

MATERIAL SAFETY DATA SHEET

Complies with ANSI Z400.1 format

HMIS

Health	1
Fire Hazard	0
Reactivity	0
Personal Protection – depends upon use of product.	X

PRODUCTS: SLAG (Steel)
Cascade Steel Rolling Mills

Date of Preparation: 01/01

Revised: 4/03, 9/05, 1/08

Section 1 General Information

Chemical Name & Synonyms: SLAG (From Steel Production Process)

Chemical Family: Metal

Formula: Mixture primary use is road fill and road building

Manufacturers Name:

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Section 2 Composition of Ingredients

Base Metal, Alloying Elements and Coatings	% Weight	OSHA PEL	ACGIH TLV
Calcium Oxide	20%-35%	5 mg/m ³ as calcium oxide	2 mg/m ³
Iron (base metal)	10%-20%	10 mg/m ³ as iron oxide fume	5 mg/m ³ as iron oxide fume
Silicon	10%-20%	10 mg/m ³ – total as silicon 5 mg/m ³ – respirable	10 mg/m ³
Magnesium Oxide	1%-10%	10 mg/m ³ – total 5 mg/m ³ - respirable	10 mg/m ³ inhalable
Aluminum Metal	1%-10%	10 mg/m ³ – dust 5 mg/m ³ - fume	1 mg/m ³ – respirable
Manganese	1%-5%	5 mg/m ³ ceiling limit	0.2 mg/m ³
Chromium metal	0.1%-1%	1 mg/m ³	0.5 mg/m ³

Notations:

OSHA PEL = Federal OSHA Permissible Exposure Limit (Note in some state programs the level may be lower)
 ACGIH TLV = American Conference of Governmental Industrial Hygienist Threshold Limit Values (recommended limits)

TWA = time weighted average

STEL = short term exposure limit

Ceiling Limit = at no time shall exposures exceed this limit.

Total = total dust

Respirable = collection of respirable sized particles

Section 3 Toxicology and Health Information

Effects of Overexposure: Steel slag under normal conditions does not present an inhalation, ingestion, or contact health hazard. Dust exposures to various metal dusts in higher concentrations can result in signs and symptoms including redness, swelling, itching, and/or irritation of skin and eyes, respiratory difficulties such as coughing, wheezing, shortness of breath (calcium oxide), central nervous system effects (manganese), anorexia and weight loss (chronic lead overexposure).

Acute: Exposure to metal particulates or fumes can cause eye, skin, and respiratory tract irritation and/or sensitization. Skin contact with dust may cause irritation or sensitization, possibly leading to dermatitis.

Chronic: Excessive and repeated exposures to fume or dust generated during processing may cause:

- Allergic sensitization – dermatitis and asthma
- Lung inflammation and damage – pneumonitis, pneumonia, bronchitis, siderosis, diffuse pulmonary fibrosis
- Nasal perforation and nasal cavity damage
- Eye inflammation
- Central nervous system damage, possibly permanent (manganese overexposure)
- Kidney damage
- Liver damage
- Gout – inflammation of the joints

Target Organs: Respiratory tract, skin and eyes

Route of Entry: Inhalation, ingestion

Carcinogenicity: The carcinogenicity of this product as a whole has not been tested. Individual components and some compounds of these elemental metals may have been associated with carcinogenicity by NTP and IARC.

Section 4 Emergency First Aid

Inhalation: High dust inhalation exposures remove from area to fresh air. Seek medical attention if breathing becomes difficult.

Eye Contact: Immediately flush eyes with copious amounts of water for at least 15 minutes. Assure adequate flushing of the eyes by separating the eyelids with fingers. Seek emergency medical care if irritation persists.

Skin Contact: Wash with soap and rinse with copious amounts of water. Remove and wash contaminated clothing. If persistent rash or irritation occurs, seek medical attention.

Ingestion: Get medical attention immediately.

Section 5 Fire and Explosion Hazard

Flash point (Method Used)	Flammable limits	LEL	UEL
Not Applicable		Not Applicable	Not Applicable

Steel slag in the solid state is not considered to be a fire or an explosion hazard.

Section 5 Fire and Explosion Hazard – continued

Extinguishing Media: A fire involving finely divided particles should be treated as a Class D combustible metal fire.

Special Fire Fighting Procedures

As with all fires, fire fighters should wear full protective gear including supplied air respirators.

Unusual Fire & Explosion: None

Section 6 Accidental Release Measures

Steps to be Taken in Case Material is Released or Spilled: Not generally applicable to steel slag in the solid state. Appropriate PPE should be worn if exposure limits are exceeded. Collect material in compatible and appropriately labeled containers. For small dry spills, place material into clean dry container with a clean shovel, and cover loosely.

Waste Disposal Method: Follow safe solid waste disposal guidelines in accordance with federal state and local regulations. National or regional provisions may also be in force.

Section 7 Storage and Handling

Storage Precautions: Keep away from incompatible materials.

Handling Precautions: Avoid breathing of and contact with dusts during processing.

Section 8 Exposure Controls & Personal Protection

Required Ventilation: Local and/or general exhaust ventilation should be used to keep worker exposures below applicable exposure limits.

Respiratory Protection: Generally would not be needed for handling steel slag in the solid state. Use a NIOSH/MSHA approved dust/fume respirator if there is overexposure to fume or particulate.

Protective Gloves: Suitable for protection against physical injury and skin contact during handling and processing.

Eye Protection: Safety glasses or goggles when there are flying particles.

