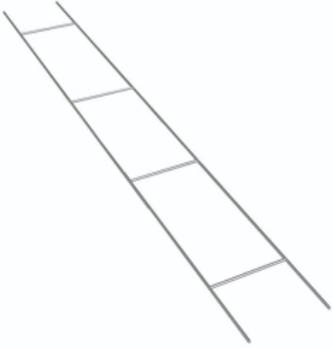




HOHMANN & BARNARD

Ladder Joint Reinforcement 220 Ladder-Mesh Reinforcement



DESCRIPTION

220 Ladder Mesh Reinforcement features cross rods spaced so block cells are not obstructed, allowing easy placement of vertical rebar. For single-wythe block walls.

PRODUCT ATTRIBUTES

Lengths: 10' (Standard Length)

Wire Size:

(S) Standard Weight: 9 Gauge Side Rods x 9 Gauge Cross Rods

Block Size: 8"

Finishes /Materials :

Hot-Dip Galvanized

NOTES

H&B recommends Stainless Steel for maximum protection against corrosion.

HOHMANN & BARNARD, INC.

Corporate
Headquarters

Branch/Subsidiary
Locations

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HOHMANN & BARNARD

Ladder Joint Reinforcement 220 Ladder-Mesh Reinforcement

MATERIAL CONFORMANCE

Hohmann & Barnard joint reinforcement products conform to:

ASTM A951/A951M (Standard Specification for Steel Wire for Masonry Joint Reinforcement)

ACI / ASCE 530 (Building Code Requirements for Masonry Structures)

Wire (Carbon Steel): Prefabricated from cold-drawn steel wire conforming to ASTM A1064/A1064M
Tensile Strength - 80,000 p.s.i. | Yield Point - 70,000 p.s.i. minimum
Zinc Coating: Hot-Dip Galvanized after fabrication : ASTM A153/A153M-B2 (1.5 oz/ft²)

Wire (Stainless Steel): ASTM A580/ASTM A580M - AISI Type 304 (Type 316 available on special order)

Wire Diameter /Dimensions :
9 gauge (.148" or W1.7) or 3/16" (.187" or W2.8) Side Rods and Cross Rods available :

- (S) Standard Weight: 9 ga. Side Rods x 9 ga. Cross Rods
- (EH) Extra Heavy: 3/16"Ø Side Rods x 9 ga. Cross Rods
- (SHD) Super Heavy Duty: 3/16"Ø Side Rods x 3/16"Ø Cross Rods
Cross Rods welded 16" O.C.

First Cross Rods welded 12" in from each end to allow lap splices per code requirements .

IMPORTANT

Since each construction project is unique , the appropriate selection and use of any product contained herein

must be determined by competent

architects , engineers and other

appropriate professionals who are familiar with the specific requirements of

Headquarters question .

Corporate Branch /Subsidiary
Headquarters Locations

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1. Identification

Product Identifier: **Wire Rod - Alloy Steel**

Manufacturer:

Hohmann & Barnard, Inc.
30 Rasons Court
Hauppauge, NY 11788
(631) 234-0600
www.h-b.com

Telephone Numbers

During normal business hours call: (800) 645-0616

24-hour emergency call Chemtrec: (800) 255-3924

Recommended use: Various alloy steel wire rod products for masonry construction projects.

Recommended restrictions: None known.

2. Hazards Identification

Emergency Overview

This formed solid metal product poses little or no immediate health or fire hazard. When product is subjected to welding, burning, grinding, melting, sawing, brazing, or other similar machining activities, potentially hazardous airborne particulate and fumes may be generated and should be evaluated by an industrial hygienist. Avoid inhalation of metal dusts and fumes. Operations having the potential to generate airborne particulates should be performed in well ventilated areas and, if it is impossible, respiratory protection and other personal protective equipment should be used. The presence of nonmetallic coatings (for example, oils, paints, epoxies, laminates, etc.) on steel products should be considered when evaluating potential employee health hazards during handling, welding, grinding, sanding or other fume/dust generating activities.

Potential Health Effects

Primary Entry Routes: Inhalation. Steel products in the natural state do not present an inhalation, ingestion or contact hazard. However, operations such as burning, welding, sawing, brazing, machining and grinding may result in the following effects if exposures exceed recommended limits as listed in Section 8.

Target Organs: Respiratory system

Acute Effects:

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

Chronic Effects:

Presented below are the potential health effects that have been identified for the ingredients listed that are of industrial hygiene significance.

- **IRON OXIDE:** Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in the development of a benign lung conditions known as pneumoconiosis, called siderosis, which is observable as an X-ray change. But, no physical impairment of lung function has been associated with siderosis.
- **ALUMINUM:** Aluminum dusts/fines are a low health risk by inhalation and should be treated as a nuisance dust.
- **CHROMIUM:** The health hazards associated with exposure to chromium are dependent upon its oxidation state. The metal form (chromium as it exists in this product) is of relatively low toxicity. Long term excessive inhalation of ferrochromium dusts and fumes may cause lung changes in exposed workers. Exposure to chromium metal does not give rise to pulmonary fibrosis or pneumoconiosis. The hexavalent form (Cr+6), unlike chromium metal is very toxic. Repeated or prolonged exposure to hexavalent chromium compounds may cause respiratory irritation, nosebleed, ulceration and perforation of the nasal septum. Industrial exposure to certain forms of hexavalent chromium has been related to an increased incidence of respiratory cancer.

- COPPER: Chronic exposure to copper dusts may result in runny nose, irritation of mucous membranes, and atrophic changes with resultant dementia. Chronic inhalation of copper dust has caused, in animals, hemolysis of the red blood cells, deposition of hemofuscin in the liver and pancreas, injury to lung cells and gastrointestinal symptoms.
- MANGANESE: Manganese dust and fume can act as minor irritants to the eyes and respiratory tract. Excessive inhalation exposure to manganese fume may result in a flulike illness termed metal fume fever. Chronic exposure to high concentrations of manganese fumes and dusts may adversely affect the central nervous system (CNS) 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.
- PHOSPHOROUS: Inhalation of dusts and fumes of ferrophosphorus and phosphorous oxides may cause respiratory irritation.
- SILICON: Silicon dusts are a low health risk by inhalation and should be treated as a nuisance dust.
- SULFUR: Sulfur compounds, present in the fumes, may irritate the skin, eyes, lungs and gastrointestinal tract. Long-term inhalation exposure to high concentrations (overexposure) to pneumoconiotic agents may act synergistically with inhalation of oxides, fumes or dusts of this product to cause toxic effects.

