

MATERIAL SAFETY DATA SHEET

MSDS No: MK203	Date Prepared: 03/12/1996	Current Date: 10/28/2009
		Last Revised: (10/28/2009)

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Group: MICROPOROUS INSULATION

Chemical Name: Mixture

Intended Use: Application as a thermal insulation in high temperature environments such as: Industrial furnaces, ovens, boilers and other process equipment in aluminium, iron and steel, glass, automotive, petrochemical, chemical processing, power generation, commercial OEM, fire protection, and fuel cell applications.

Trade Names: BTU Block®: Boards, Panel, Flexible, Ladle Liner

Manufacturer/Supplier: Thermal Ceramics
 Elkhart Facility (PHONE: 574-296-3500)
 2730 Industrial Parkway
 Elkhart, IN 46516

For Product Stewardship and Emergency Information -
Hotline: 1-800-722-5681
Fax: 706-560-4054

For additional MSDSs and to confirm this is the most current MSDS for the product, visit our web page [www.thermalceramics.com]

2. COMPOSITION/INFORMATION ON INGREDIENTS

<u>INGREDIENT & CAS NUMBER</u>	<u>% BY WEIGHT</u>	<u>OSHA PEL</u>	<u>ACGIH TLV</u>
Silica fume (amorphous) Proprietary	50 - 70	(80 mg/m ³ ÷ % SiO ₂) or 20 mppcf	2 mg/m ³
Titanium dioxide 13463-67-7	20 - 30	15 mg/m ³	10 mg/m ³
Silicon carbide 409-21-2	10 - 30	15 mg/m ³ (total dust) 5 mg/m ³ (respirable dust)	10 mg/m ³ (inhalable dust) 3 mg/m ³ (respirable dust)
Alkaline-Earth Silicate Wool ⁽¹⁾ 436083-99-7	0 - 10	15 mg/m ³ (total dust) 5 mg/m ³ (respirable dust)	10 mg/m ³ (inhalable dust) 3 mg/m ³ (respirable dust)
Fibrous glass filament 65997-17-3	0 - 5	Not Established	1 f/cc, 5 mg/m ³
Polyester fiber NONE	0 - 3	Not Established	Not Established

⁽¹⁾ **CAS definition:** Alkaline Earth Silicate (AES) consisting of silica (50-82 wt %), calcia and magnesia (18-43 wt %), alumina, titania and zirconia (less than 6 wt %), and trace oxides. This CAS composition also covers Thermal Ceramics products Calcium-Magnesium-Silicate Wool (CAS no. 329211-92-9) and Calcium-Magnesium-Zirconium-Silicate Wool (CAS no. 308084-09-5).

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

**** CAUTION ****

Dust and respirable fibers from this product may aggravate existing chronic lung conditions such as bronchitis, emphysema and asthma.

POSSIBLE HEALTH EFFECTS

Target Organs: Eyes, skin, lung, nose and/or throat

Primary Entry Route: Inhalation

Acute effects: Upper respiratory physical irritation. Irritation and inflammation to the eyes on contact and to the skin on prolonged contact.

Chronic effects: No known chronic effects from exposure to these products. However, IARC has classified titanium dioxide as possibly carcinogenic (Group 2B) to humans. (See Section 11)

Signs and Symptoms of Overexposure:

Eye Contact: Physical irritation - inflammation

Skin Contact: Physical irritation - rash

Ingestion: May cause temporary irritation to the gastrointestinal tract

Inhalation: Irritation or soreness in throat, nose and respiratory tract

4. FIRST AID MEASURES

Eye Contact: If the eyes show inflammation due to mechanical irritation, flush with large amounts of water for at least 15 minutes. Do not rub eyes.

Skin Contact: If a skin rash develops due to mechanical irritation, wash the affected area gently with soap and water. A skin cream or lotion after washing may be helpful. Do not rub or scratch the exposed skin. Changing into clean clothing is recommended.

Respiratory Tract: If irritation or soreness occurs in the nose or throat, this can be alleviated by breathing fresh air. (See Section 8 for additional measures to reduce the occurrence of respiratory tract irritation caused by exposure.)

- If symptoms persist, seek medical attention -

5. FIRE FIGHTING MEASURES

NFPA Unusual Hazards: None

Flash Point: Non-combustible

Extinguishing Media: Use extinguishing media appropriate to the surrounding fire.

