



Material Safety Data Sheet

Baosteel Code Number: B00451
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Section 1-Chemical Product and Company Identification

Product/Chemical Name: Electrolytic Chromium Coated Steel (Tin Free Steel)

CAS Number: Mixture

Manufacturer: Baoshan Iron & Steel Co., Ltd. Fujing Road, Baoshan District, Shanghai, P.R.China

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Section 2-Composition / Information on Ingredients

Ingredient Name	CAS Number	Percentage by wt.	OSHA PEL ¹	ACGIH TLV ²
Base Metal				
Iron	7439-89-6	~99	10 mg/m ³ - Iron oxide fume	5 mg/m ³ -Iron oxide dust and fume
Alloying Elements				
Aluminum	7429-90-5	0.10 max.	15 mg/m ³ - Total dust 5 mg/m ³ - Respirable fraction	10 mg/m ³ - Metal Dust 5 mg/m ³ - Welding fume
Carbon	7440-44-0	0.01-0.13	15 mg/m ³ -Total dust(PNOR) ³ 5 mg/m ³ - Respirable fraction (PNOR)	10 mg/m ³ - Inhalable fraction ⁴ (PNOS) ⁵ 3 mg/m ³ - Respirable fraction ⁶ (PNOS)
Copper	7440-50-8	0.2 max.	0.1 mg/m ³ -Fume (as Cu) 1 mg/m ³ - Dusts & mists (as Cu)	0.2 mg/m ³ - Fume 1 mg/m ³ - Dusts & mists (as Cu)
Manganese	7439-96-5	0.15-0.60	5 mg/m ³ (C) - Fume & Mn compounds	0.2 mg/m ³
Phosphorus	8049-19-2	0.005-0.02	15 mg/m ³ - Total dust (PNOR) 5 mg/m ³ - Respirable fraction (PNOR)	10 mg/m ³ - Inhalable fraction (PNOS) 3 mg/m ³ - Respirable fraction (PNOS)
Sulfur	7704-34-9	0.005-0.05	15 mg/m ³ - Total dust (PNOR) 5 mg/m ³ - Respirable fraction (PNOR)	10 mg/m ³ - Inhalable fraction (PNOS) 3 mg/m ³ - Respirable fraction (PNOS)
Metallic Coating *				
Chromium	7440-47-3	0.015max.	1 mg/m ³ -Chromium metal 0.5 mg/m ³ - Cr(III) compounds (as Cr) 0.1 mg/m ³ (C) - Chromic acid & chromates	0.5 mg/m ³ - Cr metal & Cr III compounds 0.05 mg/m ³ Water-sol. Cr VI compounds.

Notes:

- * Percent weight of metallic coating is a percent of the total product.
- Electrolytic Chromium Coated Steel is coated with small amounts (~0.5-2.0 mg/ft²) of oil to minimize scratching of the chromium surface in transit and handling and also to facilitate movement of the product once in sheet form.
- All commercial steel products may contain small amounts of various elements in addition to those specified. These small quantities (less than 0.1%) may exist as intentional additions, or as "trace" or "residual" elements that generally originate in the raw materials used. These elements may include: aluminum, antimony, arsenic, boron, cadmium, calcium, chromium, cobalt, columbium, copper, lead, molybdenum, nickel, silicon, tin, titanium, vanadium, and zirconium.

1 OSHA Permissible Exposure Limits (PELs) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A ("C") designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted. A Short Term Exposure Limit (STEL) is defined as a 15-minute exposure, which should not be exceeded at any time during a workday.

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

3 PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the PNOR limit which is the same as the inert or nuisance dust limit of 15 mg/m³ for total dust and 5 mg/m³ for the respirable fraction.

4 Inhalable fraction. The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH TLVs and BEIs Appendix D, paragraph A.

5 PNOS (Particulates Not Otherwise Specified). Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos and <1% crystalline silica. A TWA-TLV of 10 mg/m³ for inhalable particulate and 3 mg/m³ for respirable particulate has been recommended.