Carcinogenicity: The International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), and OSHA do not list steel products as carcinogens. IARC identifies nickel compounds as Group 1 (sufficient evidence for carcinogenicity in humans) and metallic nickel as Group 2B (possibly carcinogenic for humans). NTP lists nickel as Group 2 (reasonably anticipated to be a human carcinogen). The American Conference of Governmental Industrial Hygienists (ACGIH) lists insoluble nickel compounds as A1 (confirmed human carcinogen) and elemental/metallic nickel as A5 (not suspected as a human carcinogen). IARC lists chromium metal and trivalent chromium compounds as Group 3 (not classifiable as to their human carcinogenicity). ACGIH lists chromium metal and trivalent compounds as A4 (not classifiable as a human carcinogen). IARC identifies welding fumes as a Group 2B carcinogen, a mixture that is possibly carcinogenic to Humans.

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

3. Composition/Information on Ingredients

Ingredient Name	CAS Number	Percentage by wt.
Fe (Iron)	7439-89-6	Balance
Si (Silicon)	7440-21-3	3.5% max.
Mn (Manganese)	7439-96-5	2.0% max
P (Phosphorus)	7723-14-0	0.2% max
S (Sulfur)	7704-34-9	0.05% max.
Al (Aluminum)	7429-90-5	0.1% max.
Cu (Copper)	7440-50-8	0.1% max.
Cr (Chromium)	7440-47-3	0.5% max.

4. First-Aid Measures

Inhalation: For over-exposure to airborne fumes and particulate, remove exposed person to fresh air. If breathing is difficult or has stopped, administer artificial respiration or oxygen as indicated. Seek medical attention promptly. Metal fume fever may be treated by bed rest, and administering a pain and fever reducing medication.

Eye Contact: Treat for foreign body in the eye. Flush with large amounts of clean water to remove particles. Seek medical attention if irritation persists.

Skin Contact: Not anticipated to pose a significant skin hazard. However, should dermatitis develop, wash affected area thoroughly with mild soap and water. If irritation or other symptoms develop, seek medical attention. Remove contaminated clothing. If thermal burn has occurred, flush area with cold water and seek medical attention. If mechanical abrasion has occurred, seek medical attention.

Ingestion: Not considered an ingestion hazard.

5. Fire-fighting measures

Steel products do not present fire or explosion hazards under normal conditions. But, molten metal may react violently with water. High concentrations of metallic fines in the air may present an explosion hazard. Fire fighters are to wear full protective equipment, including full bunker gear and SCBA respiratory protection.

6. Accidental release measures

Any excess product can be recycled for further use, disposed in an appropriately permitted waste landfill, or disposed by other methods in accordance with local, state, and federal regulations. Finely divided, dry particles should be removed by vacuuming or wet sweeping to prevent spreading dusts. Avoid using compressed air.

Spill/Leak Procedures: Not applicable to steel in solid state. For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin. If material is in a dry state, avoid inhalation of dust. Fine, dry material should be removed by vacuuming or wet sweeping methods to prevent spreading of dust. Avoid using compressed air. Do not release into sewers or

waterways.

Collect material in appropriate, labeled containers for recovery or disposal in accordance with federal, state, and local regulations.

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

Disposal: Contact your supplier or a licensed contractor for detailed recommendations.

Follow applicable Federal, state, and local regulations.

7. Handling and storage

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

Storage Requirements: Store away from acids and incompatible materials.

8. Exposure controls/personal protection

Exposure Limits OSHA

Ingredient Name	CAS Number	OSHA PEL 1
Fe (Iron)	7439-89-6	10 mg/m - Iron oxide fume
Si (Silicon)	7440-21-3	15 mg/m - Total dust 5 mg/m - Respirable fraction
Mn (Manganese)	7439-96-5	5 mg/m (C) - Fume & Mn compounds
P (Phosphorus)	7723-14-0	0.1 mg/ m
S (Sulfur)	7704-34-9	15 mg/m - Total dust (PNOR) 5 mg/m - Respirable fraction (PNOR)
Al (Aluminum)	7429-90-5	15 mg/m - Total dust 5 mg/m - Respirable fraction
Cu (Copper)	7440-50-8	0.1 mg/m - Fume (as Cu) 1 mg/m - Dusts & mists (as Cu)
Cr (Chromium)	7440-47-3	1 mg/m - Chromium metal

Exposure Limits ACGIH

Ingredient Name	CAS Number	ACGIH TLV 2
Fe (Iron)	7439-89-6	5 mg/m - Iron oxide dust and
Si (Silicon)	7440-21-3	10 mg/m
Mn (Manganese)	7439-96-5	0.2 mg/m
P (Phosphorus)	7723-14-0	0.01 mg/m
S (Sulfur)	7704-34-9	10 mg/m - Inhalable fraction (PNOS) 3 mg/m - Respirable fraction (PNOS)
Al (Aluminum)	7429-90-5	10 mg/m - Metal Dust 5 mg/m - Welding fume
Cu (Copper)	7440-50-8	0.2 mg/m - Fume 1 mg/ m - Dusts & mists (as Cu)
Cr (Chromium)	7440-47-3	0.5 mg/m - Cr metal & Cr III compounds

*All commercial steel products may contain small amounts of various elements in addition to those specified. These small quantities (less than 0.1%) may exist as intentional additions, or as "trace" or "residual" elements that generally originate in the raw materials used. These elements may include: antimony, arsenic, boron, cadmium, calcium, cobalt, columbium, lead, molybdenum, nickel, tin, titanium, vanadium, and zirconium.

1. OSHA Permissible Exposure Limits (PELs) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A ("C") designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted. A Short Term Exposure Limit (STEL) is defined as a 15-minute exposure, which should not be exceeded at any time during a workday.
2. Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted.
3. PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the PNOR limit which is the same as the inert or nuisance dust limit of 15 mg/m³ for total dust and 5 mg/m³ for the respirable fraction.
4. Inhalable fraction. The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH TLVs and BEIs Appendix D, paragraph A.
5. PNOS (Particulates Not Otherwise Specified). Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos and <1% crystalline silica. A TWATLV of 10 mg/m³ for inhalable particulate and 3 mg/m³ for respirable particulate has been recommended.
6. Respirable fraction. The concentration of respirable dust for the application of this limit is to be determined from the fraction passing

a size-selector with the characteristics defined in the ACGIH TLVs and BEIs Appendix D, paragraph C.

Engineering Controls: Use controls as appropriate to minimize exposure to metal fumes and dusts during handling operations. Use lifting and work devices, e.g., crane, hoist, etc., within rated capacities and in accordance with manufacturer's instructions when handling these products. avoid breathing dust and fume evaluate potential employee exposure minimize generation of airborne emissions maintain surfaces free as practical of accumulated material use protective clothing as specified by an industrial hygienist or safety professional where exposure levels may be excessive do not smoke in work area wash hands before eating, drinking or smoking and after handling, change contaminated clothing before leaving work premises.

Ventilation: Provide general or local exhaust ventilation systems to minimize airborne concentrations. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls: Do not use compressed air to clean-up spills.

Respiratory Protection: Seek professional advice prior to respirator selection and use.

Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen.

Skin and eye protection: For operations which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use protective clothing, gloves and safety glasses to prevent skin and eye contact.

Contact lenses should not be worn where industrial exposures to this material are likely.

Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations. Protective gloves should be worn as required for welding, burning or handling operations.

