

HANNA

Safety Data Sheet for STEEL

Section 1 – Identification

Variations: Galvanized Steel, Hot/Cold Rolled Steel, Carbon Steel, Structural Steel, High Strength Low Alloy Steel

Recommended Use: Construction, machine parts and finished goods

Name, Address, and Telephone Number:

Hanna Steel Corporation 4527 Southlake Pkwy
Hoover, AL 35244



Phone number : (800)633-8252 (8:00 am to 5:00 pm)

Emergency Phone Number: 1-800-262-8200 (CHEMTREC)

Section 2 – Hazard(s) Identification

Classification of the Chemical: Steel products manufactured by HANNA steel ARE NOT HAZARDOUS PER OSHA GHS, 29 CFR 1910.1200. 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 the following hazards:

Signal Word, Hazard Statement(s), Symbols and Precautionary Statement(s):

Hazard Symbol	Hazard Classification	Hazard Statement(s)	Precautionary Statement(s)
	Carcinogenicity - 2	Dust/Fumes suspected of causing cancer via inhalation.	Avoid breathing dust and fumes
	Skin Sensitization - 1 Target Organ Toxicity (Repeated Exposure) - 1	Dust/Fumes may cause an allergic skin reaction Repeated/prolonged exposure to dust/fumes may cause damage to respiratory system	Use personal protective equipment as required

- **Eye Contact:** Dusts may cause mechanical irritation or scratching of the cornea. Fumes may irritate the eyes.
- **Skin Contact:** Dusts may cause mechanical irritation. Some components are capable of causing an allergic reaction. Heated can cause burns.
- **Inhalation:** Dusts may irritate the nose, throat and lungs. Excessive exposure to metal fumes can cause metal fume fever. Symptoms typically subside within 12- 48 hours.
- **Ingestion:** Not expected to be acutely toxic via ingestion.
- **Chronic Effects:** Repeated exposure to dusts may cause changes to the nose, throat and lungs. Repeated welding fume exposure is associated with adverse health effects. Contains substances that may cause cancer and have reproductive effects. The following ingredients are listed by NTP, IARC, and OSHA as carcinogens: Nickel, chromium, cobalt, lead, antimony, cadmium, arsenic, and beryllium. See section 11 for more.
- **Target Organs:** Overexposure to dusts and fumes may affect the following systems: eyes, skin, liver, kidney, central nervous system, cardiovascular and respiratory.

Section 3 – Composition/Information on Ingredients

Component	CAS #	% Weight	OSHA PEL (mg/m3)	ACGIH TLV (mg/m3)
Iron	7439-89-6	Balance	10	5
Aluminum (Al)	7429-90-5	0.1 max	15/5	10 / 5
Carbon (C)	7440-44-0	0.5 max	Not Established	Not Established
Chromium (Cr)	7440-47-3	1.2 max	1	0.5
Copper (Cu)	7440-50-8	0.5 max	1 /0.1	1/0.2
Manganese (Mn)	7439-96-5	< 2.0	5 (c)	0.2
Nickel (Ni)	7440-02-0	1.5 max	1	1.5
Phosphorous (P)	7723-14-0	.05 max	0.1	0.1
Silicon (Si)	7440-21-3	1.0 max	15	10
Sulfur (S)	7704-34-9	.05 max	13 SO2	0.65 SO2
Vanadium (V)	7440-62-2	0.1 max	0.5	0.05
Zinc (Zn)	1314-13-2	10 max	5	5/10

Section 3 is a summary of elements used in alloy steel. Various grades of steel will contain different combinations of these elements. Trace elements of other compounds may also be present. There is no PEL or TLV for Steel. The occupational exposure limits are given as a reference. The values given are not product specifications.

Section 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 SDS 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.

Section 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 (CO₂). 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.

Section 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 SDS (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.

Section 7 - Handling and Storage

- **Storage Temperatures** - Stable under normal temperatures and pressures.
- **Precautions 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.

Section 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 3 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 3 for component materials. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts.

Section 9 - Physical and Chemical Properties

- **Appearance and Odor** - Silver grey to grey black with metallic luster.
- **Boiling Point** - Not applicable
- **Melting Point** - Approximately 2800° F
- **pH** - Not applicable
- **Specific Gravity (at 15.6° C)** - Not applicable
- **Density (at 15.6° 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

Section 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

Section 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 carcinogenic (Group 1) by IARC.
- When this product is welded, fumes are generated. Welding fumes may be different in composition from the original welding product, with the chief component being ordinary oxides of the metal being welded. Chronic health effects (including cancer) have been associated with the fumes and dusts of individual component metals (see above), and welding fumes as a general category have been listed by IARC as a carcinogen (Group 2B). There is also limited evidence that welding fumes may cause adverse reproductive and fetal effects. Evidence is stronger where welding materials contain known reproductive toxins, e.g., lead which may be present in the coating material of this product.
- Breathing fumes or dusts of this product may result in metal fume fever, which is an illness produced by inhaling metal oxides. These oxides are produced by heating various metals including cadmium, zinc, magnesium, copper, antimony, nickel, cobalt, manganese, tin, lead, beryllium, silver, chromium, aluminum, selenium, iron, and arsenic. The most common agents involved are zinc and copper.
- This product may contain small amounts of manganese. Prolonged exposure to manganese dusts or fumes is associated with "manganism", a Parkinson-like syndrome characterized by a variety of neurological symptoms including muscle spasms, gait disturbances, tremors, and psychoses.
- This product may contain small amounts of cadmium. Primary target organs for cadmium overexposure are the lung and the kidney. Because of its cumulative nature, chronic cadmium poisoning can cause serious disease which takes many years to develop and may continue to progress despite cessation of exposure. Progression of the disease may not reflect current exposure conditions. It is also capable of causing a painful osteomalacia called "Itai-Itai" in postmenopausal women, and has caused developmental effects and/or reproductive effects in male and female animals. Cadmium is a listed carcinogen by NTP, OSHA, and IARC (Group 1).
- This product may contain small amounts of chromium. Prolonged and repeated overexposure to chromium dusts or fumes may cause skin ulcers, nasal irritation and ulceration, kidney damage and cancer of the respiratory system. Chromium is skin sensitizer. Cancer is generally attributed to the hexavalent (+6) form of chromium which is listed as a carcinogen by NTP and IARC (Group 1).
- This product may contain small amounts of nickel. Prolonged and repeated contact with nickel may cause sensitization dermatitis. Inhalation of nickel compounds has caused lung damage as well as sinus, nasal and lung cancer in laboratory animals. Nickel is a listed carcinogen by NTP and IARC (Group 1).
- This product may contain small amounts of vanadium. Adverse effects from dermal, inhalation or parenteral exposure to various vanadium compounds have been reported. The major target for vanadium pentoxide toxicity is the respiratory tract. Fumes or dust can cause severe eye and respiratory irritation, and systemic effects. Chronic bronchitis, green tongue, conjunctivitis, pharyngitis, rhinitis, rales, chronic productive cough, and tightness of the chest have been reported following overexposure. Allergic reactions resulting from skin and inhalation exposures have also been reported. A statistical association between vanadium air levels and lung cancer has been suggested, but vanadium currently is not regarded as a human carcinogen.
- This product may contain small amounts of lead. Lead can accumulate in the body. Consequently, exposure to fumes or dust may produce signs of polyneuritis, diminished vision and peripheral neuropathy, such as tingling and loss of feeling in fingers, arms and legs. Lead is a known reproductive and developmental toxin.
- It is also associated with central nervous system disorders, anemia, kidney dysfunction, and neurobehavioral abnormalities. The brain is a major target organ for lead exposure. Elemental lead is listed as an IARC 2B carcinogen.
- The product may contain small amounts of copper. Copper dust and fumes can irritate the eyes, nose and throat causing coughing, wheezing, nosebleeds, ulcers and metal fume fever. Other effects from repeated inhalation of copper fumes include a metallic or sweet taste, and discoloration of skin, teeth or hair. Copper also may cause an allergic skin reaction. Overexposure to copper can affect the liver.

Section 12 - Ecological Information

- **Other Adverse Effects:** None Known
- **Additional Information:**
- **Hazard Category:** No Category **Signal Word:** No Signal Word
- **Hazard:** No Hazard Symbol
- **Hazard Statement:** No Hazard Statement

Section 13 - Disposal Considerations

- **Disposal:** Dispose of in accordance with local/regional/international regulations.

Section 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

Section 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 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.
- **Massachusetts Substance List:** Aluminum, Antimony, Arsenic, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Hydrochloric acid, Lead, Magnesium, Manganese, Molybdenum, Nickel, Nitrogen, Phosphorus, Selenium, Silicon, Sulfur, Tin, Titanium, Tungsten, Vanadium, Zinc
- **Pennsylvania Hazardous Substance List:** Aluminum, Antimony, Arsenic, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Hydrochloric acid, Lead, Magnesium, Manganese, Molybdenum, Nickel, Nitrogen, Phosphorus, Selenium, Silicon, Sulfur, Tin, Titanium, Tungsten, Vanadium, Zinc
- **New Jersey Hazardous Substance List:** Aluminum, Antimony, Arsenic, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Hydrochloric acid, Lead, Magnesium, Manganese, Molybdenum, Nickel, Nitrogen, Phosphorus, Selenium, Silicon, Sulfur, Tin, Titanium, Tungsten, Vanadium, Zinc
- **Toxic Substances Control Act (TSCA)** - Components of this product are listed on the TSCA inventory.

Section 15 – Regulatory Information (Continued)

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 “*”)

<u>Chemical Name</u>	<u>Reportable Quantity (in lb.)</u>
Chromium	5000*
Copper	5000*
Nickel	100*
Phosphorus	1
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	0.0-0.1	No – Less than 1%
Chromium	7440-47-3	0.01-1.2	Yes – Greater than 0.1%
Cobalt	7440-48-4	<0.09	No – Less than 0.1%
Copper	7440-50-8	<0.5	No – Less than 1%
Manganese	7439-96-5	< 2	Yes – Greater than 1%
Nickel	7440-02-0	< 1.5	Yes – Greater than 0.1%
Phosphorus	7723-14-0	<0.05	No – Less than 1%
Vanadium	7440-62-2	<0.1	No – Less than 1%
Zinc	7440-66-6	<10	Yes - Greater than 1%

Concentrations based on analytical data and process knowledge of typical products made in the industry.

Section 16 – Other Information

This SDS was prepared internally and covers products delivered from the HANNA steel facilities. This SDS does not include chemicals that may be applied by subsequent distributors of our products. HANNA steel manufactures products with coatings, therefore, the paint suppliers have been included in this section for reference in the event that information is needed concerning the paint coatings. Also, the suppliers of rust preventatives have been included since these materials are found in our product as part of the manufacturing process.

Suppliers of Coatings and Paints

Titan Coatings

2025 Exchange Place
Bessemer, AL 35023
(205) 426-8149

Valspar Corporation

PO Box 741667
Atlanta, GA 30374-1067
(815) 933-5561

Suppliers of Rust Preventatives

Henkel Corporation

PO Box 28166
Atlanta, GA 30384-1666

Fuchs Lubricants Company

Suite 1147
75 Remittance Dr.

Chemetall

22040 Network Place
Chicago, IL 60673-1220
(800) 526-4473



Health	1
Fire	0
Reactivity	0
Personal Protection	B

Material Safety Data Sheet Aluminum MSDS

Section 1: Chemical Product and Company Identification

Product Name: Aluminum

Catalog Codes: SLA4735, SLA2389, SLA3895, SLA1549, SLA3055, SLA4558, SLA2212, SLA3715

CAS#: 7429-90-5

RTECS: BD0330000

TSCA: TSCA 8(b) inventory: Aluminum

CI#: Not applicable.

