

MATERIAL SAFETY DATA SHEET

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SECTION 1. MATERIAL IDENTIFICATION

Materials Name: Ground Granulated Blast Furnace Slag (Slag Powder)

Other Designations: VCEM GGBS, VCEM Ground Granulated Blast Furnace Slag

Description: A ground powder made with an appropriate mill from a glassy granular material formed when molten iron blast furnace slag is rapidly chilled as by immersion in water.

CAS Reg. No.: NA (Mixture)

Supplier: EnGro Corporation Limited

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient: Iron Blast Furnace Slag

Ingredient Sequence Number: 01

<u>Components</u>	<u>CAS Number</u>	<u>Percentage (Approx.)</u>
CaO (calcium oxide)	1305-78-8	30-50
SiO ₂ (silicon dioxide)	7631-86-9	30-40
Al ₂ O ₃ (aluminum oxide)	1344-28-1	7-17
Fe ₂ O ₃ (iron III oxide)	1309-37-1	0.1-1.8
S (sulfur)	7704-34-9	0-2.0
MgO (magnesium oxide)	1309-48-4	2-14
MnO (manganese oxide)	7439-96-5	0-1.0

Ingredient: Gypsum

Ingredient Sequence Number: 02

Ingredient Percentage: 0-5

CAS Number:	13397-24-5
Ingredient:	Reactivity-enhancer
Ingredient Sequence Number:	03
Ingredient Percentage:	Less than 1.0
CAS Number:	Proprietary
NIOSH (RTECS) Number:	Proprietary

SECTION 3. HAZARDS IDENTIFICATION

EXPOSURE LIMITS:

Unless specified otherwise, limits are expressed as a time-weighted average (TWA) concentration for an 8-hour work shift of a 40-hour workweek. Limits for cristobalite and tridymite (other forms of crystalline silica) are equal to one-half the limits for quartz.

ABBREVIATIONS:

ACGIH TLV:	Threshold limit value of the American Conference of Governmental Industrial Hygienists (ACGIH). The Federal Mine Safety and Health Administration (MSHA) has adopted the TLVs established by ACGIH, as set forth in the 1973 edition of "TLVs Threshold Limit Values for Chemical Substances in Workroom Air Adopted by ACGIH for 1973".
m.p.p.c.f.:	Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.
mg/m³:	Milligrams of substance per cubic meter of air.
NIOSH REL:	Recommended exposure limit of the National Institute for Occupational Safety and Health (NIOSH), expressed as a TWA concentration for up to a 10-hour workday during a 40-hour workweek.
NIOSH STEL:	NIOSH Short Term Exposure Limit. This is a 15-minute TWA exposure that should not be exceeded at any time during a workday.
OSHA ACC:	Acceptable Ceiling Concentration set by the federal Occupational Safety and Health Administration (OSHA). Under OSHA regulations, an employee's exposure to an acceptable ceiling concentration shall not exceed at any time during an 8-hour shift the acceptable ceiling concentration limit given for the substance,

except for a time period, and up to a concentration not exceeding the maximum duration and concentration allowed as specified under the subheading "acceptable maximum peak above ACC for an 8-hour shift". If no such subheading appears, then employee exposure shall never exceed the acceptable ceiling concentration limit.

- OSHA PEL:** Permissible exposure limit of OSHA.
- Calcium Oxide CaO:** **OSHA PEL:** 5 mg/m³; **ACGIH TLV:** 5 mg/m³; **NIOSH REL:** 2 mg/m³.
- Silicon Dioxide SiO₂:** **OSHA PEL:** (respirable) 80 mg/m³ ÷ (% SiO₂); **ACGIH TLV:** 20 m.p.p.c.f.; **NIOSH REL:** 6 mg/m³.
- Magnesium Oxide MgO:** **OSHA PEL:** (total particulate) 15 mg/m³; **ACGIH TLV** 10 mg/m³.
- Alumina Al₂O₃:** **OSHA PEL:** (respirable) 5 mg/m³, (total dust) 15 mg/m³; **ACGIH TLV:** 10 mg/m³.
- Iron Oxide Fe₂O₃:** **OSHA PEL:** 10 mg/m³; **ACGIH TLV:** 10 mg/m³; **NIOSH REL:** 5 mg/m³.
- Manganese Oxide MnO:** **OSHA ACC:** 5 mg/m³; **ACGIH TLV:** 5 mg/m³; **NIOSH STEL:** 3 mg/m³; **NIOSH REL:** 1 mg/m³.
- Sulfur S:** **OSHA PEL:** Not listed; **ACGIH TLV:** Not listed; **NIOSH STEL:** Not listed.
- Other Particulates:** **OSHA PEL:** (total particulate, not otherwise regulated) 15 mg/m³, (respirable particulate, not otherwise regulated) 5 mg/m³; **ACGIH TLV:** (nuisance particulates) 10 mg/m³.

HEALTH HAZARDS:

Primary Route(s) of Entry:

Inhalation: Yes **Skin:** Yes **Ingestion:** No or unlikely.

Acute:

Eye Contact: Minor irritation to the eyes. Direct contact by larger amounts of material or splashes of wet material may cause effects ranging from moderate eye irritation to chemical burns and blindness.

Inhalation: Dusts may irritate the nose, throat, and respiratory tract. Coughing, sneezing, and shortness of breath may occur following exposures in excess of appropriate exposure limits.

Skin Contact: Exposure to dry material may cause drying of the skin with consequent mild irritation. Dry material contacting wet skin or exposure to moist or wet material 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.

Ingestion: Ingestion of large amounts may cause gastrointestinal irritation and blockage.

