1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Group: ALKALINE EARTH SILICATE (AES) WOOL PRODUCT

Chemical Name: Calcium-Magnesium-Silicate Wool or Calcium-Magnesium-Zirconium-Silicate Wool

Intended Use: Application as thermal insulation, heat shields, heat containment, gaskets and expansion joints in industrial furnaces, ovens, kilns, boilers and other process equipment and in the aerospace, automotive and appliance industries, and as passive fire protection systems and firestops. (Please refer to specific technical data sheets for more information)

Synonyms: AES Wool, AES Wool, Synthetic Vitreous Fiber (SVF), Man-made Vitreous Fiber (MMVF), Man-made Mineral Fiber (MMMF)

Trade Names: Superwool™ 607, 607MAX, 612: Bulk, Blanket, Mat, Module; Superwool™ 607 HT, Superwool™ PLUS: Bulk, Blanket, Mat, Module; Log, Strip, Die-cut; Isobold®; Engineered Fiber (ALL GRADES); Mix 436-C Component “A”; FireMaster® Marine: Bulks, Blankets, Mats and Modules; FireMaster PlenumWrap™; FireMaster Duct Wrap +™; FireMaster FastWrap+™; FireMaster Duct Wrap 2x2 +™; FireMaster FastWrap XL™; FireMaster Marine PLUS; FireMaster 607; Blanket, Bulk; FireMaster DryerWrap; CalSimag® (Pyroscat) CSM: Blanket, Bulk; Pyroscat Duct Wrap XL

NOTE
This product may be covered by one or more of the following patents or foreign equivalents: US5332699, US5714421, US5811360, US5821183, US5928975, US5955389, US5994247, US6180546, EP0906250, GB2348640. A list of foreign patent numbers is available upon request to The Morgan Crucible Company plc. Thermal Ceramics, Superwool, 607 and MAX are trademarks of The Morgan Crucible Company plc.

Manufacturer/Supplier: Morgan Thermal Ceramics
P. O. Box 923; Dept. 300
Augusta, GA 30903-0923

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.morganthermalceramics.com or send a request to MT.NorthAmerica@morganplc.com
2. COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENTS | CAS NUMBER | % BY WEIGHT
--- | --- | ---
Alkaline-Earth Silicate Wool\(^{(1)}\) | 436083-99-7 | 100

\(^{(1)}\) **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 Morgan Thermal Ceramics products Calcium-Magnesium-Silicate Wool (CAS no. 329211-92-9) and Calcium-Magnesium-Zirconium-Silicate Wool (CAS no. 308084-09-5).

(See Section 8 “Exposure Controls / Personal Protection” for exposure guidelines)

3. HAZARDS IDENTIFICATION

CLASSIFICATION OF THE SUBSTANCE/MIXTURE
Not Applicable

LABELING ELEMENTS
Not Applicable

OTHER HAZARDS WHICH DO NOT RESULT IN CLASSIFICATION
Mild mechanical irritation to skin, eyes and upper respiratory system may result from exposure. These affects are usually temporary.

4. FIRST AID MEASURES

**RESPIRATORY TRACT (nose and throat) IRRITATION**
If respiratory tract irritation develops, move the person to a dust free location. See Section 8 for additional measures to reduce or eliminate exposure.

**EYE IRRITATION**
If eyes become irritated, flush immediately with large amounts of lukewarm water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Do not rub eyes.

**SKIN IRRITATION**
If skin becomes irritated, remove soiled clothing. Do not rub or scratch exposed skin. Wash area of contact thoroughly with soap and water. Using a skin cream or lotion after washing may be helpful.

**GASTROINTESTINAL IRRITATION**
If gastrointestinal tract irritation develops, move the person to a dust free environment.

- **If symptoms persist, seek medical attention.** -

**NOTE TO PHYSICIANS**
Skin and respiratory effects are the result of temporary, mild mechanical irritation; fiber exposure does not result in allergic manifestations.

5. FIRE FIGHTING MEASURES

**NFPA Codes:** Flammability: _0_, Health: _1_, Reactivity: _0_, Special: _0_

NFPA Unusual Hazards: None
Flammable Properties: None
Flash Point: None
Hazardous Decomposition Products: None
Unusual Fire and Explosion Hazard: None
Extinguishing Media: Use extinguishing media suitable for type of surrounding fire.
6. ACCIDENTAL RELEASE MEASURES

SPILL PROCEDURES
Avoid creating airborne dust. Dust suppressing cleaning methods such as wet sweeping or vacuuming should be used to clean the work area. If vacuuming, the vacuum should be equipped with a HEPA filter. Compressed air or dry sweeping should not be used for cleaning.

7. HANDLING AND STORAGE

STORAGE
Store in original factory container in a dry area. Keep container closed when not in use.

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.

