1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY

Identification of the product

Kerform, Kerasetter, Kerheat - Vacuum formed material based on aluminosilicate fibre

Identification of the company

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2. COMPOSITION / INFORMATION ON INGREDIENTS

All vacuum formed Kerform, Kerasetter and Kerheat products covered by this material safety data sheet are produced on basis of Ceramic Fibre (Aluminium Silicate Fibre). Some qualities may additionally contain mineral fibres and alumina fibres, respectively (see technical data sheets). They are used as boards or shapes. The ceramic fibre is classified as carcinogenic substance to category 2 and the alumina fibre is voluntarily classified as carcinogenic substance to category 3 and as irritant according to the Directive 91/155/EG (refer also section 15).
The mineral fibre is not classified as carcinogen.

Chemical characterisation

CAS-No.	CHEMICAL NAME	HAZARD SYMBOLS	R-PHRASES	Content
142 844-00-6	Aluminium Silicate Fibre	T, Xi	R 38 / R 49	30-90%
Composition				
Al2O3	35 – 55 %			
SiO2	45 – 60 %			
ZrO2	0 – 15 %			

CAS-No.	CHEMICAL NAME	HAZARD SYMBOLS	R-PHRASES	Content
134 428-1	Alumina Fibre	Xn	R 38	0-30%
Composition				
Al2O3	70 – 98 %			
SiO2	2 – 30 %			

CAS-No.	CHEMICAL NAME	HAZARD SYMBOLS	R-PHRASES	Content
287922-11-6	Mineral Fibre	Xi	R 38	0-30%
Composition				
Al2O3	18 - 23 %			
SiO2	38 – 43 %			
CaO+MgO	23 - 28 %			
Others	< 20 %			

CAS-No.	CHEMICAL NAME	HAZARD SYMBOLS	R-PHRASES	Content
7631-86-9	Amorphous Silica			<25%
1344-28-1	Alumina			0-50%
56780-58-6	Starch			<10%

For further information see also the technical data sheet of the product.

3. HAZARD IDENTIFICATION

Irritant effects
May cause temporary mechanical irritation to eyes, skin, and upper respiratory tract (nose, throat). Pre-existing medical conditions, including dermatitis, asthma or chronic lung disease might be aggravated by exposure.

Concerns about chronic respiratory health effects
This fibre belongs to a group of fibres classified under Directive 97/69/CE as category 2 carcinogens ("substances which should be regarded as if they are carcinogenic to man"). Based on results of some animal studies there is a concern that excessive dust exposure may cause fibrosis and cancer of the lung or the pleura. This has not confirmed by human data. The manufacturer classified alumina fibres in category 3 by himself. Inhalation tests of animals haven't caused any lung damage.

4. FIRST-AID MEASURES

- **After inhalation:** If nose and throat become irritated move to a dust free area, drink water and blow nose.
- **After skin contact:** In case of skin irritation rinse affected areas with cold water and wash gently with soap. Do not rub or scratch exposed skin. Using a skin cream or lotion after washing may be helpful. Change into clean clothing.
- **After eye contact:** In case of eye contact flush abundantly with lukewarm water. Lifting lids occasionally to ensure thorough rinsing. Have eye bath available. Do not rub eyes.
- **After swallowing:** If gastrointestinal tract irritation develops, move to a dust free environment and drink plenty of water.

Further instructions
If symptoms persist, seek medical advice.

5. FIRE-FIGHTING MEASURES

The materials related to this MSDS are not combustible. However, unfired products may contain up to 5% organic and inorganic additives, respectively, which are thermally unstable and develop gases and fumes.
Packaging and surrounding materials may be combustible. Therefore use extinguishing agent suitable for surrounding combustible materials. Wear self-contained breathing apparatus when entering oxygen deficient area.

6. ACCIDENTAL RELEASE MEASURES

Personal-related safety precautions
An accidental release or spillage of the material may lead to an abnormally high dust concentration. Provide the workers with protective equipment as detailed in section 8.
Restrict access to the area to a minimum number of workers. Restore the situation to normal as quickly as possible. Prevent further dust dispersion for example by damping the materials.

