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## MATERIAL SAFETY DATA SHEET

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### Section 1 - IDENTIFICATION

**Product Name:** Essroc Slag

**CAS Reg. No.:** 65996-69-2 (Blast Furnace Slag)

**Chemical Name and Synonyms:** Ground Granulated Blast Furnace Slag Cement, Ground Granulated Iron Blast Furnace Slag Cement, Blast Furnace Slag Cement, Iron Slag Cement, Pig Iron Slag Cement, Water Granulated Ground Blast Furnace Slag Cement

**MSDS Information:** This Material Safety Data Sheet was produced in June 1998 and replaces any prior versions.

**Chemical Family:** Mineral Composite; The major ingredients include (elemental analysis calculated as oxides for most ingredients):

CaO	Calcium Oxide
SiO <sub>2</sub>	Silicon Dioxide
MgO	Magnesium Oxide
Al <sub>2</sub> O <sub>3</sub>	Aluminum Trioxide
SO <sub>3</sub>	Sulfur Trioxide
Mn <sub>2</sub> O <sub>3</sub>	Manganese Oxide
K <sub>2</sub> O	Potassium Oxide
Na <sub>2</sub> O	Sodium Oxide
TiO <sub>2</sub>	Titanium Dioxide
Fe <sub>2</sub> O <sub>3</sub>	Ferrous Trioxide
Other	

Note: Components are listed as oxides for quantitative purposes. Actual oxides do not generally occur in "free form" but rather as complexed silica-based glasses or crystals.

**Formula:** Not applicable

**Informational Phone Numbers:** (800) 523-9238  
(610) 837-6725

**Emergency Contact Information:** (800)-424-9300 Chemtrec

**MSDS Prepared By:** Essroc MSDS Development Committee  
(610) 837-6725  
June 1998

## **Section 2 - COMPONENTS**

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### **Hazardous Ingredients:**

Calcium Oxide(CAS# 1305-78-8) - approximately 40 to 50% by weight

ACGIH TLV-TWA (1995-1996) = 10 mg total dust/m<sup>3</sup>

OSHA PEL (8-hour TWA) = 5 mg/m<sup>3</sup>

LD50 = Not applicable

LC50 = Not applicable

Quartz (CAS# 14808-60-7) - approximately 0 to 0.5% by weight

ACGIH TLV-TWA (1995-1996) = 0.10 mg respirable quartz dust/m<sup>3</sup>

OSHA PEL (8-hour TWA) = (10 mg of respirable dust/m<sup>3</sup>) / (percent silica + 2)

NIOSH REL (8-hour TWA) = 0.05 mg respirable quartz dust/m<sup>3</sup>

LD50 = ipr rat LD Lo 400 mg/kg

LC50 = TWA 50ug/m<sup>3</sup>

Titanium Dioxide (CAS# 13463-67-7) - approximately 0 to 0.75% by weight

ACGIH TLV-TWA (1995-1996) = 10 mg total dust/m<sup>3</sup>

OSHA PEL (8-hour TWA) = 15 mg/m<sup>3</sup>

NIOSH REL (8-hour TWA) = 15 mg respirable quartz dust/m<sup>3</sup>

LD50 = NA (\*)

LC50 = NA (\*)

(\*) Although there are no LC50 and LD50 toxicity values, there is an irritant value for human skin of 300 ug/3D-I mild irritation effects

**Trace Elements:** Slag cement is a byproduct of the manufacture of steel. Slag cement is produced from the grinding of slag which exhibit some of the properties of portland cement. Trace amounts of naturally occurring, potentially harmful chemicals might be detected during chemical analysis. Trace constituents may include free magnesium oxide, potassium and sodium sulfate compounds, free crystalline silica and total metals. A TCLP/Total Analysis for metals is available upon request.

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## **Section 3 - HAZARDS IDENTIFICATION**

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### **Emergency Overview:**

Slag cement is a light colored powder that poses little immediate hazard. A single short term exposure to the dry powder is not likely to cause serious harm. However, exposure of sufficient duration to wet slag cement can cause serious, potentially irreversible tissue (skin or eye) destruction in the form of chemical (caustic) burns, including third degree burns. The same type of tissue destruction can occur if wet or moist areas of the body are exposed for sufficient duration to dry slag cement.

