



United States Steel Corporation

Cast Slabs, Blooms, Rounds (Semi-Finished) Safety Data Sheet (SDS)

USS IHS Number: 73713

(Replaces USS Code Number: 1A001, 1C001, 1H001)

Locations: ET, Fairfield, Gary, Granite City, Great Lakes, Lake Erie

Original: 12/16/2010

Revision: 6/29/2020

Section 1 – Identification

- 1(a) Product Identifier Used on Label:** Cast Slabs, Blooms, Rounds (Semi-Finished)
- 1(b) Other Means of Identification:** 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 Phone number: (412) 433-6840 (8:00 am to 5:00 pm)
 600 Grant Street, Room 1662 FAX: (412) 433-5019
 Pittsburgh, PA 15219-2800
- 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, **Cast Slabs, Blooms, Rounds (Semi-Finished)** 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) |
|---------------|--|---------------|---|
| | 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. 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. |
| | Acute Toxicity-Oral - 4 Skin Sensitization - 1 STOT Single Exposure - 3 | | |
| NA | Eye Irritation - 2B | | |

Precautionary Statement(s)

| Prevention | Response | Storage/Disposal |
|--|---|--|
| 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. |

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Section 2 – Hazard(s) Identification (continued)

2(c) Hazards Not Otherwise Classified: None Known

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

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 | >86 |
| Chromium | 7440-47-3 | 231-157-5 | ≤5.0 |
| Copper | 7440-50-8 | 231-159-6 | ≤2.5 |
| Manganese | 7439-96-5 | 231-105-1 | ≤2.0 |
| Molybdenum | 7439-98-7 | 231-107-2 | ≤2.5 |
| Nickel | 7440-02-0 | 231-111-4 | ≤5.0 |
| Silicon | 7440-21-3 | 231-130-8 | ≤1.5 |

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: Cast Slabs, Blooms, Rounds (Semi-Finished)** 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: Cast Slabs, Blooms, Rounds (Semi-Finished)** 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.
- **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: Cast Slabs, Blooms, Rounds (Semi-Finished)** 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: Cast Slabs, Blooms, Rounds (Semi-Finished)** as sold/shipped is not likely to present an acute or chronic health effect.
- **Eye: Cast Slabs, Blooms, Rounds (Semi-Finished)** as sold/shipped is not likely to present an acute or chronic health effect.
- **Skin: Cast Slabs, Blooms, Rounds (Semi-Finished)** as sold/shipped is not likely to present an acute or chronic health effect.
- **Ingestion: Cast Slabs, Blooms, Rounds (Semi-Finished)** 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 Cast Slabs, Blooms, Rounds (Semi-Finished) 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.

5(c) Special Protective Equipment and Precautions for Fire-fighters: Self-contained NIOSH approved respiratory protection and full protective clothing should be worn when fumes and/or smoke from fire are present. Heat and flames cause emittance of acrid smoke and fumes. Do not release runoff from fire control methods to sewers or waterways. Firefighters should wear full face-piece self-contained breathing apparatus and chemical protective clothing with thermal protection. Direct water stream will scatter and spread flames and, therefore, should not be used.

Section 6 - Accidental Release Measures

6(a) Personal Precautions, Protective Equipment and Emergency Procedures: Not applicable for Cast Slabs, Blooms, Rounds (Semi-Finished) as sold/shipped. For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin.

6(b) Methods and Materials for Containment and Clean Up: Not applicable for this product as sold/shipped. 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. Follow applicable OSHA regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

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Section 7 - Handling and Storage

7(a) Precautions for Safe Handling: Not applicable for **Cast Slabs, Blooms, Rounds (Semi-Finished)** 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.