Synonym: Aluminum metal pellets; Aluminum metal sheet; Aluminum metal shot; Aluminum metal wire

Chemical Name: Aluminum

Chemical Formula: Al

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Aluminum	7429-90-5	100

Toxicological Data on Ingredients: Aluminum LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:

Slightly hazardous in case of skin contact (irritant). Non-irritating to the eyes. Non-hazardous in case of ingestion.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation: Not available.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Do not ingest. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Moisture sensitive.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Gloves.

Personal Protection in Case of a Large Spill: Safety glasses. Lab coat. Gloves.

Exposure Limits:

TWA: 5 (mg(Al)/m) from ACGIH (TLV) [United States] Inhalation (pyro powders, welding fumes) TWA: 10 (mg(Al)/m) from ACGIH (TLV) [United States] Inhalation (metal dust) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Odorless.

Taste: Not available.

Molecular Weight: 26.98 g/mole

Color: Silver-white

pH (1% soln/water): Not applicable.

Boiling Point: 2327°C (4220.6°F)

Melting Point: 660°C (1220°F)

Critical Temperature: Not available.

Specific Gravity: Density: 2.7 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Insoluble in cold water, hot water. Soluble in alkalies, Sulfuric acid, Hydrochloric acid. Insoluble in concentrated Nitric Acid, hot Acetic acid.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, exposure to moist air or water.

Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.

Corrosivity: Not available.

Special Remarks on Reactivity:

Moisture sensitive. Aluminum reacts vigorously with Sodium Hydroxide. Aluminum is also incompatible with strong oxidizers, acids, chromic anhydride, iodine, carbon disulfide, methyl chloride, and halogenated hydrocarbons, acid chlorides, ammonium nitrate, ammonium persulfate, antimony, arsenic oxides, barium bromate, barium chlorate, barium iodate, metal salts

Special Remarks on Corrosivity:

In moist air, oxide film forms which protects metal from corrosion. Aluminum is strongly electropositive so that it corrodes rapidly in contact with other metals.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Not available.

Toxicity to Animals: Not available

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:

Slightly hazardous in case of skin contact (irritant). Non-hazardous in case of ingestion. Non-hazardous in case of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Exposure to aluminum may cause skin irritation. Eyes: Not expected to be a hazard unless aluminum dust particles are present. Exposure to aluminum dust may cause eye irritation by mechanical action. Aluminum particles deposited in the eye are generally innocuous. Inhalation: Not expected to be an inhalation hazard unless it is heated or if aluminum dust is present. If heated or in dust form, it may cause respiratory tract irritation. Heating Aluminum can release Aluminum Oxide fumes and cause fume metal fever when inhaled. This is a flu-like illness with symptoms of metallic taste, fever, chills, aches, chest tightness, and cough. Ingestion: Acute aluminum toxicity is unlikely. Chronic Potential Health Effects: Skin: Contact dermatitis occurs rarely after aluminum exposure. Most cases of aluminum toxicity in humans are in one of two categories: patients with chronic renal failure, or people exposed to aluminum fumes or dust in the workplace. The main source of aluminum in people with chronic renal failure was in the high aluminum content of the water for the dialysate used for dialysis in the 1970's. Even though this problem was recognized and corrected, aluminum toxicity continues to occur in some individuals with renal who chronically ingest aluminum-containing phosphate binders or antacids. Inhalation: Chronic exposure to aluminum dust may cause dyspnea, cough, asthma, chronic obstructive lung disease, pulmonary fibrosis, pneumothorax, pneumoconiosis, encephalopathy, weakness, incoordination and epileptiform seizures and other neurological symptoms similar to that described for chronic ingestion. Hepatic necrosis is also a reported effect of exposure to airborne particulates carrying aluminum. Ingestion: Chronic ingestion of aluminum may cause Aluminum Related Bone Disease or aluminum-induced Osteomalacia with fracturing Osteodystrophy, microcytic anemia, weakness, fatigue, visual and auditory hallucinations, memory loss, speech and language impairment (dysarthria, stuttering, stammering, anomia, hypofluency, aphasia and eventually, mutism), epileptic seizures (focal or grand mal), motor disturbance (tremors, myoclonic jerks, ataxia, convulsions, asterixis, motor apraxia, muscle fatigue), and dementia (personality changes, altered mood, depression, diminished alertness, lethargy, 'clouding of the sensorium', intellectual deterioration, obtundation, coma), and altered EEG.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: No products were found. California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: No products were found. Connecticut hazardous material survey.: Aluminum Illinois toxic substances disclosure to employee act: Aluminum Rhode Island RTK hazardous substances: Aluminum Pennsylvania RTK: Aluminum Minnesota: Aluminum Massachusetts RTK: Aluminum New Jersey: Aluminum New Jersey spill list: Aluminum California Director's List of Hazardous Substances: Aluminum TSCA 8(b) inventory: Aluminum SARA 313 toxic chemical notification and release reporting: Aluminum

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: B

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Not applicable. Safety glasses.

Section 16: Other Information

References:

-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangereuses au Canada. Centre de conformité international Ltée. 1986. 037 Waste manifest or notification not required.

Other Special Considerations: Not available.

Created: 10/09/2005 03:39 PM

Last Updated: 05/21/2013 12:00 PM

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United States Steel Corporation

Galvanized (Hot Dipped) Sheet – Carbon Steel Safety Data Sheet (SDS)

USS IHS Number: 1650

(Replaces USS Code Number: 3C012)

Locations: Irvin, Fairfield, Gary, Granite City, Great Lakes, Hamilton, Fairless

Original: 12/16/2010

Revision: 5/01/2017

Expiration: 5/01/2020

Section 1 – Identification

1(a) Product Identifier Used on Label: Galvanized (Hot Dipped) Sheet – Carbon Steel

1(b) Other Means of Identification: Galvannealed (Hot Dipped) Sheet – Carbon Steel, ACRYZINC Sheet – Carbon Steel

1(c) Recommended Use of the Chemical and Restrictions on Use: None

1(d) Name, Address, and Telephone Number:

United States Steel Corporation
600 Grant Street, Room 1662
Pittsburgh, PA 15219-2800

Phone number: (412) 433-6840 (8:00 am to 5:00 pm)
FAX: (412) 433-5019

1(e) Emergency Phone Number: 1-800-262-8200 (CHEMTREC)

Section 2 – Hazard(s) Identification

2(a) Classification of the Chemical: As sold, this product, Galvanized (Hot Dipped) Sheet – Carbon Steel is not hazardous according to the criteria specified in REACH [REGULATION (EC) No 1907/2006] and CLP [REGULATION (EC) No 1272/2008]. Under 29 CFR 1910.1200 Hazard Communication Standard, steel products are considered mixtures due to further processing which may produce dusts and or fume. The categories of Health Hazards as defined in "GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS), Third revised edition ST/SG/AC.10/30/Rev. 3" United Nations, New York and Geneva, 2009 have been evaluated. Refer to Section 3, 8 and 11 for additional information. Precautionary Statement/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.

2(b) Signal Word, Hazard Statement(s), Symbols and Precautionary Statement(s):

Hazard Symbol	Hazard Classification	Signal Word	Hazard Statement(s)	Precautionary Statement(s)
	Carcinogenicity - 2 Toxic to Reproduction - 2 Single Target Organ Toxicity (STOT) Repeat Exposure - 1	Danger	Suspected of causing cancer. Suspected of damaging fertility or the unborn child.	Do not breathe dusts / fume / spray. Wear protective gloves / protective clothing / eye protection / face protection.
	Acute Toxicity-Oral 4 Skin Sensitization - 1 STOT Single Exposure - 3		Causes damage to lungs through prolonged or repeated inhalation exposure. Harmful if swallowed.	Contaminated work clothing must not be allowed out of the workplace. Use only outdoors or in well ventilated areas. Wash thoroughly after handling. Obtain special instructions before use.
NA	Eye Irritation - 2B		May cause an allergic skin reaction. May cause respiratory irritation. Causes eye irritation.	Do not handle until all safety precautions have been read and understood. Do not eat, drink or smoke when using this product. If inhaled: Remove person to fresh air and keep comfortable for breathing. If exposed, concerned or feel unwell: Get medical advice/attention. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If on skin: Wash with plenty of water. If irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. Dispose of contents in accordance with federal, state and local regulations.

2(c) Hazards Not Otherwise Classified: None Known

2(d) Unknown Acute Toxicity Statement (mixture): None Known

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Section 3 – Composition/Information on Ingredients

3(a-c) Chemical Name, Common Name (synonyms), CAS Number and Other Identifiers, and Concentration:

Chemical Name	CAS Number	EC Number	% weight
Iron	7439-89-6	231-096-4	>95
Manganese	7439-96-5	231-105-1	≤2.0
Nickel	7440-02-0	231-111-4	≤0.2
Metallic Coating			
Iron	7439-89-6	231-096-4	≤0.8
Zinc	7440-66-6	231-175-3	0.15 – 9.1

EC- European Community

CAS- Chemical Abstract Service

Section 4 – First-aid Measures

4(a) **Description of Necessary Measures:** If exposed, concerned or feel unwell: Get medical advice/attention.

- **Inhalation:** Galvanized (Hot Dipped) Sheet – Carbon Steel as sold/shipped is not a likely form of exposure. However, during further processing (welding, grinding, burning, etc.). If inhaled: Remove person to fresh air and keep comfortable for breathing. If exposed, concerned or feel unwell: Get medical advice/attention.
- **Eye Contact:** This product as sold/shipped is not a likely form of exposure. However, during further processing (welding, grinding, burning, etc.). If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue Rinsing. If eye irritation persists: Get medical advice attention. If exposed, concerned or feel unwell: Get medical advice/attention.
- **Skin Contact:** If on skin: Wash thoroughly after handling. Wash with plenty of water. If irritation or rash occurs: Get medical advice/attention. Take off and wash contaminated clothing before reuse.
- **Ingestion:** This product as sold/shipped is not a likely form of exposure. However, during further processing (welding, grinding, burning, etc.). If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. If exposed, concerned or feel unwell: Get medical advice/attention.

4(b) **Most Important Symptoms/Effects, Acute and Delayed (chronic):**

- **Inhalation:** This product as sold/shipped is not likely to present an acute or chronic health effect.
- **Eye:** This product as sold/shipped is not likely to present an acute or chronic health effect.
- **Skin:** This product as sold/shipped is not likely to present an acute or chronic health effect.
- **Ingestion:** This product as sold/shipped is not likely to present an acute or chronic health effect.

4(c) **Immediate Medical Attention and Special Treatment:** None Known

Section 5 – Fire-fighting Measures

5(a) **Suitable (and unsuitable) Extinguishing Media:** Not applicable for Galvanized (Hot Dipped) Sheet – Carbon Steel as sold/shipped. Use extinguishers appropriate for surrounding materials.5(b) **Specific Hazards Arising from the Chemical:** Not applicable for this product as sold/shipped. When burned, toxic smoke and vapor may be emitted.

Section 6 - Accidental Release Measures

6(a) **Personal Precautions, Protective Equipment and Emergency Procedures:** Not applicable for Galvanized (Hot Dipped) Sheet – Carbon Steel as sold/shipped. 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.6(b) **Methods and Materials for Containment and Clean Up:** Not applicable for this product as sold/shipped. 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. Follow applicable OSHA regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

Section 7 - Handling and Storage

7(a) **Precautions for Safe Handling:** Not applicable for Galvanized (Hot Dipped) Sheet – Carbon Steel as sold/shipped, however further processing (welding, burning, grinding, etc.) with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Practice good housekeeping. Avoid breathing metal fumes and/or dust. Do not eat, drink or smoke when using this product.7(b) **Conditions for Safe Storage, Including any Incompatibilities:** Store away from acids and incompatible materials.

