Material Safety Data Sheet

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Alloy, Carbon or HSLA Steel Plate

MSDS ID Number: AM USA - 003

Synonyms: Alloy Steel Plate, Carbon Steel Plate, HSLA Steel Plate

CAS Number: Mixture

Manufacturer: ArcelorMittal USA Inc.
1 South Dearborn Street
Chicago, IL 60603-9888

General Information: email at: msdssupport@arcelormittal.com

Original Issue Date: 8/26/02

CHEMTREC (Day or Night): 1-800-424-9300

Emergency Contact: 1-760-476-3962, 3E Company Code: 333211

Revised: 02/08/12

Section 2 - Composition / Information on Ingredients

Ingredient Name	CAS Number	Percentage by wt. *	OSHA PEL [1]	ACGIH TLV [2]
Iron	7439-89-6	88 – 100	10 mg/m³ (as iron oxide fume)	5.0 mg/m³ (as iron oxide dust and fume)
Aluminum	7429-90-5	0 - 0.15	15 mg/m³ (as total dust, PNOR[3]) 5.0 mg/m³ (as respirable fraction[6], PNOR)	10 mg/m³ (as metal dust) 5.0 mg/m³ (as welding fume)
Carbon	7440-44-0	0 – 1.6	15 mg/m³ (as total dust, PNOR) 5.0 mg/m³ (as respirable fraction, PNOR)	10 mg/m³ (as inhalable fraction[4], PNOS[5]) 3.0 mg/m³ (as respirable fraction[6], PNOS)
Chromium	7440-47-3	0 – 10.0	1.0 mg/m³ (as chromium metal)	0.5 mg/m³ (as chromium metal & Cr III compounds)
Copper	7440-50-8	0 – 1.75	0.1 mg/m³ (as fume, Cu) 1.0 mg/m³ (as dusts & mists, Cu)	0.1 mg/m³ (as fume) 1.0 mg/m³ (as dusts & mists, Cu)
Manganese	7439-96-5	0 - 2.0	"C" 5.0 mg/m³ (as fume & Mn compounds)	0.2 mg/m³
Molybdenum	7439-98-7	0 – 1.8	15 mg/m³ (as total dust, PNOR) 5.0 mg/m³ (as respirable fraction, PNOR)	10 mg/m³ (as insoluble compounds) 5.0 mg/m³ (as soluble compounds)
Nickel	7440-02-0	0 – 9.5	1.0 mg/m³ (as metal & insoluble compounds, Ni)	1.5 mg/m³ (as elemental nickel, Ni) 0.2 mg/m³ (as insoluble compounds)
Phosphorus	7723-14-0	0 - 0.035	0.1 mg/m³	0.1 mg/m³
Silicon	7440-21-3	0 – 2.25	15 mg/m³ (as total dust, PNOR) 5.0 mg/m³ (as respirable fraction, PNOR)	10 mg/m³
Vanadium	7440-62-2	0 – 0.55	0.5 mg.m^3 (as respirable dust, PNOR) 0.1 mg/m^3 (as fume)	0.05 mg/m^3

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. Steel products may contain the following trace or residual elements including typical percentages for the elements identified: antimony 0.0025%, arsenic 0.01%, boron 0.006%, cobalt 0.06%, niobium (columbium) 0.06 - 0.1%, nitrogen 0.015%, sulfur 0.04 – 0.33%, tin 0.03%, titanium 0.05%, and zirconium 0.15%.

* 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.

1 OSHA (Occupational Safety and Health Administration) PELs (Permissible Exposure Limits) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A "C" designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted.

2 TLV (Threshold Limit Values) established by ACGIH (the American Conference of Governmental Industrial Hygienists) are 8-hour TWA concentrations unless otherwise noted.

3 PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by a limit which is the same as the inert or nuisance dust limit of 15 mg/m^3 for total dust and 5 mg/m^3 for the respirable fraction.

4 Inhalable fraction - The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH 2009 TLVs® and BEIs® (Biological Exposure Indices) Appendix D, paragraph A.

5 PNOS (Particulates Not Otherwise Specified) - Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos and <1% crystalline silica. A TWA-TLV of 10 mg/m^3 for inhalable particulate and 3 mg/m^3 for respirable particulate has been recommended.

6 Respirable fraction - The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in the 2009 TLVs ® and BEIs ® (Biological Exposure Indices) Appendix D, paragraph C by ACGIH.

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

This formed solid metal product poses little or no immediate health or fire hazard. 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 produce rust stains unless removed promptly. If appropriate, respiratory protection and other personal protective equipment should be used.

Potential Health Effects

Primary Entry Routes: 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. Steel surfaces may be treated with small amounts of corrosion resistant paints, epoxies, laminates, etc., generally applied at the customer's request. Refer to the coating manufacturer's MSDS for hazards associated with the coatings.

Target Organs: Respiratory system and skin

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 the mouth, dryness and irritation of the throat followed by weakness and muscle pain. After excessive exposures, onset of symptoms present after a few hours 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 and copper 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. Molybdenum, nickel, phosphorus oxide and vanadium compounds, especially vanadium pentoxide, are respiratory tract irritants.
- **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.
- **Skin:** Skin contact with metallic fumes and dusts may cause physical abrasion. Chromium, molybdenum and vanadium compounds, especially vanadium pentoxide, are skin irritants. Exposure to nickel may cause contact and atopic dermatitis and allergic sensitization. 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. Ingestion 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 siderosis. 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).
- **ALUMINUM**: Aluminum dusts/fines are a low health risk by inhalation and should be treated as a nuisance dust. Aluminum dust is a respiratory and eye irritant.
- **CARBON**: Chronic inhalation of high concentrations of 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 NTP's (National Toxicology Program's) Fourth Annual Report on Carcinogens cites "certain Chromium compounds" as human carcinogens. ACGIH has reviewed the toxicity data and concluded that chromium metal is not classifiable as a human carcinogen.
- **COPPER**: Inhalation of high concentrations of freshly formed oxide fumes and dusts of copper can cause "metal fume fever". Chronic inhalation of copper dust has caused, in animals, hemolysis of the red blood cells, deposition of hemofuscin in the liver and pancreas, injury to lung cells and gastrointestinal symptoms.
- **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, mask-like facial expression and paralysis. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections.
- **MOLYBDENUM**: Certain handling operations, 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 being 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**: Exposure to nickel dusts and fumes can cause sensitization dermatitis, respiratory irritation, asthma, pulmonary fibrosis, edema; and may cause nasal or lung cancer in humans. IARC lists nickel and certain nickel compounds as Group 2B carcinogens (sufficient animal data). ACGIH 2009 TLVs® and BEIs® lists insoluble nickel compounds as confirmed human carcinogens.
- **PHOSPHOROUS**: Inhalation of phosphorous oxides may cause respiratory irritation.
- **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.
- **VANADIUM**: Excessive long term or repeated exposures to vanadium compounds, especially the pentoxide, may result in chronic pulmonary changes such as emphysema or bronchitis.

Long-term inhalation exposure to high concentrations (over-exposure) to pneumoconiotic 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 possibly 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 reviewed 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 Hazard

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 area with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention.

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; however, use extinguishers appropriate for surrounding materials.

Unusual Fire or Explosion Hazards: Not applicable for solid product; however, high concentrations of airborne metallic fines may present an explosion hazard. Molten metal may react violently with water. **Do not use water on molten metal**.

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 the 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 steel in solid state; however, for spills involving finely divided particles, clean-up 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 regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable federal, state, and local regulations.

Section 7 – Handling and Storage

Handling Precautions: Use lifting and work devices, i.e., crane, hoist, etc., within rated capacities, and in accordance with manufacturer's instructions when handling this product. Operations with the potential for generating high concentrations of airborne particles should be evaluated and controlled as needed. Minimize generation of airborne dust and fumes. 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 dust during handling operations.

Ventilation: Provide general or local exhaust ventilation systems to minimize airborne concentrations. Local exhaust ventilation is preferred to prevent 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.

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 g/cm^3
Specific Gravity (H_2O = 1, at 4 °C): 7.85
pH: Not Applicable

Water Solubility: Insoluble
Other Solubilities: 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: Base Metal 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.

Conditions to Avoid: Avoid storage with strong acids or calcium hypochlorite. Molten metal may react violently with water.

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

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 health 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 in 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 Effects: Refer to Section 3

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), Aluminum LD50: NIF, Carbon LD50: NIF, Chromium LD_{Lo}: 71 mg/kg GIT orl (human), Copper LD_{Lo}: 120 ug/kg GIT ipl (rat), Manganese LD50: 9 g/kg oral (rat), Molybdenum LD_{Lo}: 114 mg/kg ipr (rat), Nickel LD_{Lo}: 5 mg/kg orl (guinea pig), Phosphorous LD50: NIF, Silicon LD50: NIF, Vanadium LD50: 59 mg/kg scu (rabbit).

Carcinogenicity: Chromium and Nickel, Refer to Section 3

Mutagenicity: NIF

Teratogenicity: NIF

* See NIOSH, *RTECS* (NO7400000), for additional toxicity data on iron oxide, (BD1200000) for aluminum oxide, (FF5250000) for carbon, (GB5425000) for chromium, (GL5325000) for copper, (OO9275000) for manganese, (QA4680000) for molybdenum, (QR5950000) for nickel, (TH3500000) for phosphorous, (WM0400000) for silicon, (YW2460000) for vanadium pentoxide.

Section 12 - Ecological Information

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

Environmental Fate: No Information Found (NIF).

Environmental Degradation: NIF

Soil Absorption/Mobility: NIF for the product; 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.

Disposal Regulatory Requirements: No Information Found (NIF).

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

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Alloy, Carbon and HSLA Steels are not listed as hazardous substances under 49 CFR 172.101

Shipping Name: Not Applicable

Shipping Symbols: Not Applicable

Hazard Class: Not Applicable

ID No.: Not Applicable

Packing Group: Not Applicable

Label: Not Applicable

Special Provisions (172.102): None

Packaging Authorizations

a) Exceptions: None

b) Non-bulk Packaging: Not Applicable

c) Bulk Packaging: Not Applicable

Quantity Limitations

a) Passenger, Aircraft, or Railcar: Not Applicable

b) Cargo Aircraft Only: Not Applicable

Vessel Stowage Requirements

a) Vessel Stowage: Not Applicable

b) Other: Not Applicable

Section 15 – Regulatory Information

Regulatory Information: *The following listing of regulations relating to an ArcelorMittal USA Inc. product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.*

This product and/or its constituents are subject to the following regulations:

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-2, Z-3): Steel products, as a whole is not listed. However, individual components of the product are listed (Refer to Section 2, Exposure Limits).

EPA Regulations:

RCRA: Chromium and Nickel are regulated under this act.

CERCLA Hazardous Substance (40 CFR 302.4): The product as a whole is not listed. However, individual components of the product are listed: Chromium, Copper, Manganese compounds, Nickel and Phosphorous are listed under SARA 302.

SARA 311/312 Codes: Immediate (acute) health hazard and delayed (chronic) health hazard

SARA 313: Aluminum (fume or dust), Chromium, Copper, Manganese, Nickel and Phosphorous are subject to SARA 313 reporting requirements. Please also note that if you prepackage or otherwise redistribute this product to industrial customers, SARA 313 requires that a notice be sent to those customers.

Clean Water Act: Chromium, Copper and Nickel are Section 307 Priority Pollutants. Phosphorus is a Section 311 hazardous chemical.

Safe Drinking Water Act: Aluminum, Chromium, Copper, Molybdenum, Nickel and Vanadium are regulated under this act.

State Regulations: The product as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations.

Pennsylvania Right to Know: Contains regulated material in the following categories:

- Hazardous Substances: Copper, Molybdenum, Silicon
- Environmental Hazards: Aluminum, Chromium, Copper, Manganese, Nickel, Phosphorous and Vanadium
- Special Hazard Substances: Chromium and Nickel

New Jersey Right to Know: Contains regulated material in the following categories:

- Environmental Hazardous Substance: Aluminum (fume or dust), Chromium, Copper, Manganese, Nickel, Phosphorous and Vanadium (fume or dust)
- Special Health Hazard Substances: Not regulated

California Prop. 65: Nickel is a material known to cause cancer or reproductive toxicity.

Other Regulations: The product is not listed in any state regulations. However, individual components of the product are listed in various state regulations.

WHMIS (Canadian): D2B Product Classification

Section 16 – Other Information

Prepared By: ArcelorMittal USA Inc.

Hazard Rating Systems:

NFPA Code: 0-0-0 HMIS Code: 0-0-0 PPE: See Section 8

ABBREVIATIONS/ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
BEIs	Biological Exposure Indices
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNS	Central Nervous System
GI, GIT	Gastro-Intestinal, Gastro-Intestinal Tract
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
LC50	Median Lethal Concentration
LD50	Median Lethal Dose
LD_{Lo}	Lowest Dose to have killed animals or humans
LEL	Lower Explosive Limit
$\mu g/m^3$	microgram per cubic meter of air
mg/m^3	milligram per cubic meter of air
mppcf	million particles per cubic foot
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association

NIF	No Information Found
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
ORC	Organization Resources Counselors
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PNOR	Particulate Not Otherwise Regulated
PNOC	Particulate Not Otherwise Classified
PPE	Personal Protective Equipment
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendment and Reauthorization Act
SCBA	Self-contained Breathing Apparatus
STEL	Short-term Exposure Limit
TLV	Threshold Limit Value
TWA	Time-weighted Average
UEL	Upper Explosive Limit

Disclaimer: This information is taken from sources or based upon data believed to be reliable. Our objective in sending this information is to help you protect the health and safety of your personnel and to comply with the OSHA Hazard Communication Standard and Title III of the Superfund Amendment and Reauthorization Act of 1986. ArcelorMittal USA Inc. makes no warranty as to the absolute correctness, completeness, or sufficiency of any of the foregoing, or any additional, or other measures that may not be required under particular conditions. ARCELORMITTAL USA INC. MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY, OR ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING OR TRADE.

LABEL

Alloy, Carbon or HSLA Steel Plate

GENERAL HAZARD STATEMENT: This formed solid product poses little or no immediate health or fire hazard. 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 produce rust stains unless removed promptly.

If appropriate, respiratory protection and other personal protective equipment should be used.

CAUTION

DUST OR FUME GENERATED DURING WELDING OR OTHER PROCESSING MAY CAUSE:

RESPIRATORY TRACT, SKIN, AND EYE IRRITATION AND/OR SENSITIZATION, AND MAY CAUSE METAL FUME FEVER.

CANCER HAZARD (CONTAINS NICKEL AND CHROMIUM*). RISKS WILL DEPEND UPON TYPE OF PROCESSING. EFFECTS WILL DEPEND ON DURATION AND LEVEL OF EXPOSURE.

Consult MSDS for more information

**** The chromium metal in these alloys is in the zero valence state. As such, chromium metal does not present any unusual health hazard. However, welding, torch cutting, brazing or perhaps grinding on this product may generate airborne concentrations of hexavalent chromium (Cr^{+6}), metallic nickel and nickel alloys. The International Agency for Research on Cancer classified hexavalent chromium as a category 1 confirmed human carcinogen and metallic nickel and alloys as a category 2B possibly carcinogenic to humans.***

PRECAUTIONS: Avoid breathing or contact with dust or fume. Adequate ventilation is required while welding burning, melting, cutting, brazing, grinding, and machining. Wear appropriate personal protective equipment.

FIRST AID:

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 area with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention.*

INGESTION *- Not a probable route of industrial exposure; however, if ingested, obtain medical advice.*

For additional information refer to appropriate Material Safety Data Sheet available at:
http://www.arcelormittal.com/environment/us/datasheets.html
Product Name: Alloy, Carbon or HSLA Steel Plate

ArcelorMittal USA Inc.

1 South Dearborn Street Chicago, IL 60603-9888

General Information:
msdssupport@arcelormittal.com or
1-760-476-3962, 3E Company Code: 333211

Original Issue Date: 01/01/2011 **Revised:** 02/08/2012

Material Safety Data Sheet

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Carbon and Alloy Steel Rod or Bar

Reference Number: AM USA - 007

Synonyms: Refer to Section 16 for product synonyms

CAS Number: Mixture

Manufacturer: ArcelorMittal USA Inc.
1 South Dearborn Street
Chicago, IL 60603-9888

General Information: email at: msdssupport@arcelormittal.com

Original Issue Date: 8/01/04

CHEMTREC (Day or Night): 1-800-424-9300

Revised: 02/08/12

Emergency Contact: 1-760-476-3962, 3E Company Code: 333211

Section 2 - Composition / Information on Ingredients

Ingredient Name	CAS Number	Percentage by wt.	OSHA PEL [1]	ACGIH TLV [2]
Iron	7439-89-6	95 – 99	10 mg/m³ - Iron oxide fume	5 mg/m³ - Iron oxide dust and fume
Bismuth *	7440-69-9	0 – 0.5	15 mg/m³ -as total dust (PNOR) [3] 5 mg/m³ - as respirable fraction (PNOR)	10 mg/m³ - Inhalable fraction[4] (PNOS) [5] 3 mg/m³ - as respirable fraction[6] (PNOS)
Carbon	7440-44-0	0 – 1.0	15 mg/m³ -as total dust (PNOR) [3] 5 mg/m³ - as respirable fraction (PNOR)	10 mg/m³ - Inhalable fraction[4] (PNOS) [5] 3 mg/m³ - as respirable fraction[6] (PNOS)
Chromium	7440-47-3	0 – 1.2	1 mg/m³ - Chromium metal	0.5 mg/m³ - Chromium metal & Cr III compounds
Copper	7440-50-8	0.005 - 0.5	0.1 mg/m³ - Fume (as Cu) 1 mg/m³ - Dusts & mists (as Cu)	0.1 mg/m³ - Fume 1 mg/m³ - Dusts & mists (as Cu)
Lead (inorganic) *	7439-92-1	0.001-0.35	0.05mg/m^3	0.05mg/m^3
Manganese	7439-96-5	0 – 2.5	5 mg/m³ (C) - Fume & Mn compounds	0.2 mg/m³
Molybdenum	7439-98-7	0 – 1.0	15 mg/m³ - as total dust 5 mg/m³ - as respirable fraction	10 mg/m³– Insoluble Compounds 5 mg/m³– Soluble Compounds
Nickel	7440-02-0	0.004 – 2.1	1 mg/m³ - Metal & insoluble compounds (as Ni)	1.5 mg/m³ - Elemental nickel (as Ni) 0.2 mg/m³ - Insoluble compounds (NOS)[7]
Selenium	7782-49-2	0- 0.06	0.2 mg/m³ (as Se)	0.2 mg/m³ (as Se)
Silicon	7440-21-3	0 – 1.6	15 mg/m³ - as total dust 5 mg/m³ - as respirable fraction	10 mg/m³
Sulfur (SO_2)	7704-34-9	0 –0.5	13 mg/m^3	5.2 mg/m^3
Tellurium *	13494-80-9	0 – 0.1	0.1 mg/m^3	0.1 mg/m^3
Vanadium (V_2O_5)	7440-62-2	0.001 - 0.5	0.5 mg/m³ - as respirable fraction 0.1 mg/m³ - Fume	0.05 mg/m^3

*** 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 (≤ .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.

1 OSHA PELs (Permissible Exposure Limits) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A "C" designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted.

2 Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted.

3 PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by a limit which is the same as the inert or nuisance dust limit of 15 mg/m3 for total dust and 5 mg/m3 for the respirable fraction.

4 Inhalable fraction. The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH 2009 TLVs® and BEIs® (Biological Exposure Indices) Appendix D, paragraph A.

5 PNOS (Particulates Not Otherwise Specified). Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos and <1% crystalline silica. A TWA-TLV of 10 mg/m3 for inhalable particulate and 3 mg/m3 for respirable particulate has been recommended.

6 Respirable fraction. The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH 2009 TLVs ® and BEIs ® Appendix D, paragraph C.

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

This formed solid metal product poses little or no immediate health or fire hazard. 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 produce rust stains unless removed promptly. If appropriate, respiratory protection and other personal protective equipment should be used.

Potential Health Effects

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 the 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 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. Ingestion 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 siderosis. 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 reviewed 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 system disorders may be displayed as irritability, headaches, insomnia, convulsions, muscular tremors, or palsy 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, mask-like facial expression and paralysis. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections.

- MOLYBDENUM: Certain handling operations, 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: Exposure to nickel dusts and fumes can cause sensitization dermatitis, respiratory irritation, asthma, pulmonary fibrosis, edema and may cause nasal or lung cancer in humans. IARC lists nickel and certain nickel compounds as Group 2B carcinogens (sufficient animal data). ACGIH 2009 TLVs® and BEIs® lists insoluble nickel compounds as confirmed human carcinogens.
- SELENIUM: Selenium itself is relatively no-reactive. Some compounds may cause skin irritation, 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 pneumoconiotic 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 possibly 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 reviewed 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 Hazard

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 area with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention.

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.

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 the 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 regulations (29 CFR 1910.120) and all other pertinent state and Federal requirements.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 7 – Handling and Storage

Handling Precautions: Use lifting and work devices, e.g., crane, hoist, etc., 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 (H_2O = 1, at 4 °C): 7.85

pH: Not Applicable

Water Solubility: Insoluble

Other Solubilities: 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 ºF)

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.

Conditions to Avoid: Avoid storage with strong acids or calcium hypochlorite.

Hazardous Decomposition Products: Thermal oxidative decomposition 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 coatings on the product may yield noxious gases such as the oxides of carbon upon thermal oxidative decomposition.

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 health 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 in 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 Effects: Refer to Section 3

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 µg/kg GIT intrapleural (rat), Lead LD_{Lo}155 mg/kg oral (human), Manganese LD50: 9 g/kg oral (rat), Molybdenum LD_{Lo}: 114 mg/kg intraperitoneal (rat), Nickel LD_{Lo}: 5 mg/kg oral (guinea pig), Selenium LD50: 6,700 mg/kg oral (rat), Silicon LD50: 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

Mutagenicity: NIF

Teratogenicity: NIF

* See NIOSH, *RTECS* (NO7400000), for additional toxicity data on iron oxide,(EB2600000) for bismuth, (FF5250000) for carbon, (GB5425000) for chromium, (GL5325000) for copper, (OF7525000) for lead, (OO9275000) for manganese, (QA4680000) for molybdenum, (QR5950000) for nickel, (VS7700000) for selenium, (WM0400000) for silicon, (WS4250000) for sulfur, (WY2625000) for tellurium, (YW2460000) for vanadium pentoxide.

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 may migrate into soil and groundwater and 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.

Disposal Regulatory Requirements: None

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

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Steel products are not listed as hazardous substances under 49 CFR 172.101.

Shipping Name: Not Applicable

Shipping Symbols: Not Applicable

Hazard Class: Not Applicable

ID No.: Not Applicable

Packing Group: Not Applicable

Label: Not Applicable

Special Provisions (172.102): None

Packaging Authorizations

a) Exceptions: None

b) Non-bulk Packaging: Not Applicable

c) Bulk Packaging: Not Applicable

Quantity Limitations

a) Passenger, Aircraft, or Railcar: Not Applicable

b) Cargo Aircraft Only: Not Applicable

Vessel Stowage Requirements

a) Vessel Stowage: Not Applicable

b) Other: Not Applicable

Section 15 – Regulatory Information

Regulatory Information: *The following listing of regulations relating to an ArcelorMittal USA Inc. product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.*

This product and/or its constituents are subject to the following regulations:

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-2, Z-3): Steel products as a whole are not listed. However, individual components of the product are listed.

EPA Regulations:

RCRA: Chromium and Nickel are regulated under this act.

CERCLA Hazardous Substance (40 CFR 302.4): The product as a whole is not listed. However, individual components of the product are listed: Chromium, Copper, Lead, Manganese compounds and Nickel are listed under SARA 302.

SARA 311/312 Codes: Immediate (acute) health hazard and delayed (chronic) health hazard.

SARA 313: Chromium, Copper, Lead, Manganese, and Nickel are subject to SARA 313 reporting requirements. Please also note that if you prepackage or otherwise redistribute this product to industrial customers, SARA 313 requires that a notice be sent to those customers.

Clean Water Act: Chromium, Copper, Lead and Nickel are Section 307 Priority Pollutants.

Safe Drinking Water Act: Chromium, Copper, Lead, Molybdenum, Nickel and Vanadium are regulated under this act.

State Regulations: The product as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations.

Pennsylvania Right to Know: Contains regulated material in the following categories:

- Hazardous Substances: Lead, Molybdenum, Silicon, and Sulfur
- Environmental Hazards: Chromium, Copper, Lead, Manganese, Nickel, and Vanadium
- Special Hazard Substances: Chromium and Nickel.

New Jersey Right to Know: Contains regulated material in the following categories:

- Environmental Hazardous Substance: Aluminum (fume or dust), Chromium, Copper, Manganese, Nickel, Phosphorous and Vanadium (fume or dust)
- Special Health Hazard Substances: Not regulated.

California Prop. 65: Nickel is a material known to cause cancer or reproductive toxicity. Lead is a material known to the State of California to cause reproductive toxicity.

Other Regulations: The product as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations.

WHMIS (Canadian): D2B Product Classification

Section 16 – Other Information

Prepared By: ArcelorMittal USA Inc.

Hazard Rating Systems:

NFPA Code: 0-0-0 HMIS Code: 0-0-0 PPE: See Section 8

ABBREVIATIONS/ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
BEIs	Biological Exposure Indices
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNS	Central Nervous System
GI, GIT	Gastro-Intestinal, Gastro-Intestinal Tract
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
LC50	Median Lethal Concentration
LD50	Median Lethal Dose
LD_{Lo}	Lowest Dose to have killed animals or humans
LEL	Lower Explosive Limit
$\mu g/m^3$	microgram per cubic meter of air
mg/m^3	milligram per cubic meter of air
mppcf	million particles per cubic foot
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association

NIF	No Information Found
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
ORC	Organization Resources Counselors
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PNOR	Particulate Not Otherwise Regulated
PNOC	Particulate Not Otherwise Classified
PPE	Personal Protective Equipment
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendment and Reauthorization Act
SCBA	Self-contained Breathing Apparatus
STEL	Short-term Exposure Limit
TLV	Threshold Limit Value
TWA	Time-weighted Average
UEL	Upper Explosive Limit

Products covered for Carbon and Alloy Steel Rod or Bar include:

Inland DURA SPRING ™	Inland DURAGRIND
Inland FREE FORM ™	Inland INcut ™ (100 &200)
Inland INX	Inland LEDLOY ™
Inland LEDLOY ™ A	Inland LEDLOY ™ AX
Nonresulfurized Carbon Steel	Nonresulfurized Carbon Steel: Copper Bearing
Nonresulfurized Carbon Steel: Vanadium Bearing	Nonresulfurized Carbon Steel: Vanadium, Titanium, and Boron
Nonresulfurized Carbon Steel: Boron Bearing	Nonresulfurized Carbon Steel: Lead Bearing
Nonresulfurized Carbon Steel: Titanium Bearing	Nonresulfurized Carbon Steel: Bismuth Bearing
Nonresulfurized Carbon Steel: Tellurium Bearing	Resulphurized Carbon Steel
Resulphurized Carbon Steel: Bismuth Bearing	Resulphurized Carbon Steel: Tellurium Bearing
Resulphurized Carbon Steel: Vanadium Bearing	Resulphurized Carbon Steel: Lead Bearing
Resulphurized Carbon Steel: Lead & Tellurium Bearing	Rephosphurized and Resulfurized Carbon Steel
Standard Alloy Steel: Boron Treated	Standard Alloy Steel: Chromium Treated
Standard Alloy Steel: Manganese	Standard Alloy Steel: Molybdenum Bearing
Standard Alloy Steel: Molybdenum Bearing and Chromium	Standard Alloy Steel: Molybdenum, Chromium and Lead
Standard Alloy Steel: Molybdenum, Chromium and Nickel	Standard Alloy Steel: Molybdenum, Chromium, Nickel, Lead
Standard Alloy Steel: Molybdenum and Nickel	Standard Alloy Steel: Silicon and Chromium
Standard Alloy Steel: Vanadium, Titanium and Boron	Standard Alloy Steel: Selenium bearing
Inland DURA SPRING ™	Inland DURAGRIND
Inland INX	Inland INcut ™ (100 &200)
Inland LEDLOY ™	Inland LEDLOY ™ A
Inland LEDLOY ™ AX	

LABEL

Carbon and Alloy Steel Rod or Bar

GENERAL HAZARD STATEMENT: This formed solid product poses little or no immediate health or fire hazard. 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 produce rust stains unless removed promptly.

If appropriate, respiratory protection and other personal protective equipment should be used.

CAUTION

DUST OR FUME GENERATED DURING WELDING OR OTHER PROCESSING MAY CAUSE:

RESPIRATORY TRACT, SKIN, AND EYE IRRITATION AND/OR SENSITIZATION, AND MAY CAUSE METAL FUME FEVER.

CANCER HAZARD (CONTAINS NICKEL AND CHROMIUM*). PODUCT MAY CONTAIN LEAD. RISKS WILL DEPEND UPON TYPE OF PROCESSING. EFFECTS WILL DEPEND ON DURATION AND LEVEL OF EXPOSURE.

Consult MSDS for more information

**** The chromium metal in these alloys is in the zero valence state. As such, chromium metal does not present any unusual health hazard. However, welding, torch cutting, brazing or perhaps grinding on this product may generate airborne concentrations of hexavalent chromium (Cr^{+6}), metallic nickel and nickel alloys. The International Agency for Research on Cancer classified hexavalent chromium as a category 1 confirmed human carcinogen and metallic nickel and alloys as a category 2B possibly carcinogenic to humans.***

PRECAUTIONS: Avoid breathing or contact with dust or fume. Adequate ventilation is required while welding burning, melting, cutting, brazing, grinding, and machining. Wear appropriate personal protective equipment.

FIRST AID:

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 area with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention.*

INGESTION *- Not a probable route of industrial exposure; however, if ingested, obtain medical advice.*

For additional information refer to appropriate Material Safety Data Sheet available at:
http://www.arcelormittal.com/environment/us/datasheets.html
Product Name: Carbon and Alloy Steel Rod or Bar

ArcelorMittal USA Inc.
1 South Dearborn Street Chicago, IL 60603-9888

General Information:
msdssupport@arcelormittal.com or
1-760-476-3962, 3E Company Code: 333211

Original Issue Date: 01/01/2011 **Revised:** 02/08/2012

Material Safety Data Sheet

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Hot Rolled or Cold Rolled Steel

MSDS ID Number: AM USA - 001

Synonyms: Refer to Section 16 for product synonyms

CAS Number: Mixture

Manufacturer: ArcelorMittal USA Inc.
1 South Dearborn Street
Chicago, IL 60603-9888

General Information: email at: msdssupport@arcelormittal.com

Original Issue Date: 8/26/02

CHEMTREC (Day or Night): 1-800-424-9300

Revised: 02/08/12

Emergency Contact: 1-760-476-3962, 3E Company Code: 333211

Section 2 - Composition / Information on Ingredients

Ingredient Name	CAS Number	Percentage by wt.	OSHA PEL [1]	ACGIH TLV [2]
Iron	7439-89-6	95 – 99.9	10 mg/m³ - Iron oxide fume	5 mg/m³ - Iron oxide dust and fume
Aluminum	7429-90-5	0.01 – 0.5	15 mg/m³ - as total dust 5 mg/m³ - as respirable fraction	10 mg/m³ - Metal Dust 5 mg/m³ - Welding fume
Carbon	7440-44-0	0.001 - 0.6	15 mg/m³ -as total dust (PNOR) [3] 5 mg/m³ - as respirable fraction (PNOR)	10 mg/m³ - Inhalable fraction[4] (PNOS) [5] 3 mg/m³ - as respirable fraction[6] (PNOS)
Chromium	7440-47-3	0 – 1.15	1 mg/m³ - Chromium metal	0.5 mg/m³ - Chromium metal & Cr III compounds
Copper	7440-50-8	0.005 - 0.4	0.1 mg/m³ - Fume (as Cu) 1 mg/m³ - Dusts & mists (as Cu)	0.1 mg/m³ - Fume 1 mg/m³ - Dusts & mists (as Cu)
Manganese	7439-96-5	0.05-2.0	5 mg/m³ (C) - Fume & Mn compounds	0.2 mg/m³
Nickel	7440-02-0	0.004 – 1.5	1 mg/m³ - Metal & insoluble compounds (as Ni)	1.5 mg/m³ - Elemental nickel (as Ni) 0.2 mg/m³ - Insoluble compounds (NOS)[7]
Silicon	7440-21-3	0.001 - 1.05	15 mg/m³ - as total dust 5 mg/m³ - as respirable fraction	10 mg/m³
Vanadium (V_2O_5)	7440-62-2	0 - 0.2	0.5 mg.m^3 - as respirable Dust 0.1 mg/m^3 - Fume	0.05 mg/m^3
Titanium (dioxide)	7440-32-6	0.1-0.7	15 mg/m^3 (dust)	10 mg/m^3

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: boron (≤0.005 max, typically 0.001%), calcium (≤ 0.005 max, typically 0.0003%), columbium (≤0.15 max, typically 0.002%), molybdenum (≤0.6 max, typically 0.006%), phosphorous (≤0.1 max, typically 0.01%), sulfur (≤ 0.04 max, typically, 0.007%), and tin (≤ .03 max, typically 0.002%). Other trace elements not frequently identified, may include antimony, arsenic, cadmium, cobalt, lead, 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.