9. Physical and chemical properties

Physical State: Solid Water

Appearance: Metallic Gray

Odor: Odorless

Vapor Pressure: Not applicable

Vapor Density (Air=1): Not applicable

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

LEL: Not applicable

Flash Point Method: Not applicable

Solubility: Insoluble

Boiling Point: Not applicable

Flash Point: Not applicable

Evaporation Rate: Not applicable

Freezing/Melting Point: ~2750 °F

pH: Not applicable

UEL: Not applicable

Flammability Classification: Non-flammable, non-combustible

Unusual Fire or Explosion Hazards: Not applicable for solid product. Do not use water on molten metal.

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

10. Stability and reactivity

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

Polymerization: Hazardous polymerization cannot occur.

Chemical Incompatibilities: Will react with strong acids to form hydrogen. Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.

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

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

11. Toxicological information

No information is available for the product as a mixture.

Eye Effects: Eye contact with the individual components may cause particulate irritation.

Implantation of iron particles in guinea pig corneas have resulted in rust rings with corneal softening about rust ring.

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

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

Acute Oral Effects: No data available

Other: No LC₅₀ or LD₅₀ has been established for the mixture as a whole.

Iron LD₅₀: 30 g/kg oral (rat). Aluminum LD₅₀: No data. Boron LD₅₀: 2000 mg/kg oral (mouse).

Calcium LD₅₀: No data. Carbon LD₅₀: No data. Copper TDLo: 120 ug/kg oral (human).

Manganese LD₅₀: 9 g/kg oral (rat). Phosphorous LD₅₀: No data. Silicon LD₅₀: 3160 mg/kg oral (rat). Sulfur LD₅₀: >8437 mg/kg oral (rat).

Chronic Effects, Carcinogenicity: See Section 8.

Mutagenicity, Teratogenicity: No data available

12. Ecological Information

Steel products in their usual form do not pose an ecological hazard.

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

Environmental Degradation: No data available.

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

13. Disposal Considerations

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

Disposal: Steel scrap 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.

14. Transport information

Not a hazardous material for DOT shipping.

15. Regulatory Information

Regulatory Information: The following listing of regulations relating to a POSCO 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.

And those followings are described (listed) by counting of first importance to USA.

OSHA Regulations:

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

EPA Regulations:

RCRA(40CFR261): Steel scrap is not regulated as a solid waste or a hazardous waste under this act. If product dusts and/or fumes from processing operations are not recycled, they are considered to be a solid waste and may be classified as a hazardous waste depending on the toxicity characteristics of the dust as defined within 40CFR261.24.

CERCLA Hazardous Substance (40 CFR 302.4): The product as a whole is not listed.

However, individual components of the product are listed: Copper (Reportable Quantity (RQ)-5000#). Manganese compounds are also listed although no reportable quantity is assigned to this generic or broad class.

SARA 311/312 Codes (40CFR370): Immediate (acute) health hazard and delayed (chronic) health hazard.

SARA 313(40CFR372.65): Manganese is subject to SARA 313 reporting requirements.

Please note that if you prepackage or redistribute this product to industrial customers, SARA 313 requires that a notice be sent to those customers.

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

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

- Hazardous Substances: Calcium, Silicon and Sulfur.
- Environmental Hazards: Aluminum, Copper and Manganese.

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

- Hazardous Substance: Aluminum (dust and fume), Copper, Manganese and Sulfur.
- Special Health Hazard Substances: Calcium.

California Prop. 65: The product may possibly contain trace quantities (generally much less than 0.1%) of metallic elements known to the State of California to cause cancer or reproductive toxicity. These include arsenic (inorganic), cadmium, lead and nickel.

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

16. Other information

Issue Date: May 31, 2015

Revision Date: April 20, 2018

Disclaimer: All information, recommendations, and suggestions appearing herein concerning this product are taken from sources or based upon data believed to be reliable. Although reasonable care has been taken in the preparation of this information, Hohmann & Barnard extends no warranties or guarantees, express or implied, makes no representations, and assumes no responsibility as to the accuracy, reliability or completeness of the information presented. Since the actual use of the product described herein is beyond our control, POSCO assumes no liability arising out of the use of the product by others. It is the user's responsibility to determine the suitability of the information presented herein, to assess the safety and toxicity of the product under their own conditions of use, and to comply with all applicable laws and regulations. Appropriate warnings and safe handling procedures should be provided to handlers and users.



1. Identification

Product Identifier: **Mill Galvanized Steel Wire Products**

Manufacturer:

Hohmann & Barnard, Inc.
30 Rasons Court
Hauppauge, NY 11788
(631) 234-0600
www.h-b.com

Telephone Numbers

During normal business hours call: (800) 645-0616
24-hour emergency call Chemtrec: (800) 255-3924

Recommended use: Various mill galvanized steel wire rod products for masonry construction projects.

Recommended restrictions: None known.

2. Hazards Identification

Signal Word: DANGER



GHS Label Statements:

- Suspected of causing cancer.
- Suspected of damaging fertility or the unborn child.
- Causes damage to lungs through prolonged or repeated inhalation exposure.
- Harmful if swallowed.
- May cause an allergic skin reaction.
- May cause respiratory irritation.
- Causes eye irritation.

GHS Classifications:

- This product is considered hazardous by The 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)
- Carcinogenicity-2
- Single Target Organ
- Acute Toxicity-Oral 4
- STOT Single Exposure - 3
- Toxic to Reproduction - 2
- Toxicity (STOT) Repeat Exposure - 1
- Skin Sensitization - 1
- Eye Irritation - 2B

Steel products in their solid state present no inhalation, ingestion, or contact hazard. Operations such as burning, welding, sawing, brazing, grinding, and machining, which result in the generation of airborne particulates, may present hazards to the respiratory system. **SHORT-TERM (ACUTE) EXPOSURE:** Excessive inhalation of metallic fumes and dusts may result in irritation of eyes, nose and throat. High concentrations of fumes of iron-oxide, zinc, lead and manganese may result in metal fume fever. Metal Fume Fever is characterized by chills, fever, vomiting, irritation of throat, upset stomach, and body aches and siderosis. **LONG-TERM (CHRONIC) EXPOSURE:** Chronic and prolonged inhalation of high concentration of fumes or dust may lead to the following conditions:

- Iron-Oxide = Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis).
- Lead = Anemia, urinary dysfunction, weakness, constipation, nausea, nervous disorder. Lead is listed as a Group 2B possible human carcinogen by IARC.
- Zinc Oxide= May cause metal fume fever. Gastrointestinal inflammation reported in animal studies. Manganese = Bronchitis, pneumonitis, and lack of coordination.
- Nickel = Lesions of the skin and mucos membranes, possible cancer of the nose and lungs-Bronchogenic Carcinoma. Nickel is listed as a Group 2B possible human carcinogen by IARC.

PRECAUTIONARY STATEMENTS:

- Do not breathe dusts / fume / spray.
- Wear protective gloves / protective clothing / eye protection / face protection.
- 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.
 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.

