1 - Identification of product

1.1 - Identification of Product

Kaowool 1600 Paper,

The above-mentioned product contains polycrystalline fibres and mineral wool.

1.2 - Use of Product

Application as thermal insulation, heat shields, heat containment, gaskets and expansion joints at temperatures up to 1600°C in industrial furnaces, ovens, kilns, and other process equipment and in the aerospace, automotive industries.

1.3 - Identification of Company

U.K.

THERMAL CERAMICS LIMITED

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marketing.tc@morganplc.com

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 CLASSIFICATION OF THE SUBSTANCE/MIXTURE

2.1.1 CLASSIFICATION ACCORDING TO REGULATION (EC) NO 1272/2008

Mineral wools (glass, rock and slag wool) included in these products have been classified under Regulation no. 1272/2008 as a category 2 carcinogen (“substance which cause concern for man owing to possible carcinogen effects”) due to the absence of toxicological data allowing to exonerate these fibres under note Q of the Directive.

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

3 - Composition / Information On ingredients

DESCRIPTION

These products are papers made of organic bonded polycrystalline fibres and mineral wool.

Composition

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>%</th>
<th>CAS Number</th>
<th>Index number</th>
<th>REACH Registration Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polycrystalline fibre</td>
<td>80-100</td>
<td>675106-31-7</td>
<td>Not applicable</td>
<td>Not yet available</td>
</tr>
<tr>
<td>Mineral wool</td>
<td>0-10</td>
<td>65997-17-3</td>
<td>Not applicable</td>
<td>Not yet available</td>
</tr>
<tr>
<td>Organic binder</td>
<td>3-10</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not yet available</td>
</tr>
</tbody>
</table>
4 - First-Aid measures

4.1 - 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.

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

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

5 - Fire-fighting measures
Non combustible products. However, virgin product binder may burn and produce gases and/or fumes. Packaging and surrounding materials may be combustible. Use extinguishing agent suitable for surrounding combustible materials.

6 - Accidental Release Measures

6.1 - PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES
Where abnormally high dust concentrations occur, provide the workers with appropriate protective equipment as detailed in section 8. 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.

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.
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 exposure limits applying (in January 2010) in different countries are given below:

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>EXPOSURE LIMIT*</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>3 mg/m$^3$</td>
<td>TRGS 900</td>
</tr>
<tr>
<td>France</td>
<td>1.0 f/ml</td>
<td>Circulaire DRT No 95-4 du 12.01.95</td>
</tr>
<tr>
<td>Spain</td>
<td>1.0 f/ml</td>
<td>Instituto Nacional de Seguridad e Higiene en el Trabajo (INSHT)</td>
</tr>
<tr>
<td>U.K.</td>
<td>2.0 f/ml and 5 mg/m$^3$</td>
<td>HSE - EH40 – Workplace Exposure Limit</td>
</tr>
</tbody>
</table>

* Time weighted average concentrations of airborne respirable fibres measured over 8 hours by the conventional membrane filter method or the total inhalable dust using standard gravimetric techniques.

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 fitted with a HEPA filter. 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

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPEARANCE</td>
<td>White paper</td>
</tr>
<tr>
<td>BOILING POINT</td>
<td>Not applicable</td>
</tr>
<tr>
<td>FLASH POINT</td>
<td>Not applicable</td>
</tr>
<tr>
<td>AUTOFLAMMABILITY</td>
<td>Not applicable</td>
</tr>
<tr>
<td>OXIDISING PROPERTIES</td>
<td>Not applicable</td>
</tr>
<tr>
<td>SOLUBILITY</td>
<td>Less than 1 mg/l</td>
</tr>
<tr>
<td>PARTITION COEFFICIENT</td>
<td>Not applicable</td>
</tr>
<tr>
<td>ODOUR</td>
<td>Slight</td>
</tr>
<tr>
<td>MELTING POINT</td>
<td>&gt; 2000°C</td>
</tr>
<tr>
<td>FLAMMABILITY</td>
<td>The material will burn for a short period only until the polymeric binder is burnt out or the resulting expansion self-extinguishes</td>
</tr>
<tr>
<td>EXPLOSIVE PROPERTIES</td>
<td>Not applicable</td>
</tr>
<tr>
<td>VAPOUR PRESSURE</td>
<td>Not applicable</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable</td>
</tr>
<tr>
<td>OTHER SAFETY INFORMATION</td>
<td>These fibres are far denser than air or water and will settle rapidly under normal environmental conditions.</td>
</tr>
</tbody>
</table>