6 Respirable fraction. The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH TLVs and BEIs Appendix D, paragraph C.

Section 3 - Hazards Identification

Emergency Overview

This formed solid metal product poses little or no immediate health or fire hazard. When product is subjected to welding, burning, melting, sawing, brazing, grinding, or other similar processes, potentially hazardous airborne particulate and fumes may be generated. Avoid inhalation of metal dusts and fumes. Operations having the potential to generate airborne particulates should be performed in well ventilated areas and, if appropriate, respiratory protection and other personal protective equipment should be used. Iron or steel foreign bodies imbedded in the cornea of the eye may produce rust stains unless removed fairly promptly.



Potential Health Effects

Primary Entry Routes: Inhalation and skin, if coated. Steel products in the natural state do not present an inhalation, ingestion or contact hazard. However, operations such as burning, welding, sawing, brazing, machining and grinding may result in the following effects if exposures exceed recommended limits as listed in Section 2.

Target Organs: Respiratory system.

Acute Effects:

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

Chronic Effects: Chronic inhalation of metallic fumes and dusts are associated with the following conditions:

- **IRON OXIDE:** 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.
- **ALUMINUM:** Aluminum dusts/fines are a low health risk by inhalation and should be treated as a nuisance dust.
- **CARBON:** Chronic inhalation of high concentrations to carbon may cause pulmonary disorders.
- **COPPER:** Inhalation of high concentration of freshly formed oxide fumes and dusts of copper can cause metal fume fever. Chronic inhalation of copper dust has caused, in animal, hemolysis of the red blood cells, deposition of hemofuscin in the liver and pancreas, injury to lung cells and gastrointestinal symptoms.
- **MANGANESE:** 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.
- **PHOSPHOROUS:** Inhalation of dusts and fumes of ferrophosphorus and phosphorous oxides may cause respiratory irritation.
- **SULFUR:** Sulfur compounds, present in the fumes, may irritate the skin, eyes, lungs and gastrointestinal tract.
- **TITANIUM:** There is no evidence of a health hazard from inhalation of titanium dioxide at airborne concentrations below 10 mg/m³. The toxicity of titanium dioxide has been found to be relatively inert.
- **TIN:** No systemic effects have been reported from industrial exposure to tin. However, exposure to dust and fume of tin oxide may result in a benign pneumoconiosis called stannosis. No cases of massive fibrosis from exposure to tin have been reported.
- **CHROMIUM:** The health hazards associated with exposure to chromium are dependent on its oxidation state. The metal form is of low toxicity. Chronic inhalation of trivalent (Cr III) compounds (as it mostly exists in this product) may produce irritation of the bronchus and lungs, dystrophic changes to the liver and kidney, pulmonary edema, and adverse effects on macrophages. Repeated or prolonged exposure to hexavalent chromium compounds may cause respiratory irritation, nosebleed, ulceration and perforation of the nasal septum. Industrial exposure to certain forms of hexavalent chromium has been related to an increased incidence of respiratory cancer.

Long-term inhalation exposure to high concentrations (over-exposure) to pneumoconiotic agents may act synergistically with inhalation of oxides, fumes or dusts of this product to cause toxic effects.

Chemical Surface Treatments/Coatings: The possible presence of chemical surface treatments and oil coatings should be considered when evaluating potential employee health hazards and exposures during handling and welding or other fume generating activities. Repeated or prolonged contact with surface treatments or oil residue may cause skin irritation, dermatitis, ulceration, or allergic reactions in sensitized individuals. Torching or burning operations on steel products with or oil coatings may produce emissions that can be irritating to the eyes and respiratory tract. Inhalation of hexavalent chromium compounds may cause ulceration of the mucous membranes of the nasal septum and has been related to an increased incidence of lung cancer.

Carcinogenicity: The International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), and OSHA do not list steel products as carcinogens. IARC lists chromium metal and trivalent chromium compounds as Group 3 (not classifiable as to their human carcinogenicity). Hexavalent chromium compounds are listed by IARC as Group 1 (sufficient evidence for carcinogenicity in humans). NTP lists certain hexavalent chromium compounds as Group 1 (known to be carcinogenic). The American Conference of Governmental Industrial Hygienists (ACGIH) lists hexavalent chromium compounds as A1 carcinogens and chromium metal and trivalent compounds as A4 (not classifiable as a human carcinogen).