Hazards Not Otherwise Classified: None Known
 Unknown Acute Toxicity Statement (mixture): None Known

3. Composition/Information on Ingredients

Component	CAS #	% Composition
Iron	7439-89-6	Balance
Zinc	7440-66-6	0-8.0
Manganese	7439-96-5	0-1.00
Nickel	7440-02-0	0-0.10
Lead	7439-92-1	0-0.10

4. First-Aid Measures

Eye Exposure: Flush eyes with plenty of water or saline for at least 15 minutes. SEEK MEDICAL ATTENTION.
Skin Exposure: Wash skin with soap and water for at least 15 minutes. If irritation develops, SEEK MEDICAL ATTENTION.
Inhalation: Move to fresh air. If not breathing, administer artificial respiration. If breathing is difficult, give oxygen. SEEK MEDICAL ATTENTION.
Ingestion:
 Never give fluids or induce vomiting if the victim is unconscious or having convulsions. SEEK MEDICAL ATTENTION.

5. Fire-fighting measures

Fire Hazard Data:

Flammable Properties

This product does not present fire or explosion hazards as shipped. Small chips, turnings, dust, and fines from processing may be readily ignitable.

Fire/Explosion

May be potential hazard under the following conditions:

Dust or fines dispersed in the air can be explosive. Even a minor dust cloud can explode violently. Chips, dust or fines in contact with water can generate flammable/explosive hydrogen gas. Hydrogen gas could present an explosion hazard in confined or poorly ventilated spaces. Fines and dust in contact with certain metal oxides (e.g., rust), molten metal in contact with water/moisture or other metal oxides (e.g., rust) and moisture entrapped by molten metal can be explosive.

Extinguishing Media:

Use Class D extinguishing agents on dusts, fines, or molten metal. Use coarse water spray on chips and turnings.

Special Fire Fighting Procedures:

Fire fighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus, and full protective clothing when appropriate. Avoid breathing metal oxide fumes, which may cause metal fume fever.

Unusual Fire and Explosion Hazards:

When heated beyond melting point, metal vapor burns in the air with a bright greenish-yellow flame to produce zinc oxide fumes.

6. Accidental release measures

Cleanup and Disposal of Spill:

Avoid inhalation, eye, or skin contact of dusts by using appropriate precautions outlined in this MSDS (see section 8). Fine turnings and small chips should be swept or vacuumed and placed into appropriate disposable containers. Keep fine dust or powder away from sources of ignition. Scrap should be reclaimed for recycling. Prevent materials from entering drains, sewers, or waterways. Discard any product, residue, disposable container, or liner in full compliance with federal, state, and local regulations.

7. Handling and storage

Product should be kept dry. Avoid generating dust. Avoid contact with sharp edges or heated metal. PACKAGES OF THIS MATERIAL MAY CONTAIN EXTREME INTERNAL STRESSES AND STORED MECHANICAL ENERGY. USE STANDARD INDUSTRY PRACTICES AND/OR CONSULT YOUR COMPANY'S SAFETY DEPARTMENT FOR PROPER PROCEDURES FOR HANDLING, OPENING, AND CUTTING.

Requirements for Processes, Which Generate Dusts or Fumes

If processing of these products includes operations where dust or extremely fine particulate is generated, obtain and follow the safety procedures and equipment guides contained in National Fire Protection Association (NFPA) brochure listed in Section 16. Cover and reseal partially empty containers. Use non-sparking handling equipment. Provide grounding and bonding where necessary to prevent accumulation of static charges during dust handling and transfer operations (See Section 16). Local ventilation and vacuum systems must be designed to handle explosive dusts. Dry vacuums and electrostatic precipitators must not be used. Avoid all ignition sources. Good housekeeping practices must be maintained.

8. Exposure controls/personal protection

Engineering Controls

Use with adequate explosion-proof ventilation to meet the limits listed in Section 8.

Personal Protective Equipment

Respiratory Protection: Use NIOSH-approved respiratory protection as specified by an Industrial Hygienist or other qualified professional if concentrations exceed the limits listed in Section 8.

Eye Protection: Wear safety glasses/goggles to avoid eye contact.

Skin Protection: Wear impervious gloves to avoid repeated or prolonged skin contact with residual oils and to avoid any skin injury.

General

Personnel who handle and work with molten metal should utilize primary protective clothing like face shields, fire resistant tapper's jackets, leggings, spats, and similar equipment to prevent burn injuries. In addition to primary protection, secondary or day-to-day work clothing that is fire resistant and sheds metal splash is recommended for use with molten metal.

Minimize breathing oil vapors and mist from those products coated with oil. Remove oil-contaminated clothing; launder or dry-clean before reuse. Remove oil contaminated shoes and thoroughly clean and dry before reuse.

Cleanse skin thoroughly after contact, before breaks and meals, and at the end of the work period. Oil coating is readily removed from skin with waterless hand cleaners followed by a thorough washing with soap and water.

Component	ACGIH	NIOSH	OSHA-PELs
Iron	ND	ND	ND
Manganese	TWA 0.2 mg/m3	ND	Ceiling 5 mg/m3
Nickel	TWA 1.5 mg/m3	ND	1 mg/m3
Zinc Oxide	TWA 10 mg/m3; (Inhalable particulate matter containing no asbestos and <1% crystalline silica) TWA 5 mg/m3; STEL 10mg/m3	(fume): 5 mg/m3 TWA, 10 mg/m3 STEL REL (total dust): 5 mg/m3 TWA, 15 mg/m3 TWA ceiling (15-min)	Total dust: 15 mg/m3; Respirable fraction: 5.0 mg/m3

9. Physical and chemical properties

Appearance (physical state, color, etc.): Metallic Gray, Odorless

Odor: NA

Odor Threshold: NA

pH: NA

Melting Point: 2800°F / 621.37 °F lead

Partition Coefficient n-octanol/water: ND

Auto-ignition Temperature: NA

Decomposition Temperature: ND

Viscosity: NA

Upper/lower Flammability or Explosive Limits: NA

Vapor Pressure: NA

Vapor Density (Air = 1): NA

Relative Density: 7.85 g/cc Coating: 7.14 g/cc

Solubility(ies): Insoluble

Flash Point: NA

Evaporation Rate: NA

Flammability (solid, gas): Non-flammable, non-combustible

NA - Not Applicable

ND - Not Determined for product as a whole

10. Stability and reactivity

Stability: Stable under normal conditions of use, storage, and transportation as shipped.

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. Hydrogen peroxide will react violently in contact with lead. (Water reacts violently with molten metals).

Hazardous Decomposition Products: Fumes and certain noxious gases, such as CO, may be produced from welding or burning operations. Lead oxide fumes can result if temperatures exceed the melting point for lead, 621.37 °F.