Section 8 - Exposure Controls / Personal Protection

8(a) Occupational Exposure Limits (OELs): Cast Slabs, Blooms, Rounds (Semi-Finished) 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 experienced industrial hygienist to review.

| Ingredients | 8(a) OSHA PEL ¹ | ACGIH TLV ² | NIOSH REL ³ | IDLH ⁴ |
|-------------|---|--|--|---|
| Iron | 10 mg/m ³ (iron oxide fume) | 5.0 mg/m ³ (iron oxide, respirable fraction ⁵) | 5.0 mg/m ³ (iron oxide dust and fume) | 2,500 mg/m ³ (as Fe) |
| Chromium | 0.5 mg/m ³ (as Cr II & III, inorganic compounds) 1.0 mg/m ³ (as Cr, metal) 0.005 mg/m ³ (as Cr VI, inorganic compounds, water soluble & insoluble) "AL" 0.0025 mg/m ³ (as Cr VI, inorganic compounds, water soluble & insoluble) | 0.003 mg/m ³ (as Cr III, inorganic compounds, inhalable fraction ⁶) "DSEN & RSEN" "water-soluble" compounds only 0.5 mg/m ³ (as Cr, metal, inhalable fraction) 0.0002 mg/m ³ (as Cr VI, inorganic compounds, water insoluble & insoluble) "STEL" 0.0005 mg/m ³ (as Cr VI, inorganic compounds, water insoluble & insoluble) | 0.5 mg/m ³ (as Cr II & III, inorganic compounds & metal) 0.0002 mg/m ³ (as Cr VI, inorganic compounds, water insoluble & insoluble) | 250 mg/m ³ (as Cr II & metal) 25 mg/m ³ (as Cr III) 15 mg/m ³ (as Cr VI, Ca) |
| Copper | 0.1 mg/m ³ (as fume, Cu) 1.0 mg/m ³ (as dusts & mists, Cu) | 0.2 mg/m ³ (as fume) 1.0 mg/m ³ (as dusts & mists, Cu) | 0.1 mg/m ³ (as fume, Cu) 1.0 mg/m ³ (as dusts & mists, Cu) | 100 mg Cu/m ³ |
| Manganese | "C" 5.0 mg/m ³ (as fume & inorganic compounds, as Mn) | 0.02 mg/m ³ (as fume & inorganic compounds, as Mn, respirable fraction) 0.1 mg/m ³ (as fume & inorganic compounds, as Mn, inhalable fraction) | 1.0 mg/m ³ (as fume & inorganic compounds, as Mn) "STEL" 3.0 mg/m ³ (as fume & inorganic compounds, as Mn) | 500 mg/m ³ (as Mn) |
| Molybdenum | 15 mg/m ³ (as Mo insoluble compounds, total dust) 5.0 mg/m ³ (as Mo soluble compounds, respirable fraction) | 10 mg/m ³ (as Mo insoluble compounds, inhalable fraction) 3.0 mg/m ³ (as Mo insoluble compounds, respirable fraction) 0.5 mg/m ³ (as Mo soluble compounds, respirable fraction) | NE | NE |
| Nickel | 1.0 mg/m ³ (metal, insoluble & soluble compounds, as Ni) | 1.5 mg/m ³ (metal, as Ni, as inhalable fraction) 0.2 mg/m ³ (insoluble compounds, as Ni, inhalable fraction, inorganic only) 0.1 mg/m ³ (soluble compounds, as Ni, inhalable fraction, inorganic only) | 0.015 mg/m ³ (metal & insoluble and soluble compounds, as Ni) | 10 mg/m ³ (as Ni) |
| Silicon | 15 mg/m ³ (total dust) 5.0 mg/m ³ (as respirable fraction) | NE | 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. A Short Term Exposure Limit (STEL) is defined as a 15-minute exposure, which should not be exceeded at any time during a workday. 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. DSEN – May cause dermal sensitization. This notation is used to indicate the potential for dermal sensitization resulting from the interaction of an absorbed agent and ultraviolet light (i.e. photosensitization). RSEN – May cause respiratory sensitization.
- 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. Ca is designated as carcinogen.
- 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 ACGIH 2020 TLVs[®] and BEIs[®] Appendix D, paragraph C.
- 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 2020 TLVs[®] and BEIs[®] (Biological Exposure Indices) Appendix D, paragraph A.