Environmental protection
Clean up spilled material to the extent possible. Package spilled material properly for disposal (see section 13). Do not allow to be wind blown. Do not flush spilled material into drains. Prevent spilled materials from entering natural water courses. Check with your employer to identify all regulations which may apply.

Measures for cleaning / collecting
Dust suppressing cleaning methods such as wet sweeping or vacuuming (equipped with a HEPA filter) should be used to clean the work area. Compressed air or dry sweeping should not be used for cleaning.

7. HANDLING AND STORAGE

Techniques to reduce dust emissions during handling
Handling can be a source of dust emission. Process should be designed to limit the amount of handling. Wherever possible handling should be carried out under ventilation. Limit use of power tools unless in conjunction with local exhaust. Using specially treated or packaged products will minimise dust emission. Regular good housekeeping will minimise secondary dust dispersal (see section 6).
Personal protection see section 8.

Storage
Always use visibly labelled containers, keep container closed when not in use.
Avoid damaging containers.
Reduce dust emission during packing out.
Store in a dry area.

Empty containers
Product packaging may contain residue. Do not reuse.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Techniques to reduce dust exposure to a minimum:
Access situations with the potential for dust release. Where practical enclose dust sources and provide dust extraction at source. Use down draft tables, emission controlling tools and materials handling equipment designed to minimise airborne fiber emissions additionally.
Keep the workplace clean. Use a vacuum cleaner fitted with a HEPA filter. Avoid using brooms and compressed air.
Operating procedures might be useful to limit dust production and exposure of workers.
If necessary consult an industrial hygienist to design proper workplace controls.
Using products specially tailored to your application(s) will help controlling dust. Some products can be delivered ready for use without further cutting or machining.
Some could be treated or packaged to minimise or avoid dust emission during handling.
Consult your supplier for further details.

Hygiene standards and exposure limits
Hygiene standards and exposure limits may differ from country to country. Check those currently applying in your country and comply with regulations.

Examples of exposure limits applying (in January 1998) are given below:

Chemical name	CAS-Nr.	National exposure limits *	
amorphous silica	7631-86-9	Germany: TRGS 900 UK: HSE EH40	4 mg/m³ 6 mg/m³ inhalable dust
aluminium silicate fibre	142 844-00-6	Germany: TRGS 900 France: DRT No 95-4 UK: HSE EH40	0,5 f/ml 0,6 f/ml 2,0 f/ml

** Time weighted average concentrations of airborne respirable particles measured over 8 hours by the conventional membrane filter method.*

Personal protection equipment
Use skin and eye protection during mean working process (e.g. dismantling). Use protective cream and lotion for sensible skin. After completing work wash polluted skin with water. Wash work clothing separately.

Respiratory protection	- FFP2 particulate respirator (complying with EN 149) recommended; for short term operations where excursions above the exposure limit value are less than a factor of ten, use FFP3 respirators
Hand protection	- wear suitable gloves (e.g. PVC or Nitril according to EN 388 and EN 420)
Eye protection	- wear goggles or safety glasses with side shields
Skin protection	- suitable work clothes recommended (loose fitting, closed overalls).

Information and training of workers:
Workers should be informed on:
- the applications involving fibre-containing products;
- the potential risks to health resulting from exposure to fibrous dust;
- the requirements regarding smoking, eating and drinking at the workplace;
- the requirements for protective equipment and clothing.

Workers shall be trained on:
- the good working practices to limit dust emissions;
- the proper use of protective equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form:	solid, fibrous material
Colour:	white - gray
Odour:	*odourless*

Safety relevant data

Melting point:	>1400°C
Flash point:	*non-flammable*
Flammability:	*non-flammable*
Ignition temperature:	*non-flammable*
Autoflammability:	*non-flammable*
Oxidising properties:	*none*
Vapour pressure:	*not applicable*
Raw density:	*200 -1500 kg/m³*
Solubility in water:	not soluble in water
pH value (1000g/H_2O, at 25°C):	7 – 8
Viscosity (at 25°C):	not applicable

Other data - *see technical data sheet*

10. STABILITY AND REACTIVITY

Conditions or materials to avoid
None

Hazardous reaction products
No hazardous decomposition products when stored and handled correctly.