### 10 - Stability and Reactivity

#### 10.1 - Reactivity

PCW is stable and non reactive

#### 10.2 - Chemical Stability

The product 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

#### 10.6 - 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

11.1 - TOXICOLOGY, METABOLISM AND DISTRIBUTION

11.1.1 Basic toxicokinetics
Exposure is predominantly by inhalation or ingestion. Polycrystalline fibres have not been shown to migrate from the lung and/or gut and do not become located in other organs of the body. Available toxicological information is as follows:

11.1.2 HUMAN TOXICOLOGICAL DATA
Epidemiology of 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.

11.2 - INFORMATION ON TOXICOLOGICAL EFFECTS
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 Polycrystalline Wool
Lifetime rat inhalation studies in the rat on PCW fibres at the maximum levels achievable have shown no evidence of lung cancer, lung fibrosis or any other adverse effect, apart from a minimal pulmonary response typical of that of a 'low toxicity dust'. Also, a lifetime feeding study in rats has produced no evidence of any adverse effects at levels up to 2.5 % in the diet. Intraperitoneal, intratracheal and intrapleural studies in rats, together with two in vitro tests, all showed negative results whereas asbestos and crystalline silica which were used as positive controls (where relevant) produced positive responses.

The results of these extensive testing programmes indicate that PCW materials lack one or more of the fundamental characteristics necessary for mesothelioma induction, as well as not possessing fibrogenic potential.

When tested using approved methods (as listed in Regulation (EC) 1907/2006, Annex 8, Section 8.1), fibres contained in this material give negative results. All man-made mineral fibres, like some natural fibres, can produce a mild irritation resulting in itching or rarely, in some sensitive individuals, in a slight 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

These products are inert materials that remain stable overtime.
No adverse effects of this material on the environment are anticipated.

13 - Disposal Considerations

WASTE TREATMENT
Waste from these materials may be generally disposed off 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 insure 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 authorised 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.

Additional information
When disposing of waste and assigning European Waste Code (EWC) any possible contamination during use will need to be considered and expert guidance sought as necessary.

14 - Transport information

Not classified as dangerous goods under relevant international transport regulations (ADR, RID, IATA, IMDG).
Ensure that dust is not windblown during transportation.

Definitions:
ADR Transport by road, council directive 94/55/EC
IMDG Regulations relating to transport by sea
RID Transport by rail, Council Directive 96/49/EC
ICAO/IATA Regulations relating to transport by air
ADN European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
SAFETY HEALTH AND ENVIRONMENT REGULATIONS/LEGISLATION SPECIFIC FOR THE SUBSTANCES OR MIXTURES

EU regulations:

- Regulation (EC) No 1907/2006 dated 18th December 2006 on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

POLYCRYSTALLINE FIBRE

In Germany and in accordance with Technical Rules for Hazardous Substances TRGS905 (2.3. para. 6) inorganic fibrous dust is classified in category 3.

In 1988 IARC classified man-made mineral fibres as possible human carcinogens (2B) and, at that time PCWs were included in this broad category of materials. Current information on carcinogenicity is given in Section 11.

Chemical Safety Reports have been requested from suppliers, as soon as this information is available it will be shared with downstream users.
useful references

(the directives which are cited must be considered in their amended version)
- Regulation (EC) No 1907/2006 dated 18th December 2006 on registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

precautionary measures

High concentrations of fibres and other dusts may be generated when after-service products are mechanically disturbed during operations such as wrecking. Therefore Morgan Thermal Ceramics recommends:
- a) control measures are taken to reduce dust emissions;
- b) all personnel directly involved wear an appropriate respirator to minimise exposure; and
- c) Compliance 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.

website

For more information connect to:
The Morgan Thermal Ceramics' website: (http://www.morganthermalceramics.com/)
Or the ECFIA’s website: (http://www.ecfia.eu)
Or Deutsche KeramikFaser-Gesellschaft e.V’ website: (http://www.dkfg.de/)

technical data sheets

For more information on individual products please see the relevant technical data sheet listed below:
Product Datasheet Code

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).