Section 8 - Exposure Controls / Personal Protection (continued)

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 | 9(j) Upper/lower Flammability or Explosive Limits: NA |
| 9(b) Odor: Odorless | 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 |
| 9(e) Melting Point/Freezing Point: ~2750 °F (~1510 °C) | 9(n) Solubility(ies): Insoluble |
| 9(f) Initial Boiling Point and Boiling Range: ND | 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 **Cast Slabs, Blooms, Rounds (Semi-Finished)** 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 ^a |  | Warning | Harmful if swallowed. |






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Section 11 - Toxicological Information (continued)

11(a-e) Information on Toxicological Effects (continued)

| Hazard Classification | Hazard Category | | Hazard Symbols | Signal Word | Hazard Statement |
|--|-----------------|-----------------|---|----------------|---|
| | EU | OSHA | | | |
| Eye Damage/ Irritation (covers Categories 1, 2A and 2B) | NA* | 2B ^c | No Pictogram | Warning | Causes eye irritation. |
| Skin/Dermal Sensitization (covers Category 1) | NA* | 1 ^d |  | Warning | May cause an allergic skin reaction. |
| Carcinogenicity (covers Categories 1A, 1B and 2) | NA* | 2 ^e |  | Warning | Suspected of causing cancer. |
| Toxic to Reproduction (covers Categories 1A, 1B and 2) | NA* | 2 ^h |  | Warning | Suspected of damaging fertility or the unborn child. |
| Specific Target Organ Toxicity (STOT) Following Single Exposure (covers Categories 1-3) | NA* | 3 ⁱ |  | Warning | May cause respiratory irritation. |
| STOT following Repeated Exposure (covers Categories 1 and 2) | NA* | 1 ^j |  | 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.

a. No LC₅₀ or LD₅₀ has been established for **Cast Slabs, Blooms, Rounds (Semi-Finished)**. 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 LD_{LO} =77 g/kg (IUCLID)
- **Copper:** Rat LD₅₀ = 481 mg/kg (REACH)
Rat LD₅₀ > 2500 mg/kg (REACH)
 - **Nickel:** LD₅₀ >9000 mg/kg (Oral/Rat); NOAEC >10.2 mg/l(Inhalation/Rat)
 - **Silicon:** LD₅₀ = 3160 mg/kg (Oral/Rat)
 - **Manganese:** Rat LD₅₀ > 2000 mg/kg (REACH)
Rat LD₅₀ > 9000 mg/kg (NLM Toxnet)

b. No Skin (Dermal) Irritation data available for **Cast Slabs, Blooms, Rounds (Semi-Finished)** as a mixture. The following Skin (Dermal) Irritation information was found for the components:

- **Molybdenum:** May cause skin irritation.

c. No Eye Irritation data available for **Cast Slabs, Blooms, Rounds (Semi-Finished)** as a mixture. The following Eye Irritation information was found for the components:

- **Iron and Molybdenum:** Causes eye irritation.
- **Silicon:** Slight eye irritation in rabbit protocol.
- **Nickel:** Slight eye irritation from particulate abrasion only.

g. No Skin (Dermal) Sensitization data available for **Cast Slabs, Blooms, Rounds (Semi-Finished)** as a mixture. The following Skin (Dermal) Sensitization information was found for the components:

- **Nickel:** May cause allergic skin sensitization.

h. No Respiratory Sensitization data available for **Cast Slabs, Blooms, Rounds (Semi-Finished)** as a mixture or its components.

f. No Germ Cell Mutagenicity data available for **Cast Slabs, Blooms, Rounds (Semi-Finished)** 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 **Cast Slabs, Blooms, Rounds (Semi-Finished)** as carcinogens. The following Carcinogenicity information was found for the components:

