MATERIAL SAFETY DATA SHEET

Silicomanganese Slag

MSDS No.: EMI-SiMnSlag
Revised: February 25, 2009

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: **Silicomanganese Slag, SiMn Slag**
Product Code: None

MANUFACTURER: Eramet / Comilog
Airport Office Park, Bldg. 4, 333 Rouser Road
Moon Township, PA 15108-2749
U.S. Phone Number: (800) 388-7025

EMERGENCY TELEPHONE NUMBER: CHEMTREC (800) 424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS [1]

	wt. %	CAS Registry #
Silicon Dioxide (Non-crystalline)	< 43	69012-64-2
Alumina	< 20	1344-28-1
Calcium Oxide	< 20	1305-78-8
Manganese Oxide	< 12	1317-35-7
Magnesium Oxide	< 12	1309-48-4
Barium Oxide	< 4	1304-28-5
Potassium Oxide	< 3	12136-45-7
Iron Oxide	< 0.5	1309-28-5

OSHA HAZARDOUS COMPONENTS (29 CFR 1910.1200):

	EXPOSURE LIMITS 8 hrs. TWA (mg/m^3)	
	OSHA PEL	ACGIH TLV
Manganese	5 (ceiling)	0.2
Aluminum Oxide Fume	15	10
Calcium Oxide	5	2
Magnesium Oxide Fume	10	10
Barium	0.5	0.5
Silica, Amorphous	OSHA Table Z3	2
Iron Oxide Fume	10	5

[1] Elemental analysis of the slag. The manufacturer can provide a more detailed analysis, including other trace elements.

3. HAZARDS IDENTIFICATION

This product does not represent a significant hazard to health, safety or the environment when handled and stored as advised (see Section 7). Repeated, long term inhalation of manganese dust in excess of exposure limits may cause adverse health effects (see Section 11). Flammable and noxious gases may be formed in contact with moisture and/or acids (see Sections 10 and 11).

4. FIRST AID MEASURES

INHALATION:
Emergency responders should use the appropriate respiratory protection when moving an affected victim to fresh air. Give artificial respiration if breathing has stopped. Call for prompt medical attention. (See Section 11)

SKIN CONTACT:
Wash skin with water and/or a mild detergent. If irritation develops, seek medical attention.

EYE CONTACT:
Rinse eyes with large amounts of water/saline solution until no particles remain in eye. See a physician on persistent feeling of discomfort or if irritation occurs.

INGESTION:
Incidental ingestion of small quantities of material fines as a result of inattention to proper personal hygiene does not represent a significant acute hazard. If large amounts are swallowed, get prompt medical attention.

5. FIRE FIGHTING MEASURES

COMBUSTIBILITY:
Silicomanganese slag is not combustible.

The following cautions apply to silicomanganese alloy which may be present in small quantities in silicomanganese slag: When suspended in air, dust of silicomanganese can be ignited, will propagate flame readily, and may generate considerable pressure and/or a mild explosion. Avoid generating sparks or ignition sources in areas of high airborne dust levels or in areas with accumulated dust. The degree of combustibility in air is dependent upon particle size, oxide coating, and quality of dispersion. The hazard increases with particle fineness. Thoroughly clean areas or equipment to be maintained prior to dust disturbing or ignition source generation activities. (See Section 10)

AUTO IGNITION TEMPERATURE (dust layer): Not applicable for silicomanganese slag; silicomanganese alloy - 550^{o}F (290^{o}C).

LOWER EXPLOSIVE LEVEL: Not applicable for silicomanganese slag; silicomanganese alloy - greater than 400 g/m^{3}.

COMBUSTION PRODUCTS:
Not applicable for silicomanganese slag.

MINIMUM IGNITION ENERGY:
Not applicable for silicomanganese slag; manganese - 80 millijoules.

EXTINGUISHING MEDIA:
Silicomanganese slag will not support combustion.

6. ACCIDENTAL RELEASE MEASURES

LAND SPILL:
Silicomanganese slag spilled on the land represents minimal hazard. Cleanup personnel should wear appropriate respiratory protective equipment when addressing fine material.

Avoid the use of compressed air to maneuver spills or leaks of fine material. Keep dry material and wet material separated. Place recovered material in disposal container. Avoid repackaging wet materials in sealed containers.

WATER SPILL:
Remove spilled product from water body by dipping, filtering, or other appropriate means. Avoid repackaging wet materials in sealed containers.

7. HANDLING AND STORAGE

HANDLING:
Avoid handling that generates dust build-up. Avoid inhalation of dust (see Section 8). Addition of wet product to molten metal may cause explosions (see Section 10).

STORAGE:
Silicomanganese slag should be stored in a dry location at ambient temperatures. Avoid contact with hydrochloric acid (HCl) and nitric acid (HNO_3)

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

The use of local exhaust ventilation is recommended to control emissions near the source. Provide appropriate ventilation of confined spaces. Use explosion-proof ventilation equipment. See Section 2 for Component Exposure Guidelines.