EMPTY CONTAINERS
Do not reuse the container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

MANUFACTURER’S RECOMMENDATION
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. Industrial hygiene standards and occupational exposure limits may vary between countries, state and local jurisdictions. Contact your employer to determine which exposure levels apply to your facility. If no regulatory dust or other standards apply, a qualified industrial hygienist can assist with a specific workplace evaluation including recommendations for respiratory protection. In the absence of such guidance, the manufacturer generally recommends the control of AES wool exposures to 1 fiber/cc or less.

<table>
<thead>
<tr>
<th>MAJOR COMPONENT</th>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
<th>MANUFACTURER’S REG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline-Earth Silicate Wool</td>
<td>None Established</td>
<td>None Established</td>
<td>1 f/cc, 8-hr TWA</td>
</tr>
</tbody>
</table>

ENGINEERING CONTROLS
Use feasible engineering controls such as local exhaust ventilation, point of generation dust collection, down draft work stations, emission controlling tool designs, and materials handling equipment designed to minimize airborne fiber emissions.

PERSONAL PROTECTION EQUIPMENT

Skin Protection
Wear gloves, head coverings and full body clothing as necessary to prevent skin irritation. Washable or disposable clothing may be used. If possible, do not take unwashed work clothing home. If soiled work clothing must be taken home, employers should ensure employees are trained on the best practices to minimize or avoid non-work dust exposure (e.g., vacuum clothes before leaving the work area, wash work clothing separately, rinse washer before washing other household clothes, etc.).

Eye Protection
Wear safety glasses with side shields or other forms of eye protection in compliance with appropriate OSHA standards to prevent eye irritation. The use of contact lenses is not recommended, unless used in conjunction with appropriate eye protection. Do not touch eyes with soiled body parts or materials. If possible, have eye-washing facilities readily available where eye irritation can occur.
Respiratory Protection
When it is not possible or feasible to reduce respirable dust exposures through engineering controls, employees are encouraged to use good work practices together with respiratory protection. For dust exposure below the REG, respiratory protection is not required, but particulate respirator equipped with N-95 or higher may be used on a voluntary basis. Comply with OSHA Respiratory Protection Standards, 29 CFR 1910.134 and 29 CFR 1926.103, for the particular hazard or airborne concentrations to be encountered in the work environment. For the most current information on respirator selection, contact your supplier.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODOR AND APPEARANCE</td>
<td>White odorless material with a wool type appearance</td>
</tr>
<tr>
<td>CHEMICAL FAMILY</td>
<td>Calcium, Magnesium, Silicate Mixture</td>
</tr>
<tr>
<td>BOILING POINT</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>WATER SOLUBILITY (%)</td>
<td>Less than 1 mg/liter</td>
</tr>
<tr>
<td>MELTING POINT</td>
<td>1275 - 1300°C (2327 - 2372°F)</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY RANGE</td>
<td>2.5 - 3.0</td>
</tr>
<tr>
<td>VAPOR PRESSURE</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>pH</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>VAPOR DENSITY (Air = 1)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>% VOLATILE</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>MOLECULAR FORMULA</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>LENGTH WEIGHTED GEOMETRIC MEAN DIAMETER OF FIBERS CONTAINED IN THE PRODUCT</td>
<td>1.4 - 3 micro m</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEMICAL STABILITY</td>
<td>Stable under conditions of normal use</td>
</tr>
<tr>
<td>CHEMICAL INCOMPATIBILITIES</td>
<td>Avoid contact with strong acids</td>
</tr>
<tr>
<td>CONDITIONS TO AVOID</td>
<td>None</td>
</tr>
<tr>
<td>HAZARDOUS DECOMPOSITION PRODUCTS</td>
<td>Upon heating above 900°C for sustained periods, this amorphous material begins to transform to mixtures of crystalline phases. For further information, please refer to Section 16.</td>
</tr>
<tr>
<td>HAZARDOUS POLYMERIZATION</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

11. TOXICOLOGICAL INFORMATION

IRRITANT PROPERTIES
Superwool fibers are negative when tested using approved methods (Directive 67/548/EEC, Annex 5, Method B4). Like all man-made mineral fibers and some natural fibers, fibers contained in this product can produce a mild mechanical irritation resulting in temporary itching or rarely, in some sensitive individuals, in a slight temporary reddening. Unlike other irritant reactions, this is not the result of allergy or chemical skin damage but is caused by mechanical effects.

OTHER ANIMAL STUDIES
Fibers 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). 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. Subchronic 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 tumors when injected into the peritoneal cavity of rats.

12. ECOLOGICAL INFORMATION
No adverse effects of this material on the environment are anticipated.
13. DISPOSAL INFORMATION

WASTE MANAGEMENT
Unless wetted, such a waste is normally dusty and should therefore be properly sealed in containers for disposal. At some authorized disposal sites dusty waste may be treated differently, in order to ensure that they are dealt with promptly and to avoid them being windblown. Check for any national and/or regional regulations which may apply.