[1] OSHA (Occupational Health and Safety Administration) PELs (Permissible Exposure Limits) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A "C" designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted.

[2] TLV (Threshold Limit Values) established by ACGIH (the American Conference of Governmental Industrial Hygienists) are 8-hour TWA concentrations unless otherwise noted.

[3] PNOR (Particulates Not Otherwise Regulated) - All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by a limit which is the same as the inert or nuisance dust limit of 15 mg/m^3 for total dust and 5 mg/m^3 for the respirable fraction.

[4] Inhalable fraction - The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH 2009 TLVs® and BEIs® (Biological Exposure Indices) Appendix D, paragraph A.

[5] PNOS (Particulates Not Otherwise Specified) - Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos and <1% crystalline silica. A TWA-TLV of 10 mg/m^3 for inhalable particulate and 3 mg/m^3 for respirable particulate has been recommended.

[6] Respirable fraction - The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH 2009 TLVs ® and BEIs ® Appendix D, paragraph C.

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

This formed solid metal product poses little or no immediate health or fire hazard. 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 produce rust stains unless removed promptly. If appropriate, respiratory protection and other personal protective equipment should be used.

Chemical Surface Treatments/Coatings: The possible presence of chemical surface treatments and oil coatings should be considered when evaluating potential employee health hazards and exposures during handling and welding or other fume generating activities. Removal of surface coatings should be considered prior to such activities. Repeated or prolonged contact with chemical surface treatments or oil residue may cause skin irritation, dermatitis, ulceration or allergic reactions in sensitized individuals. Torching or burning operations on steel products with surface treatments, oil coatings, paint or acrylic films may produce emissions that can be irritating to the eyes and respiratory tract.

Potential Health Effects

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 the mouth, dryness and irritation of the throat followed by weakness and muscle pain. After excessive exposures, onset of symptoms present after a few hours 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 and copper have been associated with causing metal fume fever. Inhalation of chromium compounds may cause upper respiratory tract irritation. Nickel and vanadium compounds, especially vanadium pentoxide, are respiratory tract irritants.
- **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. Vanadium compounds, especially vanadium pentoxide, are eye irritants.
- **Skin:** Skin contact with metallic fumes and dusts may cause physical abrasion. Chromium and vanadium compounds, especially vanadium pentoxide, are skin irritants. Exposure to nickel may cause contact and atopic dermatitis and allergic sensitization. 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. Ingestion 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 siderosis. 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.
- ALUMINUM: Aluminum dusts/fines are a low health risk by inhalation and should be treated as a nuisance dust. Aluminum dust is a respiratory and eye irritant.
- 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 reviewed the toxicity data and concluded that chromium metal is not classifiable as a human carcinogen.
- COPPER: Inhalation of high concentrations of freshly formed oxide fumes and dusts of copper can cause metal fume fever. Chronic inhalation of copper dust has caused, in animals, hemolysis of the red blood cells, deposition of hemofuscin in the liver and pancreas, injury to lung cells and gastrointestinal symptoms.
- 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, mask-like facial expression and paralysis. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections.
- 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.

- NICKEL: Exposure to nickel dusts and fumes can cause sensitization dermatitis, respiratory irritation, asthma, pulmonary fibrosis, edema and may cause nasal or lung cancer in humans. IARC lists nickel and certain nickel compounds as Group 2B carcinogens (sufficient animal data). ACGIH 2009 TLVs® and BEIs® lists insoluble nickel compounds as confirmed human carcinogens.
- TITANIUM: There is no evidence of a health hazard from inhalation of titanium dioxide at airborne concentrations below 10 mg/m^3. The toxicity of titanium dioxide has been found to be relatively inert. Eye contact with pure material can cause particulate irritation. Skin contact with titanium dusts may cause physical abrasion.
- VANADIUM: Excessive long term or repeated exposures to vanadium compounds, especially the pentoxide, may result in chronic pulmonary changes such as emphysema or bronchitis.

Long-term inhalation exposure to high concentrations (over-exposure) to pneumoconiotic 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 possibly 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 reviewed 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 Hazard

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 area with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention.

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.

Unusual Fire or Explosion Hazards: High concentrations of airborne metallic fines may present an explosion hazard. Not applicable for solid product. Molten metal may react violently with water. **Do not use water on molten metal**.

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 the 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 facepiece operated in pressure-demand or positive-pressure mode and full protective clothing.

Section 6 – Accidental Release Measures

Spill/Leak Procedures: Not applicable to steel in solid state. For spills involving finely divided particles, clean-up 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 regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable federal, state, and local regulations.

Section 7 – Handling and Storage

Handling Precautions: Use lifting and work devices, e.g., crane, hoist, etc., 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 that 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 the 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 (H_2O=1, at 4 °C): 7.85

pH: Not Applicable

Water Solubility: Insoluble

Other Solubilities: 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: Base Metal 1510°C (2750 ºF)

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.

Conditions to Avoid: Avoid storage with strong acids or calcium hypochlorite. Molten metal may react violently with water.

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

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 health 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 in 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 Effects: Refer to Section 3

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), Aluminum LD50: NIF, Carbon LD50: NIF, Chromium LD_{Lo}: 71 mg/kg GIT orl (human), Copper LD_{Lo}: 120 ug/kg GIT ipl (rat), Manganese LD50: 9 g/kg oral (rat), Nickel LD_{Lo}: 5 mg/kg orl (guinea pig), Silicon LD50: NIF, Titanium LD50: NIF, Vanadium LD50: 59 mg/kg scu (rabbit).

Carcinogenicity: Chromium and Nickel, Refer to Section 3

Mutagenicity: NIF

Teratogenicity: NIF

* See NIOSH, *RTECS* (NO7400000), for additional toxicity data on iron oxide, (BD1200000) for aluminum oxide, (FF5250000) for carbon, (GB5425000) for chromium, (GL5325000) for copper, (OO9275000) for manganese, (QR5950000) for nickel, (WM0400000) for silicon, (XR1700000) for titanium, (YW2460000) for vanadium pentoxide.

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 may migrate into soil and groundwater and 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.

Disposal Regulatory Requirements: None

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

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Hot Rolled or Cold Rolled Steel Sheet/Strip is not listed as a hazardous substance under 49 CFR 172.101.

Shipping Name: Not Applicable
Shipping Symbols: Not Applicable
Hazard Class: Not Applicable
ID No.: Not Applicable
Packing Group: Not Applicable
Label: Not Applicable
Special Provisions (172.102): None

Packaging Authorizations
a) Exceptions: None
b) Non-bulk Packaging: Not Applicable
c) Bulk Packaging: Not Applicable

Quantity Limitations
a) Passenger, Aircraft, or Railcar: Not Applicable
b) Cargo Aircraft Only: Not Applicable

Vessel Stowage Requirements
a) Vessel Stowage: Not Applicable
b) Other: Not Applicable

Section 15 – Regulatory Information

Regulatory Information: The following listing of regulations relating to an ArcelorMittal USA Inc. product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.

This product and/or its constituents are subject to the following regulations:

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-2, Z-3): Steel products is not listed; however, individual components of the product are listed.

EPA Regulations:

RCRA: Chromium and Nickel are regulated under this act.

CERCLA Hazardous Substance (40 CFR 302.4): The product is not listed. However, individual components of the product are listed: Chromium, Copper, Manganese compounds, and Nickel are listed under SARA 302.

SARA 311/312 Codes: Immediate (acute) health hazard and delayed (chronic) health hazard.

SARA 313: Aluminum (fume or dust), Chromium, Copper, Manganese, and Nickel are subject to SARA 313 reporting requirements. Please also note that if you prepackage or otherwise redistribute this product to industrial customers, SARA 313 requires that a notice be sent to those customers.

Clean Water Act: Chromium, Copper and Nickel are Section 307 Priority Pollutants.

Safe Drinking Water Act: Aluminum, Chromium, Copper, Nickel and Vanadium are regulated under this act.

State Regulations: The product is not listed in any state regulations; however, individual components of the product are listed in various state regulations.

Pennsylvania Right to Know: Contains regulated material in the following categories:

- Hazardous Substances: Silicon
- Environmental Hazards: Aluminum, Chromium, Copper, Manganese, Nickel, and Vanadium.
- Special Hazard Substances: Chromium and Nickel

New Jersey Right to Know: Contains regulated material in the following categories:

- Environmental Hazardous Substance: Aluminum (fume or dust), Chromium, Copper, Manganese, Nickel, and Vanadium (fume or dust)
- Special Health Hazard Substances: Not regulated.

California Prop. 65: Nickel is a material known to cause cancer or reproductive toxicity.

Other Regulations: The product is not listed in any state regulations; however, individual components of the product are listed in various state regulations.

WHMIS (Canadian): D2B Product Classification

Section 16 – Other Information

Prepared By: ArcelorMittal USA Inc.

Hazard Rating Systems:

NFPA Code: 0-0-0 HMIS Code: 0-0-0 PPE: See Section 8

ABBREVIATIONS/ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
BEIs	Biological Exposure Indices
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNS	Central Nervous System
GI, GIT	Gastro-Intestinal, Gastro-Intestinal Tract
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
LC50	Median Lethal Concentration
LD50	Median Lethal Dose
LD_{Lo}	Lowest Dose to have killed animals or humans
LEL	Lower Explosive Limit
$\mu g/m^3$	microgram per cubic meter of air
mg/m^3	milligram per cubic meter of air
mppcf	million particles per cubic foot
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association

NIF	No Information Found
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
ORC	Organization Resources Counselors
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PNOR	Particulate Not Otherwise Regulated
PNOC	Particulate Not Otherwise Classified
PPE	Personal Protective Equipment
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendment and Reauthorization Act
SCBA	Self-contained Breathing Apparatus
STEL	Short-term Exposure Limit
TLV	Threshold Limit Value
TWA	Time-weighted Average
UEL	Upper Explosive Limit

Disclaimer: This information is taken from sources or based upon data believed to be reliable. Our objective in sending this information is to help you protect the health and safety of your personnel and to comply with the OSHA Hazard Communication Standard and Title III of the Superfund Amendment and Reauthorization Act of 1986. ArcelorMittal USA Inc. makes no warranty as to the absolute correctness, completeness, or sufficiency of any of the foregoing, or any additional, or other measures that may not be required under particular conditions. ARCELORMITTAL USA INC. MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY, OR ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING OR TRADE.

Products covered for Hot or Cold Rolled Steel include:

Cold Rolled Steel	Cold Rolled Full Hard Steel
Cold Rolled Enameling Steel	Cold Rolled Carbon Steel
Cold Rolled HSLA Steel	MartINsite TM CR Steel
Cold Rolled Steel including I/N Tek Cold Rolled	CR Motor Lamination Steel
Hot Rolled Carbon Steel	Hot Rolled Steel or Strip
Hot Rolled HSLA Steel	Floor Plate
Hot Rolled Sheet ind. SAE 1005-1026	ASTM A414 and A1011 Structural Steel

LABEL

Hot Rolled or Cold Rolled Steel

GENERAL HAZARD STATEMENT: This formed solid product poses little or no immediate health or fire hazard. 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 produce rust stains unless removed promptly. The possible presence of chemical surface treatments and oil coatings should be considered when evaluating potential employee health hazards and exposures during handling and welding or other fume generating activities

If appropriate, respiratory protection and other personal protective equipment should be used.

CAUTION

DUST OR FUME GENERATED DURING WELDING OR OTHER PROCESSING MAY CAUSE:

RESPIRATORY TRACT, SKIN, AND EYE IRRITATION AND/OR SENSITIZATION, AND MAY CAUSE METAL FUME FEVER.

CANCER HAZARD (CONTAINS NICKEL AND CHROMIUM*). RISKS WILL DEPEND UPON TYPE OF PROCESSING. EFFECTS WILL DEPEND ON DURATION AND LEVEL OF EXPOSURE.

Consult MSDS for more information

**** The chromium metal in these alloys is in the zero valence state. As such, chromium metal does not present any unusual health hazard. However, welding, torch cutting, brazing or perhaps grinding on this product may generate airborne concentrations of hexavalent chromium (Cr^{+6}), metallic nickel and nickel alloys. The International Agency for Research on Cancer classified hexavalent chromium as a category 1 confirmed human carcinogen and metallic nickel and alloys as a category 2B possibly carcinogenic to humans.***

PRECAUTIONS: Avoid breathing or contact with dust or fume. Adequate ventilation is required while welding burning, melting, cutting, brazing, grinding, and machining. Wear appropriate personal protective equipment.

FIRST AID:

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 area with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention.*

INGESTION *- Not a probable route of industrial exposure; however, if ingested, obtain medical advice.*

For additional information refer to appropriate Material Safety Data Sheet available at:
http://www.arcelormittal.com/environment/us/datasheets.html
Product Name: Hot Rolled or Cold Rolled Steel

ArcelorMittal USA Inc.

1 South Dearborn Street Chicago, IL 60603-9888

General Information:
msdssupport@arcelormittal.com or
1-760-476-3962, 3E Company Code: 333211

Original Issue Date: 01/01/2011

Revised: 02/08/2012

Material Safety Data Sheet

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Hot Rolled Steel Shapes - LaPlace **MSDS ID Number: AM LP - 008**

Synonyms: Channel, Flats, Angles, Unequal Leg Angles, Rounds, Rebar, Squares, Wide Flange Beams (Refer to Section 16 for additional product synonyms) **CAS Number:** Mixture

Manufacturer: ArcelorMittal USA Inc.
138 Highway 3217
LaPlace, LA 70068

General Information: email at: msdssupport@arcelormittal.com **Original Issue Date:** 03/01/2010

CHEMTREC (Day or Night): 1-800-424-9300 **Revised:** 02/08/12

Emergency Contact: 1-760-476-3962, 3E Company Code: 333211

Section 2 - Composition / Information on Ingredients

Ingredient Name	CAS Number	Percentage by wt.	OSHA PEL [1]	ACGIH TLV [2]
Iron	7439-89-6	>98	10 mg/m³ (as iron oxide fume)	5.0 mg/m³ (as iron oxide dust and fume)
Manganese	7439-96-5	<1.65	"C" 5.0 mg/m³ (as fume & Mn compounds)	0.2 mg/m³
Copper	7440-50-8	<1.0	0.1 mg/m³ (as fume, as Cu) 1.0 mg/m³ (as dusts & mists, as Cu)	0.2 mg/m³ (as fume) 1.0 mg/m³ (as dusts & mists, as Cu)
Chromium	7440-47-3	<0.75	1.0 mg/m³ (as chromium metal)	0.5 mg/m³ (as chromium metal & Cr III compounds)
Carbon	7440-44-0	<0.7	15 mg/m³ (as total dust, PNOR) [3] 5.0 mg/m³ (as respirable fraction, PNOR)	10 mg/m³ (as inhalable fraction[4], PNOS) [5] 3.0 mg/m³ (as respirable fraction[6], PNOS)
Nickel	7440-02-0	<0.60	1.0 mg/m³ (as metal & insoluble compounds, as Ni)	1.5 mg/m³ (as elemental nickel, as Ni) 0.2 mg/m³ (as insoluble compounds, PNOS)
Silicon	7440-21-3	<0.4	15 mg/m³ (as total dust) 5.0 mg/m³ - as respirable fraction	10 mg/m³
Vanadium	7440-62-2	<0.15	0.05 mg.m^3 (as respirable vanadium dust as vanadium pentoxide) 0.1 mg/m^3 (as fume)	0.05 mg/m^3
Molybdenum	7439-98-7	<0.12	15 mg/m^3 (as total dust) 5.0 mg/m^3 (as soluble compounds0	10 mg/m^3 (as insoluble compounds) 5.0 mg/m^3 (as soluble compounds

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: columbium, phosphorus, boron, calcium, sulfur, tin, titanium. Other trace elements not frequently identified, may include antimony, arsenic, cadmium, cobalt, lead, and zirconium.
- 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.

1. OSHA (Occupational Health and Safety Administration) PELs (Permissible Exposure Limits) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A "C" designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted.
2. TLV (Threshold Limit Values) established by ACGIH (the American Conference of Governmental Industrial Hygienists) are 8-hour TWA concentrations unless otherwise noted.
3. PNOR (Particulates Not Otherwise Regulated) - All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by a limit which is the same as the inert or nuisance dust limit of 15 mg/m^3 for total dust and 5 mg/m^3 for the respirable fraction.
4. Inhalable fraction - The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the 2009 TLVs ® and BEIs ® (Biological Exposure Indices) by ACGIH Appendix D, paragraph A.
5. PNOS (Particulates Not Otherwise Specified) - Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos and <1% crystalline silica. A TWA-TLV of 10 mg/m^3 for inhalable particulate and 3 mg/m^3 for respirable particulate has been recommended.
6. Respirable fraction - The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH 2009 TLVs ® and BEIs ® Appendix D, paragraph C.

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

This formed solid metal product poses little or no immediate health or fire hazard. 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 produce rust stains unless removed promptly. If appropriate, respiratory protection and other personal protective equipment should be used.

Chemical Surface Treatments/Coatings: The possible presence of chemical surface treatments and oil coatings should be considered when evaluating potential employee health hazards and exposures during handling and welding or other fume generating activities. Removal of surface coatings should be considered prior to such activities. Repeated or prolonged contact with chemical surface treatments or oil residue may cause skin irritation, dermatitis, ulceration or allergic reactions in sensitized individuals. Torching or burning operations on steel products with surface treatments, oil coatings, paint or acrylic films may produce emissions that can be irritating to the eyes and respiratory tract.

Potential Health Effects

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 the mouth, dryness and irritation of the throat followed by weakness and muscle pain. After excessive exposures, onset of symptoms present after a few hours 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 and copper have been associated with causing metal fume fever. Inhalation of chromium compounds may cause upper respiratory tract irritation. Nickel and vanadium compounds, especially vanadium pentoxide, are respiratory tract irritants.
- **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. Vanadium compounds, especially vanadium pentoxide, are eye irritants.
- **Skin:** Skin contact with metallic fumes and dusts may cause physical abrasion. Chromium and vanadium compounds, especially vanadium pentoxide, are skin irritants. Exposure to nickel may cause contact and atopic dermatitis and allergic sensitization. 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. Ingestion 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 siderosis. 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).
- **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, mask-like facial expression and paralysis. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections.
- **COPPER**: Inhalation of high concentrations of freshly formed oxide fumes and dusts of copper can cause metal fume fever. Chronic inhalation of copper dust has caused, in animals, hemolysis of the red blood cells, deposition of hemofuscin in the liver and pancreas, injury to lung cells and gastrointestinal symptoms.
- **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 reviewed the toxicity data and concluded that chromium metal is not classifiable as a human carcinogen.
- **CARBON**: Chronic inhalation of high concentrations to carbon may cause pulmonary disorders.
- **NICKEL**: Exposure to nickel dusts and fumes can cause sensitization dermatitis, respiratory irritation, asthma, pulmonary fibrosis, edema and may cause nasal or lung cancer in humans. IARC lists nickel and certain nickel compounds as Group 2B carcinogens (sufficient animal data). ACGIH 2009 TLVs® and BEIs® lists insoluble nickel compounds as confirmed human carcinogens.

- **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.
- **VANADIUM**: Excessive long term or repeated exposures to vanadium compounds, especially the pentoxide, may result in chronic pulmonary changes such as emphysema or bronchitis.
- **MOLYBDENUM**: Certain handling operations, 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.

Long-term inhalation exposure to high concentrations (over-exposure) to pneumoconiotic 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 possibly 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 reviewed 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 Hazard

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 area with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention.

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.

Unusual Fire or Explosion Hazards: High concentrations of airborne metallic fines may present an explosion hazard. Not applicable for solid product. Molten metal may react violently with water. **Do not use water on molten metal**.

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 the 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 facepiece operated in pressure-demand or positive-pressure mode and full protective clothing.

Section 6 – Accidental Release Measures

Spill/Leak Procedures: Not applicable to steel in solid state. For spills involving finely divided particles, clean-up 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 regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable federal, state, and local regulations.

Section 7 – Handling and Storage

Handling Precautions: Use lifting and work devices, e.g., crane, hoist, etc., 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 that 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 the 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: Dark Gray, Odorless

Odor Threshold: Not Applicable

Vapor Pressure: Not Applicable

Vapor Density (Air = 1) : Not Applicable

Formula Weight: Not Applicable

Density: Not Applicable

Specific Gravity (H_2O = 1, at 4 °C): 7.83

pH: Not Applicable

Water Solubility: Insoluble

Other Solubilities: 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: Base Metal 1510°C (2755 ºF)

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.

Conditions to Avoid: Avoid storage with strong acids or calcium hypochlorite. Molten metal may react violently with water

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

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 health 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 in 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 Effects: Refer to Section 3

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), Manganese LD50: 9 g/kg oral (rat), Copper LD_{Lo}: 120 ug/kg GIT ipl (rat), Chromium LD_{Lo}: 71 mg/kg GIT orl (human), Carbon LD50: NIF, Nickel LD_{Lo}: 5 mg/kg orl (guinea pig), Silicon LD50: NIF, Vanadium LD50: 59 mg/kg scu (rabbit), Molybdenum LD_{Lo}: 114 mg/kg intrapleural (rat).

Carcinogenicity: Chromium and Nickel, Refer to Section 3

Mutagenicity: NIF

Teratogenicity: NIF

* See NIOSH, *RTECS* (NO4565500), for additional toxicity data on iron oxide, (OO9275000) for manganese metal, (GL5325000) for copper, (GB4200000) for chromium metal, (FF5250100), for carbon, (QR5950000) for nickel metal, (VW0400000) for silicon, (YW1355000) for vanadium, and (QA4680000) for molybdenum.

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 may migrate into soil and groundwater and 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.

Disposal Regulatory Requirements: None

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

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Hot Rolled Steel Shapes is **Not Listed** as a hazardous substance under 49 CFR 172.101.

Shipping Name: Not Applicable
Shipping Symbols: Not Applicable
Hazard Class: Not Applicable
ID No.: Not Applicable
Packing Group: Not Applicable
Label: Not Applicable
Special Provisions (172.102): None

Packaging Authorizations
a) Exceptions: None
b) Non-bulk Packaging: Not Applicable
c) Bulk Packaging: Not Applicable

Quantity Limitations
a) Passenger, Aircraft, or Railcar: Not Applicable
b) Cargo Aircraft Only: Not Applicable

Vessel Stowage Requirements
a) Vessel Stowage: Not Applicable
b) Other: Not Applicable

Section 15 – Regulatory Information

Regulatory Information: The following listing of regulations relating to an ArcelorMittal USA Inc. product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.

This product and/or its constituents are subject to the following regulations:

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-2, Z-3): Steel products is not listed; however, individual components of the product are listed.

EPA Regulations:

RCRA: Chromium and Nickel are regulated under this act.

CERCLA Hazardous Substance (40 CFR 302.4): The product is not listed. However, individual components of the product are listed: Chromium, Copper, Manganese compounds, and Nickel are listed under SARA 302.

SARA 311/312 Codes: Immediate (acute) health hazard and delayed (chronic) health hazard.

SARA 313: Chromium, Copper, Manganese, and Nickel are subject to SARA 313 reporting requirements. Please also note that if you prepackage or otherwise redistribute this product to industrial customers, SARA 313 requires that a notice be sent to those customers.

Clean Water Act: Chromium, Copper and Nickel are Section 307 Priority Pollutants.

Safe Drinking Water Act: Aluminum, Chromium, Copper, Nickel, Molybdenum, and Vanadium are regulated under this act.

State Regulations: The product is not listed in any state regulations; however, individual components of the product are listed in various state regulations.

Pennsylvania Right to Know: Contains regulated material in the following categories:

- Hazardous Substances: Silicon, Molybdenum,
- Environmental Hazards: Chromium, Copper, Manganese, Nickel, and Vanadium.
- Special Hazard Substances: Chromium and Nickel

New Jersey Right to Know: Contains regulated material in the following categories:

- Environmental Hazardous Substance: Chromium, Copper, Manganese, Nickel, and Vanadium (fume or dust)
- Special Health Hazard Substances: Not regulated.

California Prop. 65: Nickel is a material known to cause cancer or reproductive toxicity.

Other Regulations: The product is not listed in any state regulations; however, individual components of the product are listed in various state regulations.

WHMIS (Canadian): D2B Product Classification

Section 16 – Other Information

Prepared By: ArcelorMittal USA Inc.

Hazard Rating Systems:

NFPA Code: 0-0-0 HMIS Code: 0-0-0 PPE: See Section 8

ABBREVIATIONS/ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
BEIs	Biological Exposure Indices
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNS	Central Nervous System
GI, GIT	Gastro-Intestinal, Gastro-Intestinal Tract
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
LC50	Median Lethal Concentration
LD50	Median Lethal Dose
LD_{Lo}	Lowest Dose to have killed animals or humans
LEL	Lower Explosive Limit
$\mu g/m^3$	microgram per cubic meter of air
mg/m^3	milligram per cubic meter of air
mppcf	million particles per cubic foot
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association

NIF	No Information Found
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
ORC	Organization Resources Counselors
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PNOR	Particulate Not Otherwise Regulated
PNOC	Particulate Not Otherwise Classified
PPE	Personal Protective Equipment
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendment and Reauthorization Act
SCBA	Self-contained Breathing Apparatus
STEL	Short-term Exposure Limit
TLV	Threshold Limit Value
TWA	Time-weighted Average
UEL	Upper Explosive Limit

Disclaimer: This information is taken from sources or based upon data believed to be reliable. Our objective in sending this information is to help you protect the health and safety of your personnel and to comply with the OSHA Hazard Communication Standard and Title III of the Superfund Amendment and Reauthorization Act of 1986. ArcelorMittal USA Inc. makes no warranty as to the absolute correctness, completeness, or sufficiency of any of the foregoing, or any additional, or other measures that may not be required under particular conditions. ARCELORMITTAL USA INC. MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY, OR ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING OR TRADE.

Hot Rolled Steel Shapes Include:

ASTM Grades
A36, A70936
A588A, A588B
A615 Gr 40 & Gr 60
A105
A572 Gr 50 & Gr 65
A529 Gr 50, Gr 55 & Gr 60
A709 Gr 50 & Gr 50W

ABS Grades
Grade A
Grade AH32 & AH36

CSA Grades
44W
50W

LaPlace Grades
A3652950
A3644W
A36G

Products
Equal Leg Angles ¾" thru 6"
Unequal Leg Angles 3" x 2" thru 8" x 4"
Channels 3" thru 10"
Wide Flange Beams 4" & 6"
Standard Beams 3", 4", 5" & 6"
Flats 1" thru 8"
Rebar # 4 thru # 11
Squares ½" thru 1"
Rounds ½" thru 2"

LABEL

Hot Rolled Steel Shapes

GENERAL HAZARD STATEMENT: This formed solid product poses little or no immediate health or fire hazard. 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 produce rust stains unless removed promptly. The possible presence of chemical surface treatments and oil coatings should be considered when evaluating potential employee health hazards and exposures during handling and welding or other fume generating activities.

If appropriate, respiratory protection and other personal protective equipment should be used.

CAUTION

DUST OR FUME GENERATED DURING WELDING OR OTHER PROCESSING MAY CAUSE:

RESPIRATORY TRACT, SKIN, AND EYE IRRITATION AND/OR SENSITIZATION, AND MAY CAUSE METAL FUME FEVER.

CANCER HAZARD (CONTAINS NICKEL AND CHROMIUM*). RISKS WILL DEPEND UPON TYPE OF PROCESSING. EFFECTS WILL DEPEND ON DURATION AND LEVEL OF EXPOSURE.

Consult MSDS for more information

**** The chromium metal in these alloys is in the zero valence state. As such, chromium metal does not present any unusual health hazard. However, welding, torch cutting, brazing or perhaps grinding on this product may generate airborne concentrations of hexavalent chromium (Cr^{+6}), metallic nickel and nickel alloys. The International Agency for Research on Cancer classified hexavalent chromium as a category 1 confirmed human carcinogen and metallic nickel and alloys as a category 2B possibly carcinogenic to humans.***

PRECAUTIONS: Avoid breathing or contact with dust or fume. Adequate ventilation is required while welding burning, melting, cutting, brazing, grinding, and machining. Wear appropriate personal protective equipment.

FIRST AID:

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 area with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention.*

INGESTION - *Not a probable route of industrial exposure; however, if ingested, obtain medical advice.*

For additional information refer to appropriate Material Safety Data Sheet available at:
http://www.arcelormittal.com/environment/us/datasheets.html
Product Name: Hot Rolled Steel Shapes

ArcelorMittal USA Inc.

1 South Dearborn Street Chicago, IL 60603-9888

General Information:
msdssupport@arcelormittal.com or
1-760-476-3962, 3E Company Code: 333211

Original Issue Date: 01/01/2011 **Revised:** 02/08/12

Atlas Tube Inc.
200 Clark St.
Harrow, Ontario Canada
N0R 1G0
519-738-5000
www.atlastube.com

Material Safety Data Sheet

SECTION 1 - MATERIAL IDENTIFICATION AND USE

Material Name: **Steel Tubing**
WHMIS Class: D2A
Chemical Name: Not Applicable
Chemical Family: Steel
Chemical Formula: Not Applicable
Molecular Weight: Not Applicable
Trade Name and Synonyms: Not Applicable
Material Use: Several uses ranging from oem products to construction and fabrication

SECTION 2 - HAZARDOUS INGREDIENTS OF MATERIAL

ELEMENT	% MAXIMUM	C.A.S. NO.	T.L.V. (A.C.G.I.H.) mg/m3 (as fume)	P.E.L. (OSHA) mg/m3 (as fume)	LD_{50}/LC_{50}
STEEL:					
Iron	>99.00	7439-89-6	5	10	30 g/kg (LD_{50} Oral Rat)
Manganese	1.18	7439-96-5	0.2	5 (C)	9 g/kg (LD_{50} Oral Rat)
Nickel	0.5	7440-02-0	1.5 (I)	1	Not Available
Chromium	0.60	7440-47-3	0.5	1	Not Available

The above ingredient list identifies those components which meet the regulated reporting criteria. Concentrations represent a maximum for all grades within a category of steel products and must not be interpreted as a specification for a particular grade. All ingredients are pre-registered on the CEPA domestic substances list. All C.O.N.E.G. substances are below the detection limit.

Tube may contain coating of mill coolant/rust inhibitor - see appropriate MSDS for details

SECTION 3 - PHYSICAL DATA

Physical State	Odour and Appearance	Odour Threshhold	Specific Gravity
Solid	Silver / Grey Metallic (steel)	Not Applicable	7.6 - 7.8

Vapour Pressure	Vapour Density (Air - 1)	Evaporation Rate	Boiling Point (C)	Freezing / Melting Point (C)
Not Applicable	Not Applicable	Not Applicable	Not Applicable	1530 C (steel)

Solubility in Water	% Volatile (by volume)	pH	Coefficient of water / oil distribution
Not Applicable	Not Applicable	Not Applicable	Not Applicable

SECTION 4 - FIRE AND EXPLOSION HAZARD

Flammability	Means of Extinction	Special Procedures
Not Flammable	Not Applicable	Not Applicable
Flashpoint (C) and Method	**Upper Explosion Limit (% by volume)**	**Lower Explosion Limit (% by volume)**
Not Applicable	Not Applicable	Not Applicable
Auto Ignition Temperature		**Hazardous Combustion Products**
Not Applicable		Not Applicable
Explosion Data - Sensitivity to Chemical Impact	**Rate of Burning**	**Sensitivity to Static Discharge**
Not Applicable	Not Applicable	Not Applicable

SECTION 5 - REACTIVITY DATA

Chemical Stability
Yes

Incompatibility to other substances
Not Applicable

Reactivity and under what condition
Contact with mineral gases will release hydrogen gas.

Hazardous Decomposition Products
Thermal degredation of coating material (if any) may produce irritating hydrocarbons.

SECTION 6 - TOXOLOGICAL PROPERTIES

Effect of Acute Exposure
Steel in it's natural state has no accute effect from exposure. Eye irritation may result from contact with coating. Welding or burning of material will generate metal fumes. Inhalation overexposure to fumes may cause a flu-like condition (e.g. chills, nausea) called metal fume fever.