PERSONAL PROTECTION:

Eye protection, eye flushing facilities and protective gloves are recommended. Ensure adequate ventilation. Wear an appropriate particulate respirator in accordance with 29 CFR 1910.134 or CSA Standard Z94.4-M1982 for dust exposure that may exceed exposure limits. Area and/or personal air monitoring is recommended to determine whether exposures are below permissible limits. If exposure to phosphine and arsine is suspected (see section 10), or if adequate ventilation is not possible, then a self contained breathing apparatus or an air supplied respirator is recommended.

OCCUPATIONAL EXPOSURE LIMITS (OSHA and ACGIH):

	8-hour TWA (mg/m^3)	
	OSHA PEL	ACGIH TLV
Total inhalable dust	15	10
Aluminum Oxide Fume	15	10
Magnesium Oxide Fume	10	10
Iron Oxide Fume	10	5
Respirable dust	5	3
Manganese	5 (ceiling)	0.2
Phosphine gas (PH_3)	0.4	0.42
Arsine gas (AsH_3)	0.2	0.16

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Lump, non uniform size
Color:	Light green with brown to black coating
Odor:	Odorless
Solubility:	Insoluble in Water
Melting Point (°C):	Approx. 1093°C to 1232°C (silicomanganese alloy)
Specific Gravity (water = 1):	Variable

10. STABILITY AND REACTIVITY

GENERAL:

Silicomanganese slag is stable and hazardous polymerization will not occur.

CONDITIONS TO AVOID:

Addition of wet material to molten metal may cause explosions.

MATERIALS TO AVOID:

Avoid contact with water and/or acids.

HAZARDOUS REACTION/DECOMPOSITION PRODUCTS:

Highly flammable hydrogen gas (H_2) and the highly flammable and very toxic gases phosphine and arsine (garlic-like smell), both heavier than air, may be formed if silicomanganese slag comes in contact with moisture, acids or bases. Contact with acids (pH<7) may result in generation of silane (SiH_4), a spontaneously combustible gas. Wet product will form highly flammable hydrogen gas if added to molten metal, due to decomposition of water.

11. TOXICOLOGICAL INFORMATION

ACUTE EFFECTS:

INHALATION:

Finely divided dust may irritate and dehydrate mucous membranes. Phosphine/arsine may be absorbed from dust deposited on mucous membranes. The toxic mechanism for phosphine is not clear. Phosphine irritates exposed mucous membranes, depresses the central nervous system (CNS) and can cause edema of the lungs. Acute, non-fatal poisoning with phosphine gives temporary effects, including but not limited to headache, malaise, vomiting, stomach pains, cough, and difficulty in breathing. Symptomatic treatment: Corticosteroids, prophylactic for edema of the lungs.

SKIN CONTACT:

Frequent or prolonged contact may irritate the skin and cause a skin rash (dermatitis).

EYE CONTACT:

Dust may irritate and cause dryness but will not permanently injure eye tissue.

INGESTION:

Minimal hazard in normal industrial use.

CHRONIC EFFECTS:

Manganese poisoning (Manganism) can occur from excessive intake of manganese via inhalation and ingestion. The most notable effects of manganese poisoning are central nervous system disorders which may occur as early as six months after initial exposure. Symptoms include apathy, drowsiness, sleep disturbance, muscular twitching, spastic gait, and emotion control problems. Permanent injury of the central nervous system may occur if chronic manganese poisoning is not treated.

Prolonged exposure (years) to phosphine may lead to chronic effects such as difficulty in movement and speech problems. Epidemiological studies in the Norwegian ferroalloy industry have neither shown an increased rate of mortality, nor an increased incidence of cancer.

Fumes produced through heating metal to high temperatures may be associated with pneumoconiosis. Silicomanganese slag is not known to be a reproductive toxin, teratogen, or mutagen.

12. ECOLOGICAL INFORMATION

Silicomanganese slag is not characterized as a hazard to the land.

13. DISPOSAL CONSIDERATIONS

Avoid repackaging wet material in sealed containers. Dispose of in accordance with applicable federal, state, and local regulations. Silicomanganese slag is not a listed or characteristic RCRA Hazardous Waste (40 CFR 261).

14. TRANSPORT INFORMATION

DOT (DEPARTMENT OF TRANSPORTATION):

Proper Shipping Name: Not Regulated
Hazard Class: Not Regulated
I.D. Number and Initials: Not Regulated
Packing Group: Not Regulated
Label(s): Not Regulated

15. REGULATORY INFORMATION

OSHA (Occupational Safety and Health Administration)
Hazardous by definition of hazardous communication standard (29 CFR 1910.1200)

TSCA (Toxic Substance Control Act):
Components of this product are listed on the TSCA Inventory.

CERCLA (Comprehensive Response Compensation, and Liability Act):
Silicomanganese slag is not found in "List of Hazardous Substances and Reportable Quantities" (40 CFR 302.4). No RQ has been assigned for the generic or broad class of "Manganese and Compounds".

