



UNIFRAX INDIA PRIVATE LIMITED

MATERIAL SAFETY DATA SHEET (M S D S)

FIBERFRAX Z FIBRES
(ZIRCONIA – CONTAINING FIBERFRAX FIBRES)

MSDS Number MSDS 010(A) Rev 12

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According to 2001/58/EC

Date of last revision 20th September,16



1 - IDENTIFICATION OF THE PRODUCTS AND OF THE COMPANY

Identification of the products

Zirconia containing Fiberfrax Ceramic Fibres Are Refractory Ceramic Fibres (RCF)

Zirconia – containing Fiberfrax fibres enter into the composition of several products which are listed under their commercial name in the ***appended Table***.

Products containing Zirconia – containing Fiberfrax fibres are available in a variety of forms.

Products such as non-lubricated bulk, standard blanket rolls which are non-lubricated or not pre-sized for the application, boards which are not pre-sized for the application, modules non-encapsulated and dry cements are likely to release fibrous dust in normal handling and use.

The other products (lubricated, specially packaged or encapsulated, ready for use, pre-sized, ready to install) have less potential for dust release and should preferably be used.

Identification of the company

UNIFRAX INDIA PRIVATE LIMITED

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2 - COMPOSITION / INFORMATION OR INGREDIENTS

Fibre chemistry

(SiO₂ 46-53%, Al₂O₃ 33-44%, ZrO₂ 4 - 19%)
ZIRCONIA ALUMINOSILICATE VITREOUS FIBRES FOR HIGH TEMPERATURE USE

CAS Number 142 844-00-6

T (Toxic)

R49 “ May cause cancer by inhalation”

R38 “ Irritating to skin”

Other Ingredients

According to product form, other ingredients may be present (CF *appended Table*):

Acrylic latex – Not harmful to health if correctly handled; thermal decomposition may result in the release of formaldehyde (Xn, R40-43), ammonia (Xi, R37) or carbon monoxide.

Amorphous silica – Could contribute to crystalline silica formation at temperature >900°C. Occupational exposure limit in the UK : 3 mg/m³ respirable dust ; 6 mg/m³ inhalable dust.

Organic lubricant – Repeated or prolonged contact may produce “defatting “ of the skin leading to irritation and dermatitis; S24/25; S36/37.

Starch – Thermal decomposition in oxygen deficient conditions may release carbon monoxide. Occupational exposure limit in the UK: 5 mg/m³ respirable dust; 10 mg/m³ inhalable dust.

3 - HAZARD IDENTIFICATION

Hazard Pictogram





Inhalation

MAY RELEASE FIBROUS DUST

REDUCE DUST EXPOSURE AS FAR AS TECHNICALLY POSSIBLE

In October 2001, the International Agency for Research on Cancer (IARC) confirmed that Group 2b (possible human carcinogen) remains the appropriate IARC classification for RCF.

These fibres belong to a group of fibres classified under Directive 97/69/EC as category 2 carcinogen (“substances which should be regarded as if they are carcinogenic to man”).

Irritation

Mild mechanical irritation to skin, eyes and upper respiratory system may result from exposure.

4 - FIRST AID MEASURES

Skin : In case of skin irritation rinse affected areas with water and wash gently.

Eyes : In case of serious eye contact flush abundantly with water; have eye bath available.

5 - FIRE FIGHTING MEASURES

The fibre and the products without organic binder are not combustible.

Packaging and surrounding materials may be combustible.

Use extinguishing agent suitable for surrounding combustible materials.

Wear self-contained breathing apparatus when entering oxygen deficient area.

6 – ACCIDENTAL RELEASE MEASURES

Personal protection in case of accidental release or spillage likely to result in an abnormally high dust concentration.

Provide the workers with appropriate 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



Methods for cleaning up

Pick up large pieces first and finish with a vacuum cleaner fitted with high efficiency filter.
If brushing is used, ensure that the area is wetted down first.
Do not use compressed air for clean up.
For waste disposal refer to section 13.

Environmental protection

Do not allow to be wind blown
Do not flush spillage to drain and prevent from entering natural water courses
Check for local regulations which may apply.

7 – HANDLING AND STORAGE

Techniques to reduce dust release during handling

Handling can be a source of dust exposure
Process should be designed to limit the amount of handling.
Wherever possible handling should be carried out under controlled conditions (i.e. use dust exhaust system).
Using specially treated or packaged products will minimise dust release.
Regular good housekeeping will minimise secondary dust dispersal.

Personal Protection

See next section 8.

Storage

Always use sealed and visibly labelled containers.
Avoid damaging containers
Reduce dust emission during packing out
Emptied containers which may contain debris should be cleaned before disposal or recycling.
Recyclable cardboard and / or plastic films are recommended for packaging.

