SAFETY DATA SHEET

(Following Regulations (EC) No 1907/2006 & (EC) No 1272/2008)

SDS Number: 245 Date of first issue: 01 May 2011 Date of last revision: 01 June 2015

1 - Identification of product

1.1 - Identification of Product

Tradenames: Firemaster Board 350, Firemaster Board 550, Superwool Plus Aluboard, Superwool Plus Block 1000, Superwool Plus Block 1100, Superwool Plus Block 800, Superwool Plus Board 75, Superwool Plus Board 85, Superwool Plus Board LTI, Superwool Plus H Board,

The above-mentioned products contain Alkaline-earth silicate wools (AES wools)
Index Number: 650-016-00-2 Annex VI
CAS number: 436083-99-7
Registration number: 01-2119457644-32-0000

1.2 - Use of Product

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 fire stops.
(Please refer to specific technical data sheet for more information)

1.3 - Identification of Company

U.K. THERMAL CERAMICS LIMITED
Tebay Road, Bromborough
Wirral, Merseyside CH62 3PH
Tel.: +44 (0) 151 334 4030
Fax: +44 (0) 151 334 1684

1.4 - Emergency information

Tel: + 44 (0) 7931 963 973
Language: English
Opening hours: Only available during office hours

2 - Hazard Identification

2.1 - Classification of the substance/ mixture

2.1.1 CLASSIFICATION ACCORDING TO REGULATION (EC) NO 1272/2008
Not classified as hazardous according to Classification, Labelling and Packaging regulations (CLP) 1272/2008 EEC

2.2 - Labelling Elements

Not applicable

2.3 - Other hazards which do not result in classification

Mild mechanical irritation to skin, eyes and upper respiratory system may result from exposure. These effects are usually temporary.

CHRONIC EFFECTS FOR CRYSTALLINE SILICA
These products may contain minimal amounts of crystalline silica. Prolonged/repeated inhalation of respirable crystalline silica dust may cause delayed lung injury (silicosis).
IARC (International Agency for Research on Cancer) states that there is "sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the form of quartz or cristobalite from occupational sources to classify crystalline silica as carcinogenic to humans (Group 1)". (Monograph V 68)
In making the overall evaluation the Working Group noted however that carcinogenicity in humans was not detected in all industrial circumstances studied.
3 - Composition / Information On Ingredients

Description
These products are boards made of AES wool bound with organic and inorganic materials.

Composition

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>% by weight</th>
<th>CAS No.</th>
<th>REACH Registration Number</th>
<th>Hazard Classification according to CLP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline-earth silicate wools</td>
<td>10-90</td>
<td>436083-99-7</td>
<td>01-2119457644-32</td>
<td>Not classified as hazardous</td>
</tr>
<tr>
<td>Mineral wool</td>
<td>0-60</td>
<td>65997-17-3</td>
<td>Not yet available</td>
<td>Not classified as hazardous</td>
</tr>
<tr>
<td>Starch</td>
<td>2-5</td>
<td>9005-25-8</td>
<td>Not yet available</td>
<td>Not classified as hazardous</td>
</tr>
<tr>
<td>Inert inorganic material</td>
<td>10-60</td>
<td>Not Applicable</td>
<td>Not yet available</td>
<td>Not classified as hazardous</td>
</tr>
<tr>
<td>Quartz (respirable fraction)</td>
<td>&lt; 5</td>
<td>14808-60-7</td>
<td>Not yet available</td>
<td>STOT RE 2 (H373)</td>
</tr>
</tbody>
</table>

Composition additional information

Composition:
* CAS definition: Alkaline earth silicate (AES) consisting of silica (50-82 wt%), calcia and magnesia (18-43 wt%), alumina and titania (less than 6 wt%), and trace oxides.

None of the components are radioactive under the terms of European Directive Euratom 96/29.

4 - First-Aid measures

4.1 - Description of First Aid Measures

Skin
Handling of this material may generate mild mechanical temporary skin irritation. If this occurs, rinse affected areas with water and wash gently. Do not rub or scratch exposed skin.