Explosion Hazards: None

6. ACCIDENTAL RELEASE MEASURES

Spill/Leak Procedures: Avoid creating airborne dust. Provide workers with respirators, if necessary (See Section 8). Follow routine housekeeping procedures. Where possible, use a HEPA vacuum to clean up the spilled material. If sweeping is necessary, use a dust suppressant and place material in closed containers. Do not use compressed air for clean-up. Avoid clean-up procedures that could result in water pollution.

7. HANDLING AND STORAGE

Handling: Limit use of power tools unless in conjunction with local exhaust. Use hand tools whenever possible. Frequently clean the work area with HEPA filtered vacuum or wet sweeping to minimize the accumulation of debris. Do not use compressed air for clean-up.

Storage: This product is stable under all conditions of storage. Store in original factory container in a dry area. Keep container closed when not in use. Do not reuse the container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls:

It is prudent to reduce exposure to respirable dusts to the lowest attainable level through the use of engineering controls such as ventilation and dust collection devices. Effective technologies to control respirable dust are available. These include local exhaust ventilation, point of generation dust collection, down draft workstations, emissions controlling tool designs and materials handling equipment. For further information call the Thermal Ceramics' Product Stewardship Hotline: (800-722-5681).

Personal Protection Equipment:

Skin Protection: Wear long-sleeved, loose fitting clothing, gloves and hat as necessary to prevent skin irritation.
Eye Protection: Wear goggles/safety glasses with sideshields
Respiratory Protection: When it is not possible to reduce respirable dust exposures through engineering controls, employees are encouraged to use good work practices together with respiratory protection. Comply with OSHA Respiratory Protection Standards, 29 CFR 1910.134 and 29 CFR 1926.103.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Molded fibrous sheet or form		
Chemical Family:	Mixture		
Vapor Pressure:	Not applicable	Vapor Density:	Not applicable
Boiling Point:	Not applicable	Specific Gravity Range:	Not applicable
Melting Point:	>2000°F (1093°C)	Volatile by Volume (%):	0
Water Solubility (%):	Slight	pH:	Not applicable

10. STABILITY AND REACTIVITY

Hazardous Polymerization: Will not occur
Chemical Incompatibilities: Avoid contact with strong acids.
Hazardous Decomposition Products: Upon heating above 1650°F (900°C) for sustained periods, AES wools begin to transform to mixtures of amorphous and crystalline phases. (See Section 16 for additional information.)

11. TOXICOLOGICAL INFORMATION

Toxicology:

Silica, amorphous

Toxic effects described in animals from single inhalation exposures of amorphous silica include upper respiratory irritation, lung congestion, bronchitis, and emphysema. Repeated inhalation exposures at concentration of 50 or 150 mg/m³ produced increased lung weights and lung changes. No progressive pulmonary fibrosis was seen and the observed lung changes were reversible. No adverse effects were observed in this study at 10 mg/m³. No animal test reports are available to define the carcinogenic, mutagenic, or reproductive effects.

Titanium Dioxide

Titanium dioxide was reclassified by the IARC in 2006 as a "possibly carcinogenic to humans (Group 2B)". The classification was based on sufficient evidence in experimental animals but inadequate evidence in humans for the carcinogenicity of titanium dioxide. IARC indicated in the monograph that "the studies do not suggest an association between occupational exposure to titanium dioxide as it occurred in recent decades in Western Europe and North America and risk for cancer."
 [IARC Monograph (Vol. 93)]

The US National Institute for Occupational Safety and Health (NIOSH) is currently reviewing the available toxicity data on titanium dioxide. On the recent draft Current Intelligence Bulletin (March, 2006), NIOSH recommends exposure limits of 1.5 mg/m³ for fine TiO₂ (particle greater than 0.1 um in diameter) and 0.1 ug/m³ for ultrafine particles. The draft document states that the difference in the recommended limits reflect findings from studies, which suggest that ultrafine

TiO₂ particles may be more potent than fine TiO₂ particles at the same mass. It also indicated this may be due to the fact, that the ultrafine particles have a greater surface area than the fine particles at the same mass.

