



United States Steel Corporation

Electrical Steel Sheet
Safety Data Sheet (SDS)
USS IHS Number: 73714
 (Replaces USS Code Number: 3A, 3C017)
Locations: Big River Steel
Revision: 10/13/2023

Original: 10/05/2002

Section 1 – Identification

1(a) Product Identifier Used on Label: Electrical Steel Sheet

1(b) Other Means of Identification: InduX™, Cold Roll Motor Lamination Sheet, Chromium-Free C-5 Insulation Non-Oriented Electrical Steel Products, C-5 per ASTM A 976

1(c) Recommended Use of the Chemical and Restrictions on Use: Electrical steel products are sold to various steel-consuming industries manufacturing next generation hyper-efficient transformers, generators, and motors. The main markets for these products are the electrical power grid and automotive hybrid and electric vehicles.

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
 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, **Electrical Steel Sheet** is 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 “GLOBALY 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)
	Single Target Organ Toxicity (STOT) Single Exposure Repeat Exposure - 3	DANGER	May cause respiratory irritation. Causes damage to lungs through prolonged or repeated inhalation exposure. Causes eye irritation.
	STOT Repeat Exposure - 1		
NA	Eye Irritation - 2B		

Precautionary Statement(s)

Prevention	Response	Storage/Disposal
Do not breathe dusts or fume. Use only outdoors or in well-ventilated areas. Wash thoroughly after handling. 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 eye irritation persists: Get medical advice/attention.	Store in a well-ventilated place. Store locked up. Keep container tightly closed. Dispose of contents in accordance with federal, state and local regulations.

2(c) Hazards Not Otherwise Classified: None Known

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

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Section 3 – Composition/Information on Ingredients

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

Chemical Name	CAS Number	EC Number	% weight
Iron	7439-89-6	231-096-4	93 - 99
Silicon	7440-21-3	231-130-8	0.15 - 3.4
Chromium	7440-47-3	231-157-5	0.3 - 2.0
Aluminum	7429-90-5	231-072-3	0.15 – 1.7
Manganese	7439-96-5	231-105-1	0.10 – 1.0

EC- European Community

CAS- Chemical Abstract Service

Commercial steel products contain small amounts of various elements in addition to those specified. These small quantities frequently referred to as “trace” or “residual” elements, generally originate in the raw materials used and/or are alloying metals. Individual trace elements vary in concentration by weight, and may include boron, calcium, carbon, columbium (niobium), copper, molybdenum, nickel, phosphorus, sulfur, titanium, and vanadium.

Note: Product surfaces may be treated with small amounts (<1.0%) of coatings for electrical insulation and other purposes, applied at the customer’s request. Refer to the coating manufacturer’s SDS for hazards associated with coatings. Refer to the following table for additional information.

Metallic Coating¹

Chemical Name	CAS Number	EC Number	% weight ²
C-5			
Aluminum Orthophosphate	7784-30-7	232-056-9	75
Silicon Dioxide	7631-86-9	231-545-4	25

EC- European Community

CAS- Chemical Abstract Service

1. Coatings represent less than 1% of total percent weight of product.

2. Percentages are expressed as typical ranges or maximum concentrations of elements in the coating, for the purpose of communicating the potential hazards of the finished product.

Section 4 – First-aid Measures

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

- **Inhalation:** **Electrical Steel Sheet** 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:** **Electrical Steel Sheet** as sold/shipped is not a likely form of exposure. However, during further processing (welding, grinding, burning, etc.). If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue Rinsing. If eye irritation persists: Get medical advice attention. If exposed, concerned or feel unwell: Get medical advice/attention.
- **Skin Contact:** If on skin: Wash thoroughly after handling. Wash with plenty of water. If irritation or rash occurs: Get medical advice/attention. Take off and wash contaminated clothing before reuse.
- **Ingestion:** **Electrical Steel Sheet** as sold/shipped is not a likely form of exposure. However, during further processing (welding, grinding, burning, etc.).

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

- **Inhalation:** **Electrical Steel Sheet** as sold/shipped is not likely to present an acute or chronic health effect.
- **Eye:** **Electrical Steel Sheet** as sold/shipped is not likely to present an acute or chronic health effect.
- **Skin Contact:** **Electrical Steel Sheet** as sold/shipped is not likely to present an acute or chronic health effect.
- **Ingestion:** **Electrical Steel Sheet** 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 **Electrical Steel Sheet** as sold/shipped. For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin. If material is in a dry state, avoid inhalation of dust.