8 – EXPOSURE CONTROL / PERSONAL PROTECTION

Techniques to reduce dust exposure to a minimum

Review your RCF application(s) and assess situations with the potential for dust release.
Where practical enclose dust sources and provide dust extraction.
Delimit RCF work areas and restrict access to informed and trained workers.
Use operating procedures which will limit dust production and exposure of workers.
Keep the workplace clean
Use a vacuum cleaner fitted with a HEPA filter; avoid using brooms and compressed air.



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 release 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 are given below:

| <u>Country</u> | <u>Exposure limit*</u> |
|-------------------------------------|------------------------|
| Germany, Australia, Austria | 0.5 f/ml |
| France | 0.6 f/ml |
| UK, Netherland, New Zealand, Sweden | 1.0 f/ml |

- 8-hr time-weighted average concentrations of airborne respirable ceramic fibres measured by the conventional membrane filter method.

Skin and eye protection

Wear gloves and overalls which are loose fitting at the neck and wrists.
Wear goggles or safety glasses with side shields in case of over head working.
After handling rinse exposed skin with water.
Wash work clothing separately.

Respiratory Protection

Use appropriate respiratory protective equipment (RPE) against excessive concentrations of fibrous dust or other possible contaminant which could have been introduced.

For dust concentrations significantly 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 above the exposure limit value are less than a factor of ten, use FFP3 respirators.

In case of higher concentrations, please contact your supplier for advice.

Information and training of workers

Workers shall be informed on:

- the applications involving fibre-containing products;
- the potential risks to health resulting from the exposure to fibrous dust;
- the requirements regarding smoking, eating & drinking at the workplace;
- the requirements for protective equipment & clothing.



Workers shall be trained on:

- the good working practices to limit dust release
- the proper use of protective equipment

Further recommendation

Please refer to the attached code of practice of the European Ceramic fibres Association (ECFIA).

9 – PHYSICAL AND CHEMICAL PROPERTIES

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| Oxidising properties | : None |
| Oddour | : None |
| Melting point | : > 1650 °C |
| Flammability | : None |
| Explosive properties | : None |
| Length weighted geometric mean diameter | : 2.5 – 3 mm |

10 – STABILITY AND REACTIVITY

Conditions or materials to avoid

Avoid contact with hydrofluoric acid, phosphoric acids and strong alkalis.

Decomposition products

Use of this product at temperature above 900°C may lead to the formation of several crystalline phases. If crystalline silica is present, follow corresponding hygiene standards and national regulations appended.

Thermal decomposition of products containing acrylic latex or phenolic resin (CF appended Table) may result in the release of formaldehyde, ammonia or carbon monoxide.

11 – TOXICOLOGICAL INFORMATION

Irritant properties

When tested using approved methods (Directive 67/548/EC., Annex 5, Method B4), this material gives 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.



Human data on chronic respiratory health effects

No known disease associated with exposure to RCF even though these fibres have been used for nearly 40 years. Pulmonary morbidity studies were carried out among the production workers in Europe and the USA. The only noticeable finding was that in the American study pleural plaques were reported in 2.9% of workers examined. The relationship between RCF exposure and pleural plaques was not found in the European study. Plaques do not cause any symptom 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 injections but the several inhalation experiments conducted were inconclusive.

In 1990 chronic inhalation studies known as the "RCC studies" were conducted with size – selected fibres. Zirconia contained fibre type was tested. A group of 121 Fisher 344/N rats was exposed to 220 f/ml for 24 months. Among this group, 8 rats developed lung tumor and 3 mesothelioma. 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 RCF samples have proved to be largely less biologically active.

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| 12 – ECOLOGICAL INFORMATION |
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Inert materials which remain stable over time.

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| 13 – DISPOSAL CONSIDERATIONS |
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Waste from these materials is not classified as hazardous waste and may generally be disposed of at a normal tipping site which has been licensed for the disposal of industrial waste. In case of contamination by products classified as hazardous waste, expert guidance should be sought. Unless wetted, such a waste is normally dusty and so should be properly sealed in clearly and visibly labelled containers for disposal. Special precautions should be taken to avoid damaging the containers during transportation, storage and field disposal.

Check for local regulations which may apply. In the UK for example, RCF waste is considered as "Special waste" with strict rules for disposal.



14 – TRANSPORT INFORMATION

Ensure that dust is not wind blown during transportation.

15 – REGULATORY INFORMATION

Fibre type definition according to Directive 97/69/EC

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 alkali earth oxide ($\text{Na}_2\text{O}+\text{K}_2\text{O}+\text{CaO}+\text{MgO}+\text{BaO}$) content less or equal to 18% by weight”.

