil with soap and water or waterless hand cleaner.

Section 9 – Physical and Chemical Properties

Physical State: Solid

Appearance and Odor: Metallic Gray, Odorless

Odor Threshold: Not Applicable

Vapor Pressure: Not Applicable

Vapor Density (Air +1): Not Applicable

Formula Weight: Not Applicable

Density: 7:85

Specific Gravity (H₂O = 1, at 4°C): 7.85

pH: Not Applicable

Water Solubility: Insoluble

Other Solubility: Not applicable

Boiling Point: Not Applicable

Viscosity: Not Applicable

Refractive Index: Not Applicable

Surface Tension: Not Applicable

% Volatile: Not Applicable

Evaporation Rate: Not Applicable

Freezing/Melting Point: 1510°C, (2750°F)

Section 10 – Stability and Reactivity

Stability: Steel products are stable under normal storage and handling conditions.

Polymerization: Hazardous polymerization will not occur.

Chemical Incompatibilities: Will react with strong acids to form hydrogen. Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion. Steel at a temperature at or above the melting point may liberate fumes containing oxide of iron and alloying elements.

Conditions to Avoid: Avoid storage with strong acids or calcium hypochlorite. Avoid contact with Strong Acids and Strong Oxidizers.

Hazardous Decomposition Products: Thermal oxidative decomposition from welding of steel products can produce fumes containing oxides of iron, manganese as well as other elements. If present, surface treatments such as corrosion-inhibiting oils, resin, or coating on the product may yield noxious gases such as the oxides of carbon upon thermal oxidative decomposition. Refer to ANSI Z49.1

Section 11 – Toxicological Information

Toxicity Data:* No information is available for the product as a mixture. The possible presence of chemical surface treatments and oil coatings should be considered when evaluating potential employee hazards and exposures during handling and welding or other fume generating activities.

Eye Effects:

Eye contact with the individual components may cause particulate irritation. Implantation of iron particles in guinea pig corneas have resulted I rust rings with corneal softening about rust ring.

Skin Effects:

Not anticipated to pose significant skin hazards. Skin contact with the individual components may cause physical abrasion, irritation, dermatitis, ulcerations and sensitizations.

Chronic Effect: Refer to Section 3

Mutagenicity: NIF

Teratogenicity: NIF

Acute Inhalation Effects:

Inhalation of the individual alloy components has been shown to cause various respiratory effects.

Acute Oral Effects:

No Information Found (NIF)

Other: No LC50 or LD50 has been established for the mixture As a whole. Iron LD50: 30 g/kg oral (rat), Bismuth: NIF Carbon LD50: NIF, Chromium LD_{Lo}: 71 mg/kg GIT oral (human), Copper LD_{Lo}: 120 ug/kg GIT intrapleural (rat), Lead LD_{Lo}:155 mg/kg oral (rat), Molybdenum LD_{Lo}: 114 mg/kg intraperitoneal *rat), Nickel LD_{Lo}: 5mg/kg oral (guinea pig), Selenium LD50: 6,700 mg/kg oral (rat), SiliconLD50: NIF, Sulfur LD50: NIF, Tellurium LD50: 83 mg/kg oral (rat), Vanadium LD50: 59 mg/kg subcutaneous (rabbit).

Carcinogenicity: Chromium and Nickel, Refer to Section 3

The primary component of this product is iron. Long-term exposure to iron dusts or fumes can result in a condition called siderosis which is considered to be a benign pneumoconiosis. Symptoms may include chronic bronchitis, emphysema, and shortness of breath upon exertion. Penetration of iron particles in the skin or eye may cause an exogenous or ocular siderosis which may be

characterized by a red-brown Carbon and Alloy Steels pigmentation of the affected area. Ingestion overexposures to iron may affect the gastrointestinal, nervous, and hematopoietic system and the liver. Iron and steel founding, but not iron or iron oxide, has been listed as carcinogenic (Group 1) by IARC.

When this product is welded, fumes are generated. Welding fumes may be different in composition from the original welding product, with the chief component being ordinary oxides of the metal being welded. Chronic health effects (including cancer) have been associated with the fumes and dusts of individual component metals (see above), and welding fumes as a general category have been listed by IARC as a carcinogen (Group 2B). There is also limited evidence that welding fumes may cause adverse reproductive and fetal effects. Evidence is stronger where welding materials contain known reproductive toxins, e.g., lead, which may be present in the coating material of this product.