Effects of Chronic Exposure to Product
Steel in it's natural state has no chronic exposure effect. Coating materials may cause skin irritation and/or dermatitis upon prolonged contact. Welding, burning, or grinding will generate metal fumes or dust. Prolonged inhalation overexposure to dust or fumes may result in accumulation of iron oxide in the lung, a condition (siderosis) with a few or no symptoms.
Certain nickel and chromium compounds have been listed by IARC as nasal and lung carcinogens.

Sensitization to Product
No known effect

Synergistic Materials
No known effect

Reproductive effects
No known effect

Teratogenicity
No known effect

Mutagenicity
No known effect

SECTION 7 - PREVENTATIVE MEASURES

Personal Protective Equipment
Personal protective equipment required is dependant upon the process or operation being performed on the material (e.g. burning, welding).
Each operation must be addressed for suitable protective equipment required.

Gloves
Gloves may be required to prevent skin abrasions, cuts or punctures

Eye (Specify)
Safety glasses or faceshield as appropriate

Footwear (Specify)
Safety Shoes or boots where required

Other (Specify)
Barrier cream may be used when handling

Respiratory
NIOSH approved respiratory protection where applicable

Engineering Controls (e.g. ventilation, enclosed process, specify)
General or local ventilation during welding, burning or grinding.

Leak and Spill Procedure
Not Applicable

Waste Disposal
Not Applicable

TDG Classification
Not Applicable

SECTION 8 - FIRST AID MEASURES

Skin
Wash affected area with soap and water. Seek medical attention if irritation persists.

Eye
For irritation from any coating material, flush eyes with plenty of water while holding eyelids open. Seek medical attention if irritation persists.

Inhalation
For overexposure to metal fumes, remove to fresh air. Seek medical attention for adverse symptoms.

Ingestion
Not Applicable

SECTION 9 - PREPARER INFORMATION

Prepared By: Atlas Tube Health and Safety Department

Phone Number
(519) 738-5000 Ext.5224

Updated :January 5, 2009

GERDAU AMERISTEEL

Material Safety Data Sheet

Material Name: Carbon Steel

*** Section 1 - Chemical Product and Company Identification ***

Manufacturer Information

Gerdau Ameristeel
4221 West Boy Scout Blvd.
Suite 600
Tampa, FL 33607

Phone: (800) 876-3626

Emergency # 800-424-9300 CHEMTREC

*** Section 2 - Hazards Identification ***

Emergency Overview

Fumes may cause irritation of the eyes and respiratory tract.

Potential Health Effects: Eyes

May cause irritation.

Potential Health Effects: Skin

Not considered to cause skin effects. Sensitive individuals may experience skin irritation.

Potential Health Effects: Ingestion

Not considered a route of exposure under anticipated product use conditions.

Potential Health Effects: Inhalation

Inhalation of fumes may cause irritation of the nose, throat and lungs. Chronic irritation may cause bronchitis, pneumonitis, siderosis, upper respiratory tract irritation, headaches, lack of coordination, metal fume fever.

Medical Conditions Aggravated by Exposure

Respiratory conditions may be aggravated by exposure to metal fumes or dusts.

HMIS Ratings: Health: 1 **Fire:** 0 **HMIS Reactivity** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 3 - Composition / Information on Ingredients ***

CAS #	Component	Percent
1309-37-1	Iron oxide	97
7439-96-5	Manganese	2
7440-50-8	Copper	1.5
124-38-9	Carbon dioxide	0.9
7440-02-0	Nickel	0.5
7440-21-3	Silicon	0.4
7440-31-5	Tin	0.08
7446-09-5	Sulfur dioxide	0.08
7723-14-0	Phosphorus	0.06
1314-62-1	Vanadium pentoxide	0.05

*** Section 4 - First Aid Measures ***

First Aid: Eyes

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

First Aid: Skin

For skin contact, flush with large amounts of water. If irritation persists, get medical attention.

First Aid: Ingestion

If the material is swallowed, get immediate medical attention or advice.

First Aid: Inhalation

Move person to non-contaminated air. Seek medical attention.

*** Section 5 - Fire Fighting Measures ***

General Fire Hazards

See Section 9 for Flammability Properties.

Concentrations of metallic fines in the air could present an explosion hazard.

Hazardous Combustion Products

Above the melting point, iron oxide fumes may be present.

Extinguishing Media

For molten metal, use Class D chemical or sand.

Fire Fighting Equipment/Instructions

Firefighters should wear full protective gear.

NFPA Ratings: Health: 1 **Fire:** 0 **Reactivity:** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

* * * Section 6 - Accidental Release Measures * * *

Containment Procedures

None necessary.

Clean-Up Procedures

Fine particles and small chips should be swept up and disposed of properly.

Evacuation Procedures

Isolate area. Keep unnecessary personnel away.

Special Procedures

User should consult applicable standards for specific process employed to determine any special precautions needed to insure the health and safety of its employees.

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Avoid contact with skin and eyes. Wash thoroughly after handling.

Storage Procedures

No special storage procedures necessary.

* * * Section 8 - Exposure Controls / Personal Protection * * *

A: Component Exposure Limits

Iron oxide (1309-37-1)

ACGIH: 5 mg/m3 TWA (respirable fraction)
OSHA: 10 mg/m3 TWA (fume)
NIOSH: 5 mg/m3 TWA (dust and fume, as Fe)

Manganese (7439-96-5)

ACGIH: 0.2 mg/m3 TWA
OSHA: 1 mg/m3 TWA (fume)
3 mg/m3 STEL (fume)
5 mg/m3 Ceiling
NIOSH: 1 mg/m3 TWA (fume)
3 mg/m3 STEL

Copper (7440-50-8)

ACGIH: 0.2 mg/m3 TWA (fume); 1 mg/m3 TWA (dust and mist, as Cu)
OSHA: 0.1 mg/m3 TWA (dust, fume, mists, as Cu)
NIOSH: 1 mg/m3 TWA (dust and mist)

Carbon dioxide (124-38-9)

ACGIH: 5000 ppm TWA
30000 ppm STEL
OSHA: 10000 ppm TWA; 18000 mg/m3 TWA
30000 ppm STEL; 54000 mg/m3 STEL
NIOSH: 5000 ppm TWA; 9000 mg/m3 TWA
30000 ppm STEL; 54000 mg/m3 STEL

Nickel (7440-02-0)
ACGIH: 1.5 mg/m3 TWA (inhalable fraction)
OSHA: 1 mg/m3 TWA
NIOSH: 0.015 mg/m3 TWA

Silicon (7440-21-3)
OSHA: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
NIOSH: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)

Tin (7440-31-5)
ACGIH: 2 mg/m3 TWA
OSHA: 2 mg/m3 TWA
NIOSH: 2 mg/m3 TWA

Sulfur dioxide (7446-09-5)
ACGIH: 2 ppm TWA
5 ppm STEL
OSHA: 2 ppm TWA; 5 mg/m3 TWA
5 ppm STEL; 15 mg/m3 STEL
NIOSH: 2 ppm TWA; 5 mg/m3 TWA
5 ppm STEL; 13 mg/m3 STEL

Phosphorus (7723-14-0)
OSHA: 0.1 mg/m3 TWA
NIOSH: 0.1 mg/m3 TWA

Vanadium pentoxide (1314-62-1)
ACGIH: 0.05 mg/m3 TWA (dust or fume, respirable fraction)
NIOSH: 0.05 mg/m3 Ceiling (15 min, dust and fume, as V)

Engineering Controls
Use general ventilation and use local exhaust, where possible, in confined or enclosed spaces.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face
Wear safety glasses; chemical goggles for fumes which may arise from thermal processing.

Personal Protective Equipment: Skin
Use impervious gloves.

Personal Protective Equipment: Respiratory
If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection.

Personal Protective Equipment: General
Eye wash fountain and emergency showers are recommended.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Grey metallic	**Odor:**	Metallic or odorless
Physical State:	Solid	**pH:**	NA
Vapor Pressure:	NA	**Vapor Density:**	NA
Boiling Point:	3000°C (5432°F)	**Melting Point:**	1535°C (2795°F)
Solubility (H2O):	NA	**Specific Gravity:**	7.0
Evaporation Rate:	NA	**VOC:**	NA
Octanol/H2O Coeff.:		**Flash Point:**	NA
Flash Point Method:	NA	**Upper Flammability Limit (UFL):**	NA
Lower Flammability Limit (LFL):	NA	**Burning Rate:**	NA
Auto Ignition:	NA		

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Chemical Stability: Conditions to Avoid

None

Incompatibility

Strong Acids

Hazardous Decomposition

Metal fumes if heated. Above the melting point, iron oxide fumes may be present

Possibility of Hazardous Reactions

Will not occur.

* * * Section 11 - Toxicological Information * * *

Acute Dose Effects

A: General Product Information

Operations or fire which supply sufficient energy to the product (i.e. welding, high speed grinding or melting) can release dust or fumes which may make components of the product biologically available. Exposure to dusts or fumes from some metals including iron, zinc, manganese, chromium, cobalt and copper can produce a condition known as metal fume fever. Iron dust can irritate the eyes and respiratory tract by mechanical action. Acute iron poisoning may involve hemorrhagic vomiting and diarrhea, abdominal pain, acidosis, coagulaopathy, shock, coma and convulsions followed by hepatic and renal failure and perhaps cardiovascular collapse. Chronic inhalation of iron has resulted in mottling of the lungs, a condition referred to as siderosis.

Systemic effects from ingestion of nickel include capillary damage, kidney damage, myocardial weakness and central nervous system depression. Allergic skin sensitization reactions are the most frequent effect of exposure to nickel compounds. Exposure to nickel compounds may also result in allergic lung sensitization. Exposure to copper fume or dust can cause respiratory tract irritation, hemolytic anemia and allergic contact dermatitis.

B: Component Analysis - LD50/LC50

Iron oxide (1309-37-1)
Oral LD50 Rat: >10000 mg/kg

Manganese (7439-96-5)
Oral LD50 Rat: 9 g/kg

Nickel (7440-02-0)
Oral LD50 Rat: >9000 mg/kg

Silicon (7440-21-3)
Oral LD50 Rat: 3160 mg/kg

Sulfur dioxide (7446-09-5)
Inhalation LC50 Rat: 2500 ppm/1H

Phosphorus (7723-14-0)
Inhalation LC50 Rat: 4.3 mg/L/1H; Oral LD50 Rat:3.03 mg/kg; Dermal LD50 Rat:100 mg/kg

Vanadium pentoxide (1314-62-1)
Inhalation LC50 Rat: 2.21 mg/L/4H; Oral LD50 Rat:10 mg/kg; Dermal LD50 Rat:>2500 mg/kg

Carcinogenicity

A: General Product Information

The carcinogenic effect of nickel has been well documented in occupationally exposed nickel refinery workers. Lung and nasal cancers were the predominant forms of cancer in the exposed workers.

B: Component Carcinogenicity

Iron oxide (1309-37-1)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Supplement 7 [1987], Monograph 1 [1972] (Group 3 (not classifiable))

Nickel (7440-02-0)

ACGIH: A5 - Not Suspected as a Human Carcinogen
NIOSH: potential occupational carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)
IARC: Monograph 49 [1990], Supplement 7 [1987] (Group 2B (possibly carcinogenic to humans))

Sulfur dioxide (7446-09-5)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 54 [1992] (Group 3 (not classifiable))

Vanadium pentoxide (1314-62-1)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 86 [2006] (Group 2B (possibly carcinogenic to humans))

Teratogenicity

Manganese, copper and nickel have been reported to have adverse reproductive effects in experimental animals. Copper and nickel have been shown to be fetotoxic in experimental animals.

Neurological Effects

Chronic overexposure to manganese compounds may result in CNS effects such as weakness, sleepiness, emotional instability and spastic gait. These effects can be permanent.

Other Toxicological Information

Under normal conditions of handling, the likelihood of inhaling or ingesting amounts necessary for these effects to occur is very small.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

No information available for the product.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Copper (7440-50-8)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	23 µg/L	
96 Hr LC50 Oncorhynchus mykiss	13.8 µg/L	
96 Hr LC50 Lepomis macrochirus	236 µg/L	
72 Hr EC50 Scenedesmus subspicatus	120 µg/L	
96 Hr EC50 water flea	10 µg/L	
96 Hr EC50 water flea	200 µg/L	

Nickel (7440-02-0)

Test & Species		Conditions
96 Hr LC50 Oncorhynchus mykiss	31.7 mg/L	adult
96 Hr LC50 Pimephales promelas	3.1 mg/L	
96 Hr LC50 Brachydanio rerio	>100 mg/L	
72 Hr EC50 freshwater algae (4 species)	0.1 mg/L	
72 Hr EC50 Selenastrum capricornutum	0.18 mg/L	
96 Hr EC50 water flea	510 µg/L	

Phosphorus (7723-14-0)

Test & Species	Conditions
96 Hr LC50 Lepomis macrochirus	0.0024 mg/L [flow-through]
96 Hr LC50 Brachydanio rerio	>100 mg/L [static]
48 Hr EC50 Daphnia magna	0.111 mg/L

* * * Section 13 - Disposal Considerations * * *

US EPA Waste Number & Descriptions

Component Waste Numbers

Vanadium pentoxide (1314-62-1)

RCRA: waste number P120

Disposal Instructions

Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations. See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

* * * Section 14 - Transportation Information * * *

US DOT Information

Shipping Name: Not Regulated

TDG Information

Shipping Name: Not Regulated

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

A: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Manganese (7439-96-5)

SARA 313: 1.0 % de minimis concentration

Copper (7440-50-8)

SARA 313: 1.0 % de minimis concentration

CERCLA: 5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

Nickel (7440-02-0)

SARA 313: 0.1 % de minimis concentration

CERCLA: 100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

Sulfur dioxide (7446-09-5)

SARA 302: 500 lb TPQ

Phosphorus (7723-14-0)

SARA 302: 100 lb TPQ (This material is a reactive solid. The TPQ does not default to 10000 pounds for non-powder, non-molten, non-solvent form)

CERCLA: 1 lb final RQ; 0.454 kg final RQ

Vanadium pentoxide (1314-62-1)

SARA 302: 100 lb lower threshold TPQ; 10000 lb upper threshold TPQ

CERCLA: 1000 lb final RQ; 454 kg final RQ

B: Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	
Copper	7440-50-8	DOT regulated severe marine pollutant

State Regulations

A: General Product Information

Product may be subject to reporting in states other than those listed for individual components.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Iron oxide	1309-37-1	Yes	Yes	Yes	Yes	Yes	Yes
Manganese	7439-96-5	Yes	Yes	Yes	Yes	Yes	Yes
Copper	7440-50-8	Yes	Yes	Yes	Yes	Yes	Yes
Carbon dioxide	124-38-9	Yes	Yes	Yes	Yes	Yes	Yes
Nickel	7440-02-0	Yes	Yes	Yes	Yes	Yes	Yes
Silicon	7440-21-3	No	Yes	Yes	Yes	Yes	Yes
Tin	7440-31-5	Yes	Yes	Yes	Yes	Yes	Yes
Sulfur dioxide	7446-09-5	Yes	Yes	Yes	Yes	Yes	Yes
Phosphorus	7723-14-0	Yes	Yes	Yes	Yes	Yes	Yes
Vanadium pentoxide	1314-62-1	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Iron oxide	1309-37-1	1 %
Manganese	7439-96-5	1 %
Copper	7440-50-8	1 %
Nickel	7440-02-0	0.1 %

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Iron oxide	1309-37-1	Yes	DSL	EINECS
Manganese	7439-96-5	Yes	DSL	EINECS
Copper	7440-50-8	Yes	DSL	EINECS
Carbon dioxide	124-38-9	Yes	DSL	EINECS
Nickel	7440-02-0	Yes	DSL	EINECS
Silicon	7440-21-3	Yes	DSL	EINECS
Tin	7440-31-5	Yes	DSL	EINECS
Sulfur dioxide	7446-09-5	Yes	DSL	EINECS
Phosphorus	7723-14-0	Yes	DSL	EINECS
Vanadium pentoxide	1314-62-1	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

Other Information

Reasonable care has been taken in the preparation of this information, but the manufacturer makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use.

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

End of Sheet

Material Safety Data

Structural Steel Tubing

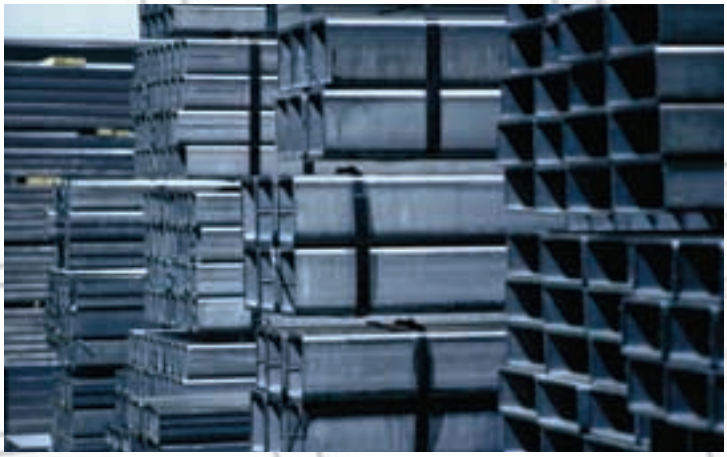
Solid Metal

Melting Point: 2750 F

Appearance: Grey-Black

Odor: None

Specific Gravity (H20=1): Greater than 7



Typical Chemical Composition and Hazard Data

Ingredient	CAS. No.	Weight %	Hazard Data (1984 TLV's)
Iron	7439-89-6	Balance	5mg/M_for iron oxides fumes
Carbon	7440-44-0		Not listed
Manganese	7439-96-5	1.7 max	5mg/M_fumes & dust
Phosphorus	7723-14-0	.15 max	None for inorganic phosphates
Sulfur	7704-34-9	.35 max	5mg/M_as SO_
Columbium	7440-25-7	.10 max	None established
Vanadium	7440-62-2	.20 max	.005mg/M_Al metal & oxide
Aluminum	7429-90-5	.10 max	10 mg/M_ Al metal & oxide
Copper	7440-50-8	.20-0.6	0.2 mg/M_ Copper fume 1 mg/M_Copper dust

Health Hazard Data	
Steel products under normal conditions do not present a health hazard. However, when subjected to welding, burning, grinding, abrasive blasting, heat treatment, pickling or similar operations, potentially hazardous fumes or dusts may be emitted.	
Primary Route of Entry	Inhalation
Health Hazards	Iron (iron oxide): Irritation of eyes, nose, throat Metallic taste in mouth or metal fume fever
Effects of Exposure	Iron (iron oxide): Pulmonary (upper respiratory) effects, siderosis. Manganese: pneumonitis, bronchitis, lack of coordination
Carcinogenic Hazard	Not considered to be a carcinogen
Emergency and First Aid Procedures	In the event of exposure to high concentrations of metal fumes, remove person to fresh air, administer oxygen and seek prompt medical attention

6226 West 74th Street
Chicago, IL 60638
800–376–6000
FAX 708–563–1950
www.independencetube.com

Independence Tube
Chicago Decatur Marseilles

Your 1st Choice in Steel Tubular Products

May 2011

Material Safety Data

Fire and Explosion Data	
Flash Point:	N/A
Extinguishing Media:	Use methods applicable to surrounding area
Flammable Limits:	N/A
Unusual Fire and Explosion Hazards:	None
Special Fire Fighting Procedures:	N/A

Reactivity Data

Steel is considered stable under normal circumstances. Will react with string acid.
At elevated temperatures, it may liberate metal fumes, iron oxides and oxides of other alloying elements.

Special Protection Information

Steel is considered stable under normal circumstances. Will react with string acid.
At elevated temperatures, it may liberate metal fumes, iron oxides and oxides of other alloying elements.

Waste Disposal Methods

Disposal of in accordance with Federal, State and/or local waste regulations.

Other Information

Castrol WY-3-085A as a coolant during manufacture of structural steel tubing.

The information contained in the Material Safety Data Sheet is believed to be correct, but Independence Tube Corporation makes no representations, guarantees or warranties of any kind as to its absolute accuracy.

INDEPENDENCE TUBE CORPORATION MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING OR TRADING.

6226 West 74th Street
Chicago, IL 60638
800–376–6000
FAX 708–563–1950
www.independencetube.com

Independence Tube
Chicago Decatur Marseilles

Your 1st Choice in Steel Tubular Products

May 2011

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Carbon and Alloy Steels
CAS Number: Not applicable
Synonyms: Steels
Use/Description: Bar and structural steel products, billets (sheet steel for Castrip®)

Nucor Mill Locations **24 Hour Contact – CHEMTREC 1-800-424-9300**

Nucor Steel – South Carolina
300 Steel Mill Road
Darlington, S.C. 29540
(843) 393-5841

Nucor Steel – Auburn, Inc.
25 Quarry Road
Auburn, N.Y. 13021
(315) 253-4561

Nucor Steel – Texas
U.S. Highway 79 South
Jewett, Texas 75846
(903) 626-4461

Nucor Steel Connecticut, Inc.
35 Toelles Road
Wallingford, CT 06492
(203) 265-0615

Nucor Steel Kankakee, Inc.
One Nucor Way
Bourbonnais, IL 60914
(815) 939-5541

Nucor Steel – Utah
West Cemetery Road
Plymouth, Utah 84330
(435) 458-2300

Nucor Steel Marion, Inc.
912 Cheney Avenue
Marion, Ohio 43302
(740) 383-4011

Nucor Steel Kingman, LLC
3000 West Old Highway 66
Kingman, AZ 86413
(928) 718-7035

Nucor Steel Jackson, Inc.
3630 Fourth Street
Flowood, MS 39232
(601) 939-1623

Nucor Steel Birmingham, Inc.
2301 F.L. Shuttlesworth Drive
Birmingham, Alabama 35234
(205) 250-7400

Nucor Steel – Berkeley
1455 Hagan Avenue
Huger, SC 29450
(843) 336-6000

Nucor Steel – Nebraska
2911 East Nucor Road
Norfolk, Nebraska 68701
(402) 644-0200

Nucor Steel Seattle, Inc.
2424 SW Andover
Seattle, WA 98106
(206) 933-2222

Nucor Yamato Steel/ Nucor Castrip Arkansas, LLC
5929 E. State Hwy 18
Armorel, AR 72310
(870) 762-5500

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Base Metal:							
Iron	(Fe)	7439-89-6	Balance	5	Oxide Dust/Fume	10	Oxide Dust/Fume
Alloying Elements							
Aluminum	(Al)	7429-90-5	0-0.05	10 5	Dust Fume	15 5	Dust Respirable fraction
Antimony	(Sb)	7440-36-0	<0.9	0.5	As Antimony	0.5	As Antimony
Arsenic	(As)	7440-38-2	<0.09	0.01	As Arsenic (A1 Carcinogen)	0.01	As Arsenic
Beryllium	(Be)	7440-41-7	<0.09	0.002 0.01	As Beryllium (A1 Carcinogen) As Beryllium (STEL)	0.002 0.005	As Beryllium As Beryllium (Ceiling)
Boron	(B)	7440-42-8	<0.9	10	Oxide Dust	15	Oxide Dust
Cadmium	(Cd)	7440-43-9	<0.09	0.01 0.002	As Cadmium (A2 Carcinogen) Respirable fraction	0.005 0.0025	As Cadmium As Cadmium (Action Level)
Calcium	(Ca)	1305-78-8	<0.9	2	Oxide Dust	5	Oxide Dust
Carbon	(C)	7440-44-0	0-1.0		Not Established		Not Established

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Chromium	(Cr)	7440-47-3	0.01-1.0	0.5	Metal	1	Metal
Cobalt	(Co)	7440-48-4	<0.09	0.02	As Cobalt (A3 Carcinogen)	0.1	Metal/Dust/Fume
Copper	(Cu)	7440-50-8	<0.9	1 0.2	Dust Fume	1 0.1	Dust Fume
Lead	(Pb)	7439-92-1	<0.05	0.05	Dust / Fume (A3 Carcinogen)	0.05	Dust / Fume
Magnesium	(Mg)	7439-95-4	<0.9		Not Established		Not Established
Manganese	(Mn)	7439-96-5	0.2-2	0.2	Elemental Mn and Inorg Compounds	5	Fume (Ceiling)
Molybdenum	(Mo)	7439-98-7	<0.9	10	Insoluble Compounds	15	Insoluble Compounds
Niobium	(Nb)	7440-03-1	<0.9		Not Established		
Nickel	(Ni)	7440-02-0	<1.0	1.5	Metal	1	Metal and Insoluble Compounds
Nitrogen	(N)	7727-37-9	<0.9		Simple Asphyxiant		Simple Asphyxiant
Phosphorus	(P)	7723-14-0	<0.9	0.1	Phosphorus	0.1	Phosphorus
Selenium	(Se)	7782-49-2	<0.9	0.2	Selenium	0.2	Selenium
Silicon	(Si)	7440-21-3	<0.9	10	Dust	15	Dust
Sulfur	(S)	7446-09-05	<0.9	5.2 13	Sulfur Dioxide Sulfur Dioxide (STEL)	13	Sulfur Dioxide
Tin	(Sn)	7440-31-5	<0.9	2	Metal,Oxide and Inorganic Compounds	2	Inorganic Compounds
Titanium	(Ti)	7440-32-6	<0.9		Not Established		Not Established
Tungsten	(W)	7440-33-7	<0.9	5 10	Insoluble Compounds as W Insoluble Compounds as W (STEL)		Not Established
Vanadium	(V)	7440-62-2	<0.9	0.05	Oxide Dust/Fume	0.5 0.1	Oxide Dust (Ceiling) Oxide Fume (Ceiling)
Zinc	(Zn)	7440-66-6	0.0-0.10	10 5 10	Oxide Dust OxideFume Oxide Fume (STEL)	5 10	Oxide Fume Oxide Dust

NOTE: No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel over all. The above listing is a summary of elements used in alloying Nucor Steel Products. Various grades of steel will contain different combinations of these elements and/or trace materials. Exact specifications may be found by calling the division and asking for a specifications sheet.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING! WELDING, SAWING, BRAZING, GRINDING, ABRASIVE BLASTING, MACHINING AND OTHER PROCESSES MAY CAUSE DUSTS, POTENTIALLY COMBUSTIBLE DUST, AND/OR FUMES TO BE RELEASED. MAY BE HARMFUL IF INHALED. MAY IRRITATE THE EYES, SKIN, AND RESPIRATORY TRACT. MOLTEN MATERIAL MAY CAUSE THERMAL BURNS.

Potential Health Effects

Note: Steel products as sold by Nucor, do not present an inhalation, ingestion or skin hazard. However, individual customer processes, (such as welding, sawing, brazing, grinding, abrasive blasting, and machining) may result in the formation of fumes, dust (combustible or otherwise), and/or particulate that may present a variety of health hazards. Molten steel also is hazardous.

Eye Contact

Dusts or particulates may cause mechanical irritation including pain, tearing, and redness. Scratching of the cornea can occur if eye is rubbed. Fumes may be irritating. Contact with the heated material may cause thermal burns.

Skin Contact

Dusts or particulates may cause mechanical irritation due to abrasion. Coated steel may cause skin irritation in sensitive individuals (see Section 16 for additional information.) Some components in this

product are capable of causing an allergic reaction, possibly resulting in burning, itching and skin eruptions. Contact with heated material may cause thermal burns.

Inhalation

Dusts may cause irritation of the nose, throat, and lungs. Excessive inhalation of metallic fumes and dusts may result in metal fume fever, an influenza-like illness. It is characterized by a sweet or metallic taste in the mouth, accompanied by dryness and irritation of the throat, cough, shortness of breath, pulmonary edema, general malaise, weakness, fatigue, muscle and joint pains, blurred vision, fever and chills. Typical symptoms last from 12 to 48 hours.

Ingestion

Not expected to be acutely toxic via ingestion based on the physical and chemical properties of the product. Swallowing of excessive amounts of the dust may cause irritation, nausea, and diarrhea.

Potential Fire and Explosion Hazards

Under normal conditions, steel products do not present fire or explosion hazards, and dust generated by handling steel products is oxidized and not combustible. Processing of steel product by some individual customers may produce potentially combustible dust that may represent a fire or explosion hazard.

Chronic or Special Toxic Effects

Repeated exposure to fine dusts may inflame the nasal mucosa and cause changes to the lung. In addition, a red-brown pigmentation of the eye and/or skin may occur.

Welding fumes have been associated with adverse health effects. Contains components that may cause cancer or reproductive effects. The following components are listed by NTP, OSHA, or IARC as carcinogens: Nickel, chromium (hexavalent), cobalt, lead, cadmium, antimony (trioxide), arsenic, beryllium. See Section 11, for additional, specific information on effects noted above.

Target Organs

Overexposure to specific components of this product that are generated in dusts or fumes may cause adverse effects to the following organs or systems: eyes, skin, liver, kidney, central nervous system, cardiovascular system, respiratory system,.

Medical Conditions Aggravated by Exposure

Diseases of the skin such as eczema may be aggravated by exposure. Also, disorders of the respiratory system including asthma, bronchitis, and emphysema. Long-term inhalation exposure to agents that cause pneumoconiosis (e.g. dust) may act synergistically with inhalation of oxide fumes or dusts of this product.

4. FIRST AID MEASURES

Eye Contact- In case of overexposure to dusts or fumes, immediately flush eyes with plenty of water for at least 15 minutes occasionally lifting the eye lids. Get medical attention if irritation persists. Thermal burns should be treated as medical emergencies.

Skin Contact - In case of overexposure to dusts or particulates, wash with soap and plenty of water. Get medical attention if irritation develops or persists. If thermal burn occurs, flush area with cold water and get immediate medical attention.

Inhalation - In case of overexposure to dusts or fumes, remove to fresh air. Get immediate medical attention if symptoms described in this MSDS develop.

Ingestion - Not considered an ingestion hazard. However, if excessive amounts of dust or particulates are swallowed, treat symptomatically and supportively. Get medical attention.

Notes to Physician - Inhalation of metal fume or metal oxides may produce an acute febrile state, with cough, chills, weakness, and general malaise, nausea, vomiting, muscle cramps, and remarkable leukocytosis. Treatment is symptomatic, and condition is self limited in 24-48 hours. Chronic exposure to dusts may result in pneumoconiosis of mixed type.

5. FIRE FIGHTING MEASURES

Flash Point (Method) - Not applicable

Flammable Limits (% volume in air) - Not applicable

Auto ignition Temperature - Not applicable

Extinguishing Media - For molten metal, use dry powder or sand. For steel dust use or dry sand, water, foam, argon or nitrogen.

Special Fire Fighting Procedures - Do not use water on molten metal. Do not use Carbon Dioxide (CO_2). Firefighters should not enter confined spaces without wearing NIOSH/MSHA approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.

Unusual Fire or Explosion Hazards - Unusual Fire or Explosion Hazards - Steel products do not present fire or explosion hazards under normal conditions. Any non-oxidized fine metal particles/ dust generated by grinding, sawing, abrasive blasting, or individual customer processes may produce materials that the customer should test for combustibility and other hazards in accordance with applicable regulations. High concentrations of combustible metallic fines in the air may present an explosion hazard.

6. ACCIDENTAL RELEASE MEASURES

Precautions if Material is Spilled or Released - Emergency response is unlikely unless in the form of combustible dust. Avoid inhalation, eye, or skin contact of dusts by using appropriate precautions outlined in this MSDS (see section 8). Fine turnings and small chips should be swept or vacuumed and placed into appropriate disposable containers. Keep fine dust or powder away from sources of ignition. Scrap should be reclaimed for recycling. Prevent materials from entering drains, sewers, or waterways. Specific standards and regulations may be applicable to materials generated by individual customer processes. As appropriate, these standards and regulations should be consulted for applicability.

Fire and Explosion Hazards

Some customer processes may generate combustible dust that may require specific precautions when cleaning spills or releases of dust.

Environmental Precautions - Some grades of steel may contain reportable quantities of alloying elements. See Section 15 for additional information.

Waste Disposal Methods - Dispose used or unused product in accordance with applicable Federal, State, and Local regulations. Please recycle.

7. HANDLING AND STORAGE

Storage Temperatures - Stable under normal temperatures and pressures.

Precautions to be Taken in Handling and Storing - Store away from strong oxidizers. Dusts and/or powders, alone, or combined with process specific fluids, may form explosive mixtures with air. Applicable Federal, state and local laws and regulations may require testing dust generated from processing of steel products to determine if it represents a fire or explosion hazard and to determine appropriate protection methods. Avoid breathing dusts or fumes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Operations with potential for generating high concentrations of airborne particulates or fumes should be evaluated and controlled as necessary.

Eye Protection - Use safety glasses. Dust resistant safety goggles are recommended under circumstances where particles could cause mechanical injury such as grinding or cutting. Face shield should be used when welding or cutting.

Skin - Appropriate protective gloves should be worn as necessary. Good personal hygiene practices should be followed including cleansing exposed skin several times daily with soap and water, and laundering or dry cleaning soiled work clothing.