The first heat up of unfired material leads to the thermal decomposition of organic and/or volatile inorganic components in the temperature range between about 100 and 600°C. The amount of organic and/or volatile inorganic components present in the material can reach up to 5 wt.-%. The decomposition products are mainly carbon monoxide and carbon

dioxide. Additionally trace gasses (e.g. hydrogen chloride, sulphur dioxide, nitrogen oxides) may released.
Emission occurs only during the first heating. It is advisable to ensure good ventilation when such appliances are first put into service. Please avoid exposures at high concentrations.
Continuous use of the products at temperatures above 900°C may lead to the formation of several crystalline phases. If crystalline silica (cristobalite) is present, follow corresponding hygienic standards and national regulations.

11. TOXICOLOGICAL INFORMATION

Irritant properties
Under Directive 67/548/EEC all types of man-made vitreous (silicate) fibres are classified as "irritant" despite the fact that testing by the appropriate EU method (B4 in annex 5 of Directive 67/548/EEC) is providing no response and would not result in irritant classification.
Coarse fibres can cause itching of the skin, foreign body reaction in the upper respiratory system (mucous membranes), and in the eyes. The itching and possible inflammation are a mechanical reaction to the coarse fibres (of more than about 5 µm in diameter) and are not damaging in the way chemical irritants may be. They generally abate within a short time after the end of exposure.
Appropriate work clothes prevent irritation (see section 8).

Human data on chronic respiratory health effects
No known disease associated with exposure to refractory ceramic even though these fibres have been used for nearly 40 years. Pulmonary morbidity studies were carried out among the production workers in Europe and USA. In the American study pleural plaques were reported in 2,9% of workers examined. Plaques do not cause any symptoms and do not develop into disease.

Inhalation toxicology data in animals
In earlier studies RCF together with other man-made mineral fibres were regarded as inert. In the 70‘s and 80‘s tumours were produced in animals after intrapleural or intraperitoneal injection but the several inhalation experiments conducted were inconclusive. In 1990 inhalation studies known as the ”RCC experiments” were conducted with size selected fibres. Fibrosis, lung tumours and mesotheliomas were produced in animals exposed to very high concentrations. It was then discovered that the size selection process led to a serious contamination of the test samples by non-fibrous particles. The inhaled particles may have decreased the rate of fibre clearance leading to a condition sometimes referred to as pulmonary overload. Experts are still analysing the significance of the RCC results. In further tests, uncontaminated fibre samples have proved to be largely less biologically active.

12. ECOLOGICAL INFORMATION

The Kerform, Kerasetter and Kerheat products are inert materials, which remain stable over time.
No adverse effects of this material on the environment have been identified.

13. DISPOSAL CONSIDERATIONS

EWC-Code for mineral fibre waste: 101 103

Waste from the Kerform, Kerasetter and Kerheat materials is usually not classified as hazardous waste and may generally be disposed at a normal tipping site which has been licensed for the disposal of industrial waste. Unless wetted, such a waste is normally dusty and thus, should be properly sealed in clearly and visibly labelled containers for disposal. At some tip sites dusty waste may be treated differently in order to ensure they are dealt with promptly to avoid them being wind blown.
In case of contamination by products classified as hazardous waste, expert guidance should be sought.

Check for national and/or regional regulations which may apply.

14. TRANSPORT INFORMATION

Not classified as dangerous goods according to international transport regulations (ADR, RID, IATA, IMDG).

Ensure that dust is not wind blown during transportation.

15. REGULATORY INFORMATION

EC Classification

The Kerform, Kerasetter and Kerheat products contain aluminum silicate fibres classified as category 2 carcinogen.
According to Directive 97/69/EC these fibres belong to the group of "man-made vitreous (silicate) fibres with random orientation with alkaline oxide and alkaline-earth oxide ($Na_2O+K_2O+CaO+MgO+BaO$) content less or equal to 18% by weight".