Eyes
In case of eye contact flush abundantly with water; have eye bath available. Do not rub eyes. Seek medical attention if irritation persists.

Nose and Throat
If these become irritated move to a dust free area, drink water and blow nose. Seek medical attention if irritation persists.

First aid additional information
If symptoms persist, seek medical advice.

4.2 - Most Important symptoms and effects, both acute and delayed

No symptoms or effects expected either acute or delayed

4.3 - Indication of any immediate medical attention and special treatment required

No special treatment required, if exposure occurs wash exposed areas to avoid irritation.

5 - Fire-fighting measures

5.1 - Extinguishing media

Use extinguishing agent suitable for surrounding combustible materials.

5.2 - Special hazards arising from the substance or mixture

Non combustible products. However, virgin product binder may burn and produce gases and/or fumes.

5.3 - advice for firefighters

Packaging and surrounding materials may be combustible.
6 - Accidental Release Measures

6.1 - Personal precautions, protective equipment and emergency procedures

Where abnormally high dust concentrations occur, provide workers with appropriate protective equipment as detailed in section 8.

Restrict access to the area to a minimum number of workers required. Restore the situation to normal as quickly as possible.

6.2 - Environmental precautions

Prevent further dust dispersion for example by damping the materials. Do not flush spillage to drain and prevent from entering natural watercourses. Check for local regulations, which may apply.

6.3 - Methods and materials for containment and clean up

Pick up large pieces and use a vacuum cleaner. If brushes are used, ensure that the area is wetted down first. Do not use compressed air for clean up. Do not allow to become windblown.

6.4 - Reference to other sections

For further information, please refer to sections 7 and 8.

7 - Handling and storage

7.1 - Precautions for safe handling

Handling can be a source of dust emission and therefore the processes should be designed to limit the amount of handling. Whenever possible, handling should be carried out under controlled conditions (i.e., using dust exhaust system). Regular good housekeeping will minimise secondary dust dispersal.

7.2 - Conditions for safe storage

Store in original packaging in a dry area. Always use sealed and clearly labelled containers. Avoid damaging containers. Reduce dust emission during unpacking.

7.3 - Specific end use

The main application of these products is as thermal insulation. Please refer to your local Morgan Thermal Ceramics’ supplier.
8 - Risk Management Measures / Exposures Controls / Personal Protection

8.1 - Control parameters

Industrial hygiene standards and occupational exposure limits vary between countries and local jurisdictions. Check which exposure levels apply to your facility and comply with local regulations. If no regulatory dust or other standards apply, a qualified industrial hygienist can assist with a specific workplace evaluation including recommendations for respiratory protection. Examples of national OELs (November 2014) are given in the table below.