IARC identifies welding fumes as a Group 2B carcinogen, a mixture that is possibly carcinogenic to humans.

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

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

Section 4 - First Aid Measures

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

Eye Contact: Flush with large amounts of clean water to remove particles. Seek medical attention if irritation persists.

Skin Contact: Remove contaminated clothing. Wash affected areas with soap or mild detergent and water. If thermal burn has occurred, flush area with cold water and seek medical attention. If a persistent rash or irritation occurs, seek medical attention.

Ingestion: Not a probable route of industrial exposure. However, if ingested, seek medical attention immediately.

Section 5 - Fire-Fighting Measures

Flash Point: Not applicable

LEL: Not applicable

Flash Point Method: Not applicable

UEL: Not applicable

Burning Rate: Not applicable

Auto-ignition Temperature: Not applicable

Flammability Classification: Non-flammable, non-combustible

Extinguishing Media: Not applicable for solid product. Use extinguishers appropriate for surrounding materials.

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

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

Fire-Fighting Instructions: Do not release runoff from fire control methods to sewers or waterways.

Fire-Fighting Equipment: Wear a self-contained breathing apparatus (SCBA) with a full face piece operated in pressure-demand or positive pressure mode and full protective clothing.

Section 6 - Accidental Release Measures

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

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

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 7 - Handling and Storage

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

Storage Requirements: Store away from acids and incompatible materials.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use controls as appropriate to minimize exposure to metal fumes and dusts during handling operations.

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

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

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen.

Protective Clothing/Equipment: For operations which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use protective clothing, gloves and safety glasses to prevent skin and eye contact. Contact lenses should not be worn where industrial exposures to this material are likely. Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations. Protective gloves should be worn as required for welding, burning or handling operations. Where the surface treatments are applied to the product, wear gloves when handling. Do not continue to use gloves or work clothing that has become saturated or soaked through with oil coating. Wash skin that has been exposed to oil with soap and water or waterless hand cleaner.

Section 9 - Physical and Chemical Properties

Physical State: Solid

Appearance and Odor: Metallic Gray, Odorless

Odor Threshold: Not applicable

Vapor Pressure: Not applicable



Vapor Density (Air=1) : Not applicable
Formula Weight: Not applicable
Density: 7.85 g/cc
Specific Gravity (H₂O=1, at 4 °C): 7.85
pH: Not applicable
Water Solubility: Insoluble
Other Solubilities: Not applicable
Boiling Point: Not applicable
Viscosity: Not applicable
Refractive Index: Not applicable
Surface Tension: Not applicable
% Volatile: Not applicable
Evaporation Rate: Not applicable
Freezing/Melting Point: Base Metal ~1510 °C

Section 10 - Stability and Reactivity

Conditions to Avoid: Storage with strong acids or calcium hypochlorite
Hazardous Decomposition Products: Thermal oxidative decomposition of galvanized steel products can produce fumes containing oxides of zinc, iron and manganese as well as other alloying elements

Section 11 - Toxicological Information

Toxicity Data* :

Toxicity Data:* No information is available for **electrolytic chromium coated steel** as a mixture. The possible presence of chemical surface treatments and coatings should be considered when evaluating potential employee health hazards and exposures during handling and welding or other fume generating activities.
Eye Effects: Eye contact with the individual components may cause particulate irritation. Implantation of iron particles in guinea pig corneas has resulted in rust rings with corneal softening about rust ring. Repeated or prolonged eye contact with zinc oxide fume may produce conjunctivitis.
Skin Effects: Skin contact with the individual dust components may cause physical abrasion, irritation and dermatitis.
Acute Inhalation Effects: Inhalation of the individual alloy components has been shown to cause various respiratory effects.
Acute Oral Effects: No data available
Other: No LC50 or LD50 has been established for the mixture as a whole. Iron LD50: 30 g/kg oral (rat). Aluminum LD50: No data. Carbon LD50: No data. Copper TDLo: 120 ug/kg oral (human). Manganese LD50: 9 g/kg oral (rat). Phosphorous LD50: No data. Sulfur LD: >8437 mg/kg oral (rat). Tin LD50: No data. Chromium LDLo: 71 mg/kg oral (human).
Chronic Effects: See Section 3.
Carcinogenicity: See Section 3.
Mutagenicity: No data available
Teratogenicity: No data available * See NIOSH, RTECS: (NO4565500) for additional toxicity data on iron; (BD0330000) for aluminum; (FF5250000) for carbon; (GL5325000) for copper; (OO9275000) for manganese; (WS4250000) for sulfur; (XP7320000) for tin; GB4200000 for chromium

