The Steel Company of Canada

Blast Furnace Iron

Safety Data Sheet (SDS)

Section 1 – Identification

1(a) Product Identifier Used on Label: Blast Furnace Iron

1(b) Other Means of Identification: Hot Metal (Blast Furnace Iron, Pig Iron, Beach Iron, or Ground Iron)

1(c) Recommended Use of the Chemical and Restrictions on Use: The manufacture of steel and ferrous castings. No restrictions known.

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

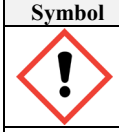
Stelco Inc.
386 Wilcox Street
Hamilton, ON L8L 8K5
Phone number : (905) 528-2511 (8:00 am to 5:00 pm)

1(e) Emergency Phone Number: 1-888-CAN-UTEC (226-8832) or 613-996-6666

Section 2 – Hazard(s) Identification

2(a) Classification of the Chemical: As sold, this product, **Blast Furnace Iron** is not hazardous according to the criteria specified in the federal Hazardous Products Regulations. Under WHMIS 2015, 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), have been evaluated. Refer to Section 3, 8 and 11 for additional information.

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

Hazard Symbol	Hazard Classification	Signal Word	Hazard Statement(s)	Precautionary Statement(s)
	Acute Toxicity - Oral 4 STOT Single Exposure - 3	**Warning**	Harmful if swallowed. May cause respiratory irritation. Causes eye irritation.	Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid breathing dust/fume. Use only outdoors or in a well-ventilated area If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. Dispose of contents in accordance with federal, provincial and local regulations.
NA	Eye Irritation - 2B			

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	% weight
Iron	7439-89-6	93-98
Carbon	7440-44-0	2-5
Silicon	7440-21-3	0.3-1.2

CAS- Chemical Abstract Service

Section 4 – First-aid Measures

4(a) Description of Necessary Measures:

- **Inhalation:** Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell.
- **Eye Contact:** 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:** Wash thoroughly after handling.
- **Ingestion:** Call a poison center/doctor if you feel unwell. Rinse mouth.

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

- **Inhalation:** Excessive exposure to high concentrations of dust/fume may cause irritation to the eyes, skin and mucous membranes of the upper respiratory tract.
- **Eye:** Contact with molten metal will cause severe burns and blindness. Particles of iron or iron compounds may become imbedded in the eye. Excessive exposure to high concentrations of dust may cause irritation to the eyes.
- **Skin:** Skin contact with molten metal will cause severe burns. Skin contact with dusts may cause irritation or sensitization, possibly leading to dermatitis. Skin contact with metallic fumes and dusts may cause physical abrasion.
- **Ingestion:** Ingestion of harmful amounts of molten iron is unlikely. However, it will cause severe burns. Ingestion of dust/fume may cause nausea or vomiting.

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

Section 5 – Fire-fighting Measures

5(a) Suitable (and unsuitable) Extinguishing Media: Molten metal may react violently with water. Use extinguishers appropriate for surrounding materials.

5(b) Specific Hazards Arising from the Chemical: Avoid having molten iron run onto or trap water under molten iron. Sudden violent release of steam and gases can occur when water is trapped under molten iron.

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 to iron in solid state. For spills involving molten iron, personnel should be protected against contact with eyes and skin and avoid inhalation of dust/fume. For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin. If material is in a dry state, avoid inhalation of dust.

6(b) Methods and Materials for Containment and Clean Up: 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, provincial and local regulations. Follow applicable provincial and federal requirements.

Section 7 - Handling and Storage

7(a) Precautions for Safe Handling: 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. Avoid contact with molten iron.