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Section 8 - Exposure Controls / Personal Protection

8(a) Occupational Exposure Limits (OELs): Galvanized (Hot Dipped) Sheet – Carbon Steel as sold/shipped in its physical form does not present an inhalation, ingestion or contact hazard, nor would any of the following exposure data apply. However, operations such as high temperature (burning, welding), sawing, brazing, machining and grinding may produce fumes and/or particulates. The following exposure limits are offered as reference, for an experience industrial hygienist to review.

Ingredients	8(a) OSHA PEL ¹	ACGIH TLV ²	NIOSH REL ³	IDLH ⁴
Iron	10 mg/m ³ (as iron oxide fume)	5.0 mg/m ³ (as iron oxide dust and fume)	5.0 mg/m ³ (as iron oxide dust and fume)	2,500 mg Fe/m ³
Manganese	"C" 5.0 mg/m ³ (as Fume & Mn compounds)	0.2 mg/m ³	"C" 5.0 mg/m ³ 1.0 mg/m ³ (as fume) "STEL" 3.0 mg/m ³	500 mg Mn/m ³
Nickel	1.0 mg/m ³ (as Ni metal & insoluble compounds)	1.5 mg/m ³ (as inhalable fraction ⁵ Ni metal) 0.2 mg/m ³ (as inhalable fraction Ni inorganic only insoluble and soluble compounds)	0.015 mg/m ³ (as Ni metal & insoluble and soluble compounds)	10 mg/m ³ (as Ni)
Zinc	5.0 mg/m ³ (as zinc oxide fume) 15 mg/m ³ (as total dust) 5.0 mg/m ³ (as respirable fraction)	2.0 mg/m ³ (as zinc oxide)	10 mg/m ³ (as total dust) 5.0 mg/m ³ (as respirable dust)	NE

NE - None Established

- 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. An Action level (AL) is used by OSHA and NIOSH to express a health or physical hazard. They indicate the level of a harmful or toxic substance/activity, which requires medical surveillance, increased industrial hygiene monitoring, or biological monitoring. Action Levels are generally set at one half of the PEL but the actual level may vary from standard to standard. The intent is to identify a level at which the vast majority of randomly sampled exposures will be below the PEL.
- Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted. ACGIH TLVs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes. A Short Term Exposure Limit (STEL) is defined as the maximum concentration to which workers can be exposed for a short period of time (15 minutes) for only four times throughout the day with at least one hour between exposures.
- The National Institute for Occupational Safety and Health Recommended Exposure Limits (NIOSH-REL) - Compendium of Policy and Statements. NIOSH, Cincinnati, OH (1992). NIOSH is the federal agency designated to conduct research relative to occupational safety and health. As is the case with ACGIH TLVs, NIOSH RELs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes.
- The "immediately dangerous to life or health air concentration values (IDLHs)" are used by NIOSH as part of the respirator selection criteria and were first developed in the mid-1970's by NIOSH. The Documentation for Immediately Dangerous to Life or Health Concentrations (IDLHs) is a compilation of the rationale and sources of information used by NIOSH during the original determination of 387 IDLHs and their subsequent review and revision in 1994.
- 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 2017 TLVs ⁵ and BEIs ⁶ (Biological Exposure Indices) Appendix D, paragraph A.

8(b) Appropriate Engineering Controls: Use controls as appropriate to minimize exposure to metal fumes and dusts during handling operations. Provide general or local exhaust ventilation systems to minimize airborne concentrations. Local exhaust is necessary for use in enclosed or confined spaces. Provide sufficient general/local exhaust ventilation in pattern/volume to control inhalation exposures below current exposure limits.

8(c) Individual Protection Measures:

- Respiratory Protection:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use only 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. Concentration in air of the various contaminants determines the extent of respiratory protection needed. Half-face, negative-pressure, air-purifying respirator equipped with P100 filter is acceptable for concentrations up to 10 times the exposure limit. Full-face, negative-pressure, air-purifying respirator equipped with P100 filter is acceptable for concentrations up to 50 times the exposure limit. Protection by air-purifying negative-pressure and powered air respirators is limited. Use a positive-pressure-demand, full-face, supplied air respirator or self-contained breathing apparatus (SCBA) for concentrations above 50 times the exposure limit. If exposure is above the IDLH (Immediately dangerous to life or health) for any of the constituents, or there is a possibility of an uncontrolled release or exposure levels are unknown, then use a positive-demand, full-face, supplied air respirator with escape bottle or SCBA.

Warning! Air-purifying respirators both negative-pressure, and powered-air do not protect workers in oxygen-deficient atmospheres.

- Eyes:** Wear appropriate eye protection to prevent eye contact. 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 safety glasses to prevent 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.
- Skin:** Wear appropriate personal protective clothing to prevent skin contact. Cut resistant gloves and sleeves should be worn when working with steel products. 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, and gloves to prevent skin contact. Protective gloves should be worn as required for welding, burning or handling operations. Contaminated work clothing must not be allowed out of the workplace.
- Other protective equipment:** An eyewash fountain and deluge shower should be readily available in the work area.

Section 9 - Physical and Chemical Properties

9(a) Appearance (physical state, color, etc.): Metallic Gray, Odorless	9(j) Upper/lower Flammability or Explosive Limits: NA
9(b) Odor: NA	9(k) Vapor Pressure: NA
9(c) Odor Threshold: NA	9(l) Vapor Density (Air = 1): NA
9(d) pH: NA	9(m) Relative Density: 7.85 g/cc, Coating: 7.14 g/cc
9(e) Melting Point/Freezing Point: ~2750°F (~1510°C), Coating: ~2750°F (~1510°C)	9(n) Solubility(ies): Insoluble
9(f) Initial Boiling Point and Boiling Range: Coating: ~1700 °F (~927°C)	9(o) Partition Coefficient n-octanol/water: ND
9(g) Flash Point: NA	9(p) Auto-ignition Temperature: NA
9(h) Evaporation Rate: NA	9(q) Decomposition Temperature: ND
9(i) Flammability (solid, gas): Non-flammable, non-combustible	9(r) Viscosity: NA



NA - Not Applicable
ND - Not Determined for product as a whole

Section 10 - Stability and Reactivity

- 10(a) Reactivity: Not Determined (ND)
- 10(b) Chemical Stability: Steel products are stable under normal storage and handling conditions.
- 10(c) Possibility of Hazardous Reaction: None Known
- 10(d) Conditions to Avoid: Storage with strong acids or calcium hypochlorite.
- 10(e) Incompatible Materials: Will react with strong acids to form hydrogen. Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.
- 10(f) Hazardous Decomposition Products: Thermal oxidative decomposition of steel products can produce fumes containing oxides of iron and manganese as well as other alloying elements.

Section 11 - Toxicological Information

11(a-e) Information on toxicological effects: The following toxicity data has been determined for Galvanized (Hot Dipped) Sheet – Carbon Steel as a mixture when further processed using the information available for its components applied to the guidance on the preparation of an SDS under the GHS requirements of OSHA and the EU CPL:

Hazard Classification	Hazard Category		Hazard Symbols	Signal Word	Hazard Statement
	EU	OSHA			
Acute Toxicity Hazard (covers Categories 1-5)	NA*	4*		Warning	Harmful if swallowed.
Eye Damage/ Irritation (covers Categories 1, 2A and 2B)	NA*	2B*	No Pictogram	Warning	Causes eye irritation.
Skin/Dermal Sensitization (covers Category 1)	NA*	1*		Warning	May cause an allergic skin reaction.
Carcinogenicity (covers Categories 1A, 1B and 2)	NA*	2*		Warning	Suspected of causing cancer.
Toxic to Reproduction (covers Categories 1A, 1B and 2)	NA*	2*		Warning	Suspected of damaging fertility or the unborn child.
Specific Target Organ Toxicity (STOT) Following Single Exposure (covers Categories 1-3)	NA*	3 ¹		Warning	May cause respiratory irritation.
STOT following Repeated Exposure (covers Categories 1 and 2)	1	1 ¹		Danger	Causes damage to lungs through prolonged or repeated inhalation exposure.

* Not Applicable

Toxicological data listed below are presented regardless to classification criteria. Individual hazard classification categories where the toxicological information has met or exceeded a classification criteria threshold are listed above.

Section 11 - Toxicological Information (continued)

11(a-e) Information on toxicological effects (continued):

- a. No LC₅₀ or LD₅₀ has been established for Galvanized (Hot Dipped) Sheet – Carbon Steel. The following data has been determined for the components:
- **Iron:** Rat LD₅₀ =98.6 g/kg (REACH)
Rat LD₅₀ =1060 mg/kg (IUCLID)
Rat LD₅₀ =984 mg/kg (IUCLID)
Rabbit LD₅₀ =890 mg/kg (IUCLID)
Guinea Pig LD₅₀ =20 g/kg (TOXNET)
Human LD₅₀ =77 g/kg (IUCLID)
 - **Nickel:** LD₅₀ >9000 mg/kg (Oral/Rat); NOAEC >10.2 mg/l (Inhalation/Rat)
 - **Manganese:** Rat LD₅₀ > 2000 mg/kg (REACH)
Rat LD₅₀ > 9000 mg/kg (NLM Toxnet)
 - **Zinc:** Rat LD₅₀ > 2000 mg/kg
- b. No Skin (Dermal) Irritation data available for Galvanized (Hot Dipped) Sheet – Carbon Steel as a mixture or its components.
- c. No Eye Irritation data available for Galvanized (Hot Dipped) Sheet – Carbon Steel as a mixture. The following Eye Irritation information was found for the components:
- **Iron:** Causes eye irritation.
 - **Nickel:** Slight eye irritation from particulate abrasion only.
- d. No Skin (Dermal) Sensitization data available for Galvanized (Hot Dipped) Sheet – Carbon Steel as a mixture. The following Skin (Dermal) Sensitization information was found for the components:
- **Nickel:** May cause allergic skin sensitization.
- e. No Respiratory Sensitization data available for Galvanized (Hot Dipped) Sheet – Carbon Steel as a mixture or its components.
- f. No Germ Cell Mutagenicity data available for Galvanized (Hot Dipped) Sheet – Carbon Steel as a mixture. The following Mutagenicity and Genotoxicity information was found for the components:
- **Iron:** IUCLID has found some positive and negative findings in vitro.
 - **Nickel:** EU RAR has found positive results in vitro and in vivo but insufficient data for classification.
- g. Carcinogenicity: IARC, NTP, and OSHA do not list Galvanized (Hot Dipped) Sheet – Carbon Steel as carcinogens. The following Carcinogenicity information was found for the components:
- **Welding Fumes** - IARC Group 2B carcinogen, a mixture that is possibly carcinogenic to humans.
 - **Nickel and certain nickel compounds** – Group 2B - metallic nickel Group 1 - nickel compounds ACGIH confirmed human carcinogen. Nickel – EURAR Insufficient evidence to conclude carcinogenic potential in animals or humans; suspect carcinogen classification Category 2 Suspected of causing cancer.
- h. No Toxic to Reproduction data available for Galvanized (Hot Dipped) Sheet – Carbon Steel as a mixture. The following Toxic to Reproductive information was found for the components:
- **Nickel:** Effects on fertility.
- i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for Galvanized (Hot Dipped) Sheet – Carbon Steel as a mixture. The following STOT following a Single Exposure data was found for the components:
- **Iron:** Irritating to respiratory tract.
- j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available for Galvanized (Hot Dipped) Sheet – Carbon Steel as a whole. The following STOT following Repeated Exposure data was found for the components:
- **Nickel:** Rat 4 wk inhalation LOEL 4 mg/m³ Lung and Lymph node histopathology. Rat 2 yr inhalation LOEL 0.1 mg/ m³ Pigment in kidney, effects on hematopoiesis spleen and bone marrow and adrenal tumor. Rat 13 Week Inhalation LOAEC 1.0 mg/m³ Lung weights, and Alveolar histopathology.
 - **Manganese:** Inhalation of metal fumes - Degenerative changes in human brain; Behavioral: Changes in motor activity and muscle weakness (Whitlock *et al.*, 1966).