Chronic:

Inhalation: Inhalation of slag dust can cause inflammation of the lining of the nose.

Eye Contact: Exposure to slag dust may cause inflammation of the cornea.

Skin Contact: Hypersensitive individuals may develop allergic dermatitis.

Signs & Symptoms Of Exposure: Irritation of eyes, skin and/or respiratory system.

Medical Conditions Generally Aggravated by Exposure: Inhaling respirable dust may aggravate existing respiratory system disease(s) and/or dysfunctions such as emphysema or asthma. Exposure may aggravate existing skin and/or eye conditions.

SECTION 4. FIRST AID MEASURES

Eyes: Immediately flush eye(s) with plenty of clean water for at least 15 minutes, while holding the eyelid(s) open. Beyond flushing, do not attempt to remove material from the eye(s). Contact a physician if irritation persists or later develops.

Inhalation: Remove to fresh air. Dust in throat and nasal passages should clear spontaneously. Contact a physician if irritation persists or later develops.

Skin: Wash with cool water and a pH-neutral soap or mild detergent intended for use on skin. Seek medical treatment in all cases of prolonged direct exposure to wet product or prolonged wet skin exposure to dry product.

Ingestion: Do not induce vomiting. If person is conscious, give large quantity of water. Get immediate medical attention.

SECTION 5. FIREFIGHTING MEASURES

Flash Point:	N/A
Extinguishing Media:	Media suitable for surrounding fire. (FPN)
Special Fire Fighting Procedures:	None
Unusual Fire & Explosion Hazards:	None reported
Flammable Limits in Air (Volume %):	N/A
Lower Explosive Limit:	N/A
Upper Explosive Limit:	N/A

SECTION 6. ACCIDENTAL RELEASE MEASURES

Steps to be taken if material is released or spilled: Use dry clean-up methods that do not disperse dust into the air. Avoid actions that cause dust to become airborne. Avoid inhalation of dust and contact with skin. Wear appropriate personal protective equipment. Scrape up wet material and place in an appropriate container. Allow the material to "dry" before disposal.

SECTION 7. HANDLING AND STORAGE

Respirable dust may be generated during processing, handling, and storage. The personal protection and controls identified in Section 8 of the MSDS should be applied as appropriate.

Keep product dry until used.

Do not store or handle near food and beverages or smoking materials.

The personal protection and controls identified in Section 8 of the MSDS should be applied as appropriate.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Ventilation:	Local exhaust or general ventilation adequate to maintain exposures below appropriate exposure limits.
Other:	Exposure levels should be monitored regularly. Exposure levels in excess of appropriate exposure limits should be reduced by all feasible engineering controls, including (but not limited to) ventilation, process enclosure, and enclosed employee workstations.
Respiratory Protection:	When exposure levels exceed or are likely to exceed appropriate exposure limits, follow MSHA or OSHA regulations, as appropriate, for use of NIOSH-approved respiratory protection equipment.
Skin Protection:	Protective gloves, shoes and protective clothing that are impervious to water should be worn to avoid contact with skin.
Eye Protection:	Safety glasses with side shields should be worn as minimum protection. Dust goggles should be worn when excessive (visible) dust conditions are present or anticipated. Contact lenses should not be worn when working with this product.
Hygiene:	Periodically wash exposed skin with a pH-neutral soap. Wash again before eating, drinking, smoking, and using toilet facilities. Wash work clothes after each use. If clothing becomes saturated with wet material, it should be removed and replaced with clean, dry clothing.

SECTION 9. PHYSICAL / CHEMICAL CHARACTERISTICS

Boiling Point:	N/A
Specific Gravity (H₂O = 1):	2.80-2.95
Vapor Pressure (mm Hg):	N/A
Melting Point:	N/A
Vapor Density (AIR-1):	N/A
Evaporation Rate:	N/A
Solubility in Water:	0.1-0.5 %
Appearance & Odor:	Beige to white powder with traces of sulfur odor

SECTION 10. STABILITY AND REACTIVITY

Stability:	Stable
Conditions to Avoid (Stability):	Avoid moisture. Keep dry until used.
Materials to Avoid:	None
Incompatibility:	None
Hazardous Decomposition/By-products:	Respirable dust particles may be generated when the product is handled.
Hazardous Polymerization:	Will not occur. No conditions to avoid.

SECTION 11. & 12. TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For questions regarding Toxicological and Ecological information refer to contact EnGro

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal Method: Do not attempt to wash material down drains. Dispose of waste materials only in accordance with applicable federal, state, and local laws and regulations. Material can be returned to container for later use, or it can be disposed of as a common non hazardous material.

SECTION 14. TRANSPORT INFORMATION

The product is not covered by the international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID) and therefore no classification is required.

SECTION 15. REGULATORY INFORMATION

For Regulatory information refer to contact EnGro Corporation Limited

SECTION 16. SOURCE DATA / OTHER INFORMATION

Reference Sources:

1. CSR Rinker Materials, *MSDS for: Ground Slag Material*, Effective Date: October 1, 1996; Revision: 0; (Address: 1501 Belvedere Road, West Palm Beach, FL 33406).
2. TARMAC AMERICA, INC. *Material Safety Data Sheet for Iron Blast Furnace Slag, Ground*, Revised: 3/25/98; (Address: 1151 Azalea Garden Road, Norfolk, VA 23502)
3. Test Certificate of GGBS issued by the Original Manufacturer (dated 27th February 2004)
4. In-house test reports of Engro Central Laboratory.

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Note: Physical and chemical data contained in this MSDS are provided for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references. However, EnGro Corporation Limited does not certify the data on the MSDS. The certified values for this material are given only on the EnGro Corporation Certificate of Analysis.