Danger Symbol:	T - Toxic, Xi - Irritant
Risk Phrases:	R 49 - May cause cancer by inhalation, R 38 - Irritating to skin
Safety Phrases:	S 24/25 Avoid contact with eyes and skin, S 36/37/38 Wear suitable loose fitting, long-sleeved clothes, gloves and eye protection

The polycrystalline alumina fibres used for some of the products are voluntarily classified as category 3 carcinogen.
According to Directive 97/69/EC also these fibres belong to the group of "man-made vitreous (silicate) fibres with random orientation with alkaline oxide and alkaline-earth oxide ($Na_2O+K_2O+CaO+MgO+BaO$) content less or equal to 18% by weight".

Danger Symbol:	Xn - Harmful
Risk Phrases:	R 20 Harmful by inhalation, R 38 Irritating to skin
Safety Phrases:	S 24/25 Avoid contact with eyes and skin, S 36/37/38 Wear suitable loose fitting, long-sleeved clothes, gloves and eye protection

Some products additionally contain non-classified mineral fibres.
According to Directive 97/69/EC these fibres belong to the group of "man-made vitreous (silicate) fibres with random orientation with alkaline oxide and alkaline earth oxide ($Na_2O+K_2O+CaO+MgO+BaO$) content >18% by weight".

Danger Symbol:	Xi, Irritant
Risk Phrases:	Irritating to skin (R 38)
Safety Phrases:	Wear suitable protective clothing and gloves (S 36, S 37)

Water protection

National laws may apply.

Protection of workers

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

- Council Directive 90/394/EC "on the protection of workers from the risks related to exposure to carcinogens at work".
- Council Directive 89/391/EEC dated 12 June 1989 "on the introduction of measures to encourage improvements in the safety and health of workers at work" (Official Journal of the European Community - OJEC) L 183 of 29 June 1989, p.1).

General hygienic standards (e.g. TRGS 521) and all applicable regulations have to be observed.

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 directives. Member States may impose more stringent requirements.
Please always refer to any national regulation.

16. OTHER INFORMATION

Precautionary measures to be taken after service upon removal

As produced, the used fibres are vitreous (glassy) materials which, upon continued exposure to elevated temperatures (above 900°C), may devitrify. 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 "hotface" fibre.
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 notes "in making the overall evaluation, the Working Group noted that carcinogenicity in humans was not detected in all industrial circumstances studied..." In most jurisdictions there are specific occupational exposure limits for crystalline silica (quartz, cristobalite) which may vary between countries and local jurisdictions. Check which exposure levels apply to your facility and comply with local regulation.

Useful references

- Hazards from the use of Refractory Ceramic Fibre. Health and Safety Executive; Information document, HSE 267 / (1998)
- Working with Refractory Ceramic Fibres; ECFIA; Code of practice (February 1998)
- TRGS 521: Faserstäube
- Commission Directive 97/69/EC of 5 December 1997 adapting to technical progress for the 23rd time Council Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances. Official Journal of the European Communities, 13 December 1997, and its national adaptions
- Maxim LD et al (1998); CARE – A European programme for monitoring and reducing refractory ceramic fiber dust at the workplace - initital results: "Gefahrstoffe – Reinhaltung der Luft", 58 : 3, pp. 97-103

CARE Programm

The European Ceramic Fibres Industry Association (ECFIA) has undertaken an extensive hygiene Programme for refractory ceramic fibres (RCF).
The objectives are twofold:
(i) to monitor workplace dust concentrations at both manufacturers' and customers' premises, and
(ii) to document manufacturing and use of RCF products from an industrial hygiene perspective in order to establish appropriate recommendations to reduce exposures.
The initial results of the programme have been published; (see Maxim et al referenced above).
If you wish to participate in the CARE programme, contact ECFIA or your supplier.

The data given here are based on current knowledge and experience. The purpose of this safety Data Sheet is to describe the products in terms of their safety requirements. The above details do not imply any guarantee concerning composition, properties or performance.
Relevant laws and regulations have to be observed in direct responsibility of our customers.

Replaces version dated: November 4, 2002

Department issuing MSDS:	**R&D** **Dr.-Ing. habil. S. Möhmel**