Respiratory Protection - NIOSH/MSHA approved dust/fume/mist respirator should be used to avoid excessive exposure. See Section 2 for component material information exposure limits. If such concentrations are sufficiently high that this respirator is inadequate, or high enough to cause oxygen deficiency, use a positive pressure self-contained breathing apparatus (SCBA). Follow all applicable respirator use, fitting, and training standards and regulations.

Ventilation - Provide general and/or local exhaust ventilation to control airborne levels of dust or fumes below exposure limits.

Exposure Guidelines - No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. See Section 2 for component materials. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor – Silver grey to grey black with metallic luster.
Boiling Point - Not applicable
Melting Point - Approximately 2800 ^{o}F
pH - Not applicable**Specific Gravity (at 15.6^{o}C) -** Not applicable
Density (at 15.6 ^{o}C) - Not applicable
Vapor Pressure - Not applicable
Vapor Density (air = 1) - Not applicable
% Volatile, by Volume - Not applicable
Solubility in Water - Insoluble.
Evaporation Rate (Butyl Acetate = 1) - Not applicable
Other Physical and Chemical Data
None

10. STABILITY AND REACTIVITY

Stability - Stable
Conditions to Avoid - Steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements. Avoid generation of airborne fume.
Hazardous Polymerization - Will not occur.
Incompatibility (Materials to Avoid) - Reacts with strong acids to form hydrogen gas. Do not store near strong oxidizers.
Hazardous Decomposition Products - Metallic fumes may be produced during welding, burning, grinding, and possibly machining or any situation with the potential for thermal decomposition. Refer to ANSI Z49.1

11. TOXICOLOGICAL INFORMATION

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 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 potentially carcinogenic 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 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.

12. ECOLOGICAL INFORMATION

Aquatic Ecotoxicological Data - No specific information available on this product.
Environmental Fate Data - No specific information available on this product.

13. DISPOSAL CONSIDERATIONS

Recovery and reuse, rather than disposal, should be the ultimate goal of handling efforts. Dispose in accordance with federal, state, and local health and environmental regulations. Prevent materials from entering drains, sewers, or waterways.

14. TRANSPORT INFORMATION

DOT Proper Shipping Name - Not regulated
DOT Hazard Classification - Not regulated
UN/NA Number - Not applicable
DOT Packing Group - Not applicable
Labeling Requirements - Not applicable
Placards - Not applicable
DOT Hazardous Substance - Not applicable
DOT Marine Pollutant - Not applicable

15. REGULATORY INFORMATION

This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be hazardous. This product is not

hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be combustible or hazardous and require protection to comply with applicable Federal, state and local laws and regulations.

CALIFORNIA PROPOSITION 65

This product contains chemicals (antimony [oxide], arsenic, beryllium, chromium [hexavalent], cobalt, cadmium, lead, nickel) known to the State of California to cause cancer and chemicals (cadmium, lead) known to the State of California to cause birth defects or other reproductive harm.

Regulatory Lists

Some components of this product may be specifically listed by individual states; other product-specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements, you should contact the appropriate agency in your state.

Toxic Substances Control Act (TSCA)

Components of this product are listed on the TSCA Inventory.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

Steel is not reportable, however, it contains hazardous substances that may be reportable if released in pieces with diameters less than or equal to 0.004 inches (RQ marked with a "*").

Chemical Name	Reportable Quantity (in lb)
Antimony	5000*
Arsenic	1*
Beryllium	10*
Cadmium	10*
Chromium	5000*
Copper	5000*
Lead	10*
Nickel	100*
Phosphorus	1
Selenium	100*
Zinc	1000*

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III

SECTION 311/312 HAZARD CATEGORIES: Immediate Health Effect, Delayed Health Effect

This product contains the following EPCRA Section 313 chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right – To – Know Act of 1986 (40 CFR 372):

SECTION 313 REPORTABLE INGREDIENTS:

Chemical Name	CAS Number	Concentration (% by weight)	Reportable
Aluminum	7429-90-5	<0.01	No – Less than 1%
Antimony	7440-36-0	<0.9	No – Less than 1%
Arsenic	7440-38-2	<0.09	No – Less than 0.1%
Beryllium	7440-43-9	<0.09	No – Less than 0.1%
Cadmium	7440-43-9	<0.09	No – Less than 0.1%
Chromium	7440-47-3	0.01-1.0	Yes – Greater than 0.1%
Cobalt	7440-48-4	<0.09	No – Less than 0.1%
Copper	7440-50-8	<0.9	No – Less than 1%
Lead	7439-92-1	<0.05	No – Less than 0.1%
Manganese	7439-96-5	0.2-2	Yes – Greater than 1%
Nickel	7440-02-0	<1.0	Yes – Greater than 0.1%
Phosphorus	7723-14-0	<0.9	No – Less than 1%
Selenium	7782-49-2	<0.9	No – Less than 1%
Vanadium	7440-62-2	<0.9	No – Less than 1%
Zinc	7440-66-6	0-0.10	No – Less than 1%

Concentrations based on analytical data and process knowledge of typical products distributed by the facility.

16. OTHER INFORMATION

This MSDS covers Nucor product as delivered from the Nucor facility, but does not include chemicals that may be applied by subsequent handlers and/or distributors of this product. This could include a variety of materials including oils, paints, galvanization, etc. that are not included in this MSDS. Additionally, specialty orders may require application of coating material not listed in this MSDS. MSDSs for any Nucor-applied specialty coating will be provided separately. During welding, precautions should be taken for airborne contaminants that may originate from components of the welding rod. Arc or spark generated when welding or burning could be a source of ignition for combustible and/or flammable materials. The information in this Material Safety Data Sheet (MSDS) was obtained from sources which we believe are reliable; however, the information is provided without any representation or warranty, expressed or implied, regarding the accuracy or correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use, or disposal of this product.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Cold Finished Carbon, Stainless and Alloy Steels
CAS Number: Not applicable
Synonyms: Steels
Use/Description: Cold Finish Steel Products

Company Identification:

Nucor Cold Finish - Darlington
300 Steel Mill Road
PO Box 525
Darlington, South Carolina 29540
1-843-393-5841

Nucor Cold Finish – Utah
1875 West Hwy 13, South
Brigham City, Utah, 84302
1-435-734-9433

Nucor Cold Finish – Nebraska
2301 West Omaha Avenue
Norfolk, Nebraska 68701
1-402-644-8600

Nucor Cold Finish Wisconsin, Inc.
7200 South 6th Street
Oak Creek, Wisconsin 53154
1-414-764-0220

Nucor – LMP, Inc.
2000 East First Street
Maryville, MO 64468
1-660-582-3127

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Base Metal:							
Iron	(Fe)	7439-89-6	Balance	5	Oxide Dust/Fume	10	Oxide Dust/Fume
Alloying Elements							
Aluminum	(Al)	7429-90-5	0-0.15	10 5	Dust Fume	15 5	Dust Respirable fraction
Antimony	(Sb)	7440-36-0	<0.9	0.5	As Antimony	0.5	As Antimony
Arsenic	(As)	7440-38-2	<0.09	0.01	As Arsenic (A1 Carcinogen)	0.01	As Arsenic
Beryllium	(Be)	7440-41-7	<0.09	0.002 0.005	As Beryllium (A1 Carcinogen) As Beryllium (STEL)	0.002 0.005	As Beryllium As Beryllium (Ceiling)
Bismuth	(Bi)	7440-69-9	<1.5	0.01	Not established		Not established
Boron	(B)	7440-42-8	<0.9	10	Oxide Dust	15	Oxide Dust
Cadmium	(Cd)	7440-43-9	<0.09	0.01 0.002	As Cadmium (A2 Carcinogen) Respirable fraction	0.005 0.0025	As Cadmium As Cadmium (Action Level)
Calcium	(Ca)	1305-78-8	<0.9	2	Oxide Dust	5	Oxide Dust
Carbon	(C)	7440-44-0	<1.5		Not Established		Not Established
Chromium (Alloy grades)	(Cr)	7440-47-3	0.01-1.6	0.5	Metal	1	Metal

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Chromium (Stainless grades)	(Cr)	7440-47-3	4-20	0.5	Metal	1	Metal
Chromium (Carbon grades)	(Cr)	7440-47-3	0.01-1.0	0.5	Metal	1	Metal
Cobalt	(Co)	7440-48-4	<0.09	0.02	As Cobalt (A3 Carcinogen)	0.1	Metal/Dust/Fume
Copper	(Cu)	7440-50-8	0.04-1.0	1 0.2	Dust Fume	1 0.1	Dust Fume
Lead (Leaded Grades)	(Pb)	7439-92-1	0.15-0.35	0.05	Dust / Fume (A3 Carcinogen)	0.05	Dust / Fume
Lead (All Other Grades)	(Pb)	7439-92-1	<0.05	0.05	Dust/Fume (A3 Carcinogen)	0.05	Dust/Fume
Magnesium	(Mg)	7439-95-4	<0.9		Not Established		Not Established
Manganese	(Mn)	7439-96-5	0-2.5	0.2	Elemental Mn and Inorg Compounds	5	Fume (Ceiling)
Molybdenum	(Mo)	7439-98-7	0-1.1	10	Insoluble Compounds	15	Insoluble Compounds
Niobium	(Nb)	7440-03-1	<0.9		Not Established		
Nickel	(Ni)	7440-02-0	<4.0	1.5	Metal	1	Metal and Insoluble Compounds
Nitrogen	(N)	7727-37-9	<0.9		Simple Asphyxiant		Simple Asphyxiant
Phosphorus	(P)	7723-14-0	<0.9	0.1	Phosphorus	0.1	Phosphorus
Selenium	(Se)	7782-49-2	<0.9	0.2	Selenium	0.2	Selenium
Silicon	(Si)	7440-21-3	<03.0	10	Dust	15	Dust
Sulfur	(S)	7704-34-9	<0.9	5.2 13	Sulfur Dioxide Sulfur Dioxide (STEL)	13	Sulfur Dioxide
Tin	(Sn)	7723-14-0	<0.9	2	Metal,Oxide and Inorganic Compounds	2	Inorganic Compounds
Tellurium	(Te)	13494-80-9	0-0.1	0.1	Vapor	0.1	Vapor
Titanium	(Ti)	7440-32-6	<0.9		Not Established		Not Established
Tungsten	(W)	7440-33-7	<0.9	5 10	Insoluble Compounds as W Insoluble Compounds as W (STEL)		Not Established
Vanadium	(V)	7440-62-2	<0.9	0.05	Oxide Dust/Fume	0.5 0.1	Oxide Dust (Ceiling) Oxide Fume (Ceiling)
Zinc	(Zn)	7440-66-6	<0.9	10 5 10	Oxide Dust OxideFume Oxide Fume (STEL)	5 10	Oxide Fume Oxide Dust

NOTE: No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. The above listing is a summary of elements used in alloying Nucor Cold Finish Products. Various grades of steel will contain different combinations of these elements and/or trace materials. Exact specifications may be found by calling the division and asking for a specifications sheet.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING! WELDING, SAWING, BRAZING, GRINDING, ABRASIVE BLASTING, MACHINING AND OTHER PROCESSES MAY CAUSE DUSTS, POTENTIALLY COMBUSTIBLE DUST, AND/OR FUMES TO BE RELEASED. MAY BE HARMFUL IF INHALED. MAY IRRITATE THE EYES, SKIN, AND RESPIRATORY TRACT. MOLTEN MATERIAL MAY CAUSE THERMAL BURNS.

Potential Health Effects

Note: Steel products as sold by Nucor, do not present an inhalation, ingestion or skin hazard. However, individual customer processes, (such as welding, sawing, brazing, grinding, abrasive blasting, and machining) may result in the formation of fumes, dust (combustible or otherwise), and/or particulate that may present a variety of health hazards. Molten steel also is hazardous.

Eye Contact

Dusts or particulates may cause mechanical irritation including pain, tearing, and redness. Scratching of the cornea can occur if eye is rubbed. Fumes may be irritating. Contact with the heated material may cause thermal burns.

Skin Contact

Dusts or particulates may cause mechanical irritation due to abrasion. Coated steel may cause skin irritation in sensitive individuals (see Section 16 for additional information.) Some components in this product are capable of causing an allergic reaction, possibly resulting in burning, itching and skin eruptions. Contact with heated material may cause thermal burns.

Inhalation

Dusts may cause irritation of the nose, throat, and lungs. Excessive inhalation of metallic fumes and dusts may result in metal fume fever, an influenza-like illness. It is characterized by a sweet or metallic taste in the mouth, accompanied by dryness and irritation of the throat, cough, shortness of breath, pulmonary edema, general malaise, weakness, fatigue, muscle and joint pains, blurred vision, fever and chills. Typical symptoms last from 12 to 48 hours.

Ingestion

Not expected to be acutely toxic via ingestion based on the physical and chemical properties of the product. Swallowing of excessive amounts of the dust may cause irritation, nausea, and diarrhea.

Potential Fire and Explosion Hazards

Under normal conditions, steel products do not present fire or explosion hazards, and dust generated by handling steel products is oxidized and not combustible. Processing of steel product by some individual customers may produce potentially combustible dust that may represent a fire or explosion hazard.

Chronic or Special Toxic Effects

Repeated exposure to fine dusts may inflame the nasal mucosa and cause changes to the lung. In addition, a red-brown pigmentation of the eye and/or skin may occur.

Welding fumes have been associated with adverse health effects. Contains components that may cause cancer or reproductive effects. The following components are listed by NTP, OSHA, or IARC as carcinogens: Nickel, chromium (hexavalent), cobalt, lead, cadmium, antimony (trioxide), arsenic, beryllium. See Section 11, for additional, specific information on effects noted above.

Target Organs

Overexposure to specific components of this product that are generated in dusts or fumes may cause adverse effects to the following organs or systems: eyes, skin, liver, kidney, central nervous system, cardiovascular system, respiratory system,.

Medical Conditions Aggravated by Exposure

Diseases of the skin such as eczema may be aggravated by exposure. Also, disorders of the respiratory system including asthma, bronchitis, and emphysema. Long-term inhalation exposure to agents that cause pneumoconiosis (e.g. dust) may act synergistically with inhalation of oxide fumes or dusts of this product.

4. FIRST AID MEASURES

Eye Contact- In case of overexposure to dusts or fumes, immediately flush eyes with plenty of water for at least 15 minutes occasionally lifting the eye lids. Get medical attention if irritation persists. Thermal burns should be treated as medical emergencies.

Skin Contact - In case of overexposure to dusts or particulates, wash with soap and plenty of water. Get medical attention if irritation develops or persists. If thermal burn occurs, flush area with cold water and get immediate medical attention.

Inhalation - In case of overexposure to dusts or fumes, remove to fresh air. Get immediate medical attention if symptoms described in this MSDS develop.

Ingestion - Not considered an ingestion hazard. However, if excessive amounts of dust or particulates are swallowed, treat symptomatically and supportively. Get medical attention.
Notes to Physician - Inhalation of metal fume or metal oxides may produce an acute febrile state, with cough, chills, weakness, and general malaise, nausea, vomiting, muscle cramps, and remarkable leukocytosis. Treatment is symptomatic, and condition is self limited in 24-48 hours. Chronic exposure to dusts may result in pneumoconiosis of mixed type.

5. FIRE FIGHTING MEASURES

Flash Point (Method) - Not applicable
Flammable Limits (% volume in air) - Not applicable
Auto ignition Temperature - Not applicable
Extinguishing Media - For molten metal, use dry powder or sand. For steel dust use or dry sand, water, foam, argon or nitrogen.
Special Fire Fighting Procedures - Do not use water on molten metal. Do not use Carbon Dioxide (CO_2). Firefighters should not enter confined spaces without wearing NIOSH/MSHA approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.
Unusual Fire or Explosion Hazards - Unusual Fire or Explosion Hazards - Steel products do not present fire or explosion hazards under normal conditions. Any non-oxidized fine metal particles/ dust generated by grinding, sawing, abrasive blasting, or individual customer processes may produce materials that the customer should test for combustibility and other hazards in accordance with applicable regulations. High concentrations of combustible metallic fines in the air may present an explosion hazard.

6. ACCIDENTAL RELEASE MEASURES

Precautions if Material is Spilled or Released - Emergency response is unlikely unless in the form of combustible dust. Avoid inhalation, eye, or skin contact of dusts by using appropriate precautions outlined in this MSDS (see section 8). Fine turnings and small chips should be swept or vacuumed and placed into appropriate disposable containers. Keep fine dust or powder away from sources of ignition. ~~.~~ Scrap should be reclaimed for recycling. Prevent materials from entering drains, sewers, or waterways. Specific standards and regulations may be applicable to materials generated by individual customer processes. As appropriate, these standards and regulations should be consulted for applicability.
Fire and Explosion Hazards
Some customer processes may generate combustible dust that may require specific precautions when cleaning spills or releases of dust.
Environmental Precautions - Some grades of steel may contain reportable quantities of alloying elements. See Section 15 for additional information.
Waste Disposal Methods - Dispose used or unused product in accordance with applicable Federal, State, and Local regulations. Please recycle.

7. HANDLING AND STORAGE

Storage Temperatures - Stable under normal temperatures and pressures.
Precautions to be Taken in Handling and Storing - Store away from strong oxidizers. Dusts and/or powders, alone, or combined with process specific fluids, may form explosive mixtures with air. Applicable Federal, state and local laws and regulations may require testing dust generated from processing of steel products to determine if it represents a fire or explosion hazard and to determine appropriate protection methods. Avoid breathing dusts or fumes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Operations with potential for generating high concentrations of airborne particulates or fumes should be evaluated and controlled as necessary.
Eye Protection - Use safety glasses. Dust resistant safety goggles are recommended under circumstances where particles could cause mechanical injury such as grinding or cutting. Face shield should be used when welding or cutting.

Skin - Appropriate protective gloves should be worn as necessary. Good personal hygiene practices should be followed including cleansing exposed skin several times daily with soap and water, and laundering or dry cleaning soiled work clothing.
Respiratory Protection - NIOSH/MSHA approved dust/fume/mist respirator should be used to avoid excessive exposure. See Section 2 for component material information exposure limits. If such concentrations are sufficiently high that this respirator is inadequate, or high enough to cause oxygen deficiency, use a positive pressure self-contained breathing apparatus (SCBA). Follow all applicable respirator use, fitting, and training standards and regulations.
Ventilation - Provide general and/or local exhaust ventilation to control airborne levels of dust or fumes below exposure limits.
Exposure Guidelines - No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. See Section 2 for component materials. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor – Silver grey to grey black with metallic luster.
Boiling Point - Not applicable
Melting Point - Approximately 2800 ^{o}F
pH - Not applicable
Specific Gravity (at 15.6^{o}C) - Not applicable
Density (at 15.6 ^{o}C) - Not applicable
Vapor Pressure - Not applicable
Vapor Density (air = 1) - Not applicable
% Volatile, by Volume - Not applicable
Solubility in Water - Insoluble.
Evaporation Rate (Butyl Acetate = 1) - Not applicable
Other Physical and Chemical Data
None

10. STABILITY AND REACTIVITY

Stability - Stable
Conditions to Avoid - Steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements. Avoid generation of airborne fume.
Hazardous Polymerization - Will not occur.
Incompatibility (Materials to Avoid) - Reacts with strong acids to form hydrogen gas. Do not store near strong oxidizers.
Hazardous Decomposition Products - Metallic fumes may be produced during welding, burning, grinding, and possibly machining or any situation with the potential for thermal decomposition. Refer to ANSI Z49.1

11. TOXICOLOGICAL INFORMATION

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 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 potentially carcinogenic 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 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.

12. ECOLOGICAL INFORMATION

Aquatic Ecotoxicological Data - No specific information available on this product.
Environmental Fate Data - No specific information available on this product.

13. DISPOSAL CONSIDERATIONS

Recovery and reuse, rather than disposal, should be the ultimate goal of handling efforts. Dispose in accordance with federal, state, and local health and environmental regulations. Prevent materials from entering drains, sewers, or waterways.

14. TRANSPORT INFORMATION

DOT Proper Shipping Name - Not regulated
DOT Hazard Classification - Not regulated
UN/NA Number - Not applicable
DOT Packing Group - Not applicable
Labeling Requirements - Not applicable
Placards - Not applicable
DOT Hazardous Substance - Not applicable
DOT Marine Pollutant - Not applicable

15. REGULATORY INFORMATION

This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be hazardous. This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be combustible or hazardous and require protection to comply with applicable Federal, state and local laws and regulations.

CALIFORNIA PROPOSITION 65
This product contains chemicals (antimony [oxide], arsenic, beryllium, chromium [hexavalent], cobalt, cadmium, lead, nickel) known to the State of California to cause cancer and chemicals (cadmium, lead) known to the State of California to cause birth defects or other reproductive harm.
Regulatory Lists
Some components of this product may be specifically listed by individual states; other product-specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements, you should contact the appropriate agency in your state.
Toxic Substances Control Act (TSCA)
Components of this product are listed on the TSCA Inventory.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
Steel is not reportable, however, it contains hazardous substances that may be reportable if released in pieces with diameters less than or equal to 0.004 inches (RQ marked with a "*").

Chemical Name	Reportable Quantity (in lb)
Antimony	5000*
Arsenic	1*
Beryllium	10*
Cadmium	10*
Chromium	5000*
Copper	5000*
Lead	10*
Nickel	100*
Phosphorus	1
Selenium	100*
Zinc	1000*

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III
SECTION 311/312 HAZARD CATEGORIES: Immediate Health Effect, Delayed Health Effect
This product contains the following EPCRA Section 313 chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right – To – Know Act of 1986 (40 CFR 372):
SECTION 313 REPORTABLE INGREDIENTS:

Chemical Name	CAS Number	Concentration (% by weight)	Reportable
Aluminum	7429-90-5	<0.15	No – Less than 1%
Antimony	7440-36-0	<0.9	No – Less than 1%
Arsenic	7440-38-2	<0.09	No – Less than 0.1%
Beryllium	7440-43-9	<0.09	No – Less than 0.1%
Bismuth	7440-69-9	0-0.5	Yes – Greater than 0.1%
Cadmium	7440-43-9	<0.09	No – Less than 0.1%
Chromium	7440-47-3	0.01-1.6	Yes – Greater than 0.1%
Cobalt	7440-48-4	<0.09	No – Less than 0.1%

Chemical Name	CAS Number	Concentration (% by weight)	Reportable
Copper	7440-50-8	<1.0	No – Less than 1%
Lead	7439-92-1	<0.05	Yes
Lead (leaded steel only)	7439-92-1	0.15-0.35	Yes
Manganese	7439-96-5	0-2.5	Yes – Greater than 1%
Nickel	7440-02-0	<4.0	Yes – Greater than 0.1%
Phosphorus	7723-14-0	<0.9	No – Less than 1%
Selenium	7782-49-2	<0.9	No – Less than 1%
Vanadium	7440-62-2	<0.9	No – Less than 1%
Zinc	7440-66-6	<0.9	No – Less than 1%

Concentrations based on analytical data and process knowledge of typical products distributed by the facility.

16. OTHER INFORMATION

This MSDS covers Nucor product as delivered from the Nucor facility, but does not include chemicals that may be applied by subsequent handlers and/or distributors of this product. This could include a variety of materials including oils, paints, galvanization, etc. that are not included in this MSDS. Additionally, specialty orders may require application of coating material not listed in this MSDS. MSDSs for any Nucor-applied specialty coating will be provided separately. During welding, precautions should be taken for airborne contaminants that may originate from components of the welding rod. Arc or spark generated when welding or burning could be a source of ignition for combustible and/or flammable materials. The information in this Material Safety Data Sheet (MSDS) was obtained from sources which we believe are reliable; however, the information is provided without any representation or warranty, expressed or implied, regarding the accuracy or correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use, or disposal of this product.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Carbon and Alloy Steels
CAS Number: Not applicable
Synonyms: Steels
Use/Description: Plate products

Company Identification:
Nucor Steel – Hertford County
PO Box 279
Winton, North Carolina 27986
Nucor Steel Tuscaloosa, Inc.
1700 Holt Road, N.E.
Tuscaloosa, Alabama 35404

24 Hour Contact – CHEMTREC 1-800-424-9300

Safety Officer [8:00 am – 5:00 pm]: 1-252-356-3929

Safety Officer [8:00 am – 5:00 pm]: 1-205-556-1482

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Base Metal:							
Iron	(Fe)	7439-89-6	Balance	5	Oxide Dust/Fume	10	Oxide Dust/Fume
Alloying Elements							
Aluminum	(Al)	7429-90-5	0-0.10	10 5	Dust Fume	15 5	Dust Respirable fraction
Antimony	(Sb)	7440-36-0	<0.9	0.5	As Antimony	0.5	As Antimony
Arsenic	(As)	7440-38-2	<0.09	0.01	As Arsenic (A1 Carcinogen)	0.01	As Arsenic
Beryllium	(Be)	7440-41-7	<0.09	0.002 0.01	As Beryllium (A1 Carcinogen) As Beryllium (STEL)	0.002 0.005	As Beryllium As Beryllium (Ceiling)
Boron	(B)	7440-42-8	<0.9	10	Oxide Dust	15	Oxide Dust
Cadmium	(Cd)	7440-43-9	<0.09	0.01 0.002	As Cadmium (A2 Carcinogen) Respirable fraction	0.005 0.0025	As Cadmium As Cadmium (Action Level)
Calcium	(Ca)	1305-78-8	<0.9	2	Oxide Dust	5	Oxide Dust
Carbon	(C)	7440-44-0	0.04-0.95		Not Established		Not Established
Chromium	(Cr)	7440-47-3	0.01-1.0	0.5	Metal	1	Metal
Cobalt	(Co)	7440-48-4	<0.09	0.02	As Cobalt (A3 Carcinogen)	0.1	Metal/Dust/Fume
Copper	(Cu)	7440-50-8	<0.9	1 0.2	Dust Fume	1 0.1	Dust Fume
Lead	(Pb)	7439-92-1	0.0-0.04	0.05	Dust / Fume (A3 Carcinogen)	0.05	Dust / Fume
Magnesium	(Mg)	7439-95-4	<0.9		Not Established		Not Established
Manganese	(Mn)	7439-96-5	0.2-2	0.2	Elemental Mn and Inorg Compounds	5	Fume (Ceiling)
Molybdenum	(Mo)	7439-98-7	<0.9	10	Insoluble Compounds	15	Insoluble Compounds
Niobium	(Nb)	7440-03-1	<0.9		Not Established		
Nickel	(Ni)	7440-02-0	0.01-1.0	1.5	Metal	1	Metal and Insoluble Compounds
Nitrogen	(N)	7727-37-9	<0.9		Simple Asphyxiant		Simple Asphyxiant
Phosphorus	(P)	7723-14-0	<0.9	0.1	Phosphorus	0.1	Phosphorus

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Selenium	(Se)	7782-49-2	<0.9	0.2	Selenium	0.2	Selenium
Silicon	(Si)	7440-21-3	<0.9	10	Dust	15	Dust
Sulfur	(S)	7446-09-05	<0.9	5.2 13	Sulfur Dioxide Sulfur Dioxide (STEL)	13	Sulfur Dioxide
Tin	(Sn)	7723-14-0	<0.9	2	Metal,Oxide and Inorganic Compounds	2	Inorganic Compounds
Titanium	(Ti)	7440-32-6	<0.9		Not Established		Not Established
Tungsten	(W)	7440-33-7	<0.9	5 10	Insoluble Compounds as W Insoluble Compounds as W (STEL)		Not Established
Vanadium	(V)	7440-62-2	<0.9	0.05	Oxide Dust/Fume	0.5 0.1	Oxide Dust (Ceiling) Oxide Fume (Ceiling)
Zinc	(Zn)	7440-66-6	0.0-0.01	10 5 10	Oxide Dust OxideFume Oxide Fume (STEL)	5 10	Oxide Fume Oxide Dust

NOTE: No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. The above listing is a summary of elements used in alloying Nucor Steel Products. Various grades of steel will contain different combinations of these elements and/or trace materials. Exact specifications may be found by calling the division and asking for a specifications sheet.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING! WELDING, SAWING, BRAZING, ABRASIVE BLASTING, MACHINING AND OTHER PROCESSES MAY CAUSE DUSTS, POTENTIALLY COMBUSTIBLE DUST, AND/OR FUMES TO BE RELEASED. MAY BE HARMFUL IF INHALED. MAY IRRITATE THE EYES, SKIN, AND RESPIRATORY TRACT. MOLTEN MATERIAL MAY CAUSE THERMAL BURNS

Potential Health Effects

Note: Steel products, as sold by Nucor, do not present an inhalation, ingestion or skin hazard. However, individual customer processes, (such as welding, sawing, brazing, grinding, abrasive blasting, and machining) may result in the formation of fumes, dust (combustible or otherwise), and/particulate formation that may present a variety of health hazards. Molten steel also is hazardous.

Eye Contact

Dusts or particulates may cause mechanical irritation including pain, tearing, and redness. Scratching of the cornea can occur if eye is rubbed. Fumes may be irritating. Contact with the heated material may cause thermal burns.

Skin Contact

Dusts or particulates may cause mechanical irritation due to abrasion. Coated steel may cause skin irritation in sensitive individuals (see Section 16 for additional information.) Some components in this product are capable of causing an allergic reaction, possibly resulting in burning, itching and skin eruptions. Contact with heated material may cause thermal burns.

Inhalation

Dusts may cause irritation of the nose, throat, and lungs. Excessive inhalation of metallic fumes and dusts may result in metal fume fever, an influenza-like illness. It is characterized by a sweet or metallic taste in the mouth, accompanied by dryness and irritation of the throat, cough, shortness of breath, pulmonary edema, general malaise, weakness, fatigue, muscle and joint pains, blurred vision, fever and chills. Typical symptoms last from 12 to 48 hours.

Ingestion

Not expected to be acutely toxic via ingestion based on the physical and chemical properties of the product. Swallowing of excessive amounts of the dust may cause irritation, nausea, and diarrhea.

Potential Fire and Explosion Hazards

Under normal conditions, steel products do not present fire or explosion hazards, and dust generated by handling steel products is oxidized and not combustible. Processing of steel product by some individual customers may produce potentially combustible dust that may represent a fire or explosion hazard.

Chronic or Special Toxic Effects
Repeated exposure to fine dusts may inflame the nasal mucosa and cause changes to the lung. In addition, a red-brown pigmentation of the eye and/or skin may occur.
Welding fumes have been associated with adverse health effects. Contains components that may cause cancer or reproductive effects. The following components are listed by NTP, OSHA, or IARC as carcinogens: Nickel, chromium (hexavalent), cobalt, lead, cadmium, antimony (trioxide), arsenic, beryllium. See Section 11, for additional, specific information on effects noted above.
Target Organs
Overexposure to specific components of this product that are generated in dusts or fumes may cause adverse effects to the following organs or systems: eyes, skin, liver, kidney, central nervous system, cardiovascular system, respiratory system,.
Medical Conditions Aggravated by Exposure
Diseases of the skin such as eczema may be aggravated by exposure. Also, disorders of the respiratory system including asthma, bronchitis, and emphysema. Long-term inhalation exposure to agents that cause pneumoconiosis (e.g. dust) may act synergistically with inhalation of oxide fumes or dusts of this product.

4. FIRST AID MEASURES

Eye Contact- In case of overexposure to dusts or fumes, immediately flush eyes with plenty of water for at least 15 minutes occasionally lifting the eye lids. Get medical attention if irritation persists. Thermal burns should be treated as medical emergencies.
Skin Contact - In case of overexposure to dusts or particulates, wash with soap and plenty of water. Get medical attention if irritation develops or persists. If thermal burn occurs, flush area with cold water and get immediate medical attention.
Inhalation - In case of overexposure to dusts or fumes, remove to fresh air. Get immediate medical attention if symptoms described in this MSDS develop.
Ingestion - Not considered an ingestion hazard. However, if excessive amounts of dust or particulates are swallowed, treat symptomatically and supportively. Get medical attention.
Notes to Physician - Inhalation of metal fume or metal oxides may produce an acute febrile state, with cough, chills, weakness, and general malaise, nausea, vomiting, muscle cramps, and remarkable leukocytosis. Treatment is symptomatic, and condition is self limited in 24-48 hours. Chronic exposure to dusts may result in pneumoconiosis of mixed type.

5. FIRE FIGHTING MEASURES

Flash Point (Method) - Not applicable
Flammable Limits (% volume in air) - Not applicable
Auto ignition Temperature - Not applicable
Extinguishing Media - For molten metal, use dry powder or sand. For steel dust use or dry sand, water, foam, argon or nitrogen.
Special Fire Fighting Procedures - Do not use water on molten metal. Do not use Carbon Dioxide (CO_2). Firefighters should not enter confined spaces without wearing NIOSH/MSHA approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.
Unusual Fire or Explosion Hazards - Steel products do not present fire or explosion hazards under normal conditions. Any non-oxidized fine metal particles/ dust generated by grinding, sawing, abrasive blasting, or individual customer processes may produce materials that the customer should test for combustibility and other hazards in accordance with applicable regulations. High concentrations of combustible metallic fines in the air may present an explosion hazard.