The above toxicity information was determined from available scientific sources to illustrate the prevailing posture of the scientific community. The scientific resources includes: The American Conference of Governmental Industrial Hygienist (ACGIH) Documentation of the Threshold Limit Values (TLVs) and Biological Exposure indices (BEIs) with Other Worldwide Occupational Exposure Values 2017, The International Agency for Research on Cancer (IARC), The National Toxicology Program (NTP) updated documentation, the World Health Organization (WHO) and other available resources, the International Uniform Chemical Information Database (IUCLID), European Union Risk Assessment Report (EU-RAR), Concise International Chemical Assessment Documents (CICAD), European Union Scientific Committee for Occupational Exposure Limits (EU-SCOEL), Agency for Toxic Substances and Disease Registry (ATSDR), Hazardous Substance Data Bank (HSDB), and International Programme on Chemical Safety (IPCS).

The following health hazard information is provided regardless to classification criteria and is based on the individual component(s) and potential resultant components from further processing:

Acute Effects by component:

- **Iron and oxides:** Iron is harmful if swallowed, causes skin irritation, and causes eye irritation. Contact with iron oxide has been reported to cause skin irritation and serious eye damage.
- **Manganese and oxides:** Manganese and Manganese oxide are harmful if swallowed.
- **Nickel and oxides:** Nickel may cause allergic skin sensitization. Nickel oxide may cause an allergic skin.
- **Zinc and zinc oxides:** Not Reported/ Not Classified

Delayed (chronic) Effects by component:

- **Iron and oxides:** 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 the International Agency for Research on Cancer (IARC).

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Section 11 - Toxicological Information (continued)

Delayed (chronic) Effects by component (continued):

- **Manganese and oxides:** 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. Occupational overexposure (Manganese) is a progressive, disabling neurological syndrome that typically begins with relatively mild symptoms and evolves to include altered gait, fine tremor, and sometimes, psychiatric disturbances. May cause damage to lungs with repeated or prolonged exposure. Neurobehavioral alterations in worker populations exposed to MnO including: speed and coordination of motor function are especially impaired.
- **Nickel and oxides:** 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. Causes damage to lungs through prolonged or repeated inhalation exposure. IARC lists nickel and certain nickel compounds as Group 2B carcinogens (sufficient animal data). ACGIH 2017 TLVs® and BEIs® lists insoluble nickel compounds as confirmed human carcinogens. Suspected of damaging the unborn child.
- **Zinc and zinc oxides:** Zinc is a low health risk by inhalation and should be treated as a nuisance dust. Inhalation of zinc oxide fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.

Section 12 - Ecological Information

12(a) Ecotoxicity (aquatic & terrestrial): No Data Available for Galvanized (Hot Dipped) Sheet – Carbon Steel as sold/shipped. However, individual components of the product when processed have been found to be toxic to the environment. Metal dusts may migrate into soil and groundwater and be ingested by wildlife as follows:

- **Iron Oxide:** LC₅₀: >1000 mg/L; Fish 48 h-EC₅₀ > 100 mg/L (Currenta, 2008k); 96 h-LC₀ ≥ 50,000 mg/l. Test substance: Bayferrox 130 red (95 – 97% Fe₂O₃; < 4% SiO₂ and Al₂O₃) (Bayer, 1989a).
- **Nickel Oxide:** IUCLID found LC₅₀ in fish, invertebrates and algae > 100 mg/l.
- **Zinc:** EU RAR lists as Category I Very toxic to aquatic life with long lasting effects.

12(b) Persistence & Degradability: No Data Available

12(c) Bioaccumulative Potential: No Data Available

12(d) Mobility (in soil): No data available for Galvanized (Hot Dipped) Sheet – Carbon Steel as sold/shipped. However, individual components of the product have been found to be absorbed by plants from soil.

12(e) Other adverse effects: None Known

Additional Information:

Hazard Category: Category 1

Signal Word: Warning

Hazard Symbol:



Hazard Statement: Very Toxic to aquatic life with long lasting effects.

Section 13 - Disposal Considerations

Disposal: Galvanized (Hot Dipped) Sheet – Carbon Steel should be recycled whenever possible. Product dusts and fumes from processing operations should also be recycled, or classified by a competent environmental professional and disposed of in accordance with applicable federal, state or local regulations.

Container Cleaning and Disposal: Follow applicable federal, state and local regulations. Observe safe handling precautions. European Waste Catalogue (EWC): 16-01-17 (ferrous metals), 12-01-99 (wastes not otherwise specified), 16-03 (off specification batches and unused products), or 15-01-04 (metallic packaging).

Please note this information is for Galvanized (Hot Dipped) Sheet – Carbon Steel in its original form. Any alterations can void this information.

Section 14 - Transport Information

14 (a-g) Transportation Information:

US Department of Transportation (DOT) under 49 CFR 172.101 **does not** regulate Galvanized (Hot Dipped) Sheet – Carbon Steel as a hazardous material. All federal, state, and local laws and regulations that apply to the transport of this type of material must be adhered to.

<p>Shipping Name: Not Applicable (NA) Shipping Symbols: NA Hazard Class: NA UN No.: NA Packing Group: NA DOT/ IMO Label: NA Special Provisions (172.102): NA</p>	<p>Packaging Authorizations a) Exceptions: NA b) Group: NA c) Authorization: NA</p>	<p>Quantity Limitations a) Passenger, Aircraft, or Railcar: NA b) Cargo Aircraft Only: NA Vessel Stowage Requirements a) Vessel Stowage: NA b) Other: NA DOT Reportable Quantities: NA</p>
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International Maritime Dangerous Goods (IMDG) and the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID) classification, packaging and shipping requirements follow the US DOT Hazardous Materials Regulation.

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Section 14 - Transport Information (continued)

Regulations Concerning the International Carriage of Dangerous Goods by Road (ADR) does not regulate Galvanized (Hot Dipped) Sheet – Carbon Steel as a hazardous material.

Shipping Name: Not Applicable (NA) Classification Code: NA UN No.: NA Packing Group: NA ADR Label: NA Special Provisions: NA Limited Quantities: NA	Packaging a) Packing Instructions: NA b) Special Packing Provisions: NA c) Mixed Packing Provisions: NA	Portable Tanks & Bulk Containers a) Instructions: NA b) Special Provisions: NA
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International Air Transport Association (IATA) does not regulate Galvanized (Hot Dipped) Sheet – Carbon Steel as a hazardous material.

Shipping Name: Not Applicable (NA) Class/Division: NA Hazard Label (s): NA UN No.: NA Packing Group: NA Excepted Quantities (EQ): NA	Passenger & Cargo Aircraft Limited Quantity (EQ) Pkg Inst: NA Max Net Qty/Pkg: NA	Cargo Aircraft Only Pkg Inst: NA Max Net Qty/Pkg: NA	Special Provisions: NA ERG Code: NA
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Pkg Inst – Packing Instructions Max Net Qty/Pkg – Maximum Net Quantity per Package ERG – Emergency Response Drill Code

Transport Dangerous Goods (TDG) Classification: Galvanized (Hot Dipped) Sheet – Carbon Steel does not have a TDG classification.

Section 15 - Regulatory Information

Regulatory Information: The following listing of regulations relating to a U. S. Steel 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:

SARA Potential Hazard Categories: Immediate Acute Health Hazard; Delayed Chronic Health Hazard

Section 313 Supplier Notification: The product, Galvanized (Hot Dipped) Sheet – Carbon Steel contains the following toxic chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372:

CAS #	Chemical Name	Percent by Weight
7439-96-5	Manganese	2.0 max
7440-02-0	Nickel	0.2 max
7440-66-6	Zinc	9.1 max

State Regulations: The product, Galvanized (Hot Dipped) Sheet – Carbon Steel as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations:

California Prop. 65: This product can expose you to nickel, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Other Regulations:

WHMIS Classification (Canadian): The product, Galvanized (Hot Dipped) Sheet – Carbon Steel is not listed as a whole. However individual components are listed.

Ingredients	WHMIS Classification
Iron	Combustible dusts - Category 1
Manganese	Specific target organ toxicity - repeated exposure - Category 1; Combustible dusts
Nickel	Skin sensitization – Category 1; Carcinogenicity – Category 2; Specific target organ toxicity - repeated exposure - Category 1

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

Section 16 - Other Information

Prepared By: United States Steel Corporation

Revision History:

- 5/01/2017 – Update WHMIS 2015
- 4/28/16 – Update of Adding Fairless to Locations
- 4/1/2014 - Update to OSHA HAZ COM 2012
- 12/16/10 – Update of content and format to comply with GHS. Replaces USS Code 3C012
- 8/1/1985 - Original

Expiration Date: 5/01/20

Galvanized (Hot Dipped) Sheet – Carbon Steel

USS IHS No.: 1650

Rev. 5/17

Section 16 - Other Information (continued)

Additional Information:

Hazardous Material Identification System (HMIS) Classification

Health Hazard	1
Fire Hazard	0
Physical Hazard	0

HEALTH= 1, Denotes possible chronic hazard if airborne dusts or fumes are generated Irritation or minor reversible injury possible.

FIRE= 0, Materials that will not burn.

PHYSICAL HAZARD= 0, Materials that are normally stable, even under fire conditions, and will not react with water, polymerize, decompose, condense, or self-react. Non-explosives.

National Fire Protection Association (NFPA)



HEALTH = 1, Exposure could cause irritation but only minor residual injury even if no treatment is given.

FIRE = 0, Materials that will not burn.

INSTABILITY = 0, Normally stable, even under fire exposure conditions, and are not reactive with water.

ABBREVIATIONS/ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists	NIF	No Information Found
BEIs	Biological Exposure Indices	NIOSH	National Institute for Occupational Safety and Health
CAS	Chemical Abstracts Service	NTP	National Toxicology Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	ORC	Organization Resources Counselors
CFR	Code of Federal Regulations	OSHA	Occupational Safety and Health Administration
CNS	Central Nervous System	PEL	Permissible Exposure Limit
GI, GIT	Gastro-Intestinal, Gastro-Intestinal Tract	PNOR	Particulate Not Otherwise Regulated
HMIS	Hazardous Materials Identification System	PNOC	Particulate Not Otherwise Classified
IARC	International Agency for Research on Cancer	PPE	Personal Protective Equipment
LC50	Median Lethal Concentration	ppm	parts per million
LD50	Median Lethal Dose	RCRA	Resource Conservation and Recovery Act
LD ₅₀	Lowest Dose to have killed animals or humans	RTECS	Registry of Toxic Effects of Chemical Substances
LEL	Lower Explosive Limit	SARA	Superfund Amendment and Reauthorization Act
LOEL	Lowest Observed Effect Level	SCBA	Self-contained Breathing Apparatus
LOAEC	Lowest Observable Adverse Effect Concentration	SDS	Safety Data Sheet
µg/m ³	microgram per cubic meter of air	STEL	Short-term Exposure Limit
mg/m ³	milligram per cubic meter of air	TLV	Threshold Limit Value
Mppcf	million particles per cubic foot	TWA	Time-weighted Average
MSHA	Mine Safety and Health Administration	UEL	Upper Explosive Limit
NFPA	National Fire Protection Association		

Disclaimer: This information is taken from sources or based upon data believed to be reliable. However, United States Steel Corporation 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.