5(b) Specific Hazards Arising from the Chemical: Not Applicable for **Electrical Steel Sheet** 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 **Electrical Steel Sheet** as sold/shipped. For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin. If material is in a dry state, avoid inhalation of dust.

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Section 6 - Accidental Release Measures (continued)

6(b) Methods and Materials for Containment and Clean Up: Not Applicable for **Electrical Steel Sheet** as sold/shipped. Collect material in appropriate labeled containers for recovery or disposal in accordance with federal, state, and local regulations. Follow applicable OSHA regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

Section 7 - Handling and Storage

7(a) Precautions for Safe Handling: Not Applicable for **Electrical Steel Sheet** as sold/shipped, however further processing, such as but not limited to, welding, burning, grinding, etc. may generate high concentrations of airborne particulates that should be evaluated and controlled as necessary. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use only outdoors or in well-ventilated areas. Practice good housekeeping. Avoid breathing metal fumes and/or dust. Do not eat, drink or smoke when using this product. Cut resistant gloves and sleeves should be worn when working with steel products.

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

Ingredients	8(a) OSHA PEL ¹	ACGIH TLV ²	NIOSH REL ³	IDLH ⁴
Iron	10 mg/m ³ (as iron oxide fume)	5.0 mg/m ³ (as iron oxide dust and fume)	5.0 mg/m ³ (as iron oxide dust and fume)	2,500 mg Fe/m ³
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
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 ⁵) "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)
Aluminum	15 mg/m ³ (as aluminum oxide, metal & insoluble compounds, total dust) 5.0 mg/m ³ (as aluminum oxide, metal & insoluble compounds, respirable fraction)	1.0 mg/m ³ (as metal & insoluble compounds, respirable fraction ⁶)	10 mg/m ³ (as metal & insoluble compounds, total dust) 5.0 mg/m ³ (as metal & insoluble compounds, respirable fraction) 5.0 mg/m ³ (as welding fumes & pyro powders)	NE
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)

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.
- 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 2023 TLVs [®] and BEIs [®] (Biological Exposure Indices) Appendix D, paragraph A.
- Respirable fraction. The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in ACGIH 2023 TLVs [®] and BEIs [®] Appendix D, paragraph C.

8(b) Appropriate Engineering Controls: Local exhaust ventilation should be used to control the emission of air contaminants. General dilution ventilation may assist with the reduction of air contaminant concentrations. Emergency eye wash stations and deluge safety showers should be available in the work area.

Section 8 - Exposure Controls / Personal Protection (continued)

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 exposure to this material is 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


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| <p>9(a) Appearance (physical state, color, etc.): Solid, Metallic Gray (appearance will vary by coating)</p> <p>9(b) Odor: Odorless</p> <p>9(c) Odor Threshold: NA</p> <p>9(d) pH: NA</p> <p>9(e) Melting Point/Freezing Point: ~2750 °F (~1510 C)</p> <p>9(f) Initial Boiling Point and Boiling Range: ND</p> <p>9(g) Flash Point: NA</p> <p>9(h) Evaporation Rate: NA</p> <p>9(i) Flammability (solid, gas): Non-flammable, non-combustible</p> <p>NA - Not Applicable
ND - Not Determined for product as a whole</p> | <p>9(j) Upper/lower Flammability or Explosive Limits: NA</p> <p>9(k) Vapor Pressure: NA</p> <p>9(l) Vapor Density (Air = 1): NA</p> <p>9(m) Relative Density: 7.60 – 7.75 g/cm³</p> <p>9(n) Solubility(ies): Insoluble</p> <p>9(o) Partition Coefficient n-octanol/water: ND</p> <p>9(p) Auto-ignition Temperature: NA</p> <p>9(q) Decomposition Temperature: ND</p> <p>9(r) Viscosity: NA</p> |
|--|--|

Section 10 - Stability and Reactivity

- 10(a) Reactivity:** Not Determined (ND) for product is in solid form. Do not use water on molten metal.
- 10(b) Chemical Stability:** Electrical Steel Sheet is 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 **Electrical Steel Sheet** 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			
Eye Damage/Irritation (covers Categories 1, 2A and 2B)	NR	2B ^c	NA	Warning	Causes eye irritation. Rating due to iron particulate generated from further processing (welding, grinding, burning, etc.).
Specific Target Organ Toxicity (STOT) Following Single Exposure (covers Categories 1-3)	NR	3 ⁱ		Warning	May cause respiratory irritation. Rating due to iron particulate or fume that can enter the body generated when further processed (welding, grinding, burning, etc.).