11. Toxicological information

Health Effects of Ingredients

A: General Product 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 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 effected area. Ingestion overexposure to iron may affect the gastrointestinal, nervous, and hematopoietic system and the liver. Iron and steel founding, but not iron oxide, has been listed as potentially carcinogenic by IARC.

When this product is welded, fumes are generated. Welding fumes may be different in composition from the original welding product, with the chief component being ordinary oxides of the metal being welded. Chronic health effects (including cancer) have been associated with the fumes and dusts of individual component metals (see above), and welding fumes as a general category have been listed by IARC as a carcinogen (Group B). 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 manganese, zinc and iron. 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.

B: Component Analysis – LD50/LC50

Manganese (7439-96-5)

Oral LD50 Rat: 9gm/kg

Carcinogenicity

A. General Product Information

No information available for product.

12. Ecological Information

A: General Product Information

No information available for product.

B: Component Analysis – Ecotoxicity – Aquatic Toxicity

No ecotoxicity data was found for this product's components.

Environmental Fate

No information found for product.

13. Disposal Considerations

Disposal Instructions

Reuse or recycle material whenever possible. Material may be disposed of at an industrial landfill.

US EPA Waste Number & Descriptions

A. General Product Information

RCRA Status: Must be determined at time material is disposed. If material is disposed as waste, it must be characterized under RCRA according to 40 CFR, Part 261, or state equivalent in the U.S.

B. Component Waste Numbers

RCRA waste codes other than described under Section A may apply depending on use of product. Refer to 40 CFR 261 or state equivalent in the U.S.

14. Transport information

US Department of Transportation Shipping Name: Not regulated

15. Regulatory Information

US Federal Regulations

Component Analysis

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

Manganese (7439-96-5)

SARA 313: form R reporting required for 1.0% de minimis concentration

Nickel (7440-47-3)

SARA 313: form R reporting required for 0.1% de minimis concentration

Zinc (7440-66-6)

SARA 313: form R reporting required for 1.0% de minimis concentration

Lead (7439-92-1)

SARA 313: form R reporting required for 100 pound processing, manufacturing, and otherwise used threshold

SARA 311/312 Physical and Health Hazard Categories:

Immediate (acute) Health Hazard: Yes, if particulates/fumes generated during processing.

Delayed (chronic) Health Hazard: Yes, if particulates/fumes generated during processing.

Fire Hazard: No

Sudden Release of Pressure: No

Reactive: Yes, if molten

State Regulations

Component Analysis – State

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

Component	CA	MA	MI	NJ	PA
Iron	No	No	No	No	No
Manganese	No	Yes	No	Yes	Yes
Nickel	No	Yes	Yes	Yes	Yes
Zinc	No	Yes	Yes	Yes	Yes
Lead	Yes	Yes	Yes	Yes	Yes

The following statement is provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): WARNING! This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Other Regulations

A: General Product Information

In reference to Title VI of the Clean Air Act of 1990, this material does not contain nor was it manufactured using ozone-depleting chemicals.

B: Components Analysis – WHMIS IDL

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

Component CAS # Minimum Concentration

Manganese 7439-96-5 1% item 974(1077)

16. Other information

Issue Date: May 31, 2015

Revision Date: April 20, 2018

Disclaimer: All information, recommendations, and suggestions appearing herein concerning this product are taken from sources or based upon data believed to be reliable. Although reasonable care has been taken in the preparation of this information, Hohmann & Barnard extends no warranties or guarantees, express or implied, makes no representations, and assumes no responsibility as to the accuracy, reliability or completeness of the information presented. Since the actual use of the product described herein is beyond our control, POSCO assumes no liability arising out of the use of the product by others. It is the user's responsibility to determine the suitability of the information presented herein, to assess the safety and toxicity of the product under their own conditions of use, and to comply with all applicable laws and regulations. Appropriate warnings and safe handling procedures should be provided to handlers and users.



1. Identification

Product Identifier: **Zinc Metal: Special High Grade**

Manufacturer:

Hohmann & Barnard, Inc.
30 Rasons Court
Hauppauge, NY 11788
(631) 234-0600
www.h-b.com

Telephone Numbers

During normal business hours call: (800) 645-0616
24-hour emergency call Chemtrec: (800) 255-3924

2. Hazards Identification

EMERGENCY OVERVIEW:

Short Term Overexposure: ZINC: Inhalation of high levels of zinc vapor (zinc oxide fumes) may result in tightness of chest, metallic taste, cough, dizziness, fever, chills, headache, nausea, and dry throat. Overexposure may produce symptoms known as metal fume fever or "zinc shakes"; an acute, self-limiting condition without recognized complications. Symptoms of metal fume fever include: chills, fever, muscular pain, nausea and vomiting.

Long Term Overexposure: ZINC: Chronic exposure to zinc may cause respiratory tract irritation with nasopharyngitis and laryngitis
Medical Conditions Generally Aggravated By Exposure: Inhalation of dust may be an irritant to pre-existing respiratory conditions

Prevention: Avoid contact with acids and alkalis..

Route of Exposure: PRIMARY: Inhalation, if material has been heated above the boiling point, driving off zinc fume.
SECONDARY: Ingestion of dusts..

GHS Ratings:

Inhalation Toxicity: Acute 4

GHS Hazards

H332 May be harmful if inhaled

GHS Precautions

P261 Avoid breathing dust/fume/gas/mist/vapours/spray

P271 Use only outdoors or in a well-ventilated area

P312 Call a POISON CENTER or doctor/physician if you feel unwell

P304+P340

IF INHALED: Remove victim to fresh air and Keep at rest in a position comfortable for breathing

Signal Word: Warning



POTENTIAL HEALTH EFFECTS:

Inhalation: Inhaling dust may be an irritant to pre-existing respiratory conditions.

Skin: No data found.

Ingestion: No data found.

Eyes: No data found.

Carcinogenicity: N/A.

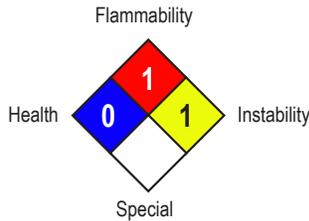
3. Composition/Information on Ingredients

Component	CAS No.	%
ZINC	7440-66-6	99.9
PROPRIETARY INGREDIENTS	N/A	0.1

Hazardous Material Information System (HMIS)

National Fire Protection Association (NFPA)

Health	1
Flammability	1
Physical Hazard	1
Personal Protection	



HMIS & NFPA Hazard Rating Legend

- * = CHRONIC HEALTH HAZARD
- 0 = INSIGNIFICANT
- 1 = SLIGHT
- 2 = MODERATE
- 3 = HIGH

4. First-Aid Measures

Symptoms resulting from inhalation overexposure usually disappear within 24 hours. Symptomatic treatment, such as bed rest and possibly aspirin is recommended to provide relief from fever and chills. In all cases, consult physician for medical attention.