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Total Dust (mg/m³)</th>
<th>Resp Dust (mg/m³)</th>
<th>MMMF (fibre/ml)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>10</td>
<td>6</td>
<td>1</td>
<td>Grenzwerteverordnung</td>
</tr>
<tr>
<td>Belgium</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>Valeurs limites d'exposition professionnelle – VLEP/ Grenswaarden voor beroepsmatige blootstelling – GWBB</td>
</tr>
<tr>
<td>Denmark</td>
<td>10</td>
<td>5</td>
<td>1</td>
<td>Grænseværdier for stoffer og materialer</td>
</tr>
<tr>
<td>Finland</td>
<td>No limit</td>
<td>No limit</td>
<td>1</td>
<td>Finnish Ministry of Social Affairs and Health</td>
</tr>
<tr>
<td>France</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>Institut National de Recherche et de Sécurité</td>
</tr>
<tr>
<td>Germany</td>
<td>10</td>
<td>4</td>
<td>1</td>
<td>TRGS 900</td>
</tr>
<tr>
<td>Hungary</td>
<td>No limit</td>
<td>No limit</td>
<td>1</td>
<td>EüM-SZCSM rendelet</td>
</tr>
<tr>
<td>Ireland</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>HAS – Ireland</td>
</tr>
<tr>
<td>Italy</td>
<td>10</td>
<td>5</td>
<td>1</td>
<td>Uses EU values</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>10</td>
<td>6</td>
<td>1</td>
<td>Agents Chimiques, Cancérgènes Ou Mutagènes Au Travail</td>
</tr>
<tr>
<td>Netherlands</td>
<td>10</td>
<td>5</td>
<td>1</td>
<td>SER</td>
</tr>
<tr>
<td>Norway</td>
<td>10</td>
<td>5</td>
<td>0.5</td>
<td>Veiledning om administrative normer for forurensing i arbeidsatmosfære</td>
</tr>
<tr>
<td>Poland</td>
<td>No limit</td>
<td>No limit</td>
<td>2</td>
<td>Dziennik Ustaw 2010</td>
</tr>
<tr>
<td>Spain</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>INSHT</td>
</tr>
<tr>
<td>Sweden</td>
<td>10</td>
<td>5</td>
<td>1</td>
<td>AFS 2005:17</td>
</tr>
<tr>
<td>Switzerland</td>
<td>10</td>
<td>6</td>
<td>1</td>
<td>SUVA - Valeurs limites d'exposition aux postes de travail</td>
</tr>
<tr>
<td>UK</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>EH40/2005</td>
</tr>
</tbody>
</table>

Information on monitoring procedures

United Kingdom

MDHS 59 specific for MMVF: “Man-made mineral fibre - Airborne number concentration by phase-contrast light microscopy” and MDHS 14/4 “General methods for sampling and gravimetric analysis of respirable and inhalable dust”

NIOSH

NIOSH 0500 "Particulates not otherwise regulate, total"
NIOSH 0600 "Particulates not otherwise regulate, respirable"
NIOSH 7400 "Asbestos and other fibres by PCM"

8.2 - Exposure controls

8.2.1 APPROPRIATE ENGINEERING CONTROLS

Review your applications in order to identify potential sources of dust exposure. Local exhaust ventilation, which collects dust at source, can be used. For example down draft tables, emission controlling tools and materials handling equipment. Keep the workplace clean. Use a vacuum cleaner. Avoid brushing and compressed air.
If necessary, consult an industrial hygienist to design workplace controls and practices. The use of products specially tailored to your application(s) will help to control dust. Some products can be delivered ready for use to avoid further cutting or machining. Some could be pre-treated or packaged to minimise or avoid dust release during handling. Consult your supplier for further details.

8.2.2 - Personal Protective Equipment

Skin protection:
Wear gloves and work clothes, which are loose fitting at the neck and wrists. Soiled clothes should be cleaned to remove excess fibres before being taken off (e.g. use vacuum cleaner, not compressed air). Wash work clothes separately from other clothing.

Eye protection:
As necessary wear goggles or safety glasses with side shields.

Respiratory protection:
For dust concentrations below the exposure limit value, RPE is not required but FFP2 respirators may be used on a voluntary basis. For short-term operations where excursions are less than ten times the limit value use FFP2 respirators. In case of higher concentrations or where the concentration is not known, please seek advice from your company and/or local Thermal Ceramics supplier.

Information and training of workers
Workers should be trained on good working practices and informed on applicable local regulations.

8.2.3 - Environmental Exposure Controls

Refer to local, national or European applicable environmental standards for release to air water and soil. For waste, refer to section 13.
9 - Physical and chemical properties

| Information on basic physical and chemical properties | Not applicable |
| Appearance | Beige to light brown |
| Odour | None |
| Odour threshold | Not Applicable |
| pH | Not applicable |
| Melting point/freezing point | > 1200°C |
| Initial boiling point and boiling point range | Not applicable |
| Flash point | Not applicable |
| Evaporation rate | Not Applicable |
| Flammability (solid, gas) | Not applicable |
| Upper/lower flammability or explosive limits | Not applicable |
| Vapour pressure | Not applicable |
| Vapour density | Not Applicable |
| Relative density | 300 kg/m³ |
| Solubility(ies) | Less than 1 mg/l |
| Partition co-efficient: n-octanol/water | Not applicable |
| Auto-ignition temperature | Not applicable |
| Decomposition temperature | Not Applicable |
| Viscosity | Not Applicable |
| Explosive properties | Not applicable |
| Oxidising properties | Not applicable |