Section 9 Physical & Chemical Properties

Physical State: Solid

Color: Silver-gray

Odor: Odorless

Melting Point: 3000⁰ F

Vapor Pressure (mm Hg, @ 68 deg F):
Negligible

Specific Gravity (H₂O =1): Heavier than water, varies (Density 100-140 lb/ft³)

Evaporation Rate: N/A

Solubility in Water: Insoluble

Freezing Point: N/A

Section 10 Stability and Reactivity

Stability: Stable under normal conditions.

Incompatible: Oxidizers. Reacts with strong acids to form explosive hydrogen gas and heat.

Hazardous Decomposition Products: Extreme heat from fire or processing may produce toxic or irritating airborne particulate, including metal and metallic oxide fumes. Reaction of some metals with water, steam, acids, etc. can evolve hydrogen, which is a highly dangerous fire and explosion hazard.

Conditions to Avoid: Contact with incompatible materials. Avoid creating finely divided, concentrated airborne particulates in the presence of ignition sources.

Section 11 Toxicological Information Data not available for the mixture.

Calcium oxide: Industrial experience has shown calcium oxide to be very irritating to mucous membranes and moist skin as a result of local liberation of heat and dehydration of tissues when in contact with dust. Inflammation of the respiratory passages and ulceration and perforation of the nasal septum have been reported. Inhalation of lime dust results in eye and skin irritation.

Iron: Excessive exposure of eyes to airborne iron dust can cause conjunctivitis, choroiditis, and retinitis. Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in development of a benign pneumoconiosis, called siderosis, which is observable via x-ray. Inhalation of excessive concentrations of iron oxide may enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. IARC Cancer Review Group 3. OSHA/ACGIH Not classifiable as a human carcinogen. LD50 (oral, rat) – 30 gm/kg.

Silicon: Elemental silicon is an inert material which appears to lack the property of causing fibrosis in lung tissue. Silicon dust has little adverse effect on lungs and does not appear to produce significant organic disease or toxic effects when exposures are below the permissible exposure limit. Silicon may cause chronic respiratory effects.

Magnesium: HUMAN EXPOSURE STUDIES/ Examination of 95 workers exposed to an unspecified concentration of MgO dust revealed slight irritation of the eyes and nose. Conjunctivitis, nasal discharge, and coughing up discolored sputum /was cited/ after industrial exposures, but even when such exposures doubled serum magnesium as compared to normal concentrations, no systematic effects were noted among these workers; however, serum calcium concentrations were elevated. Inhalation of magnesium oxide produced a fever reaction and a leukocytosis, similar to metal fume fever, in the exposed subjects analogous to that caused by inhalation of zinc oxide.

Aluminum: Inhalation of finely divided aluminum and aluminum oxide powder has been reported as a cause of pulmonary fibrosis and lung damage.

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 low toxicity; however, Hexavalent Chromium (Cr VI) can be found in welding or high temperature decomposition by-products. Cr VI is listed as Confirmed Human Carcinogen by ACGIH, IARC Group 1 and OSHA

Manganese: Chronic manganese poisoning may result from prolonged inhalation of manganese dust and fumes. The central nervous system is the chief site of damage from the disease, which may result permanent disability. Symptoms include languor, sleepiness, weakness, emotional disturbances, spastic gait, recurring leg cramps, and paralysis. LD50 (oral, rat) – 30 mg/mkg.

Section 12 Ecological Information

It is believed that finely divided product, based on its components, will be hazardous to fish, animals, plants and the environment if released, the degree of which would depend on the particle size and quantity released. This material may persist in the environment for long periods, based upon its corrosion resistant, insoluble, and non-biodegradable properties.

Section 13 Waste Disposal

Follow safe solid waste disposal guidelines in accordance with federal, state and local regulations. For proper disposal, an assessment must be completed to determine the proper and permissible waste management options permissible under applicable rules, regulations, and/or laws governing your location.

Section 14 Transportation Information

Hazardous materials description/proper shipping name: Not applicable for solid formed product.
Hazard Class: Not applicable for solid formed product.
Product Identification No.: Not applicable for solid formed product.

Section 15 Regulatory Information

SARA Title III Section 302 Extremely hazardous substances: No components are listed as extremely hazardous substances.

SARA Title III Section 313 Reportable Substances: Aluminum, manganese, and chromium are subject to reporting requirements. All other components are below *de minimis levels*.

CERCLA Hazardous Substances: Chromium (threshold 5000 lbs.), copper (threshold 5000 lbs.). CERCLA reporting only if diameter of particles released is less than 100 micrometers.

Pennsylvania R-T-K List: Listed components (greater than 0.1% by weight) – Aluminum (E), Manganese (E), Silicon, Chromium (E,S). E-environmental hazard, S-special hazardous substance.

New Jersey R-T-K Environmental Hazardous substance list: Listed components – aluminum (as dust and fume), chromium, manganese

California Proposition 65: Listed possible trace (less than 0.1% by weight) elements known by the State to cause cancer or be developmental risks. This trace metals may be present in the furnace dust which includes: antimony, arsenic, beryllium, cadmium, lead, nickel, carbon as carbon black, hexavalent chromium.

Section 16 Other Information

HMS Hazard Rating (for solid formed product) *Health – 1 Flammability – 0 Physical Hazard – 0 Personal Protective Equipment – X (PPE is dependant upon use of product)* (0- Insignificant, 1- Slight, 2- Moderate, 3- High, 4- Extreme)

NFPA Rating (for solid formed product): No NFPA signage required.

References

- 1) TLV's Threshold Limit Values and Biological Exposure Indices for 2007. American Conference of Governmental Industrial Hygienists, 2007.
- 2) Air Contaminants, OSHA regulations CFR 29 1910.1000
- 3) Toxnet, current on-line publications
- 4) Material Safety Data Sheets and Cheminfo, Canadian Centre for Occupational Health and Safety
- 5) SAX'S Dangerous Properties of Industrial Materials, 12th Edition

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