6. ACCIDENTAL RELEASE MEASURES

Precautions if Material is Spilled or Released - Emergency response is unlikely unless in the form of combustible dust. Avoid inhalation, eye, or skin contact of dusts by using appropriate precautions outlined in this MSDS (see section 8). Fine turnings and small chips should be swept or vacuumed and placed into appropriate disposable containers. Keep fine dust or powder away from sources of ignition. Scrap should be reclaimed for recycling. Prevent materials from entering drains, sewers, or waterways. Specific

standards and regulations may be applicable to materials generated by individual customer processes. As appropriate, these standards and regulations should be consulted for applicability.

Fire and Explosion Hazards

Some customer processes may generate combustible dust that may require specific precautions when cleaning spills or releases of dust.

Environmental Precautions - Some grades of steel may contain reportable quantities of alloying elements. See Section 15 for additional information.

Waste Disposal Methods - Dispose used or unused product in accordance with applicable Federal, State, and Local regulations. Please recycle.

7. HANDLING AND STORAGE

Storage Temperatures - Stable under normal temperatures and pressures.

Precautions to be Taken in Handling and Storing - Store away from strong oxidizers. Dusts and/or powders, alone, or combined with process specific fluids, may form explosive mixtures with air. Applicable Federal, state and local laws and regulations may require testing dust generated from processing of steel products to determine if it represents a fire or explosion hazard and to determine appropriate protection methods. Avoid breathing dusts or fumes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Operations with potential for generating high concentrations of airborne particulates or fumes should be evaluated and controlled as necessary.

Eye Protection - Use safety glasses. Dust resistant safety goggles are recommended under circumstances where particles could cause mechanical injury such as grinding or cutting. Face shield should be used when welding or cutting.

Skin - Appropriate protective gloves should be worn as necessary. Good personal hygiene practices should be followed including cleansing exposed skin several times daily with soap and water, and laundering or dry cleaning soiled work clothing.

Respiratory Protection - NIOSH/MSHA approved dust/fume/mist respirator should be used to avoid excessive exposure. See Section 2 for component material information exposure limits. If such concentrations are sufficiently high that this respirator is inadequate, or high enough to cause oxygen deficiency, use a positive pressure self-contained breathing apparatus (SCBA). Follow all applicable respirator use, fitting, and training standards and regulations.

Ventilation - Provide general and/or local exhaust ventilation to control airborne levels of dust or fumes below exposure limits.

Exposure Guidelines - No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. See Section 2 for component materials. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor - Silver grey to grey black with metallic luster.

Boiling Point - Not applicable

Melting Point - Approximately 2800 ^{o}F

pH - Not applicable

Specific Gravity (at 15.6^{o}C) - Not applicable

Density (at 15.6 ^{o}C) - Not applicable

Vapor Pressure - Not applicable

Vapor Density (air = 1) - Not applicable

% Volatile, by Volume - Not applicable

Solubility in Water - Insoluble.

Evaporation Rate (Butyl Acetate = 1) - Not applicable

Other Physical and Chemical Data

None

10. STABILITY AND REACTIVITY

Stability - Stable
Conditions to Avoid - Steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements. Avoid generation of airborne fume.
Hazardous Polymerization - Will not occur.
Incompatibility (Materials to Avoid) - Reacts with strong acids to form hydrogen gas. Do not store near strong oxidizers.
Hazardous Decomposition Products - Metallic fumes may be produced during welding, burning, grinding, and possibly machining or any situation with the potential for thermal decomposition. Refer to ANSI Z49.1

11. TOXICOLOGICAL INFORMATION

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 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 potentially carcinogenic 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 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.

12. ECOLOGICAL INFORMATION

Aquatic Ecotoxicological Data - No specific information available on this product.
Environmental Fate Data - No specific information available on this product.

13. DISPOSAL CONSIDERATIONS

Recovery and reuse, rather than disposal, should be the ultimate goal of handling efforts. Dispose in accordance with federal, state, and local health and environmental regulations. Prevent materials from entering drains, sewers, or waterways.

14. TRANSPORT INFORMATION

DOT Proper Shipping Name - Not regulated
DOT Hazard Classification - Not regulated
UN/NA Number - Not applicable
DOT Packing Group - Not applicable
Labeling Requirements - Not applicable
Placards - Not applicable
DOT Hazardous Substance - Not applicable
DOT Marine Pollutant - Not applicable

15. REGULATORY INFORMATION

This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be hazardous. This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be combustible or hazardous and require protection to comply with applicable Federal, state and local laws and regulations.

CALIFORNIA PROPOSITION 65
This product contains chemicals (antimony [oxide], arsenic, beryllium, chromium [hexavalent], cobalt, cadmium, lead, nickel) known to the State of California to cause cancer and chemicals (cadmium, lead) known to the State of California to cause birth defects or other reproductive harm.
Regulatory Lists

Some components of this product may be specifically listed by individual states; other product-specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements, you should contact the appropriate agency in your state.

Toxic Substances Control Act (TSCA)

Components of this product are listed on the TSCA Inventory.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

Steel is not reportable, however, it contains hazardous substances that may be reportable if released in pieces with diameters less than or equal to 0.004 inches (RQ marked with a "*").

Chemical Name	Reportable Quantity (in lb)
Antimony	5000*
Arsenic	1*
Beryllium	10*
Cadmium	10*
Chromium	5000*
Copper	5000*
Lead	10*
Nickel	100*
Phosphorus	1
Selenium	100*
Zinc	1000*

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III

SECTION 311/312 HAZARD CATEGORIES: Immediate Health Effect, Delayed Health Effect

This product contains the following EPCRA Section 313 chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right – To – Know Act of 1986 (40 CFR 372):

SECTION 313 REPORTABLE INGREDIENTS:

Chemical Name	CAS Number	Concentration (% by weight)	Reportable
Aluminum	7429-90-5	<0.10	No – Less than 1%
Antimony	7440-36-0	<0.9	No – Less than 1%
Arsenic	7440-38-2	<0.09	No – Less than 0.1%
Beryllium	7440-43-9	<0.09	No – Less than 0.1%
Cadmium	7440-43-9	<0.09	No – Less than 0.1%
Chromium	7440-47-3	0.01-1.0	Yes – Greater than 0.1%
Cobalt	7440-48-4	<0.09	No – Less than 0.1%
Copper	7440-50-8	<0.9	No – Less than 1%
Lead	7439-92-1	0.0-0.04	Yes
Manganese	7439-96-5	0.2-2	Yes – Greater than 1%
Nickel	7440-02-0	0.01-1.0	Yes – Greater than 0.1%
Phosphorus	7723-14-0	<0.9	No – Less than 1%
Selenium	7782-49-2	<0.9	No – Less than 1%
Vanadium	7440-62-2	<0.9	No – Less than 1%
Zinc	7440-66-6	<0.9	No – Less than 1%

Concentrations based on analytical data and process knowledge of typical products distributed by the facility.

16. OTHER INFORMATION

This MSDS covers Nucor product as delivered from the Nucor facility, but does not include chemicals that may be applied by subsequent handlers and/or distributors of this product. This could include a variety of materials including oils, paints, galvanization, etc. that are not included in this MSDS. Additionally, specialty orders may require application of coating material not listed in this MSDS. MSDSs for any Nucor-applied specialty coating will be provided separately. During welding, precautions should be taken for airborne contaminants that may originate from components of the welding rod. Arc or spark generated

when welding or burning could be a source of ignition for combustible and/or flammable materials. The information in this Material Safety Data Sheet (MSDS) was obtained from sources which we believe are reliable; however, the information is provided without any representation or warranty, expressed or implied, regarding the accuracy or correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use, or disposal of this product.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Sheet Steel
CAS Number: Not applicable
Synonyms: Hot Band, Cold Rolled, P&O, Galvanized
Use/Description: Steel for thin gauge products

Company Identification:
Nucor Steel – Arkansas
7301 E. County Road 142
Blytheville, AR 72315

Nucor Steel – Berkeley
1455 Hagan Avenue
Huger, SC 29450

Nucor Steel Decatur, LLC
4301 Iverson Boulevard
Trinity, AL 35673

Nucor Steel – Indiana/
Nucor Castrip® Crawfordsville IN
4537 South Nucor Road
Crawfordsville, IN 47933

24 Hour Contact – CHEMTREC 1-800-424-9300
Safety Officer [8:00 am – 5:00 pm]: 1-(870) 762-2100

Safety Officer [8:00 am – 5:00 pm]: 1-(843) 336-6000

Safety Officer [8:00 am – 5:00 pm]: 1-(256) 301-3500

Safety Officer [8:00 am – 5:00 pm]: 1-(765) 364-1323

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Base Metal:							
Iron	(Fe)	7439-89-6	Balance	5	Oxide Dust/Fume	10	Oxide Dust/Fume
Alloying Elements							
Aluminum	(Al)	7429-90-5	0-0.43	10 5	Dust Fume	15 5	Dust Respirable fraction
Antimony	(Sb)	7440-36-0	<0.9	0.5	As Antimony	0.5	As Antimony
Arsenic	(As)	7440-38-2	<0.09	0.01	As Arsenic (A1 Carcinogen)	0.01	As Arsenic
Beryllium	(Be)	7440-41-7	<0.09	0.002 0.01	As Beryllium (A1 Carcinogen) As Beryllium (STEL)	0.002 0.005	As Beryllium As Beryllium (Ceiling)
Boron	(B)	7440-42-8	<0.9	10	Oxide Dust	15	Oxide Dust
Cadmium	(Cd)	7440-43-9	<0.01	0.01 0.002	As Cadmium (A2 Carcinogen) Respirable fraction	0.005 0.0025	As Cadmium As Cadmium (Action Level)
Calcium	(Ca)	1305-78-8	<0.9	2	Oxide Dust	5	Oxide Dust
Carbon	(C)	7440-44-0	<1.0		Not Established		Not Established
Chromium	(Cr)	7440-47-3	0.01-1.5	0.5	Metal	1	Metal
Cobalt	(Co)	7440-48-4	<0.09	0.02	As Cobalt (A3 Carcinogen)	0.1	Metal/Dust/Fume
Copper	(Cu)	7440-50-8	<0.9	1 0.2	Dust Fume	1 0.1	Dust Fume
Lead	(Pb)	7439-92-1	0.0-0.04	0.05	Dust / Fume (A3 Carcinogen)	0.05	Dust / Fume
Magnesium	(Mg)	7439-95-4	<0.9		Not Established		Not Established
Manganese	(Mn)	7439-96-5	<6.0	0.2	Elemental Mn and Inorg Compounds	5	Fume (Ceiling)

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Molybdenum	(Mo)	7439-98-7	<1.1	10	Insoluble Compounds	15	Insoluble Compounds
Niobium	(Nb)	7440-03-1	<0.9		Not Established		
Nickel	(Ni)	7440-02-0	0.01-1.5	1.5	Metal	1	Metal and Insoluble Compounds
Nitrogen	(N)	7727-37-9	<0.9		Simple Asphyxiant		Simple Asphyxiant
Phosphorus	(P)	7723-14-0	<0.9	0.1	Phosphorus	0.1	Phosphorus
Selenium	(Se)	7782-49-2	<0.9	0.2	Selenium	0.2	Selenium
Silicon	(Si)	7440-21-3	0.0-3.0	10	Dust	15	Dust
Sulfur	(S)	7446-09-05	<0.9	5.2 13	Sulfur Dioxide Sulfur Dioxide (STEL)	13	Sulfur Dioxide
Tin	(Sn)	7440-31-5	<0.9	2	Metal,Oxide and Inorganic Compounds	2	Inorganic Compounds
Titanium	(Ti)	7440-32-6	<0.9		Not Established		Not Established
Tungsten	(W)	7440-33-7	<0.9	5 10	Insoluble Compounds as W Insoluble Compounds as W (STEL)		Not Established
Vanadium	(V)	7440-62-2	<0.9	0.05	Oxide Dust/Fume	0.5 0.1	Oxide Dust (Ceiling) Oxide Fume (Ceiling)
Zinc	(Zn)	7440-66-6	0.0-0.1	10 5 10	Oxide Dust OxideFume Oxide Fume (STEL)	5 10	Oxide Fume Oxide Dust
Coatings and Finishing Treatments:							
Hydrochloric Acid	(HCl)	7647-01-0	<3				
Petroleum, Natural or Synthetic oils		Mixture	<0.1	5	Mist	5	Mist
Anhydrous Potassium Hydroxide		1310-58-3	<0.01	2	Ceiling	2	Ceiling
Glycine,nn-1,2-ethanediylbis		60-00-4	<0.01				
Polyalkylene glycol		Mixture	<0.01				
Sodium nitrite		7632-00-0	<0.01				
Zinc (galvanized)		7440-66-6	0.4 - 10	10 5 10	Oxide Dust OxideFume Oxide Fume (STEL)	5 10	Oxide Fume Oxide Dust

NOTE: No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel over all. The above listing is a summary of elements used in normal Nucor Steel Products. Various grades of steel will contain different combinations of these elements and/or trace materials. Exact specifications for specific products may be available upon request.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING! WELDING, SAWING, BRAZING, GRINDING, ABRASIVE BLASTING, MACHINING AND OTHER PROCESSES MAY CAUSE DUSTS, POTENTIALLY COMBUSTIBLE DUST, AND/OR FUMES TO BE RELEASED. MAY BE HARMFUL IF INHALED. MAY IRRITATE THE EYES, SKIN, AND RESPIRATORY TRACT. MOLTEN MATERIAL MAY CAUSE THERMAL BURNS

Potential Health Effects

Note: Steel products, as sold by Nucor, do not present an inhalation, ingestion or skin hazard. However, individual customer processes, (such as welding, sawing, brazing, grinding, abrasive blasting, and machining) may result in the formation of fumes, dust (combustible or otherwise), and/or particulate formation that may present a variety of health hazards. Molten steel also is hazardous.

Eye Contact

Dusts or particulates may cause mechanical irritation including pain, tearing, and redness. Scratching of the cornea can occur if eye is rubbed. Fumes may be irritating. Contact with the heated material may cause thermal burns.

Skin Contact
Dusts or particulates may cause mechanical irritation due to abrasion. Coated steel may cause skin irritation in sensitive individuals (see Section 16 for additional information.) Some components in this product are capable of causing an allergic reaction, possibly resulting in burning, itching and skin eruptions. Contact with heated material may cause thermal burns.
Inhalation
Dusts may cause irritation of the nose, throat, and lungs. Excessive inhalation of metallic fumes and dusts may result in metal fume fever, an influenza-like illness. It is characterized by a sweet or metallic taste in the mouth, accompanied by dryness and irritation of the throat, cough, shortness of breath, pulmonary edema, general malaise, weakness, fatigue, muscle and joint pains, blurred vision, fever and chills. Typical symptoms last from 12 to 48 hours.
Ingestion
Not expected to be acutely toxic via ingestion based on the physical and chemical properties of the product. Swallowing of excessive amounts of the dust may cause irritation, nausea, and diarrhea.
Potential Fire and Explosion Hazards
Under normal conditions, steel products do not present fire or explosion hazards, and dust generated by handling steel products is oxidized and not combustible. Processing of steel product by some individual customers may produce potentially combustible dust that may represent a fire or explosion hazard.
Chronic or Special Toxic Effects
Repeated exposure to fine dusts may inflame the nasal mucosa and cause changes to the lung. In addition, a red-brown pigmentation of the eye and/or skin may occur.
Welding fumes have been associated with adverse health effects. Contains components that may cause cancer or reproductive effects. The following components are listed by NTP, OSHA, or IARC as carcinogens: Nickel, chromium (hexavalent), cobalt, lead, cadmium, antimony (trioxide), arsenic, beryllium. See Section 11, for additional, specific information on effects noted above.
Target Organs
Overexposure to specific components of this product that are generated in dusts or fumes may cause adverse effects to the following organs or systems: eyes, skin, liver, kidney, central nervous system, cardiovascular system, respiratory system,.
Medical Conditions Aggravated by Exposure
Diseases of the skin such as eczema may be aggravated by exposure. Also, disorders of the respiratory system including asthma, bronchitis, and emphysema. Long-term inhalation exposure to agents that cause pneumoconiosis (e.g. dust) may act synergistically with inhalation of oxide fumes or dusts of this product.

4. FIRST AID MEASURES

Eye Contact- In case of overexposure to dusts or fumes, immediately flush eyes with plenty of water for at least 15 minutes occasionally lifting the eye lids. Get medical attention if irritation persists. Thermal burns should be treated as medical emergencies.
Skin Contact - In case of overexposure to dusts or particulates, wash with soap and plenty of water. Get medical attention if irritation develops or persists. If thermal burn occurs, flush area with cold water and get immediate medical attention.
Inhalation - In case of overexposure to dusts or fumes, remove to fresh air. Get immediate medical attention if symptoms described in this MSDS develop.
Ingestion - Not considered an ingestion hazard. However, if excessive amounts of dust or particulates are swallowed, treat symptomatically and supportively. Get medical attention.
Notes to Physician - Inhalation of metal fume or metal oxides may produce an acute febrile state, with cough, chills, weakness, and general malaise, nausea, vomiting, muscle cramps, and remarkable leukocytosis. Treatment is symptomatic, and condition is self limited in 24-48 hours. Chronic exposure to dusts may result in pneumoconiosis of mixed type.

5. FIRE FIGHTING MEASURES

Flash Point (Method) - Not applicable
Flammable Limits (% volume in air) - Not applicable
Auto ignition Temperature - Not applicable
Extinguishing Media - For molten metal, use dry powder or sand. For steel dust use or dry sand, water, foam, argon or nitrogen.

Special Fire Fighting Procedures - Do not use water on molten metal. Do not use Carbon Dioxide (CO_2). Firefighters should not enter confined spaces without wearing NIOSH/MSHA approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.
Unusual Fire or Explosion Hazards - Steel products do not present fire or explosion hazards under normal conditions. Any non-oxidized fine metal particles/ dust generated by grinding, sawing, abrasive blasting, or individual customer processes may produce materials that the customer should test for combustibility and other hazards in accordance with applicable regulations. High concentrations of combustible metallic fines in the air may present an explosion hazard.

6. ACCIDENTAL RELEASE MEASURES

Precautions if Material is Spilled or Released - Emergency response is unlikely unless in the form of combustible dust. Avoid inhalation, eye, or skin contact of dusts by using appropriate precautions outlined in this MSDS (see section 8). Fine turnings and small chips should be swept or vacuumed and placed into appropriate disposable containers. Keep fine dust or powder away from sources of ignition. Scrap should be reclaimed for recycling. Prevent materials from entering drains, sewers, or waterways.
Fire and Explosion Hazards
Some customer processes may generate combustible dust that may require specific precautions when cleaning spills or releases of dust.
Environmental Precautions - Some grades of steel may contain reportable quantities of alloying elements. See Section 15 for additional information.
Waste Disposal Methods - Dispose used or unused product in accordance with applicable Federal, State, and Local regulations. Please recycle.

7. HANDLING AND STORAGE

Storage Temperatures - Stable under normal temperatures and pressures.
Precautions to be Taken in Handling and Storing - Store away from strong oxidizers. Dusts and/or powders, alone, or combined with process specific fluids, may form explosive mixtures with air. Applicable Federal, state and local laws and regulations may require testing dust generated from processing of steel products to determine if it represents a fire or explosion hazard and to determine appropriate protection methods. Avoid breathing dusts or fumes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Operations with potential for generating high concentrations of airborne particulates or fumes should be evaluated and controlled as necessary.
Eye Protection - Use safety glasses. Dust resistant safety goggles are recommended under circumstances where particles could cause mechanical injury such as grinding or cutting. Face shield should be used when welding or cutting.
Skin - Appropriate protective gloves should be worn as necessary. Good personal hygiene practices should be followed including cleansing exposed skin several times daily with soap and water, and laundering or dry cleaning soiled work clothing.
Respiratory Protection - NIOSH/MSHA approved dust/fume/mist respirator should be used to avoid excessive exposure. See Section 2 for component material information exposure limits. If such concentrations are sufficiently high that this respirator is inadequate, or high enough to cause oxygen deficiency, use a positive pressure self-contained breathing apparatus (SCBA). Follow all applicable respirator use, fitting, and training standards and regulations.
Ventilation - Provide general and/or local exhaust ventilation to control airborne levels of dust or fumes below exposure limits.
Exposure Guidelines - No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. See Section 2 for component materials. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor – Silver grey to grey black with metallic luster.
Boiling Point - Not applicable

Melting Point - Approximately 2800 ^{o}F
pH - Not applicable
Specific Gravity (at 15.6^{o}C) - Not applicable
Density (at 15.6 ^{o}C) - Not applicable
Vapor Pressure - Not applicable
Vapor Density (air = 1) - Not applicable
% Volatile, by Volume - Not applicable
Solubility in Water - Insoluble.
Evaporation Rate (Butyl Acetate = 1) - Not applicable
Other Physical and Chemical Data
None

10. STABILITY AND REACTIVITY

Stability - Stable
Conditions to Avoid - Steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements. Avoid generation of airborne fume.
Hazardous Polymerization - Will not occur.
Incompatibility (Materials to Avoid) - Reacts with strong acids to form hydrogen gas. Do not store near strong oxidizers.
Hazardous Decomposition Products - Metallic fumes may be produced during welding, burning, grinding, and possibly machining or any situation with the potential for thermal decomposition. Refer to ANSI Z49.1

11. TOXICOLOGICAL INFORMATION

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 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 potentially carcinogenic 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 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.

12. ECOLOGICAL INFORMATION

Aquatic Ecotoxicological Data - No specific information available on this product.
Environmental Fate Data - No specific information available on this product.

13. DISPOSAL CONSIDERATIONS

Recovery and reuse, rather than disposal, should be the ultimate goal of handling efforts. Dispose in accordance with federal, state, and local health and environmental regulations. Prevent materials from entering drains, sewers, or waterways.

14. TRANSPORT INFORMATION

DOT Proper Shipping Name - Not regulated
DOT Hazard Classification - Not regulated
UN/NA Number - Not applicable
DOT Packing Group - Not applicable
Labeling Requirements - Not applicable
Placards - Not applicable
DOT Hazardous Substance - Not applicable
DOT Marine Pollutant - Not applicable

15. REGULATORY INFORMATION

This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be hazardous. This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

However, dusts and fumes from this product may be combustible or hazardous and require protection to comply with applicable Federal, state and local laws and regulations.

CALIFORNIA PROPOSITION 65
This product contains chemicals (antimony [oxide], arsenic, beryllium, chromium [hexavalent], cobalt, cadmium, lead, nickel) known to the State of California to cause cancer and chemicals (cadmium, lead) known to the State of California to cause birth defects or other reproductive harm.
Regulatory Lists
Some components of this product may be specifically listed by individual states; other product-specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements, you should contact the appropriate agency in your state.
Toxic Substances Control Act (TSCA)
Components of this product are listed on the TSCA Inventory.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
Steel is not reportable, however, it contains hazardous substances that may be reportable if released in pieces with diameters less than or equal to 0.004 inches (RQ marked with a "*").

Chemical Name	Reportable Quantity (in lb)
Antimony	5000*
Arsenic	1*
Beryllium	10*
Cadmium	10*
Chromium	5000*
Copper	5000*
Lead	10*
Nickel	100*
Phosphorus	1
Selenium	100*
Zinc	1000*

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III
SECTION 311/312 HAZARD CATEGORIES: Immediate Health Effect, Delayed Health Effect
This product contains the following EPCRA Section 313 chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right – To – Know Act of 1986 (40 CFR 372):

SECTION 313 REPORTABLE INGREDIENTS:

Chemical Name	CAS Number	Concentration (% by weight)	Reportable
Aluminum	7429-90-5	0.0-0.01 Some grades up to 0.43%	No – Less than 1%
Antimony	7440-36-0	<0.9	No – Less than 1%
Arsenic	7440-38-2	<0.09	No – Less than 0.1%
Beryllium	7440-41-7	<0.09	No – Less than 0.1%
Cadmium	7440-43-9	<0.01	No – Less than 0.1%
Chromium	7440-47-3	0.01-1.0 Some grades up to 1.5%	Yes – Greater than 0.1%
Cobalt	7440-48-4	<0.09	No – Less than 0.1%
Copper	7440-50-8	<0.9	No – Less than 1%
Lead	7439-92-1	0.0-0.04	Yes
Manganese	7439-96-5	0.2-2 Some grades up to 6.0%	Yes – Greater than 1%
Nickel	7440-02-0	0.01-0.1 Some grades up to 1.5%	Yes – Greater than 0.1%
Phosphorus	7723-14-0	<0.9	No – Less than 1%
Selenium	7782-49-2	<0.9	No – Less than 1%
Vanadium	7440-62-2	<0.9	No – Less than 1%
Zinc	7440-66-6	<0.01	No – Less than 1%

Concentrations based on analytical data and process knowledge of typical products distributed by the facility.

16. OTHER INFORMATION

This MSDS covers Nucor product as delivered from the Nucor facility, but does not include chemicals that may be applied by subsequent handlers and/or distributors of this product. This could include a variety of materials including oils, paints, galvanization, etc. that are not included in this MSDS. Additionally, specialty orders may require application of coating material not listed in this MSDS. MSDSs for any Nucor-applied specialty coating will be provided separately. During welding, precautions should be taken for airborne contaminants that may originate from components of the welding rod. Arc or spark generated when welding or burning could be a source of ignition for combustible and/or flammable materials. The information in this Material Safety Data Sheet (MSDS) was obtained from sources which we believe are reliable; however, the information is provided without any representation or warranty, expressed or implied, regarding the accuracy or correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use, or disposal of this product.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Carbon and Alloy Steels
CAS Number: Not applicable
Synonyms: Steels
Use/Description: Wire, wire mesh, rack deck

Nucor Wire Locations **24 Hour Contact – CHEMTREC 1-800-424-9300**

Nucor Steel Connecticut, Inc.
35 Toelles Road
Wallingford, CT 06492
(203) 265-0615
Safety Coordinator 9 AM – 5 PM

Nucor Wire Products Pennsynvania
1015 New Salem Rd.
New Salem, PA 15468
(724) 245-9577
Safety Coordinator 9 AM – 5 PM

Vulcraft – Utah
1875 West Hwy 13, South
Brigham City, Utah, 84302
(435) 734-9433
Safety Coordinator 9AM – 5PM

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Base Metal:							
Iron	(Fe)	7439-89-6	Balance	5	Oxide Dust/Fume	10	Oxide Dust/Fume
Alloying Elements							
Aluminum	(Al)	7429-90-5	0-0.05	10 5	Dust Fume	15 5	Dust Respirable fraction
Antimony	(Sb)	7440-36-0	<0.9	0.5	As Antimony	0.5	As Antimony
Arsenic	(As)	7440-38-2	<0.09	0.01	As Arsenic (A1 Carcinogen)	0.01	As Arsenic
Beryllium	(Be)	7440-41-7	<0.09	0.00 2 0.01	As Beryllium (A1 Carcinogen) As Beryllium (STEL)	0.002 0.005	As Beryllium As Beryllium (Ceiling)
Boron	(B)	7440-42-8	<0.9	10	Oxide Dust	15	Oxide Dust
Cadmium	(Cd)	7440-43-9	<0.09	0.01 0.00 2	As Cadmium (A2 Carcinogen) Respirable fraction	0.005 0.0025	As Cadmium As Cadmium (Action Level)
Calcium	(Ca)	1305-78-8	<0.9	2	Oxide Dust	5	Oxide Dust
Carbon	(C)	7440-44-0	0.04-1.0		Not Established		Not Established
Chromium	(Cr)	7440-47-3	0.01-1.0	0.5	Metal	1	Metal
Cobalt	(Co)	7440-48-4	<0.09	0.02	As Cobalt (A3 Carcinogen)	0.1	Metal/Dust/Fume
Copper	(Cu)	7440-50-8	<0.9	1 0.2	Dust Fume	1 0.1	Dust Fume
Lead	(Pb)	7439-92-1	<0.05	0.05	Dust / Fume (A3 Carcinogen)	0.05	Dust / Fume
Magnesium	(Mg)	7439-95-4	<0.9		Not Established		Not Established
Manganese	(Mn)	7439-96-5	0.2-2	0.2	Elemental Mn and Inorg Compounds	5	Fume (Ceiling)
Molybdenum	(Mo)	7439-98-7	<0.9	10	Insoluble Compounds	15	Insoluble Compounds
Niobium	(Nb)	7440-03-1	<0.9		Not Established		
Nickel	(Ni)	7440-02-0	<1.0	1.5	Metal	1	Metal and Insoluble Compounds

Components		CAS No.	% Weight	Exposure Limits			
				ACGIH TLV (mg/m^3)		OSHA PEL (mg/m^3)	
Nitrogen	(N)	7727-37-9	<0.9		Simple Asphyxiant		Simple Asphyxiant
Phosphorus	(P)	7723-14-0	<0.9	0.1	Phosphorus	0.1	Phosphorus
Selenium	(Se)	7782-49-2	<0.9	0.2	Selenium	0.2	Selenium
Silicon	(Si)	7440-21-3	<0.9	10	Dust	15	Dust
Sulfur	(S)	7446-09-05	<0.9	5.2 13	Sulfur Dioxide Sulfur Dioxide (STEL)	13	Sulfur Dioxide
Tin	(Sn)	7440-31-5	<0.9	2	Metal,Oxide and Inorganic Compounds	2	Inorganic Compounds
Titanium	(Ti)	7440-32-6	<0.9		Not Established		Not Established
Tungsten	(W)	7440-33-7	<0.9	5 10	Insoluble Compounds as W Insoluble Compounds as W (STEL)		Not Established
Vanadium	(V)	7440-62-2	<0.9	0.05	Oxide Dust/Fume	0.5 0.1	Oxide Dust (Ceiling) Oxide Fume (Ceiling)
Zinc	(Zn)	7440-66-6	0.0-0.01	10 5 10	Oxide Dust OxideFume Oxide Fume (STEL)	5 10	Oxide Fume Oxide Dust

NOTE: No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel over all. The above listing is a summary of elements used in alloying Nucor Steel Products. Various grades of steel will contain different combinations of these elements and/or trace materials. Exact specifications may be found by calling the division and asking for a specifications sheet.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING! WELDING, SAWING, BRAZING, GRINDING, ABRASIVE BLASTING, MACHINING AND OTHER PROCESSES MAY CAUSE DUSTS, POTENTIALLY COMBUSTIBLE DUST, AND/OR FUMES TO BE RELEASED. MAY BE HARMFUL IF INHALED. MAY IRRITATE THE EYES, SKIN, AND RESPIRATORY TRACT. MOLTEN MATERIAL MAY CAUSE THERMAL BURNS.

Potential Health Effects

Note: Steel products as sold by Nucor, do not present an inhalation, ingestion or skin hazard. However, individual customer processes, (such as welding, sawing, brazing, grinding, abrasive blasting, and machining) may result in the formation of fumes, dust (combustible or otherwise), and/or particulate that may present a variety of health hazards. Molten steel also is hazardous.

Eye Contact

Dusts or particulates may cause mechanical irritation including pain, tearing, and redness. Scratching of the cornea can occur if eye is rubbed. Fumes may be irritating. Contact with the heated material may cause thermal burns.

Skin Contact

Dusts or particulates may cause mechanical irritation due to abrasion. Coated steel may cause skin irritation in sensitive individuals (see Section 16 for additional information.) Some components in this product are capable of causing an allergic reaction, possibly resulting in burning, itching and skin eruptions. Contact with heated material may cause thermal burns.

Inhalation

Dusts may cause irritation of the nose, throat, and lungs. Excessive inhalation of metallic fumes and dusts may result in metal fume fever, an influenza-like illness. It is characterized by a sweet or metallic taste in the mouth, accompanied by dryness and irritation of the throat, cough, shortness of breath, pulmonary edema, general malaise, weakness, fatigue, muscle and joint pains, blurred vision, fever and chills. Typical symptoms last from 12 to 48 hours.

Ingestion

Not expected to be acutely toxic via ingestion based on the physical and chemical properties of the product. Swallowing of excessive amounts of the dust may cause irritation, nausea, and diarrhea.

Potential Fire and Explosion Hazards

Under normal conditions, steel products do not present fire or explosion hazards, and dust generated by handling steel products is oxidized and not combustible. Processing of steel product by some individual customers may produce potentially combustible dust that may represent a fire or explosion hazard.

Chronic or Special Toxic Effects

Repeated exposure to fine dusts may inflame the nasal mucosa and cause changes to the lung. In addition, a red-brown pigmentation of the eye and/or skin may occur.

Welding fumes have been associated with adverse health effects. Contains components that may cause cancer or reproductive effects. The following components are listed by NTP, OSHA, or IARC as carcinogens: Nickel, chromium (hexavalent), cobalt, lead, cadmium, antimony (trioxide), arsenic, beryllium. See Section 11, for additional, specific information on effects noted above.