MATERIAL SAFETY DATA SHEET

Material Name: **Brass and Copper Alloys** ID:

SECTION 1 - CHEMICAL PRODUCT AND COMPANY INFORMATION

Chemical Name: **Brass and Copper Alloys**

Product Use:

Manufacturer Information:

OMNISOURCE CORPORATION

1610 North Calhoun Street
Fort Wayne, Indiana 46808

Telephone: (260)422-5541 Safety Department
Emergency #: 800-666-4789

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

CAS #	Component	Percent
7440-50-8	*Copper (Cu)	55-99.9
7440-66-6	**Zinc Coat (Zn)	0-43
7440-02-0	*Nickel (Ni)	0-33
7429-90-5	**Aluminum (Al)	0-11
7439-92-1	*Lead (Pb)	0-8
7440-31-5	Tin (Sn)	0-6.5
7439-89-6	Iron (Fe)	0-6
7439-96-5	Manganese (Mn)	0-5
7440-21-3	Silicon (Si)	0-4.5
7440-48-4	*Cobalt (Co)	0-2.7
7440-41-7	Beryllium (Be)	0-2
13494-80-9	Tellurium (Te)	0-0.7
7723-14-0	Phosphorous (p)	1-0.5

Note: Those elements identified by an * and those elements capable of generating highly toxic fumes or dusts (identified by a **) are classified as toxic by EPA in 40 CFR 372.65 and subject to reporting requirements of SARA Title III Section 313 and 40 CFR 372.

SECTION 3 - HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Brass and copper alloys in their solid state present no inhalation, ingestion or contact health hazard. However, inhaling dusts, fumes or mists which may be generated during certain manufacturing procedures (burning, melting, welding, sawing, brazing, grinding, and machining) may be hazardous to your health. Dusts may also be irritating to the unprotected skin or eyes.

MATERIAL SAFETY DATA SHEET

Material Name: **Brass and Copper Alloys** ID:

ACUTE EFFECTS: Excessive exposure to dusts/fumes may cause irritation of eyes, nose and throat, Inhalation of dusts/fumes may result in metal fumes fever (metallic taste in mouth, dryness and irritation of throat, chills and fever).

CHRONIC EFFECTS: Prolonged inhalation of fumes or dusts may caused a variety of adverse health effects to the respiratory system, including (but not necessarily limited to) lesions of the mucous membrane, bronchitis, pneumonia and cancers of the nasal cavity and respiratory tract.

POTENTIAL HEALTH EFFECTS/MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Any preexisting chronic respiratory condition (asthma, chronic bronchitis, emphysema).

ROUTES OF ENTRY: Inhalation (dust/fumes/mists), contact with skin and eyes (dust/mist), ingestion (dusts).

SECTION 4 - FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If condition persists, consult physician.

EYE CONTACT: Immediately flush with running water to remove particulates, consult physician.

SKIN CONTACT: If irritation develops, remove clothing and wash with soap and water. If condition persists, consult physician.

INGESTION: Consult physician.

NOTE TO PHYSICIAN: None.

SECTION 5 - FIRE FIGHTING MEASURES

FLASHPOINT: Nonflammable.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: None Required.

AUTOIGNITION TEMPERATURE: NA

FLAMABLE LIMITS: Nonflammable

HAZARDOUS COMBUSTION PRODUCTS: None.

EXTINGUISHING MEDIA: Use what is appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None know.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

MATERIAL SAFETY DATA SHEET

Material Name: **Brass and Copper Alloys** ID:

CLEAN UP PROCEDURES: No special procedures needed.

SPECIALIZED EQUIPMENT: None

SECTION 7 – HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Minimize activities which may generate dusts, mists or fumes. Keep areas well ventilated. Use suitable equipment to move materials.

PRECAUTIONS TO BE TAKEN IN STORAGE: None.

SECTION 8 – EXPOSURE CONTROLS, PERSONAL PROTECTION

RESPIRATORY PROTECTION: Wear NIOSH approved dust/mist/fume respirator when welding or burning this metal.

EYE/FACE PROTECTION: Face shields (welding or burning), safety glasses (cutting or grinding).

OTHER PROTECTIVE EQUIPMENT: Use appropriate protective clothing such as welding aprons and gloves when welding or burning.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Metal

ODOR: Odorless

PHYSICAL STATE: Solid

VAPOR PRESSURE: NA

BOLING POINT (C): NA

SOLUBILITY IN WATER: Insoluble

SPECIFIC GRAVITY(H2O=1) 7.78-8.94

SECTION 10 – STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: None.

HAZARDOUS DECOMPOSITION PRODUCTS (when heated): None.

MATERIALS TO AVOID: Strong acids (such as sulfuric, hydrochloric, nitric).

MATERIAL SAFETY DATA SHEET

Material Name: **Brass and Copper Alloys** ID:

SECTION 11 - TOXICOLOGY INFORMATION

LETHAL CONCENTRATION (LC50): None established.
REPRODUCTIVE EFFECTS: NA
LETHAL DOSE (LD50): NA
MUTAGENICITY: NA
TERATOGENICITY: NA
CARCINOGENIC BY NTP, IARC OR OSHA: No. (Note: fumes/dusts/mists from this material may be carcinogenic if inhaled over long periods of time).

SECTION 12 - ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

SECTION 13- DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Recycle scrap materials through scrap dealers and brokers. Dispose of used non-cyclable materials in accordance with local, state and federal regulations.

SECTION 14 - TRANSPORT INFORMATION

No special DOT regulations pertaining to this material.

SECTION 15 - REGULATORY INFORMATION

SARA: Some components of this product are classified as toxic by the EPA in 40 CFR 372.65 and subject to reporting requirements of SARA Title III § 313 and CFR 372.45.

SECTION 16 - OTHER INFORMATION

OTHER PRECAUTIONS: Take appropriate precautions when moving or shipping this material to prevent injury to personnel handling it.

DISCLAIMER: Information included in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any representation or warranty, expressed or implied regarding its accuracy or correctness. The conditions or methods of handling, storage, use and/or disposal of this product are beyond the control and knowledge of the manufacturer. Therefore, the manufacturer cannot assume responsibility for adverse events which may occur in the use and/or misuse of this product and expressly

MATERIAL SAFETY DATA SHEET

Material Name: **Brass and Copper Alloys** ID:

disclaims liability for loss, damage and/or expense arising out of or in any way connected with the handling, storage, use and/or disposal of this product.

	Material Safety Data Sheet Copper	Document # - MSDS-05 Issue No. - 2.3 Issue Date: 01/01/04 Page 1 of 4
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A. GENERAL INFORMATION

Trade Name (Common Name) COPPER ROD - ELECTRICAL	<input checked="" type="checkbox"/> C.A.S. No. <input type="checkbox"/> General Product Code# 7440-50-8
Chemical Name and/or Synonym Copper 99.9+%	
Formula Cu	Molecular Weight 63.55
Address (No., Street, City, State and Zip Code) Southwire Company 372 Central High Road Carrollton, Georgia 30117	
Contact - David Hutcheson	Phone Number - (770) 832-4242

B. FIRST AID MEASURES

<p><u>Eyes:</u> Flush eyes immediately with water for at least 15 minutes. Get medical attention.</p> <p><u>Skin:</u> Promptly wash with plenty of soap and water.</p> <p><u>Inhalation:</u> Remove to fresh air. Get medical assistance for irritation or any other symptoms.</p> <p><u>Ingestion:</u> If conscious, give plenty of water or milk. Induce vomiting by touching finger to back of throat. Get immediate medical attention.</p>
--

C. HAZARDS INFORMATION HEALTH

<p>Inhalation Dust or fume inhalation can cause "metal Fume Fever", Headaches, cramps, pain in extremities in addition to respiratory irritation.</p>
<p>Ingestion Ingestion of copper will irritate the gastrointestinal tract producing salivation, nausea, vomiting and gastric pain.</p>
<p>Skin Although not commonly associated with industrial dermatitis, mechanical irritation is possible along with skin discoloration.</p>
<p>Eyes Mechanical irritation, potentially severe, can result from eye contact with this material.</p>
<p>Permissible Concentration: Air TWA = 1 mg/m³ (dust); TWA = 0.2 mg/m³ (fume); PEL = 1 mg/m³ (dust).</p>
<p>Unusual Chronic Toxicity Wilson's disease may be affected by copper exposure.</p>

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C. HAZARDS INFORMATION (Cont.) FIRE AND EXPLOSION

Flash Point <input type="checkbox"/> Open Cup <input type="checkbox"/> Closed Cup	None °C	Auto Ignition Temperature Not Applicable	°C	Flammable limits in Air (% by Vol.) LOWER UPPER
Unusual Fire and Explosion Hazards None Known				

D. PRECAUTIONS/PROCEDURES

Fire Extinguishing Agents RECOMMENDED Use any agent suitable for surrounding fire.
Fire Extinguishing Agents to AVOID None known.
Special Fire Fighting Precautions Avoid breathing dusts and fumes from burning material. Use NIOSH approved breathing apparatus and full protective clothing.
Ventilation Local exhaust: In packaging and unloading areas, over open processing equipment, and any other places where dusty or misty condition prevails. Natural ventilation: Adequate for other areas.
Normal Handling Avoid contact with eyes, skin, or clothing. Avoid breathing dust or fume. Use good personal hygiene and housekeeping.
Storage Avoid storage near acetylene, chlorine, oxidizers, magnesium, and halogenates.
Spill or Leak (Always Wear Personal Protective Equipment - Section E) Promptly sweep up with minimum dusting. Collect for reuse.
Special: Precautions/Procedures/Label Instructions None
SIGNAL WORD - N/A

E. PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection None needed under most conditions. If dust or fume is expected, use a NIOSH approved HEPA or fume respirator.
Eyes and Face Safety glasses or goggles.
Hands, Arms and Body None normally needed. Impervious gloves may be used to prevent mechanical irritation.
Other Clothing and Equipment Eye-wash is recommended.

	Material Safety Data Sheet Copper	Document # - MSDS-05 Issue No. 2.3 Issue Date: 01/01/04 Page 3 of 4
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F. PHYSICAL DATA

Material is (at Normal Conditions): <input type="checkbox"/> Gas <input type="checkbox"/> Liquid <input checked="" type="checkbox"/> Solid <input type="checkbox"/> _____		Appearance and Odor Yellow-red metal, odorless, various shapes	
Boiling Point	2595°C	Specific Gravity (H ₂ O = 1)	Vapor Density (Air = 1)
Melting Point	1083°C	8.94	Not applicable
Solubility in Water (% by weight) Low in metallic form		P _H	Vapor Pressure (mmHg at 20°C) <input type="checkbox"/> (PSIG) <input type="checkbox"/>
		Not applicable	Not applicable
Evaporation Rate (Butyl Acetate = 1) <input type="checkbox"/> (Ether = 1) <input type="checkbox"/>	Not applicable	% Volatiles by Volume (at 20°C)	
		Not applicable	

G. REACTIVITY DATA

Stability <input type="checkbox"/> Unstable <input checked="" type="checkbox"/> Stable	Conditions to Avoid None Known
Incompatibility (Materials to Avoid) Acetylene, chlorine, oxidizers, magnesium and halogenate.	
Hazardous Decomposition Products Extreme temperatures can generate metal fume.	
Hazardous Polymerization <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	Conditions to Avoid Not applicable

H. HAZARDOUS INGREDIENTS (Mixtures Only)

Material or Component/C.A.S. #	WT %	Hazard Data (See Sect. J)
Not Applicable	N/A	N/A

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I. ENVIRONMENTAL

Degradability/Aquatic Toxicity <p style="text-align: center;">Not Determined</p>	Octanol/Water Partition Coefficient <p style="text-align: center;">Not determined</p>
EPA Hazardous Substance? (Clean Water Act Sect. 307) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If so, Reportable Quantity: <u>5000# (less than 100 micron diameter)</u>	
Waste Disposal Methods (Disposer must comply with Federal, State and Local Disposal or Discharge Laws) Users should review their operations in terms of any applicable federal, state and local laws and regulations, then consult with appropriate regulatory agencies before discharging or disposing of waste materials. If regulations permit, waste may be disposed of by burial in an approved chemical wastes landfill or removed by a licensed waste disposal contractor.	
RCRA Status of <u>Unused</u> Material if Discarded: Follow EPA & local regulations to determine	Hazardous Waste Number: (If Applicable) N/A

J. REFERENCES

Permissible Concentration References 29 CFR 1910.1000 (1989) ACGIH 1991-92-List: "Threshold Limit Values for Chemical Substances".
D.O.T. Classification - Not regulated
General Lucky, T.D., "Metal Toxicity In Mammals", 1977, Plenum Press, N.Y. Sax, E.I., "Dangerous Properties of Industrial Materials", 7th edition Sittig, M. "Handbook of Toxic and Hazardous Chemicals", 1985, Noyes, Park Ridge, N.J.