### **Potential Health Effects:**

#### **Relevant Routes of Exposure:**

Eye contact, skin contact, inhalation and ingestion.

#### **Effects resulting from eye contact:**

Exposure to airborne dust may cause immediate or delayed irritation or inflammation.

Eye contact by larger amounts of dry powder or splashes of wet slag cement may cause effects ranging from moderate eye irritation to chemical burns and blindness. Such exposures require immediate first aid (see Section 4) and medical attention to prevent significant damage to the eye.

#### **Effects resulting from skin contact:**

Discomfort or pain cannot be relied upon to alert a person to hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly contact with wet slag cement. Exposed persons may not feel discomfort until hours after the exposure has ended and significant injury has occurred.

Exposure to dry slag cement may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation or other conditions. Dry slag cement contacting wet skin or exposure to moist or wet slag cement may cause more severe skin effects including thickening, cracking, or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of (caustic) chemical burns.

Some individuals may exhibit an allergic response upon exposure to slag cement, possibly due to trace amounts of chromium. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers. Persons already sensitized may react to their first contact with the product. Other persons may first experience this effect after years of contact with Slag Cement.

**Effects resulting from inhalation:**

Slag cement may contain trace amounts of free crystalline silica and titanium dioxide. Prolonged exposure to airborne free crystalline silica and/or titanium dioxide may cause delayed lung injury including silicosis, a disabling and potentially fatal lung disease, and/or other diseases. (also see "Carcinogenic potential" below.) It may also aggravate other lung conditions. Exposure to slag cement may cause irritation to the moist mucous membranes of the nose, throat, and upper respiratory system. It may also leave unpleasant deposits in the nose.

**Effects resulting from ingestion:**

Slag cement should not be eaten. Although ingestion of small quantities of slag cement are not known to be harmful, ill effects are possible especially if larger quantities are consumed.

**Carcinogenic potential:**

Slag cement is not listed as a carcinogen by the International Agency for Research (IARC), National Toxicology Program (NTP), or the Occupational, Safety, and Health Administration (OSHA). However, it contains slight quantities of titanium dioxide in complexes with calcium oxides. Free titanium dioxide has been classified by the IARC as having "limited evidence of carcinogenicity" in laboratory animals.

Crystalline silica, a potential trace level contaminant in slag cement, is now classified by IARC as a known human carcinogen (Group 1). The NTP has characterized respirable silica a "reasonably anticipated to be a carcinogen".

**Medical conditions which may be aggravated by inhalation or dermal exposure:**

Pre-existing upper respiratory and lung diseases.  
Unusual (hyper) sensitivity to hexavalent chromium (chromium<sup>+6</sup>) salts.

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**Section 4 - FIRST AID**

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**Eyes:** Immediate flush eyes thoroughly with water. Continue flushing eye for at least 15 minutes including under lids, to remove all particles. Call physician immediately.

**Skin:** Remove all contaminated clothing. Wash skin with cool water and pH-neutral soap or a mild detergent intended for use on skin. Seek medical treatment in all cases of prolonged exposure to wet slag cement, slag cement mixtures, liquids from fresh cement products, or prolonged wet skin exposure to dry slag cement.

**Inhalation of Airborne Dust:** Remove personnel from contaminated area to fresh air. Restore/support breathing if required. Administer oxygen if necessary to support respiration. Seek medical help if coughing and other symptoms do not subside. ("Inhalation" of gross amounts of slag cement requires immediate medical attention.)

**Ingestion:** Rinse mouth immediately. Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

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## **Section 5 - FIRE AND EXPLOSION DATA**

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Flash Point.....None  
Lower Explosive Limit.....None  
Upper Explosive Limit.....None  
Auto ignition temperature..... Not combustible  
Extinguishing media.....Not combustible  
Hazardous combustion products.....None  
Unusual fire and explosion hazards.....None  
Special fire fighting procedures..... None\*

*\*Although slag cement poses no fire-related hazards, a self-contained breathing apparatus is recommended to limit exposure to combustion products when fighting any fire.*

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## **Section 6 - ACCIDENTAL RELEASE MEASURES**

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Carefully scoop or vacuum using an appropriate filter into a suitable container for reclamation or disposal. Avoid actions that cause dust to become airborne. Ventilate the affected area. Avoid inhalation of dust and contact with skin. Wear appropriate personal protective equipment as described in Section 8.