- **Welding Fumes:** IARC-2B, possibly carcinogenic to humans; NIOSH-Ca, potential occupational carcinogen.
- **Nickel and certain nickel compounds:** IARC-1 (compounds), carcinogen to humans; IARC-2B (elemental & alloys), possibly carcinogenic to humans; ACGIH TLV-A1 (insoluble compounds, as Ni), confirmed human carcinogen; TLV-A5 (elemental), not suspected as a human carcinogen; NTP-K, known to be a carcinogen; NIOSH-Ca, potential occupational carcinogen.
- **Chromium (as metal and trivalent chromium compounds):** IARC-3 (organic & inorganic compounds), unclassifiable as to carcinogenicity in humans; ACGIH TLV-A4, not classifiable as a human carcinogen; EPA-D, not classifiable as to human carcinogenicity (CBD, cannot be determined).
- **Chromium (hexavalent):** IARC-1, carcinogen to humans; ACGIH TLV-A1, confirmed human carcinogen; NIOSH-Ca, potential occupational carcinogen; NTP-K, known to be a carcinogen; EPA-A, human carcinogen (by inhalation route of entry), EPA-K, cannot be determined, not classifiable as to human carcinogenicity.

Section 11 - Toxicological Information (continued)

11(a-e) Information on Toxicological Effects (continued):

g. Carcinogenicity (continued):

- **Copper (dust, mist, fume, inorganic compounds, as Cu):** EPA-D, not classifiable as to human carcinogenicity (CBD, cannot be determined).
- **Iron Oxide (Fe₂O₃):** IARC-3, unclassifiable as to carcinogenicity in humans; ACGIH TLV-A4, not classifiable as a human carcinogen.
- **Molybdenum (soluble compounds, as Mo):** ACGIH TLV-A3, confirmed animal carcinogen with unknown relevance to humans.
- **Magnesium (oxide):** ACGIH TLV-A4, not classifiable as a human carcinogen
- **Manganese (inorganic compounds, as Mn):** ACGIH TLV-A4, not classifiable as a human carcinogen; EPA-D, not classifiable as to human carcinogenicity (CBD, cannot be determined).
- **Manganese (fume, as Mn):** EPA-D, not classifiable as to human carcinogenicity (CBD, cannot be determined).

h. No Toxic to Reproduction data available for **Cast Slabs, Blooms, Rounds (Semi-Finished)** 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 **Cast Slabs, Blooms, Rounds (Semi-Finished)** as a mixture. The following STOT following a Single Exposure data was found for the components:

- **Iron and Molybdenum:** Irritating to respiratory tract.

j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available for **Cast Slabs, Blooms, Rounds (Semi-Finished)** as a whole. The following STOT following Repeated Exposure data was found for the components:

- **Copper:** Target organs affected - Skin, eyes liver, kidneys and respiratory tract.
- **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 2020, 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 (IUCSID), 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.
- **Chromium, Oxides and Hexavalent Chrome:** Hexavalent chrome causes damage to gastrointestinal tract, lung, severe skin burns and eye damage, serious eye damage, skin contact may cause an allergic skin reaction. Inhalation may cause allergic or asthmatic symptoms or breathing difficulties.
- **Copper and Oxides:** Copper may cause allergic skin reaction. Copper oxide is harmful if swallowed, causes skin and eye irritation, and may cause an allergic skin reaction.
- **Manganese and Oxides:** Manganese and Manganese oxide are harmful if swallowed.
- **Molybdenum and Oxides:** Molybdenum causes skin and eye irritation. Molybdenum oxide is toxic if swallowed and causes eye irritation.
- **Nickel and Oxides:** Nickel may cause allergic skin sensitization. Nickel oxide may cause an allergic skin.
- **Silicon and Oxides:** May be harmful if swallowed.