5. Fire-fighting measures

FLASH POINT: N/A

EXTINGUISHING MEDIA: Smother and cool with a suitable dry extinguishing agent (class D fires) such as dry powder (Ansul Met-L-X), zinc oxide or dry sand. Water should not be used; however wherever it is necessary to cool exposures, extreme caution should be taken to prevent contact with molten zinc or burning zinc products.

HAZARDOUS COMBUSTION PRODUCTS: No data found.

FIRE FIGHTING PROCEDURES: No Data Found.

FIRE FIGHTER PROTECTION: Use NIOSH/MSHA approved self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Heating of metal beyond boiling point results in evolution of zinc vapors, which immediately reacts with air to form zinc oxide fume. Slabs must be completely dry before charging into molten metal to prevent a steam explosion.

6. Accidental release measures

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Material should be contained for recycling.

WASTE DISPOSAL METHODS: Material may be recycled or disposed of in accordance with Federal, State, and Local Environmental Regulations. This material may be regulated under CERCLA, TSCA, SARA, and/or RCRA Regulations.

CLEAN WATER ACT REQUIREMENTS: No data found

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) REQUIREMENTS: No data found

7. Handling and storage

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in a dry location, separate from acids and alkalis. Keep metal dry so it does not contain any moisture when ready for use.

OTHER PRECAUTIONS: Damp slabs placed in molten metal may result in a steam explosion. Always practice good personal hygiene when working in areas where this material exists.

REGISTRATIONS/CERTIFICATIONS: No data found.

8. Exposure controls/personal protection

ENGINEERING CONTROLS: No data found

ADMINISTRATIVE CONTROLS: No data found

VENTILATION: Local exhaust or other ventilation that will reduce dust concentrations to less than permissible exposure limits

PROTECTIVE GLOVES: Recommended to prevent skin irritation in hypersensitive individuals

EYE PROTECTION: Use safety eyewear for protection against airborne particulate matter.

RESPIRATORY PROTECTION (SPECIFIC TYPE): Use NIOSH/MSHA approved type respirator for protection against dust and metal fume.

OTHER: To prevent burns from contact with molten metal, appropriate protective garments should be worn. Such garments may include aprons, face shields, leggings, etc., depending on conditions of use.

LOCAL EXHAUST: N/A.

MECHANICAL (GENERAL): N/A

SPECIAL: N/A

OTHER: N/A.

9. Physical and chemical properties

Physical Form: Solid

Appearance: Silver-white, or Bluish-white metal

Color: No data found

Boiling Point: 1665°F

Melting Point: 788°F

Freezing Point: No data found

Specific Gravity: 7.12

Density: No data found

Bulk Density: No data found

Viscosity: No data found

pH: No data found

Water Solubility: Negligible

Partition Coefficient-Octanol / Water: No data found

Molecular Weight: No data found

Decomposition Temp.: No data found

Taste: No data found

Odor: None

Odor Threshold: No data found

Vapor Pressure: 0.13kPa @ 909°F

Vapor Density: N/A

Evaporation Rate: N/A

VOC (Weight): No data found

VOC (Volume): No data found

Volatiles (Weight): No data found

Volatiles (Volume): No data found

Flash Point: N/A

Upper Explosion Limit: N/A

Lower Explosion Limit: N/A

Auto Ignition: No data found

Flammability (Solid, Gas): No data found

10. Stability and reactivity

STABILITY: Stable.

HAZARDOUS DECOMPOSITION: Zinc boils off as vapor at elevated temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: None.

INCOMPATIBLE MATERIALS: Avoid contact with acids and alkalis.

11. Toxicological information

ROUTES OF ENTRY: PRIMARY: Inhalation, if material has been heated above the boiling point, driving off zinc fume.

SECONDARY: Ingestion of dusts.

TARGET ORGANS: No data found.

EFFECTS OF OVEREXPOSURE:

Short Term Overexposure: ZINC: Inhalation of high levels of zinc vapor (zinc oxide fumes) may result in tightness of chest, metallic taste, cough, dizziness, fever, chills, headache, nausea, and dry throat. Overexposure may produce symptoms known as metal fume fever or "zinc shakes"; an acute, self-limiting condition without recognized complications. Symptoms of metal fume fever include: chills, fever, muscular pain, nausea and vomiting.

Long Term Overexposure: ZINC: Chronic exposure to zinc may cause respiratory tract irritation with nasopharyngitis and laryngitis.

CARCINOGENICTY: None.

12. Ecological Information

No data available for this product.

13. Disposal Considerations

Material may be recycled or disposed of in accordance with Federal, State, and Local Environmental Regulations. This material may be regulated under CERCLA, TSCA, SARA, and/or RCRA Regulations.

14. Transport information

D.O.T. Shipping Information: Not data found.

I.M.O. Shipping Information: Not data found.

15. Regulatory Information

No data found.

16. Other information

Issue Date: May 31, 2015

Revision Date: April 20, 2018

The data in this Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. This information is taken from sources or based upon data believed to be reliable; however, Hohmann & Barnard, Inc. disclaims any warranty, express or implied, as to the absolute correctness or sufficiency of any of the foregoing or that additional or other measures may be required under particular conditions.

The information contained herein is based on current knowledge and experience; no responsibility is accepted and that the information is sufficient or correct in all cases. Users should consider this data only as a supplement to other information. Users should make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials, the safety and health of employees and customer, and the protection of the environment.

1. Identification

Product Identifier: **Stainless Steel Products (Types 304 and 316)**

Manufacturer:

Hohmann & Barnard, Inc.
30 Rasons Court
Hauppauge, NY 11788
(631) 234-0600
www.h-b.com

Telephone Numbers

During normal business hours call: (800) 645-0616
24-hour emergency call Chemtrec: (800) 255-3924

Recommended use: Various stainless steel products for masonry construction.

Recommended restrictions: None known.

2. Hazards Identification

Description of hazards

Dust and fumes may be generated during working, e.g. during welding, cutting or grinding. Long term over-exposure to air pollutants in the form of dust or fumes may affect health and cause, for instance, chronic bronchitis.

A thin coat of anti-corrosion oil is applied to certain materials. This should be taken into account during handling and working. Heating and working of materials that have been coated with anti-corrosion oil may cause irritating and hygienically harmful fumes. Skin irritation may be caused by repeated or extended contact with anti-corrosion oil.

3. Composition/Information on Ingredients

Material/Component	CAS Number	% Weight	
		TYPE 304	TYPE 316
<u>Alloying Elements</u>			
Carbon (C)	7440-44-0	0.08 max	0.08 max
Manganese (Mn)	7439-96-5	2.0 max	2.0 max
Phosphorous (P)	7723-14-0	0.045 max	0.045 max
Sulfur (S)	7704-34-9	0.030 max	0.030 max
Silicon (Si)	7440-21-3	2.0 max	0.75 max
Chromium (Cr)	7440-47-3	18.0-20.0	18.0-20.0
Nickel (Ni)	7440-02-0	8.0-12.0	8.0-12.0
Molybdenum (Mo)	7439-98-7	0.0	2.0-3.0
Nitrogen (N)	7727-37-9	0.10 max	0.10 max
<u>Base Metal</u>			
Iron (Fe)	7439-89-6	Balance	Balance

NOTE: The above listing is a summary of elements used to alloy stainless steel. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts.