Silicon Carbide

An animal study showed that, although exposure to silicon carbide alone produced no fibrosis of the lungs, exposure of guinea pigs infected with pulmonary tuberculosis to the extent that extensive fibrosis occurred. Guinea pigs exposed to silicon carbide dust and infected with the tubercle bacteria developed tuberculopneumoconiotic lesions. Miller and Sayers observed that silicon carbide dust administered by intraperitoneal injection to guinea pigs produced no reaction. A study in tungsten carbide industry workers concluded that exposure to silicon carbide was not a hazard unless the exposed workers already had pulmonary tuberculosis.

Fibrous Glass Filament (non-respirable)

IARC in June, 1987, categorized fiberglass continuous filament as not classifiable with respect to human carcinogenicity (Group 3). The evidence from human as well as animal studies was evaluated by IARC as insufficient to classify fiberglass continuous filament as a possible, probable, or confirmed cancer causing material.

AES Wools

AES contained in the products listed in the title have been designed to be rapidly cleared from lung tissue. This low biopersistence has been confirmed in many studies on AES using EU protocol ECB/TM/27(rev 7) and the German method specified in TRGS 905 (1999). When inhaled, even at very high doses, they do not accumulate to any level capable of producing a serious adverse biological effect. In lifetime chronic studies there was no exposure-related effect more than would be seen with any "inert" dust. Sub-chronic studies at the highest doses achievable produced at worst a transient mild inflammatory response. Fibers with the same ability to persist in tissue do not produce tumours when injected into the peritoneal cavity of rats.

Epidemiology:

This material has not been the subject of an epidemiology study.

12. ECOLOGICAL INFORMATION

No adverse effects of this material on the environment are anticipated.

13. DISPOSAL INFORMATION

Waste Management:	To prevent waste materials becoming airborne, a covered container or plastic bagging is recommended. Comply with federal, state and local regulations. Chemical additions, processing or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate, or otherwise inappropriate.		
Method of Disposal:	Landfill		
RCRA:	If discarded in its purchased form, this product would not be hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal whether a material containing the product or derived from the product should be classified as a hazardous waste (40 CFR 261.20-24).		
European Union:	Waste from this product is not classified as "hazardous" or "special" under European Union regulations. Disposal is permitted at landfills licensed for industrial waste.		

14. TRANSPORT INFORMATION

Department of Transportation (DOT):

Hazard Class:	Not regulated	United Nations (UN) Number:	Not applicable
Labels:	Not applicable	North America (NA) Number:	Not applicable
Placards:	Not applicable		
Bill of Lading:	Product name		

International:

Not classified as dangerous goods under ADR (road), RID (train), IATA (air) or IMDG (ship).

15. REGULATORY INFORMATION

United States Regulations:

SARA Title III:	This product does not contain any substances reportable under Sections 302, 304, 313 (40 CFR 372). Sections 311 and 312 apply.
OSHA:	Comply with Hazard Communication Standards 29 CFR 1910.1200 and 29 CFR 1926.59 and Respiratory Protection Standards 29 CFR 1910.134 and 29 CFR 1926.103.
TSCA:	All substances contained in this product are listed in the TSCA Chemical Inventory.
CERCLA:	AES wools contain fibers with an average diameter greater than one micron and thus is not considered a CERCLA hazardous substance.
CAA:	AES wools contain fibers with an average diameter greater than one micron and thus is not considered a hazardous air pollutant.

International Regulations:

Canada WHMIS:	Titanium dioxide is classified as Class D2-A – Materials causing other toxic effects.
Canadian EPA:	All substances in this product are listed, as required, on the Domestic Substance List (DSL).
European Union:	These products are exonerated from any carcinogenic classification in the countries of the European Union under the provisions of Nota Q of the European Commission Directive 97/69/EC.

16. OTHER INFORMATION

Precautionary Measures to be Taken After Service and Upon Removal:

The amorphous silica component of Thermal Ceramics' microporous insulation will not form respirable crystalline silica at temperatures below 1800°F (~1000°C), which is the maximum temperature use rating of the insulation product. However, these products contain AES wools. Continued exposure to elevated temperatures (above 900°C) may cause these materials to form crystalline phases, including crystalline silica. The occurrence and extent of crystalline phase formation is dependent on the duration and temperature of exposure, fibre chemistry and/or the presence of fluxing agents. The presence of crystalline phases can be confirmed only through laboratory analysis of the "hot-face" of the product.