RCRA (Resource Conservation/Recovery Act):
Silicomanganese slag is not a listed hazardous waste.

SARA TITLE III (Superfund Amendments and Reauthorization Act);
EPCRA (Emergency Planning and Community Right to Know Act):
311/312 Hazard Categories:
Immediate Health, Delayed Health, Fire.
313 Reportable Ingredients:
Manganese Compounds

CALIFORNIA PROPOSITION 65:
This product contains chemical(s) known to the State of California to cause cancer:
None

16. OTHER INFORMATION

Literature references are available upon request from the manufacturer.

The information presented in this Material Safety Data Sheet relates to this specific material. It may not be valid for this material if used in combination with any other materials or in any process. It is the user's responsibility to verify the suitability and completeness of this information for the particular use intended.

Felman Production, Inc.
Rt. 3, Box 127
Letart, WV 25253
304-882-2375
Fax: 304-882-3853

For additional information Call 304-882-1181

MATERIAL SAFETY DATA SHEET

Section 1 – Product:

Product Name: SLAG (From the Manufacture of Silico Manganese)
Formula:
MSDS INFORM. This Material Safety Data Sheets was produced in December, 2007 and replaces any prior versions.

Section 2 – Physical Data:

Form: Product is in vitreous lump form

Solubility: Insoluble in water.
Reactivity: Stable in water.

Section 3 – Composition:

Typical Analysis (wt %)

Silicon Oxide	39 – 46%
Calcium Oxide	18 – 27%
Manganese Oxide	5 - 16%
Magnesium Oxide	6 - 9 %
Aluminum Oxide	1 - 9 %
Iron Oxide	< 2%
Potassium Oxide	< 2%
Barium Oxide	< 0.5%

FORMULA Not Applicable

Section 4 – Hazards:

Part A – Air Contaminants

No permissible exposure limits or threshold limit values are known for silicomanganese or silicomanganese Slag. Values for ingredients in the product may be appropriate.

Ingredient	PEL*	TLV**	STEL****	TWA*****
Manganese (Fume MnO)			3	1
Manganese (Dust)	C5***	5		
Iron (as Oxide Fume)	10 (total)	5 (total)		
Carbon	3.5			
Silicon	10 (total) 5 (respirable)	10 (total)		

*Permissible Exposure Limit (mg/m^3). OSHA 29CFR 1910.
**Threshold Limit Value (mg/m^3). American Conference of Governmental Hygienists.
***Indicates ceiling value, at no time should exposure exceed this level.
****Short Term Exposure Limit (15 minutes) (mg/m^3)
*****Time Weighted Average (mg/m^3).

Part B – Short Term Exposure

Irritation of the eyes and throat may result from short time exposure to high concentrations of dust. Cold-like symptoms are indicative of manganese fever, however, no residual injury is anticipated from short time exposure. Smoking will increase the potential for injury from both short and long term exposures to both dust and fume.

Part C – Long Term Exposure

Long term exposure to fumes or dust emitted from melting, grinding, or crushing the slag may produce manganese poisoning with symptoms ranging from sleepiness and weakness in the legs to difficulty in walking and pneumonia.

The American Conference of Governmental Industrial Hygienists Inc. reports that chronic manganese poisoning may occur when TLV levels of oxides are in excess of 5 mg/m^3 as manganese. Chronic manganese poisoning affects the central nervous system.

Part D – Fire Hazard

Under certain conditions the fine slag particles may ignite.

This is a Class D fire which requires dry chemicals, dry sand or CO_2 to smother the fire. Nitrogen blanket will not extinguish a manganese fire.

Part E – Emergency and First Aid Procedures

For dust in the eyes, flush with plenty of water for 15 minutes. If inhaled, remove to a well-ventilated area.

HAZARDOUS WASTE REGULATIONS

The slag is not a hazardous waste based upon results of the RCRA Toxicity Characteristic Leachate procedure.

Section 5 – Precautions:

A. Atmosphere - Avoid generation of dust and collect fumes emitted by melting of the slag in compliance with OSHA regulations.

B. Spill and Leak Information – Fine material should be swept or vacuumed. Spill or leak of lump material presents no hazard. Disposal should be in accordance with regulations that apply.

C. Employee – Respirators that are NIOSH approved in accordance with 29 CFR 1910.134, are necessary when exposure limits must be extended due to inadequate ventilation. Industrial hygiene monitoring is required to establish exposure levels.

The silicomanganese slag may have sharp edges, therefore, protective gloves are recommended for handling.

Eye protection should conform with local safety regulations.

REFERENCES:

1. OSHA (29 CFR 1910) Department of Labor.
2. Documentation of the Threshold Limit Values, Fourth Edition 1980....American Conference of Governmental Industrial Hygienists Inc.

IMPORTANT NOTICE:

This information relates only to the specific product or material designated and may not be valid for such product or material used in combination with any other materials or products or any process. The information is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty or guarantee is made as to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of the material for his own particular use. We do not accept liability for any loss or damage that may occur from the use of this information, nor do we offer any warranty against patent infringement.