10 - Stability and Reactivity

10.1 - Reactivity
AES is stable and non reactive

10.2 - Chemical Stability
AES is inorganic, stable and inert

10.3 - Possibility of Hazardous Reactions
During first heating, oxidation products from the organic binder might be emitted in a temperature range from 180°C to 600°C. It is recommended to ventilate the room until gases and fumes have disappeared. Avoid exposure to high concentrations of gas or fumes.

10.4 - Conditions to Avoid
Please refer to handling and storage advice in Section 7

10.5 - Incompatible Materials
None

10.6 - Hazardous decomposition products
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.
11 - Toxicological Information

Toxicokinetics, metabolism and distribution

11.1.1 BASIC TOXICOKINETIC
Exposure is predominantly by inhalation or ingestion. Man made vitreous fibres of a similar size to AES have not been shown to migrate from the lung and/or gut and do not become located in other organs of the body. AES fibres 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.

11.1.2 Human Toxicological data

RESPIRATORY TOXICITY FOR MINERAL WOOLS
Epidemiological studies did not show any health effects related to fibres among Mineral Wool manufacturing workers. The excess of lung cancers reported in 1982 have been the subject of additional investigations and the examination of the confounding factors showed that the excess were not attributed to fibres. Smoking has been identified as the most important of these confounding factors.

Epidemiology for crystalline silica
Prolonged/repeated inhalation of respirable crystalline silica dust may cause delayed lung injury (silicosis).
In evaluating crystalline silica as a cancer risk, the International Agency for Research on Cancer (IARC) reviewed several studies from different industries and concluded that crystalline silica from occupational sources inhaled in the form of quartz or cristobalite is carcinogenic to humans (Group 1) [IARC Monograph; vol.68; June 1997]. However, in reaching its conclusion, IARC stated that the carcinogenicity in humans could not be found in all industries reviewed and that carcinogenicity might be dependent on inherent characteristics of crystalline silica or on external factors affecting biological activity (e.g., cigarette smoking) or distribution of its polymorphs.

11.1 - Information on toxicological effects

EXPERIMENTAL STUDIES FOR AES WOOL
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. Fibres with the same ability to persist in tissue do not produce tumours when injected into the peritoneal cavity of rats.

Experimental Studies for Mineral Wools
Animal inhalation studies on mineral wools showed neither pulmonary fibrosis nor lung cancer nor mesothelioma. Intratracheal and intraperitoneal injection studies did not show any disease except those involving selected fine glass fibres for special uses or experimental rock wools.

Experimental Studies for Crystalline Silica
Animals exposed to very high concentrations of crystalline silica, artificially or by inhalation, have reported fibrosis and tumours (IARC Monographs 42 and 68).
Inhalation and intratracheal installation of crystalline silica in rats caused lung cancer. However, studies in other species such as mice and hamsters caused no lung cancer. Crystalline silica also caused fibrosis in rats and hamsters in several inhalation and intratracheal installation studies.

Irritant properties
Superwool fibres are negative when tested using approved methods (Directive 67/548/EEC, Annex 5, Method B4). Like all man-made mineral fibres and some natural fibres, fibres 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.
12 - Ecological information

a - Ecotoxicity (aquatic and terrestrial, where available)

12.1 - Toxicity

These products are insoluble materials that remain stable over time and are chemically identical to inorganic compounds found in the soil and sediment; they remain inert in the natural environment. No adverse effects of this material on the environment are anticipated.

12.2 - Persistence and degradability

Not established

12.3 - Bioaccumulative potential

Not established

12.4 - Mobility in soil

No information available

12.5 - Results of PBT and vPvB assessment

This mixture contains no substance considered to be persistent, bioaccumulating nor toxic (PBT).