IARC's evaluation of crystalline silica states "Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)" and additionally mentions "in making the overall evaluation, the Working Group noted that carcinogenicity in humans was not detected in all industrial circumstances studied..." Devitrified, after-service Superwool™, containing crystalline silica, has shown no adverse reactions in toxicity assays. Simulated after-use (up to 8 weeks at 1000°C) AES fibres were not toxic to macrophage like cells.

OSHA has set different PELs for different forms of silica. The content of silica in devitrified Superwool products is such that controlling fiber exposure, as detailed in Section 8 (above) will simultaneously ensure compliance with any applicable PELs for silica.

Ventilation and respiratory protection should be provided in compliance with OSHA standards. The evaluation of workplace hazards and, if necessary, the identification of appropriate respiratory protection is best performed by qualified Industrial Hygienists. For more information, call the Thermal Ceramics Product Stewardship Hotline (800-722-5681).

HMIS Hazard Rating:

HMIS Health:	1*
HMIS Flammable:	0
HMIS Reactivity:	0
HMIS Personal Protective:	To be determined by user

* See section 3 of the MSDS for possible chronic health effects.

SARA Title III Hazard Categories:

Acute Health:	Yes	Pressure Hazard:	No
Chronic Health:	Yes	Reactivity Hazard:	No
Fire Hazard:	No		

DEFINITIONS:

ACGIH:	American Conference of Governmental Industrial Hygienists
ADR:	Carriage of Dangerous Goods by Road (International Regulation)
CAA:	Clean Air Act
CAS:	Chemical Abstracts Service
CERCLA:	Comprehensive Environmental Response, Compensation and Liability Act
DSL:	Domestic Substances List
EPA:	Environmental Protection Agency
EU:	European Union
f/cc:	Fibers per cubic centimeter
HEPA:	High Efficiency Particulate Air
HMIS:	Hazardous Materials Identification System
IARC:	International Agency for Research on Cancer
IATA:	International Air Transport Association
IMDG:	International Maritime Dangerous Goods Code
mg/m³:	Milligrams per cubic meter of air
mmpcf:	Million particles per cubic meter
NFPA:	National Fire Protection Association
NIOSH:	National Institute for Occupational Safety and Health
OSHA:	Occupational Safety and Health Administration
29 CFR 1910.134 & 1926.103:	OSHA Respiratory Protection Standards
29 CFR 1910.1200 & 1926.59:	OSHA Hazard Communication Standards
PEL:	Permissible Exposure Limit (OSHA)
PIN:	Product Identification Number
PNOC:	Particulates Not Otherwise Classified
PNOR:	Particulates Not Otherwise Regulated
PSP:	Product Stewardship Program
RCFC:	Refractory Ceramic Fibers Coalition
RCRA:	Resource Conservation and Recovery Act
REG:	Recommended Exposure Guideline (RCFC)
REL:	Recommended Exposure Limit (NIOSH)
RID:	Carriage of Dangerous Goods by Rail (International Regulations)
SARA:	Superfund Amendments and Reauthorization Act
SARA Title III:	Emergency Planning and Community Right to Know Act
SARA Section 302:	Extremely Hazardous Substances
SARA Section 304:	Emergency Release
SARA Section 311:	MSDS/List of Chemicals and Hazardous Inventory
SARA Section 312:	Emergency and Hazardous Inventory
SARA Section 313:	Toxic Chemicals and Release Reporting
STEL:	Short Term Exposure Limit
SVF:	Synthetic Vitreous Fiber
TDG:	Transportation of Dangerous Goods
TLV:	Threshold Limit Value (ACGIH)
TSCA:	Toxic Substances Control Act
TWA:	Time Weighted Average
WHMIS:	Workplace Hazardous Materials Information System (Canada)

Revision Summary:

Section 2: Silicon carbide added
Section 11: Silicon carbide information added

MSDS Prepared By:

THERMAL CERAMICS ENVIRONMENTAL, HEALTH & SAFETY DEPARTMENT

DISCLAIMER

The information presented herein is presented in good faith and believed to be accurate as of the effective date of this Material Safety Data Sheet. Employers may use this MSDS to supplement other information gathered by them in their efforts to assure the health and safety of their employees and the proper use of the product. This summary of the relevant data reflects professional judgment; employers should note that information perceived to be less relevant has not been included in this MSDS. Therefore, given the summary nature of this document, Thermal Ceramics does not extend any warranty (expressed or implied), assume any responsibility, or make any representation regarding the completeness of this information or its suitability for the purposes envisioned by the user.