K. ADDITIONAL INFORMATION

<p>NOTICE: This material contains the following toxic chemical subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To Know Act of 1986 and of 40 CFR 372:</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">CAS#</th> <th style="text-align: center;">Chemical Name</th> <th style="text-align: center;">% By Weight</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">7440-50-8</td> <td style="text-align: center;">Copper</td> <td style="text-align: center;">99.9+</td> </tr> </tbody> </table> <p>This information must be included in all MSDS's that are copied and distributed for this material.</p>	CAS#	Chemical Name	% By Weight	7440-50-8	Copper	99.9+
CAS#	Chemical Name	% By Weight				
7440-50-8	Copper	99.9+				

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION.

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Safety data sheet

Ultramid® B3 NATURAL, NYLON 6 RESIN

Revision date : 2009/05/07
Version: 1.0Page: 1/6
(30082319/SDS_GEN_US/EN)

1. Substance/preparation and company identification

Company
BASF CORPORATION
100 Campus Drive
Florham Park, NJ 07932, USA

24 Hour Emergency Response Information
CHEMTREC: 1-800-424-9300
BASF HOTLINE: 1-800-832-HELP

Chemical family: polyamide
Synonyms: Nylon 6

2. Composition/information on ingredients

<u>CAS Number</u>	<u>Content (W/W)</u>	<u>Chemical name</u>
25038-54-4	>= 95.0 %	polyamide (PA 6)
105-60-2	>= 0.1 - <= 1.0 %	caprolactam

3. Hazard identification

Emergency overview

CAUTION: MAY CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION.
Use with local exhaust ventilation.
Wear safety glasses with side-shields.
Wear protective clothing.
Eye wash fountains and safety showers must be easily accessible.

Potential health effects

Primary routes of exposure

Routes of entry for solids and liquids include eye and skin contact, ingestion and inhalation. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquified gases.

Acute toxicity:

Contact with molten product may cause thermal burns. The resin in pelleted form poses a low hazard.

Information on: Caprolactam

*No adverse effects have been reported in the processing and use of polycaprolactam.
Caprolactam monomer may be released during processing.*

Irritation:

Thermal decomposition products of the substance can irritate the eyes, skin, and respiratory tract.

Sensitization:

The substance is inert.

Repeated dose toxicity:

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Information on: Caprolactam

May affect the liver and kidneys as indicated in animal studies.

Medical conditions aggravated by overexposure:

Data available do not indicate that there are medical conditions that are generally recognized as being aggravated by exposure to this substance/product.
See MSDS section 11 - Toxicological information.

Potential environmental effects

Aquatic toxicity:

There is a high probability that the product is not acutely harmful to aquatic organisms.
The product has not been tested. The statement has been derived from the structure of the product.

4. First-aid measures

General advice:

Remove contaminated clothing.

If inhaled:

Assist in breathing if necessary. Keep patient calm, remove to fresh air. Consult a physician.

If on skin:

Burns caused by molten material require hospital treatment. Wash affected areas thoroughly with soap and water. If irritation develops, seek medical attention.

If in eyes:

In case of contact with the eyes, rinse immediately for at least 15 minutes with plenty of water. If irritation develops, seek medical attention.

5. Fire-fighting measures

Autoignition: > 400 °C (ASTM D1929)
Self-ignition temperature: not self-igniting

Suitable extinguishing media:

water, foam, dry extinguishing media, carbon dioxide

Hazards during fire-fighting:

carbon monoxide, hydrogen cyanide, can be emitted at > 300 °C
Under special fire conditions traces of other toxic substances are possible. Formation of further decomposition and oxidation products depends upon the fire conditions.

Protective equipment for fire-fighting:

Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:

Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

6. Accidental release measures

Environmental precautions:

This product is not regulated by RCRA. This product is not regulated by CERCLA ('Superfund').

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Cleanup:

For small amounts: Pick up with suitable appliance and dispose of.
For large amounts: Pick up with suitable appliance and dispose of.

Further information:

High risk of slipping due to leakage/spillage of product.

7. Handling and storage

Handling

Protection against fire and explosion:

Take precautionary measures against static discharges.

Storage

Storage stability:

Protect against moisture.

8. Exposure controls and personal protection

Components with workplace control parameters

caprolactam

ACGIH

TWA value 5 mg/m³ Inhalable fraction and vapor ;

Advice on system design:

Provide local exhaust ventilation to control dusts/vapours.

Personal protective equipment

Respiratory protection:

Wear respiratory protection if ventilation is inadequate. Wear a NIOSH-certified (or equivalent) particulate respirator. Wear a NIOSH-certified (or equivalent) organic vapour/particulate respirator.

Hand protection:

Wear gloves to prevent contact during mechanical processing and/or hot melt conditions.

Eye protection:

Safety glasses with side-shields.

Body protection:

Body protection must be chosen based on level of activity and exposure.

General safety and hygiene measures:

Wear protective clothing to prevent contact during mechanical processing and/or hot melt conditions. Avoid inhalation of dust. Wash soiled clothing immediately.

9. Physical and chemical properties

Form:	pellets	
Odour:	odourless	
Colour:	colourless	
pH value:		not soluble
Melting temperature:	approx. 220 °C	(DIN 53765)
Density:	1.12 - 1.15 g/cm ³	(20 °C)
Bulk density:	640 - 740 kg/m ³	
Solubility in water:		insoluble

Safety data sheet

Ultramid® B3 NATURAL, NYLON 6 RESIN

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10. Stability and reactivity

Conditions to avoid:

Temperature: > 300 degrees Celsius
Avoid prolonged exposure to extreme heat.

Hazardous reactions:

The product is chemically stable.
No hazardous reactions known.

Decomposition products:

Hazardous decomposition products: carbon monoxide, hydrogen cyanide, caprolactam
Thermal decomposition products: caprolactam, The substances/groups of substances mentioned may be released during processing.

Thermal decomposition:

> 300 °C
May decompose if overheated and/or subjected to prolonged heating.

Corrosion to metals:

No corrosive effect on metal.

Oxidizing properties:

not fire-propagating

11. Toxicological information

Chronic toxicity

Genetic toxicity:

The substance is inert.

Other information:

Based on our experience and the information available, no adverse health effects are expected if handled as recommended with suitable precautions for designated uses.

12. Ecological information

Environmental fate and transport

Bioaccumulation:

The product will not be readily bioavailable due to its consistency and insolubility in water.
Due to the consistency of the product, dispersion into the environment is impossible. Therefore no negative effects on the environment may be anticipated based on the present state of knowledge.

13. Disposal considerations

Waste disposal of substance:

Check for possible recycling.
Dispose of in accordance with national, state and local regulations.

Safety data sheet

Ultramid® B3 NATURAL, NYLON 6 RESIN

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Container disposal:

Dispose of in accordance with national, state and local regulations. Packs must be completely emptied. Completely emptied packagings can be given for recycling.

14. Transport information

Land transport

USDOT

Not classified as a dangerous good under transport regulations

Sea transport

IMDG

Not classified as a dangerous good under transport regulations

Air transport

IATA/ICAO

Not classified as a dangerous good under transport regulations

15. Regulatory information

Federal Regulations

Registration status:

TSCA, US

released / listed

SARA hazard categories (EPCRA 311/312): Not hazardous

State regulations

State RTK

CAS Number

105-60-2

Chemical name

caprolactam

State RTK

MA, NJ, PA

16. Other information

HMIS III rating

Health: 1

Flammability: 1

Physical hazard: 0

HMIS uses a numbering scale ranging from 0 to 4 to indicate the degree of hazard. A value of zero means that the substance possesses essentially no hazard; a rating of four indicates high hazard.

Local contact information

Tech Desk

1-800-527-8324

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Safety data sheet

Ultramid® B3 NATURAL, NYLON 6 RESIN

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(30082319/SDS GEN US/EN)

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Date Prepared: 8/31/2010

NOTICE: The products described herein are considered articles. As such, provision of a Material Safety Data Sheet (MSDS) is not required by regulation. Under normal use, no significant risk of hazardous exposure is associated with these articles. The information contained in this document is provided for reference only, and includes information from the MSD sheets for individual components.

SECTION 1: CHEMICAL AND COMPANY IDENTIFICATION

PRODUCT NAME: Building Wire Products
CHEMICAL NAME: None
PRODUCT DESCRIPTION: Wire and cable products for operation at low voltage (2000 V or less) utilizing thermoplastic or crosslinked insulation. See Section 2 for individual wire and cable types.

CONTACT ADDRESS:
Southwire Company
1 Southwire Drive, Carrollton, Georgia 30119

EMERGENCY TELEPHONE NUMBER: (24 Hours) (770) 832-4242

NON EMERGENCY TELEPHONE NUMBERS: (8 am - 5 pm M-F) FOR
HEALTH AND SAFETY INFORMATION CALL: (770) 832-4725 FOR
GENERAL PRODUCT INFORMATION: www.Southwire.com

SECTION 2: COMPOSITION / INFORMATION ON INGREDIENT

The product categories below contain some combination of the following components:

Poly(vinyl chloride) compounds (PVC)
Polyamide compounds (nylon)
Polyethylene compounds (PE)
Chlorinated polyethylene compounds (CPE)
Copper
Electrical-grade Aluminum alloy

This document addresses the following product categories:

<u>Wire/Cable Type</u>	<u>Components (may contain some or all)</u>
Thermoplastic Insulated Conductors THHN/TFFN/T90/AWM/MTW and similar	PVC, Nylon, Copper, Aluminum
Thermoset Insulated Conductors XHHW/RW90/USE and similar	PE, Copper, Aluminum
Service Entrance Cable SE/SER/SEU/USE and similar	PE, PVC, Nylon, Copper, Aluminum
Tray Cable Type TC	PE, PVC, Nylon, CPE, Copper, Aluminum
Pump Cable	PVC
NM-B, NMD	PVC, Nylon, Copper

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Composition of Components:

- PVC Compounds may contain: PVC Resin
 - Hydrocarbon Plasticizer(s)
 - Alumina Trihydrate Antimony Trioxide Proprietary Stabilizer Proprietary lubricant
- Nylon Compounds may contain: Nylon 6 (polycaprolactam)
 - Caprolactam Proprietary lubricant
- PE Compounds may contain:
 - Antioxidant Dicumyl Peroxide Dibutyl Tin Dilaurate Magnesium Hydroxide Alumina Trihydrate
- CPE Compounds may contain:
 - Chlorinated polyethylene Antimony Trioxide Lead Phthalate Chlorinated Paraffin Magnesium Oxide

SECTION 3: HAZARDS IDENTIFICATION

Under normal use, no hazards are associated with use of these articles.

POTENTIAL HEALTH EFFECTS: Exposure does not cause significant irritation or toxicity.

EYE CONTACT: None

SKIN CONTACT: Minor skin irritation possible.

INHALATION: None

INGESTION: None

SECTION 4: FIRST AID MEASURES

EYE CONTACT: Treat as any foreign particulate matter.

SKIN CONTACT: If minor skin irritation occurs, wash affected area with soap and water. If irritation persists, seek medical attention. If molten polymer is contacted, cool the affected area with water and seek medical attention.