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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			
STOT Following Repeated Exposure (covers Categories 1 and 2)	NR	1 ^j		Danger	May cause damage to respiratory tract and lungs through prolonged or repeated exposure. Rating due particulate or fume that can enter the body generated when further processed (welding, grinding, burning, etc.).

* 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 **Electrical Steel Sheet**. 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)
- **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 **Electrical Steel Sheet** as a mixture or its components.

c. No Eye Irritation data available for **Electrical Steel Sheet** as a mixture. The following Eye Irritation information was found for the components:

- **Iron:** Irritating when administered as Iron metal. Rabbit Draize - irritating (IUCLID).
- **Silicon:** Slight eye irritation in rabbit protocol.

d. No Skin (Dermal)/Respiratory Sensitization data available for **Electrical Steel Sheet** as a mixture or its individual components.

e. No Aspiration Hazard data available for **Electrical Steel Sheet** as a mixture or its individual components.

f. No Germ Cell Mutagenicity data available for **Electrical Steel Sheet** 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 **Electrical Steel Sheet** as carcinogens. The following Carcinogenicity information was found for the components:

- **Iron Oxide (Fe2O3):** IARC-3, unclassifiable as to carcinogenicity in humans; ACGIH TLV-A4, not classifiable as a human carcinogen
- **Chromium (as metal):** IARC-3, unclassifiable as to carcinogenicity in humans; EPA-A, human carcinogen (inhalation), EPA-K, known human carcinogen (inhalation), EPA-D, not classifiable as a human carcinogen (oral), EPA-CBD, cannot be determined (oral)
- **Chromium (as trivalent chromium III, inorganic 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, VI, inorganic water-soluble & soluble compounds):** 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 (inhalation), EPA-K, known human carcinogen (inhalation), EPA-D, not classifiable as a human carcinogen (oral), EPA-CBD, cannot be determined (oral)
- **Manganese (inorganic compounds, as Mn):** ACGIH TLV-A4, not classifiable as a human carcinogen; EPA-D, not classifiable as to human carcinogenicity
- **Manganese (fume, as Mn):** ACGIH TLV-A4, not classifiable as a human carcinogen; EPA-D, not classifiable as to human carcinogenicity
- **Aluminum (metal and insoluble compounds):** IARC-1 (production), carcinogen to humans; ACGIH TLV-A4, not classifiable as a human carcinogen.
- **Welding Fumes:** IARC-1, carcinogen to humans; NIOSH-Ca, potential occupational carcinogen

h. No Toxic to Reproduction data available for **Electrical Steel Sheet** as a mixture or its individual components.

i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for **Electrical Steel Sheet** 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 **Electrical Steel Sheet** as a whole. The following STOT following Repeated Exposure data was found for the components:

- **Iron oxide:** Some pulmonary and lung effects reported from Iron oxide exposure in humans.
- **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 2023, 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).

Section 11 - Toxicological Information (continued)

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:

- **Inhalation:** Excessive exposure to high concentrations of metal 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 micrometer and usually between 0.02-0.05 micrometers 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 exposure and usually last from 12 to 48 hours. Long-term effects from metal fume fever have not been noted. Freshly formed oxide fumes of manganese have been associated with causing metal fume fever.
- **Eye:** Excessive exposure to high concentrations of metal dust may cause irritation to the eyes.
- **Skin:** Skin contact with metal 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 this product as distributed is unlikely due to its solid insoluble form. Ingestion of metal dust may cause nausea or vomiting.

Acute Effects by component:

- **Iron and iron 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. Particles of iron or iron compounds, which become imbedded in the eye, may cause rust stains unless removed fairly promptly.
- **Silicon and silicon oxides:** May be harmful if swallowed.
- **Manganese and oxides:** Manganese and Manganese oxide are harmful if swallowed.
- **Aluminum:** Not Reported/ Not Classified

Delayed (chronic) Effects by component:

- **Iron and iron 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.
- **Silicon and silicon 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.
- **Chromium and chromium oxides:** 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.
- **Aluminum:** Chronic inhalation of finely divided powder has been reported to cause pulmonary fibrosis and emphysema. Repeated skin contact has been associated with bleeding into the tissue, delayed hypersensitivity and granulomas. Chronic exposure to aluminum flake has been reported to cause pneumoconiosis in workers. Repeat oral exposure to aluminum results in decrements in neurobehavioral function and development.
- **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.

Section 12 - Ecological Information

12(a) Ecotoxicity (aquatic & terrestrial): No Data Available for **Electrical Steel Sheet** 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).

12(b) Persistence & Degradability: No Data Available for **Electrical Steel Sheet** as sold/shipped or individual components.