Scrape up wet material and place in appropriate container. Allow the material to "dry" before disposal. Do not attempt to wash slag cement down drains.

Dispose of waste material according to local, state, and federal regulations.

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## **Section 7 - HANDLING AND STORAGE**

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This material should be stored in a dry area to prevent clumping of the product. Store it away from incompatible materials. Protect containers from physical damage. Normal temperatures and pressures do not affect the material. Promptly remove dusty clothing or clothing which is wet with cement fluids and launder before reuse. Wash thoroughly after exposure to dust or wet cement mixtures or fluids. Good housekeeping should be maintained to minimize the accumulation of dust.

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## **Section 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION**

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**Skin protection:** Prevention is essential to avoid potentially severe skin injury. Avoid contact with unhardened (wet) slag cement products. If contact occurs, promptly wash affected area with soap and water. Where prolonged exposure to unhardened slag cement products might occur, wear impervious clothing and gloves to eliminate skin contact. Leather or cloth gloves should be used when handling the dry material. Rubberized or other water repellent glove should be used when handling wet material. Where required, wear boots that are impervious to water to eliminate foot and ankle exposure.

Do not rely on barrier creams; barrier creams should not be used in place of gloves.

Periodically wash areas contacted by dry or wet slag cement by wet cement or concrete fluids with a pH neutral soap. Wash again at the end of the work. If irritation occurs, immediately wash the affected area

and seek treatment. If clothing becomes saturated with wet concrete, it should be removed and replaced with clean dry clothing.

**Respiratory protection:** Avoid actions that cause dust to become airborne. Use local or general ventilation to control exposures below applicable exposure limits.

Use NIOSH/MSHA-approved (under 30 CFR 11) or NIOSH-approved (under 42 CFR 84) respirators in poorly ventilated areas, if an applicable exposure limit is exceeded, or when dust causes discomfort or irritation. (Advisory: Respirators and filters purchased after July 10, 1998, must be certified under 42 CFR 84)

**Ventilation:** Use local exhaust and/or general dilution ventilation to control exposure within applicable limits.

**Eye protection:** When engaged in activities where slag cement or wet slag cement or concrete could contact the eye, wear safety glasses with side shields or goggles. In extremely dusty environments and unpredictable environments, wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with wet slag cement or fresh slag cement products.

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## **Section 9 - PHYSICAL AND CHEMICAL PROPERTIES**

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Appearance.....	Light/gray/tan/white powder (very fine) solid
Odor.....	Slight sulfur odor
Physical state.....	Solid (powder)
pH (as per EPA 9045 procedure).....	12.0 to 13.2
Solubility in water.....	Slightly soluble
Vapor pressure.....	Not applicable
Vapor density.....	Not applicable
Boiling point.....	Not applicable
Melting point.....	1300 - 1350 Deg. C
Specific gravity (H <sub>2</sub> O = 1.0).....	2.7 - 3.1
Evaporation Rate.....	Not applicable
Freezing Point.....	Not applicable
Coefficient of oil to water distribution.....	Not applicable

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## **Section 10 - STABILITY AND REACTIVITY**

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**Stability:** Stable

**Conditions to avoid:** This product is stable at all temperatures. Product should be kept in dry storage prior to use to avoid the normal hydrolysis/solidification process. Unintentional contact with water.

**Incompatibility:** Wet slag cement is alkaline. As such it is incompatible with acids, ammonium salts and aluminum metal.

**Hazardous decomposition:** Will not spontaneously occur. However, hydrogen sulfide (H<sub>2</sub>S) may be released when product is exposed directly to some organic or inorganic acids in a low pH environment (pH < 5). H<sub>2</sub>S is a hazardous, toxic and poisonous gas. Finally, adding water results in hydration and produces (caustic) calcium hydroxide.