4. First-Aid Measures

Description of Necessary First Aid Measures:

Eye contact: flush eyes with plenty of water for at least 15 minutes. seek medical attention if eye irritation persists.

Skin contact: maintain good personal hygiene. wash affected area with mild soap and water. seek medical attention if skin irritation persists.

Inhalation: remove to fresh air. check for clear airway, breathing and presence of pulse. If necessary administer CPR. Consult a physician immediately.

Ingestion: Rare in industry. dust may irritate mouth and gastrointestinal tract. If ingested, seek medical attention promptly.

Most important symptoms/effects, acute and delayed:

Stainless steel as sold and shipped is not likely to present an acute or chronic health effects. However, during processing (cutting, milling, grinding, melting or welding) emitted byproducts may cause irritations, difficulty in breathing, coughing or wheezing. may cause allergic skin reactions. Indication of immediate medical attention and special treatment needed, if necessary:

Notes to physician: May cause sensitization by skin contact or inhalation. Treat symptomatically.

5. Fire-fighting measures

SUITABLE EXTINGUISHING MEDIA: Non-flammable. Will not support combustion. Not applicable for solid product. Use extinguishers appropriate for surrounding materials.

Do not use water on molten metal.

SPECIFIC HAZARDS ARISING FROM MATERIAL: Not applicable for solid product.

HAZARDOUS COMBUSTION PRODUCTS: At temperatures above the melting point, fumes containing metal oxides and other alloying elements may be liberated.

SPECIAL PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIRE FIGHTERS:

Firefighters should wear self-contained NIOSH-approved breathing apparatus and full protective clothing.

EXPLOSION DATA:

SENSITIVITY TO MECHANICAL IMPACT: None.

SENSITIVITY TO STATIC DISCHARGE: N/A

6. Accidental release measures

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES:

Not applicable to stainless steel in solid state. Avoid dust formation. Ensure adequate ventilation. Clean-up personnel should be protected against contact with eyes and skin protection.

ENVIRONMENTAL PRECAUTIONS: Not applicable to stainless steel in solid state.

METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP:

Not applicable to stainless steel in solid state. For spills involving fine dusts, remove by vacuuming or wet sweeping methods to prevent spreading of dust. Avoid inhalation of dusts.

7. Handling and storage

PRECAUTIONS FOR SAFE HANDLING: Not applicable to stainless steel in solid state. Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Practice good housekeeping.

Avoid breathing metal fumes and/or dust.

CONDITIONS FOR SAFE STORAGE: No special storage conditions for stainless steel in solid state.

INCOMPATIBLE PRODUCTS: Store away from acids and incompatible materials.

8. Exposure controls/personal protection

CONTROL PARAMETERS: There are no exposure limits for stainless steel.

The exposure limit for iron-containing fumes has been established at 5 mg/m³ with ACGIH's TWA. The individual complex compounds within the fume may have lower exposure limits than the general fume.

Material/Component	CAS Number	Exposure Limits OSHA PEL (mg/m ³)	ACGIH TLV (mg/m ³)
<u>Alloying Elements</u>			
Carbon (C)	7440-44-0	None Listed	None Listed
Manganese (Mn)	7439-96-5	5.0 as Mn	1.0 as Mn
Phosphorous (P)	7723-14-0	0.1 as P	0.1 as P
Sulfur (S)	7704-34-9	13 (Sulfur Dioxide)	5 (Sulfur Dioxide)
Silicon (Si)	7440-21-3	None Listed	None Listed
Chromium (Cr)	7440-47-3	1.0 as Cr	0.5 as Cr
Nickel (Ni)	7440-02-0	1.0 as Ni	1.0 as Ni
Molybdenum (Mo)	7439-98-7	5.0 Sol. Cmpds	5.0 Sol. Cmpds
Nitrogen (N)	7727-37-9	None Listed	Simple Asphyxiant
<u>Base Metal</u>			
Iron (Fe)	7439-89-6	(Fe ₂ O ₃ Fume)	5 (Fe ₂ O ₃ Fume)

Notes:

- Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH 2011) are 8-hour Time Weighted Average concentrations unless otherwise noted.

APPROPRIATE ENGINEERING CONTROLS: Provide general or local exhaust to minimize airborne concentrations during milling, grinding, melting and welding operations.

INDIVIDUAL PROTECTIVE MEASURES: Dependent upon process being performed on material each operation must be addressed for suitable equipment.

GLOVES (Specify): Wear gloves as required EYES (Specify): Safety glasses or goggles as required.

CLOTHING (Specify): N/A FOOTWEAR (Specify): N/A

RESPIRATOR (Specify): If concentrations exceed established limits use NIOSH/MSHA approved particulate respirators (dust & fume or high efficiency dust fume) when grinding or welding.

OTHER (Specify): N/A

9. Physical and chemical properties

PHYSICAL STATE: Solid	APPEARANCE: Silver Grey Metallic (Steel)
ODOR: Not Applicable	ODOR THRESHOLD: Not Applicable
pH: Not Applicable	MELTING POINT: 1530°C (2786°F)
BOILING POINT: Not Applicable	FLASH POINT (°C): N/A
EVAPORATION RATE: Not Applicable	FLAMMIBILITY (solid, Gas): Not flammable
UPPER FLAMMABLE LIMIT %: Not Applicable	LOWER FLAMMABLE LIMIT %: Not Applicable
VAPOUR PRESSURE: Not Applicable	VAPOUR DENSITY: Not Applicable
RELATIVE DENSITY: 7.86	SPECIFIC GRAVITY: No data
SOLUBILITY: Not soluble	PARTITION COEFFICIENT: No data
AUTO-IGNITION TEMP (°C): Not Applicable	DECOMPOSITION TEMPERATURE: No data
VISCOSITY: Not Applicable	
OTHER INFORMATION: Not Applicable	

10. Stability and reactivity

REACTIVITY: Not determined for product in solid form.
CHEMICAL STABILITY: Yes. Steel products are stable under normal storage and handling conditions.
POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization cannot occur.
CONDITIONS TO AVOID: Contact with mineral acids will release flammable hydrogen gas. Dust formation.
INCOMPATIBLE MATERIALS: Yes, strong acids.
HAZARDOUS DECOMPOSITION PRODUCTS: Not Applicable.