Target Organs

Overexposure to specific components of this product that are generated in dusts or fumes may cause adverse effects to the following organs or systems: eyes, skin, liver, kidney, central nervous system, cardiovascular system, respiratory system,.

Medical Conditions Aggravated by Exposure

Diseases of the skin such as eczema may be aggravated by exposure. Also, disorders of the respiratory system including asthma, bronchitis, and emphysema. Long-term inhalation exposure to agents that cause pneumoconiosis (e.g. dust) may act synergistically with inhalation of oxide fumes or dusts of this product.

4. FIRST AID MEASURES

Eye Contact- In case of overexposure to dusts or fumes, immediately flush eyes with plenty of water for at least 15 minutes occasionally lifting the eye lids. Get medical attention if irritation persists. Thermal burns should be treated as medical emergencies.

Skin Contact - In case of overexposure to dusts or particulates, wash with soap and plenty of water. Get medical attention if irritation develops or persists. If thermal burn occurs, flush area with cold water and get immediate medical attention.

Inhalation - In case of overexposure to dusts or fumes, remove to fresh air. Get immediate medical attention if symptoms described in this MSDS develop.

Ingestion - Not considered an ingestion hazard. However, if excessive amounts of dust or particulates are swallowed, treat symptomatically and supportively. Get medical attention.

Notes to Physician - Inhalation of metal fume or metal oxides may produce an acute febrile state, with cough, chills, weakness, and general malaise, nausea, vomiting, muscle cramps, and remarkable leukocytosis. Treatment is symptomatic, and condition is self limited in 24-48 hours. Chronic exposure to dusts may result in pneumoconiosis of mixed type.

5. FIRE FIGHTING MEASURES

Flash Point (Method) - Not applicable

Flammable Limits (% volume in air) - Not applicable

Auto ignition Temperature - Not applicable

Extinguishing Media - For molten metal, use dry powder or sand. For steel dust use or dry sand, water, foam, argon or nitrogen.

Special Fire Fighting Procedures - Do not use water on molten metal. Do not use Carbon Dioxide (CO_2). Firefighters should not enter confined spaces without wearing NIOSH/MSHA approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.

Unusual Fire or Explosion Hazards - Unusual Fire or Explosion Hazards - Steel products do not present fire or explosion hazards under normal conditions. Any non-oxidized fine metal particles/ dust generated by grinding, sawing, abrasive blasting, or individual customer processes may produce materials that the customer should test for combustibility and other hazards in accordance with applicable regulations. High concentrations of combustible metallic fines in the air may present an explosion hazard.

6. ACCIDENTAL RELEASE MEASURES

Precautions if Material is Spilled or Released - Emergency response is unlikely unless in the form of combustible dust. Avoid inhalation, eye, or skin contact of dusts by using appropriate precautions outlined in this MSDS (see section 8). Fine turnings and small chips should be swept or vacuumed and placed into appropriate disposable containers. Keep fine dust or powder away from sources of ignition. Scrap should

be reclaimed for recycling. Prevent materials from entering drains, sewers, or waterways. Specific standards and regulations may be applicable to materials generated by individual customer processes. As appropriate, these standards and regulations should be consulted for applicability.

Fire and Explosion Hazards

Some customer processes may generate combustible dust that may require specific precautions when cleaning spills or releases of dust.

Environmental Precautions - Some grades of steel may contain reportable quantities of alloying elements. See Section 15 for additional information.

Waste Disposal Methods - Dispose used or unused product in accordance with applicable Federal, State, and Local regulations. Please recycle.

7. HANDLING AND STORAGE

Storage Temperatures - Stable under normal temperatures and pressures.

Precautions to be Taken in Handling and Storing - Store away from strong oxidizers. Dusts and/or powders, alone, or combined with process specific fluids, may form explosive mixtures with air. Applicable Federal, state and local laws and regulations may require testing dust generated from processing of steel products to determine if it represents a fire or explosion hazard and to determine appropriate protection methods. Avoid breathing dusts or fumes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Operations with potential for generating high concentrations of airborne particulates or fumes should be evaluated and controlled as necessary.

Eye Protection - Use safety glasses. Dust resistant safety goggles are recommended under circumstances where particles could cause mechanical injury such as grinding or cutting. Face shield should be used when welding or cutting.

Skin - Appropriate protective gloves should be worn as necessary. Good personal hygiene practices should be followed including cleansing exposed skin several times daily with soap and water, and laundering or dry cleaning soiled work clothing.

Respiratory Protection - NIOSH/MSHA approved dust/fume/mist respirator should be used to avoid excessive exposure. See Section 2 for component material information exposure limits. If such concentrations are sufficiently high that this respirator is inadequate, or high enough to cause oxygen deficiency, use a positive pressure self-contained breathing apparatus (SCBA). Follow all applicable respirator use, fitting, and training standards and regulations.

Ventilation - Provide general and/or local exhaust ventilation to control airborne levels of dust or fumes below exposure limits.

Exposure Guidelines - No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. See Section 2 for component materials. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor – Silver grey to grey black with metallic luster.

Boiling Point - Not applicable

Melting Point - Approximately 2800 ^{o}F

pH - Not applicable

Specific Gravity (at 15.6^{o}C) - Not applicable

Density (at 15.6 ^{o}C) - Not applicable

Vapor Pressure - Not applicable

Vapor Density (air = 1) - Not applicable

% Volatile, by Volume - Not applicable

Solubility in Water - Insoluble.

Evaporation Rate (Butyl Acetate = 1) - Not applicable

Other Physical and Chemical Data

None

10. STABILITY AND REACTIVITY

Stability - Stable
Conditions to Avoid - Steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements. Avoid generation of airborne fume.
Hazardous Polymerization - Will not occur.
Incompatibility (Materials to Avoid) - Reacts with strong acids to form hydrogen gas. Do not store near strong oxidizers.
Hazardous Decomposition Products - Metallic fumes may be produced during welding, burning, grinding, and possibly machining or any situation with the potential for thermal decomposition. Refer to ANSI Z49.1

11. TOXICOLOGICAL INFORMATION

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 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 potentially carcinogenic 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 disfunction 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 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.

12. ECOLOGICAL INFORMATION

Aquatic Ecotoxicological Data - No specific information available on this product.
Environmental Fate Data - No specific information available on this product.

13. DISPOSAL CONSIDERATIONS

Recovery and reuse, rather than disposal, should be the ultimate goal of handling efforts. Dispose in accordance with federal, state, and local health and environmental regulations. Prevent materials from entering drains, sewers, or waterways.

14. TRANSPORT INFORMATION

DOT Proper Shipping Name - Not regulated
DOT Hazard Classification - Not regulated
UN/NA Number - Not applicable
DOT Packing Group - Not applicable
Labeling Requirements - Not applicable
Placards - Not applicable
DOT Hazardous Substance - Not applicable
DOT Marine Pollutant - Not applicable

15. REGULATORY INFORMATION

This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be hazardous. This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be combustible or hazardous and require protection to comply with applicable Federal, state and local laws and regulations.

CALIFORNIA PROPOSITION 65
This product contains chemicals (antimony [oxide], arsenic, beryllium, chromium [hexavalent], cobalt, cadmium, lead, nickel) known to the State of California to cause cancer and chemicals (cadmium, lead) known to the State of California to cause birth defects or other reproductive harm.
Regulatory Lists

Some components of this product may be specifically listed by individual states; other product-specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements, you should contact the appropriate agency in your state.

Toxic Substances Control Act (TSCA)

Components of this product are listed on the TSCA Inventory.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

Steel is not reportable, however, it contains hazardous substances that may be reportable if released in pieces with diameters less than or equal to 0.004 inches (RQ marked with a "*").

Chemical Name	Reportable Quantity (in lb)
Antimony	5000*
Arsenic	1*
Beryllium	10*
Cadmium	10*
Chromium	5000*
Copper	5000*
Lead	10*
Nickel	100*
Phosphorus	1
Selenium	100*
Zinc	1000*

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III

SECTION 311/312 HAZARD CATEGORIES: Immediate Health Effect, Delayed Health Effect

This product contains the following EPCRA Section 313 chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right – To – Know Act of 1986 (40 CFR 372):

SECTION 313 REPORTABLE INGREDIENTS:

Chemical Name	CAS Number	Concentration (% by weight)	Reportable
Aluminum	7429-90-5	<0.01	No – Less than 1%
Antimony	7440-36-0	<0.9	No – Less than 1%
Arsenic	7440-38-2	<0.09	No – Less than 0.1%
Beryllium	7440-43-9	<0.09	No – Less than 0.1%
Cadmium	7440-43-9	<0.09	No – Less than 0.1%
Chromium	7440-47-3	0.01-1.0	Yes – Greater than 0.1%
Cobalt	7440-48-4	<0.09	No – Less than 0.1%
Copper	7440-50-8	<0.9	No – Less than 1%
Lead	7439-92-1	<0.05	No – Less than 0.1%
Manganese	7439-96-5	0.2-2	Yes – Greater than 1%
Nickel	7440-02-0	<1.0	Yes – Greater than 0.1%
Phosphorus	7723-14-0	<0.9	No – Less than 1%
Selenium	7782-49-2	<0.9	No – Less than 1%
Vanadium	7440-62-2	<0.9	No – Less than 1%
Zinc	7440-66-6	0-0.01	No – Less than 1%

Concentrations based on analytical data and process knowledge of typical products distributed by the facility.

16. OTHER INFORMATION

This MSDS covers Nucor product as delivered from the Nucor facility, but does not include chemicals that may be applied by subsequent handlers and/or distributors of this product. This could include a variety of materials including oils, paints, galvanization, etc. that are not included in this MSDS. Additionally, specialty orders may require application of coating material not listed in this MSDS. MSDSs for any Nucor-applied specialty coating will be provided separately. During welding, precautions should be taken for airborne contaminants that may originate from components of the welding rod. Arc or spark generated

when welding or burning could be a source of ignition for combustible and/or flammable materials. The information in this Material Safety Data Sheet (MSDS) was obtained from sources which we believe are reliable; however, the information is provided without any representation or warranty, expressed or implied, regarding the accuracy or correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use, or disposal of this product.

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name **Structural Hot Rolled Carbon Steel**

Revision date 07-20-2011

Version # 01

Product use Structural steel / Rail Steel.

Synonym(s) Steel

Manufacturer/Supplier Steel Dynamics, Inc.
Structural and Rail Division
2601 County Road 700 East
Columbia City, Indiana 46725
Telephone (260) 625 – 8100
Contact Person: Safety Department

Emergency Emergency phone (800)-424-9300

2. Hazards Identification

Physical state Solid.

Appearance Massive, solid metal.

Emergency overview In its manufactured and shipped state, this product is considered non-hazardous. Processing may generate hazardous fumes and dusts. Welding, cutting and metalizing can generate ozone. Ozone can cause irritation of eyes, nose and respiratory tract.

OSHA regulatory status Under some use conditions, this material may be considered to be hazardous in accordance with OSHA 29 CFR 1910.1200.

Potential health effects

Routes of exposure Skin. Eyes. Inhalation. Ingestion.

Eyes Under normal conditions of intended use, this material does not pose a risk to health. Contact with hot material can cause thermal burns which may result in permanent damage. Grinding and sanding this product may generate dust. Dust may irritate the eyes. Exposed individuals may experience eye tearing, redness, and discomfort.

Skin Under normal conditions of intended use, this material does not pose a risk to health. Dust may irritate skin. Contact with hot material can cause thermal burns which may result in permanent damage.

Inhalation No inhalation hazard under normal conditions. Welding, burning, sawing, brazing, grinding or machining operations may generate fumes and dusts of metal oxides. High concentrations of freshly formed fumes/dusts of metal oxides can produce symptoms of metal fume fever. Typical symptoms last 12 to 48 hours and are characterized by metallic taste in the mouth, dryness, and irritation of the throat, followed by weakness, muscle pain, fever, and chills.

Ingestion Solid steel: Not relevant, due to the form of the product. However, ingestion of dusts generated during working operations may cause nausea and vomiting.

Target organs Skin. Central nervous system. Lungs.

Chronic effects Danger of adverse health effects by prolonged exposure. Frequent inhalation of fume/dust over a long period of time increases the risk of developing lung diseases. Contains nickel. May cause sensitization by skin contact. Nickel is listed by IARC (Group 2B) and NTP. Vanadium pentoxide is classified as possibly carcinogenic to humans (Group 2B) by IARC, may cause adverse reproductive effects and may adversely affect the developing fetus. Exposure to manganese fume/dust can affect the central nervous system (apathy, drowsiness, weakness and other chronic symptoms such as postural tremors). These ingredients are bound within the product and release is not expected under normal conditions.

Potential environmental effects The environmental hazard of the product is considered to be limited.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Iron	7439-89-6	>90
Manganese	7439-96-5	0.5-1.5

Silicon	7440-21-3	0.1-0.8
Carbon	7440-44-0	0.01-0.85
Chromium	7440-47-3	0-0.7
Copper	7440-50-8	0-0.6
Nickel	7440-02-0	0-0.5
Molybdenum	7439-98-7	0-0.15
Phosphorus	7723-14-0	0-0.15
Vanadium	7440-62-2	0-0.1
Niobium	7440-03-1	0-0.05
Sulphur	7704-34-9	0-0.05
Titanium dioxide (TiO2)	13463-67-7	<0.05
Antimony	7440-36-0	<0.02
Lead	7439-92-1	<0.015
Limestone	1317-65-3	<0.015
Aluminum	7429-90-5	<0.01
Tin	7440-31-5	<0.01
Zinc	7440-66-6	<0.01
Iron oxide	1309-37-1	0
Vanadium pentoxide	1314-62-1	0

Composition comments * All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume. **Iron oxide and vanadium pentoxide are formed at temperatures above the melting point.

4. First Aid Measures

First aid procedures

Eye contact Any material that contacts the eye should be washed out immediately with water. If easy to do, remove contact lenses. Get medical attention promptly if symptoms persist or occur after washing.

Skin contact Wash skin with soap and water. Contact with dust: In case of burns with hot metal, rinse with plenty of cold water. If burns are severe, consult a physician.

Inhalation In case of inhalation of fumes from heated product: Move into fresh air and keep at rest. Get medical attention if symptoms persist. If breathing is difficult, give oxygen. If breathing stops, provide artificial respiration.

5. Fire Fighting Measures

Flammable properties No unusual fire or explosion hazards noted.

Extinguishing media

Suitable extinguishing media Use fire-extinguishing media appropriate for surrounding materials.

Protection of firefighters

Protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions Use standard firefighting procedures and consider the hazards of other involved materials.

Hazardous combustion products Metal oxides.

6. Accidental Release Measures

Personal precautions
Cold solid metal: No special precautions are necessary beyond normal good hygiene practices. See Section 8 of the MSDS for additional personal protection advice when handling this product. Hot metal: Avoid contact with hot material. Wear protective clothing as described in Section 8 of this safety data sheet.

Environmental precautions
No specific precautions.

Methods for containment
In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

Methods for cleaning up
In the event of accidental release, notify relevant authorities in accordance with all applicable regulations.

Collect for recycling.

7. Handling and Storage

Handling
Avoid contact with sharp edges and hot surfaces. Use appropriate gloves and tools to ensure safe handling. Use work methods which minimize dust/fume production. Do not breathe fumes and dusts. Follow the recommendations in ANSI Z49.1, Safety in welding and cutting (ANSI=American National Standard Institute).

Storage
Store in a dry place. Store away from: Strong oxidizing agents. Acids.

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	1 mg/m3	Respirable fraction.
Antimony (7440-36-0)	TWA	0.5 mg/m3	
Carbon (7440-44-0)	TWA	2 mg/m3	Respirable fraction.
Chromium (7440-47-3)	TWA	0.5 mg/m3	
Copper (7440-50-8)	TWA	0.2 mg/m3	Fume.
		1 mg/m3	Dust and mist.
Iron oxide (1309-37-1)	TWA	5 mg/m3	Respirable fraction.
Lead (7439-92-1)	TWA	0.05 mg/m3	
Manganese (7439-96-5)	TWA	0.2 mg/m3	
Molybdenum (7439-98-7)	TWA	10 mg/m3	Inhalable fraction.
		3 mg/m3	Respirable fraction.
Nickel (7440-02-0)	TWA	1.5 mg/m3	Inhalable fraction.
Tin (7440-31-5)	TWA	2 mg/m3	
Titanium dioxide (TiO2) (13463-67-7)	TWA	10 mg/m3	
Vanadium pentoxide (1314-62-1)	TWA	0.05 mg/m3	Inhalable fraction.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Aluminum (7429-90-5)	PEL	15 mg/m3	Total dust.
		5 mg/m3	Respirable dust.
Antimony (7440-36-0)	PEL	0.5 mg/m3	
Carbon (7440-44-0)	PEL	15 mg/m3	Total dust.
		5 mg/m3	Respirable fraction.
	TWA	15 mppcf	
Chromium (7440-47-3)	PEL	1 mg/m3	
Copper (7440-50-8)	PEL	0.1 mg/m3	Fume.
		1 mg/m3	Dust and mist.
Iron oxide (1309-37-1)	PEL	10 mg/m3	Fume.
Lead (7439-92-1)	TWA	0.05 mg/m3	
Limestone (1317-65-3)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Manganese (7439-96-5)	Ceiling	5 mg/m3	Fume.
Molybdenum (7439-98-7)	PEL	15 mg/m3	Total dust.
Nickel (7440-02-0)	PEL	1 mg/m3	
Silicon (7440-21-3)	PEL	15 mg/m3	Total dust.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
		5 mg/m3	Respirable fraction.
Tin (7440-31-5)	PEL	2 mg/m3	
Titanium dioxide (TiO2) (13463-67-7)	PEL	15 mg/m3	Total dust.
Vanadium pentoxide (1314-62-1)	Ceiling	0.5 mg/m3	Respirable dust.
		0.1 mg/m3	Fume.

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	10 mg/m3	Dust.
		5 mg/m3	Pyrophoric powder.
Antimony (7440-36-0)	TWA	0.5 mg/m3	
Carbon (7440-44-0)	TWA	2 mg/m3	Respirable.
Chromium (7440-47-3)	TWA	0.5 mg/m3	
Copper (7440-50-8)	TWA	0.2 mg/m3	Fume.
		1 mg/m3	Dust and mist.
Iron oxide (1309-37-1)	TWA	5 mg/m3	Respirable.
Lead (7439-92-1)	TWA	0.05 mg/m3	
Limestone (1317-65-3)	TWA	10 mg/m3	
Manganese (7439-96-5)	TWA	0.2 mg/m3	
Nickel (7440-02-0)	TWA	1.5 mg/m3	
Sulphur (7704-34-9)	TWA	10 mg/m3	
Tin (7440-31-5)	TWA	2 mg/m3	
Titanium dioxide (TiO2) (13463-67-7)	TWA	10 mg/m3	
Vanadium pentoxide (1314-62-1)	TWA	0.05 mg/m3	Respirable particulate or fume.

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	1 mg/m3	Respirable.
Antimony (7440-36-0)	TWA	0.5 mg/m3	
Carbon (7440-44-0)	TWA	2 mg/m3	Respirable.
Chromium (7440-47-3)	TWA	0.5 mg/m3	
Copper (7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Iron oxide (1309-37-1)	STEL	10 mg/m3	Fume.
	TWA	3 mg/m3	Respirable fraction.
		5 mg/m3	Fume.
		10 mg/m3	Total dust.
		5 mg/m3	Dust.
Lead (7439-92-1)	TWA	0.05 mg/m3	
Limestone (1317-65-3)	STEL	20 mg/m3	Total dust.
	TWA	10 mg/m3	Total dust.
		3 mg/m3	Respirable fraction.
Manganese (7439-96-5)	TWA	0.2 mg/m3	
Molybdenum (7439-98-7)	TWA	10 mg/m3	Inhalable
		3 mg/m3	Respirable.
Nickel (7440-02-0)	TWA	0.05 mg/m3	
Tin (7440-31-5)	TWA	2 mg/m3	
Titanium dioxide (TiO2) (13463-67-7)	TWA	10 mg/m3	Total dust.
		3 mg/m3	Respirable fraction.
Vanadium pentoxide (1314-62-1)	Ceiling	0.05 mg/m3	Respirable dust and/or fume.
	TWA	0.2 mg/m3	Total dust.

Canada. Ontario OELs. (Ministry of Labor - Control of Exposure to Biological or Chemical Agents)

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	10 mg/m3	Dust.

Canada. Ontario OELs. (Ministry of Labor - Control of Exposure to Biological or Chemical Agents)

Components	Type	Value	Form
		5 mg/m3	Welding fume.
Antimony (7440-36-0)	TWA	0.5 mg/m3	
Carbon (7440-44-0)	TWA	2 mg/m3	Respirable.
Chromium (7440-47-3)	TWA	0.5 mg/m3	
Copper (7440-50-8)	TWA	0.2 mg/m3	Fume.
		1 mg/m3	Dust and mist.
Iron (7439-89-6)	TWA	5 mg/m3	Welding fume.
Iron oxide (1309-37-1)	TWA	5 mg/m3	Respirable.
Lead (7439-92-1)	TWA	0.05 mg/m3	
Manganese (7439-96-5)	TWA	0.2 mg/m3	
Molybdenum (7439-98-7)	TWA	3 mg/m3	Respirable.
		10 mg/m3	Inhalable
Nickel (7440-02-0)	TWA	1 mg/m3	Inhalable
Silicon (7440-21-3)	TWA	10 mg/m3	Total dust.
Tin (7440-31-5)	TWA	2 mg/m3	
Titanium dioxide (TiO2) (13463-67-7)	TWA	10 mg/m3	Total dust.
Vanadium (7440-62-2)	TWA	0.05 mg/m3	Respirable dust and/or fume.
Vanadium pentoxide (1314-62-1)	TWA	0.05 mg/m3	Respirable dust and/or fume.

Canada. Quebec OELS. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	10 mg/m3	
		5 mg/m3	Welding fume.
Antimony (7440-36-0)	TWA	0.5 mg/m3	
Carbon (7440-44-0)	TWA	2 mg/m3	Respirable dust.
Chromium (7440-47-3)	TWA	0.5 mg/m3	
Copper (7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Iron oxide (1309-37-1)	TWA	10 mg/m3	Total dust.
		5 mg/m3	Dust and fume.
Lead (7439-92-1)	TWA	0.05 mg/m3	
Limestone (1317-65-3)	TWA	10 mg/m3	Total dust.
Manganese (7439-96-5)	STEL	3 mg/m3	Fume.
	TWA	1 mg/m3	Fume.
		5 mg/m3	Dust.
Molybdenum (7439-98-7)	TWA	10 mg/m3	
Nickel (7440-02-0)	TWA	1 mg/m3	
Silicon (7440-21-3)	TWA	10 mg/m3	Total dust.
Tin (7440-31-5)	TWA	2 mg/m3	
Titanium dioxide (TiO2) (13463-67-7)	TWA	10 mg/m3	Total dust.
Vanadium pentoxide (1314-62-1)	TWA	0.05 mg/m3	Respirable dust and/or fume.

Mexico. Occupational Exposure Limit Values

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	10 mg/m3	Dust.
		5 mg/m3	Welding fume.
		5 mg/m3	Pyrophoric powder.
Antimony (7440-36-0)	TWA	0.5 mg/m3	
Carbon (7440-44-0)	TWA	10 mg/m3	
Chromium (7440-47-3)	TWA	0.5 mg/m3	
Copper (7440-50-8)	STEL	2 mg/m3	Fume.
		2 mg/m3	Dust and mist.
	TWA	0.2 mg/m3	Fume.
		1 mg/m3	Dust and mist.
Iron oxide (1309-37-1)	STEL	10 mg/m3	
	TWA	5 mg/m3	
Lead (7439-92-1)	TWA	0.15 mg/m3	Dust and fume.

Mexico. Occupational Exposure Limit Values

Components	Type	Value	Form
Limestone (1317-65-3)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Manganese (7439-96-5)	STEL	3 mg/m3	Fume.
	TWA	1 mg/m3	Fume.
		0.2 mg/m3	
Molybdenum (7439-98-7)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Nickel (7440-02-0)	TWA	1 mg/m3	
Silicon (7440-21-3)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Tin (7440-31-5)	STEL	4 mg/m3	
	TWA	2 mg/m3	
Titanium dioxide (TiO2) (13463-67-7)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Vanadium pentoxide (1314-62-1)	TWA	0.5 mg/m3	Respirable dust and/or fume.

Engineering controls Adequate ventilation should be provided so that exposure limits are not exceeded. Use local exhaust when welding, burning, sawing, brazing, grinding or machining to prevent excessive dust or fume exposure.

Personal protective equipment

Eye / face protection Risk of contact: Wear approved safety goggles. Use of safety glasses or goggles is required for welding, burning, sawing, brazing, grinding or machining operations.

Skin protection Wear protective gloves. When material is heated, wear gloves to protect against thermal burns. Risk of contact: Wear suitable protective clothing. Thermally protective apron and long sleeves are recommended when volume of hot material is significant.

Respiratory protection Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits.

General hygiene considerations Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Observe any medical surveillance requirements.

9. Physical & Chemical Properties

Appearance Massive, solid metal.

Color Metallic gray.

Odor None.

Odor threshold Not available.

Physical state Solid.

Form Solid.

pH Not applicable.

Melting point 2750 °F (1510 °C)

Freezing point Not applicable.

Boiling point Not applicable.

Flash point Not applicable.

Evaporation rate Not applicable.

Flammability limits in air, upper, % by volume Not applicable.

Flammability limits in air, lower, % by volume Not applicable.

Vapor pressure Not applicable.

Vapor density Not applicable.

Specific gravity Not available.

Solubility (water) Insoluble.

Partition coefficient (n-octanol/water) Not applicable.

Auto-ignition temperature	Not applicable.
Decomposition temperature	Not available.

10. Chemical Stability & Reactivity Information

Chemical stability	This product is stable under expected conditions of use.
Conditions to avoid	Contact with incompatible materials. Contact with acids will release flammable hydrogen gas.
Incompatible materials	Strong acids. Oxidizing agents.
Hazardous decomposition products	Not available.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Toxicological data

Components	Test Results
Iron (7439-89-6)	Acute Inhalation LC50 Rat: 250 mg/m3 6 Hours (Carbonyl iron)
	Acute Oral LD50 Rat: 7500 mg/kg

Acute effects

High concentrations of freshly formed fumes/dusts of metal oxides can produce symptoms of metal fume fever. Typical symptoms last 12 to 48 hours and are characterized by metallic taste in the mouth, dryness, and irritation of the throat, followed by weakness, muscle pain, fever, and chills. Welding, cutting and metalizing can generate ozone. Ozone can cause irritation of eyes, nose and respiratory tract.

Chronic effects

Frequent inhalation of dust over a long period of time increases the risk of developing lung diseases. The product contains a small amount of sensitizing substance which may provoke an allergic reaction among sensitive individuals in contact with skin. The ingredients of the alloy are bound within the product and release is not expected under normal conditions.

Contains nickel. Nickel is listed by IARC (Group 2B) and NTP. Vanadium pentoxide is classified as possibly carcinogenic to humans (Group 2B) by IARC, may cause adverse reproductive effects and may adversely affect the developing fetus. Exposure to manganese fume/dust can affect the central nervous system (apathy, drowsiness, weakness and other chronic symptoms such as postural tremors).

Carcinogenicity

ACGIH Carcinogens

Aluminum (CAS 7429-90-5)	A4 Not classifiable as a human carcinogen.
Chromium (CAS 7440-47-3)	A4 Not classifiable as a human carcinogen.
Iron oxide (CAS 1309-37-1)	A4 Not classifiable as a human carcinogen.
Lead (CAS 7439-92-1)	A3 Confirmed animal carcinogen with unknown relevance to humans.
Molybdenum (CAS 7439-98-7)	A3 Confirmed animal carcinogen with unknown relevance to humans.
Nickel (CAS 7440-02-0)	A5 Not suspected as a human carcinogen.
Titanium dioxide (TiO2) (CAS 13463-67-7)	A4 Not classifiable as a human carcinogen.
Vanadium pentoxide (CAS 1314-62-1)	A3 Confirmed animal carcinogen with unknown relevance to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Chromium (CAS 7440-47-3)	3 Not classifiable as to carcinogenicity to humans.
Iron oxide (CAS 1309-37-1)	3 Not classifiable as to carcinogenicity to humans.
Lead (CAS 7439-92-1)	2B Possibly carcinogenic to humans.
Nickel (CAS 7440-02-0)	2B Possibly carcinogenic to humans.
Titanium dioxide (TiO2) (CAS 13463-67-7)	2B Possibly carcinogenic to humans.
Vanadium pentoxide (CAS 1314-62-1)	2B Possibly carcinogenic to humans.

US NTP Report on Carcinogens: Anticipated carcinogen

Lead (CAS 7439-92-1)	Anticipated carcinogen.
Nickel (CAS 7440-02-0)	Anticipated carcinogen.

US NTP Report on Carcinogens: Known carcinogen

Nickel (CAS 7440-02-0)	Known carcinogen.

12. Ecological Information

Ecotoxicity	Not expected to be harmful to aquatic organisms.

Persistence and degradability	No data available.
Bioaccumulation / Accumulation	No data available on bioaccumulation.
Partition coefficient (n-octanol/water)	Not applicable.
Mobility in environmental media	Not relevant, due to the form of the product.

13. Disposal Considerations

Disposal instructions	Dispose waste and residues in accordance with applicable federal, state, and local regulations.
Waste from residues / unused products	Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal. Recover and recycle, if practical.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

TDG

Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations

Under some use conditions, this material may be considered to be hazardous in accordance with OSHA 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification(40 CFR 707, Subpt. D)

Not regulated.

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Spill: Reportable quantity

Phosphorus (CAS 7723-14-0)	1 LBS
Vanadium pentoxide (CAS 1314-62-1)	1000 LBS

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Substance: Threshold Planning Quantity

Phosphorus (CAS 7723-14-0)	100 LBS

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Substance: Threshold planning quantity, lower value

Vanadium pentoxide (CAS 1314-62-1)	100 LBS

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Substance: Threshold planning quantity, upper value

Vanadium pentoxide (CAS 1314-62-1)	10000 LBS

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

Aluminum (CAS 7429-90-5)	1.0 %
Antimony (CAS 7440-36-0)	1.0 %
Chromium (CAS 7440-47-3)	1.0 %
Copper (CAS 7440-50-8)	1.0 %
Lead (CAS 7439-92-1)	0.1 % Substance is not eligible for the de minimis exemption except for the purposes of supplier notification requirements.
Manganese (CAS 7439-96-5)	1.0 %
Nickel (CAS 7440-02-0)	0.1 %
Phosphorus (CAS 7723-14-0)	1.0 %
Vanadium (CAS 7440-62-2)	1.0 %
Vanadium pentoxide (CAS 1314-62-1)	1.0 % N770
Zinc (CAS 7440-66-6)	1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Reportable threshold

Lead (CAS 7439-92-1)	100 LBS

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

Aluminum (CAS 7429-90-5)	Listed.

Antimony (CAS 7440-36-0)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Copper (CAS 7440-50-8)	Listed.
Lead (CAS 7439-92-1)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Vanadium (CAS 7440-62-2)	Listed.
Vanadium pentoxide (CAS 1314-62-1)	N770 Listed.
Zinc (CAS 7440-66-6)	Listed.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)

Chromium: 5000
Copper: 5000
Nickel: 100
Phosphorus: 1
Antimony: 5000
Lead: 10
Zinc: 1000
Vanadium pentoxide: 1000

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - Yes Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
Section 302 extremely hazardous substance (40 CRF 355, Appendix A)	No
Section 311/312 (40 CFR 370)	No
Drug Enforcement Administration (DEA) (21 CFR 1308.11-15)	Not controlled
Canadian regulations	This product has been classified according to the hazard criteria of the Canadian Controlled Products Regulations, Section 33, and the MSDS contains all required information.
WHMIS status	Controlled
WHMIS classification	D2A - Other Toxic Effects-VERY TOXIC

WHMIS labeling

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	Yes
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations WARNING: This product contains chemical(s) known to the State of California to cause cancer.

US - California Hazardous Substances (Director's): Listed substance

Aluminum (CAS 7429-90-5)	Listed.
Antimony (CAS 7440-36-0)	Listed.
Carbon (CAS 7440-44-0)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Copper (CAS 7440-50-8)	Listed.
Iron (CAS 7439-89-6)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Lead (CAS 7439-92-1)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Molybdenum (CAS 7439-98-7)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Sulphur (CAS 7704-34-9)	Listed.
Tin (CAS 7440-31-5)	Listed.
Vanadium (CAS 7440-62-2)	Listed.
Vanadium pentoxide (CAS 1314-62-1)	Listed.
Zinc (CAS 7440-66-6)	Listed.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Lead (CAS 7439-92-1)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Vanadium pentoxide (CAS 1314-62-1)	Listed.