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).
- **Chromium, Oxides and Hexavalent Chromium:** The health hazards associated with exposure to chromium are dependent upon its oxidation state. The metal form (chromium as it exists in this product) is of very low toxicity. The hexavalent form is very toxic. Repeated or prolonged exposure to hexavalent chromium compounds may cause respiratory irritation, nosebleed, ulceration and perforation of the nasal septum. Industrial exposure to certain forms of hexavalent chromium has been related to an increased incidence of cancer. NTP (The National Toxicology Program) Fourth Annual report on Carcinogens cites "certain Chromium compounds" as human carcinogens. ACGIH has reviewed the toxicity data and concluded that chromium metal is not classifiable as a human carcinogen. Hexavalent chromium may cause genetic defects and is suspected of damaging the unborn child. Developmental toxicity in the mouse, suspected of damaging fertility or the unborn child.
- **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 2020 TLVs® and BEIs® lists insoluble nickel compounds as A1 confirmed human carcinogen. Suspected of damaging the unborn child.
- **Copper and Oxides:** Inhalation of high concentrations of freshly formed oxide fumes and dusts of copper can cause metal fume fever. Chronic inhalation of copper dust has caused, in animals, hemolysis of the red blood cells, deposition of hemofuscin in the liver and pancreas, injury to lung cells and gastrointestinal symptoms.

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.
- **Molybdenum and Oxides:** Certain handling operations, such as burning and welding, may generate both insoluble molybdenum compounds (metal and molybdenum dioxide) and soluble molybdenum compounds (molybdenum trioxide). Molybdenum compounds generally exhibit a low order of toxicity with the trioxide the more toxic. However, some reports indicate that the dust of the molybdenum metal, molybdenum dioxide and molybdenum trioxide may cause eye, skin, nose and throat irritation in animals. Also has been reported to cause induction of tumors in experimental animals, suspected of causing cancer. Molybdenum oxide is suspected of causing cancer in humans.
- **Silicon and Oxides:** Silicon dusts are a low health risk by inhalation and should be treated as a nuisance dust. Eye contact with pure material can cause particulate irritation. Skin contact with silicon dusts may cause physical abrasion.

Section 12 - Ecological Information

12(a) Ecotoxicity (aquatic & terrestrial): No Data Available for **Cast Slabs, Blooms, Rounds (Semi-Finished)** 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).
- **Hexavalent Chrome:** EU RAR listed as category 1, found acute EC₅₀ and LD₅₀ to algae and invertebrates < 1 mg.
- **Nickel Oxide:** IUCLID found LC₅₀ in fish, invertebrates and algae > 100 mg/l.

12(b) Persistence & Degradability: No Data Available

12(c) Bioaccumulative Potential: No Data Available

12(d) Mobility (in soil): No data available for this product 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: Not Reported

Signal Word: No Signal Word

Hazard Symbol: No Symbol

Hazard Statement: No Statement

Section 13 - Disposal Considerations

Disposal: **Cast Slabs, Blooms, Rounds (Semi-Finished)** 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 Cast Slabs, Blooms, Rounds (Semi-Finished) 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 **Cast Slabs, Blooms, Rounds (Semi-Finished)** 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> |
|---|--|---|

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.

Cast Slabs, Blooms, Rounds

USS IHS No.: 73713

Rev. 6/20

Section 16 - Other Information

Prepared By: United States Steel Corporation

Revision History:

6/29/2020 – Update Sections 2, 8, 11 & 15

5/01/2017 – Update WHMIS 2015

4/1/2014 - Update to OSHA HAZ COM 2012

12/16/10 – Update of content and format to comply with GHS

Expiration Date: 6/29/2020 (For shipments to Canada only)

Combined the following three MSDSs to create one that covers all three of the following products:

| IHS Number | Product Name | USS Code | SRP Number |
|------------|---|----------|------------|
| 612 | Slabs, Blooms, Ingots, Tube Rounds – Alloy Steel | 1A001 | |
| 18880 | Slabs, Blooms, Ingots, Tube Rounds – Carbon Steel | 1C001 | |
| 618 | Slabs, Blooms, Ingots, Tube Rounds – HSLA Steel | 1H001 | |

Additional Information:

Hazardous Material Identification System (HMIS) Classification

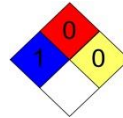
| | |
|-----------------|---|
| Health Hazard | 1 |
| Fire Hazard | 0 |
| Physical Hazard | 0 |

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_{Lo} | 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/m³ | microgram per cubic meter of air | STEL | Short-term Exposure Limit |
| mg/m³ | 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.