Breathing fumes or dusts of this product may result in metal fume fever, which is an illness produced by inhaling metal oxides. These oxides are produced by heating various metals including cadmium, zinc, magnesium, copper, antimony, nickel, cobalt, manganese, tin, lead, beryllium, silver, chromium, aluminum, selenium, iron, and arsenic. The most common agents involved are zinc and copper.

This product may contain small amounts of manganese. Prolonged exposure to manganese dusts or fumes is associated with "manganism", a Parkinson-like syndrome characterized by a variety of neurological symptoms including muscle spasms, gait disturbances, tremors, and psychoses.

This product may contain small amounts of cadmium. Primary target organs for cadmium overexposure are the lung and the kidney. Because of its cumulative nature, chronic cadmium poisoning can cause serious disease which takes many years to develop and may continue to progress despite cessation of exposure. Progression of the disease may not reflect current exposure conditions. It is also capable of causing a painful osteomalacia called "Itai-Itai" in postmenopausal women, and has caused developmental effects and/or reproductive effects in male and female animals. Cadmium is a listed carcinogen by NTP, OSHA, and IARC (Group 1).

This product may contain small amounts of chromium. Prolonged and repeated overexposure to chromium dusts or fumes may cause skin ulcers, nasal irritation and ulceration, kidney damage and cancer of the respiratory system. Chromium is skin sensitizer. Cancer is generally attributed to the hexavalent (+6) form of chromium which is listed as a carcinogen by NTP and IARC (Group 1).

This product may contain small amounts of nickel. Prolonged and repeated contact with nickel may cause sensitization dermatitis. Inhalation of nickel compounds has caused lung damage as well as sinus, nasal and lung cancer in laboratory animals. Nickel is a listed carcinogen by NTP and IARC (Group 1).

This product may contain small amounts of vanadium. Adverse effects from dermal, inhalation or parenteral exposure to various vanadium compounds have been reported. The major target for vanadium pentoxide toxicity is the respiratory tract. Fumes or dust can cause severe eye and respiratory irritation, and systemic effects. Chronic bronchitis, green tongue, conjunctivitis, pharyngitis, rhinitis, rales, chronic productive cough, and tightness of the chest have been reported following overexposure. Allergic reactions resulting from skin and inhalation exposures have also been reported. A statistical association between vanadium air levels and lung cancer has been suggested, but vanadium currently is not regarded as a human carcinogen.

This product may contain small amounts of lead. Lead can accumulate in the body. Consequently, exposure to fumes or dust may produce signs of polyneuritis, diminished vision and peripheral neuropathy, such as tingling and loss of feeling in fingers, arms and legs. Lead is a known reproductive and developmental toxin. It is also associated with central nervous system disorders, anemia, kidney dysfunction, and neurobehavioral abnormalities. The brain is a major target organ for lead exposure. Elemental lead is listed as an IARC 2B carcinogen.

The product may contain small amounts of copper. Copper dust and fumes can irritate the eyes, nose and throat causing coughing, wheezing, nosebleeds, ulcers and metal fume fever. Other effects from repeated Carbon and Alloy Steels inhalation of copper fumes include a metallic or sweet taste, and discoloration of skin, teeth or hair. Copper also may cause an allergic skin reaction. Overexposure to copper can affect the liver.

Section 12 – Ecological Information

Ecotoxicity: No data available for the product as a whole. However, individual components of the product have been found to be toxic to the environment. Metal dusts migrate into soil and groundwater and can be ingested by wildlife.

Environmental Fate: No Information Found (NIF)

Environmental Degradation: NIF

Soil Absorption/Mobility: No data available for the product as a whole. However, individual components of the product have been found to be absorbed by plants from soil.

Section 13 – Disposal Considerations

Disposal: This material is considered to be a solid waste, not a hazardous waste. Follow applicable Federal, state, and local regulations for disposal of solid waste and airborne particulates accumulated during handling operations of the product. Waste steel products can be recycled for further use. Prevent materials from entering drains, sewers, and waterways.

Disposal Regulatory Requirements: None

Container Cleaning and Disposal: Follow applicable Federal, state and local regulations. Observe safe handling precautions.

Section 14 - Transportation Information

Refer to all Local Laws and Regulations specific to transportation type.

Section 15 - Regulatory Information

Refer to all Local Laws and Regulations

Section 16 - Other Information

Prepared By: Niagara LaSalle Corporation

Hazard Rating System:

NFPA Code: 0-0-0

HMIS Code: 0-0-0

PPR: See Section 8

Revision Date	Revision Number	Changes Made	Comments
11/01/2014	00	Created Entire Document	1 st Draft SDS Document
02/05/2015	01	Updates to Section 2 and 3	Completed 1 st Draft for Review

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