INHALATION: No effects known in normal use. Inhalation of combustion products could cause damage to the respiratory tissues. Seek medical attention.

INGESTION: No ingestion effects known.

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SECTION 5: FIRE - FIGHTING MEASURES

FLASHPOINT: N/A

FLAMMABLE LIMITS: N/A

AUTOIGNITION TEMP: N/A

GENERAL HAZARDS:

Article contains combustible substances which may decompose upon burning to produce irritating, hazardous fumes.

FIRE FIGHTING:

Use dry chemical or foam type extinguishing media. Avoid breathing fumes, use self contained breathing apparatus.

DECOMPOSITION PRODUCT UNDER FIRE CONDITIONS: Carbon Dioxide, Carbon Monoxide, Hydrogen Chloride and irritants.

SECTION 6: ACCIDENTAL RELEASE MEASURES

LAND SPILL: N/A WATER SPILL: N/A

SECTION 7: STORAGE AND HANDLING

No special handling and storage requirements.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Gloves and eye protection recommended during installation of articles.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Article is solid at room temperature and pressure.

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Stable

CONDITIONS TO AVOID INSTABILITY: Fire

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID HAZARDOUS POLYMERIZATION: N/A

HAZARDOUS DECOMPOSITION PRODUCTS: See Section 5.

SECTION 11: TOXICOLOGICAL INFORMATION

Reported human effects: Product/similar product – no human data available

Reported animal effects: Product/similar product – no animal data available

SECTION 12: ECOLOGICAL INFORMATION

No ecological information available

PRODUCT INFORMATION SHEET
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SECTION 13: DISPOSAL CONSIDERATIONS

Recycling of metal conductor is encouraged. Dispose of cable residues in accordance with all applicable local, state and federal environmental regulations.

SECTION 14: TRANSPORT INFORMATION

DEPARTMENT OF TRANSPORTATION (DOT): No
transportation restrictions.

SECTION 15: REGULATORY INFORMATION

Wire and cable products have been determined to be exempt from Proposition 65 by a California judicial decision.

SECTION 16: OTHER INFORMATION

RATING SYSTEMS: NFPA rating: Health 0 Flammability 1
Reactivity 0

This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty or guarantee is made as to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use. We do not accept liability for any loss or damage that may occur from the use of this information nor do we offer warranty against patent infringement.

1. Product and Company Identification

Material name	Aluminum Bronze Alloys
Revision date	06-30-2011
Version #	04
CAS #	Mixture
Product code	C95200, C95210, C95220, C95400, C95420, C95500, C95510, C95600, C95700, C95800, C95900, AB2, ADV22, ADVANCE20, AMS-4640, AMS-4872, CA-104, CA954-A, CB954, CONCAST-380, CDA954JD, CLASS-1, CON-954, CuAl10Fe, CuAl10Fe2, CuAl10Ni, CuAl10Ni5, CuAl10Ni5F, CuAl10Ni-M, CuAl10NiP, CuAl11Ni, CuAl11Fe4, CuAl11FeNi, CuAl9Ni5Fe, RCB 954, Paper Rolls, Alumimium Bronze Solids
MSDS Number	1
Product use	Manufacturing
Manufacturer/Supplier	Concast Metal Products Company 131 Myoma Road (PO Box 816) Mars, PA 16046 dpl@concast.com or adk@concast.com Telephone 1-800-626-7071 Contact Person: Dominic LeMaire or Andy Krowsoski
Emergency	1-800-424-9300 Chemtrec (24-hrs)

2. Hazards Identification

Physical state	Solid.
Appearance	Shapes, Solids, Tubes & Turnings.
Emergency overview	WARNING May cause allergic respiratory and skin reactions. Possible cancer hazard - may cause cancer based on animal data. Danger of serious damage to health by prolonged exposure. Warning: May Form Combustible (Explosive) Dust - Air Mixtures
OSHA regulatory status	This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).
Potential health effects	
Routes of exposure	Inhalation. Skin contact. Eye contact.
Eyes	Molten material will produce thermal burns. Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the eyes. Acute exposure to cobalt metal, dust, and fume may cause irritation of skin and eyes.
Skin	May cause allergic skin reaction. Hot or molten material may produce thermal burns. Workers allergic to nickel may develop eczema or rashes. Acute exposure to cobalt metal, dust, and fume may cause irritation of skin and eyes. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea.
Inhalation	May cause allergic respiratory reaction. Elevated temperatures or mechanical action may form dust and fumes which may be irritating to mucous membranes and respiratory tract. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea.
Ingestion	Not relevant, due to the form of the product in its manufactured and shipped state. However, ingestion of dusts generated during working operations may cause nausea and vomiting.
Target organs	Lungs.
Chronic effects	Contains nickel. Chronic inhalation of metallic oxide dust/fume may cause metal fume fever. Repeated or prolonged inhalation of iron oxide dust may lead to the lung disease known as Siderosis. Prolonged and repeated overexposure to dust and fumes can lead to benign pneumoconiosis (stannosis). The effects might be delayed. Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain. Exposure to manganese fume/dust can affect the central nervous system (apathy, drowsiness, weakness and other chronic symptoms such as postural tremors).
Signs and symptoms	Irritation of nose and throat. Irritation of eyes and mucous membranes. Coughing. Shortness of breath. Wheezing. Sensitization.

Potential environmental effects Alloys in massive forms present a limited hazard for the environment. The product contains a substance which may cause long-term adverse effects in the environment.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Copper	7440-50-8	71-90
Aluminum	7429-90-5	7-16
Manganese	7439-96-5	0-14
Iron	7439-89-6	2-6.5
Nickel	7440-02-0	0-6
Cobalt	7440-48-4	0-3
Silicon	7440-21-3	0-1.5
Zinc	7440-66-6	<0.5
Tin	7440-31-5	<0.3

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First Aid Measures

First aid procedures

Eye contact

Do not rub eyes. Remove any contact lenses. Flush eyes thoroughly with water, taking care to rinse under eyelids. If irritation persists, continue flushing for 15 minutes, rinsing from time to time under eyelids. If discomfort continues, consult a physician.

Skin contact

Contact with dust: Wash skin with soap and water. In case of allergic reaction or other skin disorders: Seek medical attention and bring along these instructions. In case of contact with hot or molten product, cool rapidly with water and seek immediate medical attention. Do not attempt to remove molten product from skin because skin will tear easily. Cuts or abrasions should be treated promptly with thorough cleansing of the affected area.

Inhalation

In case of exposure to fumes or particulates: Get medical attention if discomfort persists.

Ingestion

Rinse mouth thoroughly if dust is ingested. Only induce vomiting at the instruction of medical personnel. Get medical attention if any discomfort continues.

Notes to physician

Treat symptomatically. Symptoms may be delayed.

General advice

Get medical attention if any discomfort develops. Seek medical attention for all burns, regardless how minor they may seem. Show this safety data sheet to the doctor in attendance.

5. Fire Fighting Measures

Flammable properties

Solid metal is not flammable; however, finely divided metallic dust or powder may form an explosive mixture with air. In a fire, ferronickel may form highly toxic substances: iron carbonyl and nickel carbonyl, a known carcinogen.

Extinguishing media

Suitable extinguishing media

Special powder against metal fires. Dry sand.

Unsuitable extinguishing media

Do not use water or halogenated extinguishing media. Do not use water on molten metal: Explosion hazard could result.

Protection of firefighters

Specific hazards arising from the chemical

During fire, gases hazardous to health may be formed.

Protective equipment and precautions for firefighters

Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for fire fighting: follow the general fire precautions indicated in the workplace.

Fire fighting equipment/instructions

Move containers from fire area if you can do it without risk.

Hazardous combustion products

Metal oxides.

6. Accidental Release Measures

Personal precautions	Ensure adequate ventilation. Avoid inhalation of dust and contact with skin and eyes. Wear protective clothing as described in Section 8 of this safety data sheet.
Environmental precautions	Avoid release to the environment. Do not contaminate water.
Methods for containment	Not applicable.
Methods for cleaning up	Allow spilled material to solidify and scrape up with shovels into a suitable container for recycle or disposal. Collect dust using a vacuum cleaner equipped with HEPA filter. If not possible, gently moisten dust before it is collected with shovel, broom or the like. The vacuum cleaner should be explosion-proofed. Avoid dust formation. This material and its container must be disposed of as hazardous waste.
Other information	Clean up in accordance with all applicable regulations.

7. Handling and Storage

Handling	Welding, burning, sawing, brazing, grinding or machining operations may generate fumes and dusts of metal oxides. Provide adequate ventilation. Avoid contact with sharp edges and hot surfaces. Avoid generation and spreading of dust and fumes. Avoid inhalation of dust and contact with skin and eyes. Avoid contact with hot or molten material. Dust clouds may be explosive under certain conditions. Take precautionary measures against static discharges when there is a risk of dust explosion. Use explosion-proof electrical equipment if airborne dust levels are high. To prevent and minimize fire or explosion risk from static accumulation and discharge, effectively bond and/or ground product transfer system. Wear appropriate personal protective equipment. Do not use water on molten metal. Do not eat, drink or smoke when using the product. Keep the workplace clean. Observe good industrial hygiene practices.
Storage	Keep dry. Store away from incompatible materials.

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	1 mg/m ³	Respirable fraction.
Cobalt (7440-48-4)	TWA	0.02 mg/m ³	
Copper (7440-50-8)	TWA	1 mg/m ³	Dust and mist.
		0.2 mg/m ³	Fume.
Manganese (7439-96-5)	TWA	0.2 mg/m ³	
Nickel (7440-02-0)	TWA	1.5 mg/m ³	Inhalable fraction.
Tin (7440-31-5)	TWA	2 mg/m ³	

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

Components	Type	Value	Form
Aluminum (7429-90-5)	PEL	5 mg/m ³	Respirable dust.
		15 mg/m ³	Total dust.
Cobalt (7440-48-4)	PEL	0.1 mg/m ³	Dust and fume.
Copper (7440-50-8)	PEL	1 mg/m ³	Dust and mist.
		0.1 mg/m ³	Fume.
Manganese (7439-96-5)	Ceiling	5 mg/m ³	Fume.
Nickel (7440-02-0)	PEL	1 mg/m ³	
Silicon (7440-21-3)	PEL	15 mg/m ³	Total dust.
		5 mg/m ³	Respirable fraction.
Tin (7440-31-5)	PEL	2 mg/m ³	

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

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	10 mg/m ³	Dust.
		5 mg/m ³	Pyrophoric powder.
Cobalt (7440-48-4)	TWA	0.02 mg/m ³	
Copper (7440-50-8)	TWA	1 mg/m ³	Dust and mist.
		0.2 mg/m ³	Fume.
Manganese (7439-96-5)	TWA	0.2 mg/m ³	
Nickel (7440-02-0)	TWA	1.5 mg/m ³	
Tin (7440-31-5)	TWA	2 mg/m ³	

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/m ³	Respirable.
Cobalt (7440-48-4)	TWA	0.02 mg/m ³	
Copper (7440-50-8)	TWA	1 mg/m ³	Dust and mist.
		0.2 mg/m ³	Fume.
Manganese (7439-96-5)	TWA	0.2 mg/m ³	
Nickel (7440-02-0)	TWA	0.05 mg/m ³	
Tin (7440-31-5)	TWA	2 mg/m ³	

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

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	5 mg/m ³	Welding fume.
		10 mg/m ³	Dust.
Cobalt (7440-48-4)	TWA	0.02 mg/m ³	Dust and fume.
Copper (7440-50-8)	TWA	0.2 mg/m ³	Fume.
		1 mg/m ³	Dust and mist.
Iron (7439-89-6)	TWA	5 mg/m ³	Welding fume.
Manganese (7439-96-5)	TWA	0.2 mg/m ³	
Nickel (7440-02-0)	TWA	1 mg/m ³	Inhalable
Silicon (7440-21-3)	TWA	10 mg/m ³	Total dust.
Tin (7440-31-5)	TWA	2 mg/m ³	