12(c) Bioaccumulative Potential: No Data Available for **Electrical Steel Sheet** as sold/shipped or individual components.

12(d) Mobility (in soil): No data available for **Electrical Steel Sheet** as sold/shipped.

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: **Electrical Steel Sheet** 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.

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Section 13 - Disposal Considerations (continued)

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), 16-03-04 (off specification batches and unused products), or 15-01-04 (metallic packaging).

Please note this information is for Electrical Steel Sheet 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 may regulate **Electrical Steel Sheet** as a hazardous material under certain circumstances. All Local, State, Federal and international 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 U. S. Steel product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities. This product and/or its constituents are subject to the following regulations:

OSHA Regulations: Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-2, Z-3): The product, **Electrical Steel Sheet** as a whole is not listed. However, individual components of the product are listed: Refer to Section 8, Exposure Controls and Personal Protection.

EPA Regulations: The product, **Electrical Steel Sheet** is not listed as a whole. However, individual components of the product may be listed depending on the coating applied.

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

Section 313 Supplier Notification: The product, **Electrical Steel Sheet** contains the following toxic chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372: Regulations Key:

CAS #	Chemical Name	Percent by Weight
7439-89-6	Iron	93 - 99
7440-21-3	Silicon	0.15 - 3.4
7440-47-3	Chromium	0.3 - 2.0
7429-90-5	Aluminum	0.15 - 1.7
7439-96-5	Manganese	0.10 - 1.0

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

California Prop.
65:



This product, **Electrical Steel Sheet** can expose you to chemicals including chromium (hexavalent chromium compounds) which is known to the State of California to cause cancer; and chromium (hexavalent chromium compounds) which is known to the State of California to cause reproductive toxicity. For more information go to www.P65Warnings.ca.gov

Other Regulations:

WHMIS Classification (Canadian): The product, **Electrical Steel Sheet** is not listed as a whole. However individual components are listed.

Ingredients	WHMIS Classification
Iron	Combustible dusts - Category 1 (may form combustible dust concentrations in air)
Silicon	Flammable solids - Category 2 (The classification "Flammable solids" refers to the amorphous form of silicon powder); Combustible dusts *
Chromium	Combustible dusts**
Manganese	Reproductive toxicity - Category 2; Specific target organ toxicity - repeated exposure - Category 1; Combustible dusts*

* This product could belong to the hazard class "Combustible dust", based on various factors related to the combustibility and explosiveness of its dust, including composition, shape and size of the particles

** This product belongs to the hazard class "Combustible dust" if 5% or more by weight of its composition has a particle size < 500 µm.

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

Section 16 - Other Information

Prepared By: United States Steel Corporation

Revision History:

10/13/2023 – General Updates
6/29/2020 – Update Sections 2, 8, 11 & 15
5/01/2017 – Update WHMIS 2015
4/01/2014 - Update to OSHA HAZ COM 2012

Expiration Date: Not Applicable

12/16/2010 – Update of content and format to comply with GHS

8/01/1985 - Original Issue

Section 16 - Other Information (continued)

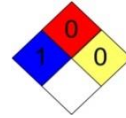
Additional Information:

Hazardous Material Identification System (HMIS) Classification

Health Hazard	1
Fire Hazard	0
Physical Hazard	0

HEALTH= 1, Denotes possible chronic hazard if airborne dusts or fumes are generated Irritation or minor reversible injury possible.
 FIRE= 0, Materials that will not burn.
 PHYSICAL HAZARD= 0, Materials that are normally stable, even under fire conditions, and will not react with water, polymerize, decompose, condense, or self-react. Non-explosives.

National Fire Protection Association (NFPA)



HEALTH = 1, Exposure could cause irritation but only minor residual injury even if no treatment is given.
 FIRE = 0, Materials that will not burn.
 INSTABILITY = 0, Normally stable, even under fire exposure conditions, and are not reactive with water.

ABBREVIATIONS/ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
BEIs	Biological Exposure Indices
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNS	Central Nervous System
GI, GIT	Gastro-Intestinal, Gastro-Intestinal Tract
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
LC50	Median Lethal Concentration
LD50	Median Lethal Dose
LD_{Lo}	Lowest Dose to have killed animals or humans
LEL	Lower Explosive Limit
LOEL	Lowest Observed Effect Level
LOAEC	Lowest Observable Adverse Effect Concentration
µg/m³	microgram per cubic meter of air
mg/m³	milligram per cubic meter of air
mppcf	million particles per cubic foot
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association

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

Disclaimer: This information is taken from sources or based upon data believed to be reliable. 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.