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):

Ingredients	Ontario TWA[1]	ACGIH TLV[2]	NIOSH REL[3]	IDLH[4]
Iron	5.0 mg/m³ (as iron oxide, respirable fraction[5])	5.0 mg/m³ (as iron oxide, respirable fraction[5])	5.0 mg/m³ (as iron oxide dust and fume)	2,500 mg Fe/m³
Carbon	10 mg/m³ (as inhalable fraction[6], PNOS[7]) 3.0 mg/m³ (as respirable fraction[5], PNOS)	10 mg/m³ (as inhalable fraction[6], PNOS[7]) 3.0 mg/m³ (as respirable fraction[5], PNOS)	NE	NE
Silicon	10 mg/m³ (Inhalable PNOS) 3 mg/m³ (Respirable PNOS)	10 mg/m³(Inhalable PNOS) 3 mg/m³ (Respirable PNOS)	10 mg/m³ (as total dust) 5.0 mg/m³ (as respirable dust)	NE

NE - None Established

1. Time-Weighted Average (TWA) limits established by the Ontario Ministry of Labour are 8-hour TWA concentrations unless otherwise noted.
2. Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted. ACGIH TLVs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes.

Section 8 - Exposure Controls/Personal Protection (continued)

3. 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 U.S. 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.
4. 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.
5. Respirable fraction. The concentration of respirable 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® based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices – as cited by Ministry of Labour (MOL) R.R.O. 833/90.
6. 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® based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices – as cited by Ministry of Labour (MOL) R.R.O. 833/90.
7. PNOS. Particles (Insoluble or Poorly Soluble) Not Otherwise Specified defined in the ACGIH TLVs® and BEIs® based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices – as cited by Ministry of Labour (MOL) R.R.O. 833/90.

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 CSA Standard Z94.4-11 "Selection Care and Use of Respirators" or the "NIOSH Guide to the Selection and Use of Particulate Respirators (1996)" for additional information. 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 molten iron or the generation of airborne particulates, use safety glasses to prevent eye contact as required. 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. For molten iron or 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.
- **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.): Silvery-white or gray, Soft metal

9(b) Odor: NA

9(c) Odor Threshold: NA

9(d) pH: NA

9(e) Melting Point/Freezing Point: ~ 1510°C (~ 2750ºF)

9(f) Initial Boiling Point and Boiling Range: ND

9(g) Flash Point: NA

9(h) Evaporation Rate: NA

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

9(j) Upper/lower Flammability or Explosive Limits: NA

9(k) Vapor Pressure: NA

9(l) Vapor Density (Air = 1): NA

9(m) Relative Density: NA

9(n) Solubility(ies): Insoluble

9(o) Partition Coefficient n-octanol/water: ND

9(p) Auto-ignition Temperature: NA

9(q) Decomposition Temperature: ND

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) for product in a solid form. Do not use water on molten metal.

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-j) Information on Toxicological Effects: The following toxicity data has been determined for **Blast Furnace Iron** 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 WHMIS:

Hazard Classifications	Hazard Category	Hazard Symbols	Signal Word	Hazard Statement
Acute Toxicity Hazard (covers Categories 1-5)	4[a]		**Warning**	Harmful if swallowed.
Eye Damage/Irritation (covers Categories 1, 2A, and 2B)	2B[c]	No Pictogram	**Warning**	Causes eye irritation.
Specific Target Organ Toxicity (STOT) Following Single Exposure (covers Categories 1-3)	3[i]		**Warning**	May cause respiratory irritation.

* 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 LC_{50} or LD_{50} has been established for **Blast Furnace Iron**. The following data has been determined for the components:

- **Iron:** Rat LD_{50} =98.6 g/kg (REACH)
  Rat LD_{50} =1060 mg/kg (IUCLID)
  Rat LD_{50} =984 mg/kg (IUCLID)
  Rabbit LD_{50} =890 mg/kg (IUCLID)
  Guinea Pig LD_{50} =20 g/kg (TOXNET)
  Human LD_{LO} =77 g/kg (IUCLID)
- **Carbon:** LD_{50} = >10,000 mg/kg (Oral/ Rat)
- **Silicon:** LD_{50} = 3160 mg/kg (Oral/Rat)

b. No Skin (Dermal) Irritation data available for **Blast Furnace Iron** as a mixture or its components.

c. No Eye Irritation data available for **Blast Furnace Iron** as a mixture. The following Eye Irritation information was found for the components:

- **Iron:** Causes eye irritation.
- **Silicon:** Slight eye irritation in rabbit protocol.