11. Toxicological information

LIKELY ROUTES OF ENTRY: None for stainless steel in its natural solid state.
EYES: High concentrations of dust may cause irritation to the eyes.
SKIN: Prolonged skin contact with coated steel may cause skin irritation in sensitive individuals.
INHALATION: Inhalation of metal particulate or elemental oxide fumes generated during welding, burning, grinding or machining may pose acute or chronic health effects.
SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS: None for stainless steel in its natural solid state.
EFFECTS OF ACUTE EXPOSURE TO MATERIAL: MANGANESE & COPPER: Inhalation overexposure to manganese or copper (or zinc coated products) may cause metal fume fever characterized by fever and chills (i.e. flu-like symptoms) which appear 4-6 hours after exposure with no long-term effects.
EFFECTS OF CHRONIC EXPOSURE TO MATERIAL:
CHROMIUM: IARC lists certain hexavalent chromium compounds under its Group 1 category - "confirmed human carcinogens" and metallic chromium under its Group 3 category - "not classifiable as to their carcinogenicity to humans". Chromium metal is classified as carcinogenic by NTP.
NICKEL: IARC lists metallic nickel under its Group 2B category - "possibly carcinogenic to humans". Nickel may cause skin sensitivity
COBALT: Cobalt dust may result in an asthma-like condition (cough, shortness of breath). IARC lists metallic cobalt under its Group 2B category - "possibly carcinogenic to humans".
IRON: Inhalation overexposures may cause a benign pneumoconiosis (siderosis) with few or no symptoms.
MANGANESE: Existing studies are inadequate to assess its carcinogenicity. Susceptible to Parkinson's disease, metal fume fever and kidney damage.
STOT (Single Exposure): No data.
STOT (Repeated Exposures): Respiratory system. Allergic skin reactions.
MUTAGENICITY OF MATERIAL: N/A
REPRODUCTIVE EFFECTS: N/A
TERATOGENICITY OF MATERIAL: N/A
CARCINOGENICITY OF MATERIAL:
CHROMIUM: IARC lists certain hexavalent chromium compounds under its Group 1 category - "confirmed human carcinogens" and metallic chromium under its Group 3 category - "not classifiable as to their carcinogenicity to humans".
NICKEL: IARC lists metallic nickel under its Group 2B category - "possibly carcinogenic to humans".
COBALT: IARC lists metallic cobalt under its Group 2B category - "possibly carcinogenic to humans".
SYNERGISTIC MATERIALS: N/A
ASPIRATION HAZARD: No data.

SENSITIZATION OF MATERIAL: N/A

LD50 (of Material): Not established

LC50 (of Material): Not established

Notes:

- STOT – Specific Target Organ Toxicity
- International Agency for Research on Cancer (IARC) - Summaries & Evaluations (2008).
- 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP).
- Iron containing welding fume has an exposure limit of 5 mg/m³ (ACGIH-TLV's 2011). Welding fume may also contain contaminants from fluxes or welding consumables. Prolonged skin contact may cause reddening and drying of skin or dermatitis in sensitive individuals due to nickel and/or chromium content in steel.

12. Ecological Information

ECOTOXICITY: No data available for the stainless steel in its natural solid state. However, individual components of the material have been found to be toxic to the environment.

COMPONENT	TOXICITY TO FISH	TOXICITY TO ALGAE	TOXICITY TO MICROORGANISMS
Iron	LC50 Common Carp 96 hr. 0.56 mg/l	-	-
Chromium	LC50 Fathead minnow 96 hr. 10-100 mg/l	-	-
Nickel	LC50 Common Carp 96 hr. 1.3 mg/l	EC50 Freshwater Algae 72 hr. 0.18 mg/l	EC50 Water Flea 48 hr. 1.0 mg/l

PERSISTENCE AND DEGRADABILITY: No data available.

BIOACCUMULATIVE POTENTIAL: No data available.

MOBILITY IN SOIL: No data available for stainless steel in its natural solid state. Individual metal dusts may migrate into soil and groundwater and be absorbed by plants.

OTHER ADVERSE EFFECTS: None known.

13. Disposal Considerations

WASTE DISPOSAL METHODS: Steel scrap should be recycled whenever possible.

CONTAINER CLEANING & DISPOSAL: Dispose of in accordance with applicable federal, provincial/state or local regulations.

14. Transport information

GENERAL SHIPPING INFORMATION: Stainless steel not regulated for shipping.

SHIPPING NAME AND DESCRIPTION: N/A

UN NUMBER: N/A

HAZARD CLASS: N/A

PACKING GROUP/RISK GROUP: N/A

TRANSPORT REGULATIONS:

Canadian Transportation of Dangerous Goods Regulations (TDG) March 2011.

US Department of Transport (DOT) Hazardous Materials shipping information (Title 49 - Transportation March 2011).

15. Regulatory Information

REGULATORY INFORMATION: The following listing of regulations relating to a Russel Metals Inc. product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.

ADDITIONAL CANADIAN REGULATIONS:

WHMIS CLASSIFICATION: Class D2A/D2B: Materials Causing Other Toxic Effects.

DOMESTIC SUBSTANCES LIST: The components of this material are on the federal DSL Inventory.

OTHER CANADIAN REGULATIONS: N/A

ADDITIONAL U.S. REGULATIONS:

SARA: The components of this material are subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA – Oct. 2006).

SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the components of this material. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

TSCA INVENTORY STATUS: The components of this material are listed on the Toxic Substances Control Act Inventory.

CERCLA REPORTABLE QUANTITY (RQ): RQ's for Hazardous Substances in the Comprehensive Environmental Response, Compensation, and Liability Act are: Chromium = 5000 lb. (2270 kg); Copper = 5000 lb. (2270 kg); Nickel = 100 lb. (45 kg).

CALIFORNIA (PROPOSITION 65): The Chromium (VI) component of this material is known in the State of California to cause cancer.

The Nickel component of this material is known in the State of California to cause cancer.

The Cobalt component of this material is known in the State of California to cause cancer.

OTHER U.S. FEDERAL REGULATIONS: N/A.

ADDITIONAL EUROPEAN UNION REGULATIONS:

RoHS & WEEE: This MSDS follows the European Union Directive "Restriction on the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment" (2002/95/EC) and the "Waste Electrical and Electronic Equipment (WEEE)" Directive (2002/96/EC).

Lead (Pb): Lead is not intentionally added to stainless steel however, it may exist in trace levels. Although not analyzed, lead levels in steel are typically well below the EU Directive limit of 0.1%. Note, the EU Directive has a lead exemption limit of up to 0.35% as an alloying element in steel.

Chromium VI (Cr +6): The hexavalent oxidation state of chromium does not normally exist as part of a metal or alloy.

16. Other information

Issue Date: May 31, 2015

Revision Date: April 20, 2018

Disclaimer: All information, recommendations, and suggestions appearing herein concerning this product are taken from sources or based upon data believed to be reliable. Although reasonable care has been taken in the preparation of this information, Hohmann & Barnard extends no warranties or guarantees, express or implied, makes no representations, and assumes no responsibility as to the accuracy, reliability or completeness of the information presented. Since the actual use of the product described herein is beyond our control, POSCO assumes no liability arising out of the use of the product by others. It is the user's responsibility to determine the suitability of the information presented herein, to assess the safety and toxicity of the product under their own conditions of use, and to comply with all applicable laws and regulations. Appropriate warnings and safe handling procedures should be provided to handlers and users.