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/m ³	
		5 mg/m ³	Welding fume.
Cobalt (7440-48-4)	TWA	0.02 mg/m ³	
Copper (7440-50-8)	TWA	0.2 mg/m ³	Fume.
		1 mg/m ³	Dust and mist.
Manganese (7439-96-5)	STEL	3 mg/m ³	Fume.
	TWA	1 mg/m ³	Fume.
		5 mg/m ³	Dust.
Nickel (7440-02-0)	TWA	1 mg/m ³	
Silicon (7440-21-3)	TWA	10 mg/m ³	Total dust.
Tin (7440-31-5)	TWA	2 mg/m ³	

Mexico. Occupational Exposure Limit Values

Components	Type	Value	Form
Aluminum (7429-90-5)	TWA	5 mg/m ³	Pyrophoric powder.
		10 mg/m ³	Dust.
		5 mg/m ³	Welding fume.
Cobalt (7440-48-4)	TWA	0.1 mg/m ³	Dust and fume.
Copper (7440-50-8)	STEL	2 mg/m ³	Dust and mist.
		2 mg/m ³	Fume.
	TWA	0.2 mg/m ³	Fume.
		1 mg/m ³	Dust and mist.
Manganese (7439-96-5)	STEL	3 mg/m ³	Fume.
	TWA	1 mg/m ³	Fume.
		0.2 mg/m ³	
Nickel (7440-02-0)	TWA	1 mg/m ³	
Silicon (7440-21-3)	STEL	20 mg/m ³	
	TWA	10 mg/m ³	
Tin (7440-31-5)	STEL	4 mg/m ³	
	TWA	2 mg/m ³	

Exposure guidelines

Follow standard monitoring procedures.

Engineering controls

Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation of dust. Ventilate as needed to control airborne dust. Use explosion-proof ventilation equipment if airborne dust levels are high. Special ventilation should be used to convey finely divided metallic dust generated by grinding, sawing etc., in order to eliminate explosion hazards.

Personal protective equipment

Eye / face protection	Wear dust-resistant safety goggles where there is danger of eye contact. In addition to safety glasses or goggles, a welding helmet with appropriate shaded shield is required during welding, burning, or brazing. A face shield is recommended, in addition to safety glasses or goggles, during sawing, grinding, or machining.
Skin protection	Wear suitable protective gloves to prevent cuts and abrasions. When material is heated, wear gloves to protect against thermal burns. Suitable gloves can be recommended by the glove supplier. Wear suitable protective clothing.
Respiratory protection	When engineering controls are not sufficient to lower exposure levels below the applicable exposure limit, use a NIOSH approved respirator for dusts. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever work place conditions warrant a respirator's use. Seek advice from local supervisor. In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter.
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. Contaminated uniforms should be laundered separately from other clothing to prevent potential cross-contamination. If possible, an industrial laundry service should be used to eliminate the possibility of contaminating the home environment. Handle in accordance with good industrial hygiene and safety practices. Observe any medical surveillance requirements.

9. Physical & Chemical Properties

Appearance	Shapes, Solids, Tubes & Turnings.
Color	Yellow to red.
Odor	None.
Odor threshold	Not available.
Physical state	Solid.
Form	Solid. Shapes, Solids, Tubes & Turnings.
pH	Unknown.
Melting point	1814 - 1929.2 °F (990 - 1054 °C)
Freezing point	Not available.
Boiling point	Not available.
Flash point	Not available.
Evaporation rate	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Specific gravity	7.5 - 9
Solubility (water)	Insoluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Bulk density	0.27 - 0.323 lb/in ³ @ 68 F

10. Chemical Stability & Reactivity Information

Chemical stability	Massive metal is stable and non reactive under normal conditions of use, storage and transport.
Conditions to avoid	Contact with incompatible materials. Contact with acids will release flammable hydrogen gas. Avoid dust formation. Dust clouds may be explosive under certain conditions.
Incompatible materials	Acids. Ammonium nitrate. Fluoride. Halogens. Nitrates. Phosphorus. Strong oxidizing agents. Sulphur.
Hazardous decomposition products	Welding, burning, sawing, brazing, grinding or machining operations may generate dusts and fumes of metal oxides.

Possibility of hazardous reactions

Hazardous polymerization does not occur. Hot molten material will react violently with water resulting in spattering and fuming.

11. Toxicological Information

Toxicological data

Components

Test Results

Silicon (7440-21-3)

Acute Oral LD50 Rat: 3150 mg/kg

Acute effects

Acute exposure to cobalt metal, dust, and fume may cause irritation of skin and eyes. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea. Ingestion of cobalt may cause nausea, vomiting, diarrhea, and a sensation of hotness. High concentrations of freshly formed fumes/dusts of metal oxides can produce symptoms of metal fume fever.

Local effects

May cause irritation through mechanical abrasion.

Sensitization

May cause sensitization by inhalation and skin contact.

Chronic effects

Harmful: danger of serious damage to health by prolonged exposure through inhalation. Chronic inhalation of high concentrations of iron oxide fumes or dust may lead to benign pneumoconiosis (siderosis). Prolonged and repeated overexposure to dust and fumes can lead to benign pneumoconiosis (stannosis). Chronic exposure to breathing low levels of manganese dust or fume over a long period of time can result in "manganism," a disease of the central nervous system similar to Parkinson's Disease, gait impairment, muscle spasms and behavioral changes. Chronic inhalation of metallic oxide dust/fume may cause metal fume fever.

Carcinogenicity

Possible cancer hazard - may cause cancer based on animal data.

ACGIH Carcinogens

Aluminum (CAS 7429-90-5)

A4 Not classifiable as a human carcinogen.

Cobalt (CAS 7440-48-4)

A3 Confirmed animal carcinogen with unknown relevance to humans.

Nickel (CAS 7440-02-0)

A5 Not suspected as a human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

Cobalt (CAS 7440-48-4)

2B Possibly carcinogenic to humans.

Nickel (CAS 7440-02-0)

2B Possibly carcinogenic to humans.

US NTP Report on Carcinogens: Anticipated carcinogen

Nickel (CAS 7440-02-0)

Anticipated carcinogen.

US NTP Report on Carcinogens: Known carcinogen

Nickel (CAS 7440-02-0)

Known carcinogen.

Epidemiology

Based on epidemiological studies, pre-existing pulmonary disorders may be aggravated by prolonged exposure to high concentrations of metal dust or fumes. Pre-existing skin conditions including dermatitis might be aggravated by exposure to this product.

Mutagenicity

Suspected of causing genetic defects.

Neurological effects

Exposure to manganese fume/dust can affect the central nervous system (apathy, drowsiness, weakness and other chronic symptoms such as postural tremors).

Reproductive effects

In experimental animal studies, cobalt produces adverse developmental effects at doses that produce maternal toxicity. There are no human data on cobalt exposure during pregnancy.

Teratogenicity

Nickel: Has shown teratogenic effects in laboratory animals.

Symptoms and target organs

Irritation of nose and throat. Irritation of eyes and mucous membranes. Coughing. Wheezing. Shortness of breath. Sensitization.

Further information

Welding or plasma arc cutting of metal and alloys can generate ozone, nitric oxides and ultraviolet radiation. Ozone overexposure may result in mucous membrane irritation or pulmonary discomfort. UV radiation can cause skin erythema and welders flash.

12. Ecological Information

Ecotoxicity

Alloys in massive forms present a limited hazard for the environment. The product contains a substance which may cause long-term adverse effects in the environment.

Persistence and degradability

The product is not biodegradable.

Bioaccumulation / Accumulation

The product contains potentially bioaccumulating substances.

Partition coefficient (n-octanol/water)

Not available.

Mobility in environmental media

Alloys in massive forms are not mobile in the environment.

13. Disposal Considerations

Waste codes

Not regulated.

Disposal instructions

This material and its container must be disposed of as hazardous waste. Dispose in accordance with all applicable regulations.

Waste from residues / unused products

Recover and recycle, if practical. Solid metal and alloys in the form of particles may be reactive. Its hazardous characteristics, including fire and explosion, should be determined prior to disposal.

Contaminated packaging

Not applicable.

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

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 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 313 - Toxic Chemical: De minimis concentration

Aluminum (CAS 7429-90-5)	1.0 %
Cobalt (CAS 7440-48-4)	0.1 %
Copper (CAS 7440-50-8)	1.0 %
Manganese (CAS 7439-96-5)	1.0 %
Nickel (CAS 7440-02-0)	0.1 %
Zinc (CAS 7440-66-6)	1.0 %

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

Aluminum (CAS 7429-90-5)	Listed.
Copper (CAS 7440-50-8)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Zinc (CAS 7440-66-6)	Listed.

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

Copper: 5000
Nickel: 100
Zinc: 1000

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - Yes

Section 302 extremely hazardous substance (40 CFR 355, Appendix A)
No

Section 311/312 (40 CFR 370)
Yes

Drug Enforcement Administration (DEA) (21 CFR 1308.11-15)
Not controlled

Canadian regulations This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

WHMIS status Controlled

WHMIS classification D2A - Other Toxic Effects-VERY TOXIC
D2B - Other Toxic Effects-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)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
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)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
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 a chemical known to the State of California to cause cancer.

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

Aluminum (CAS 7429-90-5)	Listed.
Cobalt (CAS 7440-48-4)	Listed.
Copper (CAS 7440-50-8)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Tin (CAS 7440-31-5)	Listed.
Zinc (CAS 7440-66-6)	Listed.

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

Cobalt (CAS 7440-48-4)	Listed.
Nickel (CAS 7440-02-0)	Listed.

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

Cobalt (CAS 7440-48-4)	Listed: July 1, 1992 Carcinogenic.
Nickel (CAS 7440-02-0)	Listed: October 1, 1989 Carcinogenic.

US - Massachusetts RTK - Substance: Listed substance

Aluminum (CAS 7429-90-5)	Listed.
Cobalt (CAS 7440-48-4)	Listed.
Copper (CAS 7440-50-8)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Silicon (CAS 7440-21-3)	Listed.
Tin (CAS 7440-31-5)	Listed.
Zinc (CAS 7440-66-6)	Listed.

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

Aluminum (CAS 7429-90-5)	500 LBS
Copper (CAS 7440-50-8)	500 LBS
Manganese (CAS 7439-96-5)	500 LBS
Nickel (CAS 7440-02-0)	500 LBS
Zinc (CAS 7440-66-6)	500 LBS

US - New Jersey RTK - Substances: Listed substance

Aluminum (CAS 7429-90-5)	Listed.
Copper (CAS 7440-50-8)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Silicon (CAS 7440-21-3)	Listed.
Tin (CAS 7440-31-5)	Listed.
Zinc (CAS 7440-66-6)	Listed.

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

Cobalt (CAS 7440-48-4)	LISTED
Copper (CAS 7440-50-8)	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.
Cobalt (CAS 7440-48-4)	Listed.
Copper (CAS 7440-50-8)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Nickel (CAS 7440-02-0)	Listed.
Silicon (CAS 7440-21-3)	Listed.
Tin (CAS 7440-31-5)	Listed.
Zinc (CAS 7440-66-6)	Listed.

US - Pennsylvania RTK - Hazardous Substances: Special hazard

Nickel (CAS 7440-02-0)	Special hazard.
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16. Other Information

Recommended use	Manufacturing
Recommended restrictions	Use in accordance with supplier's recommendations.
Further information	HMIS® is a registered trade and service mark of the NPCA.
Other information	None known.
HMIS® ratings	Health: 2* Flammability: 0 Physical hazard: 2 Personal protection: X
NFPA ratings	Health: 2 Flammability: 0 Instability: 0 Special hazards: W
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