Section 12 - Ecological Information

Ecotoxicity: No data available for **electrolytic chromium coated steel** as a whole. However, individual components have been found to be toxic to the environment. Metal dusts may migrate into soil and groundwater and be ingested by wildlife. Lead can be bio-accumulated in plants and water organisms, especially shellfish.
Environmental Fate: No data available.
Environmental Degradation: No data available.
Soil Absorption/Mobility: No data available for tinplate or tin coated sheets as a whole. However, individual components have been found to be absorbed by plants from soil.

Section 13 - Disposal Considerations

Disposal: Steel scrap should be recycled whenever possible. Product dusts and fumes from processing operations should also be recycled, or classified by a competent environmental professional and disposed of in accordance with applicable federal, state or local regulations.
Container Cleaning and Disposal: Follow applicable Federal, state and local regulations. Observe safe handling precautions.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):
Electrolytic chromium coated steel are not listed as hazardous substances under 49 CFR 172.101.
Shipping Name: Not applicable
Shipping Symbols: Not applicable
Hazard Class: Not applicable
ID No.: Not applicable
Packing Group: Not applicable



Label: Not applicable

Special Provisions (172.102): None

Packaging Authorizations

a) **Exceptions:** None

b) **Non-bulk Packaging:** Not applicable

c) **Bulk Packaging:** Not applicable

Quantity Limitations

a) **Passenger, Aircraft, or Railcar:** Not applicable

b) **Cargo Aircraft Only:** Not applicable

Vessel Stowage Requirements

a) **Vessel Stowage:** Not applicable

b) **Other:** Not applicable

Section 15 - Regulatory Information

Regulatory Information: *The following listing of regulations relating to Baoshan Iron & Steel Co., Ltd. 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-1-A): The product as a whole is not listed. However, individual components of the product are listed.

EPA Regulations(USA):

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

CERCLA Hazardous Substance (40 CFR 302.4): The product as a whole is not listed. However, individual components of the product are listed: Copper (Reportable Quantity(RQ)-5000#), and Chromium (RQ-5000#). Manganese compounds are also listed although no reportable quantity is assigned to this generic or broad class.

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

SARA 313 (40CFR372.65): This product does not contain ingredients, in excess of the de minimis concentration, subject to the reporting requirements of SARA 313.

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

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

- Hazardous Substances: Sulfur.
- Environmental Hazards: Aluminum, Copper, and Manganese.
- Special hazard Substance: Chromium.

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

- Hazardous Substance: Aluminum (dust & fume), Copper, Manganese and Tin.
- Special Health Hazard Substances: Chromium.

California Prop. 65: An extremely small amount of hexavalent chromium treatment may be applied to the surface of the product. Hexavalent chromium is known to the State of California to cause cancer or reproductive toxicity. In addition, the product may also possibly contain trace quantities (generally much less than 0.1%) of other metallic elements known to the State of California to cause cancer or reproductive toxicity. These include arsenic (inorganic), cadmium, lead and nickel.

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

WHMIS Classification (Canadian): D-2

Section 16 - Other Information

Prepared By: Baoshan Iron & Steel Co., Ltd.

Hazard Rating Systems:

NFPA Code: 0-0-0

HMIS Code: 1*-0-0 PPE: See Section 8 * Denotes possible chronic hazard if airborne dusts or fumes are generated.

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