**Hazardous polymerization:** Will not occur.

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## **Section 11 - TOXICOLOGICAL INFORMATION**

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Route of Entry.....	Section 3
Effects of acute exposure to product.....	Section 3
Effects of chronic exposure to product.....	Section 3
Exposure Limits.....	Section 2
Irritancy of product.....	Section 3
Sensitization to product.....	Section 3
Carcinogenicity.....	Section 3
Reproductive Toxicity.....	Not Applicable
Teratogenicity.....	Not Applicable
Mutagenicity.....	Not Applicable
Toxicologically synergistic products.....	Section 3, Section 16

For a description of available, more detailed toxicological information, call one of the informational phone numbers listed at the end of Section 1.

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## **Section 12 - ECOLOGICAL INFORMATION**

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**Ecotoxicity:** No recognized unusual toxicity to plants or animals.

**Relevant physical and chemical properties:** See sections 9 and 10.

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## **Section 13 - DISPOSAL**

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Dispose of waste material according to local, state, and federal regulations. (Since slag cement is stable, uncontaminated material may be saved for future use.) Waste slag cement when contacted with water will solidify and can be disposed as demolition debris in a landfill. However, if waste slag cement is contaminated with foreign substances, this waste must be evaluated for Resource Conservation and Recovery Act (RCRA) characteristics to determine if it must be managed as a hazardous waste.

Dispose of bags in an approved landfill or incinerator.

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## **Section 14 - TRANSPORTATION DATA**

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**Hazardous materials description/proper shipping name:** Slag cement is not hazardous under US Department of Transportation (DOT) regulations.

**Hazard class:** Not applicable.

**Identification number:** Not applicable

**Required label text:** Not applicable.

**Hazardous substances/reportable quantities (RQ):** Not applicable

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## **Section 15 - OTHER REGULATORY INFORMATION**

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**Status under USDOL-OSHA Hazard Communication Rule, 29 CFR 1910.1200:** Slag cement is considered a "hazardous chemical" under this regulation, and should be part of any hazard communication program.

**Status under CERCLA/Superfund, 40 CFR 117 and 302:** Not Listed

**Hazard Categories under SARA TITLE III, Sections 311- 312:** Slag cement qualifies as a “hazard substance” under the following hazard categories:

Immediate (Acute) Health Hazard  
Delayed (Chronic) Health Hazard

**Status under SARA Title III, Section 313:** This product contains NONE of the substances 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 in concentrations above deminimis levels.

**Toxic Substance Control Act (TSCA):** All components of this products are on the TSCA inventory.

**Status under the Federal Hazardous Substances Act:** Slag cement is a “hazardous substance” subject to statutes promulgated under the subject act.

**Status under Canadian Environmental Protection Act:** Not listed.

**Status under WHMIS:** Slag cement is considered to be a hazardous material under the Hazardous Products Act as defined by the Controlled Products Regulations (Class E - Corrosive material) and is therefore subject to the labeling and MSDS requirements of the Workplace Hazardous Materials Information System (WHMIS).

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## **SECTION 16 - OTHER INFORMATION**

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### **Abbreviations:**

ACGIH	American Conference of Government Industrial Hygienists
ASTM	American Society of Testing Materials
CAS	Chemical Abstract Service
CFR	Code of Federal Regulations
DOT	Department of Transportation
IARC	International Agency for Research
m <sup>3</sup>	cubic meter
mg	Milligram
mm	millimeter
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicity Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
RCRA	Resource Conservation and Recovery Act
RQ	Reportable Quantity
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TWA	Time Weighted Average
URT	Upper Respiratory Tract
WHMIS	Workplace Hazardous Material Information System

### **Other important information:**

Slag cement should only be used by knowledgeable persons. A key to using the product safely requires the user to recognize that slag cement chemically reacts with water, and that some of the intermediate products of this reaction (that is, those present while slag cement is “setting”) pose a far more severe hazard than does slag cement itself.

While the information provided in this material safety data sheet is believed to provide a useful summary of the hazards of slag cement as it is commonly used, the sheet cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product.

In particular, the data furnished in this sheet do not address hazards that may be posed by other materials mixed with slag cement to produce slag cement dust products. Users should review other relevant material safety data sheets before working with this slag cement or working on slag cement products, for example portland cement.

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