RCRA
Superwool, as manufactured, is not classified as a hazardous waste according to Federal regulations (40 CFR 261). As manufactured, Superwool was tested using EPA's Toxicity Characteristics Leaching Procedure (TCLP). Results showed there were no detectable contaminants or detectable leachable contaminants that exceeded the regulatory levels. Any processing, use, alteration or chemical additions to the product, as purchased, may alter the disposal requirements. Under Federal regulations, it is the waste generator's responsibility to properly characterize a waste material, to determine if it is a "hazardous" waste. Check local, regional, state or provincial regulations to identify all applicable disposal requirements.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

<table>
<thead>
<tr>
<th>Hazard Class:</th>
<th>Not regulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labels:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Placards:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Bill of Lading:</td>
<td>Product name</td>
</tr>
</tbody>
</table>

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


TSCA: AES wools have been assigned several CAS numbers; however, they are not required to be listed on the TSCA inventory.

CERCLA: AES wool contains fibers with an average diameter greater than one micron and thus is not considered a CERCLA hazardous substance.

CAA: AES wool contains fibers with an average diameter greater than one micron and thus is not considered a hazardous air pollutant.

States: AES wools are not known to be regulated by any State. If in doubt, contact your local regulatory agency.

INTERNATIONAL REGULATIONS

Canada WHMIS: No Canadian Workplace Hazardous Materials Information System categories apply to this product.

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 UPON REMOVAL
High temperature insulating wool (HTIW) is typically used in insulation applications to keep temperature exposure at 900°C or above in a closed space. The exposure temperature maximum occurs at the hot face surface of the insulation. The heat exposure on the insulation decreases from the hot face to the cold face as the insulation "insulates itself". As a result, only thin layers of the hot face surface of the insulation become devitrified and respirable dust generated during removal operations typically do not contain detectable levels of crystalline silica (CS).

Toxicological evaluation of the effect of the presence of CS in artificially heated HTIW material has not shown any increased toxicity in vitro and in vivo. The results from different factor combinations such as increased brittleness of fibers or micro crystals embedded in the glass structure of the fiber and therefore not biologically available, may explain the lack of toxicological effects. IARC evaluation as provided in Monograph 68 is not relevant since CS is not biologically available in after-service HTIW.

High concentrations of fibers and other dusts may be generated when after-service products are mechanically disturbed during removal. Therefore, ECFIA and RCFC recommend:

a) Controlled measures are taken to reduce dust emissions and
b) All personnel directly involved wear an appropriate respirator to minimize and comply with local regulatory limits.

For more information, call the Morgan Thermal Ceramics Product Stewardship Hotline (800-722-5681).

PRODUCT STEWARDSHIP PROGRAM
Morgan Thermal Ceramics has established a program to provide customers with up-to-date information regarding the proper use and handling of Superwool™. If you would like more information about this program, please call your local supplier or visit one of the following web sites.

Morgan Thermal Ceramics     www.morganthermalceramics.com
Refractory Ceramic Fibers Coalition (USA)  www.RCFC.net
ECFIA (Europe)           www.ecfia.eu

LABELING
As product information labels may be required on Superwool™ packages, check local destination regulations before shipping.

HMIS HAZARD RATING

| HMIS Health: | 1 |
| HMIS Flammable: | 0 |
| HMIS Reactivity: | 0 |
| HMIS Personal Protective: | To be determined by user |
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 Registry Number
CERCLA: Comprehensive Environmental Response, Compensation and Liability Act
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
mppcf: Million particles per cubic meter
MSHA: Mine Safety and Health Administration
NFPA: National Fire Protection Association
NIOSH: National Institute for Occupational Safety and Health
OSHA: Occupational Safety and Health Administration
PEL: Permissible Exposure Limit
PNOC: Particulates Not Otherwise Classified
PNOR: Particulates Not Otherwise Regulated
RCRA: Resource Conservation and Recovery Act
RID: Carriage of Dangerous Goods by Rail (International Regulation)
SARA: Superfund Amendments and Reauthorization Act
Title III: Emergency Planning and Community Right to Know Act
...Section 302: Extremely Hazardous Substances
...Section 304: Emergency Release
...Section 311: MSDS/List of Chemicals
...Section 312: Emergency and Hazardous Inventory
...Section 313: Toxic Chemicals Release Reporting
STEL: Short-Term Exposure Limit
TCLP: Toxicity Characteristics Leaching Procedures (EPA)
TLV: Threshold Limit Values (ACGIH)
TSCA: Toxic Substance Control Act
WHMIS: Workplace Hazardous Materials Information System (Canada)
29 CFR 1910.134 & 1926.103: OSHA Respiratory Protection Standards

Revision Summary: Company's logo: Rebranded.
Section 1:
* Several product names added (previously listed on MSDS # 406 and 600).
* Manufacturer’s company name and e-mail address changed.
* Additional statements added.
Sections 2 - 16: Various changes applied.

MSDS Prepared By: MORGAN 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, Morgan 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.