d. No Skin (Dermal) Sensitization data available **for Blast Furnace Iron** as a mixture or its components.

e. No Respiratory Sensitization data available for **Blast Furnace Iron** as a mixture or its components.

f. No Germ Cell Mutagenicity data available for **Blast Furnace Iron** 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.

g. Carcinogenicity: IARC, NTP, and OSHA do not list **Blast Furnace Iron** as a carcinogen. The following Carcinogenicity information was found for the components:

- **Welding Fumes:** IARC Group 2B carcinogen, a mixture that is possibly carcinogenic to humans.
- **Iron and Steel Founding**: IARC Group 1 carcinogen, an occupation that is carcinogenic to humans

h. No Toxic Reproduction data available for Blast Furnace Iron as a mixture or its components.

i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for **Blast Furnace Iron** as a mixture. The following STOT following a Single Exposure data was found for the components:

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

j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available for **Blast Furnace Iron** as a mixture or its components.

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

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

Acute Effects by component:

- **Iron and Oxides:** Iron is harmful if swallowed, causes skin irritation, and causes eye irritation. Contact with iron oxide has been reported to cause skin irritation and serious eye damage.
- **Carbon:** Not Reported/ Not Classified
- **Silicon and Oxides:** May be harmful if swallowed.

Section 11 - Toxicological Information (continued)

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

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.
- **Carbon:** Chronic inhalation may lead to decreased pulmonary function.
- **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 **Blast Furnace Iron** 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**: LC_{50}: >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).

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: This material is considered to be a solid waste, not a hazardous waste. Follow applicable federal, provincial and local regulations for disposal of solid waste and airborne particulates accumulated during handling operations of the product. Iron 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, provincial or local regulations.

Container Cleaning and Disposal: Follow applicable federal, provincial 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).

Please note this information is for Blast Furnace Iron in its original form. Any alterations can void this information.

Section 14 - Transport Information

14 (a-g) Transportation Information:

Transport Dangerous Goods (TDG) under federal TDG **does not** regulate **Blast Furnace Iron** as a hazardous material. All federal, provincial and local laws and regulations that apply to the transport of this type of material must be adhered to.

Section 15 - Regulatory Information

Regulatory Information: *The following listing of regulations relating to a Stelco 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:

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

Section 16 - Other Information

Prepared By: Stelco Inc.

Revision History:

6/30/2017 – Update to Stelco
5/01/2017 – Update WHMIS 2015
4/01/2014 - Update to OSHA HAZ COM 2012
12/16/10 – Update of content and format to comply with GHS
8/01/1985 - Original Issue

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
CNS	Central Nervous System		**OSHA**	Occupational Safety and Health Administration
GI, GIT	Gastro-Intestinal, Gastro-Intestinal Tract		**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		**RTECS**	Registry of Toxic Effects of Chemical Substances
LD_{Lo}	Lowest Dose to have killed animals or humans		**SCBA**	Self-contained Breathing Apparatus
LEL	Lower Explosive Limit		**STEL**	Short-term Exposure Limit
$\mu g/m^3$	microgram per cubic meter of air		**TLV**	Threshold Limit Value
mg/m^3	milligram per cubic meter of air		**TWA**	Time-weighted Average
SDS	Safety Data Sheet		**UEL**	Upper Explosive Limit
MOL	Ontario Ministry of Labour		**WHMIS**	Workplace Hazardous Materials Information System
NFPA	National Fire Protection Association			

Blast Furnace Iron

Signal Word: WARNING	**Symbols:** 

HAZARD STATEMENTS:

Harmful if swallowed.

May cause respiratory irritation.

Causes eye irritation.

PRECAUTIONARY STATEMENTS

Wash thoroughly after handling.

Do not eat, drink or smoke when using this product.

Avoid breathing dust/fume.

Use only outdoors or in a well-ventilated area.

If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell.

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth.

Dispose of contents in accordance with federal, provincial and local regulations.

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Original Issue Date: 08/01/1985

Revised: 4/8/2021