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

Lead (CAS 7439-92-1)	Listed: October 1, 1992 Carcinogenic.
Nickel (CAS 7440-02-0)	Listed: October 1, 1989 Carcinogenic.
Vanadium pentoxide (CAS 1314-62-1)	Listed: February 11, 2005 Carcinogenic.

US - California Proposition 65 - CRT: Listed date/Developmental toxin

Lead (CAS 7439-92-1)	Listed: February 27, 1987 Developmental toxin.

US - California Proposition 65 - CRT: Listed date/Female reproductive toxin

Lead (CAS 7439-92-1)	Listed: February 27, 1987 Female reproductive toxin.

US - California Proposition 65 - CRT: Listed date/Male reproductive toxin

Lead (CAS 7439-92-1)	Listed: February 27, 1987 Male reproductive toxin.

US - Massachusetts RTK - Substance: Listed substance

Aluminum (CAS 7429-90-5)	Listed.
Antimony (CAS 7440-36-0)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Copper (CAS 7440-50-8)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Lead (CAS 7439-92-1)	Listed.
Limestone (CAS 1317-65-3)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Molybdenum (CAS 7439-98-7)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Silicon (CAS 7440-21-3)	Listed.
Sulphur (CAS 7704-34-9)	Listed.
Tin (CAS 7440-31-5)	Listed.
Titanium dioxide (TiO2) (CAS 13463-67-7)	Listed.
Vanadium (CAS 7440-62-2)	Listed.
Vanadium pentoxide (CAS 1314-62-1)	Listed.
Zinc (CAS 7440-66-6)	Listed.

US - New Jersey Community RTK (EHS Survey): Reportable threshold

Aluminum (CAS 7429-90-5)	500 LBS
Antimony (CAS 7440-36-0)	500 LBS
Chromium (CAS 7440-47-3)	500 LBS
Copper (CAS 7440-50-8)	500 LBS
Lead (CAS 7439-92-1)	500 LBS
Manganese (CAS 7439-96-5)	500 LBS
Nickel (CAS 7440-02-0)	500 LBS
Phosphorus (CAS 7723-14-0)	100 LBS
Vanadium (CAS 7440-62-2)	500 LBS
Vanadium pentoxide (CAS 1314-62-1)	100 LBS
Zinc (CAS 7440-66-6)	500 LBS

US - New Jersey RTK - Substances: Listed substance

Aluminum (CAS 7429-90-5)	Listed.
Antimony (CAS 7440-36-0)	Listed.
Carbon (CAS 7440-44-0)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Copper (CAS 7440-50-8)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Lead (CAS 7439-92-1)	Listed.
Limestone (CAS 1317-65-3)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Molybdenum (CAS 7439-98-7)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Silicon (CAS 7440-21-3)	Listed.
Sulphur (CAS 7704-34-9)	Listed.
Tin (CAS 7440-31-5)	Listed.
Titanium dioxide (TiO2) (CAS 13463-67-7)	Listed.
Vanadium (CAS 7440-62-2)	Listed.
Vanadium pentoxide (CAS 1314-62-1)	Listed.
Zinc (CAS 7440-66-6)	Listed.

US - Pennsylvania RTK - Hazardous Substances: All compounds of this substance are considered environmental hazards

Antimony (CAS 7440-36-0)	LISTED
Chromium (CAS 7440-47-3)	LISTED
Copper (CAS 7440-50-8)	LISTED
Lead (CAS 7439-92-1)	LISTED
Manganese (CAS 7439-96-5)	LISTED
Nickel (CAS 7440-02-0)	LISTED
Zinc (CAS 7440-66-6)	LISTED

US - Pennsylvania RTK - Hazardous Substances: Listed substance

Aluminum (CAS 7429-90-5)	Listed.
Antimony (CAS 7440-36-0)	Listed.
Chromium (CAS 7440-47-3)	Listed.
Copper (CAS 7440-50-8)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Lead (CAS 7439-92-1)	Listed.
Limestone (CAS 1317-65-3)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Molybdenum (CAS 7439-98-7)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Silicon (CAS 7440-21-3)	Listed.
Sulphur (CAS 7704-34-9)	Listed.
Tin (CAS 7440-31-5)	Listed.
Titanium dioxide (TiO2) (CAS 13463-67-7)	Listed.
Vanadium (CAS 7440-62-2)	Listed.
Vanadium pentoxide (CAS 1314-62-1)	Listed.
Zinc (CAS 7440-66-6)	Listed.

US - Pennsylvania RTK - Hazardous Substances: Special hazard

Chromium (CAS 7440-47-3)	Special hazard.
Nickel (CAS 7440-02-0)	Special hazard.

Mexico regulations Under some use conditions, this material may be considered to be hazardous in accordance with Mexican regulations.

16. Other Information

HMIS® ratings
Health: 2*
Flammability: 0
Physical hazard: 0

NFPA ratings
Health: 0
Flammability: 0
Instability: 0

Disclaimer This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment. MSDS's for specific coatings are available upon request.

Issue date	07-20-2011

Material Safety Data Sheet

SSAB Code Number: SSA-001

Original Issue Date: 02/07/01 Revised: 6/03/08

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Steel Sheet, Plate, Slab and Coil

Manufacturer: SSAB, 650 Warrenville Road, Lisle, Illinois 60532

General Information: (630) 810-4737 (8:00 am to 5:00 pm)

Off-Hour Emergency Phone Number: (563) 381-5311

Section 2 - Composition / Information on Ingredients

Ingredient Name	CAS Number	Percentage by wt.	OSHA PEL [1]	ACGIH TLV [2]
Iron	7439-89-6	99.8 max	10 mg/m³ - as Iron oxide fume	5 mg/m³ - Iron oxide dust and fume, as Fe
Chromium	7440-47-3	3.0	2.5 µg/m³/5.0 µg/m³ (as Cr VI) * 0.5 mg/m³ (chromium II & III compounds) 1.0 mg/m³ (chromium metal)	0.5 mg/m³ - Metal & Cr III compounds 0.05 mg/m³ - Water Soluble Cr VI compounds 0.01 mg/m³ - Insoluble Cr VI compounds
Carbon	7440-44-0	1.0	15 mg/m³ - Total dust (PNOR) [3] 5.0 mg/m³ - Respirable fraction (PNOR) [3]	10 mg/m³ - Inhalable fraction (PNOS) [4] 3 mg/m³ - Respirable fraction (PNOS) [4]
Copper	7440-50-8	1.0	0.1 mg/m³ - Fume (as Cu) 1.0 mg/m³ - Dusts & mists (as Cu)	0.2 mg/m³ - fume 1.0 mg/m³ - dust & mist as Cu
Manganese	7439-96-5	2.2	"C" 5.0 mg/m³ - Fume & Mn compounds	0.3 mg/m³ - as Mn
Silicon	7440-21-3	1.0	15 mg/m³ - Total dust (PNOR) [3] 5 mg/m³ - Respirable fraction (PNOR) [3]	10 mg/m³
Molybdenum	7439-98-7	1.0	5.0 mg.m³ - Soluble compounds 15 mg.m³ - Insoluble compounds (total dust, PNOR)	5.0 mg/m³ - Soluble compounds Respirable fraction 10 mg/m³ - Metal & Insoluble compounds inhalable fraction 3.0 mg/m³ - Metal & Insoluble compounds respirable fraction
Nickel	7440-02-0	2.0	1.0 mg/m³ - Metal, soluble & insoluble compounds (as Ni)	1.5 mg/m³ - Elemental (as Ni) inhalable fraction 0.1 mg/m³ - Soluble inorganic compounds inhalable fraction (NOS) [5] 0.2 mg/m³ - Insoluble inorganic compounds inhalable fraction (NOS) [5]

Notes:

- All commercial steel products contain small amounts of various elements in addition to those specified. These small quantities frequently referred to as "trace" or "residual" elements, generally originate in the raw materials used. Individual trace elements vary in concentration by weight, and may include aluminum, titanium, vanadium, niobium, tin, sulfur, boron, and phosphorus.
- Element weight percents shown represent maximum concentrations possible over all product ranges. These do not represent actual steel specification limits for any SSAB steel grade produced.

* Steel products as provided contain chromium metal in the zero valence state. As such, chromium metal does not present any unusual health hazard. Hence, the most applicable exposure limits relative to chromium in these products are those established for the metal, itself. However, welding, torch cutting, brazing or perhaps grinding of the chromium metal in steel products may generate airborne concentrations of hexavalent chromium, (Cr VI), a confirmed human carcinogen. Therefore, should the user perform any of these tasks, the hexavalent chromium exposure limits would apply.

[1] OSHA Permissible Exposure Limits (PELs) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A ("C") designation denotes a Ceiling Limit, which should not be exceeded during any part of the working exposure unless otherwise noted. A Short Term Exposure Limit (STEL) is defined as a 15-minute exposure, which should not be exceeded at any time during a workday.

[2] Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted

[3] PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the PNOR limit which is the same as the inert or nuisance dust limit of 15 mg/m^3 for total dust and 5.0 mg/m^3 for the respirable fraction.

[4] PNOS (Particulates Not Otherwise Specified). Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos and <1% crystalline silica. A TWA-TLV of 10 mg/m^3 for inhalable particulate and 3 mg/m^3 for respirable particulate has been recommended. Inhalable fraction - The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH TLVs and BEIs Appendix D, paragraph A. Respirable fraction. - The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH TLVs and BEIs Appendix D, paragraph C.

[5] NOS (Not Otherwise Specified)

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

This formed solid metal product poses little or no immediate health or fire hazard. 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 produce rust stains unless removed fairly promptly. If appropriate, respiratory protection and other personal protective equipment should be used.

Primary Entry Routes: Inhalation and/ or 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 the 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 and copper 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. Boron oxide, molybdenum, nickel, phosphorus oxide and vanadium compounds, especially vanadium pentoxide, are respiratory tract irritants.
- **Eye:** Excessive exposure to high concentrations of dust may cause irritation to the eyes. Particles of iron or iron compounds, which become imbedded in the eye, may cause rust stains unless removed fairly promptly. 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. Molybdenum and vanadium compounds, especially vanadium pentoxide, are eye irritants.
- **Skin:** Skin contact with dusts may cause irritation or sensitization, possibly leading to dermatitis. Repeated or prolonged contact with chemical surface treatments or oil residue may cause skin irritation, dermatitis, ulceration or allergic reactions in sensitized individuals.
- Skin contact with metallic fumes and dusts may cause physical abrasion. Sulfur compounds, present in generated fumes, may irritate the skin. Molybdenum and vanadium compounds, especially vanadium pentoxide, are skin irritants. Exposure to nickel may cause contact and atopic dermatitis and allergic sensitization. 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. Ingestion of dust may cause nausea and/or vomiting.

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

- **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, mask-like facial expression and paralysis. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections.
- **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 reviewed the toxicity data and concluded that chromium metal is not classifiable as a human carcinogen.

- **COPPER**: Inhalation of high concentrations of freshly formed oxide fumes and dusts of copper can cause metal fume fever. Chronic inhalation of copper dust has caused, in animals, hemolysis of the red blood cells, deposition of hemofuscin in the liver and pancreas, injury to lung cells and gastrointestinal symptoms.
- **MOLYBDENUM**: Certain handling operations, 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.
- **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 siderosis. 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.
- **NICKEL**: Exposure to nickel dusts and fumes can cause sensitization dermatitis, respiratory irritation, asthma, pulmonary fibrosis, edema and may cause nasal or lung cancer in humans. IARC lists nickel and certain nickel compounds as Group 2B carcinogens (sufficient animal data). ACGIH 2001 TLVs® and BEIs® lists insoluble nickel compounds as confirmed human carcinogens.
- **CARBON**: Chronic inhalation of high concentrations to carbon may cause pulmonary disorders.
- **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.

Long-term inhalation exposure to high concentrations (over-exposure) to pneumoconiotic 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. However, some nickel and chromium compounds are listed as nasal and lung carcinogens by IARC and ACGIH. The International Agency for Research on Cancer (IARC) identifies welding fumes as Group 2B carcinogens, which are possibly carcinogenic to humans. IARC and NTP list hexavalent chromium compounds as Group 1 and ACGIH as A1.

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 Hazard.

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. Metal fume fever may be treated by bed rest, and administering a pain and fever reducing medication.

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 area with cold water and seek medical attention. If a persistent rash or irritation occurs, seek medical attention.

Ingestion: Not a probable route of industrial exposure. However, if ingested, seek medical attention immediately.

Section 5 - Fire-Fighting Measures

Flash Point: NA

LEL: NA

Flash Point Method: NA

UEL: NA

Burning Rate: NA

Auto-ignition Temperature: NA

Flammability Classification: Non-flammable

Extinguishing Media: Not applicable for solid product. Use extinguishers appropriate for surrounding materials. Use water spray, dry chemical, alcohol foam or carbon dioxide. Water or foam may cause frothing. Use water to keep fire-exposed containers cool. Water spray may be used to flush spills away from exposures and to dilute spills to non-combustible mixtures.

Unusual Fire or Explosion Hazards: Not applicable for solid product. Do not use water on molten metal. Material can form explosive and flammable mixtures with air.

Hazardous Combustion Products: At temperatures above the melting point, fumes containing metal oxides and other alloying elements may be liberated.

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 facepiece operated in pressure-demand or positive-pressure mode and full protective clothing.

Section 6 - Accidental Release Measures

Spill/Leak Procedures: Not applicable to steel in solid state. For spills involving finely divided particles, clean-up 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 regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 7 - Handling and Storage

Handling Precautions: Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Practice good housekeeping. Avoid breathing metal fumes and/or dust.

Storage Requirements: Store away from acids and incompatible materials. Store in cool, well-ventilated areas away from sources of heat and ignition, oxidizing agents, 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 spills.

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 the 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: Grey-black, Odorless
Odor Threshold: Not applicable
Vapor Pressure: Not applicable
Vapor Density (Air=1) : Not applicable
Formula Weight: Not applicable
Density: Not applicable
Specific Gravity (H_2O=1, at 4 °C): .275-.282 lb/in^3
pH: **Not applicable**

Water Solubility: Insoluble
Other Solubilities: Not applicable
Boiling Point: 5252 F (approximate)
Viscosity: Not applicable
Refractive Index: Not applicable
Surface Tension: Not applicable
% Volatile: Not applicable
Evaporation Rate: Not applicable
Melting Point: 2786 F (approximate)

Section 10 - Stability and Reactivity

Stability: Steel products are stable under normal storage and handling conditions. May react with strong acids to form hydrogen gas.

Polymerization: Hazardous polymerization cannot 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.

Conditions to Avoid: Storage with strong acids or calcium hypochlorite.

Hazardous Decomposition Products: Thermal oxidative decomposition of steel products can produce fumes containing oxides of iron and manganese as well as other elements.

Section 11 - Toxicological Information

Toxicity Data:*

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

Skin Effects:
Skin contact with the individual components may cause physical abrasion, irritation and dermatitis.

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

Acute Oral Effects:
No data available

Other: No LC50 or LD50 has been established for the mixture as a whole. Iron LD50: 30 g/kg oral (rat). Carbon LD50: No data. Manganese LD50: 9g/kg oral (rat).

Chronic Effects: See section 3.

Carcinogenicity: Chromium (in surface passivation treatment, if specified).

Mutagenicity: No data available

Teratogenicity: No data available

- See NIOSH, *RTECS*: (NO7400000) for additional toxicity data on iron oxide; (BD1200000) for aluminum oxide; (FF5250000) for carbon; (OO9275000) for manganese; (TH3500000) for phosphorous; (XR1700000) for titanium.

Section 12 - Ecological Information

Ecotoxicity: No data available for Steel Sheet, Plate, Slab and Coil as a whole. However, individual components have been found to be toxic to the environment. Metal dusts may migrate into soil and groundwater and be ingested by wildlife.

Environmental Fate: No data available.

Environmental Degradation: No data available.

Soil Absorption/Mobility: No data available for Steel Sheet, Plate, Slab and Coil as a whole. However, individual components 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 steel. Do not release into sewers or waterways. Controlled burning for disposal. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Disposal Regulatory Requirements: None

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

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Steel Sheet, Plate, Slab and Coil is not listed as hazardous substances under 49 CFR 172.101.

Shipping Name: Not applicable
Shipping Symbols: Not applicable
Hazard Class: Not applicable
ID No.: Not applicable
Packing Group: Not applicable
Label: Not applicable
Special Provisions (172.102): None

Packaging Authorizations
a) Exceptions: None
b) Non-bulk Packaging: Not applicable
c) Bulk Packaging: Not applicable

Quantity Limitations
a) Passenger, Aircraft, or Railcar: Not applicable
b) Cargo Aircraft Only: Not applicable

Vessel Stowage Requirements
a) Vessel Stowage: Not applicable
b) Other: Not applicable

Section 15 - Regulatory Information

Regulatory Information
This product and/or its constituents are subject to the following regulations:

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Tables Z-1& Z-2,): The product as a whole is not listed. However, individual components of the product are listed.

OSHA Specifically Regulated Substance: Not applicable

EPA Regulations:

RCRA: Not applicable

CERCLA Hazardous Substance (40 CFR 302.4): The product as a whole is not listed. However, individual components of the product are listed: Manganese is listed under SARA 302.

SARA 311/312 Codes: Immediate (acute) health hazard and delayed (chronic) health hazard.

SARA 313: Manganese is subject to SARA 313 reporting requirements. Please also note that if you prepackage or otherwise redistribute this product to industrial customers, SARA 313 requires that a notice be sent to those customers.

Clean Water Act: Not applicable.

Safe Drinking Water Act: Iron and Manganese are regulated under this act. The product as a whole is not listed.

State Regulations: The product as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations.

Other Regulations: The product as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations.

Section 16 - Other Information

Prepared By: AM Health and Safety, Inc.

Hazard Rating Systems: (for solid formed product)

NFPA Code: 0-0-0 HMIS Code: 0-0-0 PPE: See Section 8

Disclaimer: This information is taken from sources or based upon data believed to be reliable. However, SSAB Inc and AM Health and Safety, Inc. makes no warranty as to the absolute correctness or sufficiency of any of the foregoing or that additional or other measures may not be required under particular conditions.

STRUCTURAL GROUP
1855 East 122nd Street, Chicago, IL 60633
Ph. 773-646-4500. Fax. 773-646-6305

MATERIAL SAFETY DATA SHEET
ISSUE DATE JANUARY 2009
(revised 10/08/2010)

PRODUCT NAME:	**BLACK EPOXZKOTE POWDER PRIMED TUBING**
OTHER DESIGNATIONS:	Powder Primer Coated Steel
MANUFACTURER:	ATLAS
	1855 East 122nd Street
	Chicago, IL 60633

II. INGREDIENTS AND HAZARDS

HAZARD DATA

INGREDIENT NAME	CAS NUMBER	% WEIGHT	LD50 or LC50 SPECIES/ROUTE	1992 TLV's (ACGIH)	1990 PEL's (USOSHA)
BASE METAL:					
Iron	1309-37-1	Balance	5.4gm / kg mouse / oral	5 mg / m^3 iron oxide fume	10 mg / m^3 (STEL) dust and fume
ALLOYING ELEMENTS:					
Manganese	7439-96-5	1.90 max.	9 gm / kg rat / oral	1 mg / m^3 Mn. fume 1 mg / m^3 Mn. dust 3 mg / m^3 (STEL) fume	5 mg / m^3 fume (C) 3 mg / m^3 (STEL) fume
Carbon	7440-44-0	0.60 max.	440 mg / kg mouse / intraveneous	10 mg / m^3 total dust*	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
Phosphorus	7723-14-0	0.15 max.	no info.	0.1 mg / m^3	0.1 mg / m^3
Aluminum	7429-90-5	0.10 max.	no info.	5 mg / m^3 welding fume 10 mg / m^3 dust	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
Sulfur	7704-34-9	0.05 max.	no info.	10 mg/ m^3 total dust*	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
Chromium [3]	7440-47-3	1.20 max.	no Info.	0.5 mg / m^3 Cr. Metal compounds (II & III) 0.5 mg / m^3 Cr. VI Sol. & insol.	1 mg / m^3 Cr. metal 0.5 mg / m^3 Cr. compounds (II & III)
Vanadium [3]	7440-62-2	0.20 max.	59 mg / kg rabbit / subcutaneous	0.05 mg / m^3 as respirable V_2O_5 dust and fume	0.5 mg / m^3 (C) respirable V_2O_5 dust 0.1 mg / m^3 (C) respirable V_2O_5 fume
Nickel [2]	7440-02-0	2.00 max.	no info.	1mg / m^3 metal & insol. Ni.	1 mg / m^3 metal, sol. & insol. Ni.

INGREDIENT NAME	CAS NUMBER	% WEIGHT	LD50 or LC50 SPECIES / ROUTE	1992 TLV's (ACGIH)	1990 PEL's (USOSHA)
Copper [2]	7440-50-8	1.00 max.	3-5 mg / kg rodent / intraperitoneal	0.2 mg / m^3 fume 1.0mg / m^3 Cu. dust and mist	0.1 mg / m^3 Cu. fume 1.0 mg / m^3 Cu. dust and mist
Silicon [2]	7440-21-3	1.00 max.	no info.	10 mg / m^3 total dust*	10 mg / m^3 total dust 5 mg/ m^3 respirable fraction*
Molybdenum [2]	7439-98-7	0.10 max.	no info.	5 mg / m^3 Mo. Sol. 10 mg / m^3 Mo. insol.	5 mg / m^3 Mo. sol. 15 mg / m^3 insol. total dust
Titanium [1]	7740-32-6	0.30 max.	no info.	10 mg / m^3 total dust*	15 mg / m^3 total dust* 5 mg / m^3 respirable fraction
Columbium [1]	7440-03-1	0.10 max.	no info.	10 mg / m^3 total dust*	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
Rare Earth (Ce) [1]	7440-45-1	0.10 max.	no info	10 mg / m^3	10 mg / m^3 total dust 5 mg / m^3 respirable fraction
Tin	7440-31-5	0.05 max.	no info	0.1 mg / m^3 Sn. organic 2 mg / m^3 Sn. Metal & inorganic	0.1 mg / m^3 Sn. organic 2 mg / m^3 Sn. inorganic
Cerium	7440-45-1	20 ppm max.	no info	10 mg / m^3 total dust*	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
Lanthanum	7439-91-0	10 ppm max.	3.5 mg / kg rat / iv	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*	15 mg / m^3 total dust*
POWDER INGREDIENTS:					
EPOXY RESIN	25036-25-3	< 2g / ft²	no info	10 mg / m^3 total dust*	10 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
CARBON BLACK	1333-86-4	< 1 g / ft²	no info	10 mg / m^3 total dust*	10 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*

This list combines all ingredients contained in Rolled Alloy, Rolled HSLA and Rolled Carbon Steel Sheet. The common ingredients are at the top of the list. The numbers in parentheses indicate the additional alloying metals in each type of steel.

[1] = Only present in Rolled HSLA Sheet Steel
[2] = Only present in Rolled Alloy Sheet Steel
[3] = Present in both Rolled HSLA and Rolled Alloy Sheet Steel

ACGIH = American Conference of Governmental Industrial Hygienists PEL = Permissible Exposure Limits
USOSHA = United States Occupational Safety & Health Administration TLV = Threshold Limit Value

Note: This product has a light surface coating of EPOXZKOTE® primer. This coating is less than one percent by weight (<1.0%) of the product. During welding tests performed for Atlas by a certified industrial hygiene company, air monitoring was performed on coated and uncoated steel simulating standard use of this material. These tests did not reveal any hazardous levels of contaminants derived from the coating that would not be present when welding uncoated material.

The coating on this product does not contain lead or ingredients considered carcinogens by OSHA, IARC or NTP.

III. PHYSICAL DATA

Solid Metal with Powder Coating. Stable under normal conditions of use, storage and transport. Operations such as welding, burning, grinding and machining may result in the generation of airborne particulates.

IV. FIRE AND EXPLOSION HAZARD DATA

Steel products in the solid state pose no fire or explosion hazard. It is not flammable or combustible.
Flash Point – N/A Flammable Limits – N / A
Extinguishing Media – N / A
Special Fire Fighting Procedures – N / A
Unusual Fire and Explosion Hazards – N / A

V. REACTIVITY DATA

Stability: Stable
Conditions to avoid: N / A
Incompatibility: N / A

Hazardous Decomposition Products: Metallic dust and / or metallic oxide dust and fumes will be liberated from welding, burning, grinding and, possibly, machining operations.

HEALTH HAZARD DATA

No health hazard as delivered to the customer. However, welding, burning, grinding, and machining will generate metallic fumes and dusts.

Welding on EPOXZKOTE® powder coated tubing does not create any additional hazard which would not be present when welding uncoated material.

Route of Entry: Inhalation
Acute Exposure to Fumes and Dust:

Inhalation of metallic oxide fumes may result in irritation of the upper respiratory tract and an influenza – like illness called metal fume fever. Symptoms include chills, muscle aches, nausea, fever, dry throat, cough and weakness.

Chronic Exposure to Fumes and Dust:

Continuous overexposure to iron oxide fumes as dust may produce a benign pneumoconiosis (siderosis). Inhalation of high concentrations of iron oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

Certain chromium and nickel compounds are considered known or suspect carcinogens by the National Toxicology Program, the International Agency for Research on Cancer or OSHA. Chromium is contained in HSLA and Rolled Alloy base steel.

A search of the scientific literature indicates that exposure to Chromium, Copper, Manganese and Nickel may Cause reproductive effects. The literature review did not indicate that any of the chemicals in this product were teratogens, mutagens or reparatory sensitizers.

VII. EMERGENCY AND FIRST AID PROCEDURES

Respiratory:

In the event of inhalation of high concentrations of metal fumes and dust, remove the person to fresh air, administer first aid and seek medical attention promptly.

Skin:

If thermal burns occur, flush area with cold water. Seek medical attention. For mechanical abrasions, seek first aid and / or medical attention.

Eyes:

If particles deposit in the eyes, flush eyes with large amounts of water. Seek medical attention.

VIII. SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released: N / A

Waste Disposal Method: Dispose of in accordance with state and / or local regulations.

IX. SPECIAL PROTECTION INFORMATION

Ventilation:

Local exhaust ventilation should be provided when, welding, burning, grinding and machining to prevent excessive steel dust or fume exposure.

Respiratory Protection:

NIOSH / MSHA approved respirators for dust, mist and fume should be used to avoid excessive inhalation of steel dusts and fumes. Appropriate respirator selection depends on the magnitude of exposure.

Protective Gloves:

As required for welding, burning, grinding or machining operations.

Eye Protection:

As required for welding, burning, grinding and machining operations.

Other Protective Clothing:

Steel-toed work shoes and welding aprons as required.

X. SPECIAL PRECAUTIONS

Precautions to be taken in Handling and Storage:

Operations with potential for generating high concentrations of airborne particulates should be evaluated as necessary. Air monitoring to determine levels of exposure is advisable.

Welding nearby areas where chlorinated solvents are used can result in the creation of toxic gases such as phosgene.

If coolants are used during cutting and braising and / or oil coatings are applied to the steel after receipt, additional precautions must be taken based on the hazards associated with those materials. Refer to each product MSDS for the appropriate protection information.

XI. REGULATORY INFORMATION

USA:

This product contains chemicals that are subject to reporting requirements of Section 313 of the Superfund Amendments and Reauthorization Act of 1986, 40 CFR Part 372. The release and disposal of fumes or dust generated when welding, burning, grinding and machining this product may be regulated by this law.

Canada:

Workplace Hazardous Materials Information System (WHMIS)

Rolled Carbon Steel	D-2-B
Alloyed Steel	D-2-A
HSLA	D-2-B

STRUCTURAL GROUP
1855 East 122nd Street, Chicago, IL 60633
Ph. 773-646-4500. Fax. 773-646-6305

MATERIAL SAFETY DATA SHEET
ISSUE DATE JANUARY 2009
(revised 10/08/2010)

PRODUCT NAME:	**RED EPOXZKOTE POWDER PRIMED TUBING**
OTHER DESIGNATIONS:	Powder Primer Coated Steel
MANUFACTURER:	ATLAS
	1855 East 122nd Street
	Chicago, IL 60633

II. INGREDIENTS AND HAZARDS

HAZARD DATA

INGREDIENT NAME	CAS NUMBER	% WEIGHT	LD50 or LC50 SPECIES/ROUTE	1992 TLV's (ACGIH)	1990 PEL's (USOSHA)
BASE METAL:					
Iron	1309-37-1	Balance	5.4gm / kg mouse / oral	5 mg / m^3 iron oxide fume	10 mg / m^3 (STEL) dust and fume
ALLOYING ELEMENTS:					
Manganese	7439-96-5	1.90 max.	9 gm / kg rat / oral	1 mg / m^3 Mn. fume 1 mg / m^3 Mn. dust 3 mg / m^3 (STEL) fume	5 mg / m^3 fume (C) 3 mg / m^3 (STEL) fume
Carbon	7440-44-0	0.60 max.	440 mg / kg mouse / intraveneous	10 mg / m^3 total dust*	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
Phosphorus	7723-14-0	0.15 max.	no info.	0.1 mg / m^3	0.1 mg / m^3
Aluminum	7429-90-5	0.10 max.	no info.	5 mg / m^3 welding fume 10 mg / m^3 dust	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
Sulfur	7704-34-9	0.05 max.	no info.	10 mg/ m^3 total dust*	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
Chromium [3]	7440-47-3	1.20 max.	no Info.	0.5 mg / m^3 Cr. Metal compounds (II & III) 0.5 mg / m^3 Cr. VI Sol. & insol.	1 mg / m^3 Cr. metal 0.5 mg / m^3 Cr. compounds (II & III)
Vanadium [3]	7440-62-2	0.20 max.	59 mg / kg rabbit / subcutaneous	0.05 mg / m^3 as respirable V_2O_5 dust and fume	0.5 mg / m^3 (C) respirable V_2O_5 dust 0.1 mg / m^3 (C) respirable V_2O_5 fume
Nickel [2]	7440-02-0	2.00 max.	no info.	1mg / m^3 metal & insol. Ni.	1 mg / m^3 metal, sol. & insol. Ni.

INGREDIENT NAME	CAS NUMBER	% WEIGHT	LD50 or LC50 SPECIES / ROUTE	1992 TLV's (ACGIH)	1990 PEL's (USOSHA)
Copper [2]	7440-50-8	1.00 max.	3-5 mg / kg rodent / intraperitoneal	0.2 mg / m^3 fume 1.0mg / m^3 Cu. dust and mist	0.1 mg / m^3 Cu. fume 1.0 mg / m^3 Cu. dust and mist
Silicon [2]	7440-21-3	1.00 max.	no info.	10 mg / m^3 total dust*	10 mg / m^3 total dust 5 mg/ m^3 respirable fraction*
Molybdenum [2]	7439-98-7	0.10 max.	no info.	5 mg / m^3 Mo. Sol. 10 mg / m^3 Mo. insol.	5 mg / m^3 Mo. sol. 15 mg / m^3 insol. total dust
Titanium [1]	7740-32-6	0.30 max.	no info.	10 mg / m^3 total dust*	15 mg / m^3 total dust* 5 mg / m^3 respirable fraction
Columbium [1]	7440-03-1	0.10 max.	no info.	10 mg / m^3 total dust*	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
Rare Earth (Ce) [1]	7440-45-1	0.10 max.	no info	10 mg / m^3	10 mg / m^3 total dust 5 mg / m^3 respirable fraction
Tin	7440-31-5	0.05 max.	no info	0.1 mg / m^3 Sn. organic 2 mg / m^3 Sn. Metal & inorganic	0.1 mg / m^3 Sn. organic 2 mg / m^3 Sn. inorganic
Cerium	7440-45-1	20 ppm max.	no info	10 mg / m^3 total dust*	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
Lanthanum	7439-91-0	10 ppm max.	3.5 mg / kg rat / iv	15 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*	15 mg / m^3 total dust*
POWDER INGREDIENTS:					
EPOXY RESIN	25036-25-3	< 2g / ft²	no info	10 mg / m^3 total dust*	10 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
RED IRON OXIDE	1309-37-1	< 1 g / ft²	no info	10 mg / m^3 total dust*	10 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
CARBON BLACK	1333-86-4	< 0.5 g / ft²	no info	10 mg / m^3 total dust*	10 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*
TITANIUM DIOXIDE	13463-67-7	< 0.5 g / ft²	no info	10 mg / m^3 total dust*	10 mg / m^3 total dust* 5 mg/ m^3 respirable fraction*

This list combines all ingredients contained in Rolled Alloy, Rolled HSLA and Rolled Carbon Steel Sheet. The common ingredients are at the top of the list. The numbers in parentheses indicate the additional alloying metals in each type of steel.