Fibre type classification according to Directive 97/69/EC

Carc. Cat. 2

T

R49 “May cause cancer by inhalation”

Xi

R38 “Irritating to skin”

Protection of workers

Shall be in accordance with several European Directives and their national implementation:

Council Directive 80/1107/EEC as amended by Directive 88/642/EEC “on the protection of workers from the risks related to exposure to chemical, physical and biological agents at work” ; Council Directive 89/391/EEC “on the introduction of measures to encourage improvements in the safety and health of workers at work” .

Council Directive 90/394/EC”. on the protection of workers from the risk related to exposure to carcinogens at work”.

Council Directive 98/24/EC “on the protection or workers from the risks related to chemical agents at work”.

Comply with hygiene standards and any applicable regulation.

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 applicable regulation.

Labelling

Labelling of each product takes into consideration its potential for dust release.

Products such as non-lubricated bulk, standard blanket rolls which are non-lubricated or not pre sized



for the application, boards which are not pre-sized for the application, modules non-encapsulated and dry cements are likely to release fibrous dust in normal handling and use. They carry the skull and cross – bones label (attached).

The other products which have lower potential for dust release carry the “attention” label (attached).

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| 16 – OTHER INFORMATION |
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The European Ceramic Fibres Industry Association (ECFIA)
3 rue du Colonel Moll 75017 Paris; Tel + 33 (0) 1 44 05 54 84 : Fax + 33 (0) 1 44 05 54 94

Useful References

Working with Refractory Ceramic Fibres; ECFIA Code of practice (February 1998)

Hazards from the use of Refractory Ceramic Fibre.
Health and Safety Executive; Information document, HSE 267/(1998).

Requirements of COSHH, Control of Substances Hazardous to Health.

Requirements of CHIP, Chemical Hazard Information and Packaging of Substances and preparation dangerous for supply.

Council Directive 80/1107/EEC of 27 November 1980 as amended by Directive 88/642/EEC “on the protection of workers from the risks related to exposure to chemical, physical and biological agents at work”.

Official Journal of the European Communities, 03/12/80.

Council Directive 89/391/EEC of 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 Communities, 29/06/89.

Council Directive 90/394/EEC of 28th June 1989 “on the protection of workers from risks related to exposure to carcinogens at work”.

Official Journal of the European Communities, 26/07/90.

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, 13/12/97.

Council Directive 98/24/EC of 7 April 1998 “on the protection of the health and safety of workers from the risks related to chemical agents at work”.

Official Journal of the European Communities, 05/05/98.

Maxim LD et al (1998).

CARE – A European programme for monitoring and reducing refractory ceramic fibre dust at the workplace initial results.



Gefahrstoffe – Reinhaltung der Luft, 58 : 3, 97- 103.
Refractory ceramic fibres : A substitute study.
Document “ RCFC coalition “, March, 1996.

CARE Programme (“ Controlled and Reduced Exposure”)

The European Ceramic Fibres Industry Association (ECFIA) has undertaken an extensive hygiene programme for refractory ceramic fibre (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 prespective in order to establish appropriate recommendations to reduce exposures.

The initial results of the programme have been published (See Maxim et al referred above).

If you wish to participate in the CARE programme, contact ECFIA or your supplier.

Spraying

ECFIA recommends that this fibre is not used for spraying.

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| NOTICE |
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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, 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 authorization given or implied to practice any patented invention without a license. 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.



PRODUCTS CONTAINING FIBERFRAX Z & FIBERFRAX S Z FIBRES
(ZIRCONIA-CONTAINING FIBERFRAX FIBRES)

PRODUCTS CONTAINING FIBERFRAX FIBRES

| <u>COMMERCIAL NAMES</u> | <u>PRODUCT FORM</u> | <u>GREDIENTS TO BE NOTICED</u> |
|--|--------------------------|---------------------------------|
| Fiberfrax S Z & Z Bulk /Regular / Chopped Regular | Non Lubricated bulk | None |
| Fiberfrax S Z & Z Bulk Lubricated | Lubricated bulk | Organic Lubricant <1% |
| Fiberfrax Durablanket S Z & Z | Blankets | None |
| Fiberfrax Cervac Boards & Shapes (S Z & Z) | Boards | Amorphous silica<10%,Starch <6% |
| Fiberfrax Cerlock/Cermax/ Anchor-Loc2 / Thread-Loc2 Anchor-Loc3 /RX2 Modules (Prismo)/ Weld-Loc Modules | Modules | None |
| Fiberfrax S Z & Z without anchor Modules | Modules | None |
| Fiberfrax SZ & Z Veneer Modules | Modules | None |
| SZ & Z Paper | Paper | Acrylic latex <12% |
| SZ & Z Felt | Paper | Acrylic latex <12% |
| Fiberfrax SZ & Z Rope | Braided blanket strip | None |