This mixture contains no substance considered to be very persistent and very bioaccumulative (vPvB).

12.6 - Other adverse effects

No additional information available

13 - Disposal Considerations

13.1 - Waste treatment methods

Waste from these materials may be generally disposed of at a landfill, which has been licensed for this purpose. Please refer to the European list (Decision N° 2000/532/CE as modified) to identify your appropriate waste number, and ensure national and/or regional regulations are complied with.

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

14 - Transport information

Transport

14.1. UN number
Not Applicable

14.2. UN proper shipping name
Not Applicable

14.3. Transport hazard class(es)
Not Applicable

14.4. Packing group
Not Applicable

14.5. Environmental hazards
Not Applicable

14.6. Special precautions for user
Not Applicable

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not Applicable
15 - Regulatory information

15.1 - Safety health and environment regulations/legislation specific for the substances or mixtures

EU regulations:


PROTECTION OF WORKERS

Shall be in accordance with several European Directives as amended and their implementations by the Member States:


OTHER POSSIBLE REGULATIONS

Member States are in charge of implementing European Directives into their own national regulation within a period of time normally given in the Directive. Member States may impose more stringent requirements. Please always refer to any national regulation.

15.2 - Chemical Safety Assessment

A Chemical Safety Assessment has been carried out for AES and CSR can be provided on request.
Useful references

Full text for H Phrases found in Section 3:

H373: May cause damage to lungs through prolonged or repeated exposure

Precautionary measures

Information on after service heated fibres

In almost all applications high temperature insulating wools products (HTIW) are used as an insulating material helping keeping up temperature at 900°C or more in a closed space. As only a thin layer of the insulation hot face side is exposed to high temperature, respirable dust generated during removal operations does not contain detectable levels of crystalline silica.

In applications where the material is heat socked, duration of heat exposure is normally short and a significant devitrification allowing CS to build up does not occur. This is the case for waste mould casting for instance.

Toxicological evaluation of the effect of the presence of CS in artificially heated HTIW material has not shown any increased toxicity in vitro. The results from different combinations of factors like increased brittleness of fibres, or micro crystals embedded in the glass structure of the fibre and therefore not biologically available may explain the lack of toxicological effects.

IARC evaluation as provided in Monograph 68 is not relevant as CS is not biologically available in after service HTIW and respirable dust generated during removal operations does not contain detectable levels of crystalline silica. [http://www.iarc.fr/en/publications/pdfs-online/index.php]

High concentrations of fibres and other dusts may be generated when after-service products are mechanically disturbed during operations such as wrecking. Therefore ECFIA recommends:

a) control measures are taken to reduce dust emissions; and
b) all personnel directly involved wear an appropriate respirator to minimise exposure and comply with local regulatory limits.

CARE Program

The trade association representing the European high temperature insulation wool industry (ECFIA) has undertaken an extensive hygiene programme for High Temperature Insulation Wool (HTIW). The objectives are twofold: (i) to monitor workplace dust concentrations at both manufacturers’ and customers’ premises, and (ii) to document manufacturing and use of HTIW products from an industrial hygiene perspective in order to establish appropriate recommendations to reduce exposures. The initial results of the programme have been published. If you wish to participate in the CARE programme, contact ECFIA or your Thermal Ceramics’ supplier.

Uses advised against

Website

For more information connect to:
The Morgan Thermal Ceramics’ website: [http://www.morganthermalceramics.com/]
Or ECFIA’s website: [http://www.ecfia.eu]

Revision Summary

Amendments to sections 2, 3, 4, 5, 6, 8, 9, 12, 14, 15 and 16 to comply with new guidelines

Technical data sheets

For more information on individual products please see the relevant technical data sheet available from [http://www.morganthermalceramics.com/downloads/datasheets]

Other Information

NOTICE:
The information presented herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet. However safe as provided by law, no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorisation given or implied to practice any patented invention without a licence. In addition, no responsibility can be assumed by the vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product (however, this shall not act to restrict the vendor’s potential liability for negligence or under statute).