[1] = Only present in Rolled HSLA Sheet Steel
[2] = Only present in Rolled Alloy Sheet Steel
[3] = Present in both Rolled HSLA and Rolled Alloy Sheet Steel
ACGIH = American Conference of Governmental Industrial Hygienists PEL = Permissible Exposure Limits
USOSHA = United States Occupational Safety & Health Administration TLV = Threshold Limit Value

Note: This product has a light surface coating of EPOXZKOTE® primer. This coating is less than one percent by weight (<1.0%) of the product. During welding tests performed for Atlas by a certified industrial hygiene company, air monitoring was performed on coated and uncoated steel simulating standard use of this material. These tests did not reveal any hazardous levels of contaminants derived from the coating that would not be present when welding uncoated material.
The coating on this product does not contain lead or ingredients considered carcinogens by OSHA, IARC or NTP.

III. PHYSICAL DATA

Solid Metal with Powder Coating. Stable under normal conditions of use, storage and transport. Operations such as welding, burning, grinding and machining may result in the generation of airborne particulates.

IV. FIRE AND EXPLOSION HAZARD DATA

Steel products in the solid state pose no fire or explosion hazard. It is not flammable or combustible.
Flash Point – N/A Flammable Limits – N / A
Extinguishing Media – N / A
Special Fire Fighting Procedures – N / A
Unusual Fire and Explosion Hazards – N / A

V. REACTIVITY DATA

Stability: Stable
Conditions to avoid: N / A
Incompatibility: N / A

Hazardous Decomposition Products: Metallic dust and / or metallic oxide dust and fumes will be liberated from welding, burning, grinding and, possibly, machining operations.

HEALTH HAZARD DATA

No health hazard as delivered to the customer. However, welding, burning, grinding, and machining will generate metallic fumes and dusts.

Welding on EPOXZKOTE® powder coated tubing does not create any additional hazard which would not be present when welding uncoated material.

Route of Entry: Inhalation

Acute Exposure to Fumes and Dust:

Inhalation of metallic oxide fumes may result in irritation of the upper respiratory tract and an influenza – like illness called metal fume fever. Symptoms include chills, muscle aches, nausea, fever, dry throat, cough and weakness.

Chronic Exposure to Fumes and Dust:

Continuous overexposure to iron oxide fumes as dust may produce a benign pneumoconiosis (siderosis). Inhalation of high concentrations of iron oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

Certain chromium and nickel compounds are considered known or suspect carcinogens by the National Toxicology Program, the International Agency for Research on Cancer or OSHA. Chromium is contained in HSLA and Rolled Alloy base steel.

A search of the scientific literature indicates that exposure to Chromium, Copper, Manganese and Nickel may Cause reproductive effects. The literature review did not indicate that any of the chemicals in this product were teratogens, mutagens or reparatory sensitizers.

VII. EMERGENCY AND FIRST AID PROCEDURES

Respiratory:

In the event of inhalation of high concentrations of metal fumes and dust, remove the person to fresh air, administer first aid and seek medical attention promptly.

Skin:

If thermal burns occur, flush area with cold water. Seek medical attention. For mechanical abrasions, seek first aid and / or medical attention.

Eyes:

If particles deposit in the eyes, flush eyes with large amounts of water. Seek medical attention.

VIII. SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released: N / A

Waste Disposal Method: Dispose of in accordance with state and / or local regulations.

IX. SPECIAL PROTECTION INFORMATION

Ventilation:

Local exhaust ventilation should be provided when, welding, burning, grinding and machining to prevent excessive steel dust or fume exposure.

Respiratory Protection:

NIOSH / MSHA approved respirators for dust, mist and fume should be used to avoid excessive inhalation of steel dusts and fumes. Appropriate respirator selection depends on the magnitude of exposure.

Protective Gloves:

As required for welding, burning, grinding or machining operations.

Eye Protection:

As required for welding, burning, grinding and machining operations.

Other Protective Clothing:

Steel-toed work shoes and welding aprons as required.

X. SPECIAL PRECAUTIONS

Precautions to be taken in Handling and Storage:

Operations with potential for generating high concentrations of airborne particulates should be evaluated as necessary. Air monitoring to determine levels of exposure is advisable.

Welding nearby areas where chlorinated solvents are used can result in the creation of toxic gases such as phosgene.

If coolants are used during cutting and braising and / or oil coatings are applied to the steel after receipt, additional precautions must be taken based on the hazards associated with those materials. Refer to each product MSDS for the appropriate protection information.

XI. REGULATORY INFORMATION

USA:

This product contains chemicals that are subject to reporting requirements of Section 313 of the Superfund Amendments and Reauthorization Act of 1986, 40 CFR Part 372. The release and disposal of fumes or dust generated when welding, burning, grinding and machining this product may be regulated by this law.

Canada:

Workplace Hazardous Materials Information System (WHMIS)

Rolled Carbon Steel	D-2-B
Alloyed Steel	D-2-A
HSLA	D-2-B

GERDAU AMERISTEEL

Material Safety Data Sheet

Material Name: Hot Rolled Carbon Steel Merchant Bars

*** Section 1 - Chemical Product and Company Identification ***

Manufacturer Information

Gerdau Ameristeel
4221 West Boy Scout Blvd.
Suite 600
Tampa, FL 33607

Phone: (800) 876-3626

Emergency # 800-424-9300 CHEMTREC

*** Section 2 - Hazards Identification ***

Emergency Overview

Fumes may cause irritation of the eyes and respiratory tract.

Potential Health Effects: Eyes

May cause irritation.

Potential Health Effects: Skin

Not considered to cause skin effects. Sensitive individuals may experience skin irritation.

Potential Health Effects: Ingestion

Not considered a route of exposure under anticipated product use conditions.

Potential Health Effects: Inhalation

Inhalation of fumes may cause irritation of the nose, throat and lungs. Chronic irritation may cause bronchitis, pneumonitis, siderosis, upper respiratory tract irritation, headaches, lack of coordination, metal fume fever.

Medical Conditions Aggravated by Exposure

Respiratory conditions may be aggravated by exposure to metal fumes or dusts.

HMIS Ratings: Health: 1 **Fire:** 0 **HMIS Reactivity** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 3 - Composition / Information on Ingredients ***

CAS #	Component	Percent
1309-37-1	Iron oxide	97
7439-96-5	Manganese	2
7440-50-8	Copper	1.5
124-38-9	Carbon dioxide	0.9
7440-02-0	Nickel	0.5
7440-21-3	Silicon	0.4
7446-09-5	Sulfur dioxide	0.08
7440-31-5	Tin	0.08
7723-14-0	Phosphorus	0.06
1314-62-1	Vanadium pentoxide	0.05

*** Section 4 - First Aid Measures ***

First Aid: Eyes

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

First Aid: Skin

For skin contact, flush with large amounts of water. If irritation persists, get medical attention.

First Aid: Ingestion

If the material is swallowed, get immediate medical attention or advice.

First Aid: Inhalation

Move person to non-contaminated air. Seek medical attention.

*** Section 5 - Fire Fighting Measures ***

General Fire Hazards

See Section 9 for Flammability Properties.

Concentrations of metallic fines in the air could present an explosion hazard.

Hazardous Combustion Products

Above the melting point, iron oxide fumes may be present.

Extinguishing Media

For molten metal, use Class D chemical or sand.

Fire Fighting Equipment/Instructions

Firefighters should wear full protective gear.

NFPA Ratings: Health: 1 **Fire:** 0 **Reactivity:** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

* * * Section 6 - Accidental Release Measures * * *

Containment Procedures

None necessary.

Clean-Up Procedures

Fine particles and small chips should be swept up and disposed of properly.

Evacuation Procedures

Isolate area. Keep unnecessary personnel away.

Special Procedures

User should consult applicable standards for specific process employed to determine any special precautions needed to insure the health and safety of its employees.

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Avoid contact with skin and eyes. Wash thoroughly after handling.

Storage Procedures

No special storage procedures necessary.

* * * Section 8 - Exposure Controls / Personal Protection * * *

A: Component Exposure Limits

Iron oxide (1309-37-1)

ACGIH: 5 mg/m3 TWA (respirable fraction)
OSHA: 10 mg/m3 TWA (fume)
NIOSH: 5 mg/m3 TWA (dust and fume, as Fe)

Manganese (7439-96-5)

ACGIH: 0.2 mg/m3 TWA
OSHA: 1 mg/m3 TWA (fume)
3 mg/m3 STEL (fume)
5 mg/m3 Ceiling
NIOSH: 1 mg/m3 TWA (fume)
3 mg/m3 STEL

Copper (7440-50-8)

ACGIH: 0.2 mg/m3 TWA (fume); 1 mg/m3 TWA (dust and mist, as Cu)
OSHA: 0.1 mg/m3 TWA (dust, fume, mists, as Cu)
NIOSH: 1 mg/m3 TWA (dust and mist)

Carbon dioxide (124-38-9)

ACGIH: 5000 ppm TWA
30000 ppm STEL
OSHA: 10000 ppm TWA; 18000 mg/m3 TWA
30000 ppm STEL; 54000 mg/m3 STEL
NIOSH: 5000 ppm TWA; 9000 mg/m3 TWA
30000 ppm STEL; 54000 mg/m3 STEL

Nickel (7440-02-0)
ACGIH: 1.5 mg/m3 TWA (inhalable fraction)
OSHA: 1 mg/m3 TWA
NIOSH: 0.015 mg/m3 TWA

Silicon (7440-21-3)
OSHA: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
NIOSH: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)

Tin (7440-31-5)
ACGIH: 2 mg/m3 TWA
OSHA: 2 mg/m3 TWA
NIOSH: 2 mg/m3 TWA

Sulfur dioxide (7446-09-5)
ACGIH: 2 ppm TWA
5 ppm STEL
OSHA: 2 ppm TWA; 5 mg/m3 TWA
5 ppm STEL; 15 mg/m3 STEL
NIOSH: 2 ppm TWA; 5 mg/m3 TWA
5 ppm STEL; 13 mg/m3 STEL

Phosphorus (7723-14-0)
OSHA: 0.1 mg/m3 TWA
NIOSH: 0.1 mg/m3 TWA

Vanadium pentoxide (1314-62-1)
ACGIH: 0.05 mg/m3 TWA (dust or fume, respirable fraction)
NIOSH: 0.05 mg/m3 Ceiling (15 min, dust and fume, as V)

Engineering Controls

Use general ventilation and use local exhaust, where possible, in confined or enclosed spaces.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses; chemical goggles for fumes which may arise from thermal processing.

Personal Protective Equipment: Skin

Use impervious gloves.

Personal Protective Equipment: Respiratory

If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection.

Personal Protective Equipment: General

Eye wash fountain and emergency showers are recommended.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Grey metallic	**Odor:**	Metallic or odorless
Physical State:	Solid	**pH:**	NA
Vapor Pressure:	NA	**Vapor Density:**	NA
Boiling Point:	3000°C (5432°F)	**Melting Point:**	1535°C (2795°F)
Solubility (H2O):	NA	**Specific Gravity:**	7.0
Evaporation Rate:	NA	**VOC:**	NA
Octanol/H2O Coeff.:		**Flash Point:**	NA
Flash Point Method:	NA	**Upper Flammability Limit (UFL):**	NA
Lower Flammability Limit (LFL):	NA	**Burning Rate:**	NA
Auto Ignition:	NA		

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Chemical Stability: Conditions to Avoid

None

Incompatibility

Strong Acids

Hazardous Decomposition

Metal fumes if heated. Above the melting point, iron oxide fumes may be present

Possibility of Hazardous Reactions

Will not occur.

* * * Section 11 - Toxicological Information * * *

Acute Dose Effects

A: General Product Information

Operations or fire which supply sufficient energy to the product (i.e. welding, high speed grinding or melting) can release dust or fumes which may make components of the product biologically available. Exposure to dusts or fumes from some metals including iron, zinc, manganese, chromium, cobalt and copper can produce a condition known as metal fume fever. Iron dust can irritate the eyes and respiratory tract by mechanical action. Acute iron poisoning may involve hemorrhagic vomiting and diarrhea, abdominal pain, acidosis, coagulaopathy, shock, coma and convulsions followed by hepatic and renal failure and perhaps cardiovascular collapse. Chronic inhalation of iron has resulted in mottling of the lungs, a condition referred to as siderosis.

Systemic effects from ingestion of nickel include capillary damage, kidney damage, myocardial weakness and central nervous system depression. Allergic skin sensitization reactions are the most frequent effect of exposure to nickel compounds. Exposure to nickel compounds may also result in allergic lung sensitization. Exposure to copper fume or dust can cause respiratory tract irritation, hemolytic anemia and allergic contact dermatitis.

B: Component Analysis - LD50/LC50

Iron oxide (1309-37-1)
Oral LD50 Rat: >10000 mg/kg

Manganese (7439-96-5)
Oral LD50 Rat: 9 g/kg

Nickel (7440-02-0)
Oral LD50 Rat: >9000 mg/kg

Silicon (7440-21-3)
Oral LD50 Rat: 3160 mg/kg

Sulfur dioxide (7446-09-5)
Inhalation LC50 Rat: 2500 ppm/1H

Phosphorus (7723-14-0)
Inhalation LC50 Rat: 4.3 mg/L/1H; Oral LD50 Rat:3.03 mg/kg; Dermal LD50 Rat:100 mg/kg

Vanadium pentoxide (1314-62-1)
Inhalation LC50 Rat: 2.21 mg/L/4H; Oral LD50 Rat:10 mg/kg; Dermal LD50 Rat:>2500 mg/kg

Carcinogenicity

A: General Product Information

The carcinogenic effect of nickel has been well documented in occupationally exposed nickel refinery workers. Lung and nasal cancers were the predominant forms of cancer in the exposed workers.

B: Component Carcinogenicity

Iron oxide (1309-37-1)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Supplement 7 [1987], Monograph 1 [1972] (Group 3 (not classifiable))

Nickel (7440-02-0)

ACGIH: A5 - Not Suspected as a Human Carcinogen
NIOSH: potential occupational carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)
IARC: Monograph 49 [1990], Supplement 7 [1987] (Group 2B (possibly carcinogenic to humans))

Sulfur dioxide (7446-09-5)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 54 [1992] (Group 3 (not classifiable))

Vanadium pentoxide (1314-62-1)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 86 [2006] (Group 2B (possibly carcinogenic to humans))

Teratogenicity

Manganese, copper and nickel have been reported to have adverse reproductive effects in experimental animals. Copper and nickel have been shown to be fetotoxic in experimental animals.

Neurological Effects

Chronic overexposure to manganese compounds may result in CNS effects such as weakness, sleepiness, emotional instability and spastic gait. These effects can be permanent.

Other Toxicological Information

Under normal conditions of handling, the likelihood of inhaling or ingesting amounts necessary for these effects to occur is very small.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

No information available for the product.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Copper (7440-50-8)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	23 µg/L	
96 Hr LC50 Oncorhynchus mykiss	13.8 µg/L	
96 Hr LC50 Lepomis macrochirus	236 µg/L	
72 Hr EC50 Scenedesmus subspicatus	120 µg/L	
96 Hr EC50 water flea	10 µg/L	
96 Hr EC50 water flea	200 µg/L	

Nickel (7440-02-0)

Test & Species		Conditions
96 Hr LC50 Oncorhynchus mykiss	31.7 mg/L	adult
96 Hr LC50 Pimephales promelas	3.1 mg/L	
96 Hr LC50 Brachydanio rerio	>100 mg/L	
72 Hr EC50 freshwater algae (4 species)	0.1 mg/L	
72 Hr EC50 Selenastrum capricornutum	0.18 mg/L	
96 Hr EC50 water flea	510 µg/L	

Phosphorus (7723-14-0)

Test & Species		Conditions
96 Hr LC50 Lepomis macrochirus	0.0024 mg/L [flow-through]	
96 Hr LC50 Brachydanio rerio	>100 mg/L [static]	
48 Hr EC50 Daphnia magna	0.111 mg/L	

* * * Section 13 - Disposal Considerations * * *

US EPA Waste Number & Descriptions

Component Waste Numbers

Vanadium pentoxide (1314-62-1)

RCRA: waste number P120

Disposal Instructions

Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations. See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

* * * Section 14 - Transportation Information * * *

US DOT Information

Shipping Name: Not Regulated

TDG Information

Shipping Name: Not Regulated

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

A: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Manganese (7439-96-5)

SARA 313: 1.0 % de minimis concentration

Copper (7440-50-8)

SARA 313: 1.0 % de minimis concentration

CERCLA: 5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

Nickel (7440-02-0)

SARA 313: 0.1 % de minimis concentration

CERCLA: 100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

Sulfur dioxide (7446-09-5)

SARA 302: 500 lb TPQ

Phosphorus (7723-14-0)

SARA 302: 100 lb TPQ (This material is a reactive solid. The TPQ does not default to 10000 pounds for non-powder, non-molten, non-solvent form)

CERCLA: 1 lb final RQ; 0.454 kg final RQ

Vanadium pentoxide (1314-62-1)

SARA 302: 100 lb lower threshold TPQ; 10000 lb upper threshold TPQ

CERCLA: 1000 lb final RQ; 454 kg final RQ

B: Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	
Copper	7440-50-8	DOT regulated severe marine pollutant

State Regulations

A: General Product Information

Product may be subject to reporting in states other than those listed for individual components.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Iron oxide	1309-37-1	Yes	Yes	Yes	Yes	Yes	Yes
Manganese	7439-96-5	Yes	Yes	Yes	Yes	Yes	Yes
Copper	7440-50-8	Yes	Yes	Yes	Yes	Yes	Yes
Carbon dioxide	124-38-9	Yes	Yes	Yes	Yes	Yes	Yes
Nickel	7440-02-0	Yes	Yes	Yes	Yes	Yes	Yes
Silicon	7440-21-3	No	Yes	Yes	Yes	Yes	Yes
Tin	7440-31-5	Yes	Yes	Yes	Yes	Yes	Yes
Sulfur dioxide	7446-09-5	Yes	Yes	Yes	Yes	Yes	Yes
Phosphorus	7723-14-0	Yes	Yes	Yes	Yes	Yes	Yes
Vanadium pentoxide	1314-62-1	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Iron oxide	1309-37-1	1 %
Manganese	7439-96-5	1 %
Copper	7440-50-8	1 %
Nickel	7440-02-0	0.1 %

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Iron oxide	1309-37-1	Yes	DSL	EINECS
Manganese	7439-96-5	Yes	DSL	EINECS
Copper	7440-50-8	Yes	DSL	EINECS
Carbon dioxide	124-38-9	Yes	DSL	EINECS
Nickel	7440-02-0	Yes	DSL	EINECS
Silicon	7440-21-3	Yes	DSL	EINECS
Tin	7440-31-5	Yes	DSL	EINECS
Sulfur dioxide	7446-09-5	Yes	DSL	EINECS
Phosphorus	7723-14-0	Yes	DSL	EINECS
Vanadium pentoxide	1314-62-1	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

Other Information

Reasonable care has been taken in the preparation of this information, but the manufacturer makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use.

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

End of Sheet

GERDAU AMERISTEEL

Material Safety Data Sheet

Material Name: Hot Rolled Carbon Steel Reinforcing Bars

* * * Section 1 - Chemical Product and Company Identification * * *

Manufacturer Information

Gerdau Ameristeel
4221 West Boy Scout Blvd.
Suite 600
Tampa, FL 33607

Phone: (800) 876-3626

Emergency # 800-424-9300 CHEMTREC

* * * Section 2 - Hazards Identification * * *

Emergency Overview

Fumes may cause irritation of the eyes and respiratory tract.

Potential Health Effects: Eyes

May cause irritation.

Potential Health Effects: Skin

Not considered to cause skin effects. Sensitive individuals may experience skin irritation.

Potential Health Effects: Ingestion

Not considered a route of exposure under anticipated product use conditions.

Potential Health Effects: Inhalation

Inhalation of fumes may cause irritation of the nose, throat and lungs. Chronic irritation may cause bronchitis, pneumonitis, siderosis, upper respiratory tract irritation, headaches, lack of coordination, metal fume fever.

Medical Conditions Aggravated by Exposure

Respiratory conditions may be aggravated by exposure to metal fumes or dusts.

HMIS Ratings: Health: 1 **Fire:** 0 **HMIS Reactivity** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
1309-37-1	Iron oxide	97
7439-96-5	Manganese	2
7440-50-8	Copper	1.5
124-38-9	Carbon dioxide	0.9
7440-02-0	Nickel	0.5
7440-21-3	Silicon	0.4
7446-09-5	Sulfur dioxide	0.08
7440-31-5	Tin	0.08
7723-14-0	Phosphorus	0.06
1314-62-1	Vanadium pentoxide	0.05

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

First Aid: Skin

For skin contact, flush with large amounts of water. If irritation persists, get medical attention.

First Aid: Ingestion

If the material is swallowed, get immediate medical attention or advice.

First Aid: Inhalation

Move person to non-contaminated air. Seek medical attention.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.

Concentrations of metallic fines in the air could present an explosion hazard.

Hazardous Combustion Products

Above the melting point, iron oxide fumes may be present.

Extinguishing Media

For molten metal, use Class D chemical or sand.

Fire Fighting Equipment/Instructions

Firefighters should wear full protective gear.

NFPA Ratings: Health: 1 **Fire:** 0 **Reactivity:** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

*** Section 6 - Accidental Release Measures ***

Containment Procedures

None necessary.

Clean-Up Procedures

Fine particles and small chips should be swept up and disposed of properly.

Evacuation Procedures

Isolate area. Keep unnecessary personnel away.

Special Procedures

User should consult applicable standards for specific process employed to determine any special precautions needed to insure the health and safety of its employees.

*** Section 7 - Handling and Storage ***

Handling Procedures

Avoid contact with skin and eyes. Wash thoroughly after handling.

Storage Procedures

No special storage procedures necessary.

*** Section 8 - Exposure Controls / Personal Protection ***

A: Component Exposure Limits

Iron oxide (1309-37-1)

ACGIH: 5 mg/m3 TWA (respirable fraction)
OSHA: 10 mg/m3 TWA (fume)
NIOSH: 5 mg/m3 TWA (dust and fume, as Fe)

Manganese (7439-96-5)

ACGIH: 0.2 mg/m3 TWA
OSHA: 1 mg/m3 TWA (fume)
3 mg/m3 STEL (fume)
5 mg/m3 Ceiling
NIOSH: 1 mg/m3 TWA (fume)
3 mg/m3 STEL

Copper (7440-50-8)

ACGIH: 0.2 mg/m3 TWA (fume); 1 mg/m3 TWA (dust and mist, as Cu)
OSHA: 0.1 mg/m3 TWA (dust, fume, mists, as Cu)
NIOSH: 1 mg/m3 TWA (dust and mist)

Carbon dioxide (124-38-9)

ACGIH: 5000 ppm TWA
30000 ppm STEL
OSHA: 10000 ppm TWA; 18000 mg/m3 TWA
30000 ppm STEL; 54000 mg/m3 STEL
NIOSH: 5000 ppm TWA; 9000 mg/m3 TWA
30000 ppm STEL; 54000 mg/m3 STEL

Nickel (7440-02-0)

ACGIH: 1.5 mg/m3 TWA (inhalable fraction)
OSHA: 1 mg/m3 TWA
NIOSH: 0.015 mg/m3 TWA

Silicon (7440-21-3)

OSHA: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
NIOSH: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)

Tin (7440-31-5)

ACGIH: 2 mg/m3 TWA
OSHA: 2 mg/m3 TWA
NIOSH: 2 mg/m3 TWA

Sulfur dioxide (7446-09-5)

ACGIH: 2 ppm TWA
5 ppm STEL
OSHA: 2 ppm TWA; 5 mg/m3 TWA
5 ppm STEL; 15 mg/m3 STEL
NIOSH: 2 ppm TWA; 5 mg/m3 TWA
5 ppm STEL; 13 mg/m3 STEL

Phosphorus (7723-14-0)

OSHA: 0.1 mg/m3 TWA
NIOSH: 0.1 mg/m3 TWA

Vanadium pentoxide (1314-62-1)

ACGIH: 0.05 mg/m3 TWA (dust or fume, respirable fraction)
NIOSH: 0.05 mg/m3 Ceiling (15 min, dust and fume, as V)

Engineering Controls

Use general ventilation and use local exhaust, where possible, in confined or enclosed spaces.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses; chemical goggles for fumes which may arise from thermal processing.

Personal Protective Equipment: Skin

Use impervious gloves.

Personal Protective Equipment: Respiratory

If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection.

Personal Protective Equipment: General

Eye wash fountain and emergency showers are recommended.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Grey metallic	**Odor:**	Metallic or odorless
Physical State:	Solid	**pH:**	NA
Vapor Pressure:	NA	**Vapor Density:**	NA
Boiling Point:	3000°C (5432°F)	**Melting Point:**	1535°C (2795°F)
Solubility (H2O):	NA	**Specific Gravity:**	7.0
Evaporation Rate:	NA	**VOC:**	NA
Octanol/H2O Coeff.:		**Flash Point:**	NA
Flash Point Method:	NA	**Upper Flammability Limit (UFL):**	NA
Lower Flammability Limit (LFL):	NA	**Burning Rate:**	NA
Auto Ignition:	NA		

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Chemical Stability: Conditions to Avoid

None

Incompatibility

Strong Acids

Hazardous Decomposition

Metal fumes if heated. Above the melting point, iron oxide fumes may be present

Possibility of Hazardous Reactions

Will not occur.

* * * Section 11 - Toxicological Information * * *

Acute Dose Effects

A: General Product Information

Operations or fire which supply sufficient energy to the product (i.e. welding, high speed grinding or melting) can release dust or fumes which may make components of the product biologically available. Exposure to dusts or fumes from some metals including iron, zinc, manganese, chromium, cobalt and copper can produce a condition known as metal fume fever. Iron dust can irritate the eyes and respiratory tract by mechanical action. Acute iron poisoning may involve hemorrhagic vomiting and diarrhea, abdominal pain, acidosis, coagulaopathy, shock, coma and convulsions followed by hepatic and renal failure and perhaps cardiovascular collapse. Chronic inhalation of iron has resulted in mottling of the lungs, a condition referred to as siderosis.

Systemic effects from ingestion of nickel include capillary damage, kidney damage, myocardial weakness and central nervous system depression. Allergic skin sensitization reactions are the most frequent effect of exposure to nickel compounds. Exposure to nickel compounds may also result in allergic lung sensitization. Exposure to copper fume or dust can cause respiratory tract irritation, hemolytic anemia and allergic contact dermatitis.

B: Component Analysis - LD50/LC50

Iron oxide (1309-37-1)
Oral LD50 Rat: >10000 mg/kg

Manganese (7439-96-5)
Oral LD50 Rat: 9 g/kg

Nickel (7440-02-0)
Oral LD50 Rat: >9000 mg/kg

Silicon (7440-21-3)
Oral LD50 Rat: 3160 mg/kg

Sulfur dioxide (7446-09-5)
Inhalation LC50 Rat: 2500 ppm/1H

Phosphorus (7723-14-0)
Inhalation LC50 Rat: 4.3 mg/L/1H; Oral LD50 Rat:3.03 mg/kg; Dermal LD50 Rat:100 mg/kg

Vanadium pentoxide (1314-62-1)
Inhalation LC50 Rat: 2.21 mg/L/4H; Oral LD50 Rat:10 mg/kg; Dermal LD50 Rat:>2500 mg/kg

Carcinogenicity

A: General Product Information

The carcinogenic effect of nickel has been well documented in occupationally exposed nickel refinery workers. Lung and nasal cancers were the predominant forms of cancer in the exposed workers.

B: Component Carcinogenicity

Iron oxide (1309-37-1)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Supplement 7 [1987], Monograph 1 [1972] (Group 3 (not classifiable))

Nickel (7440-02-0)

ACGIH: A5 - Not Suspected as a Human Carcinogen
NIOSH: potential occupational carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)
IARC: Monograph 49 [1990], Supplement 7 [1987] (Group 2B (possibly carcinogenic to humans))

Sulfur dioxide (7446-09-5)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 54 [1992] (Group 3 (not classifiable))

Vanadium pentoxide (1314-62-1)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 86 [2006] (Group 2B (possibly carcinogenic to humans))

Teratogenicity

Manganese, copper and nickel have been reported to have adverse reproductive effects in experimental animals. Copper and nickel have been shown to be fetotoxic in experimental animals.

Neurological Effects

Chronic overexposure to manganese compounds may result in CNS effects such as weakness, sleepiness, emotional instability and spastic gait. These effects can be permanent.

Other Toxicological Information

Under normal conditions of handling, the likelihood of inhaling or ingesting amounts necessary for these effects to occur is very small.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

No information available for the product.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Copper (7440-50-8)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	23 µg/L	
96 Hr LC50 Oncorhynchus mykiss	13.8 µg/L	
96 Hr LC50 Lepomis macrochirus	236 µg/L	
72 Hr EC50 Scenedesmus subspicatus	120 µg/L	
96 Hr EC50 water flea	10 µg/L	
96 Hr EC50 water flea	200 µg/L	

Nickel (7440-02-0)

Test & Species		Conditions
96 Hr LC50 Oncorhynchus mykiss	31.7 mg/L	adult
96 Hr LC50 Pimephales promelas	3.1 mg/L	
96 Hr LC50 Brachydanio rerio	>100 mg/L	
72 Hr EC50 freshwater algae (4 species)	0.1 mg/L	
72 Hr EC50 Selenastrum capricornutum	0.18 mg/L	
96 Hr EC50 water flea	510 µg/L	

Phosphorus (7723-14-0)

Test & Species		Conditions
96 Hr LC50 Lepomis macrochirus	0.0024 mg/L [flow-through]	
96 Hr LC50 Brachydanio rerio	>100 mg/L [static]	
48 Hr EC50 Daphnia magna	0.111 mg/L	

* * * Section 13 - Disposal Considerations * * *

US EPA Waste Number & Descriptions

Component Waste Numbers

Vanadium pentoxide (1314-62-1)

RCRA: waste number P120

Disposal Instructions

Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations. See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

* * * Section 14 - Transportation Information * * *

US DOT Information

Shipping Name: Not Regulated

TDG Information

Shipping Name: Not Regulated

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

A: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Manganese (7439-96-5)

SARA 313: 1.0 % de minimis concentration

Copper (7440-50-8)

SARA 313: 1.0 % de minimis concentration

CERCLA: 5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

Nickel (7440-02-0)

SARA 313: 0.1 % de minimis concentration

CERCLA: 100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

Sulfur dioxide (7446-09-5)

SARA 302: 500 lb TPQ

Phosphorus (7723-14-0)

SARA 302: 100 lb TPQ (This material is a reactive solid. The TPQ does not default to 10000 pounds for non-powder, non-molten, non-solvent form)

CERCLA: 1 lb final RQ; 0.454 kg final RQ

Vanadium pentoxide (1314-62-1)

SARA 302: 100 lb lower threshold TPQ; 10000 lb upper threshold TPQ

CERCLA: 1000 lb final RQ; 454 kg final RQ

B: Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	
Copper	7440-50-8	DOT regulated severe marine pollutant

State Regulations

A: General Product Information

Product may be subject to reporting in states other than those listed for individual components.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Iron oxide	1309-37-1	Yes	Yes	Yes	Yes	Yes	Yes
Manganese	7439-96-5	Yes	Yes	Yes	Yes	Yes	Yes
Copper	7440-50-8	Yes	Yes	Yes	Yes	Yes	Yes
Carbon dioxide	124-38-9	Yes	Yes	Yes	Yes	Yes	Yes
Nickel	7440-02-0	Yes	Yes	Yes	Yes	Yes	Yes
Silicon	7440-21-3	No	Yes	Yes	Yes	Yes	Yes
Tin	7440-31-5	Yes	Yes	Yes	Yes	Yes	Yes
Sulfur dioxide	7446-09-5	Yes	Yes	Yes	Yes	Yes	Yes
Phosphorus	7723-14-0	Yes	Yes	Yes	Yes	Yes	Yes
Vanadium pentoxide	1314-62-1	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Iron oxide	1309-37-1	1 %
Manganese	7439-96-5	1 %
Copper	7440-50-8	1 %
Nickel	7440-02-0	0.1 %

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Iron oxide	1309-37-1	Yes	DSL	EINECS
Manganese	7439-96-5	Yes	DSL	EINECS
Copper	7440-50-8	Yes	DSL	EINECS
Carbon dioxide	124-38-9	Yes	DSL	EINECS
Nickel	7440-02-0	Yes	DSL	EINECS
Silicon	7440-21-3	Yes	DSL	EINECS
Tin	7440-31-5	Yes	DSL	EINECS
Sulfur dioxide	7446-09-5	Yes	DSL	EINECS
Phosphorus	7723-14-0	Yes	DSL	EINECS
Vanadium pentoxide	1314-62-1	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

Other Information

Reasonable care has been taken in the preparation of this information, but the manufacturer makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use.

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

End of Sheet